International Labour Organization

1919·2019

Skills and jobs mismatches in low- and middle-income countries

Skills and jobs mismatches in low- and middle-income countries

Copyright © International Labour Organization 2019

First published 2019

Publications of the International Labour Office enjoy copyright under Protocol 2 of the Universal Copyright Convention. Nevertheless, short excerpts from them may be reproduced without authorization, on condition that the source is indicated. For rights of reproduction or translation, application should be made to ILO Publications (Rights and Licensing), International Labour Office, CH-1211 Geneva 22, Switzerland, or by email: rights@ilo.org. The International Labour Office welcomes such applications.

Libraries, institutions and other users registered with a reproduction rights organization may make copies in accordance with the licences issued to them for this purpose. Visit www.ifrro.org to find the reproduction rights organization in your country.

Skills and jobs mismatches in low- and middle-income countries
International Labour Office – Geneva: ILO, 2019

ISBN 978-92-2-131561-2 (print)

ISBN 978-92-2-131562-9 (web pdf)

International Labour Office.

skills mismatch/skill requirements/job placement/level of qualification/skill obsolescence/labour force survey/education/young worker/recommendation

13.01.3 *ILO Cataloguing in Publication Data*

The designations employed in ILO publications, which are in conformity with United Nations practice, and the presentation of material therein do not imply the expression of any opinion whatsoever on the part of the International Labour Office concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its frontiers.

The responsibility for opinions expressed in signed articles, studies and other contributions rests solely with their authors, and publication does not constitute an endorsement by the International Labour Office of the opinions expressed in them.

Reference to names of firms and commercial products and processes does not imply their endorsement by the International Labour Office, and any failure to mention a particular firm, commercial product or process is not a sign of disapproval.

ILO publications and digital products can be obtained through major booksellers and digital distribution platforms, or ordered directly from ilo@turpin-distribution.com. For more information, visit our website: www.ilo.org/publns or contact ilopubs@ilo.org.

Produced by the Publications Production Unit (PRODOC) of the ILO.

Graphic and typographic design, layout and composition, proofreading, printing, electronic publishing and distribution.

PRODOC endeavours to use paper sourced from forests managed in an environmentally sustainable and socially responsible manner.

Code: CMD-CORR-SCR-ICA

Skills and jobs mismatches in low- and middle-income countries

International Labour Office • Geneva

Editors

Paul Comyn,
International Labour Office

Olga Strietska-Ilina,
International Labour Office

Authors

Adele Bergin, co-author of Chapter 3
Economic and Social Research Institute

Judith Delaney, co-author of Chapter 6
Economic and Social Research Institute

Michael Handel, author of Chapter 4
Northeastern University

Seamus McGuinness, co-author of Chapters 2, 3 and 6
Economic and Social Research Institute

Olga Kupets, author of Chapter 5 with inputs to Chapter 6
Kyiv School of Economics

Konstantinos Pouliakas, co-author of Chapter 2
European Centre for the Development of Vocational Training

Paul Redmond, co-author of Chapters 2, 3 and 6
Economic and Social Research Institute

Foreword

Skills mismatch is a concern for policy-makers, employers and workers alike. It is a recurring theme in vocational education and skills development, with many policy initiatives launched to address the skills mismatch challenge. The frequency with which skills mismatch is referred to creates the impression that it is a major policy issue and one which generates considerable policy scrutiny over the performance of education and training systems.

High and persistent levels of unemployment, together with job vacancies that remain unfilled, are often attributed to mismatches between jobs and skills. However, the idea of skills mismatch does not always explain why employers are unable to fill available vacancies: uncompetitive wages and poor working conditions are often the main cause. Besides, skills mismatches are driven not only by low-quality education but also demographic change, rapid technological development, new sources of job creation and new forms of work organization. Regardless of the cause, skills mismatch can negatively affect labour market outcomes, workers' productivity, competitiveness and economic growth.

The concept of skills mismatch, however, is often not well understood. The term is broad and can relate to many forms of labour market friction, including vertical mismatch, skill gaps, skill shortages, field of study (horizontal) mismatch and skill obsolescence. These various forms of skills mismatch are very different in terms of how they manifest themselves, how they are measured, what causes them and how their consequences are felt.

Some relate to mismatches experienced by employees, others to employers and firm-level difficulties. Some skill mismatch concepts are measured subjectively while others are derived from existing data. Many of the mismatch indicators adopted in the literature have drawbacks and various approaches used to measure the same type of mismatch are often poorly correlated. All of this suggests that the use of the term "skills mismatch" within a policy context is highly problematic.

Policy debates on skills mismatch rarely differentiate between the different forms of mismatch and often rely on inadequate or unrelated data, particularly in low- and middle-income countries. In many cases, policy initiatives seem to focus on precisely the areas for which there is least evidence.

The purpose of this book is to unpack the issue of skills mismatch and present new data on the phenomenon in low- and middle-income countries. In doing so, it highlights the need for more nuanced policy responses to address the actual policy

challenges that exist in these labour markets; it also outlines key policy initiatives that demand more attention than they currently receive.

In this book, the authors present a comprehensive analysis of the current position of the literature on skills mismatch and highlight areas which are relatively underdeveloped and may warrant further research. They also present new research using data from national labour force surveys, the ILO and MasterCard Foundation School-to-Work-Transition Surveys, and the World Bank's Skills Towards Employability and Productivity Survey to examine in detail the incidence of various combinations of skills mismatch across low- and middle-income countries.

Sangheon Lee
Director, ILO Employment
Policy Department

Acknowledgements

This book is based on research outputs produced in the framework of the ILO Global Product "Mismatches between jobs and skills" implemented under policy Outcome 1 "More and better jobs for inclusive growth and improved youth employment prospects".

The book has been edited by Paul Comyn and Olga Strietska-Ilina, Senior Skills and Employability Specialists in the Employment Policy Department of the ILO in Geneva. Chapter 2 was authored by Seamus McGuinness (ESRI), Konstantinos Pouliakas (Cedefop) and Paul Redmond (ESRI). Chapter 3 was authored by Seamus McGuinness, Paul Redmond and Adele Bergin of ESRI. Chapter 4 was authored by Michael Handel of Northeastern University and Chapter 5 by Olga Kupets of Kyiv School of Economics. Chapter 6 was authored by Seamus McGuinness, Paul Redmond and Judith Delaney of ESRI, with important inputs from Olga Kupets and the book editors.

Useful comments and suggestions were provided by two anonymous reviewers, as well as by Sara Elder, Valentina Stoevska, Frédéric Lapeyre and Bolormaa Tumurchudur-Klok of the ILO and Alexandria Valerio of the World Bank.

Bolormaa Tumurchudur-Klok (ILO) supported technical editing. Gary Horsley, AC Marketing, edited the language. Annette Brandstater (ILO) formatted the manuscript.

Yoshie Noguchi, Aurelio Parisotto, Clemente Pignatti, Markus Pilgrim, Maria Prieto, Marco Principi, Gianni Rosas and Valerio De Stefano also contributed significantly to improving the quality of the manuscript. The entire manuscript was reviewed by Matthieu Cognac, Sara Elder, Susana Puerto Gonzalez and two anonymous external peer reviewers.

Stephen Bazen, Aix-Marseille University, Werner Eichhorst, Bonn Institute of Labour Economics, and Seamus McGuinness, Economic and Social Research Institute, Dublin, also provided extremely helpful comments on background papers presented at workshops held at the ILO in November 2015 and February 2016.

Contents

Foreword v

Acknowledgements vii

Abbreviations xv

Executive summary xvii

1. Introduction: Why discuss the issue of skills and jobs mismatches? 1

2. How useful is the concept of skills mismatch? 5

2.1 Measures of mismatch 5

Overqualification and underqualification 5

Overskilling and underskilling 8

Horizontal mismatch 9

Skill obsolescence 10

Skill gaps 10

Skill shortages 11

Macroeconomic indicator of skills mismatch 11

2.2 Analysis of the current literature 12

Overqualification 13

Underqualification 16

Overskilling and underskilling 16

Horizontal mismatch 18

Skill shortages 18

Skill gaps 19

Skill obsolescence 20

Skills mismatch in low- and middle-income countries 20

2.3 Skills mismatch combinations: Empirical evidence 22

2.4 The policy position: Potential levers, spillovers and current responses 24

Conceptual policy framework 24

Current policy responses to skills mismatch 27

2.5 Conclusion 28

References 29

3. Educational mismatch: Analysis of labour force survey data 35

3.1 Evidence on drivers of overqualification 35

3.2 Data generation and methods 37

Data availability 38

Methodology 39

3.3 Results 40

Econometric evidence 46
3.4 Conclusion 52
References 54
Annex 3.1 Tables 55
Annex 3.2 Figures 56

4. Predictors and consequences of mismatch in developing countries: Results from the World Bank STEP survey 63
4.1 The STEP survey 63
4.2 Wage models 66
4.3 Life satisfaction 71
4.4 Effects of job search methods on probability of mismatch 78
4.5 Attitudes toward informality 80
4.6 Effects of informality on probability of mismatch 83
4.7 Conclusion 84
References 88

5. Educational mismatch among young workers in low- and middle-income countries: Analysis of the SWTS data 89
5.1 Using SWTS to measure mismatch 89
5.2 Incidence of educational mismatch among young workers 90
Incidence of educational mismatch according to different methods 90
Cross-country variations in the incidence of qualification mismatch (subjective method) 94
Incidence of qualification mismatch among employees by socio-demographic characteristics 101
5.3 Determinants of mismatch among young workers 103
Country-level determinants of subjective mismatch among employees 104
Determinants of subjective mismatch among employees in a pooled framework 106
5.4 Impact of mismatch on labour market outcomes of employees 111
Impact on desire to change current employment situation 118
5.5 Conclusion 119
References 121
Annex 5.1 Tables 123
Annex 5.2 Figures 141
Annex 5.3 Definitions and measurement of educational mismatch using SWTS 145

6. Skills mismatch in low- and middle-income countries: Key synthesis findings and policy recommendations 149
6.1 Mismatch and country characteristics: Bivariate analysis 149
Descriptive statistics 150
Bivariate analysis 151

Unemployment 151
GDP per capita 153
Region 155
Wage and salary workers 157
Vulnerable workers 159
Population 161
Female labour force participation 163
Youth labour force participation 165
Income level 167
Measurement approach 168
6.2 Mismatch and country characteristics: Multivariate analysis 169
Stepwise regression 169
Results 169
Summary of main data results 173
6.3 Summary of findings from previous chapters 174
Measurement approaches 174
Main findings from Chapter 3 174
Main findings from Chapter 4 176
Main findings from Chapter 5 177
Common trends identified in low- and middle-income countries 179
6.4 Conclusion and policy recommendations 180
References 184
Annex 6.1 Tables 185

List of tables

Table 2.1 Number of papers by type of mismatch 13
Table 2.2 Skills mismatch combinations among adult employees, 2014, EU-28 (percentages) 22
Table 3.1 The incidence of educational mismatch (percentages) 41
Table 3.2 Overqualified by education level (percentages) 42
Table 3.3 Underqualified by education level (percentages) 43
Table 3.4 Summary of trends in educational mismatch for countries with panel data 44
Table 3.5 Estimated relationship between forms of educational mismatch, 2008–13: OLS 45
Table 3.6 Determinants of educational mismatch, 2001–16: Fixed effects estimates 47
Table 3.7 Determinants of female educational mismatch, 2001–16: Fixed effects estimates 49
Table 3.8 Determinants of male educational mismatch, 2001–16: Fixed effects estimates 50
Table 3.9 Wage impacts of educational mismatch: OLS 51

Table A.3.1 Key labour market and macroeconomic indicators for selected countries, 2012 (percentages) 55
Table A.3.2 Description of variables 56
Table 4.1 Rates of match, overqualification and underqualification (percentages) 65
Table 4.2 Wage means and standard deviations by country 67
Table 4.3 Effects of mismatch on (ln) wages, all countries 68
Table 4.4 Life satisfaction levels in STEP countries 72
Table 4.5 Effects of mismatch on life satisfaction, all countries 73
Table 4.6 Behavioural and personality trait measures 77
Table 4.7 Main job search method (percentages) 79
Table 4.8 Distribution of STEP respondents by eligibility for items on willingness to take informal jobs (percentages) 81
Table 4.9 Non-working persons who would accept a job without benefits and reasons for doing so (percentages) 82
Table 4.10 Summary of effects of overqualification and underqualification on job rewards 85
Table 4.11 Summary of effects of job search method and written employment agreement on odds of overqualification and underqualification 87
Table 5.1 Incidence of qualification mismatch among young employees and own-account workers, by region and income group (percentages) 95
Table 5.2 Correlation coefficients between mismatch and country characteristics (significant at 5% level) 98
Table 5.3 Determinants of mismatch in a pooled framework: Multinomial logistic regression 107
Table 5.4 The effect of education and mismatch status on wages: OLS regression 113
Table 5.5 The effect of education and mismatch status on job satisfaction: Logistic regression 117
Table 5.6 The effect of education and mismatch status on the desire to change current employment situation: Logistic regression 118
Table A.5.1. Sample characteristics: 15–29-year-old employees and own-account workers excluding students 123
Table A.5.2 Incidence of qualification mismatch (MM) and its subcomponents according to normative and subjective methods (percentages) 124
Table A.5.3 Country-level characteristics used in the cross-country analysis 126
Table A.5.4 Country-level determinants of subjective mismatch: Multinomial logistic regression 134
Table A.5.5 Determinants of hourly earnings among young employees: OLS regression 135
Table A.5.6 Determinants of job satisfaction among young employees: Logistic regression 137

Table A.5.7 Determinants of the desire to change current employment situation: Logistic regression 139
Table 6.1 Variables used in the analysis and their source 150
Table 6.2 Stepwise regression of incidence of mismatch 170
Table 6.3 Stepwise regression of incidence of mismatch 172
Table A.6.1 Summary of observations 185

List of figures

Figure 2.1 Skills mismatch combinations in adult workforce, EU-28, 2014 (percentages) 23
Figure 3.1 Average trends, 2008–13, selected countries 45
Figure A.3.1 Summary of data availability 56
Figure A.3.2 Educational mismatch trends for the Philippines, 2001–13 (percentages) 58
Figure A.3.3 Educational mismatch trends for Argentina, 2003–15 (percentages) 58
Figure A.3.4 Educational mismatch trends for Pakistan, 2005–15 (percentages) 59
Figure A.3.5 Educational mismatch trends for Mongolia, 2007–14 (percentages) 59
Figure A.3.6 Educational mismatch trends for South Africa, 2008–16 (percentages) 60
Figure A.3.7 Educational mismatch trends for Serbia, 2008–16 (percentages) 60
Figure A.3.8 Educational mismatch trends for Peru, 2005–13 (percentages) 61
Figure A.3.9 Educational mismatch trends for Ecuador, 2014–16 (percentages) 61
Figure A.3.10 Educational mismatch trends for Albania, 2007–13 (percentages) 62
Figure A.3.11 Educational mismatch trends for Guatemala, 2014–16 (percentages) 62
Figure 5.1 Incidence of qualification mismatch among employees and own-account workers according to normative and subjective methods (percentages) 92
Figure 5.2 Composition of employees according to a mixed method of qualification mismatch (percentages) 93
Figure 5.3 Incidence of overqualification and underqualification among young workers, by GCI-based classification (percentages) 97
Figure 5.4 Difference in the share of overqualified and underqualified young employees, by socio-demographic characteristics (percentage points) 102
Figure 5.5 Share of young employees satisfied with their job (percentages) and differences in job satisfaction depending on subjective mismatch status (percentage points) 115

Figure A.5.1 Proportion of mismatched young employees (percentages): Normative vs subjective approach 141
Figure A.5.2 Educational attainment of adult population, 1990 vs 2010 142
Figure A.5.3 Share of agriculture, industry and services in GDP, 1990 vs 2010 143
Figure A.5.4 Qualification mismatch, informality and unemployment of youth 144
Figure 6.1 Overqualification vs unemployment (percentages)..... 151
Figure 6.2 Underqualification vs unemployment (percentages) 152
Figure 6.3 Matched vs unemployment (percentages) 152
Figure 6.4 Overqualification vs GDP (percentages) 153
Figure 6.5 Underqualification vs GDP (percentages)..... 154
Figure 6.6 Matched vs GDP (percentages)..... 154
Figure 6.7 Overqualification by region (percentages)..... 155
Figure 6.8 Underqualification by region (percentages) 156
Figure 6.9 Matched by region (percentages) 156
Figure 6.10 Overqualification against percentage of wage and salary workers 157
Figure 6.11 Underqualification against percentage of wage and salary workers..... 158
Figure 6.12 Matched against percentage of wage and salary workers..... 158
Figure 6.13 Overqualification against percentage of vulnerable workers..... 159
Figure 6.14 Underqualification against percentage of vulnerable workers 160
Figure 6.15 Matched against percentage of vulnerable workers 160
Figure 6.16 Overqualification and log population (percentages)..... 161
Figure 6.17 Underqualification and log population (percentages)..... 162
Figure 6.18 Matched and log population (percentages)..... 162
Figure 6.19 Overqualification and female labour force participation (percentages)..... 163
Figure 6.20 Underqualification and female labour force participation (percentages)..... 164
Figure 6.21 Matched and female labour force participation (percentages) 164
Figure 6.22 Overqualification and youth labour force participation (percentages)..... 165
Figure 6.23 Underqualification and youth labour force participation (percentages)..... 166
Figure 6.24 Matched and youth labour force participation (percentages)..... 166
Figure 6.25 Overqualification by income level (percentages) 167
Figure 6.26 Underqualification by income level (percentages)..... 167
Figure 6.27 Matched by income level (percentages)..... 167
Figure 6.28 Overqualification by method (percentages)..... 168
Figure 6.29 Underqualification by method (percentages) 168
Figure 6.30 Matched by method (percentages) 168

Abbreviations

Cedefop	European Centre for the Development of Vocational Training
Df	degrees of freedom
ESJS	European Skills and Jobs Survey
ESRI	Economic and Social Research Institute of Ireland
GCI	Global Competitiveness Index
GDP	gross domestic product
GER	gross enrolment ratio
ICT	Information and Communications Technologies
ILO	International Labour Organization/Office
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
LFPR	labour force participation rate
LFS	labour force survey
n.a.	not available
OAW	own-account worker(s)
OECD	Organisation for Economic Co-operation and Development
OLS	ordinary least squares
OQ	overqualification
PIAAC	Programme of International Assessment of Adult Competencies
STEP	Skills Toward Employability and Productivity
SWTS	School-to-Work Transition Survey
TVET	technical and vocational education and training
UNESCO UIS	United Nations Educational, Scientific and Cultural Organization, Institute for Statistics
UQ	underqualification
WDI	World Development Indicators
WEF	World Economic Forum

Executive summary

Why analysing skills mismatch is important

Skills mismatch is a topical issue in policy debates around the world. Politicians and businesses share a growing concern that skills available among the workforce cannot meet the fast-changing demands of the economy, creating a major barrier to growth and development. A rapidly changing labour market, affected by technological evolution, globalization, demographic change and other mega-trends, gives an impression of an expanding skills gap and brings greater urgency to policy implementation.

Skills deficiencies are often blamed for unemployment and recruitment difficulties. Structural labour market imbalances are problematic, potentially causing unemployment and hindering investment and employment growth. Yet the reasons given for skills mismatch are not always related to skills: uncompetitive wages, poor recruitment practices, and low-quality jobs are just a few of the possible influences. Mismatch between skills offered and skills wanted results from an interplay of supply and demand, and so requires both supply- and demand-side policy measures.

Even the concept of skills mismatch is often not well understood, covering many forms of labour market asymmetry. Skills mismatch studies usually suffer from lack of comparable cross-country data and poor labour market information, especially in regard to developing economies. This is why the ILO initiated its study, with the aim of demystifying the concept of skills mismatch and analysing how the phenomenon unfolds in low- and middle-income countries.

Despite rapid growth of the literature on educational mismatch in recent decades, substantial knowledge gaps remain. To date, the bulk of studies have tended to be country-specific, with the objective of explaining the factors that influence the risk, persistence or the impacts of education mismatch on outcome variables such as earnings and job satisfaction. Most studies have focused on developed labour markets, with very little known about the situation in low- and middle-income countries. The main explanation for the research shortfalls has been the lack of data on forms of mismatch across countries over time and relatively poor data collection systems in low- and middle-income countries.

This book offers a comprehensive analysis of the current position of the literature on skills mismatch, highlighting areas which are relatively underdeveloped and may warrant further research. They also present new research using data – from national labour force surveys, the ILO and MasterCard Foundation School-to-Work-Transition Surveys, and the World Bank's Skills Towards Employability and Productivity Survey – to examine the incidence of various combinations of skills mismatch across low- and middle-income countries.

Chapter 1 introduces the book and discusses why analysing skills mismatch is important. Different types of mismatch, such as overqualification, underqualification,

overskilling, underskilling, field-of-study mismatch, skill gaps, skill shortages and skill obsolescence, have been widely debated in both the policy and academic literature. It is clear that skills mismatch, in all its forms, can have adverse labour market impacts on individuals, firms and the economy more broadly. It affects firm and worker productivity, earnings, and job satisfaction; it may increase staff turnover, hinder investment or deployment of new technologies, products or services. It can affect economic growth, lowering returns on public and private investment in training, and worsening social cohesion.

The various types of skills mismatch are very different in their manifestations, their measurement, their determinants and in how their consequences are felt. However, despite the clear distinction between these different forms and the respective labour market impacts, policy in education and training does not necessarily recognize the differences and account for them through nuanced responses. Such contradictions are a key driver for this book: to better understand the scope and nature of skills mismatch in low- and middle-income countries and to consider the most appropriate policy responses for each specific type of mismatch, rather than perpetuate policy generalizations not based on evidence. The cross-country data analysis was mostly limited to understanding educational mismatches (over/underqualification) because this was found to be the only type of mismatch for which comparable cross-country data were available.

How useful is the concept of skills mismatch?

Chapter 2 starts the analysis by asking the question: "How useful is the concept of skills mismatch?" It reviews the current position of the literature and assesses the different measurement approaches for each type of skills mismatch using available data from advanced economies. The stylized facts, based on empirical evidence from European countries, suggest potential policy levers and spillover effects. The analysis highlights inconsistencies between the focus of the academic literature and available data and policy direction. There is an abundance of evidence on the costs associated with surplus human capital, as measured by overqualification and overskilling, but much less is known on the effects of skill gaps, skill obsolescence and skill shortages. Yet policy debate in Europe seems to focus on the area for which there is least evidence: skill shortages.

The chapter concludes that current policy recommendations on skills mismatch tend to be vague, with no reference to how to address the specific type of mismatch in question. A more transparent and consistent approach, using existing evidence, should form the basis of future policy debate in this area. It is clear from the evidence analysed that underutilization of human capital is an issue in both developed and developing economies. Having one in four employees operating below productive capacity should be a major concern for policy, particularly given the weight of evidence suggesting that such forms of mismatch negatively affect worker productivity. There are strong grounds for believing that substantial benefits would accrue to individuals, firms and the macroeconomy should policy interventions in this area prove successful. It is important that policy continues to focus on tackling the issue of skill

shortages and skill gaps; however, greater balance is needed between policies aimed at eliminating gaps in the productive capacity of human capital and those removing constraints that restrict its use and promoting demand-side measures to generate jobs for available skilled workers.

Following reflections based on a literature review and available empirical data from advanced economies, Chapters 3–5 focus more specifically on the issue of educational mismatch (over- and underqualification) in low- and middle-income countries through a number of independent surveys.

Educational mismatch in low- and middle-income countries based on analysis of LFS data

Chapter 3 replicates the approach adopted in an earlier analysis of the European labour force survey (LFS) data used in Chapter 2, using national labour force survey data to examine the incidence, evolution and causes of overqualification and underqualification in low- and middle-income countries. It first assesses the quality of data from LFS for over 50 countries, finding that only 20 of these surveys were of sufficient quality to allow effective measurement of over- and underqualification rates at a point in time; only ten had sufficient data to allow analysis of the trends in educational mismatch over time and model the drivers of overqualification, underqualification and matched employment. The cross-sectional evidence, based on the 20 labour force surveys, covers a mix of both low- and middle-income countries; however, the subset of ten countries with consistent time series data is exclusively middle-income.

The sample was restricted to adult employees in employment. Overqualification was measured using an empirical approach whereby an individual is defined as overqualified (underqualified) if their level of attained education is above (below) the modal value for their occupation at two-digit level of occupational classification. Country-level averages were then calculated based on how individuals are assigned (overqualified, underqualified or matched) in the microdata. The average overqualification and underqualification rates are 24 and 17 per cent respectively. Higher overqualification does not necessarily imply lower underqualification; several of the countries which exhibit some of the highest rates of underqualification were also some of the worst performers with respect to overqualification.

The nature of both over- and underqualification differs between developed and developing labour markets. Within developed economies, underqualification is predominant among individuals with secondary levels of education. In developing countries, where underqualification rates are generally much higher, two-thirds of underqualified workers are educated only to either primary or lower secondary level. Overqualification in low- and middle-income countries is comparable to, and in many cases exceeds, that typically observed in developed labour markets. Current evidence for developed countries suggests that the determinants of overqualification relate to the over-supply of university graduates, information asymmetries between employers and jobseekers, and inefficient management practices that fail to exploit worker productivity potential. Conversely, most overqualified workers in

low- and middle-income countries possess education below tertiary levels, with one third achieving only lower secondary education. The principal drivers of overqualification here relate to low levels of labour market demand, with overqualification being positively associated with the unemployment rate, as well as a lack of quality formal employment. Overqualification also increases as the share of the younger (aged under 30) labour force increases: educational attainment is typically higher for this younger segment of the population, suggesting that higher educational attainment is lagged by growth in high-quality jobs.

In middle-income countries, overqualification was mostly found to be decreasing; in all those countries where this was the case, underqualification has been on the rise. In recent years, averaged across all countries, the rates of underqualification and overqualification have converged, confirming that underqualification is an important problem for developing labour markets. This suggests that mismatch in middle-income countries is increasingly one of changes in educational supply failing to keep pace with improvements in job quality.

The chapter offers an econometric assessment showing that a number of factors are important in explaining cross-country variation in educational mismatch in a middle-income country context. While many of the factors were also found to be important for developed countries, the direction of the impacts tends to be quite different, presumably reflecting how the phenomena are concentrated among groups with varying levels of education. The evidence points to the importance of business cycle effects measured in terms of per capita GDP and the unemployment rate, labour market participation, the relative importance of the formal economy and demographic structure.

Analysis using the econometric model showed that, unlike the findings for advanced countries (see Chapter 2), unemployment and overqualification in low- and middle-income countries move together. The relationship within developed economies may reflect individuals choosing to withdraw from the labour market during periods of high unemployment; this is less likely to be an option for employees in developing economies, implying that overqualification rises as workers compete for fewer quality jobs.

The analysis also showed that overqualification is positively related to the ratio of self-employment to employment (which proxies the level of informality) and a higher labour market share of younger workers. The model estimates found evidence of distinct business cycle effects by gender: an increase in per capita GDP was found to reduce overqualification among females but to reduce underqualification among males. In both cases, matched employment increased as a result of a rise in per capita GDP.

Educational mismatch also has substantial wage impacts in low- and middle-income countries. Most overqualified workers suffer a pay penalty relative to their matched counterparts with similar levels of education; these typically tend to be much higher than observed in developed countries. Most underqualified workers were also found to earn a wage premium above that typically found in developed labour markets.

Educational mismatch in low- and middle-income countries based on analysis of STEP data

Chapter 4 examines key issues surrounding mismatch in 12 low- and middle-income countries based on the data of the World Bank's Skills Toward Employability and Productivity (STEP) survey. The chapter details the incidence of over- and underqualification at country level, before measuring the impact of mismatch on wages and life satisfaction. STEP surveyed urban working-age adults (aged 15–64, both employees and own-account workers) and measured educational mismatch subjectively from their personal education and that required for their jobs; this was coded consistently into ISCED levels. Workers were considered well-matched when the two values were equal, overqualified when their personal education exceeded what the job required, and underqualified when it was less than the job required.

The average of over- and underqualification in the STEP sample was 35.7 and 12.4 per cent, respectively: it was higher in low- and middle-income countries relative to what is observed in advanced economies, confirming the findings in Chapter 3. This may strengthen the argument that a large proportion of jobs in low- and middle-income countries require low skill levels where even individuals with basic levels of education may see themselves as overqualified. Findings on the impact of mismatch on earnings are consistent with those for developed economies: overqualification lowers earnings by an average of 19 per cent among employees, a figure consistent with, but higher than, the 13.5 per cent average reported for developed economies in Chapter 2. The average pay penalty among self-employed workers in the STEP sample was higher, at 23 per cent. Wage penalties on overqualification of varying magnitudes were found in 11 of the 12 STEP countries. As is generally the case for advanced economies, there was little evidence of wage impacts associated with underqualification. Underqualified workers who were self-employed were found to earn a wage premium in Ghana, though, unusually, underqualification was found to be associated with wage penalties among employees in Kenya and Lao People's Democratic Republic.

Chapter 4 also assesses the impacts of educational mismatch on life satisfaction, which is likely to be correlated with job satisfaction. The results are broadly consistent with evidence from advanced economies: widespread negative impacts on life satisfaction for overqualification and little or no relationship between underqualification and satisfaction. In line with the existing literature, impacts are largely restricted to employees, but overqualified self-employed workers in Georgia, Ukraine and North Macedonia were also found to have lower rates of life satisfaction. As with wages, the magnitude of impacts is much larger in the STEP sample, with overqualified employees almost 40 per cent less likely to report life satisfaction relative to their well-matched counterparts. This is much more substantial than the impacts found for advanced economies, where the marginal effect of overqualification on job satisfaction is typically much lower than for other forms of mismatch, such as overskilling.

Chapter 4 also analyses the relationship between labour market informality, job search methods and levels of mismatch. Informality, a key characteristic of developing labour markets, is likely to impact on decisions to accept mismatched employment.

The STEP study examines attitudes to informality and reports that approximately 40 per cent of respondents would be willing to take informal jobs (those that do not offer social security benefits) mainly because they had no other choice. The measure of informality used in the analysis was the existence of a formal written agreement between the worker and the employer. Where contracts were in place, the probability of overqualification was reduced in five of the ten STEP countries for which it was tested. Chapter 4 examines the impact of job search on mismatch and finds that the use of formal agencies reduces the probability of overqualification in seven of the ten STEP countries concerned. The impacts of job search on underqualification are less pronounced.

Educational mismatch in low- and middle-income countries based on analysis of SWTS data

Chapter 5 uses the data from the ILO School-to-Work-Transition Survey (SWTS) of 15–29-year-olds in 34 countries, conducted between 2012 and 2015. It analyses the scope, determinants and possible effects of educational mismatch among young people in low- and middle-income countries.

The analysis uses two main measures of mismatch: a subjective method, based on the answers of young non-studying employees and own-account workers to the question: "Do you feel your education/training qualifications are relevant in performing your present job?"; and an objective (or normative) method based on *a priori* presumed correspondence between education and broad occupational groups, defined in line with the ILO guidelines for International Standard Classification of Occupations (2008). Comparison of subjective and normative-based estimates of mismatch suggests significant overestimation of mismatch and its two subcomponents – overqualification and underqualification – by the normative method: many individuals who are well-matched according to their self-declaration are defined as under- or overqualified because their level of education is below or above the one deemed necessary for a given occupational group. The results with respect to the scope, determinants and impact of mismatch are, therefore, very sensitive to the measure of mismatch used.

Qualification mismatch, which is mainly driven by high levels of underqualification, tends to be much more widespread in sub-Saharan Africa and East Asia and in low-income countries. The average rate of overqualification among young employees in the 31 countries based on subjective measurement was 15.3 per cent; the corresponding rate for underqualification was 14.1 per cent. The estimated averages for young own-account workers are 18.1 and 16.8 per cent respectively. The underqualification rate is above the overqualification rate in 24 out of 34 countries. Higher levels of underqualification among young workers at country level are associated with several factors: higher shares of agriculture and lower shares of industry and services in GDP and employment; higher economic activity and lower unemployment; higher shares of youth engaged in informal and part-time involuntary employment; lower educational attainment of the population, larger population growth and lower urbanization rate.

Young workers in emerging middle-income economies in Latin America, Northern Africa, Europe and Central Asia tend to suffer much more from overqualification than from underqualification. Overqualification is seen as a long-term adjustment mechanism; it is an alternative to unemployment as the educated young with financial constraints cannot afford to keep searching for better jobs, so they take less desirable ones below their own educational level.

Some personal characteristics (such as age, the highest level of completed education, and socio-economic background) and many job characteristics (economic sector, informality status, temporary job, time-related underemployment or overtime work, and receiving job-specific training) are strong and significant influences on the likelihood of young employees being overqualified or underqualified relative to being well-matched to their jobs. Young employees in public services sectors (public administration, education and health care) are found to have a significantly lower probability of being mismatched than industrial and construction workers; agricultural workers are significantly more likely to be overqualified for their jobs. Certain national characteristics are also important determinants of the likelihood of overqualification in low- and middle-income countries: industrial growth since 2007, share of agriculture in total employment, unemployment rate, gross enrolment ratio to secondary education and rigidity of employment index. One of the conclusions from this analysis is that the lag of education and training systems (skill supply) behind the requirements of firms (skill demand) is an important cause of qualification mismatch in fast-growing low- and middle-income countries.

Overqualification is found to be associated with lower hourly earnings of young employees, which can be interpreted as a wage penalty for working below one's level of education. However, this penalty is likely to be overestimated, especially if young graduates with college and university diplomas lack important skills needed to obtain highly skilled jobs. Working in a job that does not match the education of young workers also has a strong negative effect on their job satisfaction, whether it requires a lower or higher level of education.

Educational mismatch in low- and middle-income countries: Key trends and conclusions from meta-analysis

Each chapter in this book examines the situation with the use of different data sets in different countries, time periods and sample populations, but a number of key trends are identifiable. **Chapter 6** provides a summary of the incidence and impacts of overqualification in low- and middle-income countries measured against a typology of country characteristics related to region, income, informality, sectoral composition and demographic factors. It describes the final combined data set and presents descriptive statistics, including the relationships between educational mismatch and certain key labour market and macroeconomic variables. It provides a meta-analysis of 60 country estimates of educational mismatch, assessing the extent to which they are correlated with factors such as per capita GDP, labour force participation, unemployment and various forms of labour market informality.

The chapter concludes that, as with developed labour markets, overqualification and underqualification are problematic for both developed and developing economies, with overqualification consistently imposing significant wage costs on affected individuals and lowering levels of life and job satisfaction. Also in line with research for developed countries, factors such as the level of per capita GDP, the unemployment rate, and participation rates were found to be important in explaining differences in international rates of educational mismatch. The meta-analysis also demonstrated the existence of important regional differences: underqualification is a particular problem for countries in South-East Asia and sub-Saharan Africa, while the same is true of overqualification in Northern Africa.

However, there are a number of key differences in both the nature and determinants of educational mismatch between developed and developing labour markets. In developing economies, both over- and underqualification are more common among individuals with lower levels of schooling. Insufficient access to education and training causes underqualification among those with little or no schooling. In consequence, underqualification results in lowered skill requirements for available higher-skill jobs. At the same time, overqualification among those with sub-tertiary education is a reflection of the scarce availability of better-quality skill-intensive jobs.

In contrast to developed labour markets, characterized by high rates of educational attainment, the much lower levels of basic and intermediary level education in low- and middle-income countries have resulted in higher levels of underqualification; this makes underqualification much more of a policy concern relative to advanced economies.

Both the individual studies and the meta-analysis confirm that levels of informality are a key component in understanding how individuals become mismatched in developing economies. High rates of overqualification in labour markets where formal employment opportunities are relatively scarce are no surprise.

Policy recommendations

The findings from the analyses in this book allow Chapter 6 to offer key policy recommendations, largely pointing to a need for a greater balance in the mix of the following policy measures:

- Improve access to secondary education and technical and vocational education and training in low-income developing countries to offset low educational attainment causing widespread underqualification and low potential for productivity growth and economic diversification.
- Develop career guidance and labour market information systems to aid young people's career choices at both secondary and tertiary level, reduce job search costs and improve job matching; reduce information asymmetries and improve information flow between jobseekers, employers offering jobs and the institutions offering education and training to help reduce existing qualification and skills mismatches and youth unemployment.

- Encourage employers to adopt better recruitment practices, to provide on-the-job training and better utilize the skills of their employees in the workplace. This can be partly achieved by incentivizing innovation through enhanced skills use and human resource management practices, along with programmes that promote investment by employers in further training of workers, especially young graduates without prior work experience.
- Attract investments to diversify the economy and create technologically advanced, skill-intensive jobs that utilize human capital to its full productive potential and improve the quality and stability of jobs in the private sector, especially in micro and small companies. Skills development alone is not enough to generate economic growth in low- and middle-income countries; it is also necessary to support the creation of higher-skilled jobs to take advantage of the capabilities of highly skilled workers. Demand-side measures should also target macroeconomic, fiscal and industrial policies with a strong pro-employment growth and job quality component.
- Tackle informal employment and support the smooth transition of young workers to the formal sector. Since many young people in low- and middle-income countries start their working life in lower-skilled jobs in the informal sector, it is important to devise policy measures to break them out of informal employment and mismatch. Policies focused on increasing formal job creation are likely to prove influential in combating both the incidence and impacts of overqualification and underqualification in low- and middle-income countries.
- Given that the prevalence of underqualification can be partly explained by the lack of certification among skilled individuals, particularly in the informal economy, greater policy attention should be given to recognizing or validating prior learning in order to acknowledge the skills people hold and generate better-matched employment.
- Improve the quality and relevance of all levels of education, especially tertiary education, in middle-income countries. Overqualification in these countries often stems from rapid growth in college and university graduates who have diplomas but lack the necessary skills to find better-matched jobs. It is important to align education and training with the current and projected needs of the labour market to ensure high levels and relevance of skills acquired by students in formal education. An important step in increasing the relevance of technical and vocational education and training (TVET) and tertiary education is to engage employers, sector councils or economic chambers in closer and more effective cooperation with education institutions.

Much more data and research are required before reaching the point where definitive policy initiatives can be developed to counteract the causes and consequences of skills mismatches in low- and middle-income countries. The studies discussed here provide only a partial view of the situation, as they relate to a subset of countries, regions and labour market populations and examine just one form of skills mismatch.

There is a need for more consistent and standardized collection and publication of national labour force surveys to aid more comprehensive international comparisons. If future policy is to be properly informed, it will be essential to develop survey tools such as STEP or SWTS, cover more countries and regions and regularly collect information on other forms of skills mismatch, such as overskilling and underskilling, skill gaps, skill shortages or skill obsolescence.

1. Introduction: Why discuss the issue of skills and jobs mismatches?

Skills mismatch refers to various types of imbalances between skills and qualifications available on the labour market and those required in jobs. The concept is broad and includes a number of distinct types of imbalance of both qualitative and quantitative nature, addressing formal qualifications as well as technical and soft skills.

This book aims to integrate the results of research conducted by the International Labour Organization (ILO) and to identify common trends in incidence, determinants and impact of overqualification and underqualification on individuals and labour markets in low- and middle-income countries.

While studies of the incidences, impacts and, to a lesser extent, determinants of mismatch are widespread for developed economies, much less is known with regard to the phenomenon in low- and middle-income countries. The scarcity of research on the issue for developing economies is generally attributed to a lack of quality data sets.

In response to the lack of evidence on the incidence of skills mismatch in low- and middle-income countries, the ILO commissioned a series of studies under a research initiative on skills mismatch in 2016 and 2017. The main purpose of this initiative was to provide a holistic approach to understanding trends and drivers of mismatches and to identify policy responses from both the supply and demand sides of the labour market.

The initiative has attempted to provide the evidence of existing research to address the following questions:

- Which forms of educational mismatches feature more prominently in low- and middle-income countries? Are there any systematic differences identified in the studies among sectors, types of employment, sex and other variables? Are different types of mismatch correlated?
- What are the consequences of educational mismatches in terms of wage and job satisfaction, job search patterns, productivity, business performance?
- Are educational mismatches in countries related to factors such as income, demographics, informality, region?
- What policy and programme measures should be taken by businesses, public services and governments, individuals and social partners to address mismatch?
- What are the remaining knowledge gaps with respect to skills mismatches in developing countries and how can they be addressed?

Skills mismatch can be used to describe overqualification (overeducation), underqualification (undereducation), overskilling, underskilling, skill shortages, field of study mismatch and skill obsolescence. The term is generally restricted to mismatches impacting workers in employment, or firms currently employing or seeking to employ workers. While unemployment can be thought of as a form of mismatch, there are many reasons for unemployment not linked to skills issues, including economic slowdown and weak aggregate demand. Even though it is likely that some applicants for available jobs will be unemployed due to mismatch between skills they offer and those required by available jobs in a given time and location, not all such cases constitute evidence of structural unemployment: non-competitive wages, poor working conditions and inadequate recruitment practices also contribute to unemployment.

The various types of skills mismatch mentioned above are very different in terms of how they manifest themselves, their measurement, their determinants and how their consequences are felt. Some relate to skills mismatches experienced by employees, while others relate to employers and firm-level difficulties. Some mismatch concepts are measured subjectively while others are derived from existing data. Many of the mismatch indicators adopted in the literature have drawbacks, and various approaches used to measure the same type of mismatch are often poorly correlated. All of this suggests that the use of the term skills mismatch within a policy context is highly problematic.

However, the problematic nature of the concept does not reduce its significance from the perspective of policy and in terms of its impact on the labour market.

Overqualified workers are typically found to suffer a wage penalty relative to their counterparts with the same level of education who are in matched employment. They also experience lower job satisfaction and have higher observed rates of job separation. Overqualification causes lower individual returns on investments in training. It can also impact the hiring and other costs incurred by firms as a consequence of increased job separations and staff turnover. In addition, high proportions of workers operating below their productive capacity may negatively impact potential macroeconomic growth and exchequer returns. The phenomenon also represents a potential waste of public sector resources if large swathes of the population are equipped with unproductive education. High rates of overskilling in economies may reflect an overall inefficiency of the labour reallocation process, as skilled workers remain employed in firms that fail to fully exploit their potential, leading to a less productive job market equilibrium.

Compared to overqualification, human capital deficits, such as underqualification and underskilling, are largely under-researched. Empirical evidence of the impact of underqualification, however, is mixed. At firm level, underqualification is associated with lower firm productivity. At individual level, while some studies find that underqualified workers earn a wage premium relative to those with the same education who are in a matched job, others find no statistically significant wage effect. Similarly, results relating to job satisfaction are also mixed.

Firm-level aggregates of skills mismatch are usually restricted to the study of skill gaps and skill shortages and are typically based on employer surveys. Skill gaps describe a situation where employers or workers believe that workers do not possess adequate

competencies to discharge their current role successfully, whereas skill shortages relate to a situation where employers are unable to fill key vacant posts for lack of suitably qualified candidates.[1] From a policy perspective, skill gaps may harm productivity due to lower output per worker, which also tends to inflate average labour costs. Firm-level profitability can also be adversely impacted by skill gaps as a consequence of additional training and recruitment investments. The capacity of enterprises to innovate and adapt to changing market conditions may also be negatively affected. At a macroeconomic level, competitiveness may be eroded through higher wage inflation and lower productivity levels. Skill shortages are therefore important because of their effect on economic issues such as productivity, gross domestic product (GDP), employment and earnings.

It is clear that the various forms of skills mismatch have potentially adverse labour market impacts on individuals, firms and the economy more broadly. However, despite the clear distinction between the different forms of skills mismatch and the respective labour market impacts, policy in education and training does not necessarily recognize these differences and account for them through nuanced policy responses. These contradictions are a key driver for the this book: namely, to better understand the scope and nature of skills mismatch in low- and middle-income countries and to consider the most appropriate policy responses for each specific type of mismatch, rather than perpetuate policy generalizations not based on evidence.

This book includes individual research outputs produced under the ILO research initiative on skills and jobs mismatches, synthesizes the findings and provides policy recommendations. Chapter 2 is based on a background analysis produced by McGuinness, Redmond and Pouliakas. It provides a literature review and discusses the concept of skills mismatch, various types of mismatch and their measurement and possible policy responses. Chapter 3, written by McGuinness, Redmond and Bergin, analyses the available labour force survey (LFS) data in low- and middle-income countries. It looks at educational mismatch to assess the extent to which it is correlated with factors such as per capita GDP, labour force participation, unemployment and informality. Chapter 4 was prepared by Handel based on data from the World Bank Skills Towards Employability and Productivity (STEP) survey in 12 low- and middle-income countries. The chapter examines the consequences of mismatch for wages and life satisfaction and addresses possible reasons and key determinants of mismatch, including informality. Chapter 5, written by Kupets, uses the ILO/MasterCard Foundation School-to-Work Transition Survey (SWTS) data. It analyses the incidence, determinants and impact of skills mismatch among young workers in 34 low- and middle-income countries. Chapter 6 synthesizes all findings and attempts to identify key messages and themes emerging from the analyses set out in previous chapters. It provides a summary discussion

[1] Skill gaps are often associated with qualitative measurement (measured as competencies, technical and soft skills) and skill shortages with quantitative measurement (measured as share/number of hard-to-fill vacancies, shortage occupations).

on the incidence, measurements and impacts of overqualification and underqualification in low- and middle-income countries and against a typology of country characteristics related to region, income, informality, sectoral composition and demographic factors. It then offers policy conclusions.

2. How useful is the concept of skills mismatch?

This chapter reviews the literature and available empirical evidence on skills mismatch and discusses its relevance to policy. It proceeds as follows: Section 2.1 discusses the different measurement approaches for each type of skills mismatch. Section 2.2 analyses the current position of the literature and presents the stylized facts for each type of skills mismatch. Section 2.3 presents available empirical evidence from high-income countries on the incidence of various combinations of skills mismatch. Section 2.4 outlines potential policy levers and policy spillover effects for various types of mismatch. Section 2.5 concludes.

2.1 Measures of mismatch

Obtaining reliable and consistent estimates of the incidence of various forms of skills mismatch is necessary to inform policy debate in this area. However, this is difficult for several reasons. Studies of surplus human capital typically use two approaches, overqualification and overskilling, but these concepts are weakly correlated (Green and McIntosh, 2007) and various approaches can be used to measure the same type of mismatch. Four different approaches are used in the literature to measure overqualification, and results often vary substantially depending on the measure used (Barone and Ortiz, 2011; European Commission, 2015; ILO, 2013). Difficulties may also arise when using multiple data sets to make cross-country comparisons, as there are inconsistencies in the wording of mismatch questions across data sets. Developing a clear understanding of these issues is an important prerequisite for policy design. To this end, the measurement approaches for each type of skills mismatch are explained, including any potential drawbacks or difficulties associated with each measure.

Overqualification and underqualification

There are four approaches to measuring overqualification and underqualification: the subjective method, the empirical method (sometimes referred to as the statistical method), the normative method and the job evaluation method. The most commonly used are the first three, and these are also used in this report. While each method is designed to measure the same type of mismatch, they often produce conflicting results. For example, Barone and Ortiz (2011) estimate the incidence of overqualification in Europe using both the subjective and empirical approaches. In Austria,

the subjective approach yields an estimate of 9.6 per cent versus 1.1 per cent for the empirical approach. Similar inconsistencies are found by the European Commission (2015) when comparing the empirical and job evaluation methods across Europe.

Subjective method: this approach is generally based on worker self-assessment of the level of qualifications required "to get" or "to do" the job, which is then compared to the highest level of education actually acquired by the worker to determine if they are matched (have a level of education equal to that required), overqualified (have a level of education above that required) or underqualified (have a level of education below that required).[1] Based on these responses, overqualification is generally measured in terms of a binary dummy variable, but it is also occasionally determined with respect to years of education. Different combinations of the two subjective approaches may pick up different effects; being overqualified both "to do the job" and "to get the job" reflects surplus skills, whereas being overqualified "to do the job" while being matched "to get the job" may be more reflective of surplus entry requirements.

The main advantage of this approach is that it is relatively easy to apply in survey data. Its drawbacks include the potential of subjective bias and the fact that it cannot be retrospectively applied to existing data. Subjective bias arguments relate to higher levels of apathy among overqualified workers that lead to lower response rates and underestimation of the problem; workers' willingness to exaggerate either their occupational status or the qualification required to be able to do one's job results in a reluctance to admit overqualification, which also creates a downward bias.[2] There is also no uniform approach to the overqualification question within data sets, and variations in application make it difficult to compare estimates directly or to pool data for the purpose of cross-country analysis.

Normative method: it is also possible to identify over- and underqualification by using the International Standard Classification of Occupations (ISCO), which categorizes major occupational groups by four levels of education in accordance with the International Standard Classification of Education (ISCED).[3] ISCO categorizes managers, professionals and technicians as requiring skill levels 3 and 4, usually obtained as the result of tertiary level studies; clerical, service and sales workers, skilled agricultural and trade workers, plant and machine operators, and assemblers, as re-

[1] In some cases, one direct question asks individuals to assess their education as a whole in relation to the qualification needed. For example, in the OECD's Programme of International Assessment of Adult Competencies (PIAAC), individuals are asked, relative to their own education, what level of education they think would be necessary to do their job satisfactorily – a lower level would be sufficient; a higher level would be necessary; the same level.

[2] Given that subjective methods typically yield the highest estimates of the incidence of overqualification, the downward bias discussed here does not appear to be pronounced.

[3] ISCO-08 assigns skill levels to major occupational groups. The skill level is measured based on one or more of the following three factors: 1. the nature of the work performed; 2. the minimum education required; 3. the amount of informal on-the-job training required. Most of the emphasis is placed on 1 and 2, with little emphasis placed on 3. However, given that information on individual human capital captured in data sets tends to be restricted to levels of educational attainment, information on 1 and 3 is generally ignored in assessing mismatch status.

quiring skill level 2 (intermediary level education); and elementary occupations as skill level 1 (primary or the first stage of basic education) (ILO, 2012). As these are based on typical tasks and skills required in the occupations, correspondence between occupations and levels of education is theoretical rather than factual. As noted by Quintini (2011), this measure relies on the assumption that all jobs with the same titles require the same level of education and that this is true in all countries using the same occupational classification.

Empirical method (the statistical or the realized matches method): unlike the normative method, the empirical method estimates the educational requirement of an occupation by assessing the mean or modal level of education within a given occupation (the realized matches), deeming workers with acquired education above (below) the average level as overqualified (underqualified).[4] The key advantage of this approach is that the ease of calculations implies it can be easily applied to existing micro data sets containing information on both educational attainment and occupation, such as national labour force surveys, facilitating cross-country comparisons. Its drawbacks are that it does not contain information on the actual skill requirements of the job; it reflects average credentials of all workers within a given occupation and is therefore more closely related to education levels required "to get" as opposed "to do" a given job in contemporary terms. In addition, due to sample size constraints the mode education level is typically derived for broad occupational groups (such as health professionals) and not at a level that is close to an individual job title (such as nurses). This may conceal the variance in qualification needs across jobs that are classified within the same broad occupational group. Another potential flaw of the empirical approach is that occupational averages will tend to be driven by the majority of older workers with longer tenure, so tending to reflect historical entry requirements rather than current ones.[5] If changes in occupational practices have led to an increase in job skill requirements and increased entry requirements for new cohorts, the empirical approach will identify more recent entrants as overqualified when this is not the case.[6]

Job evaluation method: this method is based on assessments by professional job analysts who are tasked with measuring the educational requirements of occupations

---

[4] In the early literature, the method was applied by defining workers as overqualified (underqualified) if they had years of schooling one standard deviation above (below) the occupational mean; however, this approach was heavily criticized due to the arbitrary nature of the cut-off points and the assumption that over- and underqualification are symmetrically distributed within occupations. In recent years, the mode has typically been used in this type of analysis.

[5] This will depend on the structure of the labour market and will be less of an issue in developing countries with young populations.

[6] In response to the increased job requirements, older workers with longer tenure and lower qualifications will be trained accordingly, but new entrants will be required to have higher qualifications. Given that the average is based on both groups' education levels, the average will be lower than the required education for new entrants, and this group will be incorrectly categorized as overqualified. Focusing on specific age cohorts could mitigate this problem, but could result in small sample sizes.

for the purpose of constructing occupational dictionaries (such as O*NET in the United States or SOC in the United Kingdom).[7] The advantage of this approach is that it is perceived to be more accurate as it is based on field expertise. Its disadvantages are that it is very expensive to carry out and is, therefore, not widely available. Occupational requirements can also change rapidly over time, making the job evaluation method outdated if the analysis is not regularly updated. Also, despite the fact that the classifications are based on the opinions of experts, this approach will also involve some level of subjectivity.

Overskilling and underskilling

While overskilling describes the situation where a worker possesses more skills than their current job requires, underskilling describes the situation where the current skills of a worker do not meet the demands of the job. While overskilling and underskilling can be measured through direct assessment by human resources specialists, such direct measures are rarely captured in data sets. Both concepts are typically measured subjectively through separate questions, unlike education mismatch where a single question can be used to identify both over- and underqualification. For instance, the overskilling question in the Reflex Project data, which has been extensively studied in the literature, is: "To what extent are your skills utilized in this work?"; it has a response scale of 1 to 5, where 1 = "not at all" and 5 = "to a very high extent".[8] Values of 1 and 2 are typically taken as an indication of overskilling.[9] There is no way of identifying the underskilled using the overskilling question. In the Reflex data, there is a separate underskilling question on the same scale: "To what extent does this work require more knowledge and skills than you can actually offer?" Overskilling and underskilling measures are prone to the disadvantage of subjective bias in the same way as overqualification. Furthermore, it is not always clear that respondents are thinking only of work-related skills when responding to the question.

Overskilling has been argued to be a more accurate measure of mismatch among existing workers than overqualification, since overqualification assumes that job entry requirements accurately reflect job skill content, and worker qualifications adequately reflect their total work-related human capital. The overqualification approach ignores the fact that job entry requirements may be weakly related to job content and more

[7] There is also a multilingual classification of occupations, skills and qualifications currently being developed at a European level (ESCO).

[8] The Reflex Project is a large-scale European survey of education graduates. The participating countries are Austria, Belgium (Flanders region), the Czech Republic, Estonia, Finland, France, Germany, Italy, the Netherlands, Norway, Portugal, Spain, Switzerland and the United Kingdom.

[9] There is a debate about whether the measurement of overskilling – whether a person's skills are higher than the level needed by his/her job – is the same as skill underutilization, which can be conceptualized by comparing the deviation between an individual's frequency of skill use as part of his/her daily work tasks and the usual frequency of comparable workers in the same job. It is feasible that a worker who is not overskilled in terms of skill levels could nevertheless experience a low frequency of skill use within a job, although the two measures are likely to be highly correlated (Allen et al., 2013).

reflective of qualifications inflation and credentialism, while individual human capital will include (non-formal and informal) skills acquired through labour market experience and training (Mavromaras et al., 2009). Overskilling may be a more comprehensive measure of mismatch as it requires the worker to compare all their skills and abilities, irrespective of whether they were learned in the classroom or in the work environment, with the actual skill requirements of their current job.

Arguments against the overskilling approach are generally related to problems with how the question is phrased. For instance, in the Reflex Project questions, it is feasible that the respondent is including skills and abilities totally unrelated to the workplace, such as hobbies, leading to biased estimates. Furthermore, the questions adopted to investigate overskilling vary substantially across data sets, which makes it difficult to compare estimates.[10] Finally, overskilling questions do not allow the researcher to identify the relative importance of underused skills deriving from labour market experience, training, innate ability or formal schooling. An exception to this is the European Skills and Jobs Survey (ESJS) from the European Centre for the Development of Vocational Training (Cedefop); this asks workers to assess the skills match of a subset of 11 specific skills (literacy, numeracy, ICT, technical skills, planning, problem solving, learning, foreign languages, customer service, teamwork and communication), in addition to whether they are overskilled as a whole (Cedefop, 2015a). The ESJS reveals a correlation (ranging between 0.19 and 0.26) between the total skills mismatch question and mismatches in individuals' technical or soft skills. This highlights that aggregate mismatches can be attributed both to skills acquired mainly during formal schooling (literacy, numeracy, technical skills) and to on-the-job skills (including customer service, communication skills). The data reveal that high levels of reported overskilling among EU adult employees tend to be associated with high mismatches in both literacy skills at their work and in transversal skills, such as inadequate opportunities to apply their problem-solving skills. By contrast, high levels of underskilling tend to be underpinned by high technical or digital skill deficits and a lack of proficiency in terms of planning and organization. While the 11 skills considered in the ESJS capture a substantial part of total overskilling, a sizeable amount remains unexplained.

Horizontal mismatch

Horizontal mismatch measures the extent to which workers, typically graduates, are employed in an occupation that is unrelated to their principal field of study. This

[10] For example, in the OECD PIAAC survey, the question on overskilling is: "Do you feel that you have the skills to cope with more demanding duties than those you are required to perform in your current job?" For underskilling, individuals are asked: "Do you feel that you need further training in order to cope well with your present duties?" The Cedefop European Skills and Jobs Survey asks: "Overall, how would you best describe your skills in relation to what is required to do your job?", with the responses being either "My skills are higher than required by my job" (overskilling) or "Some of my skills are lower than what is required by my job and need to be further developed" (underskilling).

form of mismatch may be measured using a subjective question asking the respondent to assess the degree to which their current job is related to the study field of their highest qualification; it could also be measured independently by comparing a field of study variable with occupation codes.[11] There are far fewer published studies of horizontal mismatch than vertical mismatch and evidence is mixed. Several studies report pay penalties, though this impact is not detected universally. Where wage effects occur, they are typically smaller than those found for vertical forms of mismatch and generally depend on whether horizontal mismatch is also accompanied by vertical mismatch.

Skill obsolescence

While skill obsolescence may not feature in all skills mismatch taxonomies because it is considered a consequence of skills underutilization, it generally refers to the process by which workers' skills become obsolete. Skills can become obsolete through ageing, which depreciates certain manual skills (physical obsolescence), through technological or economic change, which renders certain skills unnecessary (economic obsolescence), or through the underutilization of skills (skills atrophy) (Allen and de Grip, 2007; Van Loo et al., 2001). Skill obsolescence is generally measured through the subjective questioning of workers.[12]

Skill gaps

Skill gaps measure the extent to which workers lack the skills necessary to perform their current job. Skill gaps are usually measured by collecting information from the employer on the perceived skill deficiencies of workers; when similar questions are directed at workers within firms this is usually akin to underskilling, although the form of the question is likely to differ.[13] It has been argued in the literature that skill gaps and underskilling are the same thing and they are likely to be highly correlated; however, as with all forms of mismatch, it is unlikely that the correlation will be strong.

---

[11] See Verhaest et al. (2015), Robst (2007 and 2008) and Allen and de Weert (2007) for studies using the subjective approach to horizontal mismatch, and Levels et al. (2014), Wolbers (2003), Beduwe and Giret (2011) and Domadenik et al. (2013) for the occupational code approach. As with overqualification, informal skills acquired through labour market experience and training are not picked up. It is possible that these informal skills could relate more to the occupation than the person's main field of study.

[12] For example, a question asked in the Cedefop European Skills and Jobs Survey is: "Compared to when you started your job with your current employer, would you say your skills have now improved, worsened or stayed the same?" Skill obsolescence is likely to be captured by the share of workers stating that they have experienced some worsening in their skills over time.

[13] For example, in the Reflex data underskilling is measured based on the question: "To what extent does this work require more knowledge and skills than you can actually offer?", where the scale runs from 1 (not at all) to 5 (to a very high extent), with values of 4 and 5 denoting underskilling. In the Irish National Employment Survey employees are asked if they required more training in a particular competency area. While skill deficiency is clearly present when underskilling is detected, this is not necessarily the case with respect to the skill gap question. The respondent may be perfectly competent in their job and still perceive that they require further training.

McGuinness and Ortiz (2016) examine the correlation of employer-reported skill gaps and employee perceptions of underskilling within Irish enterprises and find that it is more common for employees to report skill gaps in firms than employers. Thus the general incidence of underskilling within firms was generally higher than that of skill gaps. The correlation between worker and employer perceptions was higher for technical skills and skills or competences related to IT, management or communication, but lower for literacy, numeracy and language skills. The extent to which employers and employees mutually recognized skill gaps and underskilling within firms ranged from 64 per cent for skill deficiencies in communication to 33 per cent for deficiencies in literacy and numeracy. McGuinness and Ortiz (2016) discuss a number of possible reasons that would lead to asymmetries in perceptions and conclude that the responses of workers may be more biased as they are more likely to consider future career requirements, rather than immediate job requirements, when responding to questions on skill shortfalls.

Skill shortages

Skill shortages generally refer to unfilled or hard-to-fill vacancies that have arisen as a consequence of a lack of qualified candidates for posts. Skill shortages are measured at the firm level and generally involve a series of questions that begin by establishing the existence of unfilled or hard-to-fill vacancies; they are followed by questions establishing the employer's views of the reasons underlying any recruitment difficulties. As is the case with skill gaps, some research implicitly links skill shortages with firm-level productivity corollaries, such as product development and labour costs; however, there is relatively little research that demonstrates a causal link.

One of the challenges in estimating skill shortages is that part of the recruitment difficulties that employers attribute to skill shortages may be due to their inability to offer the necessary salary or working conditions to attract the relevant skills (Cedefop, 2015b; ILO, 2015), as well as other factors, such as location. However, genuine skill shortages only relate to situations where the demand for skills by employers cannot be met by the available supply at market clearing wage rates. As a result, the suggested incidence of skill shortages based on employer responses may be overestimated, yet such rationalization of the true magnitude and causes of skill shortages is often neglected in policy-making documents. The policy debate also frequently confuses current shortages with anticipated skill shortages or quantitative labour market imbalances (Sattinger, 2012) which are expected to arise due to the ageing of working-age populations in many developed economies. Moreover, many policy documents are often driven by the acknowledgement that digitalization and technological changes are shaping skill demands at a fast pace, yet the responsiveness of the supply side of the equation along with the issue of skills development and utilization in firms is often overlooked.

Macroeconomic indicator of skills mismatch

Following the work of Estevao and Tsounta (2011) and Pouliakas (2012), the European Commission (2015) proposes a macroeconomic indicator of skills mismatch that is

based on differences in employment rates across skill groups. They draw from and extend the theoretical and broader construct of the Beveridge curve, which relates the trends in vacancy and unemployment rates within countries or regions.[14] Although trends are notoriously difficult to observe as a result of spurious data and the difficulty of accounting for cyclical fluctuations, shifts in the Beveridge curve could be indicative of rising mismatches in economies and greater difficulties matching unemployed workers to available jobs.[15] This could reflect a variety of causes, one of which could be skill mismatches due to a greater concentration of older or lower-skilled workers in the pool of the unemployed. Macroeconomic indicators of mismatch typically reflect the relatively low employment chances of low-skilled workers, linked to falling economic demand in sectors that traditionally rely on manual labour (such as construction and manufacturing). The conclusion drawn is that structural declines in low-skilled sectors lead to skills mismatch.

Apart from being a very different concept to the measures of mismatch discussed above, which focus on individuals in the labour market whose skills or qualifications do not match their job, there are concerns regarding interpretation in the macroeconomic measure. While some of the differences in employment rates across groups of various skill levels may be attributable to skills mismatch, unemployment is also a function of many other factors which may vary across skill groups, such as replacement rates and union density. Different employment rates among skill groups may be attributable to systematic differences in unobservable characteristics among members of different groups, as opposed to skills mismatch. In addition, not all unemployment is structural and differences in frictional unemployment across groups could impact the estimates. The European Commission (2015) differentiates skill groups based on educational attainment but, while educational attainment may proxy skill levels, there is significant variance in skill levels within broad educational attainment categories (OECD, 2013).

2.2 Analysis of the current literature

The ILO, other international organizations and governments place strong emphasis on evidence-based policy-making. For example, the European Commission notes that "a strong evidence base and solid analyses are key elements for informed policy discussions

[14] Part of the reason why the abovementioned macroeconomic measures of skill mismatches have been proposed is because for many countries it is not possible to investigate movements of separate Beveridge curves at the (sub-)level of skills, industry or region, given the general unavailability of disaggregated vacancy information.

[15] It is typically the case that there is sluggishness in the reaction of unemployment relative to vacancies, which gives rise to counter-clockwise loops observed in Beveridge curves that can sometimes be mistaken for structural shifts. Shifts in the Beveridge curve are also linked to the recruiting intensity of firms, such as the underlying incentives of employers to search and hire available workers.

and policy developments in education and training".[16] Given that McGuinness (2006) has provided an extensive summary of the literature on overqualification up to 2006, we review the recent literature on each area of mismatch, focusing on work published between 2006 and 2016, to establish the existing evidence on skills mismatch and analyse whether the current policy debate and recommendations respond to and reflect this evidence. Analysis of the literature on over/underqualification, over/underskilling and horizontal mismatch is based on peer-reviewed journal articles from various disciplines, including economics, education, psychology, industrial relations, human resources and youth studies, as well as IZA Discussion Papers and research papers from the World Bank, OECD and Cedefop.[17] There is a dearth of literature on skill gaps, skill shortages and skill obsolescence, so it was necessary to expand the selection criteria to include other types of working papers and, in some cases, earlier (pre-2006) work in these areas. The number of papers dealing with each area of mismatch is shown in table 2.1 below.

Overqualification

Of the 86 papers on overqualification, four are review articles and the remaining 82 carry out some type of empirical analysis. The incidence of overqualification is reported in 60 papers, covering 37 countries. Some authors calculate the incidence of overqualification for several countries in one published paper, so a single paper may

Table 2.1 Number of papers by type of mismatch

Type of mismatch	No. of papers
Overqualification	86
Underqualification	24
Overskilling	21
Underskilling	3
Horizontal mismatch	10
Skill shortages	11
Skill gaps	6
Skill obsolescence	5

Source: Own calculations.

[16] See the European Commission's description of education and training policies based on evidence, http://ec.europa.eu/education/policy/strategic-framework/indicators-benchmarks_en.htm

[17] Apart from financing EU-wide research on skills and skills mismatch (e.g. Cedefop, 2010), Cedefop is a key contributor to new European data collection on skills mismatch, including the 2014 European skills and jobs survey (http://www.cedefop.europa.eu/en/events-and-projects/projects/analysing-skill-mismatch; http://skillspanorama.cedefop.europa.eu/en/datasets), and policy analysis to tackle skill mismatch, e.g. Cedefop (2015c), http://www.cedefop.europa.eu/en/publications-and-resources/publications/5546

consist of multiple country studies. A study of a single country may also report multiple estimates of overqualification based on different measurement approaches. There are 241 estimates of the incidence of overqualification. Estimates of overqualification tend to be consistently high for countries such as Ireland, Spain, Greece and Italy, and lowest in the Czech Republic, Norway, Switzerland and Finland. The most studied country is Belgium, which may be largely due to the availability of suitable data. The Flemish inter-university research group, SONAR,[18] have data on transitions from school to work which have been used in several recent studies on overqualification. Belgium's Flanders region is also covered in the Reflex data on European higher education graduates.

While the average incidence of overqualification across different measures is similar, sizeable differences are often reported within countries. Barone and Ortiz (2011) calculate the incidence of overqualification using both the subjective and empirical approach for eight European countries. The subjective approach yields a higher estimate in five of the eight countries, with a substantial difference in some cases: the subjective-based estimate of overqualification in Austria is 9.6 per cent compared to an empirical estimate of 1.1 per cent. The European Commission (2015) calculates job evaluation and empirical estimates of overqualification in EU countries. Their findings indicate that not only does the level of overqualification vary substantially across the two measures, but the ranking of countries is also very different. For example, based on the job evaluation measure, Spain has the highest incidence of overqualification in the EU, but with the empirical measure it has the third lowest. The report concludes that there is little correlation between the two measures, highlighting the challenges associated with estimating and interpreting these indicators.

One of the most studied aspects of overqualification is its effect on wages: the evidence consistently points to a wage penalty for the overqualified relative to individuals with the same education in matched employment. Sixteen papers report estimates of the wage penalty.[19] Some report multiple estimates due to the fact that they investigate multiple countries or employ multiple methodologies. This results in 61 estimates of the overqualification wage penalty. Taking the average of these 61 estimates indicates that the overqualified earn 13.5 per cent less than matched individuals with similar levels of education. The evidence also indicates that the overqualification wage penalty for females is typically greater than that for males (see Budría and Moro-Egido, 2009; Mavromaras et al., 2012; McGuinness, 2008; McGuinness and Bennett, 2007; Robst, 2008; Sánchez-Sánchez and McGuinness,

[18] SONAR is the acronym for Studiegroep van Onderwijs naar Arbeidsmarkt, which loosely translates as Research Group on Education to Labour Market.

[19] These are McGuinness and Pouliakas (2016), Budria and Moro-Egido (2009), Chevalier and Lindley (2009), Cutillo and Di Pietro (2006), Diem (2015), Levels et al. (2014), Mavromaras et al. (2012), McGuinness (2008), McGuinness and Bennett (2007), McGuinness and Sloane (2011), Robst (2008), Sánchez-Sánchez and McGuinness (2015), Sloane (2014), Verhaest and Omey (2006 and 2012) and Di Pietro and Urwin (2006). Some studies focus on specific sectors such as business graduates (Li et al., 2015) or nurses (Rubb, 2014) and find similar wage effects.

2015). While overqualified individuals suffer a wage penalty relative to those with similar education in matched employment, there is evidence of a wage premium relative to matched individuals in the same occupation, i.e., with lower education. Levels et al. (2014) find that having more education than is required for a job is associated with higher wages; specifically, each additional year of education in excess of that required yields a wage premium of 3 per cent.

Many studies investigate the effect of overqualification on job satisfaction, with mixed results. While some indicate that overqualification leads to lower job satisfaction (see, e.g., Verhaest and Omey, 2006; Congregado et al., 2016; Peiro et al., 2010; Diem, 2015), others find that is only the case when overqualification is also accompanied by overskilling (see, e.g., Sloane, 2014; Green and Zhu, 2010).[20] McGuinness and Sloane (2011) indicate that some overqualification may be voluntary as workers trade off earnings for other desirable job characteristics. Mavromaras et al. (2012) and McGuinness and Byrne (2015) find that overqualification is only associated with lower job satisfaction for females and Fleming and Kler (2014) find this effect is particularly strong for females without children at home.[21]

Another strand of the literature focuses on the determinants of overqualification. The evidence indicates that overqualification is more prevalent among graduates of social sciences, services and humanities (Ortiz and Kucel, 2008), in workplaces that rely heavily on shift and part-time workers (Belfield, 2010) and in areas where commuting to other labour markets is difficult (Ramos and Sanroma, 2011).[22] There is also evidence that overqualification is more common after a recession where work is scarce and people prefer overqualification to unemployment (Quintini, 2011).

The literature on the persistence of overqualification is mixed. Verhaest et al. (2015) find that a high percentage of Belgian graduates experience persistent overqualification, while Frei and Sousa-Poza (2012) find that in Switzerland spells of overqualification are short, with half of the overqualified in a given year being adequately matched one year later. Personal characteristics such as extraversion and conscientiousness reduce the probability of experiencing persistent overqualification (Blázquez and Budría, 2012).

Very little work has looked at the effect of overqualification on macroeconomic indicators. One exception is Ramos et al. (2012), who examine the effect of overqualification on GDP growth in six European countries and find that it is associated with higher GDP growth. The authors attribute this finding to the high productivity of overqualified workers. This is consistent with work by Kampelmann and Rycx (2012) who find that additional years of overqualification are beneficial for firm productivity whereas additional years of underqualification are detrimental to it.

---

[20] In related work, Piper (2015) finds that overqualified people have lower life satisfaction.

[21] Verhaest and Verhofstadt (2016) suggest that providing more autonomy to overqualified workers may be an effective strategy to avoid job dissatisfaction.

[22] McGowan et al. (2015) find that skills mismatch is lower in countries with housing policies that do not impede residential mobility.

Underqualification

Underqualification has received far less attention than overqualification. The literature survey consists of 24 papers in this area; underqualification is not the sole focus of any of the papers in the sample, but is considered in conjunction with overqualification. It is also often the case that overqualification takes precedence and receives a larger share of the analysis and discussion within a paper.[23] The incidence of underqualification is reported in 16 papers with a total of 47 estimates covering 28 countries.[24]

Empirical findings on underqualification are very mixed so it is difficult to ascertain stylized facts relating to this area. Verhaest and Omey (2006 and 2012) find evidence of an underqualification wage premium relative to workers with the same education in a matched job, yet Sánchez-Sánchez and McGuinness (2015) and Di Pietro and Urwin (2006) find no statistically significant wage effect for underqualified workers. In Salinas-Jiménez et al. (2016), underqualification is associated with higher subjective well-being, attributed to individuals securing a better job than expected. However, in Peiro et al. (2010), underqualification is shown to have no relation to job satisfaction.[25] The literature is consistent in documenting a negative association between underqualification and firm productivity (Mahy et al., 2015; Kampelmann and Rycx, 2012) and showing that underqualification is more prevalent among females (Rubb, 2014; Jauhiainen, 2011).

Overskilling and underskilling

There are fewer papers on overskilling compared to overqualification. The sample consists of 21 papers; 13 examine overskilling and overqualification together, and the remaining eight focus exclusively on overskilling. The incidence of overskilling is reported in 13 papers, covering 28 countries. All estimates of the incidence of overskilling are calculated using the subjective method, and the average incidence is 20 per cent. The literature on overskilling has largely focused on Australia, which accounts for nine of the 21 papers.[26]

---

[23] In 11 papers, the word overqualification features in the title and the word underqualification does not. However, each paper deals with underqualification in some way, even if it is not the main focus of the paper.

[24] The 16 papers reporting the incidence of underqualification are Li and Miller (2015), Allen and de Weert (2007), Ghignoni and Verashchagina (2014), Hung (2008), Jauhiainen (2011), Kampelmann and Rycx (2012), Karakaya et al. (2007), Mahy et al. (2015), Mehta et al. (2011), Peiro and Grau (2010), Rubb (2014), Sánchez-Sánchez and McGuinness (2015), Verhaest and Omey (2006), Yang and Mayston (2012), Cedefop (2015a) and Di Pietro and Urwin (2006).

[25] Bracke et al. (2013) examine the relationship between educational mismatch and depression. While overqualified individuals are more likely to be depressed, underqualified individuals are similar to matched individuals.

[26] In the Household Income and Labour Dynamics in Australia (HILDA) survey, overskilling is assessed using the seven-point scale responses to the statement: "I use many of my skills and abilities in my current job". A response of 1 corresponds to "strongly disagree" and 7 to "strongly agree".

As in the overqualification literature, the evidence indicates that there is a wage penalty associated with overskilling; overskilled individuals earn less than those with equivalent levels of education who are in matched employment. Nine papers investigate this issue and the average overskilling wage penalty, based on 38 estimates, amounts to 7.5 per cent.[27] The overskilling wage penalty is found to be smaller than the overqualification wage penalty (McGuinness and Sloane, 2011; Sánchez-Sánchez and McGuinness, 2015; Di Pietro and Urwin, 2006).[28] In addition to the wage penalty, being overskilled also increases an individual's probability of future unemployment (Mavromaras et al., 2015) and is associated with lower job satisfaction (Mavromaras et al., 2012; Sloane, 2014; Green and Zhu, 2010; Congregado et al., 2016) and lower workplace harmony (Belfield, 2010). Overskilled workers are also more likely to want to quit their job (McGuinness and Wooden, 2009) and experience less skills development (Cedefop, 2015a).

Several studies investigate the determinants of overskilling and find it is more likely for those who have been overskilled in the past (Mavromaras et al., 2013) and for individuals with low levels of education (Mavromaras and McGuinness, 2012; Mavromaras et al., 2013).[29] McGuinness and Byrne (2015) focus on immigrant graduates in Europe and find that female migrants with a shorter duration of domicile have a higher likelihood of overskilling. The persistence of overskilling is also reported in Cedefop (2015a) using data from the European Skills and Jobs Survey; 80 per cent of EU employees who were overskilled at the start of their current job, remained overskilled throughout their tenure. Only 17.6 per cent of employees transitioned from being overskilled to matched, and 1.75 per cent went from being overskilled to underskilled.

While overskilling and overqualification both measure surplus human capital, they are found to be weakly correlated (Green and McIntosh, 2007; Flisi et al., 2014). Therefore, it is important to make it clear which type of measure is being used. This is not always the case in the literature and, to complicate things further, sometimes the terms overqualification, overeducation and overskilling are used interchangeably (see, e.g., Belfield, 2010).

Underskilling has received little attention in the literature. Sánchez-Sánchez and McGuinness (2015) and Cedefop (2015a) report estimates of underskilling in 13 European countries and the EU-28 respectively. The average incidence of

---

[27] The nine papers are Di Pietro and Urwin (2006), Green and Zhu (2010), Mavromaras et al. (2012), Mavromaras et al. (2007), Mavromaras et al. (2009), Mavromaras et al. (2013), McGuinness and Sloane (2011), Sánchez-Sánchez and McGuinness (2015) and Sloane (2014).

[28] Jones and Sloane (2010) find that disabled workers are more likely to be overskilled and that the wage penalty for this group is particularly large.

[29] The result in Mavromaras and McGuinness (2012) indicates that individuals with an advanced degree or diploma have a lower probability of being overskilled relative to individuals with no qualifications.

underskilling is 25.5 per cent.[30] Sánchez-Sánchez and McGuinness (2015) also show that underskilling has no statistically significant effect on wages, and Pouliakas and Russo (2015) find that underskilled workers are more likely to be concentrated in high-skilled occupations.

Horizontal mismatch

As noted by Nordin et al. (2010), the literature on horizontal mismatch is relatively sparse in comparison to vertical mismatch. The survey consists of ten papers, of which six focus solely on horizontal mismatch and four on both horizontal and vertical mismatch. The incidence of horizontal mismatch is reported in four papers, covering 35 countries.[31] The average incidence of horizontal mismatch, based on 27 estimates, is 37.3 per cent.

Several studies investigate the wage effects of horizontal mismatch. Robst (2007 and 2008) and Nordin et al. (2010) find evidence of a wage penalty for horizontally mismatched individuals. However, Beduwe and Giret (2011) find no such effect and Montt (2015) indicates that the cost of horizontal mismatch on earnings is high only when combined with vertical mismatch. Horizontal mismatch has also been linked to lower job satisfaction (Beduwe and Giret, 2001.).

Other studies have sought to establish the determinants of horizontal mismatch. Verhaest et al. (2015), Robst (2007) and Robert (2014) find a higher likelihood of horizontal mismatch among graduates of arts, humanities and social sciences. Levels et al. (2014) find a lower incidence of horizontal mismatch among vocationally trained individuals. In related work, McGuinness et al. (2016) find that increasing the practical elements in degree programmes, irrespective of field of study, reduces the incidence of mismatch.

Skill shortages

The literature on skill shortages is typically based on employer surveys such as the European Business Survey (EBS), the Manpower Talent Shortage Survey and the European Company Survey (ECS). Caution is called for when using employer surveys to estimate the incidence of skill shortages due to difficulties in disentangling genuine skill shortages from other recruitment difficulties such as low wages or poor working conditions.[32] As noted by Cedefop (2015b), ECS data do not provide information on the reasons why employers find it difficult to attract talent. Drawing on the Eurobarometer Flash Survey 304, Cedefop (2015b) shows that while 47 per cent of employers report difficulties in recruiting suitably skilled graduates, the total

[30] In Cedefop (2015a), 22 per cent of workers in the EU-28 are underskilled when they start their jobs, but this falls to 6 per cent at the time of the survey.

[31] Montt (2015) reports estimates for 24 countries, Morgado et al. (2014) report an average incidence for 30 European countries, and Robst (2007) and Nordin et al. (2010) focus on the United States and Sweden, respectively.

[32] Genuine skill shortages occur when demand for skills by employers cannot be met by available supply at market clearing wage rates (Cedefop, 2015b).

proportion of employers facing genuine skill shortages is 34 per cent. The European Commission (2015) calculates the incidence of recruitment difficulties across the EU using each of the three surveys and highlights inconsistencies in the estimates. For example, results from the Manpower survey indicate that Greece has the second-highest incidence of hard-to-fill jobs in the EU, yet the EBS survey suggests that employers in Greece are among the least likely to report that labour shortages are a major factor limiting production.[33]

Several studies examine the effect of skill shortages on firm productivity. Bennett and McGuinness (2009), Tang and Wang (2005), Haskel and Martin (1996), Forth and Mason (2006) and Mason et al. (1994) find that skill shortages have a negative impact on firm productivity. Healy et al. (2015) investigate the strategies used by firms to respond to skill shortages using the Australian Business Longitudinal Database. They find that most firms respond to skill shortages by improved utilization of their core workforce through longer hours and better pay, while some firms use peripheral strategies such as temporary employment and outsourcing. Simple skill shortages, defined as having one cause, are typically short-lived. This result is consistent with Bellman and Hubler (2014), who find that skill shortages in German firms are normally short-term phenomena.

Frogner (2002) states that it is now generally accepted that skill shortages are important due to their effect on economic issues such as productivity, GDP, employment and earnings, and uses data from the Employers Skill Survey to provide descriptive evidence of this. Nickell and Nicolitsas (1997) estimate that a 10 per cent increase in the number of firms reporting skill shortages lowers investment by 10 per cent and R&D by 4 per cent.

Skill gaps

Most existing studies and estimates of skill gaps come from employer surveys carried out in the respective countries.[34] Using the 2006 Irish National Employment Survey, McGuinness and Ortiz (2016) find that sectoral-level collective bargaining and a well-developed human resource function are important factors in correctly identifying skill gaps in firms, with gaps found to be a key determinant of training expenditure and labour costs. Jackson and Chapman (2012) investigate the precise nature of non-technical skill gaps for graduates of Australian undergraduate business programmes and find that graduates are deficient in vital elements of the managerial skill set. Using UK data, Tether et al. (2005) find that over one fifth of firms believe that skill gaps delay the introduction of new products, and one third of firms believe that

[33] Drawing meaningful comparisons between survey data is difficult due to different sample frames and surveying methods. For example, the EBS survey has a narrow focus as it relies only on a sample of manufacturing establishments and measures labour shortages that limit production.

[34] In some studies skill gaps are treated as synonymous to underskilling and employee surveys are used (see, e.g., Cedefop, 2015a and 2015b and Quintini, 2011). However, this study makes the distinction that skill gaps are identified based on employer responses whereas employee responses relate to underskilling.

skill gaps are a barrier to the introduction of new work practices. As pointed out by McGuinness and Ortiz (2016), the literature on firm-level skill gaps remains relatively underdeveloped compared to other measures of mismatch.

Skill obsolescence

The literature on skill obsolescence tends to focus on identifying the determinants thereof. Murillo (2011) finds that workers in Spain with higher education levels are exposed to greater depreciation of human capital. Allen and de Grip (2012) and Janssen and Backes-Gellner (2009) relate skill obsolescence to job characteristics and find that workers are more likely to suffer from it when learning and technical knowledge are key components of the job. Similarly, Cedefop (2015b) finds greater work complexity to be associated with a greater degree of skill obsolescence. Van Loo et al. (2001) consider the determinants of different types of skill obsolescence and find that physically and mentally taxing working conditions increase skill obsolescence arising through natural ageing, injury or illness.

Skills mismatch in low- and middle-income countries

Due to the more widespread availability of data, the bulk of existing research in overqualification has been focused on high-income countries. However, some evidence is beginning to emerge for low- and middle-income countries. The World Bank's STEP (Skills Toward Employability and Productivity) data set collects information on individuals in 12 such countries.[35] As well as personal, education and occupational data, the STEP survey also includes a subjective measure for overqualification and underqualification.[36] Handel et al. (2016) report that the incidence of overqualification across the 12 countries in the STEP sample ranges from 22.3 per cent in North Macedonia to 70 per cent in Viet Nam, with an average incidence of 36 per cent across all countries.[37] These rates are much higher than those found in more developed labour markets (Chapter 2). Handel et al. (2016) also investigate the determinants of overqualification and find that, in all countries, workers with fewer years of tertiary education are more likely to be overqualified, as they are more likely to hold a non-tertiary job. In some STEP countries, women with young children are more likely to be overqualified than men. With respect to field of study, the incidence of overqualification was found to be relatively high for business graduates. Handel et al. (2016) report underqualification to be negatively correlated

[35] Ghana, Kenya, Lao People's Democratic Republic, Sri Lanka, Viet Nam, Armenia, Georgia, North Macedonia, Ukraine, the Plurinational State of Bolivia, Colombia and the Yunnan Province in China.

[36] This is based on a question asking respondents to give the education level required to do their current job. The required level is then compared with the respondents' actual level of education and they are deemed to be overqualified if their actual level exceeds the level required to do their current job.

[37] This is the average for 11 countries, not including Colombia, whose descriptive statistics are not reported (see figure ES.4 in Handel et al., 2016).

with levels of labour market informality within STEP countries, findings further considered in Chapter 4.

Mehta et al. (2011) study four developing economies and find evidence of growing overqualification in unskilled jobs in the Philippines and Mexico but little evidence of it in India and Thailand. However, the measure they use differs from the more commonly used measures of overqualification previously mentioned; their measure first involves identifying jobs where the wage returns on education are too small to justify their employees' schooling, and then examining how many educated workers these jobs employ.

A second substantial data set, the ILO's School-to-Work Transition Survey (SWTS), has also been used to examine overqualification in low- and middle-income countries. Sparreboom and Staneva (2014) assess the issue using a normative measure of overqualification for 28 countries in the SWTS data. They report cross-country averages of 37 per cent for youth underqualification, 16 per cent for youth overqualification and an average of 47 per cent who were matched. In contrast to Handel et al. (2016), who highlight overqualification as a primary concern, Sparrebom and Staneva (2014) emphasize underqualification as the main policy concern for young people in low-income countries. These and related findings are discussed in more detail in Chapters 4 and 5. To date, very little evidence exists on the impact of overqualification on outcome variables such as earnings, worker satisfaction or job mobility within a low- and middle-income context. While the limited evidence of effect does not prove there is no effect, the proven absence of such effects would clearly diminish the importance of overqualification as a policy concern, as it would suggest that the impacts of the phenomenon on productivity are likely to be trivial.

Labour force microdata have been used to examine skills mismatch and the relationship between educational attainment and structural changes in employment in sub-Saharan Africa (Sparreboom, 2017; Sparreboom and Staneva, 2015; Sparreboom and Gomis, 2015). Sparreboom and Staneva (2015) find that underqualification declines with age and that females are more likely to be over- or underqualified than males. The individuals most likely to be underqualified are those with no schooling, whereas the risk of overqualification increases with educational attainment. Sparreboom and Staneva (2015) find an overqualification wage penalty of 33 per cent and an underqualification wage premium of 35 per cent in Mozambique. Sparreboom and Gomis (2015) investigate education mismatch by occupation and find that elementary occupations and clerks form the largest share of overqualified workers, whereas underqualification is pervasive across all occupations. In terms of policy recommendations for sub-Saharan Africa, Sparreboom (2017) notes that if countries want to exploit structural changes in employment, levels of education need to rise.

Research into skill mismatch in developing countries is at an early stage and is likely to remain restricted due to the limited availability of quality data linking aspects of skill mismatch to key outcome variables. Therefore, Chapters 3 to 5 are devoted to analysis of available data on low- and middle-income countries based on the LFS data and revisiting the STEP and SWTS data.

2.3 Skills mismatch combinations: Empirical evidence

While some combinations of mismatch are mutually exclusive, others can potentially impact individuals simultaneously. Few data sources exist that allow for simultaneous measurement of the multiple forms of both educational mismatch (overqualification and underqualification) and skill mismatch (overskilling, underskilling and skill obsolescence). The Cedefop European Skills and Jobs Survey (ESJS) is the sole exception as it includes a variety of skills mismatch measures, some of which are captured at two points in time; employees are asked about their current skill levels relative to the requirements of their job (at the time of the survey) as well as when they were first hired for the job. The ESJS data allow estimate of the incidence of various combinations of skills mismatch affecting adult workers. Table 2.2 separates the respondents into three groups: overqualified, matched and underqualified.[38] It shows the percentage of individuals within each group that exhibit other forms of mismatch. For example, 44 per cent of overqualified individuals were overskilled when they were hired, 18 per cent were underskilled when hired and 38 per cent had skills matched to their job.

Several notable features emerge from the data. It appears that while education may act as a proxy for the total skills required to do one's job, the relationship between the two is not strong. Only 44 per cent of overqualified individuals considered them-

Table 2.2 Skills mismatch combinations among adult employees, 2014, EU-28 (percentages)

	Overqualified	Matched	Underqualified
When hired			
Overskilled	44	24	20
Skill matched	38	54	53
Underskilled	18	22	27
Present time			
Overskilled	60	36	29
Skill matched	36	58	63
Underskilled	4	5	8
Skill obsolescence (physical)	21	12	11

Notes: Overqualification and underqualification are derived by comparing an employee's highest qualification with the level needed to do the job. Overskilling is derived by asking workers to reflect if their overall skills level is higher than that needed to do the job. Underskilling is obtained by asking respondents if some of their skills are lower than those needed to do the job and require development. Respondents were asked to reflect about their overskilling and underskilling status both at the start of their current job and at the time of the survey. (Physical) skill obsolescence is measured by the share of adult workers who claim that their skills have worsened since the start of their job with their current employer.

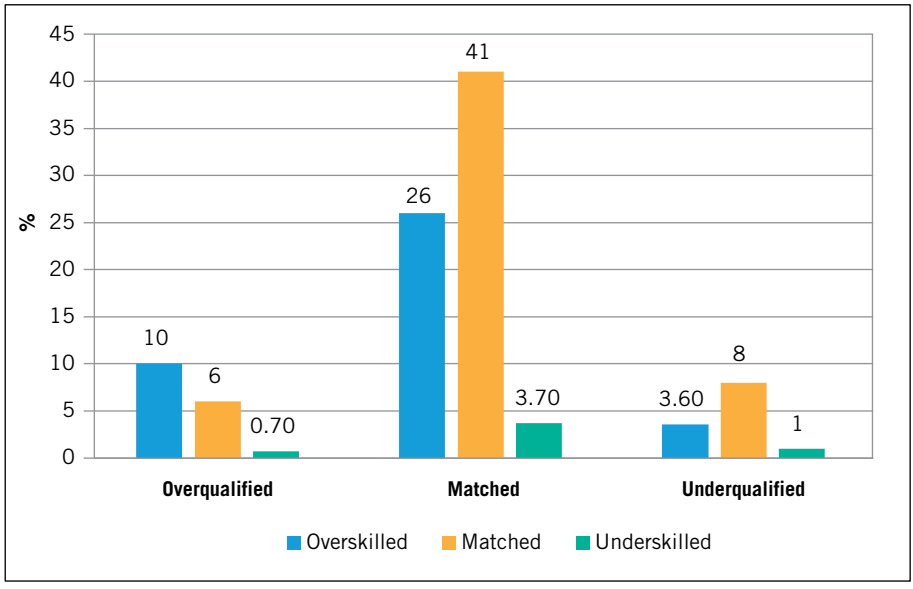
Source: Cedefop ESJS; Cedefop, 2015a.

[38] The educational mismatch variable relates to being over/underqualified "to do the job".

selves overskilled at the time of being hired and just 27 per cent of underqualified individuals considered themselves underskilled. For a significant number of workers, skills acquired in formal education appear insufficient to meet the requirements of their job when they are first hired, as shown by the 18 per cent of overqualified workers and the 22 per cent of matched workers who were also underskilled. However, only 4 per cent of overqualified workers were underskilled at the time of interview, with the drop from 18 to 4 per cent indicating that workers undergo on-the-job training and acquire necessary skills throughout their career. This pattern of on-the-job skill accumulation is also reflected in the relatively high share of underqualified individuals who are underskilled when hired (27 per cent), compared to the low percentage who were underskilled at the time of interview (8 per cent). Another notable statistic relates to the combination of overqualification and skill obsolescence, as 21 per cent of overqualified individuals report that their skills have worsened since they started their job. This provides support for the "use it or lose it" hypothesis.

Figure 2.1 reports the overall incidence of various combinations of mismatch among the full sample of surveyed working individuals. For example, 10 per cent of all workers surveyed in the ESJS are both overskilled and overqualified (overeducated).

Figure 2.1 Skills mismatch combinations in adult workforce, EU-28, 2014 (percentages)



Notes: The percentages indicate the share of adult employees in the whole EU-28 sample affected by a given skills mismatch combination (e.g. overqualified and overskilled). Overqualification and underqualification are derived by comparing an employee's highest qualification with the level needed to do the job. The skill mismatch variable captures whether an individual was over/underskilled at the time of being interviewed. Appropriate sample weights applied.

Source: Cedefop ESJS; Cedefop, 2015a.

The data suggest that underutilization of human capital is more prevalent than human capital deficits in Europe. Figure 2.1 also shows that 10 per cent of all workers are both overqualified (overeducated) and overskilled and that 26 per cent, while matched (in terms of education), are overskilled. However, only 1 per cent of all workers are both underqualified (undereducated) and underskilled in this sample of high-income countries.

2.4 The policy position: Potential levers, spillovers and current responses

Conceptual policy framework

While the subject of skills mismatch often appears within policy documents in a generic sense, the concept of skills mismatch is multidimensional and encapsulates a number of measures of both education and skill asymmetries, some of which are loosely connected to each other. The policy debate requires greater clarity in the form of mismatch to be addressed, though the interdependence of various forms of mismatch should also be understood, as policy measures designed to address one form of mismatch may well have spillover effects on other related forms. While the preceding section indicated that individuals can experience some forms of mismatch simultaneously, it is important to consider the potential drivers of each form and how they relate to each other at an aggregate labour market level. Policy initiatives to address mismatch both within and across countries should consider the interdependence and potential causal relationships between the various indicators.

The range of policy levers likely to be appropriate to combating problems of skills mismatch will tend to vary according to the type of asymmetry being considered. With respect to forms of vertical mismatch associated with surplus human capital (overqualification and overskilling), the evidence – and subsequent policy debate – has focused on the value of particular initiatives: achieving better alignment between educational or training supply and labour demand in terms of both levels and composition;[39] removing information asymmetries to enable smoother matching between jobseekers and employers; and enhancing flexibility in firms to utilize fully the skills and abilities of their workforce. McGowan et al. (2015) present evidence indicating that policies associated with lower mismatch include less stringent labour market regulations, lower barriers to entry among firms, less stringent bankruptcy legislation and lower transaction costs for housing.[40]

[39] Recently, the EU Skills Agenda has focused on strengthening the attractiveness of vocational education and work-based learning, such as apprenticeships. There is also a focus on strengthening links between educational qualifications and labour market needs by shifting to a learning outcomes approach to ensure that employers know what the graduate can do in terms of skills and competencies, as opposed to simply relying on education as a signal.

[40] Lower transaction costs improve residential mobility, which can reduce skills mismatch.

The problems of deficits in human capital (skill gaps, undereducation, underskilling) and skill obsolescence are generally discussed in the context of finding ways to incentivize training. The issue of skill shortages tends to stimulate debate around balancing education and training provision with labour demand and improving labour mobility and skilled migration. This considers the extent to which various forms of mismatch are likely to occur simultaneously in the labour market and the degree to which policy initiatives to tackle specific forms of mismatch will have spillover effects on other dimensions.

Overqualification and overskilling: To the extent that overqualification will result in under-used skills, there is good reason to believe that labour markets with high levels of overqualification will also exhibit high levels of overskilling. While the evidence does suggest a positive correlation, rates of overskilling within countries generally lie below those of overqualification. Many policy responses to vertical mismatch discussed in the literature are likely to impact simultaneously both overqualification and overskilling; policy spillover effects are likely to be strong.

Overqualification and underqualification: There is no reason to believe that high rates of overqualification in a labour market will necessarily lead to a high incidence of underqualification. The central policy responses necessary to address each respective problem will tend to differ. Policies aimed at reducing underqualification will tend to focus on improving incentives to train among both existing workers and employers, and will tend not to impact rates of overqualification. However, policy initiatives targeted at overqualification, such as matching labour supply with demand, labour mobility and reducing information asymmetries, may also influence rates of underqualification. Similar arguments can be made for the relationships between overqualification and underskilling, overskilling and underqualification, and overskilling and underskilling.

Overqualification and skill obsolescence: Given that the potential drivers of both forms of mismatch are likely to be different, there are no strong arguments to suggest that there will be major correlation between them at the labour market level. However, the evidence from the microdata provides some support for the "use it or lose it hypothesis" whereby workers with underutilized skills are likely to report skill worsening over time, suggesting some correlation. While retraining initiatives designed to improve the situations for workers with obsolete skills will have little impact on rates of overqualification in the labour market, policies aimed at reducing overqualification may have positive spillover effects for skill obsolescence. Similar arguments apply to overskilling and skill obsolescence.

Underqualification and skill obsolescence: Since both underqualification and skill obsolescence are more likely to affect older workers and have similar drivers, such as technological change, there is a basis to suggest that both forms of mismatch will be correlated to some extent at a labour market level. Given that the policy responses to both types of mismatch centre around training, positive spillover effects will exist but are likely to be limited to circumstances where workers suffer from both forms of mismatch simultaneously. Similar arguments can be made for the potential relationship between underskilling and skill obsolescence.

Underqualification and skill gaps: Underqualification and skill gaps are two approaches to describing the problem of human capital deficit among the workforce. While both forms of mismatch will be correlated at a macro level, correlation may be low as underqualification does not necessarily imply a skill gap. Underqualified workers may still be matched with regard to job skill requirements. Since policy response to both forms of mismatch will tend to focus on improving incentives to invest in training, policy spillover effects between these two forms are likely to be substantial in circumstances where they occur simultaneously.

Overskilling and skill gaps: There are no arguments to suggest that both forms of mismatch will be correlated at a labour market level.[41] Nevertheless, both forms can potentially be driven by poor connections between employer demand and the composition of education and training provisions, suggesting that some relationship could exist.[42] Policies to tackle overskilling that focus on improving the match between education provision and employer needs will also tend to reduce the incidence of skill gaps among new labour market entrants; some spillover effects are likely. The same arguments apply for the relationship between overqualification and skill gaps.

Underskilling and skill gaps: This combination of skills mismatch is likely to be strongly correlated in the labour market as both measure the prevalence of skill deficits in the workplace. Given that the policy responses to both types of mismatch centre around improving training, positive spillover effects are likely to be strong.

Skill shortages and skill gaps: There is good reason to believe that both of these forms of skill mismatch are strongly correlated, given the evidence suggesting that firms will tend to respond to skill shortages by reallocating less skilled workers to vacant posts, so creating skill gaps (Bennett and McGuinness, 2009). Policies aimed at reducing skill gaps may range from improving the match between a country's education and training outputs and employer needs, to encouraging skilled migration. To the extent to which skill gaps emerge as a consequence of skill shortages, policies aimed at addressing the latter will also impact on the former. Improved in-firm training designed to address skill gaps may also reduce the incidence of skill shortages as it becomes more feasible to fill new positions internally. Similar arguments apply to the relationship between skill shortages and both underqualification and underskilling.

Skill shortages and overskilling: There are no obvious arguments linking the incidence of skill shortages and overskilling at an aggregate level. Nevertheless, both forms of mismatch can potentially be driven by poor connections between employer demand and the composition of education and training provision, suggesting that some relationship could exist. Policy spillover effects between both forms are likely to be strong in the context where policy is focused on an improved match between labour demand and the outputs of education and training institutions. It is also

[41] It is possible that a person may be overskilled in their current post, but this does not mean that they are not subject to a skill gap in relation to progressing in the organization.

[42] Poor managerial quality could also be a driver of overskilling and skill gaps; ineffective managers may not exploit the employee's potential and may be more likely to report skill gaps among workers rather than admit managerial deficiencies.

possible that stringent employment protection legislation could lead to both skill shortages and overskilling; less flexibility may lead to overskilled employees being trapped in certain firms, while restrictions on a firm's ability to hire externally could lead to the firm reporting skill shortages. The same arguments apply for the link between skill shortages and overqualification.

Skill shortages and skill obsolescence: As both forms of mismatch are potentially driven by common factors such as skill-biased technological change, there may be some correlation at an aggregate labour market level. However, the responses to each form of mismatch are likely to be distinct and will be targeted at unrelated segments of the labour market. Policy spillover effects between both of these forms of mismatch are likely to be limited, though it is possible that more effective employee training could simultaneously reduce skill obsolescence and skill shortages by lowering a firm's reliance on external hiring.

Current policy responses to skills mismatch

There appears to be misalignment between the focus of the academic literature on skill mismatch and the direction of skills and labour market policy. Despite the existence of a large body of research demonstrating the costs associated with surplus human capital, as evidenced by data on overqualification and overskilling, policies focused on addressing the problem are rare. The reasons for such policy inertia are unclear but possibilities can be suggested. Political problems associated with implementing policies that question long-held assumptions around the benefits of continued education expansion may be a factor, as may be the challenges of addressing enhanced skills utilization in enterprises, which can increase the demand for skills. Perhaps policy-makers do not view overqualification or overskilling as being too problematic, seeing it simply as a short-term phenomenon despite convincing evidence to the contrary.

Policies that address skills mismatch tend to focus solely on the supply side aimed at enhancing the responsiveness of the education and training system to emerging labour market needs.[43] Approaches adopted in the pursuit of this goal include identifying current and future skill demand and supply through the use of occupational forecasting models, the use of sectoral or occupational analyses, and the commissioning of bespoke qualitative and quantitative research projects. The view that skills mismatch is also a function of asymmetric information between jobseekers, workers and firms has led some countries to improve career guidance and counselling services in response. Such policies are certainly valuable and may potentially inform career decisions and increase returns on public and private investments in training. On balance, however, it is reasonable to suggest that currently policies do not focus enough on the demand side to address the problem of surplus human capital – overqualification and low skills utilization – given that a substantial body of research has established that this form of mismatch imposes large costs on workers and firms.

[43] Skills mismatch indicators are also widely used for informing labour migration policies.

2.5 Conclusion

The term skills mismatch is broad, and can refer to a variety of concepts, including vertical mismatch, horizontal mismatch, skill gaps, skill shortages and skill obsolescence. Being cognizant of the distinction between types of skills mismatch, their inter-relatedness, and the various measurement issues associated with each type is necessary to inform policy debate in this area. Current policy recommendations addressing skills mismatch tend to be vague, as the term skills mismatch is often used without reference to the specific type of mismatch in question or how the policy priority is expected to address it.

In the few cases where policy recommendations on skills mismatch exist, the analysis has highlighted inconsistencies between the focus of the academic literature and available data and the direction of policy. While there is an abundance of evidence on the costs associated with surplus human capital, as measured by overqualification and overskilling, much less is known on the effects of skill gaps, skill obsolescence and skill shortages. However, the policy debate seems to focus on precisely the areas for which the least evidence exists, namely skill shortages. It is not clear why this is the case, especially given the strong emphasis placed by international organizations and governments on evidence-based policies. There is no clear discussion or justification of which measure of mismatch is being used to inform policy recommendations. This is important since the ranking of countries based on the incidence of overqualification can change dramatically depending on the type of measure used.

A more transparent and consistent approach that takes account of existing evidence should form the basis of future policy debate in this area. By bringing together the various concepts of skills mismatch into this one document and analysing their inter-relatedness, measurement approaches and stylized facts, this chapter may help to guide future policy debate along these lines. It is clear from the evidence presented here that underutilization of human capital is an issue in both developed and developing economies, more prevalent than human capital deficits. The situation where one in four employees is operating below their productive capacity should be a major concern for policy, particularly given the weight of evidence on earnings suggesting that such forms of mismatch lower worker productivity. There are strong grounds for believing that substantial benefits would accrue to individuals, firms and the macroeconomy should policy interventions in this area prove successful. It is important that policy continues to focus on tackling the issue of skill shortages and skill gaps; however, a greater balance needs to be struck between policies aimed at eliminating gaps in the productive capacity of human capital and those removing constraints that restrict the productive capacity of human capital, promoting demand-side measures to generate jobs for available skilled workers.

References

Allen, J.; de Grip, A. 2007. *Skill obsolescence, lifelong learning and labor market participation*, Research Centre for Education and the Labour Market (ROA), Maastricht.

–; –. 2012. "Does skill obsolescence increase the risk of employment loss?", in *Applied Economics*, Vol. 44, No. 25, pp. 3237–3245.

–; de Weert, E. 2007. "What do educational mismatches tell us about skill mismatches? A cross-country analysis", in *European Journal of Education*, Vol. 42, No. 1, pp. 59–73.

–; Levels, M.; van der Velden, R. 2013. *Skill mismatch and use in developed countries: Evidence from the PIAAC study*, Maastricht University RM/13/061.

–; van der Velden, R. 2007. "Transitions from higher education to work", in *Careers of University Graduates* (Netherlands, Springer).

Barone, C.; Ortiz, L. 2011. "Overeducation among European university graduates: A comparative analysis of its incidence and the importance of higher education differentiation", in *Higher Education*, Vol. 61, No. 3, pp. 325–337.

Béduwé, C.; Giret, J.F. 2011. "Mismatch of vocational graduates: What penalty on French labour market?", in *Journal of Vocational Behavior*, Vol. 78, No. 1, pp. 68–79.

Belfield, C. 2010. "Over-education: What influence does the workplace have?", in *Economics of Education Review*, Vol. 29, No. 2, pp. 236–245.

Bellman, L.; Hübler, O. 2014. "The skill shortage in German establishments before, during and after the great recession", in *Jahrbücher für Nationalökonomie und Statistik*, Vol. 234, No. 6, pp. 800–828.

Bennett, J.; McGuinness, S. 2009. "Assessing the impact of skill shortages on the productivity performance of high-tech firms in Northern Ireland", in *Applied Economics*, Vol. 41, No. 6, pp. 727–737.

Blázquez, M.; Budría, S. 2012. "Overeducation dynamics and personality", in *Education Economics*, Vol. 20, No. 3, pp. 260–283.

Bracke, P.; Pattyn, E.; Knesebeck, O. 2013. "Overeducation and depressive symptoms: Diminishing mental health returns to education", in *Sociology of Health & Illness*, Vol. 35, No. 8, pp. 1242–1259.

Budría, S.; Moro-Egido, A.I. 2009. "The overeducation phenomenon in Europe", in *Revista Internacional de Sociologia*, Vol. 67, No. 2, pp. 329–345.

Bulmahn, G.; Krakel, M. 2002. "Overeducated workers as an insurance device", in *Labour*, Vol. 16, pp. 383–402.

Cedefop. 2010. *The skill matching challenge: analysing skill mismatch and policy implications* (Luxembourg, Publications Office).

–. 2015a. *Skills, qualifications and jobs in the EU: The making of a perfect match?: Evidence from Cedefop's European skills and jobs survey*, Cedefop Reference Series 3072.

–. 2015b. *Skill shortages and gaps in European enterprises*, Cedefop Reference Series 3071.

–. 2015c. *Tackling unemployment while addressing skill mismatch: Lessons from policy and practice in EU countries*, Cedefop Research Papers, No. 5546.

Chevalier, A.; Lindley, J. 2009. "Overeducation and the skills of UK graduates", in *Journal of the Royal Statistical Society*, Vol. 172, No. 2, pp. 307–337.

Congregado, E.; Iglesias, J.; Millán, J.M.; Román, C. 2016. "Incidence, effects, dynamics and routes out of overqualification in Europe: A comprehensive analysis distinguishing by employment status", in *Applied Economics*, Vol. 48, No. 5, pp. 411–445.

Cutillo, A.; Di Pietro, G. 2006. "The effects of overeducation on wages in Italy: a bivariate selectivity approach", in *International Journal of Manpower*, Vol. 27, No. 2, pp. 143–168.

Di Pietro, G.; Urwin, P. 2006. "Education and skills mismatch in the Italian graduate labour market", in *Applied Economics*, Vol. 38, No. 1, pp. 79–93.

Diem, A. 2015. "Overeducation among graduates from universities of applied sciences: Determinants and consequences", in *Journal of Economic & Financial Studies*, Vol. 3, No. 2, pp. 63–77.

Domadenik, P.; Farcnik, D.; Pastore, F. 2013. *Horizontal mismatch in the labour market of graduates: The role of signalling*, IZA Discussion Paper No. 7527 (Bonn, Institute of Labor Economics).

Estevao, M.; Tsounta, E. 2011. *Has the Great Recession raised US structural unemployment?*, IMF Working Paper WP/11/105.

European Commission. 2015. "Measuring skills mismatch", European Commission Analytical Web Note 7/2015.

Fleming, C.; Kler, P. 2015. "Female overeducation job satisfaction and the impact of children at home in Australia", in *Economic Analysis and Policy*, Vol. 44, No. 2, pp. 143–155.

Flisi, S.; Goglio, V.; Meroni, E.; Rodrigues, M.; Vera-Toscano, E. 2014. "Measuring occupational mismatch: Overeducation and overskill in Europe – evidence from PIAAC", in *Social Indicators Research*, pp. 1–39.

Forth, J.; Mason, G. 2006. *Do ICT skill shortages hamper firms' performance? Evidence from UK benchmarking surveys*, National Institute of Economic and Social Research Discussion Paper 281.

Frei, C.; Sousa-Poza, A. 2012. "Overqualification: permanent or transitory?" in *Applied Economics*, Vol. 44, No. 14, pp. 1837–1847.

Frogner, M. 2002. "Skills shortages", in *Labour Market Trends*, Jan.

Ghignoni, E.; Verashchagina, A. 2014. "Educational qualifications mismatch in Europe. Is it demand or supply driven?", in *Journal of Comparative Economics*, Vol. 42, No. 3, pp. 670–692.

Green, F.; McIntosh, S. 2007. "Is there a genuine under-utilization of skills amongst the over-qualified?", in *Applied Economics*, Vol. 39, No. 4, pp. 427–439.

–. Zhu, Y. 2010. "Overqualification, job dissatisfaction, and increasing dispersion in the returns to graduate education", in *Oxford Economic Papers*, Vol. 62, No. 4, pp. 740–763.

Handel, M.J.; Valerio, A.; Sánchez Puerta, M. 2016. *Accounting for mismatch in low- and middle-income countries* (Washington, DC, World Bank).

Haskel, J.; Martin, C. 1996. "Skill shortages, productivity growth and wage inflation", in A. Booth and D. Snower (eds): *Acquiring skills: Market failures, their symptoms and policy responses* (Melbourne, Center for Economic Policy Research), pp. 147–174.

Healy, J.; Mavromaras, K.; Sloane, P. 2015. "Adjusting to skill shortages in Australian SMEs", in *Applied Economics*, Vol. 47, No. 24, pp. 2470–2487.

Hung, C. 2008. "Overeducation and undereducation in Taiwan", in *Journal of Asian Economics*, Vol. 19, No. 2, pp. 125–137.

ILO. 2012. *International Standard Classification of Occupations. Structure, group definitions and correspondence tables*, Volume 1 (Geneva).

–. 2013. *Global Employment Trends for Youth 2013: A generation at risk* (Geneva).

–. 2015. *Global Employment Trends for Youth 2015: Scaling up investments in decent jobs for youth* (Geneva).

Jackson, D.; Chapman, E. 2012. "Non-technical skill gaps in Australian business graduates", in *Education and Training*, Vol. 54, No. 2/3, pp. 95–113.

Janssen, S.; Backes-Gellne, U. 2009. "Skill obsolescence, vintage effects and changing tasks", in *Applied Economics Quarterly*, Vol. 55, No. 1, pp. 83–103.

Jauhiainen, S. 2011. "Overeducation in the Finnish regional labour markets", in *Papers in Regional Science*, Vol. 90, No. 3, pp. 573–588.

Jones, M.; Sloane, P. 2010. "Disability and skill mismatch", in *Economic Record*, Vol. 86, No. 1, pp. 101–114.

Kampelmann, S.; Rycx, F. 2012. "The impact of educational mismatch on firm productivity: Evidence from linked panel data", in *Economics of Education Review*, Vol. 31, No. 6, pp. 918–931.

Karakaya, G.; Plasman, R.; Rycx, F. 2007. "Overeducation on the Belgian labour market: Evaluation and analysis of the explanatory factors through two types of approaches", in *Compare*, Vol. 37, No. 4, pp. 513–532.

Levels, M.; van der Velden, R.; Allen, J. 2014. "Educational mismatches and skills: New empirical tests of old hypotheses", in *Oxford Economic Papers*, Vol. 66, No. 4, pp. 959–982.

Li, I.; Miller, P. 2015. "Overeducation and earnings in the Australian graduate labour market: An application of the Vahey model", in *Education Economics*, Vol. 23, No. 1, pp. 63–83.

–; Malvin, M.; Simonson, R. 2015. "Overeducation and employment mismatch: Wage penalties for college degrees in business", in *Journal of Education for Business*, Vol. 90, No. 3, pp. 119–125.

Mahy, B.; Rycx, R.; Vermeylen, G. 2015. "Educational mismatch and firm productivity: Do skills, technology and uncertainty matter?", in *De Economist*, Vol. 163, No. 2, pp. 233–262.

Mason, G.; Van Ark, B.; Wagner, K. 1994. "Productivity, product quality and workforce skills: Food processing in four European countries", in *National Institute Economic Review*, Vol. 147, No. 1, pp. 62–83.

Mavromaras, K.; Mahuteau, S.; Sloane, P.; Wei, S. 2013. "The effect of overskilling dynamics on wages", in *Education Economics*, Vol. 21, No. 3, pp. 281–303.

–; McGuinness, S. 2012. "Overskilling dynamics and education pathways", in *Economics of Education Review*, Vol. 31, No. 5, pp. 619–628.

–; –; Fok, Y.K. 2009. "Assessing the incidence and wage effects of overskilling in the Australian labour market", in *Economic Record*, Vol. 85, No. 268, pp. 60–72.

–; –; Wooden, M. 2007. "Overskilling in the Australian labour market", in *Australian Economic Review*, Vol. 40, No. 3, pp. 307–312.

–; Sloane, P.; Wei, Z. 2012. "The role of education pathways in the relationship between job mismatch, wages and job satisfaction: A panel estimation approach", in *Education Economics*, Vol. 20, No. 3, pp. 303–321.

–; –; –. 2015. "The scarring effects of unemployment, low pay and skills under-utilization in Australia compared", in *Applied Economics*, Vol. 47, No. 23, pp. 2413–2429.

McGowan, M.A.; Adalet, M.; Andrews, D. 2015. *Skill mismatch and public policy in OECD countries*, OECD Working Paper 28 (Paris, OECD).

McGuinness, S. 2006. "Overeducation in the labour market", in *Journal of Economic Surveys*, Vol. 20, No. 3, pp. 387–418.

–. 2008. "How biased are the estimated wage impacts of overeducation? A propensity score matching approach", in *Applied Economics Letters*, Vol. 15, No. 2, pp. 145–149.

–; Bennett, J. 2007. "Overeducation in the graduate labour market: A quantile regression approach", in *Economics of Education Review*, Vol. 26, No. 5, pp. 521–531.

–; Byrne, D. 2015. "Born abroad and educated here: Examining the impacts of education and skill mismatch among immigrant graduates in Europe", in *IZA Journal of Migration*, Vol. 4, No. 1.

–; Ortiz, L. 2016. "Skill gaps in the workplace: Measurement, determinants and impacts", in *Industrial Relations Journal*, Vol. 7, No. 3, pp. 253–278.

–; Pouliakas, K. 2016. *Deconstructing theories of overeducation in Europe: A wage decomposition approach*, IZA Discussion Paper No. 9698 (Bonn, Institute of Labor Economics).

–; Sloane, P. 2011. "Labour market mismatch among UK graduates: An analysis using REFLEX Data", in *Economics of Education Review*, Vol. 30, No. 1, pp. 130–145.

–; Whelan, A.; Bergin, A. 2016. "Is there a role for higher education institutions in improving the quality of first employment?", in *The B.E. Journal of Economic Analysis & Policy*, Vol. 16, No. 4.

–; Wooden, M. 2009. "Overskilling, job insecurity, and career mobility", in *Industrial Relations*, Vol. 48, No. 2, pp. 265–286.

Mehta, A.; Felipe, J.; Quising, P.; Camingue. 2011. "Overeducation in developing economies: How can we test for it, and what does it mean?", in *Economics of Education Review*, Vol. 30, No. 6, pp. 1334–1347.

Montt, G. 2015. *The causes and consequences of field-of-study mismatch*, OECD Working Paper (Paris, OECD).

Morgado, A.; Sequeira, T.N.; Santos, M.; Ferreira-Lopes, A.; Reis, A. 2015. "Measuring labour mismatch in Europe", in *Social Indicators Research*, Vol. 129, No. 1, pp. 161–179.

Murillo, I. 2011. "Human capital obsolescence: Some evidence for Spain", in *International Journal of Manpower*, Vol. 32, No. 4, pp. 426–445.

Nickell, S.; Nicolitsas, D. 1997. *Human capital, investment and innovation: What are the connections?*, Centre for Economic Performance Discussion Paper 20, London School of Economics.

Nordin, M.; Persson, I.; Rooth, D. 2010. "Education-occupation mismatch: Is there an income penalty?", in *Economics of Education Review*, Vol. 29, No. 6, pp. 1047–1059.

OECD. 2013. *OECD Skills Outlook 2013: First results from the survey of adult skills* (Paris). Available at: http://dx.doi.org/10.1787/9789264204256-en.

Ortiz, L.; Kucel, A. 2008. "Do fields of study matter for over-education? The cases of Spain and Germany", in *International Journal of Comparative Sociology*, Vol. 49, Nos 4–5, pp. 305–327.

Peiró, J.M.; Agut, S.; Grau, R. 2010. "The relationship between overeducation and job satisfaction among young Spanish workers: The role of salary, contract of employment, and work experience", in *Journal of Applied Social Psychology*, Vol. 40, No. 3, pp. 666–689.

Piper, A. 2015. "Heaven knows I'm miserable now: Overeducation and reduced life satisfaction", in *Education Economics*, Vol. 23, No. 6, pp. 677–692.

Pouliakas, K. 2012. "The skill mismatch challenge in Europe", in European Commission (ed.): *Employment and social developments in Europe* (Luxembourg), pp. 351–394.

–; Russo, G. 2015. *Heterogeneity of skill needs and job complexity: Evidence from the OECD PIAAC survey*, IZA Discussion Paper No. 9392 (Bonn, Institute of Labor Economics).

Quinn, M.; Rubb, S. 2006. "Mexico's labor market: The importance of education-occupation matching on wages and productivity in developing countries", in *Economics of Education Review*, Vol. 25, No. 2, pp. 147–156.

Quintini, G. 2011. *Over-qualified or under-skilled: A review of existing literature*, OECD Social, Employment and Migration Working Papers, No. 121 (OECD Publishing, Paris).

Ramos, R.; Sanroma, E. 2011. *Overeducation and local labour markets in Spain*, IZA Discussion Paper No. 6028 (Bonn, Institute of Labor Economics).

–; Surinach, J.; Artís, M. 2012. "Regional economic growth and human capital: The role of over-education", in *Regional Studies*, Vol. 46, No. 10, pp. 1389–1400.

Robert, P. 2014. "Job mismatch in early career of graduates under post-Communism", in *International Journal of Manpower*, Vol. 35, No. 4, pp. 500–513.

Robst, J. 2007. "Education and job match: The relatedness of college major and work", in *Economics of Education Review*, Vol. 26, No. 4, pp. 397–407.

–. 2008. "Overeducation and college major: Expanding the definition of mismatch between schooling and jobs", in *The Manchester School*, Vol. 76, No. 4, pp. 349–368.

Rubb, S. 2014. "Overeducation and earnings within an occupation: Controlling for occupational heterogeneity of nurses", in *Education Economics*, Vol. 22, No. 3, pp. 257–269.

Salinas-Jiménez, M.; Artés, J.; Salinas-Jiménez, J. 2016. "Educational mismatch and job aspirations: A subjective wellbeing analysis using quantile regression", in *International Journal of Manpower*, Vol. 37, No. 1, pp. 115–134.

Sánchez-Sánchez, N.; McGuinness, S. 2015. "Decomposing the impacts of overeducation and overskilling on earnings and job satisfaction: An analysis using REFLEX data", in *Education Economics*, Vol. 23, No. 4, pp. 419–432.

Sattinger, M. 2012. *Qualitative mismatches. Foundations and trends in microeconomics*, Vol. 8.

Sloane, P. 2014. "Overeducation, skill mismatches, and labor market outcomes for college graduates", in *IZA World of Labor*.

Sparreboom, T. 2017. "Structural change, employment and education in four countries in Sub-Saharan Africa", in *African Journal of Economic and Management Studies*, Vol. 8, No. 2, pp. 172–185.

–; Staneva, A. 2014. *Is education the solution to decent work for youth in developing economies*?, ILO Work 4 Youth Publication Series No. 23 (Geneva, ILO).

–; –. 2015. *Structural change, employment and education in Mozambique*, ILO Employment Working Paper No. 174 (Geneva, ILO).

Tang, J.; Wang, W. 2005. "Product market competition, skill shortages and productivity: Evidence from Canadian manufacturing firms", in *Journal of Productivity Analysis*, Vol. 23, No. 3, pp. 317–339.

Tether, B.; Mina, A.; Consoli, D.; Gagliardi, D. 2005. *A literature review on skills and innovation. How does successful innovation impact on the demand for skills and how do skills drive innovation?*, a CRIC Report for the Department of Trade and Industry (Manchester, ESRC).

Van Loo, J.; de Grip, A.; de Steur, M. 2001. "Skills obsolescence: Causes and cures", in *International Journal of Manpower*, Vol. 2, Nos 1/2, pp. 121–138.

Verhaest, D.; Omey, E. 2006. "The impact of overeducation and its measurement", in *Social Indicators Research*, Vol. 77, No. 3, pp. 419–448.

–; –. 2012. "Overeducation, undereducation and earnings: Further evidence on the importance of ability and measurement error bias", in *Journal of Labor Research*, Vol. 33, No. 1, pp. 76–90.

–; Schatteman, T.; van Trier, W. 2015. "Overeducation in the early career of secondary education graduates: An analysis using sequence techniques", in *Young*, Vol. 23, No. 4, pp. 336–356.

–; Sellami, S.; van der Velden, R. 2015. "Differences in horizontal and vertical mismatches across countries and fields of study", in *International Labour Review,* Vol. 156, No. 1, pp. 1–24.

–; Verhofstadt, E. 2016. "Overeducation and job satisfaction: The role of job demands and control", in *International Journal of Manpower*, Vol. 37, No. 3, pp. 456–473.

Wolbers, M. 2003. "Job mismatches and their labour-market effects among school-leavers in Europe", in *European Sociological Review*, Vol. 19, No. 3, pp. 249–266.

Yang, J.; Mayston, D. 2012. "Impact of overeducation on wages in China", in *Chinese Economy*, Vol. 45, No. 2, pp. 65–89.

3. Educational mismatch: Analysis of labour force survey data

Chapter 2 gave an overview of the different forms of mismatch and provided a detailed literature review for each type. Chapters 3–5 focus more specifically on the issue of educational mismatch, the form of mismatch for which data are most readily available.

This chapter examines both the trends and the potential drivers of overqualification of mainly middle-income countries, with time series based on the labour force surveys data. Countries are categorized by income classification, which is either low, lower middle or upper middle, in order to develop an understanding of the incidence and impacts of mismatch within different country contexts.[1] Where data exist, the wage impacts of both over- and underqualification for a number of both low- and middle-income countries are assessed.

Section 3.1 discusses evidence and an assessment approach to determinants of overqualification. Section 3.2 describes the data set used in this chapter and presents some descriptive statistics, including the relationships between educational mismatch and certain key labour market and macroeconomic variables. Section 3.3 conducts a meta-analysis of 60 country estimates of educational mismatch to assess the extent to which they are correlated with factors such as per capita GDP, labour force participation, unemployment and various forms of labour market informality. Section 3.4 concludes.

3.1 Evidence on drivers of overqualification

Existing evidence on the drivers of cross-country differences in overqualification is limited. Verhaest and van der Velden (2012) use a multi-level model to explain cross-country variations in the incidence of graduate overqualification among OECD countries at a single point in time. They include a range of control variables to account for factors such as education composition, education quality, measures of output and unemployment gaps, R&D expenditure, employment protection legislation, and measures of education oversupply. They find that cross-country differences

[1] The initial research design sought to develop a comprehensive typology of countries. However, the breadth of this typology could not be realized due to data constraints relating to both the number of countries included in the data set and the lack of variation in income status among these countries, most of which were middle-income.

in overqualification were related to their measures which, they argue, capture variations in the quality and orientation (general versus specific) of the education system, business cycle effects and the relative oversupply of highly skilled labour. Croce and Ghignoni (2012) use data from the European Community Household Panel (ECHP) to examine differences in graduate overqualification in 26 European countries between 1998 and 2003. Based on samples of between 80 and 100 country-level observations, they also find that overqualification is related to business cycle variables and tends to be higher in countries with a lower wage gap between graduates and workers with upper secondary education.[2] Davia et al. (2017) undertake a similar exercise using EU-SILC data to explain regional variations in overqualification rates across 28 European countries between 2004 and 2009. Similar to Verhaest and van der Velden (2012), Davia et al. (2017) find evidence to support the notion that overqualification is related to an excessively educated labour supply. They also report that the overqualification rate is positively related to the share of migrants in the labour market and is lower for females in regions with strong employment protection.

A more recent study in the area by McGuinness et al. (2017) attempts to provide a more extensive assessment of the drivers of cross-country variation in overqualification rates by building a quarterly time series data set for the 28 countries within the European Labour Force Survey (LFS) over the period 1998 to 2012. The study indicates that there are wide variations in overqualification rates throughout Europe, with rates generally highest in peripheral countries and lowest in eastern European States. With respect to trends, overqualification was found not to be rising over time in most countries; even in instances where it was growing, the upward trend has been gradual. Overqualification rates were found to be static or falling in around half of EU-28 countries. In terms of the determinants of cross-country variations in overqualification, there was considerable variation in the impact of explanatory variables by gender and whether countries were located in central Europe, eastern Europe or on the periphery of the EU-28. Overqualification was found to be lower in central European countries with a higher female employment share; this, the authors argue, suggests the important role of equality policies that enable females to remain in the labour market. Labour market flexibility, measured by the employment shares of temporary and part-time workers, was found to lower rates of male overqualification in central European countries. The evidence also suggests that workers may choose to remain unemployed and continue job search rather than enter employment and be overqualified; this effect is strongest in eastern Europe. Countries employing larger shares of workers in manufacturing in central Europe, and sales and hospitality in peripheral countries, also had lower rates of overqualification. The higher the availability of vocational educational places for young people seeking post-secondary education and training in eastern and periphery country groupings, the lower was the overqualification rate. On the basis of their findings, McGuinness et al. (2017) conclude that while overqualification is related to a number of labour market and policy variables,

[2] It is not clear that this lower wage gap is not itself driven by higher rates of overqualification which will tend to depress the earnings of graduates.

the impact of these variables will vary substantially depending on specific labour market contexts of the region in question.[3]

3.2 Data generation and methods

Our general approach seeks to replicate, given the available information, the data generation methodology adopted by McGuinness et al. (2017) for the EU-28, in order to assess the evolution and drivers of educational mismatch in low- and middle-income countries. The European study was relatively straightforward as it relied on the EU-LFS, a standardized pooled data set constructed from the labour force surveys of individual Member States. The availability of the EU-LFS data sets ensured that the data relating to each of the EU-28 countries were consistently populated over time, contained variables that were measured and reported in a standardized fashion, and consistent with respect to the variables captured for each country.

As no EU-LFS equivalent exists for low- and middle-income countries, the data generation approach can only be replicated by attempting to combine the labour force surveys of individual countries in a meaningful way. None of the three key elements that characterized the EU-LFS can be guaranteed when attempting manually to combine the surveys of countries with widely varying data infrastructures and statistical measurement practices, so generating estimates was much less straightforward than was the case for Europe.

In the absence of common subjective measurement, and due to some drawbacks of the normative method (see 2.1), educational mismatch is measured objectively using the empirical method. For each country, in each quarter, overqualification (underqualification) is defined as the proportion of employees in full-time employment whose education level is one level or more above (below) the occupational mode. The occupational modal level of education is the most common qualification possessed by workers in each two-digit occupation group. If the modal level of schooling in a particular two-digit occupation was measured at ISCED 3, then all individuals educated to ISCED levels 4 and above (level 2 or below) would be deemed to be overqualified (underqualified) in this approach. All individuals who are classified as overqualified (underqualified) are then summed up to calculate the overall rate of overqualification (underqualification) in each country for each quarter. The rates are estimated based on the sample of full-time employees in employment. Using the microdata for each country allows extracting a series of potential explanatory variables that may help explain cross-country variations in educational mismatch (such as unemployment, participation, measures of labour market flexibility and informality) for each country for each quarter.

[3] The availability of consistent EU-LFS data for a large number of countries allows McGuinness et al. (2017) to develop a typology based on region. Due to data constraints, it was not feasible to develop a comprehensive typology for our study of low- and middle-income countries.

Data availability

Labour force surveys (LFS) provide data on a large number of low- and middle-income countries. In total the feasibility of over 50 national surveys was assessed for possible inclusion in the study. However, the quality and consistency of data was below that available within the EU-LFS.[4] The extent of variability in data collection is demonstrated in figure A.3.1 in Annex 3.2. The selection of countries to be included in the assessment was driven purely by data availability and quality, as opposed to any strategic grouping according to criteria such as region or stage of economic development, although this was a goal of the original research design. In order to get the most complete cross-sectional representation of variations in the incidence of educational mismatch, a time point was selected during which the largest number of countries published a labour force survey. From figure A.3.1 it is clear that the largest extent of cross-sectional coverage occurred around 2012; for this time point (or one close to it), it is possible to generate mismatch estimates for 20 low- and middle-income countries from Africa, Latin America, Asia and Europe. Unfortunately, many countries could not be included in this cross-sectional assessment due to difficulties relating to the availability of relevant data sets or data problems related to either the education or occupational variables.[5] For a limited number of countries and years, the ILO has processed country-level labour force surveys to create standardized ILO variables relating to education, occupation and employment, making data extraction more straightforward for these countries. If a standardized ILO data set existed for a country in a year close to 2012, this was also included in the cross-sectional assessment; for example, a standardized ILO data set exists for Bangladesh in 2013. The cross-sectional analysis is referred to as 2012 (or nearest year).[6]

Meeting the core objective of measuring and understanding the evolution of educational mismatch across countries over time was challenging, as it requires continuous publication of national labour force surveys so that the direction of trends can be observed. Furthermore, the countries to be included in the longitudinal analysis should publish data over a relatively common time period in order to maximize comparability and meet the basic requirements for model estimation within an unbalanced panel data framework. Consistent with figure A.3.1 it was possible to extract and use data from ten countries for the longitudinal analysis with, once again, some countries being excluded due to data problems. No countries classified as low-income published enough data to be included in this aspect of the research so the longitudinal component is limited to

[4] Some of the main problems included lack of two-digit occupational information, language barriers and inaccessible data structure.

[5] The countries included in the cross-sectional assessment are Albania, Argentina, Bangladesh, Cambodia, Ecuador, The Gambia, Guatemala, India, Liberia, Mongolia, Namibia, Pakistan, Peru, Philippines, Samoa, Serbia, South Africa, the United Republic of Tanzania, Uganda and Viet Nam. The countries not included due to data difficulties are the Plurinational State of Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Egypt, Madagascar, Malawi, Mexico, Panama, Tunisia, Uruguay and Zambia.

[6] This was also the case for Ecuador (2014), Guatemala (2014), Liberia (2010), Namibia (2014) and the United Republic of Tanzania (2014).

assessing and explaining variations in educational mismatch across ten middle-income countries from several continents.[7]

Methodology

The dependent variable in the longitudinal analysis is the proportion of full-time employees who are overqualified (underqualified) in a given quarter, in a given year, in a given country. National labour force surveys allow construction of a series of structural variables that can potentially help us understand cross-country variations within a middle-income country context. Following McGuinness et al. (2017), constructed variables reflect the nature of each country's labour supply (participation rates and share of females in employment), level of labour demand (unemployment rate), the composition of labour demand (ratio of employment in low- to high-skilled occupations),[8] labour market flexibility (share of employees who are part-time and share of temporary contracts), demographic structure (age composition of the labour force), informality (the ratio of self-employment to employment) and the stage of economic development (per capita GDP[9]). This begins by relating trends in educational mismatch to these structural variables in a descriptive fashion, before examining relationships more formally within a panel estimation framework which can be written as follows:

$$Y_{it} = \beta_0 + \beta_i X_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

where y_{it} is the dependent variable (rate of educational mismatch among full-time employees) observed for country i at time t, β_0 is a constant term, X_{it} represents a vector of independent structural variables in country i at time t, with β_i being the associated coefficient for variable j. The unobserved time-invariant country effect is denoted by α_i and ε_{it} is the error term. In terms of the specific panel modelling approach adopted, opting for a fixed effects estimator allows modelling the determinants of educational mismatch, while controlling for time-invariant country-level fixed effects. These models are first estimated using the rate of educational mismatch for both male and female full-time employees, before assessing the extent to which the impacts vary with respect to gender by estimating the models separately, using male and female mismatch rates as dependent variables.

Educational mismatch is important from a policy perspective as it can have a negative impact on productivity-related variables, such as earnings, and the job satisfaction of mismatched workers. Skills mismatch also implies a certain level of

---

[7] The countries that have labour force surveys spanning several consecutive years but could not be included due to data difficulties are the Plurinational State of Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Egypt, Mexico, Honduras, Panama, Paraguay, Thailand and Uruguay.

[8] ISCO 2–3 to 7–9.

[9] The GDP per capita data were sourced from the World Bank World Development Indicators Database (GDP per capita, constant 2010 US$). As this variable was only available on an annual basis, the data points were interpolated to fit the time-series structure of the data.

ineffective public expenditure if people are acquiring education which is not being utilized in the labour market. While studying the impact of educational mismatch on all of these outcome variables is not possible, the data set allows examining the impact of educational mismatch on earnings. Thanks to the fact that a number of countries collect wage information within their labour force surveys, it is possible to estimate the following wage equation using cross-sectional data published between 2010 and 2013:

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 O_i + \beta_2 U_i + \varepsilon_i \quad (2)$$

where y_i is the logged rate of hourly worker pay, i, X_i are a set of control variables (gender, age and sector), while O_i and U_i are dummy variables which indicate whether the respondent was identified as being overqualified or underqualified.

3.3 Results

Table 3.1 ranks countries by their estimated rate of overqualification in 2012 (or the closest available year) and provides the incidence of underqualification and matched employment, along with an indicator of the country's estimated income status.[10] Overqualification was found to be highest, at 35 per cent, in Argentina, and exceeded 30 per cent in five of the 20 countries for which estimates were available. These incidences are higher than the rates typically observed for developed labour markets under this approach. At just under 30 per cent, underqualification was highest in India and Peru and exceeded 20 per cent in nine of the 20 countries. What is immediately clear is that a high level of overqualification in a country does not necessarily translate to a low level of underqualification; several countries exhibiting some of the highest rates of underqualification, such as Argentina, Guatemala and South Africa, were some of the worst performers with respect to overqualification. There is also no simple relationship between matched employment and the two forms of educational mismatch; for instance, almost 75 per cent of employees in Cambodia are matched due mainly to a very low level of underqualification, while Samoa exhibits a similar incidence of matched employment due to the combined effect of below average levels of both over- and underqualification. On income levels there is no discernible difference between upper and lower middle-income countries in incidence of mismatch, but table 3.1 suggests that low-income countries are more likely to experience above-average levels of overqualification. It is, however, important to note that the empirical method of measurement is likely to reflect the overall low level of education of the workforce counted in the occupational modal value.

That is why there are important differences in the nature of overqualification between country income groups. Within developed economies, overqualification tends to be concentrated among graduates and individuals with post-secondary education,

[10] The World Bank groups countries into the following classifications: high-income, upper middle-income, lower middle-income and low-income. See https://datahelpdesk.worldbank.org/knowledgebase/articles/906519

Table 3.1 The incidence of educational mismatch (percentages)

Country	Overqualified	Underqualified	Matched	Income classification
Albania	18	17	65	Upper middle-income
Argentina	35	22	43	Upper middle-income
Bangladesh	31	11	58	Lower middle-income
Cambodia	22	3	75	Lower middle-income
Ecuador	21	17	62	Upper middle-income
The Gambia	30	7	63	Low-income
Guatemala	33	23	43	Lower middle-income
India	18	29	53	Lower middle-income
Liberia	27	17	57	Low-income
Mongolia	11	20	69	Lower middle-income
Namibia	20	16	63	Upper middle-income
Pakistan	28	21	51	Lower middle-income
Peru	17	29	54	Upper middle-income
Philippines	22	27	51	Lower middle-income
Samoa	11	14	75	Upper middle-income
Serbia	22	21	56	Upper middle-income
South Africa	32	24	45	Upper middle-income
Tanzania, United Rep. of	25	7	68	Low-income
Uganda	26	7	67	Low-income
Viet Nam	25	17	59	Lower middle-income

Source: Own calculations based on LFS 2012 or nearest available year.

while underqualification is more predominant for those with lower and upper secondary levels of education. Table 3.2 plots the distribution of overqualification for each of the countries in the sample by education level. Graduates account for, on average, just 20 per cent of overqualified employees, approximately half the rate recorded for the EU-28.[11] Almost two-thirds of overqualified individuals have lower or upper secondary schooling, demonstrating that most overqualification in low- and middle-income countries relates to workers with relatively low levels of education. There is much variation across countries: in Mongolia, over 50 per cent of the overqualified are graduates, while the share is less than 3 per cent for The Gambia. Some African countries, such as Uganda, the United Republic of Tanzania, Namibia and The Gambia, have the highest shares of overqualified individuals with lower secondary education, indicating an overall low level of education among the workforce in these countries or structural mismatch by type/field of study (where comparable data are not available). It may also reflect lack of better-quality skill-intensive jobs and point to the low skills requirements for the available jobs. The latter could be a strategy to cope with lack of better-educated workers, or may point to a low-skill low-wage business strategy.

[11] Based on author's own calculations using EU-LFS data. Details available on request.

Table 3.2 Overqualified by education level (percentages)

	None / Primary	Lower secondary	Upper secondary	Post-secondary	Degree and above
Argentina	0	25	22	29	24
Bangladesh	0	34	47	2	17
Cambodia	0	68	22	1	9
Ecuador	0	26	43	3	28
The Gambia	0	45	40	12	3
Liberia	0	24	39	13	23
Mongolia	0	1	3	42	54
Namibia	0	68	1	7	24
Peru	0	0	26	44	30
Philippines	0	18	25	40	17
Serbia	0	10	43	25	22
South Africa	0	24	34	26	16
Tanzania, United Rep. of	0	62	18	11	9
Uganda	0	59	19	13	9
Viet Nam	0	30	35	18	17
Average	**0**	**33**	**28**	**19**	**20**

Note: The education categories are slightly different for Peru and Argentina. Peru: None/incomplete primary; primary/incomplete secondary; secondary/incomplete post-secondary; post-secondary; degree and above. Argentina: None/primary; incomplete secondary; complete secondary; incomplete university; complete university.
Source: Own calculations based on LFS.

Table 3.3 summarizes the distribution of underqualification by education level and, again, showing a contrast relative to the EU average: 74 per cent of underqualified workers are educated to either primary or lower secondary level compared to 61 per cent in the EU-28.[12] This suggests that underqualification is related to the relatively low levels of educational attainment present in many developing countries. Approximately 27 per cent of underqualified workers hold upper or post-secondary qualifications. There are outliers more reflective of the distribution in EU countries: Mongolia, the Philippines, Viet Nam, Uganda and the United Republic of Tanzania have much higher shares of underqualified workers holding post-secondary levels of education. The very high proportions of underqualified workers (educated to primary level only) in Namibia, Liberia, The Gambia and South Africa point to limited availability of skilled workers, with vacant jobs absorbing whatever workforce is available. Some Asian countries also have a predominance of underqualified workers holding primary qualifications only; over 40 per cent of underqualified workers in Viet Nam, Cambodia and the Philippines have only the lowest level of qualifications. Similarly,

[12] Based on author's own calculations using EU-LFS data. Details available on request.

Table 3.3 Underqualified by education level (percentages)

	None / Primary	Lower secondary	Upper secondary	Post-secondary	Degree and above
Argentina	36	43	10	10	0
Bangladesh	28	22	43	7	0
Cambodia	45	50	4	1	0
Ecuador	48	24	22	5	0
The Gambia	44	37	17	2	0
Liberia	59	34	7	1	0
Mongolia	8	35	28	29	0
Namibia	77	14	0	9	0
Peru	30	50	10	10	0
Philippines	42	30	10	18	0
Serbia	31	48	7	13	0
South Africa	44	40	10	6	0
Tanzania, United Rep. of	21	9	57	14	0
Uganda	14	51	20	14	0
Viet Nam	53	24	8	14	0
Average	**39**	**34**	**17**	**10**	**0**

Note: The education categories are slightly different for Peru and Argentina. Peru: None/incomplete primary; primary/incomplete secondary; secondary/incomplete post-secondary; post-secondary; degree and above. Argentina: None/primary; incomplete secondary; complete secondary; incomplete university; complete university.

Source: Own calculations based on LFS.

over one third of Ecuadorian and Argentinian underqualified workers possess only primary education or lower.

Table 3.4 summarizes the extent to which overqualification has been increasing, decreasing or remaining static in ten countries for which reliable longitudinal information exists. Overqualification was found to be decreasing over time in most countries but becoming more prevalent in recent years in Albania, Serbia and Viet Nam.[13] In all of the countries where overqualification was observed to be decreasing, underqualification has been on the rise, yet there is no direct trade-off between the two forms of mismatch; both over- and underqualification rose in Albania and Viet Nam in recent years. The detailed trends for each country are provided graphically

[13] If educational attainment within a country remains relatively stable and there is a reduction in overqualification, this implies that there is an increase in job quality. Similarly, an increase in underqualification, seen in most countries in the sample, may be due to an increase in higher-quality jobs.

Table 3.4 Summary of trends in educational mismatch for countries with panel data

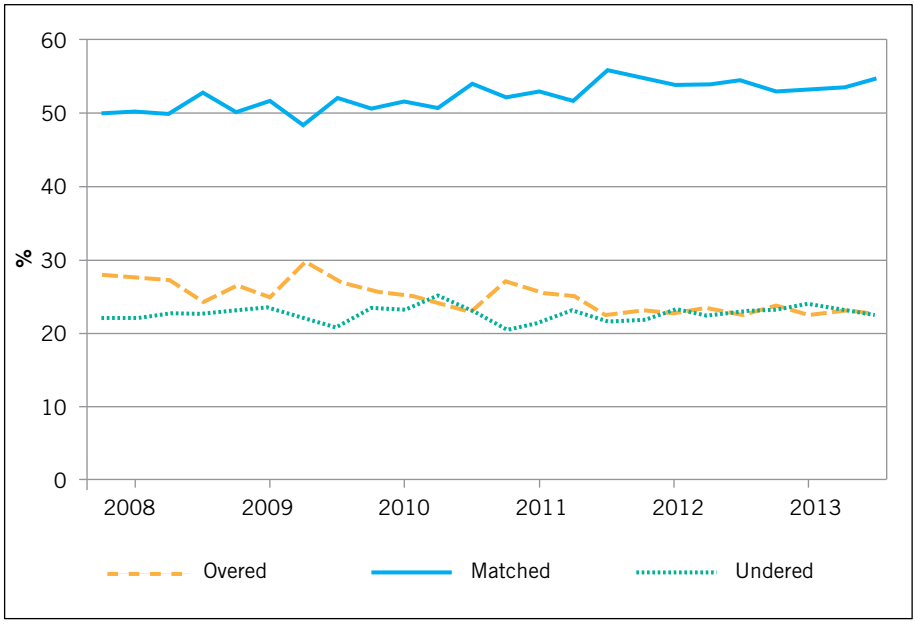
Country	Overqualification	Underqualification	Matched
Albania	Increasing	Stable	Decreasing
Argentina	Decreasing	Increasing	Stable
Ecuador	Stable	Stable	Stable
Guatemala	Decreasing	Increasing	Increasing
Mongolia	Stable	Decreasing	Increasing
Pakistan	Decreasing	Increasing	Stable / Increasing
Peru	Decreasing	Increasing	Increasing
Philippines	Decreasing	Increasing	Stable
Serbia	Increasing	Stable	Decreasing
South Africa	Decreasing	Increasing	Stable / Increasing
Viet Nam	Increasing	Increasing	Decreasing

Source: Own calculations based on LFS.

in the annexes. Figure 3.1 presents average trends for countries included in the longitudinal assessment which have consistent data over the period 2008–13; it depicts a pattern of declining overqualification, rising underqualification and rising matched employment. Underqualification rates have converged towards overqualification rates in recent years, which seems to support Sparreboom and Staneva's (2014) finding that underqualification is a more important problem for developing labour markets. The observed increase in the proportion of employees who are matched over time has occurred by virtue of the fact that the rate of increase in underqualification (which reduces matched employment) has been lower than the rate of decline in overqualification (which increases matched employment). The relationship between the various forms of mismatch is demonstrated formally in table 3.5, which presents the results from a simple linear regression between overqualification as the explanatory variable and underqualification and matched employment as the dependent variables respectively. A 1 percentage point decrease in overqualification is associated with a 0.25 percentage point increase in underqualification and, therefore, a 0.75 percentage point increase in matched employment. The descriptive analysis demonstrates that, while over- and underqualification tend generally to trend in opposite directions, the relationship between them is not proportionate, which indicates that both phenomena may be driven, at least partly, by different factors.

Table A.3.1 in Annex 3.1 shows the average over- and underqualification rates together with a range of averages for indicator variables derived principally from each country's respective labour force survey. This aims to get an initial indication of the extent to which both forms of educational mismatch are likely to be driven by factors related to the level and composition of labour demand/supply, the degree of labour

Figure 3.1 Average trends, 2008–13, selected countries*



*Albania, Argentina, Mongolia, Pakistan, Peru, Philippines, Serbia and South Africa.
Note: Overed = overeducated (overqualified); Undered = undereducated (underqualified).
Source: Own calculations based on LFS.

Table 3.5 Estimated relationship between forms of educational mismatch, 2008–13: OLS

	Matched	**Underqualification**
Overqualification	–0.751***	–0.249***
	(0.034)	(0.0337)
Constant	0.711***	0.289***
	(0.009)	(0.009)
R-squared	0.763	0.261
No. of observations	156	156

Source: Own calculations based on LFS.

market flexibility, informality, and macroeconomic performance. There are no clear linear patterns apparent in the data and it is difficult to say with any degree of confidence that either form of mismatch is correlated with any of the potential explanatory variables at a descriptive level.

Econometric evidence

Table 3.6 presents the results from a fixed effects model estimated on an unbalanced panel for the period 2001 to 2016, using quarterly observations from ten middle-income countries.[14] A fixed effects estimator is used as the random effects specification was rejected by a Hausman test (Hausman, 1978). The current specification controls for country-level, time-invariant influences that could potentially distort the findings. Unlike the results for the EU-28, for which unemployment and overqualification were found to move in opposite directions, showing that a 1 percentage point increase in the unemployment rate generates a 0.19 percentage point increase in the rate of overqualification. The inverse relationship for developed economies may reflect the fact that individuals choose to withdraw from the labour market during periods of high unemployment in advanced economies; however, this is likely to be less of an option for employees in developing labour markets, implying that overqualification rises as workers compete for fewer high-quality jobs.

While it is not possible to measure the extent to which overqualification in middle-income countries is more heavily associated with informality, whereby workers are employed in positions that are neither monitored nor taxed, a proxy for this is controlling for the ratio of self-employed to employed workers. The higher this ratio, the higher the level of informality within the labour market is likely to be. This is because the self-employed have greater opportunities for informality as they are typically covered by fewer regulations. It is reasonable to suggest that in countries where the self-employed sector is dominant, informality practices are likely to spill over to the employed sector. There is some evidence that overqualification tended to be higher in labour markets where self-employment, and informality, was more prevalent. A 1 percentage point increase in the self-employment to employment ratio results in a 0.07 percentage point increase in the overqualification rate. The demographic structure of the labour market also has a considerable influence on overqualification. A 1 percentage point increase in the share of the labour force aged under 30 leads to an increase of approximately 1 percentage point in the overqualification rate. The most obvious explanation for the demographic effect is that, as investment in education is concentrated on younger cohorts, an increased labour market share of this group will be associated with rising overqualification in instances where job quality is growing at a slower rate than the growth in more educated young people entering the labour market. Conversely, overqualification is negatively related to the participation rate; however, while there are no straightforward explanations for this result, it is likely that higher participation will also be associated with other factors such as more effective labour market institutions and employment protection legislation, all of which have been shown to reduce overqualification (Verhaest and Van der Velden, 2012; Davia et al., 2017).

Underqualification was lower in labour markets with higher shares of self-employment, which seems consistent with findings by Handel et al. (2016) that

[14] All variables used in the model are defined in the data Annex 3.1; see table A.3.2.

Table 3.6 Determinants of educational mismatch, 2001–16: Fixed effects estimates

VARIABLES	(1) Overed	(2) Undered	(3) Matched
Log(gdp)	–0.0282	–0.0294	0.0576***
	(0.0255)	(0.0283)	(0.0166)
Unemployment rate (%)	0.192**	–0.300***	0.108**
	(0.0829)	(0.0920)	(0.0539)
Participation rate (%)	–0.481***	0.341**	0.140*
	(0.129)	(0.144)	(0.0841)
Temporary workers (%)	–0.0530	0.0224	0.0306
	(0.0684)	(0.0758)	(0.0444)
Part-time (%)	–0.00339	0.0123	–0.00894
	(0.110)	(0.122)	(0.0712)
Female (%)	0.0142	–0.124	0.110
	(0.140)	(0.155)	(0.0907)
High- to low-skilled occupations	0.0262	0.0914**	–0.118***
	(0.0326)	(0.0362)	(0.0212)
Ratio of self-employed	0.0769***	–0.188***	0.111***
	(0.0244)	(0.0271)	(0.0159)
Under 30 (%)	0.955***	–0.560***	–0.395***
	(0.168)	(0.186)	(0.109)
Constant	0.405	0.582**	0.0132
	(0.262)	(0.290)	(0.170)
Observations	317	317	317
R-squared	0.341	0.254	0.455
Number of id	10	10	10

Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculations.

underqualification is negatively correlated with labour market informality in low- and middle-income countries. The results show that an increase in the share of self-employment tends to reduce underqualification by more than it increases over-qualification, resulting in an overall increase in matched employment. Underqualification also appears to be related to the composition of labour demand within an economy; specifically, underqualification increases as the relative share of jobs in high-skilled occupations rises, suggesting that there are insufficient numbers of graduates to meet the demand that exists at the upper end of the job quality spectrum. A 10 percentage point increase in this ratio leads to a 1 percentage point increase in

underqualification and a similar-sized decline in matched employment. An increase in the share of young people in the labour force tends to reduce underqualification, suggesting that there may be some substitution with respect to older, less-qualified workers exiting the labour market. The impact of younger demographics on overqualification, which drives down matched employment, dominates the impact on underqualification, which drives it up, resulting in an overall reduction in the proportion of workers who are in matched employment.

Matched employment was found to rise with per capita GDP: a 1 per cent increase in GDP is associated with a 0.058 percentage point increase in matched employment. It was positively related to the self-employment to employment ratio, suggesting that an increase in this variable reduces underqualification to a greater degree than it increases overqualification. Matched employment was found to fall with a rise in the share of professional occupations, as such a change appears to boost underqualification in consequence, presumably, of a lack of qualified applicants to fill emerging high-skilled positions.

Tables 3.7 and 3.8 estimate separate models for rates of educational mismatch among males and females, showing that differences arise with respect to the pooled (by gender) model. There is evidence of distinct business cycle effects by gender: an increase in per capita GDP was found to reduce overqualification among females but to reduce underqualification among males. In both cases, matched employment increased as a result of the rise in per capita GDP, though for different reasons. Underqualification is more heavily distributed among individuals with lower qualifications, while overqualification is more common among individuals with mid-range qualifications; the differential effect may reflect differences in the educational distribution of males and females. A finding that females in employment are more likely to have higher levels of schooling would be consistent with stylized facts of developed labour markets.

Unemployment was found to reduce underqualification for both genders but increased overqualification in the male labour market only. Similarly, increased participation reduced overqualification for both males and females but was found also to increase underqualification among females. Consequently, an increase in participation improved matched employment in the male labour market only. Some further differential effects were also observed in the share of high- to low-skilled employment and demographic structure. While statistically significant effects were present in both labour markets, these variables impacted over- and underqualification differently across genders, resulting in varying effects on the rates of matched employment.

High rates of educational mismatch are particularly problematic if there are corresponding impacts on worker productivity-related variables, such as earnings. Table 3.9 shows the results from cross-sectional ordinary least squares (OLS) wage regressions for 2012 (or nearest year) for a subset of countries whose data contain standardized ILO variables along with earnings data. The results show that educational mismatch has substantial wage impacts within low- and middle-income countries. As expected, the results provide evidence of a pay penalty associated with overqualification. The estimates range from approximately 20–25 per cent in the Philippines, Guatemala, Pakistan, Viet Nam, Ecuador and Bangladesh to as high as 30, 40 and 60 per cent in The Gambia, Uganda

Table 3.7 Determinants of female educational mismatch, 2001–16: Fixed effects estimates

VARIABLES	(1) Overed	(2) Undered	(3) Matched
Log(gdp)	–0.0628**	0.0214	0.0414*
	(0.0289)	(0.0335)	(0.0240)
Unemployment rate (%)	0.142	–0.219**	0.0770
	(0.0940)	(0.109)	(0.0781)
Participation rate (%)	–0.622***	0.691***	–0.0692
	(0.147)	(0.170)	(0.122)
Temporary workers (%)	0.0725	–0.0816	0.00907
	(0.0775)	(0.0899)	(0.0643)
Part-time (%)	–0.0960	0.112	–0.0157
	(0.124)	(0.144)	(0.103)
Female (%)	–0.114	–0.163	0.277**
	(0.158)	(0.184)	(0.132)
High- to low-skilled occupations	0.00488	0.126***	–0.131***
	(0.0370)	(0.0429)	(0.0307)
Ratio of self-employed	0.0638**	–0.214***	0.150***
	(0.0277)	(0.0321)	(0.0230)
Under 30 (%)	0.650***	–0.0842	–0.565***
	(0.190)	(0.221)	(0.158)
Constant	0.866***	–0.164	0.299
	(0.297)	(0.344)	(0.246)
Observations	317	317	317
R-squared	0.248	0.198	0.348
Number of id	10	10	10

Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculations.

Table 3.8 Determinants of male educational mismatch, 2001–16: Fixed effects estimates

VARIABLES	(1) Overed	(2) Undered	(3) Matched
Log(gdp)	–0.00286	–0.0606**	0.0634***
	(0.0281)	(0.0303)	(0.0157)
Unemployment rate (%)	0.229**	–0.279***	0.0498
	(0.0915)	(0.0984)	(0.0511)
Participation rate (%)	–0.369**	0.143	0.226***
	(0.143)	(0.154)	(0.0797)
Temporary workers (%)	–0.0744	0.0316	0.0428
	(0.0754)	(0.0811)	(0.0421)
Part-time (%)	0.00645	–0.0396	0.0332
	(0.121)	(0.130)	(0.0675)
Female (%)	0.172	–0.209	0.0375
	(0.154)	(0.166)	(0.0860)
High- to low-skilled occupations	0.0405	0.0730*	–0.113***
	(0.0360)	(0.0387)	(0.0201)
Ratio of self-employed	0.0968***	–0.168***	0.0714***
	(0.0269)	(0.0290)	(0.0150)
Under 30 (%)	1.108***	–0.875***	–0.234**
	(0.185)	(0.199)	(0.103)
Constant	0.0185	1.085***	–0.104
	(0.289)	(0.311)	(0.161)
Observations	317	317	317
R-squared	0.320	0.261	0.417
Number of countries	10	10	10

Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Source: Own calculations.

and Namibia, respectively. This is higher than the pay penalties observed in the literature for developed countries. Again, as expected, there is consistent evidence of an underqualification pay premium, with some of the estimates substantially above those found for developed countries. The estimates reveal a pay premium ranging from approximately 10 per cent in Guatemala, Pakistan, Viet Nam and Ecuador to almost 35 per cent in the Gambia and 60 per cent in Namibia. The impact of other variables in the model is as expected, with males typically earning more than females and wages increasing with age.

Table 3.9 Wage impacts of educational mismatch: OLS

	Bangladesh	The Gambia	Liberia	Cambodia	Uganda	Namibia	Philippines	Guatemala	Pakistan	Viet Nam	Ecuador
overed	−0.247***	−0.295***	−0.102	−0.0290	−0.404***	−0.598***	−0.233***	−0.211***	−0.180***	−0.196***	−0.211***
	(0.00911)	(0.104)	(0.111)	(0.0409)	(0.114)	(0.0335)	(0.00477)	(0.0163)	(0.0103)	(0.00428)	(0.00677)
undered	0.255***	0.330**	0.169	0.208***	−0.128	0.579***	0.0396***	0.102***	0.110***	0.127***	0.0988***
	(0.0101)	(0.130)	(0.121)	(0.0447)	(0.130)	(0.0359)	(0.00512)	(0.0175)	(0.0103)	(0.00484)	(0.00749)
male	0.0183***	−0.0625	−0.0292	0.115***	0.424***	0.247***	0.188***	0.166***	0.382***	0.148***	0.126***
	(0.00625)	(0.0830)	(0.0939)	(0.0152)	(0.0593)	(0.0248)	(0.00345)	(0.0154)	(0.0119)	(0.00346)	(0.00539)
age	0.0105***	0.0379***	0.0365**	0.0338***	0.0821***	0.0729***	0.0338***	0.0521***	0.0505***	0.0539***	0.0262***
	(0.00109)	(0.0139)	(0.0179)	(0.00324)	(0.0121)	(0.00670)	(0.000672)	(0.00256)	(0.00155)	(0.000862)	(0.00110)
agesq	−0.000***	−0.000**	−0.000	−0.000***	−0.000***	−0.000***	−0.000323***	−0.000543***	−0.000500***	−0.000623***	−0.000268***
	(1.000)	(0.000)	(0.000)	(4.58e−05)	(0.000162)	(8.57e−05)	(8.57e−06)	(3.27e−05)	(2.09e−05)	(1.11e−05)	(1.33e−05)
Constant	3.558***	1.246***	−1.870***	6.805***	4.040***	−0.517***	2.098***	0.596***	2.238***	8.369***	−0.265***
	(0.0210)	(0.296)	(0.413)	(0.0527)	(0.216)	(0.127)	(0.0129)	(0.0494)	(0.0284)	(0.0172)	(0.0222)
Observations	24,015	672	1,092	7,890	1,417	6,555	130,086	7,255	27,553	75,980	54,274
R−squared	0.254	0.163	0.064	0.084	0.319	0.508	0.535	0.360	0.407	0.343	0.279

Note: The models also contain sector controls. Sample consists of full-time employees. Data come from labour force surveys for the following countries and years: Philippines (2013), Guatemala (2015), Pakistan (2014 and 2015), Viet Nam (2015) and Ecuador (2015).

Source: Own calculations.

3.4 Conclusion

Rates of overqualification within low- and middle-income countries are generally higher than those observed in developed labour markets. There was no straightforward relationship between overqualification, underqualification and matched employment; in some cases, high rates of matched employment were a consequence of high overqualification and very low underqualification, while in others they were due to below-average rates of both over- and underqualification.

The nature of both over- and underqualification differs between developed and developing labour markets in terms of the education level of individuals typically impacted by each phenomenon. Within developed economies, overqualification tends to be concentrated among graduates and individuals with post-secondary education, while underqualification is more predominant among individuals with lower and upper secondary levels of education. In developing countries, graduates account for an average of 20 per cent of overqualified employees, approximately half the rate recorded for the EU-28. Most overqualification in low- and middle-income countries relates to workers with below tertiary levels of education, with one third of them possessing lower secondary education only. For underqualification, there is again a contrast relative to the EU average, with 74 per cent of underqualified workers being educated to either primary or lower secondary level compared to 61 per cent in the EU-28; this suggests that underqualification is related to the low educational attainment observed in many developing countries.

Data constraints limited the longitudinal analysis mainly to middle-income countries, where overqualification was found to be decreasing over time in most cases. In all the countries where overqualification was observed to be decreasing, underqualification has been on the rise. In recent years, averaged across all countries, the rate of underqualification has moved towards the rate of overqualification, which seems to support the view that underqualification is an important problem for developing labour markets. This would suggest that the problem of mismatch is increasingly one of changes in educational supply failing to keep pace with improvements in job quality across middle-income countries.

The econometric assessment indicates that several factors are important in explaining cross-country variation in educational mismatch within a middle-income country context. While many of the factors emerging were also found to be important for developed countries, the direction of the impacts tend to be quite different, which presumably reflects differences in how the phenomena are concentrated among groups with varying levels of education. The evidence points to the importance of business cycle effects measured in terms of per capita GDP and the unemployment rate, as well as labour market participation rates, the relative importance of the formal economy and demographic structure. For developed labour markets, a growth in per capita GDP and a reduction in unemployment generally tend to reduce overqualification, but this was not the case for middle-income countries. Increases in per capita GDP reduced underqualification for males, while for females there is the standard result of falling overqualification. In contrast to the evidence for developed

economies, overqualification is found to increase with unemployment, implying that overqualification rises as workers compete for fewer quality jobs. Results reflecting the demographic structure, whereby overqualification is higher among countries with a more youthful labour market, suggest a situation in which growth in job quality lags growth in educated labour supply. Evidence suggests that overqualification tends to be higher in countries with a larger informal employment sector, suggesting that overqualification is being driven by a lack of sufficient labour demand and lack of quality jobs.

In the countries where data are available, educational mismatch has substantial wage impacts within low- and middle-income countries. In most cases, overqualified workers suffer a pay penalty relative to their matched counterparts with similar levels of education; these are typically much higher than observed in developed countries. Similarly, most underqualified workers were found to earn a wage premium above that typically found in developed labour markets. From a policy perspective, while concluding that educational mismatch is just as important, if not more so, within developing countries than for the developed world, the underlying drivers appear to be very different. Within developed labour markets, the evidence points to overqualification being the predominant problem, driven by factors such as the supply of university graduates exceeding the demand for graduate university workers, information asymmetries between employers and jobseekers, and inefficient management practices that fail to exploit worker productivity potential. The evidence here suggests that under- and overqualification are problematic in almost equal measure within developing labour markets. The principal drivers appear to be related to a lack of quality formal employment (the role of GDP per capita, unemployment and the ratio of employment to self-employment), low levels of educational attainment and, in instances where educational attainment is growing as a consequence of demographic factors (labour force share of those aged under 30), growth in high-quality jobs tends to lag.

References

Croce, G.; Ghignoni, E. 2012. "Demand and supply of skilled labour and overeducation in Europe: A country-level analysis", in *Comparative Economic Studies*, Vol. 54, No. 2, pp. 413–439.

Davia, M.; McGuinness, S.; O'Connell, P. 2017. "Determinants of regional differences in rates of overeducation in Europe", in *Social Science Research*, No. 63, pp. 67–80.

Handel, M.J.; Valerio, A.; Sánchez Puerta, M.L. 2016. *Accounting for mismatch in low- and middle-income countries* (World Bank, Washington, DC).

Hausman, J. 1978. "Specification tests in econometrics", in *Econometrica*, Vol. 46, No. 6, pp. 1251–1271.

McGuinness, S.; Bergin, A.; Whelan, A. 2017. *Overeducation in Europe: Trends, convergence and drivers*, IZA Discussion Paper No. 10678 (Bonn, Institute of Labor Economics).

Sparreboom, T.; Staneva, A. 2014. *Is education the solution to decent work for youth in developing economies?*, ILO Work 4 Youth Publication Series No. 23 (Geneva, ILO).

Verhaest, D.; van der Velden, R. 2012. "Cross-country differences in graduate overeducation", in *European Sociological Review*, Vol. 29, No. 3, pp. 642–653.

Annex 3.1 Tables

Table A 3.1 Key labour market and macroeconomic indicators for selected countries, 2012 (percentages)

	Overqualification (%)	Underqualification (%)	Ln (gdp)	Unemployment rate (%)	Participation rate (%)	Temporary workers (%)	Part-time (%)	Female (%)	High- to low-skilled occupations	Self-employed to employed ratio	Under 30 (%)	Income
Argentina	39	18	9.15	8	58	16	25	45	0.65	0.30	30	U-M
Guatemala	33	23	8.01	3	61	66	40	32	0.29	0.46	40	L-M
Pakistan	32	18	6.96	11	53	70	4	12	0.28	0.95	42	L-M
South Africa	30	24	8.93	25	49	38	8	48	0.33	0.17	31	U-M
Philippines	25	25	7.56	7	64	28	16	38	0.22	0.75	33	L-M
Ecuador	21	16	8.60	4	66	67	13	35	0.48	0.72	29	U-M
Serbia	21	21	8.62	20	49	15	2	44	0.88	0.36	18	U-M
Peru	20	28	8.45	6	77	83	21	34	0.43	1.21	33	U-M
Albania	17	18	8.29	13	54	15	5	38	0.73	0.87	21	U-M
Mongolia	10	24	7.99	6	57	1	1	51	1.17	1.06	29	L-M

Note: The income column refers to the country's income categorization: Upper middle-income (U-M) or lower middle-income (L-M). See table A .3.2 for a full description of the variables.

Source: Own calculations based on LFS.

Table A.3.2 Description of variables

Variable	Definition
Overed	Percentage of full-time employees with a level of education which exceeds the modal education level for their 2-digit ISCO occupation.
Undered	Percentage of full-time employees with a level of education below the modal education level for their 2-digit ISCO occupation.
Matched	Percentage of full-time employees with a level of education equal to the modal education level for their 2-digit ISCO occupation.
Loggdp	Logged per capita GDP.
unemp	Unemployment rate (applies to active population aged over 15 years).
Partic	Participation rate (applies to active population aged over 15 years).
Temp	Share of employees with a temporary or non-permanent contract.
Parttime	Share of employees who work part-time.
Female	Share of employees who are female.
Highlowocc	Ratio of high-skilled to low-skilled occupations. Based on employees in ISCO 2 and 3 relative to employees in ISCO 7, 8 and 9.
Ratioselfemp1	Ratio of self-employed individuals to employees.
Under30	Percentage of the labour force under 30 years of age.

Annex 3.2 Figures

Figure A.3.1 Summary of data availability

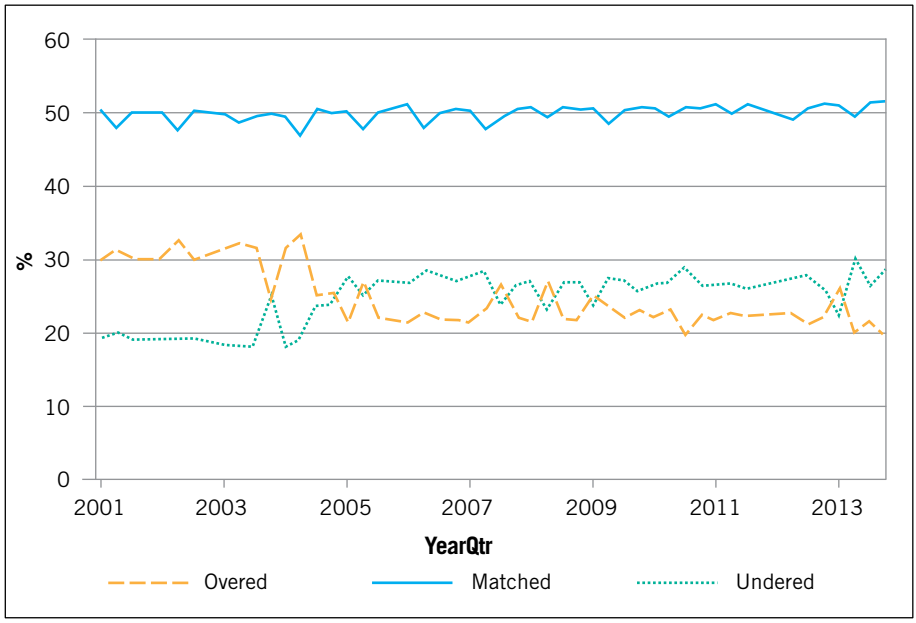
Country	Q / Y	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Philippines	Q	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
Uruguay	Q	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Argentina	Q	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Pakistan	Q	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0
Mexico	Q	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Dominican Rep.	biannual	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0
Mongolia	Q	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0
South Africa	Q	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
Serbia	biannual	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	1
Peru	Q	0	0	0	0	1	1	1	1	1	0	1	1	1	1	0	0
Viet Nam	Y&Q	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
Albania	Y&Q	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0
Honduras	Y/biannual	0	0	0	0	0	1	1	1	1	1	1	0	1	1	0	0
Egypt	Q	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0
Panama	Y	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0
Ecuador	Q	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

Figure A.3.1 Summary of data availability *(concl.)*

Country	Q / Y	01	02	03	04	'05	06	'07	08	09	10	11	12	13	13	15	16
Chile	Q	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
Costa Rica	Q	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1
Bolivia, Pluri. State of	Y	0	0	0	0	1	0	0	0	1	0	1	1	1	1	0	0
Colombia	Y	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0
Brazil	Q	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0
Paraguay	Q	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Guatemala	biannual	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Thailand	Q	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Tunisia	Y	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Moldova, Rep. of	Q	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
India	Q	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Indonesia	Q	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Jordan	Y	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Bangladesh	Y	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0
Occ. Palestinian Terr.	Y	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0
Zambia	Y	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Turkey	Y	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Armenia	Y	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Benin	Y	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Burkina Faso	Y	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Brunei Darussalam	Y	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Cambodia	Y	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
The Gambia	Y	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Ghana	Y	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Lao People's Dem. Rep.	Y	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Liberia	Y	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Malawi	Y	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Myanmar	Y	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Namibia	Y	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Nepal	Y	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Samoa	Y	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Sierra Leone	Y	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Tanzania, United Rep. of	Q	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Timor-Leste	Q	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Uganda	Y	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Madagascar	Y	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Togo	Y	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

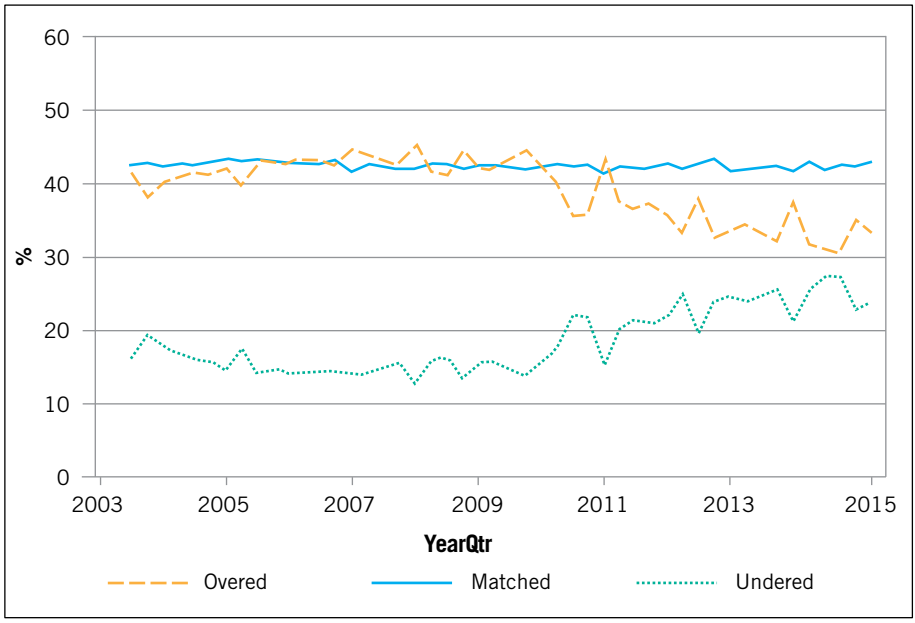
Notes: Years where data were available are indicated by 1 and are coloured. Years where no data were available are indicated by 0. The survey frequency is indicated in the second column: quarterly (Q), yearly (Y) or biannual.
Source: LFS.

Figure A.3.2 Educational mismatch trends for the Philippines, 2001–13 (percentages)



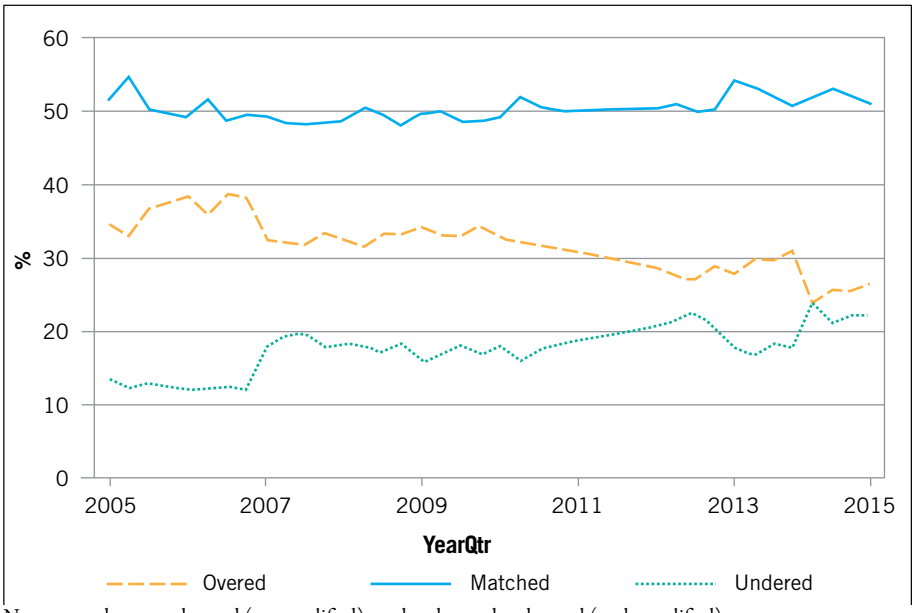
Note: overed = overeducated (overqualified); undered = undereducated (underqualified).
Source: LFS.

Figure A.3.3 Educational mismatch trends for Argentina, 2003–15 (percentages)



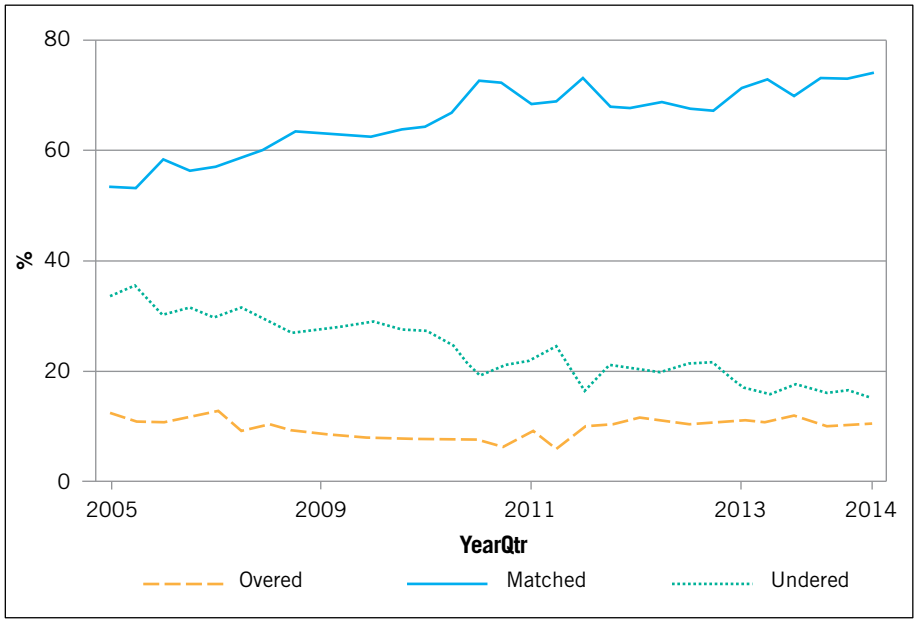
Note: overed = overeducated (overqualified); undered = undereducated (underqualified).
Source: LFS.

Figure A.3.4 Educational mismatch trends for Pakistan, 2005–15 (percentages)



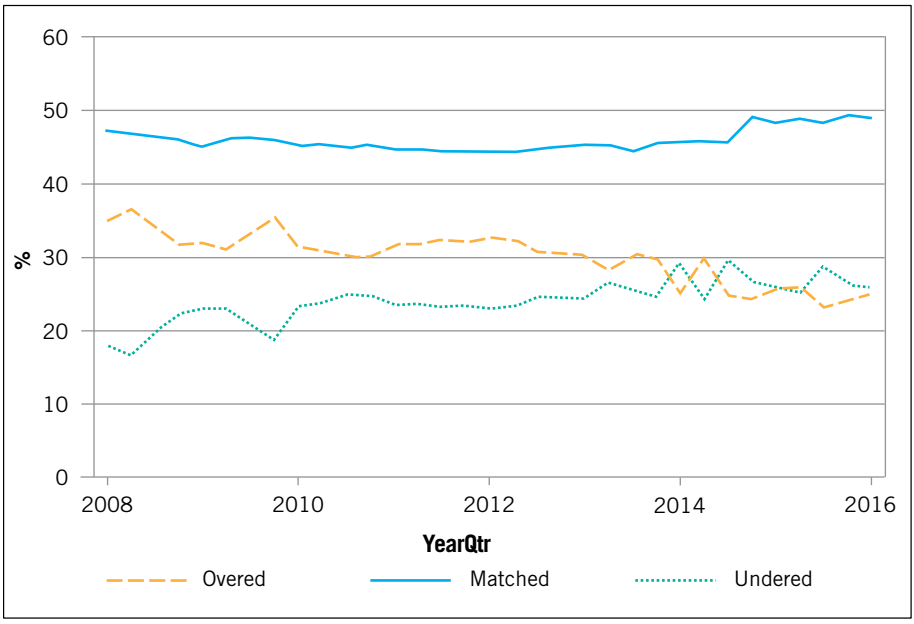
Note: overed = overeducated (overqualified); undered = undereducated (underqualified).
Source: LFS.

Figure A.3.5 Educational mismatch trends for Mongolia, 2007–14 (percentages)



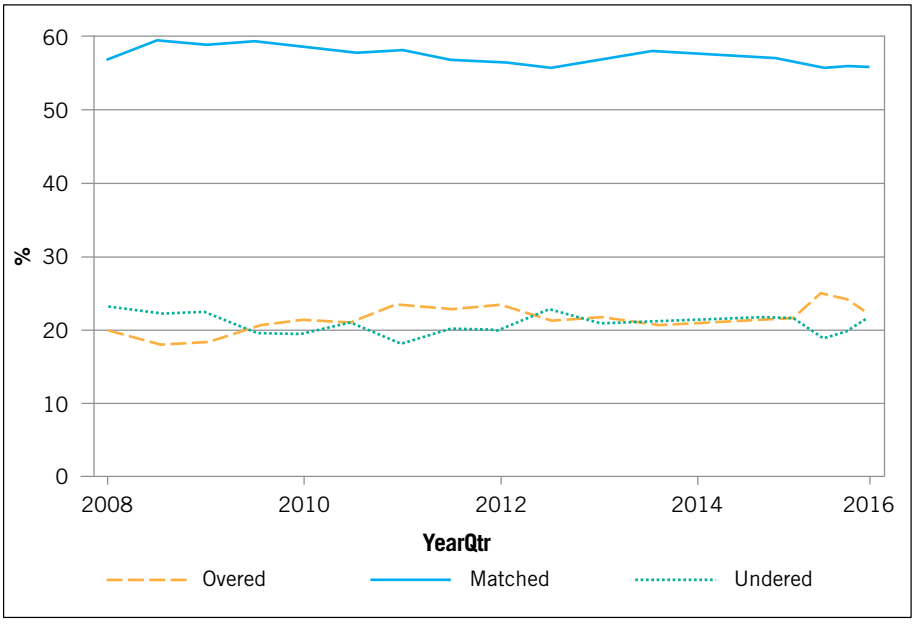
Note: overed = overeducated (overqualified); undered = undereducated (underqualified).
Source: LFS.

Figure A.3.6 Educational mismatch trends for South Africa, 2008–16 (percentages)



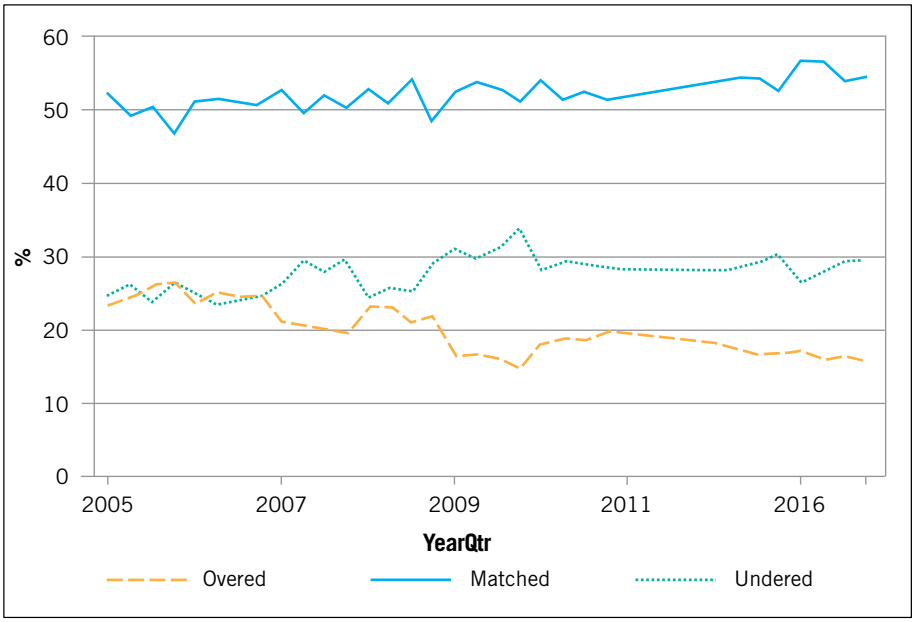
Note: overed = overeducated (overqualified); undered = undereducated (underqualified).
Source: LFS.

Figure A.3.7 Educational mismatch trends for Serbia, 2008–16 (percentages)



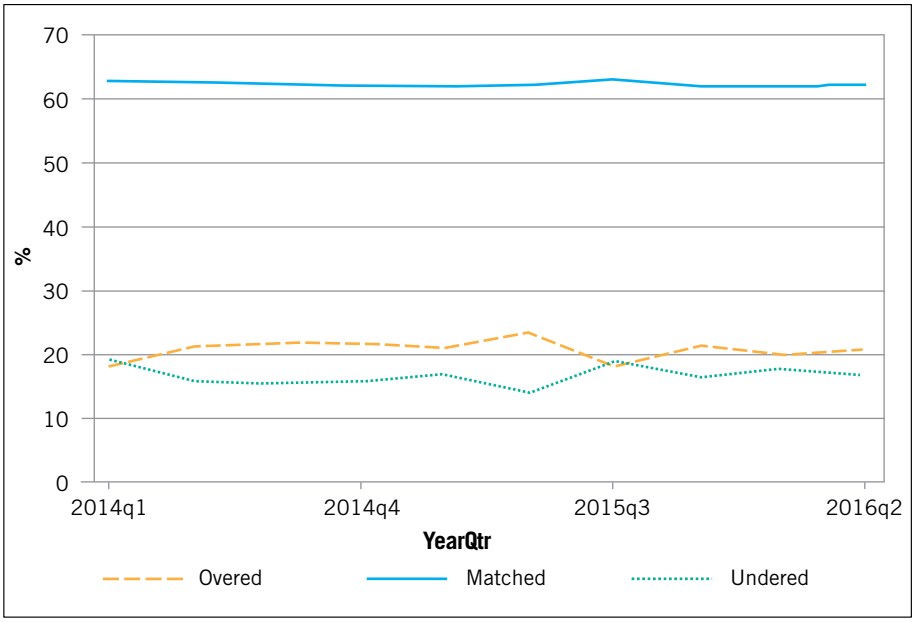
Note: overed = overeducated (overqualified); undered = undereducated (underqualified).
Source: LFS.

Figure A.3.8 Educational mismatch trends for Peru, 2005–13 (percentages)



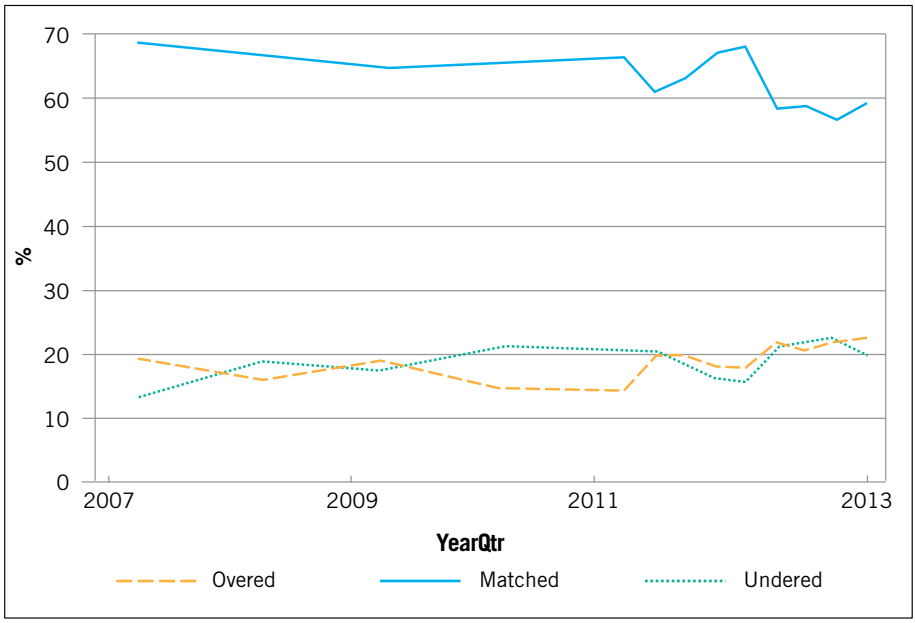
Note: overed = overeducated (overqualified); undered = undereducated (underqualified).
Source: LFS.

Figure A.3.9 Educational mismatch trends for Ecuador, 2014–16 (percentages)



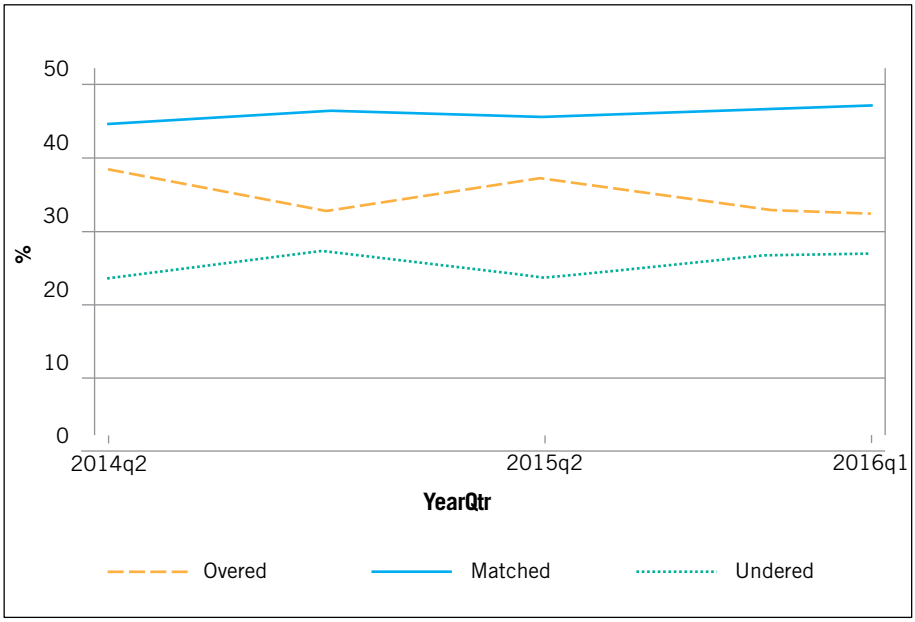
Note: overed = overeducated (overqualified); undered = undereducated (underqualified).
Source: LFS.

Figure A.3.10 Educational mismatch trends for Albania, 2007–13 (percentages)



Note: overed = overeducated (overqualified); undered = undereducated (underqualified).
Source: LFS.

Figure A.3.11 Educational mismatch trends for Guatemala, 2014–16 (percentages)



Note: overed = overeducated (overqualified); undered = undereducated (underqualified).
Source: LFS.

4. Predictors and consequences of mismatch in developing countries: Results from the World Bank STEP survey

This chapter analyses key issues surrounding mismatch in 12 low- and middle-income countries, extending previous work using these data (Handel et al., 2016).

After introducing the World Bank's Skills Toward Employability and Productivity (STEP) survey, sections 4.1–4.3 of the chapter examine the consequences of mismatch for two key outcomes, wages and life satisfaction. Results from these analyses are consistent with previous research and indicate that findings from economically advanced countries extend to low- and middle-income countries as well. Overqualified workers who hold jobs requiring less education than they have attained, generally have lower wages and life satisfaction than well-matched workers, after controlling for a range of background variables. Results for underqualified workers, holding jobs requiring more education than they possess, are weaker and more mixed, as is true in much previous research from developed countries.

After establishing these consequences of mismatch, the remaining sections explore possible explanations for mismatch. Section 4.4 addresses the role of imperfect information in labour markets by examining whether search method predicts mismatch. Section 4.5 considers workers' preferences and attitudes to informal jobs, while section 4.6 examines the effects of further indicators of informality on the probability of mismatch. Because informality is a particular challenge for less developed countries, these results add a new dimension to relevant literature. They generally reinforce previous conclusions that informality is viewed as undesirable by jobseekers, and is associated with holding a job which requires a lower level of education than that attained by the worker.

4.1 The STEP Survey

The STEP survey is a household survey of working-age adults (aged 15–64) living in urban areas, conducted by the World Bank and local counterparts in 12 countries. The survey provides new and detailed information on education, employment, skills, and related topics in developing countries. The sampling strategy was designed

to ensure that the target population represents at least 95 per cent of the urban working-age population (aged 15–64) in each country. All data were collected between March 2012 and July 2014. The 12 countries surveyed, listed below, represent most of the world's major regions and diverse national incomes.

Sub-Saharan Africa
- Ghana
- Kenya

East, Southeast and South Asia
- China – Yunnan Province ("Yunnan-China")
- Lao People's Democratic Republic ("Lao PDR")
- Sri Lanka
- Viet Nam

Europe and Central Asia
- Armenia
- Georgia
- North Macedonia
- Ukraine

Latin America and the Caribbean
- Plurinational State of Bolivia
- Colombia

Education in the STEP surveys is harmonized across countries based on ISCED categories. All working persons are asked their own level of education and the level of education required to perform their job, in widely spaced sections of the survey. When the ISCED categories are identical across the two questions, workers are defined as well-matched to their jobs. Overqualification is defined as a situation in which a person's own education exceeds what they report is required for their current job; underqualification is defined as a situation in which personal education is below the level reported necessary for the current job. This self-report method of measuring overqualification/underqualification is more sensitive to individual variation in job requirements than methods that impute job-required education using average or modal educational attainment of workers in the occupation.

The analytic sample for this report is restricted to workers aged 15–64 in sampled urban areas who are not in school (if under age 30) or in the military. Excluding from the analysis younger students who are not seeking career jobs eliminates one potential source of inflated estimates of mismatch. Results apply only to the urban population within countries, given practical constraints in sampling non-urban areas, such that significant proportions of the workforce in many of these countries are not considered.

Unlike developed economies, many developing countries have difficulty generating sufficient numbers of formal sector jobs, so individuals must make work for themselves rather than restricting their search to jobs on offer from employers. Rates of self-employment are often much higher in these countries than in the affluent countries that have been the subject of most research on mismatch; self-employment is often more a survival strategy than a choice in these contexts. In these cases, the concept of a "job" does not refer to the terms set by an employer, as the mismatch literature usually takes for granted, but rather the capacity of the economy to generate earnings opportunities that are commensurate with workers' levels of education. Most studies of mismatch in developed economies avoid this issue by excluding the self-employed altogether, but in developing countries this would eliminate too large a share of the working population and too much of the explanation for mismatch. Previous analyses of mismatch show informality is perhaps the strongest and most consistent predictor of mismatch in STEP countries (Handel et al., 2016). An additional indicator of formality used in this study, the existence of a formal, written employment agreement, is also strongly related to match rates. Country-level match rates shown in table 4.1 are correlated 0.68 with country-level rates of formal employment using this indicator.

Table 4.1 Rates of match, overqualification and underqualification (percentages)

	1 Matched	2 Overqualified	3 Underqualified
Armenia	66.2	28.0	5.8
Bolivia, Pluri. State of	40.1	34.6	25.2
Georgia	66.4	29.4	4.0
Ghana	47.7	39.5	12.8
Kenya	34.5	24.9	40.4
Lao PDR	45.1	41.1	13.7
North Macedonia	72.6	22.3	5.1
Sri Lanka	43.5	46.1	10.4
Ukraine	72.1	24.0	3.8
Viet Nam	26.0	70.0	4.0
Yunnan-China	56.6	32.6	10.7
Mean	51.9	35.7	12.4

Note: Means in bottom row are unweighted.
Source: STEP survey.

Table 4.1 shows that the levels of mismatch in STEP countries are substantial. This indicates a need to examine the implications, as has long been done for developed economies. Further details of the STEP survey and results from prior analyses of the determinants and consequences of mismatch can be found in Handel et al. (2016).

4.2 Wage models

Mismatch is important to the extent that it has undesirable consequences for workers, such as lower pay and less job satisfaction, which are the two most important forms of job reward. Controlling for workers' own level of education, overqualified workers would be expected to suffer a wage penalty for working in less-skilled jobs, while underqualified workers may receive a wage premium for working in jobs generally requiring more skill than typical for their education group.

In the analyses below, hourly wages across countries are harmonized by conversion to 2011 PPP-adjusted US dollars.[1] Analyses exclude the top 1 per cent of earners in each country to avoid potential outliers and exclude all unpaid family workers, some of whom receive compensation, in the interests of consistency. Table 4.2 gives basic descriptive statistics. Table 4.3 shows the impacts of overqualification and underqualification on (ln) wages from OLS regression models controlling for covariates, shown below.

1. workers' level of education (omitted dummy = upper secondary)
2. potential experience (omitted dummy = < 10 years' experience)
3. gender x family dummies (omitted = male)
4. chronic health problem (yes =1)
5. voluntary part-timer (yes =1)
6. public sector worker (yes =1)
7. formal/informal dummies (omitted = formal job)
8. country dummies (omitted = Armenia) (pooled models only)

[1] For further details on the wage variables, see Valerio et al., 2016.

Table 4.2 Wage means and standard deviations by country

	Wages mean	sd	ln(Wages) mean	sd
Armenia	3.03	(2.23)	0.9	(0.63)
Bolivia, Pluri. State of	4.69	(5.52)	1.07	(0.99)
Colombia	4.63	(6.34)	1.08	(0.89)
Georgia	3.87	(3.51)	1.04	(0.80)
Ghana	2.56	(3.80)	0.24	(1.20)
Kenya	2.93	(3.90)	0.53	(1.05)
Lao PDR	2.81	(4.26)	0.38	(1.20)
North Macedonia	5.10	(3.14)	1.47	(0.58)
Sri Lanka	4.60	(5.76)	1.02	(0.97)
Ukraine	3.88	(2.42)	1.17	(0.66)
Viet Nam	4.01	(5.09)	0.97	(0.95)
Yunnan-China	3.41	(3.10)	0.99	(0.66)

Note: Wages are in equivalent, PPP-adjusted US dollars.
Source: STEP survey.

Table 4.3 shows results from models estimated from all workers, wage and salary employees and self-employed workers only. Significant coefficients are shaded. Because the dependent variable is the natural log of hourly earnings, coefficients indicate the effects of the predictors in approximate percentage terms, at least when coefficient values are not much greater than 0.30 in absolute value. For example, a coefficient of –0.205 in the upper left corner of table 4.3 indicates that the overqualified receive wages approximately 20.5 per cent lower than well-matched workers who are otherwise similar. The exact calculation for determining the percentage penalty or premium is $(e^{b} - 1)$, where **b** is the coefficient value. Therefore, the exact penalty associated with the coefficient –0.205 is –18.5 per cent, which is equal to $(e^{-0.205}-1)$.

Table 4.3 Effects of mismatch on (ln) wages, all countries

	(1) All workers	(2) Wage/salary	(3) Self-employed
Overqualification	–0.205***	–0.190***	–0.226***
	(–8.611)	(–6.140)	(–5.307)
Underqualification	0.0966	0.0481	0.150
	(1.730)	(1.597)	(1.469)
< Primary (ISCED=0)	–0.529***	–0.401***	–0.613***
	(–8.491)	(–4.062)	(–5.162)
Primary (ISCED=1)	–0.382***	–0.309***	–0.444***
	(–6.317)	(–5.047)	(–5.270)
Low secondary (ISCED=2)	–0.182***	–0.181***	–0.200**
	(–3.661)	(–3.617)	(–3.032)
Tertiary < 16 years	0.200***	0.198***	0.170***
	(7.550)	(5.290)	(3.292)
Tertiary 16 years	0.438***	0.468***	0.407**
	(5.369)	(6.215)	(2.705)
Tertiary >16 years	0.572***	0.615***	0.369***
	(11.52)	(9.721)	(4.891)
10–29 years' experience	0.0832***	0.0687***	0.0892**
	(6.105)	(4.550)	(2.478)
30+ years' experience	0.0150	0.0581	–0.0608
	(0.449)	(1.413)	(–1.258)
Female, no young children	–0.268***	–0.235***	–0.314***
	(–7.637)	(–6.392)	(–5.322)
Female, young children	–0.261***	–0.242***	–0.298***
	(–5.950)	(–5.731)	(–4.137)
Health problem	–0.0101	–0.0209	0.0225
	(–0.390)	(–0.903)	(0.457)
Voluntary part-time	0.588***	0.505***	0.673***
	(10.53)	(8.611)	(11.34)
Public sector	0.0277	0.0369	
	(0.540)	(0.730)	
Informal employee	–0.229***	–0.245***	
	(–4.784)	(–6.115)	
Informal self-employed	–0.0941*		–0.203**
	(–1.817)		(–2.469)
Bolivia, Pluri. State of	0.541***	0.578***	0.267***
	(9.894)	(10.48)	(5.721)
Sri Lanka	0.374***	0.452***	0.00962
	(8.425)	(10.02)	(0.186)
Colombia	0.567***	0.616***	0.261***

Table 4.3 Effects of mismatch on (ln) wages, all countries *(concl.)*

	(1) All workers	(2) Wage/salary	(3) Self-employed
	(9.601)	(9.362)	(4.838)
Georgia	0.143***	0.223***	–0.346***
	(4.947)	(8.403)	(–9.183)
Ghana	–0.0967	–0.116*	–0.352***
	(–1.770)	(–1.966)	(–6.278)
Kenya	–0.00451	0.0918	–0.381***
	(–0.0642)	(1.149)	(–6.348)
Lao PDR	0.0551	0.329***	–0.378***
	(0.908)	(5.590)	(–5.881)
Viet Nam	0.504***	0.498***	0.259***
	(13.86)	(12.97)	(4.833)
Ukraine	0.272***	0.315***	–0.110***
	(29.91)	(24.06)	(–4.899)
North Macedonia	0.701***	0.736***	0.411***
	(17.88)	(19.94)	(9.808)
Yunnan-China	0.366***	0.334***	0.530***
	(9.785)	(9.227)	(11.17)
Observations	14,085	9,089	4,996
R-squared	0.289	0.366	0.216

Note: OLS regression coefficients and robust t-statistics.
Omitted categories: well-matched job, upper secondary education (ISCED=3), <10 years' experience, men, full-time job, private sector, formal wage and salary worker, Armenia.
*** p<0.01, ** p<0.05, * p<0.10 (significant values shaded)
Source: Own calculations based on the STEP survey data.

Overqualification results

The pooled-country models in table 4.3 show overqualification is negatively related to (ln) wages across all models, as expected, and coefficient sizes are similar to results from previous studies in developed economies. Working in a job that has lower educational requirements than one's own education level is associated with a wage penalty of 17–20 per cent. Key points regarding wage effects of overqualification from the country-specific models[2] include:

[2] Detailed country tables are available on request.

- Coefficients for all workers are negative and significant in all countries except the Plurinational State of Bolivia and Lao PDR, varying in magnitude between –0.13 and –0.45. The unweighted average for the ten countries with significant effects is –0.24. This implies a wage penalty of 21 per cent, which is higher than the average (–13.5 per cent) found in a review of recent results from mostly developed economies (McGuinness et al., 2017).
- Coefficients for wage and salary workers are negative and significant in all countries except Ghana and Lao PDR. Significant coefficients vary between –0.12 and –0.42, and average –0.23.
- Coefficients for self-employed workers are negative and significant in four of the nine countries with meaningful samples (Ghana, Kenya, Sri Lanka, Viet Nam), and two of the three countries with small samples for this category of workers (Armenia, Georgia). Coefficients average –0.33 for the former group, –0.54 for the latter, and –0.40 overall.
- Overqualification is significant only in the model for wage and salary workers in the Plurinational State of Bolivia, and is not significant in *any* model for Lao PDR.

The STEP results for low- and middle-income countries are generally consistent with prior results from advanced economies, especially for wage and salary workers. The greater strength of results for wage and salary workers is more puzzling, as prior research on self-employment in developing countries leaves no doubt that it is a very strong predictor of mismatch (Handel et al., 2016). Overqualification among the self-employed would be expected to produce similar earnings penalties as for wage and salary workers, but this does not always appear to be the case. Nevertheless, for models with all workers, overqualification is associated with a large wage penalty in ten of 12 countries. Further, the statistical significance and coefficient magnitudes are unaffected by the inclusion of test scores for the eight countries that participated in the assessment (not shown).[3] Although no single assessment can capture all unobserved heterogeneity, these results lend additional support to the view that the wage penalty reflects problems in the quality of the jobs or the matching process rather than the skills of workers. In short, mismatch appears to be genuine and the mismatched workers pay a price for it.

Underqualification results

The results for underqualification are generally much weaker. Workers in jobs that are more skilled than typical for their education group might be expected to receive a wage bonus; this is the converse of the logic that applied to overqualification.

[3] Countries that participated in the STEP assessment were Armenia, the Plurinational State of Bolivia, Colombia, Georgia, Ghana, Kenya, Ukraine and Viet Nam. For further results on the relationship between test scores and wages, see Valerio et al., 2016.

However, underqualification is unrelated to wages in all pooled-country models in table 4.3. though there are stronger results in some countries. Key points include:

- positive and significant effects for all three models for Lao PDR, which suggest that the underqualified are systematically rewarded if they hold jobs that generally require a higher level of education than their own;
- positive and significant effects for all workers and wage and salary workers in Sri Lanka, North Macedonia and Yunnan-China, suggesting that at least some groups of underqualified workers in these countries also receive a wage premium;
- positive and significant effects for only wage and salary workers in Viet Nam and for self-employed workers in Georgia;
- negative effects of underqualification for all workers in Armenia and wage and salary workers in the Plurinational State of Bolivia. The direction of these effects is contrary to expectation and there is no obvious explanation for workers receiving lower pay than similarly educated workers when they hold jobs that would generally be expected to pay higher wages;
- no significant effects of underqualification in Colombia, Ghana, Kenya and Ukraine.

Expressed another way, underqualified wage and salary workers receive a wage premium in five countries (Yunnan-China, North Macedonia, Lao PDR, Sri Lanka, Viet Nam), and self-employed workers receive a premium in two countries (Georgia, Lao PDR). Wage penalties are found in two countries (Armenia, Plurinational State of Bolivia), and effects are absent entirely in another four countries (Colombia, Ghana, Kenya, Ukraine).

These results are also unaffected by inclusion of test scores in the models (not shown).

4.3 Life satisfaction

In addition to low pay, mismatch can be considered a negative outcome to the extent that it lowers job satisfaction. STEP does not have a targeted job satisfaction question, but asks respondents:

> *How satisfied are you at present with your life, all things considered? Respond on a scale from 1 (completely dissatisfied) to 10 (completely satisfied).*

After presenting the results, some discussion of the implications of this question for mismatch analyses is given.

To aid in interpreting the results, table 4.4 shows the mean, standard deviation, and 25th and 75th percentiles for life satisfaction for all STEP countries. With the exception of Kenya (x = 4.4), country averages vary between 5.5 and 7.5 and standard deviations within countries vary narrowly around 2.1. The percentile values show the very strong tendency to report values at or above the midpoint of the response scale, which gives another indication of the extent of variation to be explained.

Table 4.4 Life satisfaction levels in STEP countries

	Mean	SD	25th pct	75th pct	IQR
Armenia	5.8	2.3	4	7	3
Bolivia, Pluri. State of	7.1	2.0	6	9	3
Colombia	7.8	1.9	7	9	2
Georgia	6.1	2.3	5	8	3
Ghana	5.5	2.5	4	7	3
Kenya	4.4	1.9	3	5	2
Lao PDR	7.6	2.1	6	10	4
North Macedonia	6.3	2.4	5	8	3
Sri Lanka	6.9	2.1	5	8	3
Ukraine	6.3	2.2	5	8	3
Viet Nam	6.4	1.8	5	7	2
Yunnan-China	6.8	2.0	6	8	2
Mean	6.4	2.1	5.1	7.8	2.8

Note: Life satisfaction scale varies from 1 to 10. All country values are weighted. Bottom line contains unweighted cross-country means. IQR = inter-quartile range.
Source: Own calculations based on the STEP survey data.

Table 4.5 shows the impacts of overqualification and underqualification on life satisfaction from OLS regression models controlling for covariates, shown below.

1. workers' level of education (omitted dummy = upper secondary)
2. potential experience (omitted dummy = < 10 years' experience)
3. gender x family dummies (omitted = male)
4. chronic health problem (yes =1)
5. voluntary part-timer (yes =1)
6. public sector worker (yes =1)
7. formal/informal dummies (omitted = formal job)
8. personality scales (Big 5, Grit, Hostile attribution bias)
9. country dummies (omitted = Armenia) (pooled models only)

Models in table 4.5 use the full STEP sample, pooling across countries. Significant coefficients are shaded.[4]

[4] Detailed country tables are available on request.

Overqualification results

Consistent with expectations, the negative coefficients in all pooled-country models in table 4.5 show overqualified workers have lower life satisfaction than well-matched members of their education group. The largest of the three coefficients (–0.428) is about 0.20 standard deviations, based on the unweighted mean SD in the bottom line of table 4.4.

Table 4.5 Effects of mismatch on life satisfaction, all countries

	(1) All workers	(2) Wage/salary	(3) Self-employed	(4) All workers
Overqualification	–0.339***	–0.428***	–0.184*	
	(–4.067)	(–5.407)	(–2.160)	
Underqualification	0.0171	–0.0817	0.182**	
	(0.234)	(–0.681)	(2.254)	
< Primary (ISCED=0)	–0.539***	–0.562*	–0.532***	
	(–3.676)	(–1.827)	(–3.655)	
Primary (ISCED=1)	–0.278***	–0.105	–0.426***	
	(–3.983)	(–0.938)	(–4.406)	
Low secondary (ISCED=2)	–0.238**	–0.245	–0.265***	
	(–2.730)	(–1.707)	(–3.533)	
Tertiary < 16 years	0.261***	0.268**	0.285***	
	(3.316)	(2.610)	(3.317)	
Tertiary 16 years	0.455***	0.505***	0.174	
	(4.011)	(4.584)	(0.910)	
Tertiary >16 years	0.659***	0.650***	0.578***	
	(4.566)	(4.486)	(3.368)	
10–29 years' experience	–0.171*	–0.167	–0.229***	
	(–2.164)	(–1.576)	(–4.917)	
30+ years' experience	–0.0767	–0.174	–0.00139	
	(–0.503)	(–0.905)	(–0.0125)	
Female, no young children	0.106	0.0862	0.137*	
	(1.651)	(1.028)	(2.039)	
Female, young children	0.205**	0.240**	0.146*	
	(2.730)	(2.502)	(1.872)	
Health problem	–0.333***	–0.343***	–0.323***	
	(–3.687)	(–3.337)	(–3.585)	
Voluntary part-time	0.115	0.125	0.0524	
	(1.756)	(1.679)	(0.578)	
Public sector	0.0253	0.115*	–0.678	
	(0.588)	(1.896)	(–1.512)	
Informal employee	–0.294***	–0.213**		
	(–3.306)	(–2.241)		
Informal self-employed	–0.0284		–0.798***	
	(–0.316)		(–3.832)	
Informal family worker	–0.109		–0.916***	
	(–0.993)		(–3.144)	

Table 4.5 Effects of mismatch on life satisfaction, all countries *(concl.)*

	(1) All workers	(2) Wage/salary	(3) Self-employed	(4) All workers
Agreeableness	0.170***	0.167***	0.169***	
	(4.592)	(3.113)	(3.350)	
Extraversion	0.0678*	0.0446	0.101*	
	(1.958)	(0.970)	(1.985)	
Openness	0.117**	0.120**	0.112	
	(2.779)	(3.092)	(1.520)	
Stability	0.258***	0.261***	0.253***	
	(7.534)	(5.338)	(5.431)	
Conscientiousness	–0.133**	–0.156**	–0.102	
	(–2.234)	(–3.063)	(–1.186)	
Grit	0.137***	0.166**	0.0802*	
	(3.327)	(2.869)	(2.195)	
Hostile bias	–0.221***	–0.226***	–0.200**	
	(–4.873)	(–5.569)	(–3.043)	
Bolivia, Pluri. State of	1.945***	1.992***	1.690***	1.500***
	(25.28)	(21.70)	(20.84)	(16.16)
Sri Lanka	1.618***	1.460***	1.631***	1.083***
	(19.64)	(18.19)	(18.57)	(9.576)
Colombia	2.609***	2.784***	2.213***	2.158***
	(33.98)	(32.86)	(26.27)	(24.59)
Georgia	0.482***	0.592***	–0.263***	0.387***
	(8.008)	(7.516)	(–3.142)	(3.894)
Ghana	0.605***	0.529***	0.477***	–0.254***
	(6.702)	(6.931)	(4.231)	(–3.032)
Kenya	–0.464***	–0.439***	–0.701***	–1.147***
	(–4.459)	(–3.685)	(–6.928)	(–13.49)
Lao PDR	2.621***	2.482***	2.466***	1.840***
	(23.82)	(23.30)	(19.29)	(20.10)
Viet Nam	1.180***	1.113***	0.992***	0.634***
	(12.27)	(14.39)	(8.769)	(7.629)
Ukraine	0.619***	0.659***	0.607***	0.431***
	(18.27)	(18.72)	(10.86)	(4.362)
North Macedonia	0.825***	0.855***	0.512***	0.598***
	(17.80)	(17.94)	(5.503)	(6.936)
Yunnan-China	1.547***	1.547***	1.469***	1.104***
	(21.15)	(23.30)	(15.44)	(12.02)
Observations	15,004	9,441	5,563	16,618
R-squared	0.217	0.218	0.232	0.163

Note: OLS regression coefficients and robust t-statistics. Omitted categories: well-matched job, upper secondary education (ISCED=3), <10 years' experience, men, full-time job, private sector, formal wage and salary worker, Armenia.

*** p<0.01, ** p<0.05, * p<0.10 (significant values shaded).

Source: Own calculations based on the STEP survey data.

Key points on effects of overqualification from the country-specific models include:

- Coefficients for all workers are negative and significant in eight of 12 individual countries, varying in magnitude between –0.18 and –0.92.
- Coefficients for wage and salary workers are negative and significant in ten of 12 countries, varying in magnitude between –0.27 and –0.91.
- Coefficients for self-employed and unpaid family workers are negative and significant in only three of 12 countries; two of the three countries are those with very small samples for this category of workers (Georgia and Ukraine).
- Overqualification is not significant in any model for Ghana and Yunnan Province, China.

The STEP results on the effects of overqualification are generally consistent with expectation, especially for the wage and salary worker group and with respect to the direction and statistical significance of effects. The magnitude of the coefficients is difficult to judge without much more detailed comparison with similar studies. The effect sizes do not initially appear large but the STEP item relates to life satisfaction in general, rather than job satisfaction specifically, and attitude questions contain significant noise; both of these are discussed further below.

As with earnings, the greater strength of results for wage and salary workers is more puzzling, as there is no doubt from prior research that self-employment in developing countries is a very strong predictor of mismatch. One would expect overqualification to be as dissatisfying for this group as for wage and salary workers.

Underqualification results

Underqualification is generally unrelated to life satisfaction across all models. The only exceptions are the self-employed in Ghana (0.726), for which the coefficient is appropriately signed, and wage and salary workers in Kenya (–0.413) and Lao PDR (–0.758), whose coefficients may be interpreted as contrary to expectation. Working in a job requiring more education than one has attained does not seem to affect life satisfaction strongly or consistently. This may reflect offsetting effects of positive material rewards and negative non-material dimensions of the work, such as feeling out of place in a context in which others have more education and, perhaps, more status as a result.

Discussion

A survey item like the STEP life satisfaction question raises a number of concerns. As with all attitude questions, the proportion of explained variance tends to be lower than for wage equations, probably due partly to greater random measurement error. There are also systematic differences in response styles across persons and countries. (For a discussion of frame of reference effects and related issues in comparing job satisfaction models across samples separated in time, see Handel, 2005.) Finally, there is

the issue that the STEP question does not refer to job satisfaction specifically. There are reasons to believe that the models estimated here are insulated reasonably well from these concerns regarding systematic variation across persons and countries and the item's lack of focus on job satisfaction specifically.

Standard control variables tend to show expected relationships with life satisfaction. The direction of the relationships, relative magnitudes, and usually the statistical significance of the education coefficients are as expected in most cases; the main exceptions are Yunnan-China and the Plurinational State of Bolivia, to a lesser extent. The association between life satisfaction and reports of a chronic health problem are almost always negative, and they are statistically significant in half the countries. Exceptions with respect to statistical significance are the Plurinational State of Bolivia, Sri Lanka, Kenya, Lao PDR, Viet Nam and Ukraine.[5] Some kinds of informality also have statistically significant negative associations with life satisfaction relative to formal jobs, in all countries except Viet Nam. These lower levels of life satisfaction among informal workers are what would be expected given decent work deficits that often accompany informality. In these respects, the measure of life satisfaction is performing well despite the difficulties often associated with subjective attitude measures, particularly in cross-cultural research.

Confidence in the results is strengthened by the inclusion of controls for relatively rich personality variables corresponding to the "big 5" (agreeableness, extraversion, openness, emotional stability[6] and conscientiousness), as well as two additional factors, grit and hostile attribution bias. These are standard personality variables and are widely used within psychology to capture the major dimensions of personality. In so far as respondents have dispositions toward life satisfaction or dissatisfaction due to more general personality traits, these variables must be controlled to derive valid estimates of the unique effects of job mismatch on life satisfaction.

The operational meaning of the personality constructs is shown in the list of STEP survey items associated with each trait, reproduced from the STEP users guide below (table 4.6). Nearly all of the personality variables are significantly associated with life satisfaction in the pooled models, despite their intercorrelation, and some subset is significant in all individual country models. The associations are almost always in the expected directions; for example, emotional stability and agreeableness are associated with higher levels of life satisfaction. The one finding that is perhaps unexpected, but nevertheless consistent, is the negative association between conscientiousness and life satisfaction. Conscientiousness may be a virtue, but it appears that this virtue is not personally rewarding on its own.

The inclusion of these variables in the models is important to help control for other determinants of life satisfaction, such as stable personality profile and non-job variables. In so far as scores on the personality items partly reflect effects of mismatch,

---

[5] Across countries about 10–22 per cent of the country samples report chronic health problems, except for Kenya (5.6 per cent) and Ukraine (33.8 per cent).

[6] Stability is a reverse scoring of neuroticism, which is the more common term for this personality factor.

Table 4.6 Behavioural and personality trait measures

Behaviour and personality trait	Question No. Module G	Items
Openness	Q.1.03	Do you come up with ideas other people haven't thought of before?
	Q.1.11	Are you very interested in learning new things?
	Q.1.14	Do you enjoy beautiful things, like nature, art and music?
Conscientiousness	Q.1.02	When doing a task, are you very careful?
	Q.1.12	Do you prefer relaxation more than hard work?
	Q.1.17	Do you work very well and quickly?
Extraversion	Q.1.01	Are you talkative?
	Q.1.04 *	Do you like to keep your opinions to yourself? Do you prefer to keep quiet when you have an opinion? *
	Q.1.20	Are you outgoing and sociable, for example, do you make friends very easily?
Agreeableness	Q.1.09	Do you forgive other people easily?
	Q.1.16	Are you very polite to other people?
	Q.1.19	Are you generous to other people with your time or money?
Emotional stability (neuroticism) *	Q.1.05 *	Are you relaxed during stressful situations? *
	Q.1.10	Do you tend to worry?
	Q.1.18	Do you get nervous easily?
Grit	Q.1.06	Do you finish whatever you begin?
	Q.1.08	Do you work very hard? For example, do you keep working when others stop to take a break?
	Q.1.13	Do you enjoy working on things that take a very long time (at least several months) to complete?
Hostile attribution bias	Q.1.07	Do people take advantage of you?
	Q.1.22	Are people mean/not nice to you?
Decision-making	Q.1.15	Do you think about how the things you do will affect you in the future?
	Q.1.21	Do you think carefully before you make an important decision?
	Q.1.23	Do you ask for help when you don't understand something?
	Q.1.24	Do you think about how the things you will do will affect others?

*Note: In the Wave 2 household questionnaire, two additional questions were asked: Q.1.25: "Do you like to share your thoughts and opinions with other people, even if you don't know them very well?" can be used instead of Q.1.04; and Q.1.26: "Do you get very upset in stressful situations?" can be used instead of Q.1.05.

Source: "STEP Skills Measurement Surveys: Innovative Tools for Assessing Skills", by Gaëlle Pierre, Maria Laura Sanchez Puerta, Alexandria Valerio and Tania Rajadel. World Bank, 9 July 2014.

the sizes of the coefficients for overqualification and underqualification are underestimated. The fact that the personality variables are significant predictors of life satisfaction, and that the effect of overqualification is robust to their inclusion, suggests that mismatch itself depresses life satisfaction rather than simply picking up the effects of personality differences that are absent in most models estimating the impacts of mismatch on life or job satisfaction.

In different ways, both country dummies in the pooled regressions and country-specific models control for national differences in response styles. The fourth column of table 4.5 expresses country differences relative to Armenia for all workers, without additional controls. All country dummies are significant. What is most interesting, when comparing the coefficients to the full model in column 1, is that they remain significant at the 1 per cent level and generally increase in magnitude, except for Kenya and Ghana (whose sign reverses). Compositional differences with respect to the variables included in model 1 explain virtually none of the baseline country differences in life satisfaction, underscoring the importance of controlling for these global effects in trying to isolate the effects of specific variables, like mismatch, on attitudes.

It may be objected that controlling for national response styles does not account for stable within-country differences in response styles across persons that may be picked up by the overqualification coefficient. However, the fact that this coefficient remains robust to the inclusion of seven personality scales that would be likely to pick up such effects is another argument in favour of accepting the estimates as reasonable. Overqualification is generally associated with lower life satisfaction, even after including attitudinal controls that are likely to be associated with both genuine personality differences and different personal styles in answering attitude questions, as well as controlling for country effects. In so far as scores on the seven personality scales partly reflect effects of mismatch, the coefficients reported in table 4.5 are lower bound estimates of their true effects on life satisfaction.

4.4 Effects of job search methods on probability of mismatch

Given the evidence on the undesirability of mismatch, particularly overqualification, a natural next step is to try to understand its drivers and possible policy responses. There are numerous potential drivers of mismatch, most notably the aggregate imbalances in the distributions of workers' personal education and the education they report as necessary for their jobs. This is especially true in developing countries that face challenges in both ensuring adequate access to education and generating formal employment. One possible contributor to mismatches is imperfect information; better information and linkages between employers and jobseekers may improve outcomes. Job search method is also attractive because it may be one of the more easily manipulated policy levers compared to generating more formal sector employment.

Table 4.7 gives the breakdown by country of the main method workers used to find their current employment; the two most common methods for each country are shaded. Finding employment through friends, relatives, or other members of

Table 4.7 Main job search method (percentages)

	Employment agency	Personal network	Direct contact	Started business	Media, Internet	Total
Armenia	12.1	38.1	36.7	10.6	2.6	100
Bolivia, Pluri. State of	3.7	30.9	13.7	47.4	4.4	100
Colombia	5.9	55.4	10.2	24.7	3.8	100
Georgia	10.6	46.2	28.2	12.1	2.9	100
Ghana	12.3	24.5	13.5	48.5	1.2	100
Kenya	4.9	40.1	13.8	36.4	4.8	100
North Macedonia	17.4	34.3	23.5	15.2	9.6	100
Lao PDR	4.9	59.2	8.3	27.6	0.1	100
Sri Lanka	10.0	40.8	10.5	30.6	8.0	100
Viet Nam	7.4	50.7	12.3	26.3	3.3	100
Yunnan-China	29.4	28.4	26.3	13.8	2.2	100
Mean	10.8	40.8	17.9	26.6	3.9	

Note: All country percentages are weighted. Bottom line gives unweighted cross-country means.
Source: STEP survey.

one's social network was the most common method overall (column 2), followed by starting one's business (column 4), and direct contact between employer and jobseeker (column 3).[7] Except for Yunnan-China, jobseekers made little use of formal employment agencies (public, private, university/school career office) or linkages through apprenticeships, which are often coordinated through vocational schools (column 1).

Media and the Internet are rarely used to find employment. North Macedonia and Sri Lanka are partial exceptions; when the sample is restricted to wage and salary workers, the shares using media/Internet in those countries rise to 11.4 per cent and 14.1 per cent, respectively (not shown). In all other countries the share of urban wage and salary workers who found their jobs by these means is in the single digits.

Overqualification

The most consistent evidence indicates that finding a job through a formal agency or career office reduces the odds of overqualification. The coefficient is significant in eight of 99 countries, and the odds ratio varies between 0.35 and 0.62, except for Georgia (~0.13). These are very large effects, though there is no guarantee that merely providing or inducing other workers to use such services will have similar effects; even if more individuals use agencies, there is no guarantee that these users will be hired by employers to the same degree. Despite the inclusion of control variables, it is always possible that there is something about the successful users of formal employment

[7] Detailed country tables are available on request.

agencies that makes them more attractive to employers than non-users or users who were not successful in securing employment through them.

Direct contact between employers and jobseekers reduces the odds of overqualification in four of 11 countries (Plurinational State of Bolivia, Yunnan-China, Armenia, Georgia). The effects are remarkably similar in these countries, varying between 0.52 and 0.58, except in Yunnan-China (0.67).

Starting a business had statistically significant effects on the odds of overqualification in three of 11 countries, but increased the odds of overqualification substantially in two of them (Sri Lanka, Georgia); this reinforces the general impression of self-employment as a survival strategy, not a form of self-actualization for most people in developing countries. The exception is Armenia, where starting one's own business is associated with lower odds of overqualification (0.47).

Using the media or Internet to find a job is associated with lower odds of overqualification in three of 11 countries (Sri Lanka, Viet Nam, Yunnan-China), with the odds ratios varying between 0.34 and 0.44. The contrast between these large effects and the low usage of these search methods is striking. It is possible that meaningful gains could be made in matching workers to jobs effectively if more workers used them, an issue that warrants further study.

Underqualification

Variation in job search methods does not help account for underqualification as often as it helps predict overqualification. None of the job search methods predicts underqualification in four of eight countries (Colombia, Sri Lanka, Viet Nam, Yunnan-China).

Among the methods that do predict underqualification, use of a formal employment agency or similar intermediary emerges as most often significant (Plurinational State of Bolivia, Ghana, Kenya). The effects are also quite large in substantive terms; odds ratios vary from about 2.0 to over 5.2, suggesting that agencies can place workers in jobs above their normal level. Direct contact between employers and employees also increases the odds of underqualification in Kenya, as does using the media and Internet. Starting a business increased the odds of underqualification in Lao PDR.

Underqualification is generally less well understood than overqualification and more difficult to predict, but these analyses suggest the impacts of formal employment agencies deserve greater study.

4.5 Attitudes toward informality

The evidence in Handel et al. (2016) and below indicates that informality is a significant predictor of mismatch. Therefore, jobseekers' attitudes towards informality are relevant to understanding the process by which individuals become employed in such jobs. STEP asks those who are not currently working a number of questions about their job search efforts, reservation wage, and related issues. Table 4.8 gives the distribution of respondents by employment status. Only those currently looking for work (unemployed) and certain inactive persons were eligible for the questions on

Table 4.8 Distribution of STEP respondents by eligibility for items on willingness to take informal jobs (percentages)

	Employed	Unemployed	Inactive eligible	Inactive ineligible	Total	Final N
Armenia	34.1	19.2	10.2	36.6	100	838
Bolivia, Pluri. State of	71.8	6.4	1.4	20.3	100	106
Colombia	65.8	10.8	3.1	20.4	100	300
Georgia	29.7	22.7	11.6	36.0	100	962
Ghana	69.9	5.2	3.2	21.7	100	238
Kenya	58.3	14.3	3.4	23.9	100	654
Lao PDR	83.0	1.1	0.6	15.2	100	25
North Macedonia	51.4	14.0	6.0	28.6	100	806
Sri Lanka	50.1	2.9	1.5	45.6	100	45
Ukraine	59.3	7.3	0.1	33.3	100	144
Viet Nam	67.4	2.3	1.2	29.1	100	83
Yunnan-China	63.0	3.0	3.3	30.8	100	124

Note: All columns are percentages except final column. Percentages calculated using entire sample and sampling weights. Shaded columns represent categories eligible for items on willingness to accept informal jobs (see table 4.9). Final sample size in right column is unweighted number of cases eligible for question on willingness to take an informal job (see table 4.9), and also reflects deletion of enrolled students under age 30.
Source: STEP survey.

attitudes toward informal jobs, so the willingness to accept an informal job cannot be related to match quality directly (current workers were not asked whether they were willing to take informal jobs).[8] The final column of table 4.8 indicates the number of respondents eligible for these questions in Lao PDR and Sri Lanka; it may be that Viet Nam is too small to draw reliable conclusions.

The first column of table 4.9 gives the percentage of respondents willing to "accept a job that did not offer social security benefits (old age, disability, pension, sickness and maternity benefits, unemployment benefits)". The unweighted mean across countries is 39 per cent, with relatively small shares indicating willingness in Kenya (14 per cent) and Georgia (21 per cent), and relatively high percentages in Colombia (51 per cent), Yunnan-China (56 per cent) and North Macedonia (68 per cent).

In six countries, more than half of those willing to take informal jobs indicate they have no choice, and a plurality (~45 per cent) give the same reason in another two countries (Lao PDR, Ukraine). This strongly reinforces the impression that informal jobs are not desirable or positively embraced by workers, even though rates of informality are generally high. Even in North Macedonia, where the greatest proportion is willing to accept informal jobs (68 per cent) and only 29 per cent of the willing say this is because they have no other choice, a large plurality (45 per cent) say they would continue looking for a job with benefits after accepting an informal job.

[8] Inactive persons ineligible for questions on willingness to take informal jobs were non-workers who had not looked for jobs in the previous four weeks because they were students, housewives, retired, elderly, ill/handicapped, in the military, or did not want a job.

Table 4.9 Non-working persons who would accept a job without benefits and reasons for doing so (percentages)

	Would accept	1. Not important	2. Can't afford	3. Continue search	4. Higher wages	5. Family support	6. No choice	7. Other		8. Sum of cols 3 and 6
Armenia	28.6	9.4	0.5	14.7	22.3	1.3	51.7	0.1	100.0	66.4
Bolivia, Pluri. State of	35.5	15.7	0.0	9.6	17.8	5.1	51.1	0.7	100.0	60.7
Colombia	50.9	1.9	0.0	22.3	12.9	4.7	51.9	6.4	100.0	74.2
Georgia	21.2	19.2	0.1	7.0	6.4	2.5	64.9	0.0	100.0	71.9
Ghana	29.2	14.8	3.1	10.2	2.7	0.9	60.0	8.4	100.0	70.2
Kenya	13.9	8.3	3.7	19.0	0.4	1.8	66.7	0.0	100.0	85.7
Lao PDR	43.6	18.1	10.6	14.8	0.0	11.7	44.8	0.0	100.0	59.6
North Macedonia	67.7	14.0	0.0	44.8	8.9	2.4	28.6	1.3	100.0	73.4
Sri Lanka	46.6	32.2	0.0	21.1	13.2	0.0	31.4	2.1	100.0	52.5
Ukraine	35.3	19.8	5.0	17.0	12.4	0.0	45.8	0.0	100.0	62.8
Viet Nam	37.2	13.1	0.0	14.1	35.1	2.2	26.4	9.1	100.0	40.5
Yunnan-China	56.0	3.7	5.8	28.2	31.1	6.5	20.3	4.4	100.0	48.5
Mean	**38.8**	**14.2**	**2.4**	**18.6**	**13.6**	**3.3**	**45.3**	**2.7**		**63.9**

Note: All figures are weighted percentages, except bottom row containing unweighted country means. Unusually high and low values are shaded.
Text of response options for columns 1–7 above:

1. Social security benefits are not important to me
2. I can't afford to pay the contributions
3. I would accept but continue looking for a job with benefits
4. I can receive more money
5. My family will support me if needed
6. I have no choice/ the only jobs available for me are without benefits
7. Other

Source: STEP survey.

Assuming these two responses are partly substitutes in the minds of respondents, the percentages in columns 3 and 6 are summed in column 8, in which North Macedonia looks similar to the other eight countries.

In nine out of 12 countries, jobless individuals who are ready to work appear at risk of accepting offers of informal employment despite their negative views of such jobs. Column 8 shows that, in these countries, 60–85 per cent of those willing to accept informal employment would do so because they had no choice or would continue looking for a better job. Such individuals would likely be at high risk of mismatch in the event they received offers for informal employment in the period following the survey. This suggests that weaknesses in their economies' capacities to generate sufficient high-quality jobs is the key problem.

Among the three remaining countries, there is more evidence that informality is a preference or active choice. A large percentage of respondents in Sri Lanka who are willing to accept informal employment say benefits are not important to them (32 per cent). Similar shares believe they could gain higher wages by taking a job without benefits in Viet Nam (35 per cent) and Yunnan-China (31 per cent). Across all countries, only about 14 per cent of respondents give higher cash wages as a positive reason for accepting an informal job. These three countries, along with North Macedonia, have the lowest percentage of respondents saying they would accept an informal job because they had no other choice.

4.6 Effects of informality on probability of mismatch

Previous analyses have shown informality is a leading predictor of underqualification and overqualification in developing countries (see Handel et al., 2016). These analyses followed the STEP team's decision to classify as informal all workers who are not covered by social benefits, are self-employed in a single-person establishment or are unpaid family workers. The analyses further distinguished informal workers according to whether they were wage and salary workers or self-employed. Other definitions of informality are possible; this report adds a predictor to previous models indicating whether the worker has a "signed contract" or "written employment agreement with your employer".

A written employment contract is a strong predictor of overqualification in five of ten countries and is associated with reduced odds of overqualification. In Colombia, Ghana and Georgia, the odds of overqualification are only about 40 per cent as large (OR = ~0.40), or less than half as large, when workers have written contracts compared to when they work without a contract. In the Plurinational State of Bolivia, the effect of a written employment contract is even stronger as the odds of overqualification are only 20 per cent as large for workers with an employment contract compared to otherwise similar workers without a contract. In Kenya the effect is weaker but still large; the odds of overqualification are 58 per cent as large for jobs with contracts, so the odds are cut by almost half.

The fact that a second measure of informality, written employment contracts, is significant even when models include another measure of informality based on social

benefits coverage, reinforces the conclusions in Handel et al. (2016) regarding the role of the weak job market in accounting for overqualification. These results are a powerful indication that the quality of available jobs, as opposed to worker characteristics, is a strong influence on the prevalence of mismatch.

A written employment contract is a significant predictor of underqualification only in one country out of eight (Viet Nam), raising the odds of underqualification relative to a good match by a factor of 2.6. The coefficient is greater than one but not significant in four additional countries. These results also (weakly) reinforce the general impression that formal sector jobs are better jobs than informal employment.

There are many definitions of informality and proposed explanations for its prevalence in developing countries, regardless of definition, but one aspect common to most definitions is the implication that most informal jobs involve businesses that are relatively low value added and poorly resourced. The association between mismatch status and formal/informal jobs, using different definitions of employment formality, in STEP countries is consistent with expectations. Informal employment has been shown to be broadly associated with various negative outcomes and the match between job required education and worker education can now be added more conclusively to that list.

4.7 Conclusion

Qualifications mismatch, especially overqualification, has long been recognized as a potential problem in developed economies. The STEP survey contains a rich set of background variables for understanding the consequences and drivers of mismatch, including reading test scores and a battery of personality measures. STEP uses self-reports of job-required education, capturing individual-level variation better rather than imputed values using average educational attainment of job holders within occupations.

Table 4.10 summarizes key findings on the consequences of mismatch, with the dominant direction of effects shaded and unexpectedly signed results are in bold. The first row of the upper and lower panels summarizes results from the pooled models; the remaining rows summarize the direction of effects from the country-specific models. Coefficients that are not statistically significant are listed as "no effect," regardless of their sign.

Overqualification, meaning working in a job requiring less education than one's own level, is associated with lower wages and life satisfaction, but more so for employees. The self-employed also experience a wage penalty for overqualification in half of the countries and report lower life satisfaction in a quarter of them. There are no countries in which overqualification is associated with higher wages or life satisfaction than for well-matched workers.

Results for underqualification might be expected to mirror those for overqualification, but the picture is not so straightforward. The pooled models indicate almost no association between underqualification and wages or life satisfaction. The exception is the self-employed, who appear to have higher life satisfaction, but the

Table 4.10 Summary of effects of overqualification and underqualification on job rewards

	Overqualification			Underqualification		
	All workers	**Employee**	**Self-employed**	**All workers**	**Employee**	**Self-employed**
Wages						
All countries pooled	Lower	Lower	Lower	*no effect*	*no effect*	*no effect*
Country-specific models						
Lower	10	10	6	**1**	**1**	
Higher				4	5	2
No effect	2	2	6	7	6	10
Life satisfaction						
All countries pooled	Lower	Lower	Lower	*no effect*	*no effect*	Higher
Country-specific models						
Lower	8	10	3		**2**	
Higher						1
No effect	4	2	9	12	10	11

Note: "Lower" and "higher" indicate direction of effects on wages and life satisfaction. Empty cells indicate no results fall into that category. Majority results shaded. Results with unexpected signs are in bold.

Source: Own calculations based on the STEP survey data.

pooled-country results are found in only one country-level model (Ghana). Underqualified workers, particularly employees, achieve a wage premium in less than half the countries, but the dominant result from the wage models is an absence of association between underqualification and wages.

The country-level results for life satisfaction are even sharper. There is no association between underqualification and life satisfaction for any sub-group in any country; two of the three exceptions are inappropriately signed. Although a STEP question on job satisfaction specifically would enhance comparability with results from developed countries, the findings for both wages and life satisfaction are generally similar to those found in the existing literature. In these respects, qualifications mismatch appears to be a similar phenomenon across the world.

Table 4.11 summarizes key findings on the drivers of mismatch. The clearest finding is that the use of a formal employment agency reduces the odds of overqualification, suggesting that policy might focus on expanding the capacity of this relatively infrequently utilized source of job information and matching. Direct contact with an employer and use of media or the Internet to search for work are also associated with lower odds of overqualification in three or four countries. Using an employment agency is also associated with higher odds of underqualification in two or three countries, but the other search methods generally have no association with underqualification.

The absence of a written employment contract or agreement, a measure of informality, is a potential driver of mismatch that is more specific to developing country contexts. A written employment agreement is associated with lower odds of overqualification in half of the countries for which data are available and generally not associated with underqualification. These results have no counterpart in the literature on mismatch from developed countries but they reinforce previous STEP results using alternative measures of informality. The fact that an employment contract is so often significant in these models in the presence of the other measures indicates informality is a very robust predictor of overqualification. Although overqualification could be reduced by expanding formal employment agencies and other efforts to lower search costs and improve information flows, it is likely that improving the ability of economies to generate high-quality jobs will be essential to lowering rates of overqualification.

Table 4.11 Summary of effects of job search method and written employment agreement on odds of overqualification and underqualification

	Overqualification		Underqualification	
	All workers	**Employee**	**All workers**	**Employee**
Search method				
Agency				
Lower	7	7		
Higher			3	2
No effect	4	4	5	6
Direct contact				
Lower	4	3		
Higher			1	1
No effect	7	8	7	7
Started business				
Lower	1	--		--
Higher	2	--	1	--
No effect	8	--	7	--
Media, Internet				
Lower	3	3		
Higher			1	1
No effect	8	8	7	7
Informality				
Contract				
Lower	--	5	--	
Higher	--		--	1
No effect	--	5	--	7

Note: "Lower" and "higher" indicate direction of effects of search method and written employment contract on odds of overqualification and underqualification. Empty cells indicate no results fall into that category. Majority results shaded. Results with unexpected signs are in bold. Dashes indicate models not appropriate or not estimated.

Source: Own calculations based on the STEP survey data.

References

Handel, M.J. 2005. "Trends in perceived job quality, 1989–1998", in *Work and Occupations*, Vol. 32, pp. 66–94.

–; Valerio, A.; Sanchez Puerta, M.L. 2016. *Accounting for mismatch in low- and middle-income countries: Measurement, magnitudes, and explanations*. Directions in Development (Washington, DC, World Bank).

McGuinness, S.; Pouliakas, K.; Redmond, P. 2017. *How useful is the concept of skills mismatch?* (Geneva, ILO).

Valerio, A.; Sanchez Puerta, M.L.; Tognatta, N.; Monroy-Taborda, S. 2016. *Are there skills payoffs in low- and middle-income countries? Empirical evidence using STEP data*. Policy Research Working Paper No. 7879 (Washington, DC, World Bank).

5. Educational mismatch among young workers in low- and middle-income countries: Analysis of the SWTS data

This chapter presents a review of the ILO School-to-Work Transition Survey (SWTS) data to close the existing knowledge gap regarding the scope, factors and possible effects of educational mismatch among young people in low- and middle-income countries.

The chapter is organized in four sections. The first discusses measurement of mismatch based on the SWTS. The second presents estimates on the extent of qualification mismatch among employees and own-account workers in developing and emerging economies, overall and by individual characteristics, and discusses cross-country variations taking into account contextual demand- and supply-side factors. The third section identifies determinants of qualification mismatch among employees using personal and job-related characteristics, at the country level and in a pooled framework. The fourth section examines the consequences of educational mismatch for labour market outcomes of young employees: net hourly earnings, job satisfaction and the willingness to change current employment situation. The last section summarizes the main findings.

5.1 Using SWTS to measure mismatch

One of the specificities of low- and middle-income countries, which typically have underdeveloped or ineffective systems of unemployment insurance and social assistance, is that poor households cannot afford extended unemployment. They are forced either to start up a small, own-account business, predominantly informal, or to accept inferior wage jobs with pervasive skills underutilization, job insecurity, low productivity and low remuneration in order to avoid unemployment. As a result, the standard unemployment rate and time-related underemployment rate tend to be relatively low and fairly stable, despite wide macroeconomic fluctuations (Herrera and Merceron, 2013). These indicators do not accurately capture labour market imbalances and youth employment challenges in developing countries.

Taking up a job that requires a lower level of education than that obtained by a worker is found to be better than being unemployed; there is less stigma and long-term positive employment effects are greater (Baert and Verhaest, 2014; Vossemer and Schuck, 2016; Clark et al., 2017). However, overqualification is likely to have scarring

effects on subsequent career prospects of young workers as they may get "trapped" in poor matches. It is a fairly persistent phenomenon at individual and aggregate levels, associated with substantial costs for individuals, economies and societies. For these reasons, overqualification and its determinants draw considerable attention from researchers and policy-makers in all regions.

The SWTS collected information on the school-to-work transitions of youth aged 15–29 in 34 countries from nine ILO regions between 2012 and 2015.[1] The original country-level data contain a rich set of variables related to family background, educational attainment, employment history and current employment status of youth. When these data are merged into a global data set, some information is not comparable because of different coding used or because the questions were not asked in some countries; therefore, some variables available in the country-level data are either omitted from the global data set (such as trade union membership) or have many missing values for whole countries (such as search methods used to find current job). Despite these limitations, the SWTS global data set allows construction of several measures of mismatch among young workers and analysis of the factors and impacts of mismatch and its subcomponents (overqualification and underqualification).

Our sample consists of employees and own-account workers, excluding those in formal education at the survey time (students) as student jobs are often temporary, low-skilled and taken for the purpose of earning additional income. Unpaid family workers, often the second-largest employment status group among youth in low-income countries, are excluded from the analysis because the main features of this subpopulation in terms of work motivation and job characteristics are not comparable to those of wage and salaried workers and own-account workers. The sample size used in the analysis of educational mismatch is approximately 32,700 individuals from 34 countries. As only one wave of SWTS was conducted in some countries, and the period between two waves of the survey in the other countries is short, the latest survey wave available was used. As a result, the sample includes young workers surveyed in 2012 in two countries, in 2013 in seven countries, in 2014 in 11 countries, and in 2015 in the remaining 14 countries. Table A.5.1 in Annex 5.1 provides some details of the sample by country and employment status.

5.2 Incidence of educational mismatch among young workers

Incidence of educational mismatch according to different methods

Several measures of educational mismatch described in Annex 5.3 were applied to the SWTS sample in 34 countries. To compute point estimates of the incidence of

[1] Other details of the ILO School-to-Work Transition Survey are available on the survey's web page: http://www.ilo.org/employment/areas/youth-employment/work-for-youth/WCMS_191853/lang--en/index.htm.

mismatch, sampling weights provided in the original data set were used and observations with undefined (missing) mismatch status disregarded.

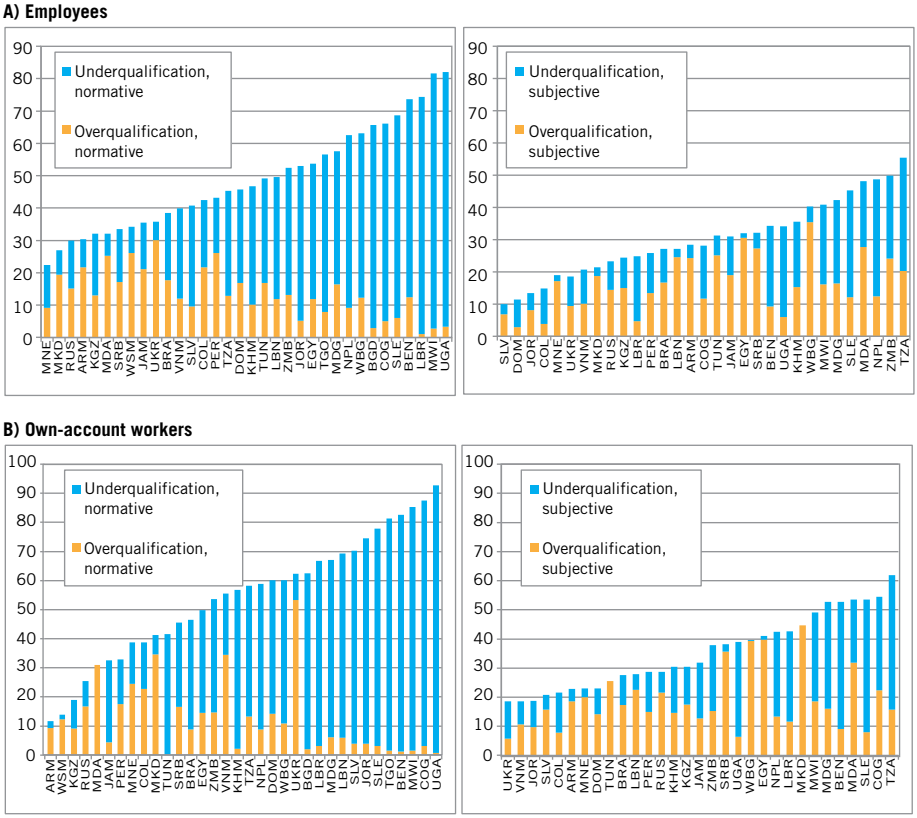
As the incidence of horizontal (field of study) mismatch cannot be estimated with the SWTS data for most countries and estimates in the other countries are not statistically reliable (see explanation in Annex 5.3), the rest of the chapter focuses on describing the main characteristics, determinants and impacts of vertical (qualification) mismatch using subjective and normative measures. The subjective measure of mismatch is more job-specific than the normative one as it takes into account the specific education and skills needed for performing certain jobs in a given country at a given point in time; it is not based on *a priori* presumed correspondence between education and broad occupational groups which is usually fixed in all countries using the same occupational classification (OECD, 2014). It is generally based on workers' self-assessment of their skills levels to do the job. Furthermore, it is likely to capture a mixture of mismatches, including mismatch between job requirements and worker's level of education (vertical educational mismatch), field of study (horizontal educational mismatch) and available skills (skills mismatch). For these reasons, this measure is deemed more appropriate for a cross-country analysis and receives more attention in the empirical part of the study.

Figure 5.1 below and table A.5.2 in Annex 5.1 report the proportion of young workers who are mismatched (overqualified or underqualified) according to two mismatch measures and in two different employment status groups. The different measures reveal diverse patterns of qualification mismatch, with substantial discrepancy between objective (normative) and subjective measures in the estimated incidence of mismatch and its subcomponents. Scatter plots of the estimated incidence of mismatch according to the two methods (figure A.5.1 in Annex 5.2) show that, in most countries, the normative-based estimates of the incidence of mismatch and underqualification substantially exceed subjective-based estimates; the opposite is true for the incidence of overqualification. The former result is partly attributed to the definition of underqualified workers by the normative approach according to which all workers with less than primary education, and the bulk of workers with primary education who take up jobs in ISCO groups 4–8, were classified as underqualified (see Annex 5.3).

Due to this peculiarity of the normative approach, on the one hand, and low educational attainment of youth in poor developing countries, on the other hand, underqualification dominates over overqualification in 24 out of 34 countries among both employees and own-account workers (see left panels in figure 5.1 below and table A.5.2 in Annex 5.1). The overall mismatch measured according to the normative approach is positively and strongly associated with the incidence of underqualification and negatively associated with the incidence of overqualification.

The number of countries with dominating underqualification as defined by the subjective approach is much smaller (14 countries) than in the normative approach (see right panels in figure 5.1 below and table A.5.2 in Annex 5.1). Another important difference between the measures based on these two approaches is that subjective-based incidence of overall mismatch is positively associated with the levels of both underqualification and overqualification.

Figure 5.1 Incidence of qualification mismatch among employees and own-account workers according to normative and subjective methods (percentages)

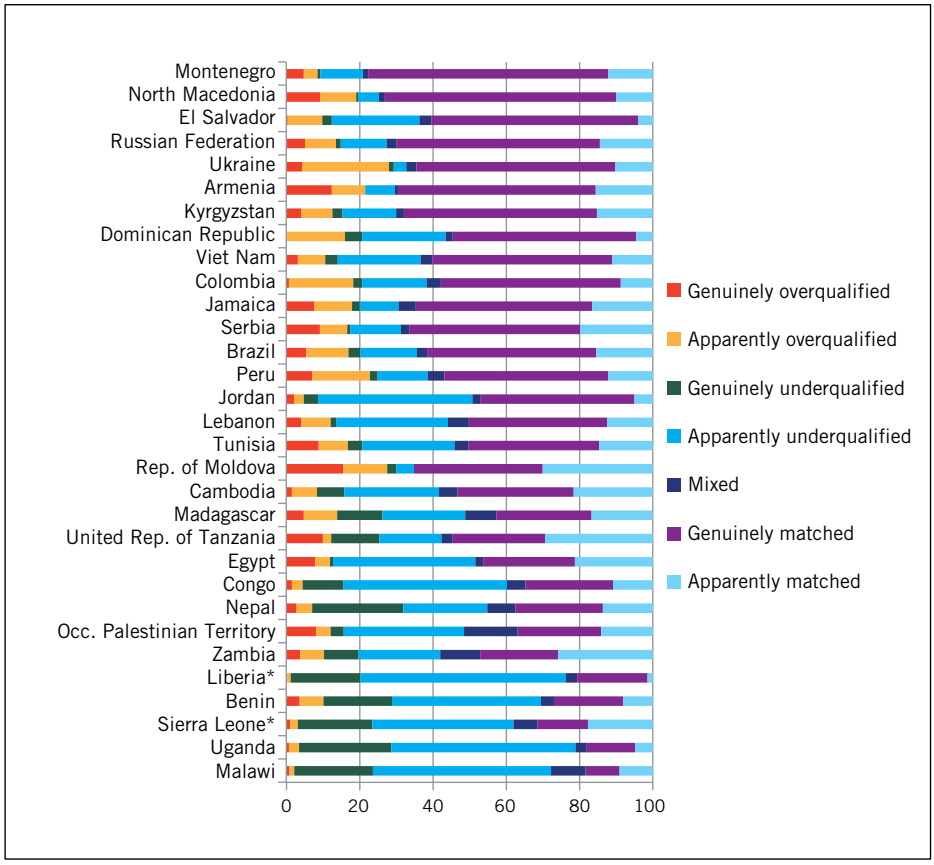


Source: SWTS, latest year available, with sample weights applied.

To shed more light on the discrepancy between the normative and subjective measures of mismatch at the individual level, estimates of the mixed method are presented, with the total population of young employees in a given country split into seven categories as described in Annex 5.3. Only 41.5 per cent of young employees in 31 countries are genuinely matched to their jobs in terms of qualification (well-matched according to both subjective and normative methods), whereas 15 per cent are well-matched according to the normative approach but self-declared as over- or underqualified (apparently matched).

Large shares of apparently underqualified (20.8 per cent) and apparently over-qualified workers (9.6 per cent) compared to those who are genuinely underqualified and overqualified (5.1 and 4.6 per cent, respectively) point to significant overestimation of mismatch by the normative method. This is particularly the case for Ukraine, where 23.7 per cent of employees are defined as apparently overqualified; this makes

Figure 5.2 Composition of employees according to a mixed method of qualification mismatch (percentages)



Note: Countries are shown in descending order of the share of genuinely matched employees. *Samples of employees with defined statuses according to normative and self-declared methods in Liberia and Sierra Leone are quite small (51 and 66 observations); the mixed-based estimates should therefore be interpreted with caution.
Source: SWTS, latest year available, with sample weights applied.

the country an absolute leader in terms of the normative-based incidence of overqualification (see panel C, figure A.5.1 in Annex 5.2). Similarly, very high values of normative-based incidence of underqualification and total mismatch in Benin, Congo, Liberia, Malawi, Sierra Leone, Uganda and other low-income countries are largely driven by misclassification, as the share of apparently underqualified workers in these countries is substantially larger than the share of genuinely underqualified workers (figure 5.2).

On average, 7.4 per cent of young employees are genuinely underqualified and 4.9 per cent are genuinely overqualified, but there is substantial heterogeneity across countries (figure 5.2), with 11 countries exhibiting much higher levels of genuine

underqualification than 7.4 per cent[2] and a further 12 countries exhibiting higher levels of genuine overqualification than the average 4.9 per cent.[3]

The comparative analysis presented in this subsection supports the notion that the two measures of qualification mismatch – based on subjective and normative methods – show very different levels of underqualification and overqualification in low- and middle-income countries, either because they capture different aspects of mismatch or because of a large measurement (misclassification) error in the normative approach.

An additional robustness check on the relationship between the two measures used an estimate of the Spearman and Kendall rank correlation coefficients between the subjective and normative measures of the incidence of overqualification, underqualification and total mismatch. The correlation is found to be significant at the 5 per cent level but weak for underqualification and total mismatch, and insignificant for overqualification. These results indicate that the subjective and normative measures provide an inconsistent picture, even for the ranking of countries according to the level of mismatch and its subcomponents.

Given a lower misclassification error rate and other advantages of the subjective method, the other sections of the chapter examine the incidence of mismatch, its determinants and impacts using this method. Similar results for the normative measure are available in working files but not described here in detail for the sake of brevity.

Cross-country variations in the incidence of qualification mismatch (subjective method)

The total incidence of qualification mismatch among young employees and own-account workers varies substantially across countries (figure 5.1 and table A .5.2 in Annex 5.1). In the United Republic of Tanzania, 55.5 per cent of employees and about 62 per cent of own-account workers are defined as mismatched according to the subjective (self-declared) approach. In contrast, qualification mismatch affects just 9.9 per cent of young employees in El Salvador and 18.6 per cent of own-account workers in Ukraine and Viet Nam.

Similar variation is observed in terms of two mismatch subcomponents. The largest incidence of underqualification is among employees in Nepal (36.4 per cent) and among own-account workers in the United Republic of Tanzania (46.2 per cent). The smallest proportion of young employees reporting that they experience gaps in the knowledge and skills and need additional training is observed in Egypt (1.4 per cent). No underqualified own-account workers are found in Tunisia and Montenegro,

[2] These are Uganda (25.3%), Nepal (24.6%), Malawi (21.4%), Sierra Leone (20.3%), Liberia (19.1%), Benin (18.6%), the United Republic of Tanzania (13.1%), Madagascar (12.5%), the Congo (11.1%) Zambia (9.4%) and Cambodia (7.6%).

[3] These are the Republic of Moldova (15.5%), Armenia (12.4%), the United Republic of Tanzania (9.9%), North Macedonia (9.4%), Serbia (9.2%), Tunisia (8.8%), Occupied Palestinian Territory (8.2%), Egypt (7.8%), Jamaica (7.7%), Peru (7.1%), Brazil (5.5%) and the Russian Federation (5.1%).

but this is attributed to a small sample of young own-account workers (see table A.5.1 in Annex 5.1) rather than to low incidence of self-declared underqualification. The incidence of overqualification ranges from 2.8 per cent in the Dominican Republic to 35.4 per cent in the Occupied Palestinian Territory among employees, and from 5.8 per cent in Ukraine to 44.6 per cent in North Macedonia among own-account workers.

Grouped by region or income level, qualification mismatch, which is mainly driven by high levels of underqualification, tends to be much more widespread in sub-Saharan Africa and East Asia and in developing low-income countries (table 5.1). As figures A.5.2 and A.5.3 in Annex 5.2 show, these countries are characterized by low educational attainment of the population and a sizeable share of agriculture in GDP, despite extensive structural changes over 1990–2010. A large increase in the share of industry and services in GDP in Benin, the Congo, Zambia, Malawi, the United Republic of Tanzania, Nepal, Bangladesh and

Table 5.1 Incidence of qualification mismatch among young employees and own-account workers, by region and income group (percentages)

Group (number of countries in the SWTS sample)	Employees			Own-account workers		
	Over-qualification	Under-qualification	Mis-match	Over-qualification	Under-qualification	Mis-match
ILO region						
North Africa (2)	30.1	1.9	31.9	38.4	1.1	39.5
Sub-Saharan Africa (9)	16.1	29.9	45.9	13.5	36.5	49.9
Latin America and the Caribbean (6)	15.0	10.4	25.4	16.4	10.7	27.1
Arab States (3)	17.1	5.1	22.2	26.4	4.2	30.6
South-Eastern Asia and the Pacific (2)	10.9	12.0	22.9	11.9	10.1	22.0
Southern Asia (1)	12.4	36.4	48.7	13.4	29.1	42.5
Northern, Southern and Western Europe (3)	24.4	4.0	28.4	36.7	2.1	38.7
Eastern Europe (3)	12.2	9.3	21.5	12.4	11.8	24.2
Central and Western Asia (2)	18.3	7.5	25.8	17.7	11.1	28.7
Income group						
Emerging, middle-income, countries (25)	16.3	9.3	25.6	16.5	11.0	27.5
Developing, low-income, countries (9)	14.8	31.5	46.4	13.2	37.0	50.2

Note: Simple average of country-level estimates of mismatch.

Source: SWTS, latest year available, with sample weights applied.

Uganda (ranging from 8.8 to 28.2 percentage points) over recent decades amid slow improvements in gross enrolment in secondary education[4] can be an important contribution to a large share of young workers who feel underqualified for their jobs.

Young workers in emerging middle-income economies in Latin America, North Africa, Europe and Central Asia tend to suffer much more from overqualification than from underqualification. Most of these countries have experienced rapid growth in tertiary education enrolment and overall educational attainment of the population (see panels B and C in figure A.5.2 in Annex 5.2) but sectoral structure is still dominated by low-productivity firms in traditional sectors.[5] This imbalance between the relative supply of and demand for educated workers contributes to high levels of overqualification. Yet the levels of overall mismatch, especially among employees, are significantly lower in middle-income economies than in low-income countries in sub-Saharan Africa and Southern Asia.

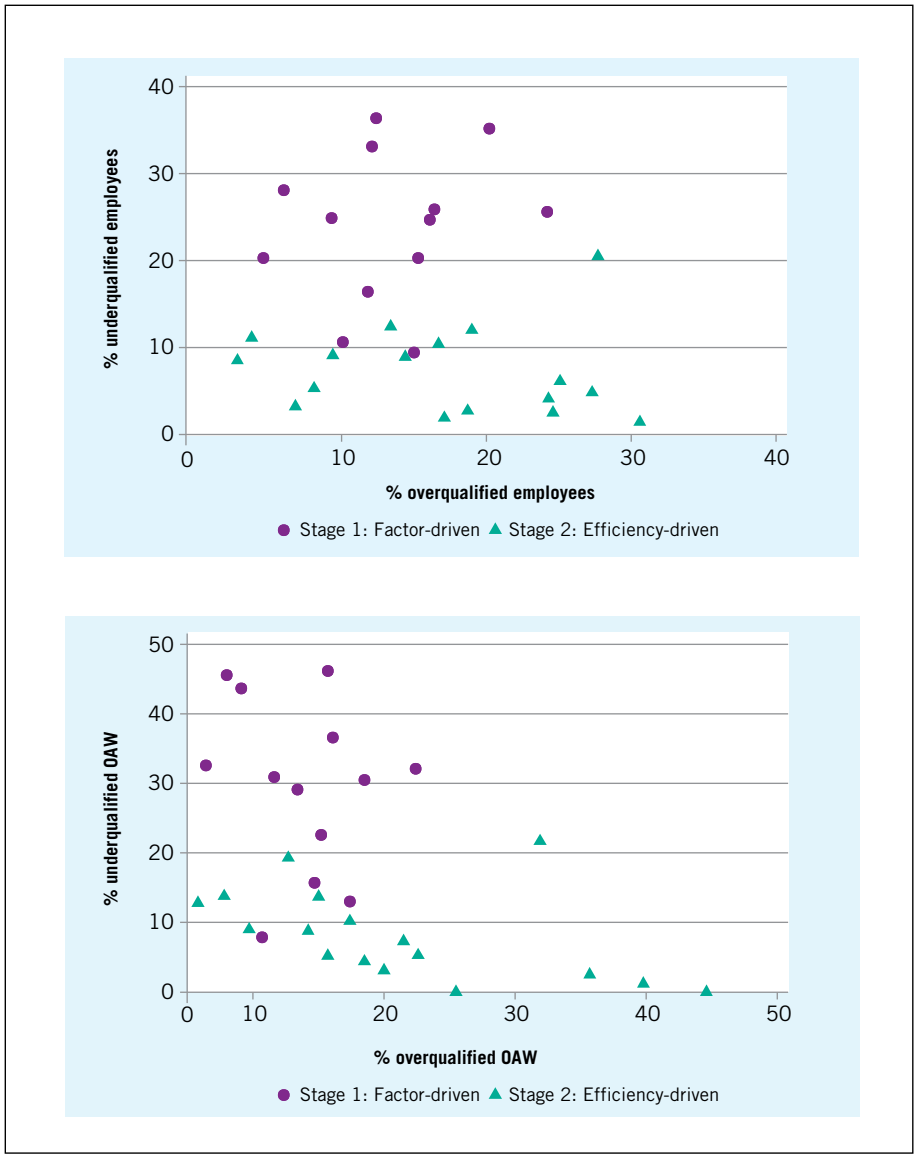
If the sample of countries is split using the approach based on the Global Competitiveness Index (GCI) and distinguishes between factor-driven and efficiency-driven countries as of 2012–13 (WEF, 2013), there are patterns of overqualification and underqualification similar to those when the income level is used. Young workers living in factor-driven countries, whose global competition is primarily based on their factor endowments such as unskilled labour and natural resources according to the WEF, experience very high levels of underqualification and, to a lesser extent, overqualification (figure 5.3). Given that the skills content of jobs in factor-driven economies is low, underqualification among young workers arises not so much from strong qualification requirements of firms from their workers (demand side) as from low educational attainment (supply side). Somewhat contrary to the expectation that efficiency-driven countries are more likely to harness the benefits of highly educated workers, observed higher rates of overqualification there could be explained by the general higher performance of national education and training systems or, conversely, by the low levels of skills utilization in workplaces.

Identifying country characteristics associated with mismatch of young workers in developing and emerging economies is done through tests of partial correlations between subjective mismatch, overqualification and underqualification levels based on the SWTS data and a large set of economic, labour market, education and demographic characteristics described in table A.5.3 in Annex 5.1. This analysis is purely suggestive; it does not take into account correlations between various country characteristics and does not allow a causal interpretation. The sample varies from 24 to

[4] According to available education statistics (UNESCO UIS and WDI data sets), gross enrolment in secondary education is below 60 per cent in sub-Saharan Africa (including a record low 26.1 per cent in Uganda) and about 70 per cent in Nepal. This is far below the target to achieve UN Sustainable Development Goal 4, "Ensure inclusive and quality education for all and promote lifelong learning", by 2030.

[5] The analysis of sectoral and occupational structures of employment along with recent developments in the education systems of Armenia, North Macedonia, Georgia and Ukraine is provided in Kupets (2016a).

Figure 5.3 Incidence of overqualification and underqualification among young workers, by GCI-based classification (percentages)



Note: OAW = own-account workers.
Source: Own calculations based on the SWTS data and WEF, 2013.

31 countries depending on the characteristic used. Correlation coefficients significant at the 5 per cent level are reported in table 5.2.

The incidence of underqualification has substantially more correlation than that of total mismatch; most statistically significant correlation coefficients with the

Table 5.2 Correlation coefficients between mismatch and country characteristics (significant at 5% level)

Indicator	Employees			Own-account workers		
	MM	UQ	OQ	MM	UQ	OQ
GDP per capita, PPP	–0.57	–0.70		–0.54	–0.69	
Growth rate in GDP per capita (2007=100)		0.45				
Growth rate in gross fixed capital formation (2007=100)		0.41		0.38	0.47	
Share of agriculture in GDP	0.55	0.74		0.51	0.70	
Share of industry in GDP	–0.38	–0.38				
Share of services in GDP		–0.53			–0.53	
Growth rate in industry value added (2007=100)		0.41		0.38	0.45	
Growth rate in industry value added (2000=100)		0.45			0.44	
Share of agriculture in total employment	0.68	0.86		0.61	0.78	
Share of industry in total employment	–0.49	–0.81		–0.48	–0.83	0.57
Share of services in total employment	–0.59	–0.74		–0.56	–0.63	
LFPR, total	0.36	0.71	–0.39		0.64	-0.53
LFPR, youth	0.37	0.66			0.54	-0.47
Unemployment rate, total		–0.61	0.47		–0.63	0.65
Unemployment rate, youth		–0.70	0.52		–0.71	0.67
Rigidity of employment index (2009)	0.43	0.36		0.50	0.38	
Share of adult population with secondary education (2010)	–0.55	–0.69		–0.63	–0.61	
Share of adult population with tertiary education (2010)	–0.44	–0.51		–0.50	–0.49	
Change in share of adult population with tertiary education (1990 to 2010)		–0.42		–0.44	–0.42	
Average years of schooling attained by adult population (2010)	–0.58	–0.73		–0.70	–0.68	
GER to secondary education	–0.51	–0.74		–0.69	–0.80	

Table 5.2 Correlation coefficients between mismatch and country characteristics (significant at 5% level) ***(concl.)***

Indicator	Employees			Own-account workers		
	MM	UQ	OQ	MM	UQ	OQ
Share of urban population (average 2000–13)	–0.60	–0.72		–0.53	–0.59	
Share of children (average 2000–213)	0.47	0.66		0.53	0.69	
Youth informal employment among employees, definition 1 (SWTS)		0.44			0.41	
Youth informal employment among employees definition 2 (SWTS)	0.47	0.50		0.40	0.47	
Youth informal employment among own-account workers (SWTS)		0.39			0.42	
Youth involuntary part-time employment (SWTS)	0.44	0.58		0.46	0.59	
Youth unemployment rate, strict (SWTS)		–0.44	0.40		–0.40	0.52

Note: Explanation of indicators is provided in table A.5.3 in Annex 5.1. If not stated otherwise, indicators refer to the latest year of SWTS in a country or the latest available year of a given indicator.

MM = mismatch; UQ = underqualification; OQ = overqualification

Source: Own calculations based on the country-level data from SWTS, world development indicators (WDI), Barro-Lee and UNESCO UIS data sets.

incidence of underqualification and total mismatch among young workers have an expected sign (table 5.2). Higher levels of underqualification are associated with:

- lower levels of GDP per capita;
- higher shares of agriculture and lower shares of industry and services in GDP and employment;
- higher economic activity and lower unemployment of population (both total and youth);
- higher shares of youth engaged in informal and part-time involuntary employment;
- lower educational attainment of population (both adults and children of secondary school age);
- larger population growth and lower urbanization rate.

A positive association between the incidence of underqualification and growth rates in GDP per capita, gross fixed capital formation and industry value added

compared to the year 2007 may indicate that investment in human capital lagged behind investment in physical capital and industrial development in fast-growing countries in their first stage of development (as defined by WEF, 2013). As a result, a huge number of young workers who just entered the labour market feel gaps in knowledge and skills related to their jobs. But this correlation is not causality and some other factors may be the true cause of high rates of underqualification in fast-growing countries.

Unlike underqualification and total mismatch, overqualification is not usually associated with labour market measures such as unemployment rates. A positive association between overqualification and unemployment rates (both of the total population and of youth, based on the SWTS or on ILO estimates) is in line with the hypothesis tested in the economic literature that overqualification can be a temporary adjustment mechanism during a cyclical shock (Groot and van den Brink, 2000; Croce and Ghignoni, 2012). High overqualification can coexist with high unemployment rates when unemployment is largely structural and is driven by the same underlying factor as overqualification, namely imbalances between skill supply and skill demand (Kupets, 2016b). Hence, overqualification, or skill-related and invisible underemployment, is seen as a long-term adjustment mechanism in middle-income emerging countries; educated and financially constrained young people cannot afford to keep searching for jobs that are better matched and take less desirable jobs below their own educational level.

The final part of the analysis of cross-country variations in total qualification mismatch among young employees and own-account workers is its relationship with important characteristics of the youth labour market, such as the incidence of informal employment and unemployment rate measured with the use of the same SWTS data in 31 countries. A scatter plot of qualification mismatch versus informal employment (panel A, figure A.5.4 in Annex 5.2) reveals a positive and strong relationship between the two measures, suggesting that countries with high youth informal employment also tend to face a widespread qualification mismatch among young workers. In contrast, there is no clear relationship between the incidence of qualification mismatch and youth unemployment rate (panel B, figure A.5.4 in Annex 5.2), probably because of the opposite relationship between two components of mismatch and the unemployment rate (see table 5.2). In countries with equally high unemployment rates, the levels of mismatch can differ substantially. For example, in El Salvador, Brazil and the Republic of Moldova the youth unemployment rate is 18.5, 17.9 and 17.4 per cent, respectively, whereas the corresponding shares of mismatched young employees and own-account workers are 11.6, 27.2 and 48.8 per cent.

The additional cluster analysis with the use of three measures – incidence of informal employment, unemployment rate and incidence of total qualification mismatch among those aged 15–29 – identified three groups of countries which face different youth employment challenges (these country groups are circled in figure A.5.4 in Annex 5.2):

1. Low-income countries with high incidence of both informal employment and qualification mismatch but relatively low youth unemployment rate: Benin, Cambodia, the Congo, Liberia, Madagascar, Malawi, Nepal, Occupied

Palestinian Territory, Sierra Leone, United Republic of Tanzania, Uganda, Zambia. These countries face the particular challenge of the large number of low-educated young people in informal sector jobs. At the same time, a lot of young workers are reported to be mismatched to their jobs in terms of education and training, mainly underqualified. Widespread informal employment engages those underqualified and substitutes for unemployment, so youth unemployment is not a major problem in most of these countries.

2. Middle-income countries with high incidence of informal employment but lower incidence of qualification mismatch and higher youth unemployment rate than in the first group: Dominican Republic, Egypt, El Salvador, Jamaica, Kyrgyzstan, Peru, Tunisia, Viet Nam. These countries suffer from widespread informal employment among youth but less so from the qualification mismatch among young employees and own-account workers (compared to low-income countries).
3. Middle-income countries with much lower incidence of informal employment and higher unemployment rate than in the above two groups but fairly high levels of qualification mismatch: Armenia, Brazil, Colombia, Jordan, Lebanon, North Macedonia,Republic of Moldova, Montenegro, Russian Federation, Serbia, Ukraine. These are the countries where qualification mismatch, predominantly overqualification of educated youth, is a complement to youth unemployment and where young mismatched workers are often found in formal sector jobs.

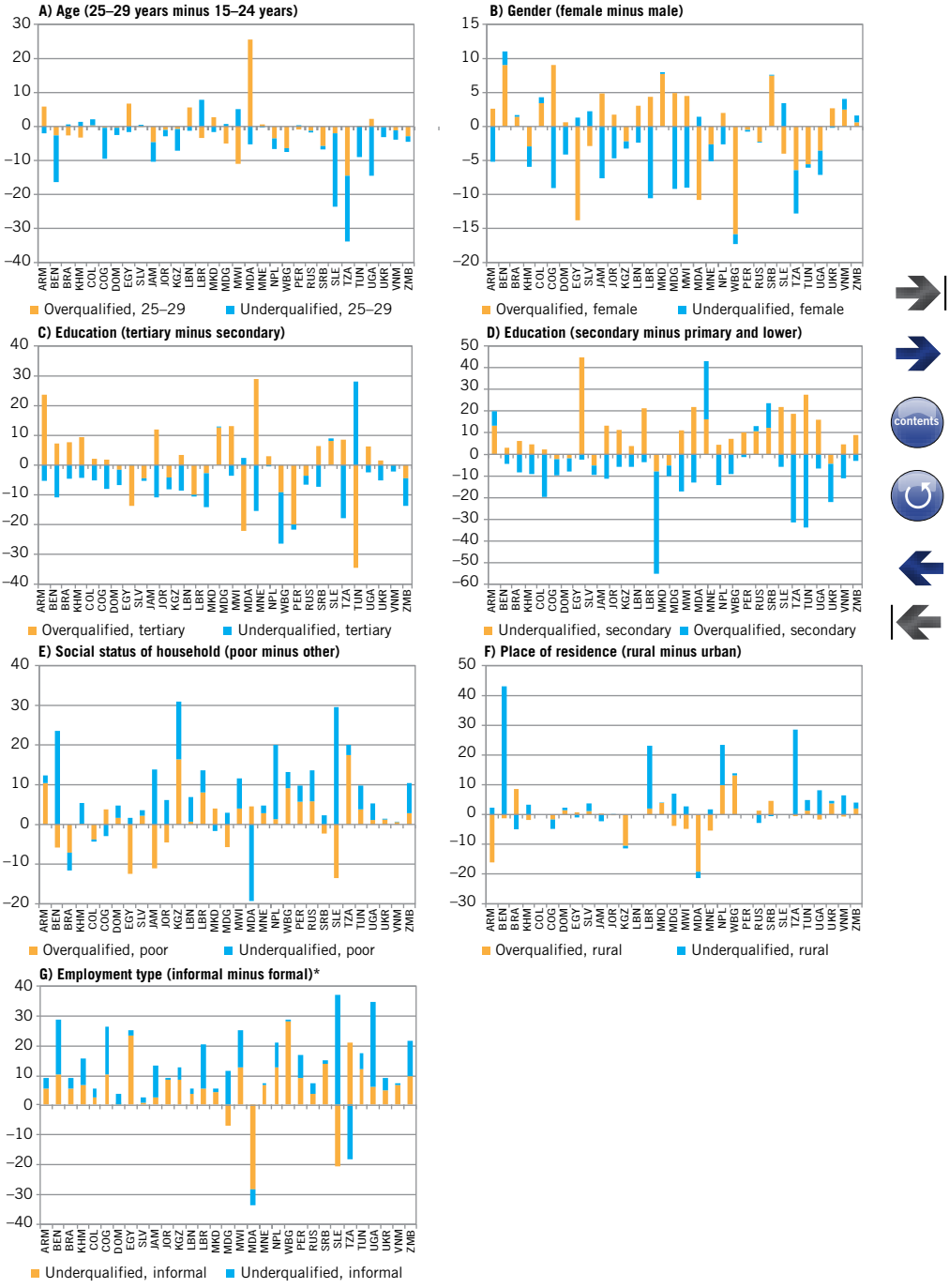
Incidence of qualification mismatch among employees by socio-demographic characteristics

Huge cross-country variations are also found across groups of young employees by the main socio-demographic characteristics (figure 5.4). In most countries, younger workers (15–24 years) are more likely to be mismatched to their jobs, due to both underqualification and overqualification, than their older counterparts (25–29 years) who had more time to either find a job in line with their education or gain the necessary experience and skills at their current job.

The pattern with respect to the gender difference is not uniform: in seven countries young females tend to suffer more from both over- and underqualification than young males. In 11 countries they have higher overqualification levels but lower underqualification levels, in four countries women are at a disadvantage with respect to underqualification only, and in the remaining nine countries females are better matched to their jobs than males.

It is expected that the higher the level of completed education of a young worker, the greater his or her risk of being overqualified and the lower the risk of being underqualified. Panels C and D in figure 5.4 reveal that this is not always true in low- and middle-income countries. It might be explained by the subjective measurement as well as by poor quality of education. For example, young employees with a university degree in the United Republic of Tanzania report much higher incidence of underqualification and zero incidence of overqualification, although this outlier can be disregarded since the sample of employees with tertiary education is small (14). A similar sample size

Figure 5.4 Difference in the share of overqualified and underqualified young employees, by socio-demographic characteristics (percentage points)



* ILO approach to the definition of informal employment (no access to paid annual leave, paid sick leave or social security contributions).
Source: SWTS, latest year available, with sample weights applied.

problem for tertiary-educated young workers that biases the results, occurs in Benin, the Congo, El Salvador, Liberia, Madagascar, Malawi, Sierra Leone and Uganda. Egypt, Lebanon and the Occupied Palestinian Territory differ from other countries by a lower share of overqualification reported by young workers with tertiary education compared to their peers with secondary and post-secondary education. In Armenia, the Republic of Moldova and the Russian Federation, workers with secondary education seem to have higher rates of underqualification than the least educated youth, but this is mainly due to zero rates of mismatch among very few young workers with primary education. In most other countries, especially in low-income developing countries where the sample of poorly educated workers is fairly large, levels of underqualification are substantially higher among young workers without basic secondary education.

Young workers who assessed the financial situation of their households as fairly poor or poor (defined as "poor") and those who live in rural areas are generally at a higher risk of qualification mismatch, mainly on account of higher underqualification (figure 5.4, panels E and F, respectively). There are exceptions, such as the much lower incidence of overqualification among rural youth compared to urban peers in Armenia, Kyrgyzstan, Madagascar, Malawi, the Republic of Moldova and Montenegro. In all countries except Madagascar, the Republic of Moldova, Sierra Leone and the United Republic of Tanzania, working informally, without social security coverage, is associated with higher chances of being overqualified or underqualified (figure 5.4, panel G). Herrera and Merceron (2013) explain higher levels of overqualification in the informal sector by a low share of skilled work in this sector because of firms' limited access to technology and capital.

5.3 Determinants of mismatch among young workers

Insights into the factors that jointly influence the incidence of overqualification and underqualification among young workers in low- and middle-income countries came from microeconometric analysis using the individual-level SWTS data and applying the multinomial logistic regression. The dependent (outcome) variable is the mismatch status specified by three non-overlapping categories: well-matched (base category), overqualified and underqualified. This is first analysed at country level and then for a pooled framework. Control variables in the widest specification at country level include the following characteristics:

- personal and household characteristics: gender, marital status and interaction between gender and marital status; age and age squared (age squared is used to test non-monotonic relationship); levels of educational attainment (primary education and below and tertiary education versus secondary education as a reference category);[6] social status based on self-assessed household financial situation (poor versus other); and living in a rural area;

[6] For countries with an insufficient number of observations for employees with either primary or tertiary education, estimated coefficients are reliable only for one of two education levels.

- job characteristics: broad economic sector (agriculture, market services, and public services, with industry and construction as a reference category); firm size (small firms with 10–49 employees and medium-to-large firms with 50 and more employees, as opposed to microbusinesses with less than ten employees, used as a reference category); temporary job (written contract or oral agreement of limited duration up to one year, as opposed to employment of unlimited duration or of at least 12 months); informality status (de jure and de facto informal employment, with formal employment as a reference category);[7] a categorical variable, based on reported hours actually worked during a reference week, which takes a value of 1 if an individual worked less than 30 hours (time-related underemployment), 2 if he/she worked from 30 to 40 hours (normal duration, reference category), and 3 otherwise (overtime work); a dummy for receiving any training for current job in the last 12 months.

Analysis in a pooled framework does not include firm size and rural dummies to avoid excluding a large number of countries (and therefore observations) lacking information about the number of workers employed in business/farm/activity and place of residence in the global data set. For similar reasons, related to data limitations, union membership and method of job search used to acquire current job are not included in any model.

The determinants of overqualification and underqualification were estimated using two alternative measures of mismatch. In line with the findings of Verhaest and Omey (2010), the estimation results, both at country level and in a pooled framework, are very sensitive to the applied measure of mismatch. This supports the previous argument that subjective and normative approaches measure different aspects of mismatch and therefore have different determinants. In the belief that self-declared measure captures the concept of job- and country-specific educational mismatch more adequately, results are discussed only on country-level determinants of mismatch for the subjective-based mismatch.

Country-level determinants of subjective mismatch among employees

Table A.5.4 in Annex 5.1 schematically presents estimation results for country-level determinants of being overqualified or underqualified relative to being well-matched; it shows only statistically significant coefficients, using two colours for positive and negative values to make the cross-country differences more visible. Countries differ greatly in the number of significant determinants among available variables in the data set, their impact on the probabilities of overqualification and underqualification, and the overall model fit. Zambia has no significant determinants (education variable

[7] Guidelines by Hussmanns (2003) distinguish between de jure and de facto informal employment ("in law or in practice"). De jure informal employment refers to employment on the basis of an oral agreement, both in the formal and informal sectors. De facto informal employment is defined as employment on the basis of a written contract in the formal sector but without access to paid annual leave, paid sick leave or social security contribution.

is not available in the global data set for Zambia). In contrast, many personal and job characteristics in Cambodia and Jamaica appear to be significant determinants of the probability of mismatch.

Taking into consideration the significant factors in most countries, several findings emerge from the country-level analysis (table A.5.4 in Annex 5.1):

- The probability of being overqualified increases, and that of being underqualified decreases, with level of education, even though in many countries there is no statistical difference between workers with primary and secondary education.
- De jure informal employment (and less often de facto informal employment) is associated with a higher risk of being overqualified or underqualified. Informal jobs are more easily available to young workers, especially in low- and middle-income countries, but the drawback is that they usually require lower skills than formal jobs. At the same time, widespread informal paid jobs in middle-income countries (Latin American, western Balkan and former Soviet Union countries) which require more advanced skills do not offer employer-provided job-specific training, so workers may still feel significant gaps in their knowledge and skills.
- Employees of public services sectors (public administration, education and health care) usually have a lower probability of being overqualified or underqualified than industrial and construction workers. This finding is in line with expectations as governments impose strict regulations on the formal education and qualifications required to access and practice a job in these sectors. As a consequence, the job market for highly skilled officials, teaching and health professionals and for clerks and support staff in these sectors typically functions much more effectively in getting the right people in terms of formal education for the right jobs than in agriculture, industry or market services, where recruitment rules are less strict.
- Temporary jobs (limited duration of up to one year) are associated with a higher likelihood of being underqualified in nine countries and with a higher likelihood of being overqualified in seven. This suggests that young workers, who are often forced to take a temporary job in order to avoid unemployment or poverty, are more prone to educational mismatch than those holding longer-term jobs. Employers providing permanent jobs are usually interested in a long-term employment relationship and try to ensure a better match of workers' skills and aspirations to jobs to avoid high labour turnover and low productivity.
- Young workers who reported receiving some training for their current job in the last 12 months are less likely to feel overqualified but more likely to be underqualified than workers without such training. The latter finding is unexpected and difficult to interpret: additional job-specific training is expected to reduce possible skill gaps and provide a better match with job requirements. One possible explanation is that the amount or quality of training provided is not sufficient to cover existing knowledge and skills gaps among young employees.

Determinants of subjective mismatch among employees in a pooled framework

Possible reasons for cross-country differences in qualification mismatch arise from analysing the determinants of over- and underqualification in a pooled framework. In addition to individual-level explanatory variables used before, there is control for country fixed effects in the first model and for county-level characteristics measuring industrial development, labour market situation and education trends in the second (table 5.3).[8]

Comparison of the estimated results for subjective and normative-based measures of mismatch shows that some variables have different significance levels: gender, agriculture, de facto informal employment, time-related underemployment and overtime work, country-level industrial growth, share of agriculture in employment and unemployment rate. At the same time, some significant variables have the opposite signs: age, poor, economic sector, de jure informal, gross enrolment ratio (GER) in secondary education. These discrepancies are mainly observed for underqualification, partly because the normative method largely overestimates the incidence of underqualification by putting many individuals who are well-matched according to their self-declaration into the group of underqualified workers.

The main findings of the country-level analysis for the subjective-based mismatch remain true in a pooled framework: education, informal employment, temporary job, work in public services, and receiving job-specific training have very strong and significant positive effects on the likelihood of being overqualified or underqualified relative to being well-matched. Several other variables also become significant in a pooled framework:

- Age, measured within the interval from 15 to 29 years, has an inverted U-shaped relationship with the likelihood of overqualification and a U-shaped but not very strong relationship with the likelihood of underqualification. As age is closely related to labour market experience and tenure, the individual's experience rather than age itself explains differences in the likelihood of mismatch. Relatively older workers potentially have more experience and marketable skills, and are less likely to be mismatched than their younger counterparts who just started their career path (decreasing parts of hyperbola for 16–28-year-olds).
- Youth from disadvantaged socio-economic background (poor households) are more likely to be both overqualified and underqualified (according to a subjective method). This effect can be explained by a lack of financial resources in a family for adequate education of children, limited access to the relevant information and social networks, and perhaps less developed cognitive abilities and socio-emotional skills necessary to obtain a well-matched job.

[8] A similar approach has been used in some microeconometric studies in developed countries. For example, Wolbers (2003) estimated the determinants of job mismatch in European countries, adding two country-level indicators for education system in one of his specifications. Verhaest et al. (2017) used a set of country-level variables to account for the differences in supply and demand context, education and labour market institutions.

Table 5.3 Determinants of mismatch in a pooled framework: Multinomial logistic regression

	Subjective method				Normative method			
	Model 1		Model 2		Model 1		Model 2	
VARIABLES	**OQ/WM**	**UQ/WM**	**OQ/WM**	**UQ/WM**	**OQ/WM**	**UQ/WM**	**OQ/WM**	**UQ/WM**
Female	0.084	−0.053	0.039	0.011	**−0.285*****	**0.197*****	**−0.248*****	0.056
	(0.060)	(0.077)	(0.067)	(0.088)	(0.067)	(0.068)	(0.076)	(0.076)
Married	−0.056	−0.075	−0.057	0.019	−0.019	0.025	−0.070	0.014
	(0.070)	(0.085)	(0.075)	(0.092)	(0.079)	(0.072)	(0.087)	(0.078)
Female married	**−0.219***	−0.006	−0.084	−0.044	0.038	0.139	0.018	**0.226***
	(0.112)	(0.131)	(0.125)	(0.151)	(0.121)	(0.114)	(0.135)	(0.129)
Age	**0.182****	**−0.168***	**0.245*****	−0.092	**−0.311*****	0.035	**−0.285****	0.015
	(0.084)	(0.090)	(0.094)	(0.103)	(0.104)	(0.077)	(0.129)	(0.084)
Age squared	**−0.004****	**0.003***	**−0.005*****	0.002	**0.006*****	−0.000	**0.006****	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Primary education and below	**−1.069*****	**0.546*****	**−1.046*****	**0.655*****		**3.829*****		**3.806*****
	(0.066)	(0.074)	(0.070)	(0.086)		(0.072)		(0.078)
Tertiary education	**0.474*****	**−0.599*****	**0.566*****	**−0.750*****	**1.936*****		**1.986*****	
	(0.065)	(0.112)	(0.071)	(0.123)	(0.072)		(0.078)	
Poor	**0.110***	**0.118***	0.083	**0.158****	**0.342*****	**−0.201*****	**0.318*****	**−0.127****
	(0.059)	(0.069)	(0.062)	(0.074)	(0.068)	(0.059)	(0.071)	(0.062)

Table 5.3 Determinants of mismatch in a pooled framework: Multinomial logistic regression *(cont.)*

	Subjective method				Normative method			
	Model 1		Model 2		Model 1		Model 2	
VARIABLES	**OQ/WM**	**UQ/WM**	**OQ/WM**	**UQ/WM**	**OQ/WM**	**UQ/WM**	**OQ/WM**	**UQ/WM**
	(0.056)	(0.070)	(0.061)	(0.080)	(0.063)	(0.061)	(0.071)	(0.067)
Public services	**–0.618*****	**–0.436*****	**–0.905*****	**–0.576*****	**–1.235*****	**2.004*****	**–1.394*****	**1.916*****
	(0.087)	(0.111)	(0.099)	(0.124)	(0.099)	(0.091)	(0.108)	(0.101)
Temporary job	**0.385*****	**0.384*****	**0.314*****	**0.277*****	**0.305*****	**–0.129***	**0.366*****	**–0.296*****
	(0.066)	(0.076)	(0.073)	(0.088)	(0.077)	(0.070)	(0.089)	(0.078)
De facto informal employment	**0.305*****	**0.163***	**0.234*****	0.014	0.050	0.068	0.031	0.014
	(0.072)	(0.099)	(0.079)	(0.108)	(0.074)	(0.084)	(0.080)	(0.093)
De jure informal employment	**0.860*****	**0.412*****	**0.822*****	**0.179***	**0.581*****	**–0.555*****	**0.501*****	**–0.531*****
	(0.073)	(0.099)	(0.080)	(0.109)	(0.077)	(0.085)	(0.085)	(0.095)
Time-related underemployment	**0.256*****	**0.276*****	**0.308*****	**0.236****	0.037	0.054	0.074	0.008
	(0.080)	(0.094)	(0.085)	(0.101)	(0.091)	(0.084)	(0.098)	(0.090)
Overtime work (41+ hours per week)	**0.296*****	**0.169****	**0.299*****	**0.159****	**0.110***	–0.029	**0.132***	0.024
	(0.058)	(0.075)	(0.061)	(0.080)	(0.063)	(0.063)	(0.068)	(0.067)
Job-specific training (dummy)	**–0.506*****	**0.287*****	**–0.451*****	**0.359*****	**–0.390*****	**0.447*****	**–0.456*****	**0.528*****
	(0.070)	(0.079)	(0.079)	(0.088)	(0.071)	(0.073)	(0.080)	(0.082)

Table 5.3 Determinants of mismatch in a pooled framework: Multinomial logistic regression *(concl.)*

	Subjective method				Normative method			
	Model 1		Model 2		Model 1		Model 2	
VARIABLES	**OQ/WM**	**UQ/WM**	**OQ/WM**	**UQ/WM**	**OQ/WM**	**UQ/WM**	**OQ/WM**	**UQ/WM**
Industry VA growth since 2007			**0.003*****	**0.002****			0.001	0.001
			(0.001)	(0.001)			(0.001)	(0.001)
Share of agriculture in employment			**0.031*****	–0.009			0.010	**0.018*****
			(0.006)	(0.007)			(0.008)	(0.006)
Unemployment rate, total			**0.031*****	–0.004			**0.038*****	**0.036*****
			(0.007)	(0.010)			(0.009)	(0.008)
Rigidity of employment index			**0.019*****	**0.012*****			**0.026*****	**–0.043*****
			(0.004)	(0.003)			(0.005)	(0.004)
GER to secondary education			**0.030*****	0.001			**–0.015***	**0.073*****
			(0.007)	(0.009)			(0.008)	(0.008)
Country FE	Yes	Yes	No	No	Yes	Yes	No	No
No. of countries	27	27	23	23	29	29	25	25
ILO region dummies	No	No	Yes	Yes	No	No	Yes	Yes
No. of observations	15,582	15,582	12,685	12,685	17,282	17,282	14,462	14,462
Pseudo R–squared	0.133	0.133	0.131	0.131	0.403	0.403	0.413	0.413

Notes: OQ/WM is the mutinomial log-odds of being overqualified relative to well-matched, and UQ/WM is the mutinomial log-odds of being underqualified relative to well–matched. Regressions also include the intercept. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Own calculations based on the SWTS data. For other sources see table A.5.3 in Annex 5.1.

- Young employees engaged in agriculture are significantly more likely to be overqualified than industrial and construction workers. Jobs in agriculture are abundant in low- and middle-income countries but are predominantly low-skilled due to a lack of access by farmers to technology and capital. This effect of working in the sector is also strong when there is control for the share of agriculture in total country employment (model 2) instead of country dummies.
- Employment in market services can be associated with a lower likelihood of being underqualified (subjectively defined), compared to industrial and construction workers. Many jobs in retail trade, accommodation and food service activities, transportation and storage, and individual services do not require very specific skills and short-term on-the-job training is usually enough to close any existing skill gaps. Jobs in modern business services sectors such as finance and insurance, IT, professional, scientific and technical activities, administrative and support service activities, usually use relatively effective recruitment and human resource management practices that help reduce mismatch of workers with job requirements.
- After controlling for the economic sector, the type of contract (temporary as opposed to more permanent job) and the informality status, working hours are found to be an important determinant of mismatch. Working less than 30 hours or more than 40 hours per week is associated with a higher likelihood of over- and underqualification compared to working 30–40 hours per week. Hence, time-related under- and overemployment are also important characteristics of jobs with high risks of educational mismatch, although this may be a consequence of subjective bias.
- Young workers living in low-income countries tend to have significantly higher probability of underqualification than their peers living in middle-income emerging countries. This is consistent with findings in the previous section comparing the incidence of mismatch across countries. The type of country, with respect to its income level, is an insignificant determinant of the likelihood of overqualification.
- In countries which experienced faster industrial growth since 2007 (the pre-crisis year) young workers tend to have higher probability of being mismatched, either overqualified or underqualified. This suggests that adjustment lag of education and training systems (skill supply) to the requirements of firms (skill demand) is a major cause of qualification mismatch in fast-growing low- and middle-income countries, as are low levels of skills utilization in workplaces.
- Young workers living in countries with higher gross enrolment ratio to secondary education and higher unemployment rates are more likely to be overqualified than their peers living in other countries (table 5.3, model 2, subjective mismatch). Affordable education encourages young people to increase their educational attainment but scarce employment opportunities for skilled labour often force them to take jobs for which they are overqualified.

5.4 Impact of mismatch on labour market outcomes of employees

Models used to analyse the effects of educational mismatches on wages, job satisfaction and desire of young employees to change their current employment situation in a pooled framework of low- and middle-income countries can be tentatively specified as follows:

$$Yij = \alpha + \beta Xij + \gamma EDUij + \delta j + \varepsilon ij \quad (1)$$

where indices *i* and *j* denote an individual and a country, respectively, *Y* is a dependent variable under consideration (log hourly wages, probability of job satisfaction, and probability of the willingness to change current employment situation), X is a vector of individual and job characteristics excluding education and mismatch, EDU is a set of dummies indicating the highest education level (secondary general is the reference category) and mismatch status (well-matched is the reference category), δj are country dummies, and εij is an error term.

All models are controlled for basic personal characteristics, social class and job characteristics available in most countries and used in the previous section on the determinants of mismatch. Age is used as a proxy for labour market experience because there is neither information on actual labour market experience or tenure in the SWTS data set nor on total years of education that could be used to calculate adjusted labour market experience. Other details on the sample, the model specification and additional control variables are provided below in the respective subsections.

Following Allen and van der Velden (2001), the models are compared without and with indicators of educational mismatch (dummies for overqualification and underqualification) to assess improvement in model fit. Two sets of model estimates using alternative indicators of mismatch based on subjective and normative approaches; additional models are estimated with subjective-mismatch for two subsets of countries, distinguishing between factor- and efficiency-driven countries in line with the GCI-based stage of development in 2012–2013 (WEF, 2013).

Impact on earnings

This part of the empirical analysis is based on the subsample of employees who reported paid wages amount. The original question about wages is: "The last time you were paid in your main job, how much did you receive in wages and salaries?" (Wages and salaries comprise regular payment for time worked and work done, pay for overtime, shift-work, commissions, tips, cash allowances, regular cash bonuses and gratuities, and remuneration for time not worked.) If respondents specified that this amount was before deductions for taxes or social security contributions, it was reduced by the amount of deductions as reported by workers in the subsequent question. Assuming that the normal workday duration is eight hours and there is a five-day workweek, this amount net of deductions is divided by 8, 16, 40 or 168 hours depending on the period covered by the payment (one day, one week, two weeks or one month, respectively).

The logarithm of net hourly earnings was trimmed at the 1st and 99th percentiles within each country. As a result, the sample of employees used for the analysis of wage effects of mismatch includes 11,697 observations from 24 countries[9] which covers slightly more than half of all employees in the original sample.[10] It is further reduced to about 10,000 observations from 19–21 countries when observations with missing control variables are automatically excluded from the analysis (table 5.4).

The Mincerian earnings function specified by equation (1) was estimated using the standard OLS regression with heteroscedasticity-robust standard errors. Unlike the Duncan and Hoffman (1981) "workhorse" specification for analysing the effects of overqualification on wages, which includes required education, surplus education and deficit education measured in years, completed education (instead of required) was used measured in terms of qualification levels[11] and include dummies for being over/underqualified. Because of the unsolved issues with endogeneity problem and measurement error, care is required in interpreting estimation results as causal effects of over- or underqualification on wages (see more in Leuven and Oosterbeek, 2011).

Table 5.4 presents the results of a linear regression analysis of the impact of completed education and mismatch status on the level of earnings among young employees in low- and middle-income countries based on the SWTS data, controlling for personal and job characteristics and country fixed effects.[12] About 94 per cent of variation in log hourly earnings is explained solely by country fixed effects, an expected result considering the relative homogeneity of the observed sample in terms of basic personal and job characteristics within countries and large differences between countries.[13]

In all three models estimated for all countries, and in the additional model estimated for two types of country, having tertiary education (university degree and above) is associated with significantly higher wages compared to secondary general education. In contrast, workers with primary education and below are expected to have lower wages than their more educated peers (*ceteris paribus*). Estimated effects of education on hourly wages, namely a positive effect of tertiary education and a negative effect of primary education, appear to be more than twice as large in factor-driven

[9] Armenia, Benin, Cambodia, Congo, Dominican Republic, Egypt, El Salvador, Jamaica, Jordan, Lebanon, Liberia, North Macedonia, Madagascar, Malawi, Republic of Moldova, Montenegro, Occupied Palestinian Territory, Serbia, Sierra Leone, Togo, Uganda, Ukraine, Viet Nam, Zambia.

[10] The share of employees with reported non-trimmed wages varies from 52 per cent of all employees in Montenegro to 97.8 per cent in Cambodia.

[11] Three dummies are used for the highest level of completed education: primary education and below, secondary and post-secondary vocational education, and tertiary education (secondary general education is the reference category). We distinguish between vocational and general secondary education as returns for these two levels might be different.

[12] A complete table with estimation results for all control variables is provided in Annex 5.1, table A.5.5.

[13] Specifically, R^2 in the model including only country fixed effects is 93.86 per cent if wages are not adjusted for the differences in purchasing power; it is 94.21 per cent if wages are adjusted with the use of PPP conversion factor for private consumption measured in local currency per international dollar in the year of SWTS survey (source: World Development Indicators).

countries as in efficiency-driven countries. This is consistent with the empirical literature on returns on education which finds the highest private returns in low- and middle-income countries of Latin America and the Caribbean and sub-Saharan Africa (Psacharopoulos and Patrinos, 2004). There is no statistically significant difference in earnings between workers with vocational versus general secondary education as expected, in light of more job-specific training of workers with vocational education and higher expected returns.

Table 5.4 The effect of education and mismatch status on wages: OLS regression

	All countries			Countries by GCI-based classification	
Variables	**Model 1**	**Model 2**	**Model 3**	**Factor-driven**	**Efficiency-driven**
Primary education and below	–0.085***	–0.091***	–0.133***	–0.153***	–0.061***
	(0.015)	(0.015)	(0.020)	(0.030)	(0.018)
Secondary and post-secondary vocational education	–0.019	–0.018	–0.022	–0.036	–0.009
	(0.019)	(0.019)	(0.019)	(0.044)	(0.021)
Tertiary education	0.093***	0.098***	0.122***	0.195***	0.089***
	(0.018)	(0.018)	(0.020)	(0.048)	(0.020)
Overqualified, subjective		–0.063***		–0.082*	–0.056***
		(0.017)		(0.050)	(0.018)
Underqualified, subjective		–0.021		–0.014	–0.035
		(0.021)		(0.035)	(0.024)
Overqualified, normative			–0.040**		
			(0.017)		
Underqualified, normative			0.059***		
			(0.017)		
Number of observations	10,586	10,381	10,446	2,641	7,069
Number of countries	21	20	21	8	11
F	8646	8326	8098	3793	5773
Df	37	38	39	26	29
R^2	0.951	0.952	0.951	0.959	0.940

Notes: Dependent variable is log of net hourly earnings for employees trimmed at the 1st and 99th percentiles within each country. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Reference categories are secondary general education and well-matched workers. Each model includes dummies for gender, married individuals, and interaction variable, age and age squared, a dummy for self-assessed household's financial situation (poor versus other), dummies for broad economic sector, firm size, temporary contract, and informality status, and country fixed effects (see table A.5.5 in Annex 5.1).

Source: Own calculations based on the SWTS data.

When indicators of educational mismatch are added to the model (Models 2 and 3), the model fit is almost unchanged. But an F-test of the joint significance of two mismatch variables (overqualified and underqualified) shows that they are jointly significant at the 1 per cent level, so the extended models are preferred to the restricted ones. Model 2 shows a significant negative effect of overqualification on wages and no wage effect for underqualification when the subjective measure of mismatch is used. Similar results are observed when the sample of all available countries is split into two subsets by GCI-based development, with the major difference that the statistical significance of an overqualification dummy is stronger among efficiency-driven countries than among factor-driven countries. By contrast, the expected positive and significant effect of underqualification is also observed when measuring mismatch following the normative approach in Model 3 (all countries). However, normative-based overqualification and underqualification dummies appear to be significant and with expected signs only for a subset of efficiency-driven countries.

These results can be interpreted as a sign of a wage penalty for working below one's level of education and, to a lesser extent, a wage premium for working above one's level of education. Similar results have been found before in some developed and developing countries.[14] But considering in part the potential omitted variable (ability) bias and measurement error, these estimates are not seen to represent causal effects. Due to increased access of low ability and poorly motivated students to tertiary education, they often are not endowed with the skills needed for obtaining highly skilled jobs after graduation; they may end up overqualified in terms of formal education requirements but are well-matched in terms of available skills (Chevalier, 2003; Quintini, 2011). Therefore, a wage penalty for overqualification is likely to be overestimated, especially in the case of a normative-based measure of mismatch. Serious attempts to tackle these econometric issues should be made in future research to obtain more credible estimates of causal effects of being over- or underqualified on wages in low- and middle-income countries.[15]

Impact on job satisfaction

Our analysis of the effects of educational mismatch and other control variables on job satisfaction of employees in low- and middle-income countries starts from the details of a sample and model specification. Dependent variable of job satisfaction is defined using answers to the question "To what extent are you satisfied with your main job?"; possible answers are on a scale from 1 (very satisfied) to 4 (very unsatisfied), recoded with a category 1 or 2 into a dummy with value 1, and value 0 otherwise. Colombia and North Macedonia are excluded from the analysis owing to data issues.

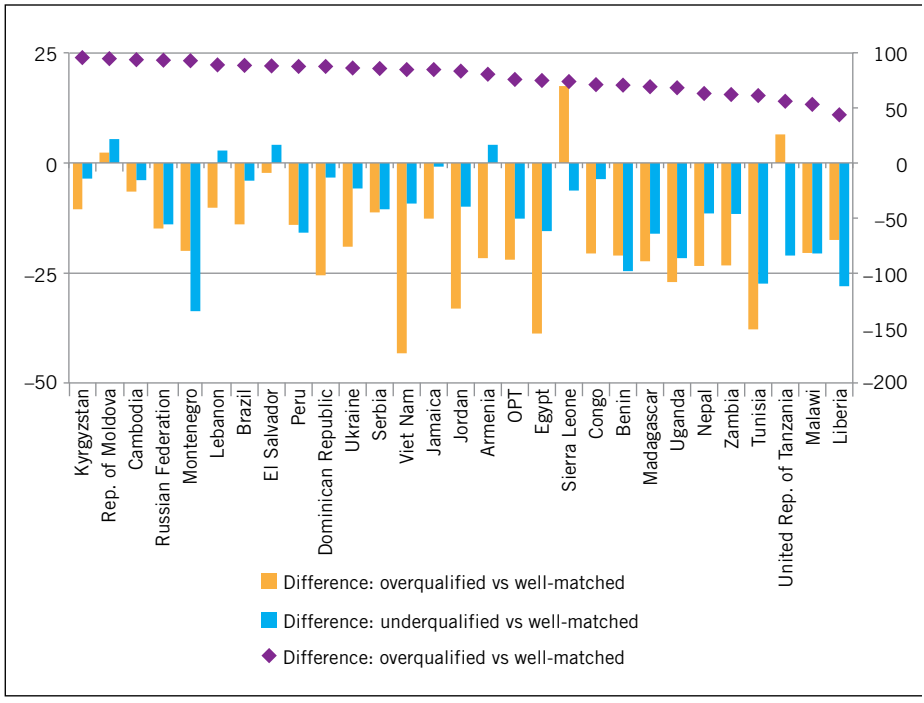
[14] See, for example, Leuven and Oosterbeek (2011) and OECD (2014) for developed countries and Herrera and Merceron (2013) for sub-Saharan African countries.

[15] Extending the analysis with by using the Heckman correction model to estimate a selection equation (the probability of being an employee) and finding a credible instrument to address the endogeneity problem are the primary tasks.

The same set of independent variables are used as for estimating the effects on wages. Add logarithms include hourly wage and weekly hour worked and a dummy for receiving job-specific training; there are important aspects of jobs that are likely to influence job satisfaction. It would be good to add a number of indicators of job quality to the model, as for example in Allen and van der Velden (2001),[16] but such indicators are not available in the SWTS data set.

Figure 5.5 shows large variation across countries in terms of the share of young employees satisfied with their main job: from 43.8 per cent in Liberia to 95.8 per cent in Kyrgyzstan. In most countries, the share of satisfied workers among those who report being well-matched to their jobs is larger than among those who feel overqualified or underqualified; this is expected. But there is much cross-country heterogeneity in the magnitude of these differences, especially for overqualified workers as opposed to well-matched workers (figure 5.5).

Figure 5.5 Share of young employees satisfied with their job (percentages) and differences in job satisfaction depending on subjective mismatch status (percentage points)



Note: Sample weights are applied. OPT = Occupied Palestinian Territory. Countries are shown in descending order of the share of satisfied employees.

Source: Own calculations based on the SWTS data.

[16] Allen and van der Velden (2001) used the degree of autonomy, the variety of work tasks, the prestige associated with the job, and the opportunity to introduce own ideas as assessed by respondents; they found significant effects of all these characteristics on job satisfaction of young employees in the Netherlands.

A negative significant correlation is found between the shares of satisfied and underqualified workers across countries but no strong relationship with the share of overqualified workers is observed. This suggests that overqualification, prevalent in emerging middle-income countries, is not associated with lower levels of aggregate job satisfaction at country level. Overqualification seems to be a less important factor of job satisfaction in these countries than characteristics such as wages and working conditions. A large share of dissatisfied workers in developing low-income countries also characterized by a high incidence of underqualification can be explained by a generally low quality of available jobs rather than by underqualification itself. This hypothesis is tested below using individual-level data and controlling for personal, job and country characteristics.

Tables 5.5 below and A.5.6 in Annex 5.1 present the results of a logistic regression analysis of satisfaction with the main job. Model 1 reveals that job satisfaction is influenced not only by country fixed effects and important characteristics of jobs held by young workers, such as hourly earnings, temporary as opposed to a more permanent job, informality status, economic sector (with a significantly higher likelihood of job satisfaction in public services compared to industrial and construction workers) and receiving training, but also by social status and completed level of education. Unexpectedly, low-educated young workers are more likely to be satisfied with their job than their peers with secondary education, other things being equal; highly educated employees tend to have a lower likelihood of job satisfaction. The latter effect can arise if tertiary education does not lead to intrinsic or extrinsic rewards consequently decreases satisfaction with work because of unfulfilled expectations and aspirations (Glenn and Weaver, 1982).

Taking into account the educational mismatch status (Models 2 and 3 for all countries and Model 2 separately for factor-driven and efficiency-driven countries), the effect of tertiary education disappears, as it is taken out by a significant negative effect of being overqualified in all models and the opposite effects of being underqualified depending on the method used to measure mismatch (table 5.5).

Model 2, which fits the data much better than Model 3, suggests that after controlling for personal and job characteristics and country fixed effects, working in a job that does not match the education of young workers has a strong negative effect on their job satisfaction, regardless of whether it is a job requiring lower or higher level of education. Young workers who report gaps in knowledge and skills for performing their current job (subjective underqualification) have slightly over a half of the estimated odds of job satisfaction as individuals with relevant education qualifications (subjective well-matched). The estimated odds of job satisfaction for workers who feel overqualified for their jobs decreases even more, roughly by a factor of three.[17] These results show that educational mismatch is an important source of job dissatisfaction at the individual level. The next subsection examines whether it provides an incentive for workers to change current employment situation.

[17] The odds ratio is 0.51 ($e^{-0.683}$) for underqualified and 0.30 ($e^{-1.214}$) for overqualified relative to well-matched workers.

Table 5.5 The effect of education and mismatch status on job satisfaction: Logistic regression

	All countries			Countries by GCI-based classification	
Variables	**Model 1**	**Model 2**	**Model 3**	**Factor-driven**	**Efficiency-driven**
Primary education and below	0.394***	0.266***	0.074	0.135	0.323**
	(0.087)	(0.092)	(0.111)	(0.153)	(0.127)
Secondary and post-secondary vocational education	–0.107	0.063	–0.155	0.227	0.163
	(0.104)	(0.109)	(0.106)	(0.195)	(0.142)
Tertiary education	–0.286***	–0.099	–0.036	–0.205	0.001
	(0.107)	(0.111)	(0.112)	(0.235)	(0.141)
Overqualified, subjective		–1.214***		–1.117***	–1.353***
		(0.075)		(0.156)	(0.095)
Underqualified, subjective		–0.683***		–0.710***	–0.600***
		(0.104)		(0.145)	(0.166)
Overqualified, normative			–0.589***		
			(0.090)		
Underqualified, normative			0.257***		
			(0.092)		
Number of observations	9,346	9,162	9,214	2,554	5,974
Number of countries	19	18	19	8	9
Model chi^2	863.1	1045	887.4	376.9	621.6
Df	38	39	40	29	30
Pseudo R^2	0.120	0.149	0.125	0.191	0.138

Notes: Dependent variable is a binary variable taking value of 1 if respondents reported to be satisfied with their main job. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Reference categories are secondary general education and well-matched workers. Each model includes control variables used for estimation of the wage effects (see note to table 4) and additional job characteristics such as log hourly earnings, log weekly hours worked, a dummy for receiving training at work, and country fixed effects (see table A.5.6 in Annex 5.1).

Source: Own calculations based on the SWTS data.

Impact on desire to change current employment situation

Young employees who experience a poor match between their education/training qualifications and those required in their current job were compared with well-matched workers in their desire to change job. This used information on whether or not young workers would like to change their current employment situation and estimated logistic regression with a standard set of control variables used before. Estimation results are provided in tables 5.6 below and A.5.7 in Annex 5.1.

Table 5.6 The effect of education and mismatch status on the desire to change current employment situation: Logistic regression

	All countries			Countries by GCI-based classification	
Variables	**Model 1**	**Model 2**	**Model 3**	**Factor-driven**	**Efficiency-driven**
Primary education and below	–0.415***	–0.301***	–0.161*	–0.326***	–0.304***
	(0.067)	(0.070)	(0.084)	(0.120)	(0.092)
Secondary and post-secondary vocational education	0.172**	0.031	0.187**	0.032	–0.080
	(0.082)	(0.084)	(0.083)	(0.153)	(0.108)
Tertiary education	0.491***	0.340***	0.293***	0.130	0.342***
	(0.082)	(0.085)	(0.088)	(0.187)	(0.105)
Overqualified, subjective		1.323***		1.107***	1.479***
		(0.070)		(0.149)	(0.090)
Underqualified, subjective		0.380***		0.252**	0.577***
		(0.089)		(0.123)	(0.136)
Overqualified, normative			0.405***		
			(0.076)		
Underqualified, normative			–0.275***		
			(0.070)		
Number of observations	9,642	9,451	9,507	2,553	6,264
Number of countries	20	19	20	8	10
Model chi^2	1292	1506	1293	445.2	995.5
Df	39	40	41	29	31
Pseudo R^2	0.125	0.156	0.127	0.166	0.158

Notes: Dependent variable is a binary variable taking value of 1 if respondents reported that they would like to change their current employment situation, and 0 otherwise. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Reference categories are secondary general education and well-matched workers. Each model includes the same control variables as the previous models for job satisfaction (see table A.5.7 in Annex 5.1).

Source: Own calculations based on the SWTS data.

As expected, lower wages, a shorter working week and poor working conditions (including temporary contracts, informal employment with limited access to benefits, and work in the agriculture sector) increase young people's desire to change current jobs or improve their employment situation without changing a job. Despite having significantly lower wages than in industry and construction, young employees in public administration, education and health-care sectors (public services) are significantly more likely to have higher job satisfaction and lower willingness to change current employment situation than workers in other sectors (see Model 1 in tables A.5.5–A.5.7 in Annex 5.1). Greater job security, more generous benefits and probably better non-financial rewards (such as prestige, promotion opportunities, recognition, trust and empowerment) in the public sector are valuable job characteristics that compensate for possible salary disadvantage. This explains the persistence of queues for public sector jobs among young workers in many developing and emerging economies.

Willingness to change current employment situation appears to grow with the level of education, even after controlling for the qualification mismatch status (table 5.6). Taking into account that the SWTS sample covers only young workers in the early stage of their career, this suggests that recent university graduates would like to improve their current employment situation in line with high career aspirations and expectations while using their current job to gain useful labour market experience and skills. By contrast, young employees with the lowest educational attainment who are often classified as underqualified according to the normative approach seem to be happy with their current job and are generally less willing to change it. It may also be that they are in fact matched but have not had their skills recognized, although in the case of young people, their limited work experience may work against this hypothesis.

As with previous models for job satisfaction, subjective mismatch status introduced in Model 2 in addition to basic control variables fits the data significantly better than mismatch measured with a normative approach in Model 3. Also, the coefficient of underqualification variable reverses sign from positive in Model 2 to negative in Model 3, most likely due to collinearity between primary education and normative-based underqualification. Model 2 shows that self-declared mismatch between respondents' education/training qualifications and those necessary to perform current job, either a surplus or a deficit of education and skills, increases the probability that a worker will seek other employment. A similar model for factor-driven and efficiency-driven countries reveals the same effects of over- and underqualification. Whether the potential willingness to change employment is motivated by qualification mismatch or other undesirable job characteristics, and whether it led to active job search, is a subject for further research.

5.5 Conclusion

Large labour market imbalances and widespread qualification mismatches among young people are serious issues in developing and emerging countries. Imbalances in the form of underqualification are more prominent in low-income countries which

are also classified as factor-driven economies in terms of their development and global competitiveness. These imbalances are mainly due to a generally low educational attainment of young workers who are often forced to drop out of school and enter the labour market to help their poor families. As a result, a lion's share of young people in low-income countries lack even the minimum skills required by the labour market and experience significant skill gaps when performing their jobs. According to the estimates based on the ILO School-to-Work Transition Survey of 15–29-year-olds in 34 countries, underqualified workers defined according to the subjective (self-reported) method comprise up to 36.4 per cent of all young employees with completed education and up to 46.2 per cent of own-account workers. If the normative method is applied, the share of underqualified workers exceeds 80 per cent in some countries.

By contrast, middle-income countries are characterized by high educational attainment of adult population and significant investments in education, often not accompanied by a steady growth in demand for skilled labour. The adjustment lag between skill demand and skill supply results in high rates of youth graduate unemployment and overqualification, while existing institutional rigidities in employing workers hamper these adjustments and worsen mismatch. If the subjective method of measuring mismatch is used, at least one in four employees or own-account workers can be classified as overqualified for his/her work in Tunisia, Serbia, the Republic of Moldova, Egypt, and the Occupied Palestinian Territory (the incidence of overqualification in the other countries is lower).

The results with respect to the scope, determinants and impacts of qualification mismatch are very sensitive to the measure of mismatch used. Comparisons of subjective and normative-based estimates of mismatch point to a significant overestimation by the latter. The subjective, or self-reported, method is preferred in this study because it is subject to a lower misclassification error than the normative method. It also captures not only vertical educational mismatch (in terms of the level of education/qualifications) but also, to some extent, horizontal educational mismatch (in terms of the field of studies) and skills mismatch (in terms of skills to perform present job). Unfortunately, genuine horizontal mismatch cannot be properly measured with the SWTS data.

Our analysis confirms findings in the literature (Quintini, 2011; Herrera and Merceron, 2013) that overqualification tends to be associated with lower wages, poor working conditions and high levels of job insecurity, dissatisfaction with a job and the willingness to change it. However, underqualified workers in low- and middle-income countries are also less likely to be satisfied with their jobs and more likely to seek alternative employment than those who are matched to jobs in terms of qualifications, if the subjective method is used. An important additional finding is that employment in public services sectors (public administration, education and health care) is associated with lower incidence of overqualification and underqualification, higher job satisfaction and lower willingness to change employment (compared to industry and construction) while employment in agriculture, perceived to be of a lower quality, often has the opposite effects.

Qualification and skills mismatches among young workers are an important policy concern, with scarring effects on the future careers of the mismatched and compromised economic development of low- and middle-income economies. Available evidence on policy interventions to reduce mismatches suggests that the involvement and effective cooperation of all key stakeholders and a long-term strategy are required (Quintini, 2011; WEF, 2014). These policy considerations will be addressed more fully in Chapter 6.

References

Allen, J.; van der Velden, R. 2001. "Educational mismatches versus skill mismatches: Effects on wages, job satisfaction, and on-the-job search", in *Oxford Economic Papers,* Vol. 53, No. 3, Special Issue on Skills Measurement and Economic Analysis, pp. 434–452.

Baert, S.; Verhaest, D. 2014. *Unemployment or overeducation: which is a worse signal to employers?* IZA Discussion Paper No. 8312 (Bonn, Institute for the Study of Labor).

Chevalier, A. 2003. "Measuring over-education", in *Economica,* Vol. 70, pp. 509–531.

Clark, B.; Joubert, C.; Maurel, A. 2017. "The career prospects of overeducated Americans", in *IZA Journal of Labor Economics,* Vol. 6, No. 3.

Croce, G.; Ghignoni, E. 2012. "Demand and supply of skilled labour and overeducation in Europe: A country-level analysis", in *Comparative Economic Studies,* Vol. 54, pp. 413–439.

Duncan, G.; Hoffman, S. 1981. "The incidence and wage effects of overeducation", in *Economics of Education Review,* Vol. 1, No. 1, pp. 75–86.

Glenn, N.D.; Weaver, C.N. 1982. "Further evidence on education and job satisfaction", in *Social Forces* 61 (1), pp. 46–55.

Groot, W.; van den Brink, M.H. 2000. "Overeducation in the labour market: A meta-analysis", in *Economics of Education Review*, Vol. 19, No. 2, pp. 149–158.

Herrera, J.; Merceron, S. 2013. "Underemployment and job mismatch in Sub-Saharan Africa", in P. De Vreyer and F. Roubaud (eds): *Urban Labor Markets in Sub-Saharan Africa, Africa Development Forum series* (Washington, DC, World Bank), pp. 83–107.

Hussmanns, R. 2003. "Statistical definition of informal employment: Guidelines endorsed by the Seventeenth International Conference of Labour Statisticians" (Geneva, ILO), available at: http://ilo.org/public/english/bureau/stat/download/papers/def.pdf.

ILO. 2012. International Standard Classification of Occupations: ISCO-08, Structure, Group Definitions and Correspondence Tables, Vol. 1 (Geneva).

–. 2013. *Global Employment Trends for Youth 2013: A generation at risk* (Geneva).

Kupets, O. 2016a. "Education in transition and job mismatch: Evidence from the skills survey in non-EU transition economies", in *The Journal of Comparative Economic Studies,* Vol. 11, pp. 117–150.

–. 2016b. "Education-job mismatch in Ukraine: Too many people with tertiary education or too many jobs for low-skilled?", in *Journal of Comparative Economics*, Vol. 44, No. 1, pp. 125–147.

Leuven, E.; Oosterbeek, H. 2011. "Over-education and mismatch in the labor market", in E. Hanusek and F. Welsh (eds): *Handbook of the Economics of Education, Volume 4* (Philadelphia, Elsevier Press), pp. 283–326.

Montt, G. 2017. "Field-of-study mismatch and overqualification: Labour market correlates and their wage penalty", in *IZA Journal of Labor Economics*, Vol. 6, No. 2.

OECD. 2014. *OECD Employment Outlook 2014* (Paris).

Psacharopoulos, G.; Patrinos, H.A. 2004. "Returns to investment in education: A further update", in *Education Economics*, Vol. 12, No. 2, pp. 111–134.

Quintini, G. 2011. *Over-qualified or under-skilled: A review of existing literature*, Working Paper No. 121 (Paris, OECD).

Sparreboom, T.; Staneva, A. 2014. *Is education the solution to decent work for youth in developing economies?: Identifying qualifications mismatch from 28 school-to-work transition surveys* (Geneva, ILO).

UNIDO (United Nations Industrial Development Organization). 2015. *Industrial Development Report 2016. The role of technology and innovation in inclusive and sustainable industrial development* (Vienna).

Verhaest, D.; Omey, E. 2010. "The determinants of overeducation: Different measures, different outcomes?", in *International Journal of Manpower,* Vol. 31, No. 6, pp. 608–625.

–; Sellami, S.; Van der Velden, R. 2017. "Differences in horizontal and vertical mismatches across countries and fields of study", in *International Labour Review,* Vol. 156, No. 1, pp. 1–23.

Vossemer, J.; Schuck, B. 2016. "Better overeducated than unemployed? The short- and long-term effects of an overeducated labour market re-entry", in *European Sociological Review*, Vol. 32, No. 2, pp. 251–265.

Wolbers, M. 2003. "Job mismatches and their labour market effects among school-leavers in Europe", in *European Sociological Review,* Vol. 19, pp. 249–266.

WEF (World Economic Forum). 2013. *Global Competitiveness Report 2013–2014* (Geneva).

–. 2014. *Matching skills and labour market needs. Building social partnerships for better skills and better jobs* (Geneva).

Annex 5.1 Tables

Table A.5.1 Sample characteristics: 15–29-year-old employees and own-account workers excluding students

Country name	Country code	Latest year available	Number of observations in the sample		
			Total	Employees	Own-account workers
Armenia	ARM	2014	673	581	92
Bangladesh	BGD	2013	2,756	1,785	971
Benin	BEN	2014	459	129	330
Brazil	BRA	2013	1,192	934	258
Cambodia	KHM	2014	1,335	846	489
Colombia*	COL	2013	2,169	1,628	541
Congo	COG	2015	835	344	491
Dominican Republic	DOM	2015	1,016	790	226
Egypt	EGY	2014	1,386	1,291	95
El Salvador	SLV	2014	1,064	886	178
Jamaica	JAM	2015	1,085	842	243
Jordan	JOR	2015	1,082	1,048	34
Kyrgyzstan	KGZ	2013	965	738	227
Lebanon	LBN	2014	744	631	113
Liberia	LBR	2014	403	51	352
Madagascar	MDG	2015	1,504	488	1,016
Malawi	MWI	2014	1,343	368	975
Moldova, Republic of	MDA	2015	272	225	47
Montenegro	MNE	2015	500	471	29
Nepal	NPL	2013	528	400	128
North Macedonia	MKD	2014	490	471	19
Occupied Palestinian Territory	WBG	2015	780	719	61
Peru*	PER	2013	879	716	163
Russian Federation*	RUS	2015	1,520	1,438	82
Samoa	WSM	2012	553	441	112
Serbia	SRB	2015	727	676	51
Sierra Leone	SLE	2015	491	66	425
Tanzania, United Rep. of	TZA	2013	519	261	258
Togo	TGO	2014	558	115	443
Tunisia	TUN	2013	689	639	50
Uganda	UGA	2015	1,206	407	799
Ukraine	UKR	2015	1,206	1,111	95
Viet Nam	VNM	2015	949	787	162
Zambia	ZMB	2014	811	447	364
Total			**32,689**	**22,770**	**9,919**

Note: In all countries, except for Colombia, Peru and the Russian Federation, nationally representative samples of young workers are used. Samples in Colombia and Peru refer to urban areas only, whereas the sample in the Russian Federation covers 11 regions. Other details are available at the survey's web page: http://www.ilo.org/employment/areas/WCMS_234860/lang--en/index.htm.

Estimates of mismatch in some countries should be interpreted with caution because of the small sample size of employment status groups (cells with less than 100 observations are coloured grey).

Source: SWTS.

Table A.5.2 Incidence of qualification mismatch (MM) and its subcomponents according to normative and subjective methods (percentages)

Country	Employees								Own-account workers							
	Normative				Subjective				Normative				Subjective			
	OQ	UQ	MM	% of UQ	OQ	UQ	MM	% of UQ	OQ	UQ	MM	% of UQ	OQ	UQ	MM	% of UQ
Armenia	21.7	8.7	30.4	28.7	24.3	4.1	28.4	14.6	9.3	2.4	11.7	20.7	18.5	4.4	22.9	19.2
Bangladesh	2.9	62.8	65.6	95.6	n.a.	n.a.	n.a.	n.a.	2.1	60.4	62.4	96.7	n.a.	n.a.	n.a.	n.a.
Benin	12.4	61.2	73.6	83.1	9.3	24.9	34.2	72.8	1.3	81.4	82.7	98.4	9.1	43.7	52.8	82.9
Brazil	17.7	20.8	38.5	54.0	16.7	10.4	27.1	38.4	8.9	37.6	46.5	80.9	17.4	10.2	27.5	36.9
Cambodia	10.2	36.5	46.7	78.2	15.3	20.3	35.6	57.1	2.2	54.6	56.8	96.1	14.7	15.7	30.4	51.6
Colombia	21.7	20.8	42.5	48.9	3.8	11.1	14.8	74.5	22.8	16.0	38.8	41.2	7.8	13.8	21.5	64.0
Congo	5.1	61.0	66.1	92.3	11.8	16.4	28.2	58.3	3.1	84.4	87.5	96.5	22.4	32.1	54.4	58.9
Dominican Rep.	16.8	28.9	45.7	63.2	2.8	8.5	11.4	75.2	14.2	45.9	60.1	76.3	14.2	8.8	23.0	38.3
Egypt	11.9	41.8	53.7	77.8	30.6	1.4	32.0	4.4	14.5	35.3	49.9	70.9	39.8	1.2	41.0	3.0
El Salvador	9.6	31.2	40.8	76.4	6.8	3.2	9.9	31.9	3.9	66.3	70.2	94.4	15.7	5.2	20.9	24.7
Jamaica	21.1	14.4	35.5	40.5	19.0	12.0	31.0	38.7	4.4	28.1	32.6	86.4	12.7	19.3	31.9	60.3
Jordan	5.1	47.9	53.0	90.3	8.1	5.3	13.4	39.3	3.9	70.7	74.6	94.7	9.7	9.0	18.8	48.1
Kyrgyzstan	13.0	19.0	32.1	59.4	15.0	9.4	24.4	38.6	9.2	9.8	19.0	51.5	17.4	13.0	30.4	42.7
Lebanon	11.9	37.7	49.6	76.0	24.6	2.5	27.1	9.3	6.0	63.3	69.3	91.4	22.6	5.3	27.9	19.0
Liberia	1.1	73.2	74.3	98.6	4.6	20.3	24.9	81.4	3.1	63.7	66.8	95.3	11.6	30.9	42.6	72.7
Madagascar	16.4	41.1	57.6	71.5	16.4	25.9	42.3	61.3	6.1	61.0	67.0	90.9	16.1	36.6	52.7	69.5
Malawi	2.7	78.9	81.6	96.7	16.1	24.7	40.8	60.5	1.5	83.8	85.3	98.2	18.5	30.5	49.1	62.2
Moldova, Rep. of	25.3	6.8	32.1	21.2	27.7	20.5	48.1	42.5	31.0	0.0	31.0	0.0	31.9	21.7	53.5	40.5

Table A.5.2 Incidence of qualification mismatch and its subcomponents according to normative and subjective methods (percentages) *(concl.)*

Country	Employees								Own-account workers							
	Normative				Subjective				Normative				Subjective			
	OQ	UQ	MM	% of UQ	OQ	UQ	MM	% of UQ	OQ	UQ	MM	% of UQ	OQ	UQ	MM	% of UQ
Montenegro	9.2	13.2	22.4	58.9	17.1	1.9	19.0	9.7	24.5	14.2	38.8	36.7	20.0	3.1	23.0	13.3
Nepal	9.2	53.4	62.6	85.3	12.4	36.4	48.7	74.7	8.8	50.0	58.8	85.1	13.4	29.1	42.5	68.5
North Macedonia	19.5	7.5	27.0	27.9	18.7	2.7	21.4	12.7	34.7	6.7	41.3	16.2	44.6	0.0	44.6	0.0
Occupied Palestinian Territory	12.3	50.8	63.1	80.5	35.4	4.9	40.3	12.1	11.0	49.2	60.2	81.8	39.2	0.4	39.6	1.1
Peru	26.2	17.1	43.2	39.5	13.4	12.4	25.8	48.1	17.5	15.4	32.9	46.8	15.0	13.7	28.7	47.6
Russian Fed.	15.1	14.8	29.9	49.4	14.4	8.9	23.3	38.3	16.8	8.7	25.4	34.0	21.5	7.3	28.8	25.2
Samoa	26.1	8.2	34.2	23.9	n.a.	n.a.	n.a.	n.a.	12.3	1.7	14.0	12.3	n.a.	n.a.	n.a.	n.a.
Serbia	17.2	16.4	33.5	48.8	27.3	4.8	32.1	14.9	16.6	28.9	45.5	63.6	35.7	2.5	38.3	6.6
Sierra Leone	6.1	62.6	68.7	91.2	12.1	33.1	45.2	73.2	3.1	74.8	77.9	96.0	8.0	45.6	53.6	85.1
Tanzania, United Rep. of	12.9	32.4	45.3	71.6	20.2	35.2	55.5	63.5	13.3	44.9	58.2	77.2	15.7	46.2	61.9	74.6
Togo	7.9	48.6	56.6	86.0	n.a.	n.a.	n.a.	n.a.	1.6	79.8	81.4	98.1	n.a.	n.a.	n.a.	n.a.
Tunisia	16.8	32.3	49.2	65.8	25.1	6.1	31.2	19.6	0.0	41.6	41.6	100.0	25.5	0.0	25.5	0.0
Uganda	3.4	78.7	82.1	95.9	6.0	28.1	34.1	82.4	0.8	91.9	92.7	99.1	6.4	32.6	39.0	83.6
Ukraine	30.1	5.6	35.8	15.7	9.4	9.1	18.5	49.3	53.3	9.1	62.4	14.6	5.8	12.8	18.6	68.7
Viet Nam	12.0	28.0	40.0	70.0	10.1	10.6	20.8	51.2	34.5	21.0	55.5	37.8	10.7	7.9	18.6	42.4
Zambia	13.2	39.3	52.5	74.9	24.2	25.6	49.8	51.5	14.8	38.9	53.6	72.5	15.2	22.6	37.8	59.8

OQ = overqualified; UQ = underqualified; MM = qualification mismatch; OPT = Occupied Palestinian Territory.

Source: SWTS.

Table A.5.3 Country-level characteristics used in the cross-country analysis

	Indicator	Description	Source	Year	Data limitations
Economic growth and investment	GDP per capita, PPP (constant 2011 international $)	GDP per capita based on purchasing power parity (PPP). Data are in constant 2011 international $	WDI	Year of last SWTS survey	
	Growth rate in GDP per capita (2007=100; or 2000=100)	Basic series: GDP per capita, PPP (constant 2011 international $)	Own estimates based on WDI data	Growth from 2007 to 2013 (2007 is chosen as pre-crisis year); growth from 2000 to 2013	
	Foreign direct investment, net inflows (% of GDP)	Foreign direct investment shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP	WDI	Year of last SWTS survey	
			Own estimates based on WDI data	Average of annual values in 2000–13	
	Gross fixed capital formation (% of GDP)	Gross fixed capital formation includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and similar, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings	WDI	Year of last SWTS survey	No data for Samoa
			Own estimates based on WDI data	Average of annual values in 2000–13	No data for Samoa; Zambia: average in 2010–13
	Growth rate in gross fixed capital formation (2007=100)	Basic series: Gross fixed capital formation (constant 2010 US$)	Own estimates based on WDI data	Growth rate from 2007 to 2013 (2007 is chosen because most countries have non-missing values in 2007; plus pre-crisis year)	No data for Samoa and Zambia

Table A.5.3 Country-level characteristics used in the cross-country analysis *(cont.)*

	Indicator	Description	Source	Year	Data limitations
Structural changes and industrial development	Agriculture, value added (% of GDP)	Agriculture corresponds to ISIC divisions 1–5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production	WDI	Year of last SWTS survey (sometimes latest year available before)	No data for Liberia and Samoa
	Industry, value added (% of GDP)	Industry corresponds to ISIC divisions 10–45 and includes manufacturing (ISIC divisions 15–37). It comprises value added in mining, manufacturing (also reported as a separate subgroup), construction, electricity, water and gas	WDI	Year of last SWTS survey (sometimes latest year available before)	
			Own estimates based on WDI data	Average of annual values in 2000–13	
	Services, etc., value added (% of GDP)	Services correspond to ISIC divisions 50–99 and they include value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, healthcare and real estate services.	WDI	Year of last SWTS survey (sometimes latest year available before)	
	Change in shares of Agriculture/industry/ services in GDP (percentage points)	Change in GDP share of agriculture between 2000 and 2013	Own estimates based on WDI data	2000 to 2013	
	Structural change index (from 0 to 1)*	The sum of absolute changes in sectoral shares over 2000–13, divided by 2	Own estimates based on WDI data	2000 to 2013	
	Growth rate in industry value added (2007=100; or 2000=100)	Basic series: Industry, value added (constant 2010 US$)	Own estimates based on WDI data	Growth from 2007 to 2013 (2007 is chosen as pre-crisis year); growth from 2000 to 2013	

Table A.5.3 Country-level characteristics used in the cross-country analysis *(cont.)*

	Indicator	Description	Source	Year	Data limitations
Labour market	Employment in agriculture (% of total employment)	The agriculture sector consists of activities in agriculture, hunting, forestry and fishing, in accordance with division 1 (ISIC 2) or categories A–B (ISIC 3) or category A (ISIC 4)	WDI	Latest year available or year of last SWTS survey	No data for Lebanon
	Employment in industry (% of total employment)	The industry sector consists of mining and quarrying, manufacturing, construction, and public utilities (electricity, gas, and water), in accordance with divisions 2–5 (ISIC 2) or categories C–F (ISIC 3) or categories B–F (ISIC 4)	WDI	Latest year available or year of last SWTS survey	
	Employment in services (% of total employment)	The services sector consists of wholesale and retail trade and restaurants and hotels; transport, storage, and communications; financing, insurance, real estate, and business services; and community, social, and personal services, in accordance with divisions 6–9 (ISIC 2) or categories G–Q (ISIC 3) or categories G–U (ISIC 4)	WDI	Latest year available or year of last SWTS survey	
	Labour force participation rate (LFPR), total (%)	Labour force in % of total population ages 15+ (modelled ILO estimate)	WDI	Year of last SWTS survey or 2014 if the year of last survey is 2015	
	Labour force participation rate (LFPR), youth (%)	Labour force in % of total population ages 15–24 (modelled ILO estimate)	WDI	Year of last SWTS survey or 2014 if the year of last survey is 2015	

Table A.5.3 Country-level characteristics used in the cross-country analysis *(cont.)*

	Indicator	Description	Source	Year	Data limitations
Labour market	Unemployment rate, total (%)	Unemployed in % of total labour force ages 15+ (modelled ILO estimate)	WDI	2014 or year of last SWTS survey	No data for Samoa
	Unemployment rate, youth (%)	Unemployed in % of total labour force ages 15–24 (modelled ILO estimate)	WDI	2014 or year of last SWTS survey	No data for Samoa
	Long-term unemployment (% of total unemployment)	Long-term unemployment refers to the number of people with continuous periods of unemployment extending for a year or longer, expressed as a percentage of the total unemployed	WDI	Latest year available in 2008–2014	No data for 16 countries
	Rigidity of employment index	Simple average of the difficulty of hiring, rigidity of hours and difficulty of redundancy indices. An index takes values between 0 and 100, with higher values indicating more rigid regulation. The highest score in the sample is 63 attributed to the Republic of Congo (ranked 7th out of 200 countries in the world). Uganda had the most flexible labour regulation (index is 0)	World Bank (2009), Doing Business	2008–2009	

Table A.5.3 Country-level characteristics used in the cross-country analysis *(cont.)*

	Indicator	Description	Source	Year	Data limitations
Education and R&D	Educational attainment of adult population	Percentage of no schooling/ primary/ secondary/ tertiary schooling attained in population (25+ years); average years of schooling attained	Barro and Lee data set, v.2.1	2010 (1990, 2000, 2010)	No data for Lebanon, North Macedonia, Madagascar, Rep. of Moldova, Montenegro, Occupied Palestinian Territory, Samoa and Serbia
	Gross enrolment ratio to secondary education (%)	Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown	UNESCO Institute for Statistics	Latest year available or year of last SWTS survey (Armenia: 2015)	No data for Cambodia, Viet Nam and Zambia
	Government expenditure on education, total (% of GDP)	General government expenditure on education (current, capital, and transfers) is expressed as a percentage of GDP	UNESCO Institute for Statistics (WDI for Dominican Republic, Egypt, Samoa, Zambia)	Latest year available or year of last SWTS survey	No data for Jordan, North Macedonia and Montenegro
	Research and development expenditure (% of GDP)	Expenditure for research and development is current and capital expenditure (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications	WDI	Latest year available or year of last SWTS survey (no data for 2015; some countries have data only for 2008–10 the earliest)	No data for 13 countries

Table A.5.3 Country-level characteristics used in the cross-country analysis *(cont.)*

	Indicator	Description	Source	Year	Data limitations
Population	Population growth (annual %)	Annual population growth rate for year *t* is the exponential rate of growth of mid-year population from year *t*–1 to *t*, expressed as a percentage	WDI Own estimates based on WDI data	Year of last SWTS survey Average of annual values in 2000–13	
	Share of urban population (% of total)	Urban population refers to people living in urban areas as defined by national statistical offices	Own estimates based on WDI data	Average of annual values in 2000–13	
	Share of children (% of total)	Population between the ages 0 and 14 as a percentage of the total population. Population is based on the de facto definition of population	Own estimates based on WDI data	Average of annual values in 2000–13	
Additional indicators on youth (15–29 years)	Informal employment among employees, definition 1 (% of total number of employees)	Informal employment is measured according to the guidelines recommended by the 17th International Conference of Labour Statisticians. It measures (a) paid employees in "informal jobs", i.e. jobs without either a social security entitlement, paid annual leave or paid sick leave; (b) paid employees in an unregistered enterprise with size class below five employees	Own estimates based on SWTS data (variable created by the SWTS team)	Year of last SWTS survey	
	Informal employment among employees, definition 2 (% of total number of employees)	Informal if employed according to an oral agreement (question: "Are you currently employed on the basis of a written contract or an oral agreement?")	Own estimates based on SWTS data	Year of last SWTS survey	

Table A.5.3 Country-level characteristics used in the cross-country analysis *(cont.)*

	Indicator	Description	Source	Year	Data limitations
Additional indicators on youth (15–29 years)	Informal employment among own-account workers (% of total number of own-account workers)	Informal employment includes own-account workers in an unregistered enterprise with size class below five employees	Own estimates based on SWTS data (variable created by the SWTS team)	Year of last SWTS survey	
	Involuntary part-time employment (% of total number of employees)	An employed person is involuntary part-time employed if working fewer than 30 hours per week but would like to work more			
	Unemployment rate, strict (% of labour force, strict)	Unemployed in % of total labour force ages 15–29, standard criteria for the unemployed		Year of last SWTS survey	
	Unemployment rate, relaxed (% of labour force, relaxed)	Unemployed in % of total labour force ages 15–29, relaxed definition: a person without work and available to work, relaxing the jobseeking criterion		Year of last SWTS survey	

Table A.5.3 Country-level characteristics used in the cross-country analysis *(concl.)*

	Indicator	Description	Source	Year	Data limitations
Other	Classification of countries by GCI-based stage of development	Stage 1 = Factor-driven; Stage 2 = Efficiency-driven (includes 1 country in transition from stage 1 to stage 2 and 3 countries in transition from stage 2 to stage 3)**	WEF (2013), Table 2	2012–13	Stage is undefined for Occupied Palestinian Territory and Samoa
	Classification of countries by ILO region	Northern Africa: Egypt, Tunisia. Sub-Saharan Africa: Benin, Congo, Liberia, Madagascar, Malawi, Sierra Leone, United Rep. of Tanzania, Togo, Uganda, Zambia. Latin America and the Caribbean: Brazil, Colombia, Dominican Republic, El Salvador, Jamaica, Peru. Arab States: Jordan, Lebanon, Occupied Palestinian Territory. South-Eastern Asia and the Pacific: Cambodia, Samoa, Viet Nam. Southern Asia: Bangladesh, Nepal. Northern, Southern and Western Europe: Montenegro, North Macedonia, Serbia Eastern Europe: Rep. of Moldova, Russian Federation, Ukraine. Central and Western Asia: Armenia, Kyrgyzstan.	ILO		

Notes: * A value of 0 corresponds to the case in which all shares remain the same, and a value of 1 would correspond to the (extreme) case in which in 2000, one sector had a share of 1, and in 2013, another sector had a share of 1 (UNIDO, 2016, p. 27).

** Stage 1: Bangladesh, Benin, Cambodia, Congo (classified by the author), Kyrgyzstan, Liberia, Madagascar, Malawi, Nepal, Sierra Leone, United Republic of Tanzania, Togo (classified by the author), Uganda, Viet Nam, Zambia; Stage 2: Armenia, Brazil (transition from stage 2 to stage 3), Colombia, Dominican Republic, Egypt, El Salvador, Jamaica, Jordan, Lebanon (transition from stage 2 to stage 3), North Macedonia, Republic of Moldova (transition from stage 1 to stage 2), Montenegro, Peru, Russian Federation (transition from stage 2 to stage 3), Serbia, Tunisia, Ukraine.

Also tested the share of exports and imports of goods and services in GDP (WDI). Also tested the share of exports and imports of goods and services in GDP (WDI).

Source: See column 4 in the table.

Table A.5.4 Country-level determinants of subjective mismatch: Multinomial logistic regression

	Armenia	Benin	Brazil	Cambodia	Colombia	Congo	Dominican Rep.	Egypt	El Salvador	Jamaica	Jordan	Kyrgyzstan	Lebanon	North Macedonia	Madagascar	Malawi	Rep. of Moldova	Montenegro	Nepal	OPT	Peru	Russian Fed.	Serbia	United Rep. of Tanzania	Tunisia	Uganda	Ukraine	Viet Nam	Zambia
Overqualified/well-matched																													
Female																													
Married																													
Female married																													
Age																													
Age squared																													
Primary education and below																													
Tertiary education																													
Poor																													
Rural																													
Agriculture																													
Market services																													
Public services																													
Small firms																													
Med/large firms																													
Temporary job																													
De facto inf. employment																													
De jure inf. employment																													
Underemployment																													
Overtime work																													
Training																													
Underqualified/well-matched																													
Female																													
Married																													
Female married																													
Age																													
Age squared																													
Primary education and below																													
Tertiary education																													
Poor																													
Rural																													
Agriculture																													
Market services																													
Public services																													
Small firms																													
Med/large firms																													
Temporary job																													
De facto inf. employment																													
De jure inf. employment																													
Underemployment																													
Overtime work																													
Training																													
No. of obs.	366	105	891	823	1,442	330	787	1,287	859	831	1,040	735	607	464	475	367	207	457	384	694	707	1,425	673	241	614	346	1,036	751	344
Pseudo R2	0.234	0.308	0.0738	0.0751	0.0637	0.171	0.107	0.293	0.110	0.107	0.191	0.128	0.112	0.155	0.0988	0.126	0.235	0.147	0.169	0.112	0.0491	0.0500	0.102	0.211	0.162	0.139	0.0796	0.0850	0.0492

Note: Darker and lighter shaded cells show significant (up to 10 per cent level) coefficients with a positive and negative sign respectively. OPT = Occupied Palestinian Territory.
Source: Own calculations based on the SWTS data.

Table A.5.5 Determinants of hourly earnings among young employees: OLS regression

Variables	All countries			Countries by GCI-based classification	
	Model 1	Model 2	Model 3	Factor-driven	Efficiency-driven
Primary education and below	–0.085***	–0.091***	–0.133***	–0.153***	–0.061***
	(0.015)	(0.015)	(0.020)	(0.030)	(0.018)
Secondary and post-secondary vocational education	–0.019	–0.018	–0.022	–0.036	–0.009
	(0.019)	(0.019)	(0.019)	(0.044)	(0.021)
Tertiary education	0.093***	0.098***	0.122***	0.195***	0.089***
	(0.018)	(0.018)	(0.020)	(0.048)	(0.020)
Overqualified, subjective		–0.063***		–0.082*	–0.056***
		(0.017)		(0.050)	(0.018)
Underqualified, subjective		–0.021		–0.014	–0.035
		(0.021)		(0.035)	(0.024)
Overqualified, normative			–0.040**		
			(0.017)		
Underqualified, normative			0.059***		
			(0.017)		
Female	–0.196***	–0.189***	–0.198***	–0.178***	–0.189***
	(0.014)	(0.014)	(0.014)	(0.033)	(0.015)
Married	0.045**	0.049***	0.041**	0.049	0.064***
	(0.018)	(0.018)	(0.018)	(0.040)	(0.019)
Female married	–0.060**	–0.069***	–0.059**	–0.075	–0.094***
	(0.025)	(0.025)	(0.025)	(0.051)	(0.028)
Age (years)	0.091***	0.095***	0.092***	0.086**	0.088***
	(0.020)	(0.020)	(0.020)	(0.042)	(0.024)
Age squared	–0.002***	–0.002***	–0.002***	–0.001	–0.001***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Poor	–0.123***	–0.123***	–0.119***	–0.043	–0.125***
	(0.013)	(0.013)	(0.013)	(0.032)	(0.013)

Table A.5.5 Determinants of hourly earnings among young employees: OLS regression *(concl.)*

Variables	All countries			Countries by GCI-based classification	
	Model 1	Model 2	Model 3	Factor-driven	Efficiency-driven
Agriculture	–0.169***	–0.165***	–0.164***	–0.153***	–0.143***
	(0.022)	(0.023)	(0.022)	(0.052)	(0.025)
Market services	–0.067***	–0.068***	–0.069***	–0.082**	–0.043***
	(0.015)	(0.015)	(0.015)	(0.035)	(0.016)
Public services	–0.138***	–0.147***	–0.161***	–0.158***	–0.125***
	(0.019)	(0.019)	(0.020)	(0.049)	(0.020)
Small firms (10–49 employees)	0.114***	0.112***	0.114***	0.157***	0.090***
	(0.015)	(0.015)	(0.015)	(0.035)	(0.016)
Med/large firms (50+ employees)	0.146***	0.144***	0.145***	0.170***	0.137***
	(0.015)	(0.015)	(0.015)	(0.037)	(0.017)
Temporary job	–0.011	–0.010	–0.008	0.017	–0.020
	(0.017)	(0.017)	(0.017)	(0.032)	(0.018)
De facto informal employment	–0.079***	–0.078***	–0.081***	–0.124***	–0.081***
	(0.015)	(0.015)	(0.015)	(0.041)	(0.016)
De jure informal employment	–0.217***	–0.209***	–0.210***	–0.293***	–0.172***
	(0.018)	(0.018)	(0.018)	(0.046)	(0.020)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of countries	21	20	21	8	11
Number of observations	10,586	10,381	10,446	2,641	7,069
F	8646	8326	8098	3793	5773
Df	37	38	39	26	29
R^2	0.951	0.952	0.951	0.959	0.940

Notes: Dependent variable is log of net hourly earnings for employees trimmed at the 1st and 99th centiles within each country. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Reference categories are secondary general education, well-matched workers, male, unmarried, non-poor (self-assessed household's financial situation), employment of unlimited duration or of at least 12 months, formal employment, industry and construction, microbusiness with fewer than ten employees. De jure informal employment refers to employment on the basis of an oral agreement, both in the formal and informal sectors. De facto informal employment is defined as employment on the basis of a written contract in the formal sector but without access to paid annual leave, paid sick leave or social security contribution.

Source: Own calculations based on the SWTS data.

Table A.5.6 Determinants of job satisfaction among young employees: Logistic regression

Variables	All countries			Countries by GCI-based classification	
	Model 1	Model 2	Model 3	Factor-driven	Efficiency-driven
Primary education and below	0.394***	0.266***	0.074	0.135	0.323**
	(0.087)	(0.092)	(0.111)	(0.153)	(0.127)
Secondary and post-secondary vocational education	–0.107	0.063	–0.155	0.227	0.163
	(0.104)	(0.109)	(0.106)	(0.195)	(0.142)
Tertiary education	–0.286***	–0.099	–0.036	–0.205	0.001
	(0.107)	(0.111)	(0.112)	(0.235)	(0.141)
Overqualified, subjective		–1.214***		–1.117***	–1.353***
		(0.075)		(0.156)	(0.095)
Underqualified, subjective		–0.683***		–0.710***	–0.600***
		(0.104)		(0.145)	(0.166)
Overqualified, normative			–0.589***		
			(0.090)		
Underqualified, normative			0.257***		
			(0.092)		
Female	0.049	0.050	0.024	–0.254*	0.146
	(0.079)	(0.082)	(0.080)	(0.148)	(0.107)
Married	–0.020	–0.038	–0.018	–0.124	0.064
	(0.088)	(0.092)	(0.088)	(0.160)	(0.124)
Female married	0.219	0.254*	0.196	0.424*	0.175
	(0.145)	(0.153)	(0.146)	(0.239)	(0.217)
Age	–0.066	–0.012	–0.064	–0.074	0.007
	(0.099)	(0.102)	(0.100)	(0.179)	(0.138)
Age squared	0.001	0.000	0.001	0.001	–0.000
	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)
Poor	–0.573***	–0.583***	–0.569***	–0.523***	–0.618***
	(0.067)	(0.070)	(0.068)	(0.129)	(0.090)

Table A.5.6 Determinants of job satisfaction among young employees: Logistic regression *(concl.)*

Variables	All countries			Countries by GCI-based classification	
	Model 1	Model 2	Model 3	Factor-driven	Efficiency-driven
Agriculture	–0.165	–0.108	–0.126	0.206	–0.171
	(0.101)	(0.106)	(0.102)	(0.194)	(0.134)
Market services	–0.039	–0.034	–0.037	0.043	–0.095
	(0.074)	(0.077)	(0.075)	(0.149)	(0.101)
Public services	0.293***	0.167	0.146	–0.210	0.328**
	(0.112)	(0.116)	(0.116)	(0.212)	(0.153)
Small firms (10–49 employees)	–0.099	–0.120	–0.097	–0.312*	–0.133
	(0.078)	(0.081)	(0.078)	(0.159)	(0.104)
Med/large firms (50+ employees)	–0.123	–0.136	–0.072	–0.086	–0.270**
	(0.090)	(0.094)	(0.092)	(0.195)	(0.115)
Temporary job	–0.401***	–0.373***	–0.381***	–0.363***	–0.554***
	(0.088)	(0.091)	(0.089)	(0.132)	(0.133)
De facto informal employment	–0.834***	–0.745***	–0.817***	–0.864***	–0.680***
	(0.108)	(0.111)	(0.110)	(0.243)	(0.132)
De jure informal employment	–1.293***	–1.116***	–1.205***	–1.394***	–1.089***
	(0.116)	(0.120)	(0.117)	(0.267)	(0.138)
Job-specific training (dummy)	0.313***	0.232**	0.263***	0.115	0.327***
	(0.092)	(0.095)	(0.094)	(0.176)	(0.120)
Log(hourly wages)	0.342***	0.344***	0.337***	0.211***	0.401***
	(0.047)	(0.051)	(0.047)	(0.079)	(0.068)
Log(weekly hours worked)	–0.010	0.003	–0.006	0.019	–0.014
	(0.055)	(0.056)	(0.054)	(0.080)	(0.086)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of countries	19	18	19	8	9
Number of observations	9,346	9,162	9,214	2,554	5,974
Model chi^2	863.1	1045	887.4	376.9	621.6
Df	38	39	40	29	30
Pseudo R^2	0.120	0.149	0.125	0.191	0.138

Notes: Dependent variable is a binary variable taking value of 1 if respondents reported to be satisfied with their main job. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Reference categories are secondary general education, well-matched workers, male, unmarried, non-poor (self-assessed household's financial situation), employment of unlimited duration or of at least 12 months, formal employment, industry and construction, microbusiness with less than ten employees, and no training received for current activity in the last 12 months.
Source: Own calculations based on the SWTS data.

Table A.5.7 Determinants of the desire to change current employment situation: Logistic regression

Variables	All countries			Countries by GCI-based classification	
	Model 1	Model 2	Model 3	Factor-driven	Efficiency-driven
Primary education and below	–0.415***	–0.301***	–0.161*	–0.326***	–0.304***
	(0.067)	(0.070)	(0.084)	(0.120)	(0.092)
Secondary and post-secondary vocational education	0.172**	0.031	0.187**	0.032	–0.080
	(0.082)	(0.084)	(0.083)	(0.153)	(0.108)
Tertiary education	0.491***	0.340***	0.293***	0.130	0.342***
	(0.082)	(0.085)	(0.088)	(0.187)	(0.105)
Overqualified, subjective		1.323***		1.107***	1.479***
		(0.070)		(0.149)	(0.090)
Underqualified, subjective		0.380***		0.252**	0.577***
		(0.089)		(0.123)	(0.136)
Overqualified, normative			0.405***		
			(0.076)		
Underqualified, normative			–0.275***		
			(0.070)		
Female	0.019	0.001	0.037	0.190	–0.062
	(0.061)	(0.063)	(0.062)	(0.122)	(0.077)
Married	0.179**	0.204***	0.177**	0.232*	0.219**
	(0.070)	(0.073)	(0.071)	(0.132)	(0.094)
Female married	–0.426***	–0.439***	–0.412***	–0.367**	–0.610***
	(0.109)	(0.114)	(0.110)	(0.187)	(0.157)
Age	0.259***	0.223***	0.258***	0.249*	0.269**
	(0.078)	(0.080)	(0.078)	(0.142)	(0.106)
Age squared	–0.005***	–0.005***	–0.005***	–0.005*	–0.005**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Poor	0.325***	0.336***	0.318***	0.376***	0.316***
	(0.054)	(0.056)	(0.054)	(0.109)	(0.068)

Table A.5.7 Determinants of the desire to change current employment situation: Logistic regression *(concl.)*

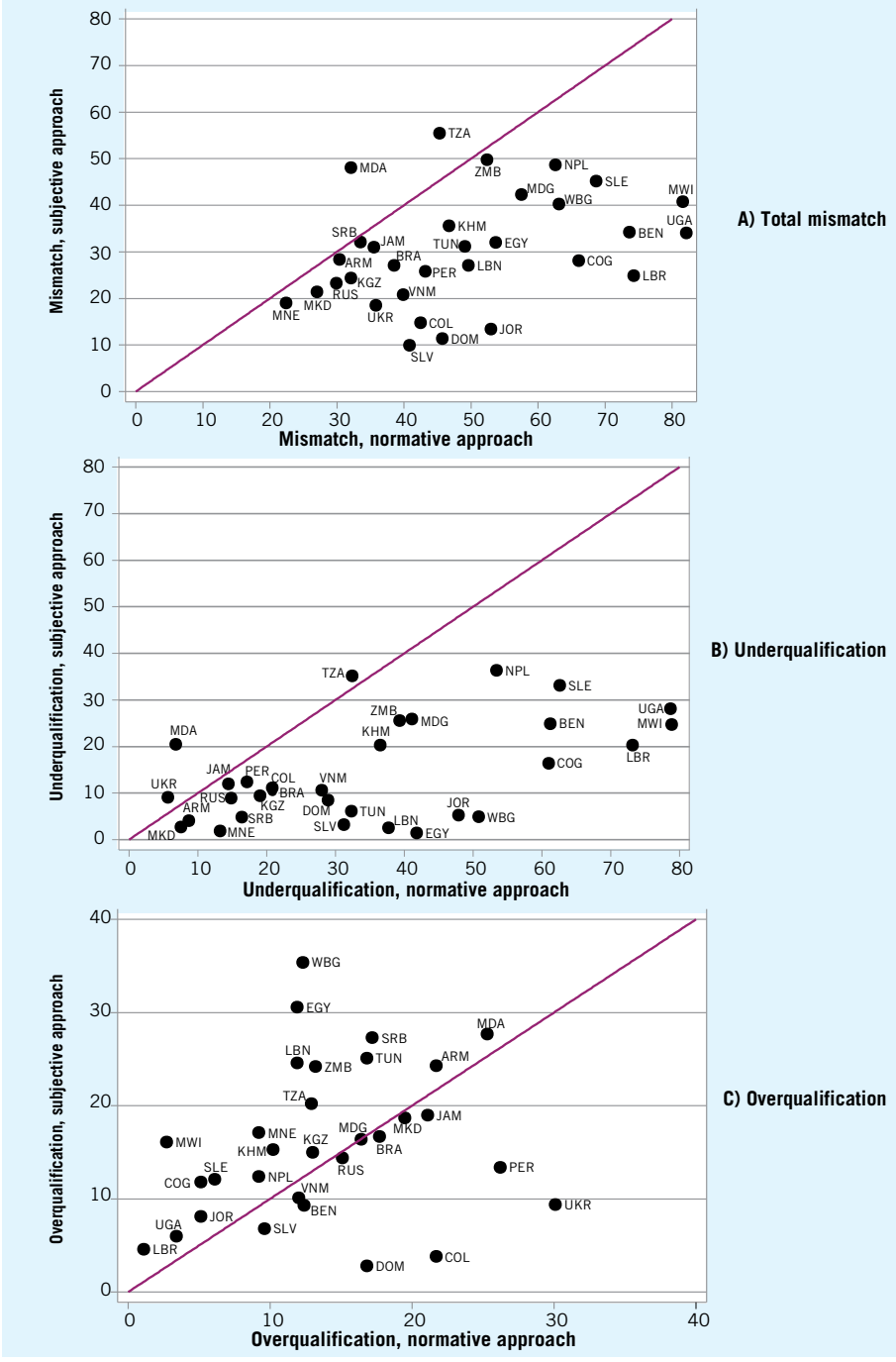
Variables	All countries			Countries by GCI-based classification	
	Model 1	Model 2	Model 3	Factor-driven	Efficiency-driven
Agriculture	0.252***	0.183**	0.213**	0.049	0.193*
	(0.084)	(0.088)	(0.085)	(0.163)	(0.110)
Market services	0.011	0.001	0.009	–0.182	0.062
	(0.057)	(0.060)	(0.058)	(0.121)	(0.074)
Public services	–0.713***	–0.617***	–0.575***	–0.468***	–0.675***
	(0.083)	(0.085)	(0.086)	(0.178)	(0.104)
Small firms (10–49 employees)	0.111*	0.126**	0.109*	0.279**	0.130
	(0.062)	(0.064)	(0.062)	(0.128)	(0.079)
Med/large firms (50+ employees)	0.035	0.039	0.010	0.004	0.094
	(0.068)	(0.071)	(0.069)	(0.149)	(0.086)
Temporary job	0.372***	0.318***	0.370***	0.140	0.480***
	(0.072)	(0.076)	(0.072)	(0.117)	(0.104)
De facto informal employment	0.606***	0.560***	0.607***	0.283*	0.607***
	(0.072)	(0.073)	(0.073)	(0.153)	(0.087)
De jure informal employment	1.056***	0.923***	1.007***	0.886***	0.944***
	(0.083)	(0.085)	(0.084)	(0.178)	(0.101)
Job-specific training (dummy)	–0.021	0.026	0.007	0.039	0.012
	(0.067)	(0.068)	(0.068)	(0.142)	(0.082)
Log(hourly wages)	–0.444***	–0.443***	–0.434***	–0.362***	–0.466***
	(0.046)	(0.047)	(0.046)	(0.078)	(0.064)
Log(weekly hours worked)	–0.082*	–0.094*	–0.075	–0.048	–0.118*
	(0.049)	(0.051)	(0.050)	(0.087)	(0.068)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of countries	20	19	20	8	10
Number of observations	9,642	9,451	9,507	2,553	6,264
Model chi^2	1292	1506	1293	445.2	995.5
Df	39	40	41	29	31
Pseudo R^2	0.125	0.156	0.127	0.166	0.158

Notes: Dependent variable is a binary variable taking value of 1 if respondents reported that they would like to change their current employment situation, and 0 otherwise. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. See reference categories in a note to table A.6.

Source: Own calculations based on the SWTS data.

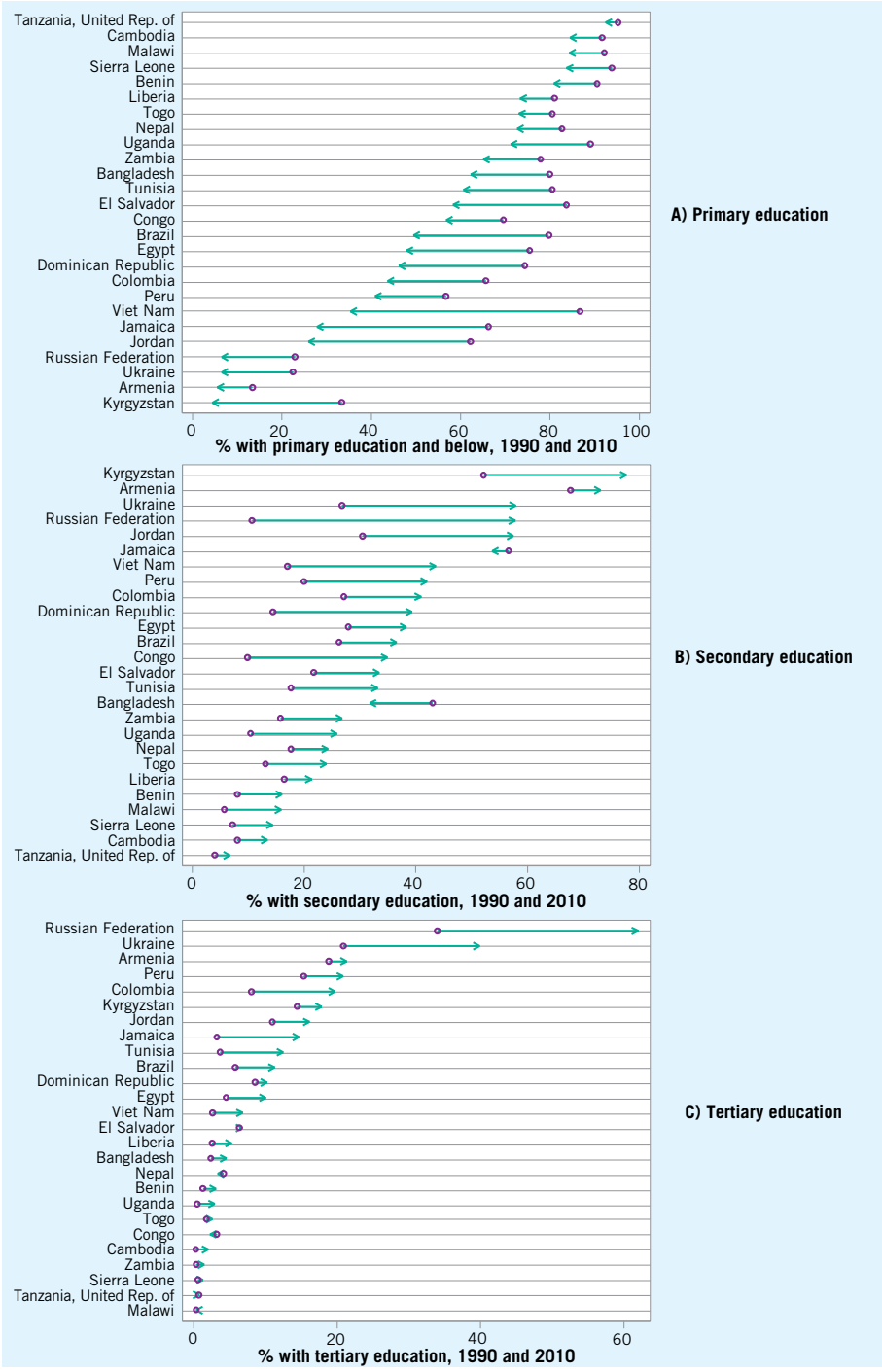
Annex 5.2 Figures

Figure A.5.1 Proportion of mismatched young employees (percentages): Normative vs subjective approach



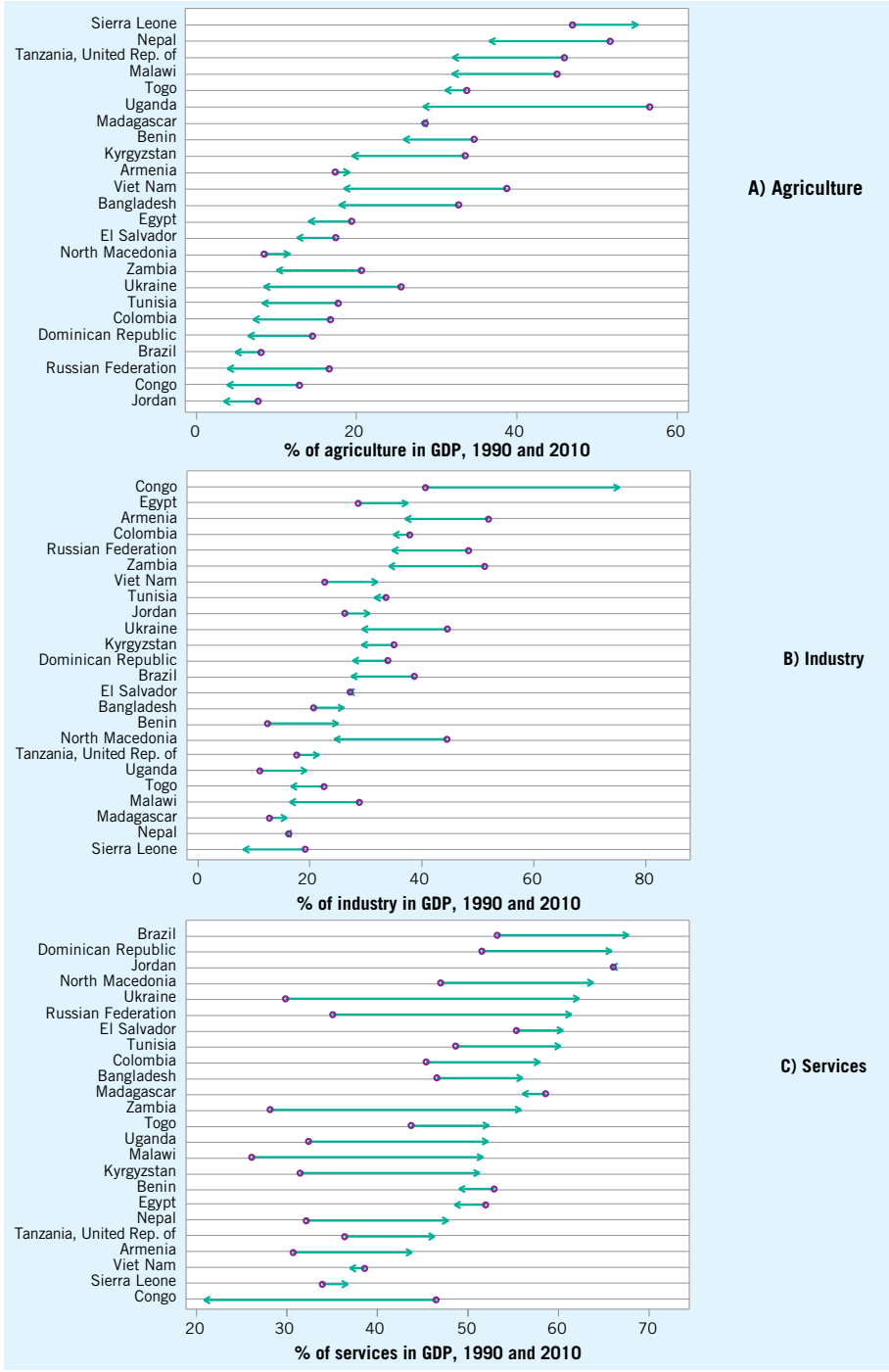
Source: SWTS, latest year available, with sample weights applied.

Figure A.5.2 Educational attainment of adult population, 1990 vs 2010



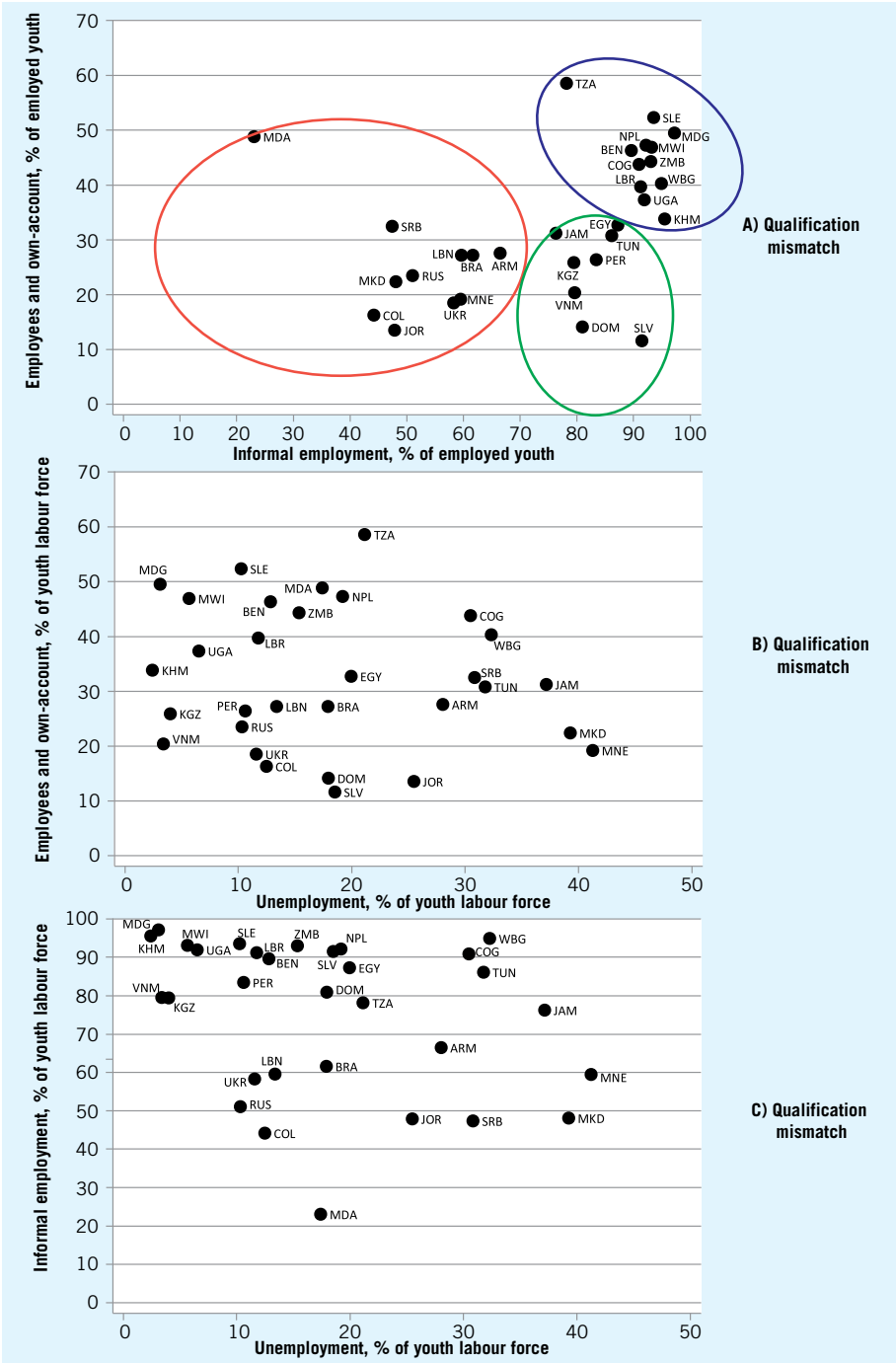
Note: Circles refer to 1990, arrows to 2010.
Source: SWTS, latest year available, with sample weights applied.

Figure A.5.3 Share of agriculture, industry and services in GDP, 1990 vs 2010



Note: Circles refer to 1990, arrows to 2010. Countries are shown in descending order of an indicator in 2010.
Source: World Development Indicators, series "Agriculture/industry/services, etc., value added (% of GDP)".

Figure A.5.4 Qualification mismatch, informality and unemployment of youth



Notes: Subjective method is used for the measurement of qualification mismatch. Unemployment refers to the strict definition.
Panel A: three country groups defined on the basis of a cluster analysis are shown in three circles.
Source: SWTS, latest year available, with sample weights applied.

Annex 5.3 Definitions and measurement of educational mismatch using SWTS

Qualification (vertical) mismatch

Qualification (or vertical) mismatch arises when a worker's educational attainment is higher or lower than required by his/her job. If it is higher, a worker is classified as overqualified or overqualified; and if it is lower, a worker is classified as underqualified or underqualified.

With the ILO SWTS data, vertical mismatch can be measured in two major ways:

1. A subjective, or self-declared, measure based on the answers of young workers (excluding students) to the questio:n "Do you feel your education/training qualifications are relevant in performing your present job?". If the answer is "Yes, they are relevant", a worker is classified as well-matched. If the answer is "No, I feel overqualified", he or she is classified as overqualified. If the answer is "No, I experience gaps in my knowledge and skills / need additional training", the worker is classified as underqualified. This measure is unavailable in Bangladesh, Samoa and Togo because the respective variable is missing in the global data set for these countries.

Although this measure may be biased by workers' judgements about educational requirements of their jobs, it has the advantages of being easily applicable in survey data and being based on up-to-date and context-related information (Chapter 2; Leuven and Oosterbeek, 2011).

2. An objective measure based on the normative, or job analysis, approach developed by the ILO. This starts from the division of major occupational groups according to the International Standard Classification of Occupations 2008 (ISCO-08) into four major skill groups (ILO, 2012). Then it assigns a level of education categorized in accordance with the International Standard Classification of Education 1997 (ISCED-97) that is deemed to be required for performing jobs of each skill level. For example, occupations classified at Skill level 4 such as legislators, senior officials, managers and professionals are presumed to require tertiary education from the long-stream programmes (ISCED 5A or 6), whereas jobs at Skill level 3 (technicians and associate professionals) usually require tertiary education from shorter and more practically oriented programmes corresponding to the ISCED level 5B.

As education systems and their organizational structures vary greatly across countries, the boundaries between ISCED 5A and ISCED 5B programmes are often hard to define. In view of these classification problems, large cross-country surveys

ISCO-08 Skill level	ISCO-08 major group	Required education (based on information about the highest level of completed formal education/ training)
4	1. Legislators, senior officials and managers	University and post-graduate level (ISCED 5–6)
	2. Professionals	
3	3. Technicians and associate professionals	
2	4. Clerical support workers	Post-secondary (vocational), Secondary (vocational), Secondary (general) (ISCED 2–4)
	5. Service and sales workers	
	6. Skilled agricultural and fishery workers	
	7. Craft and related trades workers	
	8. Plant and machine operators and assemblers	
1	9. Elementary occupations	Primary (ISCED 1)

such as the SWTS do not distinguish between tertiary education programmes by their duration. Accordingly, occupations at ISCO-08 Skill levels 4 and 3 are analysed together and presumed to require tertiary education of ISCED levels 5–6 (ILO, 2013; Sparreboom and Staneva, 2014).

The normative measure of educational mismatch developed by the ILO team in the global SWTS data set and used in the study is based on the following mapping between ISCO occupational groups and levels of education:

Workers with university or post-graduate education are classified as overqualified if they hold positions in ISCO major groups 4–9. Workers with secondary or post-secondary education are classified as overqualified if they hold elementary occupations (major group 9) and as underqualified if their occupations belong to ISCO major groups 1–3. Workers with primary education holding jobs in all groups except group 9 and all workers with less than primary education are classified as underqualified. By construction, underqualification among persons with tertiary education and overqualification among those with primary or lower level of education are impossible.

A disadvantage of the normative approach is that it is based on quite a strong assumption that all jobs with the same occupational code have the same educational requirements in all countries which use the same occupational classification (Quintini, 2011). Nor does it differentiate between diverse educational requirements of the broad range of occupations in major groups 1–3 or 4–8 (Sparreboom and Staneva, 2014), and can thus provide biased estimates of mismatch. However, its main advantage is that workers in a given occupational broad group and with a given level of education are consistently classified as overqualified/ well-matched/ underqualified across all countries in the SWTS data set, so that the results are strictly comparable.

To assess the possible biases from subjective and objective measures and obtain alternative estimates of over- and underqualification, a mixed measure based on both measures was used. This follows Chevalier (2003) in using normative and self-declared approaches and adapts his classification distinguishing between apparently and genuinely overqualified/ underqualified/ matched workers in the following way:

		Self-declared (subjective)		
		Overqualified	**Well-matched**	**Underqualified**
Normative (objective)	**Overqualified**	Genuinely overqualified	Apparently overqualified	Mismatched
	Well-matched	Apparently matched	Genuinely matched	Apparently matched
	Underqualified	Mismatched	Apparently underqualified	Genuinely underqualified

If workers are categorized equally according to both methods, they are defined as genuinely overqualified, well-matched or underqualified, respectively. A large share of such workers would imply significant coincidence between the two measures. A relatively large share of workers categorized as apparently overqualified/underqualified would point to overestimation of mismatch by the normative approach. If many workers are categorized as "mismatched" (i.e. individuals defined as overqualified according to one approach and as underqualified according to another, or vice versa); this shows that normative and self-declared approaches measure mismatch from very different angles and lead to the opposite mismatch statuses. Yet, it is difficult to decide which approach provides more accurate information about the mismatch status of workers.

The mixed measure of mismatch, with seven possible categories, is not used for analysis of mismatch among own-account workers or for a detailed analysis of mismatch among employees across individual characteristics because of the low statistical reliability of estimates based on a very small sample.

An alternative objective measure of vertical mismatch based on the realized matches, often referred to in the literature as a statistical approach (using the mean years of schooling or the mode level of education within 2- or 3-digit occupations and comparing it to workers' education; see e.g. Leuven and Oosterbeek, 2011), is not used in this study because of either different classifications of occupations applied by some countries to specify the occupation of workers or insufficient number of observations within detailed occupations in the other countries.

Field of study (horizontal) mismatch

Field of study (or horizontal) mismatch arises when workers are employed in a different field from the one in which they are specialized. Workers who are employed in an occupation that is considered a good match for their field are classified as matched, otherwise they are counted as mismatched.

As the SWTS survey does not include information about the required field of studies or self-assessed (mis)match of workers' specialization to their jobs, a normative approach in defining horizontal mismatch was used. This is based on correspondence between each broad field of study reported by respondents and occupations that are considered as an appropriate match for this field of study.

There are nine broad fields of study defined: general programmes; education, humanities and arts; social sciences, business and law; science, mathematics and computing; engineering, manufacturing and construction; agriculture and veterinary; health and welfare; and services. For Madagascar, in which ISCO-1988 3-digit codes are used for coding of occupations, we applied the table of correspondence developed by Wolbers (2003). In ten countries using ISCO-2008 3- or 4-digit codes (4-digit codes were reduced to 3-digit codes) we applied the table of correspondence provided in OECD (2014, Annex 5.A.2). The same table, but reduced to 2-digit codes, was applied to determine the fit between the field of study and jobs in five other countries that used ISCO-2008 2-digit codes. In line with the literature (Wolbers, 2003; OECD, 2014; Montt, 2017), individuals with a major in "general programmes" or "other", armed forces occupations, workers with missing information about occupation or field of study, and those who have primary or lower level of education are excluded from the analysis.

All observations for the Republic of Moldova have missing values for detailed occupation, whereas those for North Macedonia have missing values for the field of study variable; these two countries do not have estimates of horizontal mismatch. In a further ten low-income countries where the share of young people with post-secondary or tertiary education is very small, workers with missing horizontal mismatch status account for over 90 per cent of the total sample of employees and own-account workers, and the estimates of horizontal mismatch in the remaining sample lack reliability due to small sample size. Another drawback of applying this approach to the SWTS global data set is that four countries use national classifications of occupations and 13 more have undefined type of occupational classification (and missing values for detailed occupation), and therefore the horizontal mismatch status cannot be defined.

Of 32,689 observations in the sample of young employees and own-account workers in 34 countries, only 3,432 observations (10.5 per cent) have defined status of horizontal (mis)match. Only in three of the 34 countries (Montenegro, Serbia and Ukraine) is the analysis of produced estimates of horizontal mismatch relatively reliable and appropriate.

6. Skills mismatch in low- and middle-income countries: Key synthesis findings and policy recommendations

Although the research outputs included in the preceding chapters focus on a single type of skills mismatch (over/underqualification), they relate to different countries, time periods and segments of the labour market, and are based on data from different surveys. As such, it is difficult to assess the degree to which dominant patterns and relationships in low- and middle-income countries mirror those identified within more developed labour markets. This chapter attempts to identify key messages and themes emerging from the assessments presented in Chapters 3 to 5 along with the literature review in Chapter 2.

Through further concluding analysis, it provides a summary of the incidence and impacts of overqualification in low- and middle-income countries measured against a typology of country characteristics related to region, income, informality, sectoral composition and demographic factors. This final analysis seeks to provide additional insights into how the incidence of this form of mismatch relates to different country characteristics.

Section 6.1 describes the final combined data set and presents some descriptive statistics, including the relationships between educational mismatch and certain key labour market and macroeconomic variables. Section 6.2 conducts a meta-analysis of 60 country estimates of educational mismatch to assess the extent to which they are correlated with factors such as per capita GDP, labour force participation, unemployment and various forms of labour market informality. Section 6.3 outlines the main findings emerging from earlier studies both in terms of the incidence and impacts of overqualification in low- and middle-income countries and of the key relationships and trends emerging from other literature. Section 6.4 concludes, makes policy recommendations to address the emerging trends and identifies outstanding questions.

6.1 Mismatch and country characteristics: Bivariate analysis

This section synthesizes and benchmarks the estimates of mismatch generated in each of the three chapters (3 to 5) against a range of variables designed to measure national levels of income, unemployment, demographic and industrial structure, geographic

region and informality, in an attempt to extract further insights from the studies regarding the factors determining national rates of mismatch.

Descriptive statistics

The sample consists of 161 country-level observations, with estimates of overqualification, underqualification and matched employment. As the sample is drawn from three separate data analyses, there are multiple estimates for certain countries. Moreover, Chapter 5 employs two different techniques to measure over- and underqualification and reports different estimates of overqualification based on different approaches. Table A.6.1 in Annex 6.1 lists each of the 161 observations along with the corresponding estimates of overqualification, underqualification and matched employment. It also uses data for various macroeconomic and labour market related variables from the World Development Indicators database published by the World Bank. Table 6.1 lists all the variables used in the analysis.

Table 6.1 Variables used in the analysis and their source

Variable	Definition
Overqualification	The percentage of overqualified workers
Underqualification	The percentage of underqualified workers
Matched	The percentage of matched workers
Income status	The income level of the country: Lower middle-income (LMI), upper middle-income (UMI) or low-income (LI)
Method	The measurement approach used: empirical (E), job analysis (JA) or subjective (S)
Youth	A binary variable indicating whether the study focuses exclusively on young people (aged 15–29)
Salaried workers	Percentage of total workers who are wage and salary workers
GDP per capita	Measured in 2011 US$
Unemployment rate	Percentage unemployment rate
Labour force participation rate	Percentage labour force participation rate
Female labour force participation rate	Percentage female labour force participation rate
Youth labour force participation rates	Labour force participation rate for ages 15–24
Population	Log of population
Vulnerable workers	Fraction of vulnerable workers in employment where vulnerable employment includes own-account workers and contributing family members
Region	Dummy variables to indicate the region the country is from: South Asia, Sub-Saharan Africa, East Asia and Pacific, Latin America and Caribbean, Europe and Central Asia, Middle East and North Africa

Source: The variables overqualification, underqualification, matched, method and youth are sourced from Chapters 3–5, the remaining variables from the World Bank's World Development Indicators database.

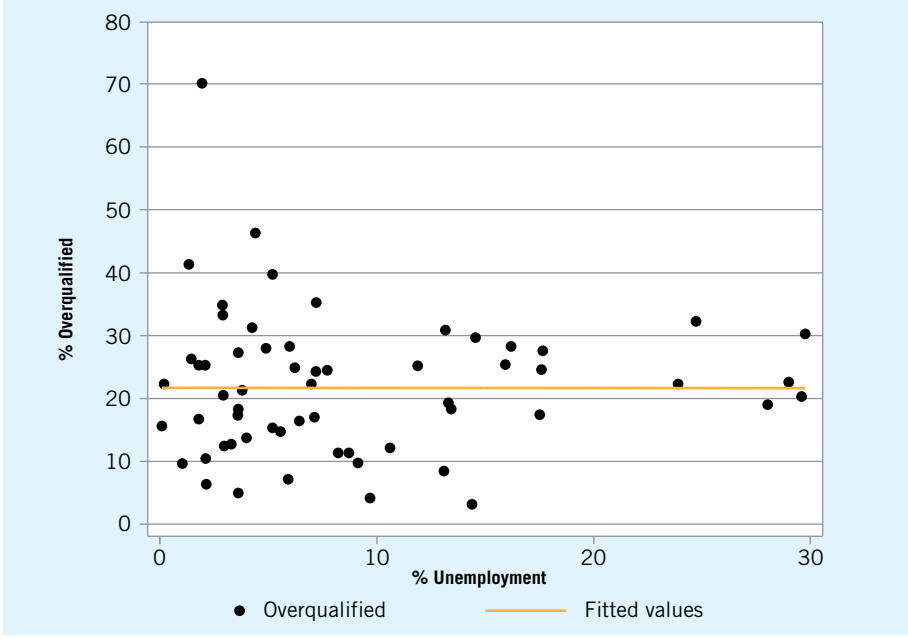
Bivariate analysis

While table A.6.1 is useful in showing all of the estimates for each country in the sample, it is difficult to gauge any sort of patterns or relationships between variables. A clearer picture comes from examining bivariate relationships by graphing dependent variable (overqualification / underqualification) against independent variables. As seen in table 5.1, Chapter 5 reports estimates of mismatch using both normative and subjective measures. However, given the criticisms associated with the normative approach outlined above, this includes only the subjective estimates in the analysis. Chapter 5 also reports separate estimates for both employees and the self-employed. As this is the only one of the three chapters to report estimates relating to the self-employed, analysis is restricted to estimates relating to employees in order to maintain consistency across papers. This leaves a sample size of 60 observations.

Unemployment

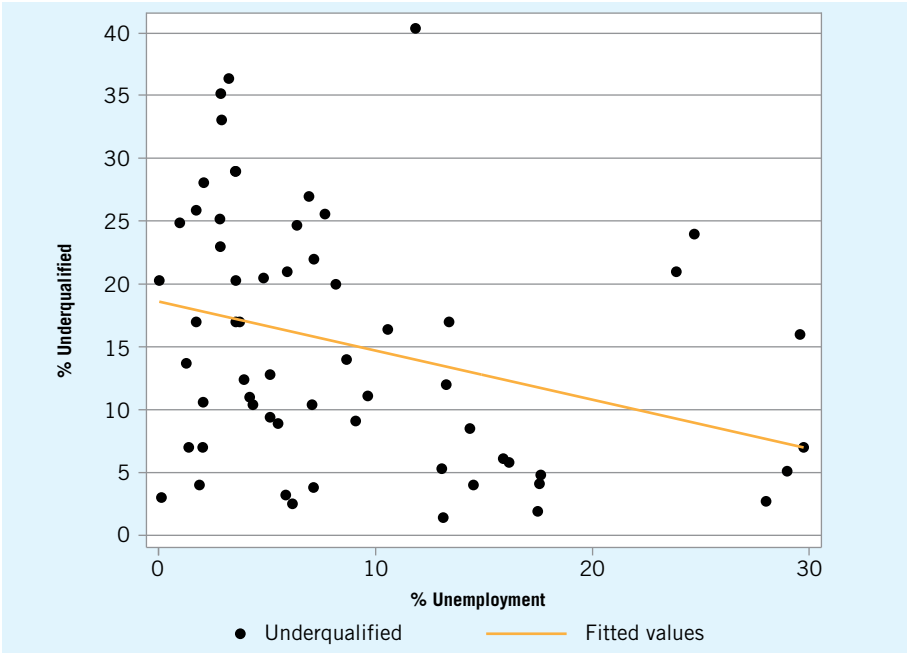
Figures 6.1–6.3 graph the unemployment rate against overqualification, underqualification and matched employment. While there does not appear to be any relationship between overqualification and unemployment, there is a sharp decline in

Figure 6.1 Overqualification vs unemployment (percentages)



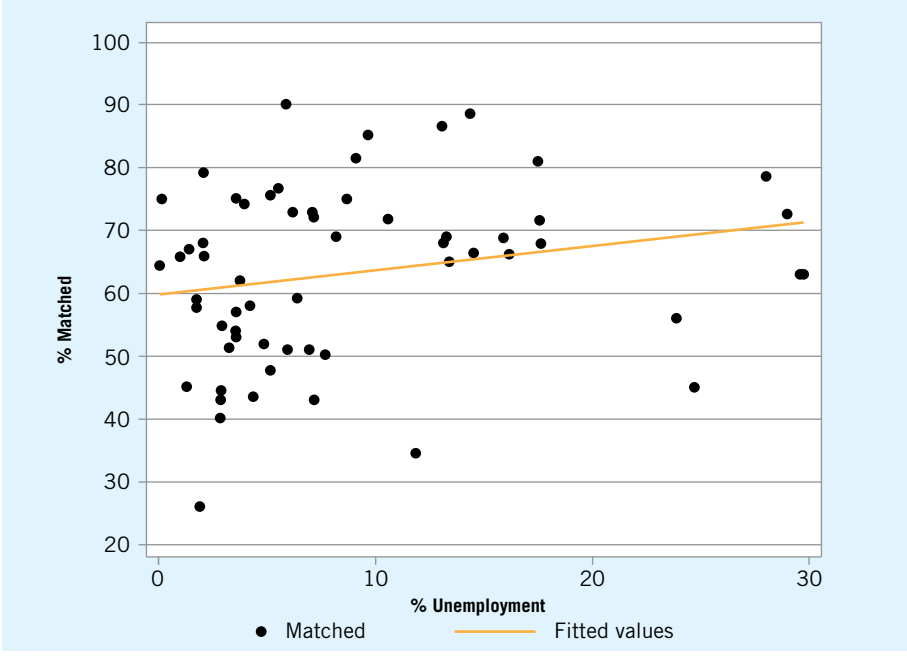
Source: Own calculations.

Figure 6.2 Underqualification vs unemployment (percentages)



Source: Own calculations.

Figure 6.3 Matched vs unemployment (percentages)



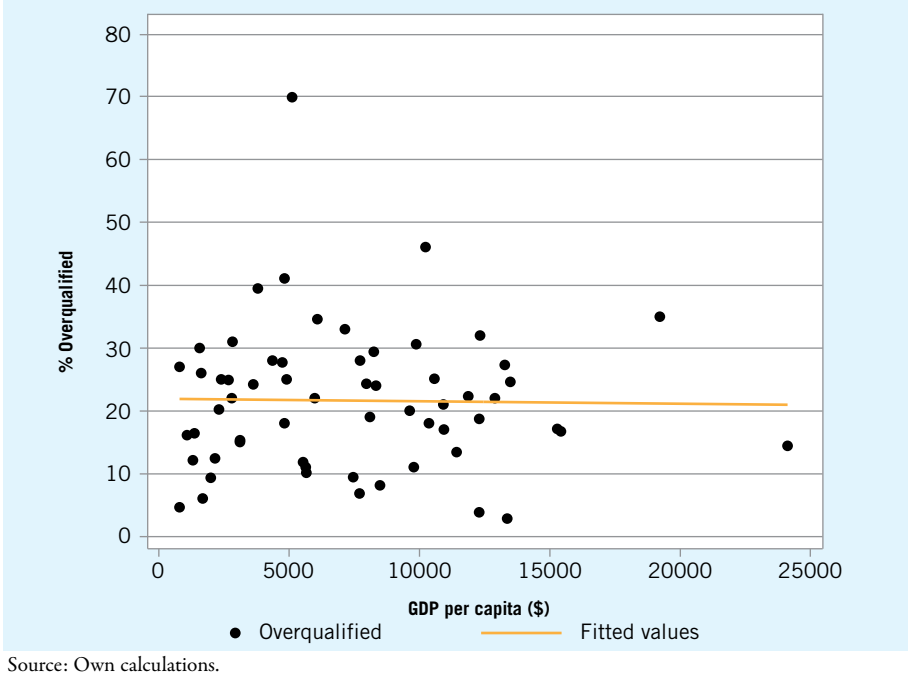
Source: Own calculations.

underqualification as the unemployment rate increases. This finding is consistent with the fixed effects estimates reported by McGuinness et al. (2017) which indicate a strong and statistically significant negative relationship between unemployment and underqualification. Figure 6.3 shows that there is an increase in matched employment as the unemployment rate increases in low- and middle-income countries, again consistent with the estimates reported by McGuinness et al. (2017) for developed countries. This may be due to the fact that as unemployment increases, only the most suitable job matches survive.

GDP per capita

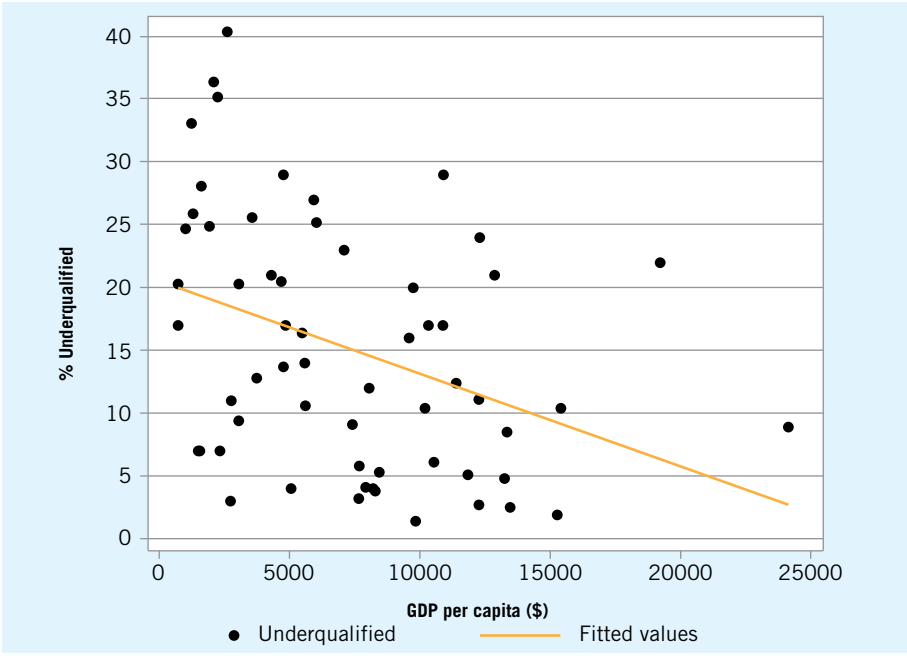
Overqualification, underqualification and matched employment against GDP per capita, measured in 2011 US$, are shown in figures 6.4–6.6. While the analyses in Chapter 5 found a relationship, in the combined analysis here there is no apparent relationship between rates of overqualification and GDP per capita. However, higher GDP per capita is associated with lower rates of underqualification and higher rates of matched employment. McGuinness et al. (2017) also find a positive and statistically significant relationship between GDP and matched employment.

Figure 6.4 Overqualification vs GDP (percentages)



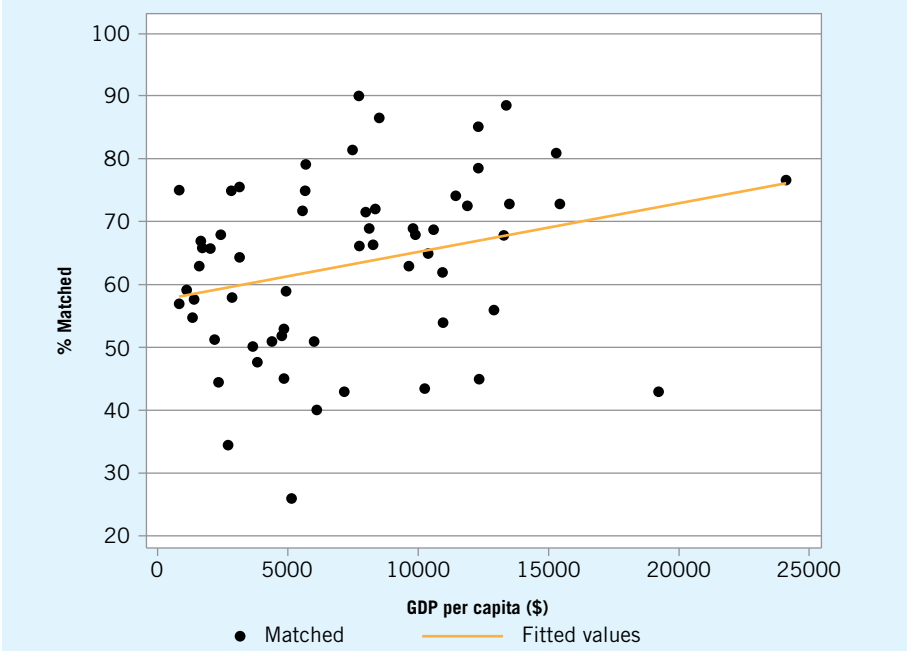
Source: Own calculations.

Figure 6.5 Underqualification vs GDP (percentages)



Source: Own calculations.

Figure 6.6 Matched vs GDP (percentages)

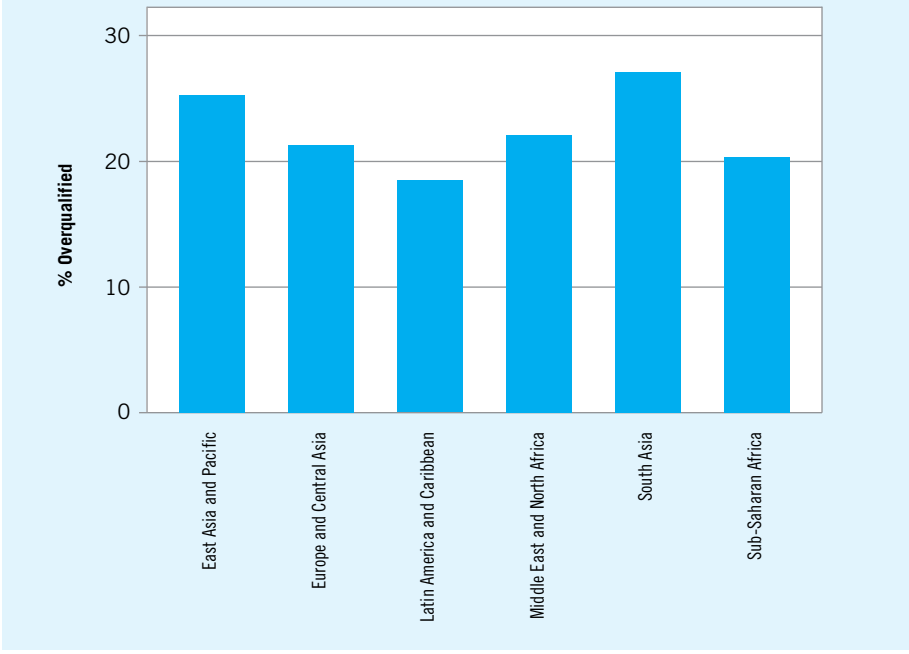


Source: Own calculations.

Region

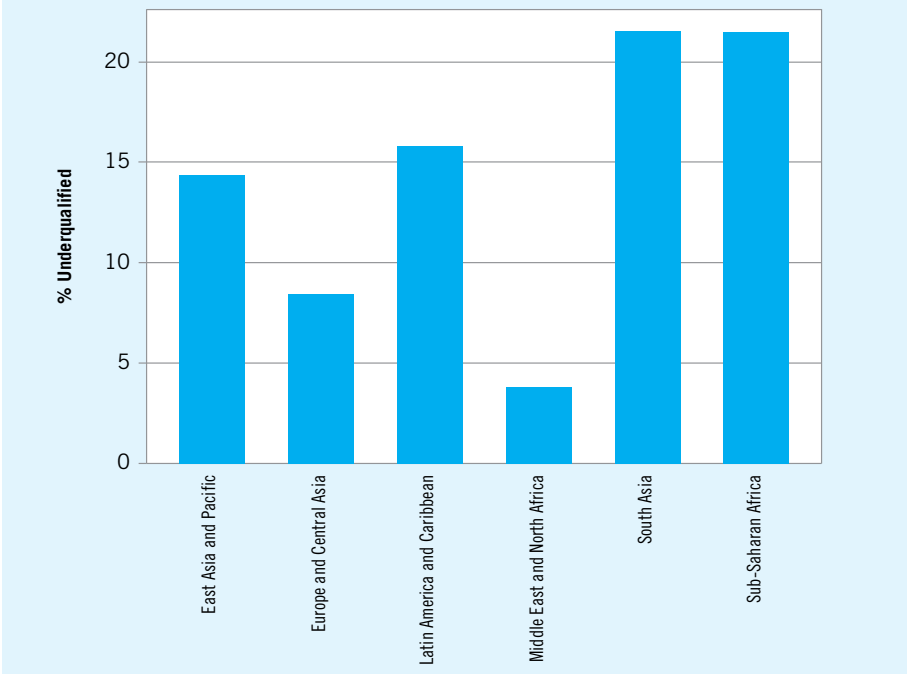
Figures 6.7–6.9 graph the overqualification, underqualification and matched employment rates across the six geographic regions covered in the data. The rates of overqualification across regions are generally higher than for underqualification, the exception being sub-Saharan Africa, where underqualification is slightly higher than overqualification. Sub-Saharan Africa, along with South Asia, also appears to have relatively high rates of overqualification and underqualification; these are the regions with the lowest levels of matched employment. The underqualification rate in the Middle East and North Africa, and in Europe and Central Asia is relatively low, and this translates into a relatively high rate of matched employment in these regions.

Figure 6.7 Overqualification by region (percentages)



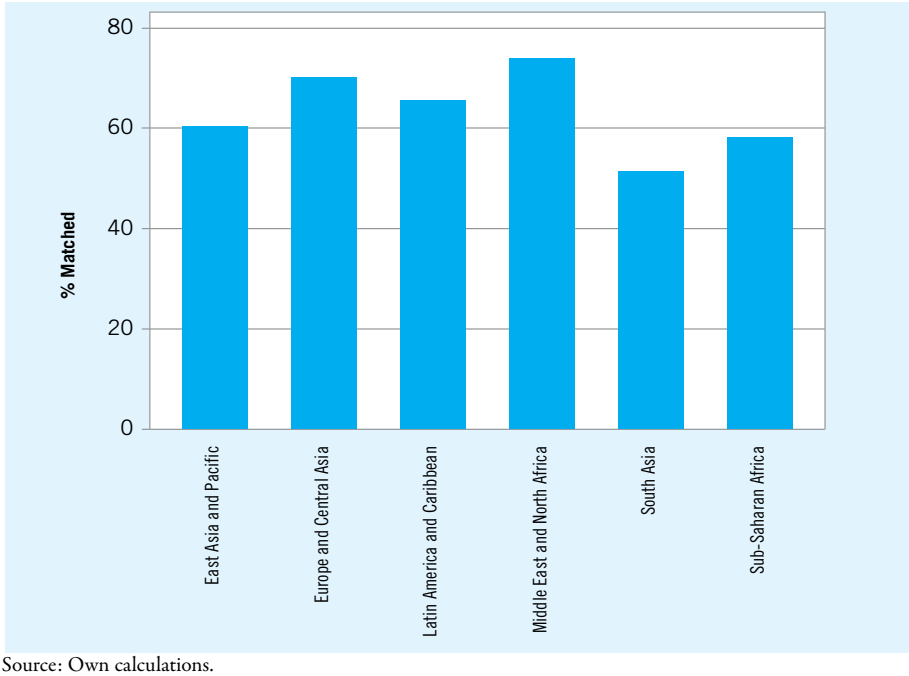
Source: Own calculations.

Figure 6.8 Underqualification by region (percentages)



Source: Own calculations.

Figure 6.9 Matched by region (percentages)

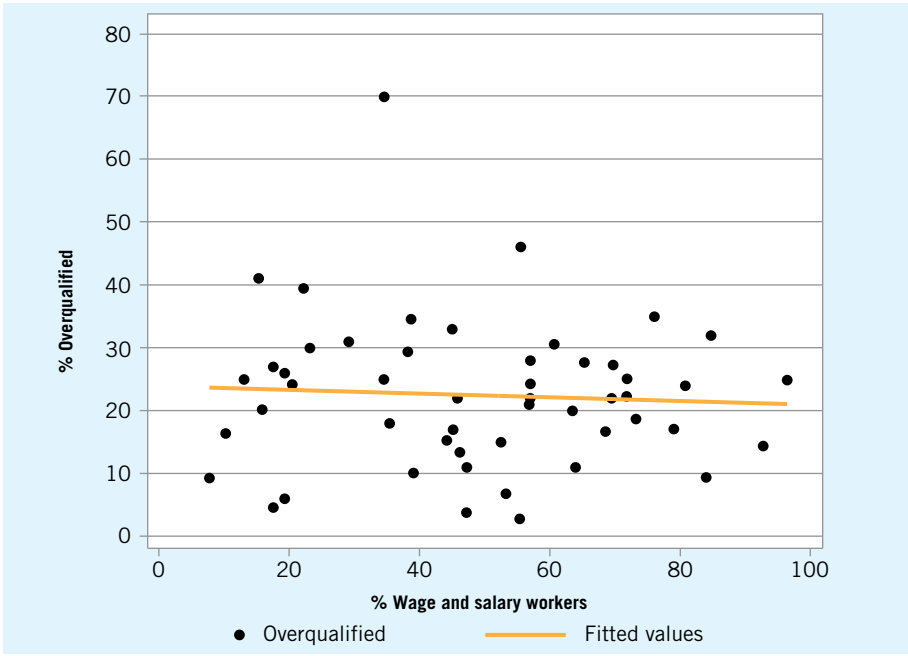


Source: Own calculations.

Wage and salary workers

As a proxy for formality, overqualification, underqualification and matched employment are shown against the percentage of wage and salary workers in figures 6.10–6.12. There does not appear to be any relationship between the percentage of wage and salary workers and overqualification but there is a slight decrease in underqualification and a slight increase in matched employment as the percentage of wage and salary workers increases.[1]

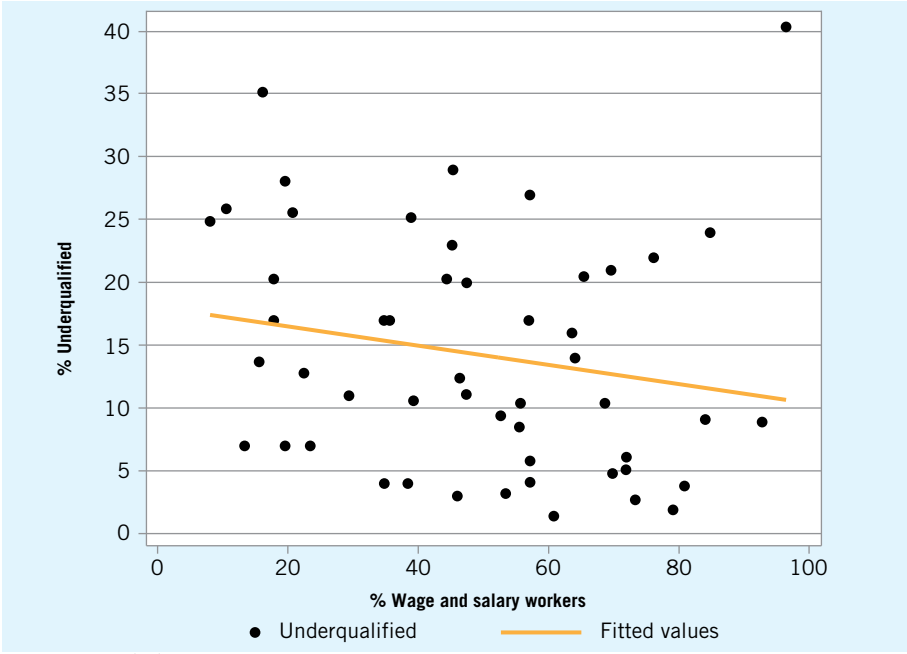
Figure 6.10 Overqualification against percentage of wage and salary workers



Source: Own calculations.

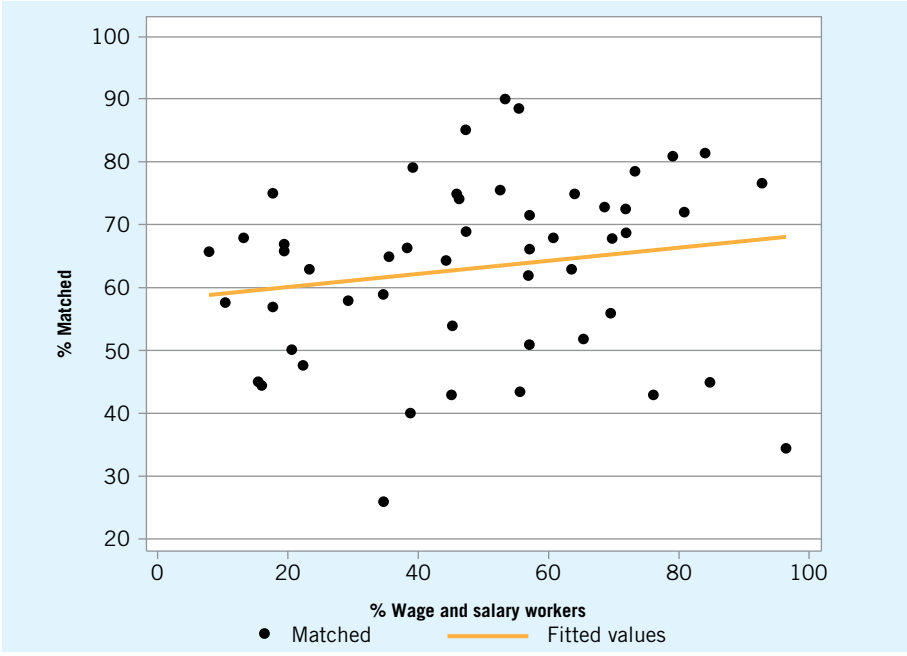
[1] The results of Chapter 4 indicate that informality is associated with holding a job whose education requirements are lower than those of the worker. The measure of informality in the chapter relates to the existence of a formal written agreement between the worker and the employer, whereas we proxy formality with the percentage of wage and salary workers.

Figure 6.11 Underqualification against percentage of wage and salary workers



Source: Own calculations.

Figure 6.12 Matched against percentage of wage and salary workers

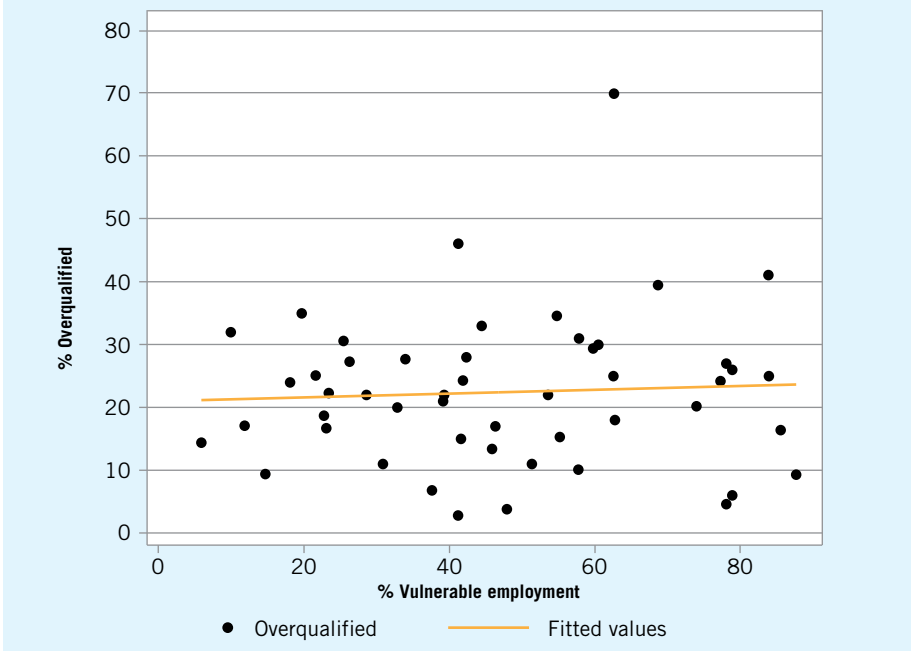


Source: Own calculations.

Vulnerable workers

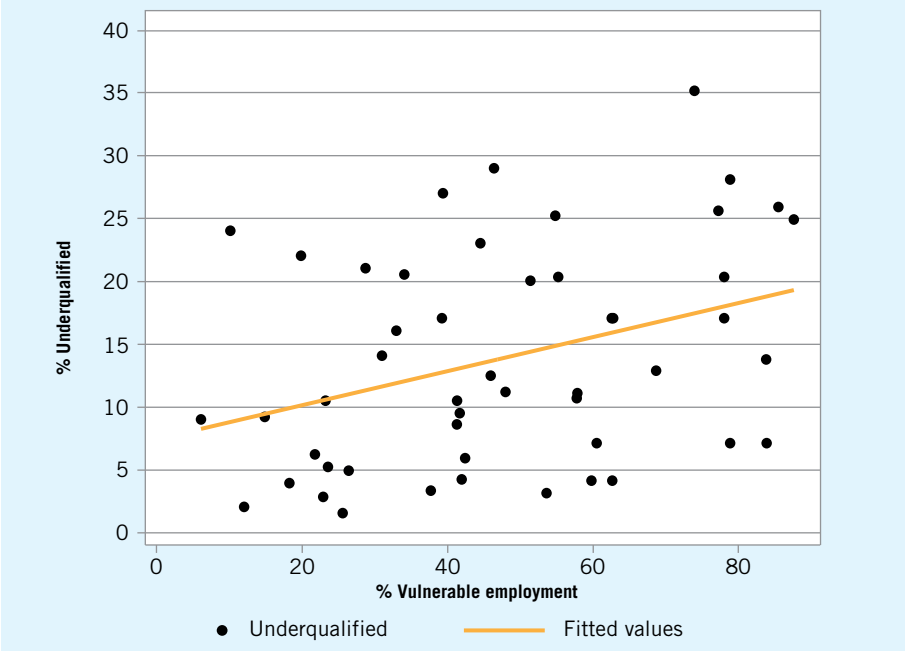
As an alternative measure of informality, overqualification, underqualification and matched employment are shown against the percentage of individuals in vulnerable employment in figures 6.13–6.15. There is no strong relationship with overqualification, but an increase in underqualification and a slight decrease in matched employment as the percentage of vulnerable workers increases.

Figure 6.13 Overqualification against percentage of vulnerable workers



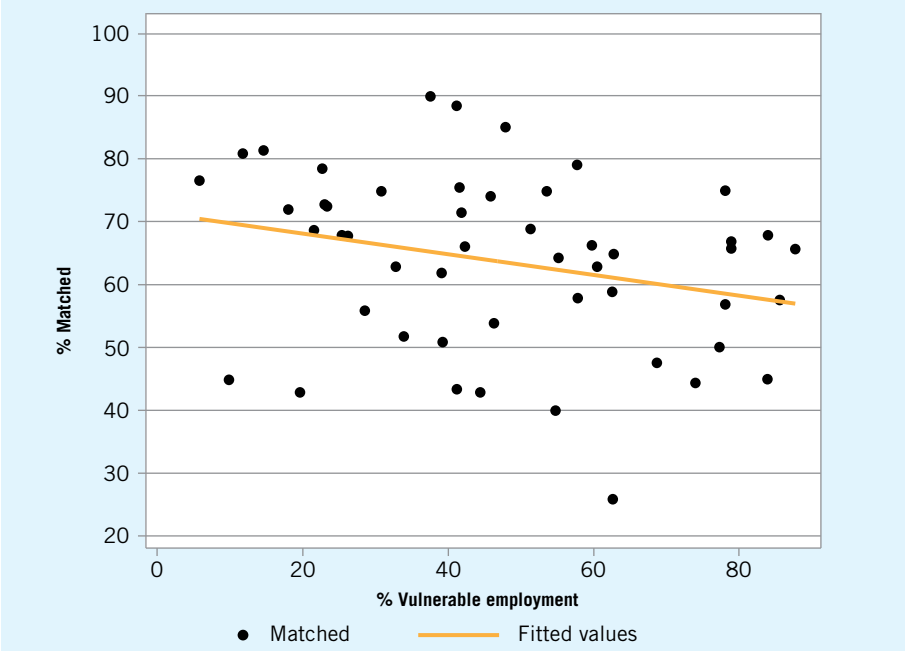
Source: Own calculations.

Figure 6.14 Underqualification against percentage of vulnerable workers



Source: Own calculations.

Figure 6.15 Matched against percentage of vulnerable workers

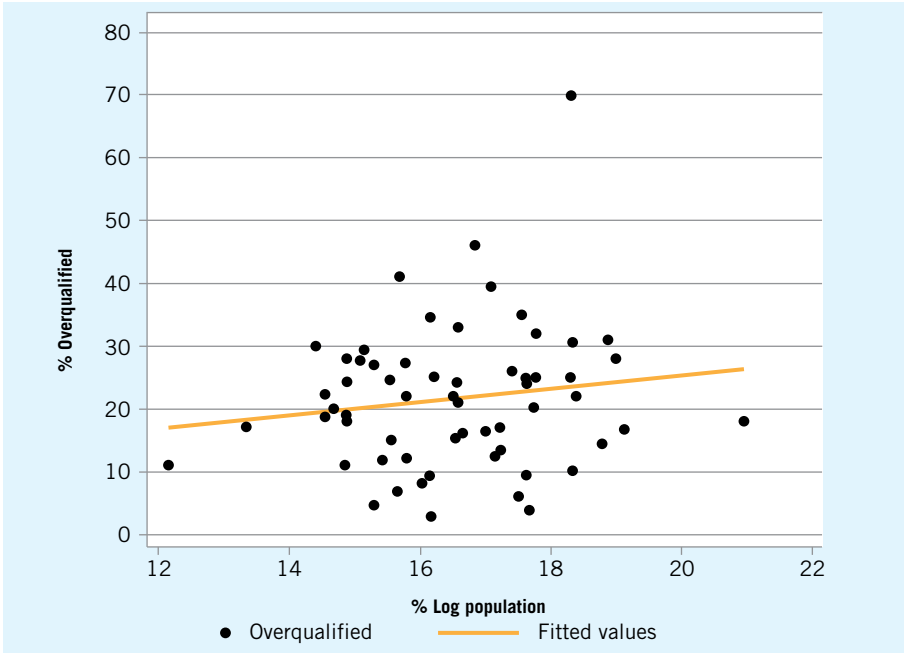


Source: Own calculations.

Population

To assess the importance of demographics, overqualification, underqualification and matched employment are shown against log population in figures 6.16–6.18.[2] While there is a slight positive relationship between overqualification and population, this is primarily driven by one data point which appears to be an outlier. The graphs indicate a positive relationship between population and underqualification and a negative relationship with matched employment.

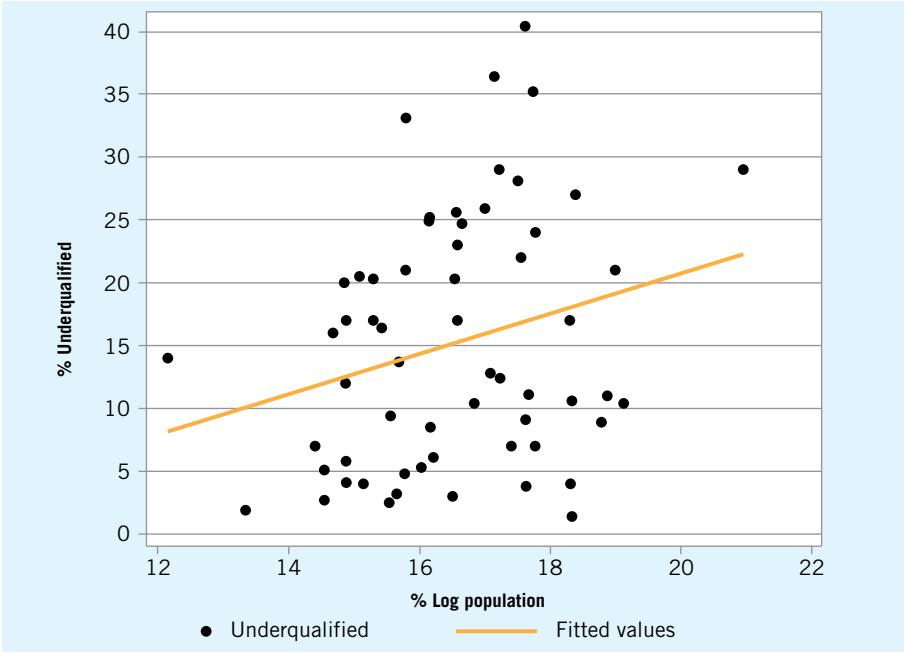
Figure 6.16 Overqualification and log population (percentages)



Source: Own calculations.

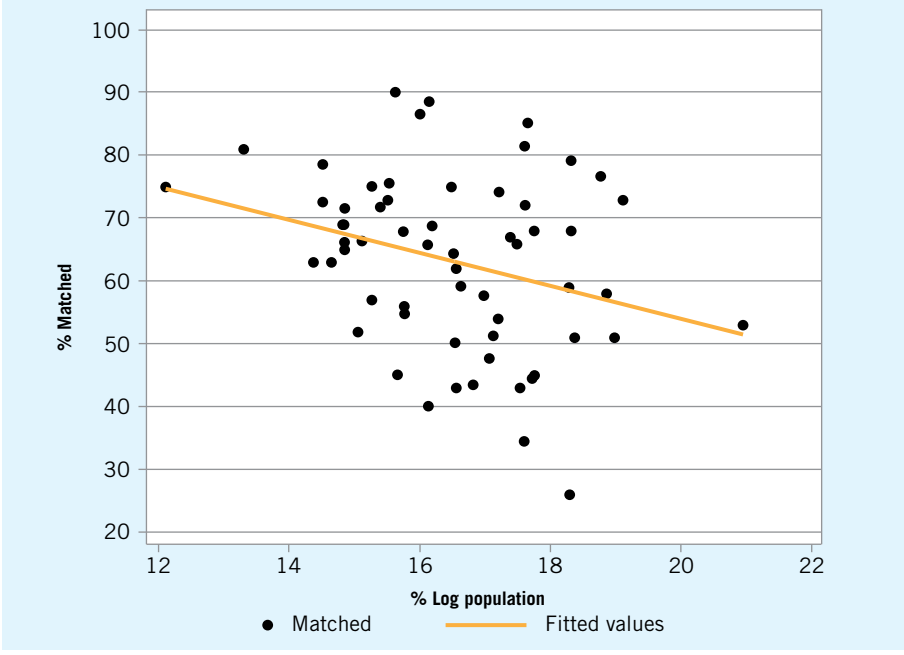
[2] We use log population as this helps to rescale the population since population is a skewed distribution. It also helps to interpret the regression results reported in the results section, since a one-unit increase corresponds to a 1 per cent increase in the population.

Figure 6.17 Underqualification and log population (percentages)



Source: Own calculations.

Figure 6.18 Matched and log population (percentages)

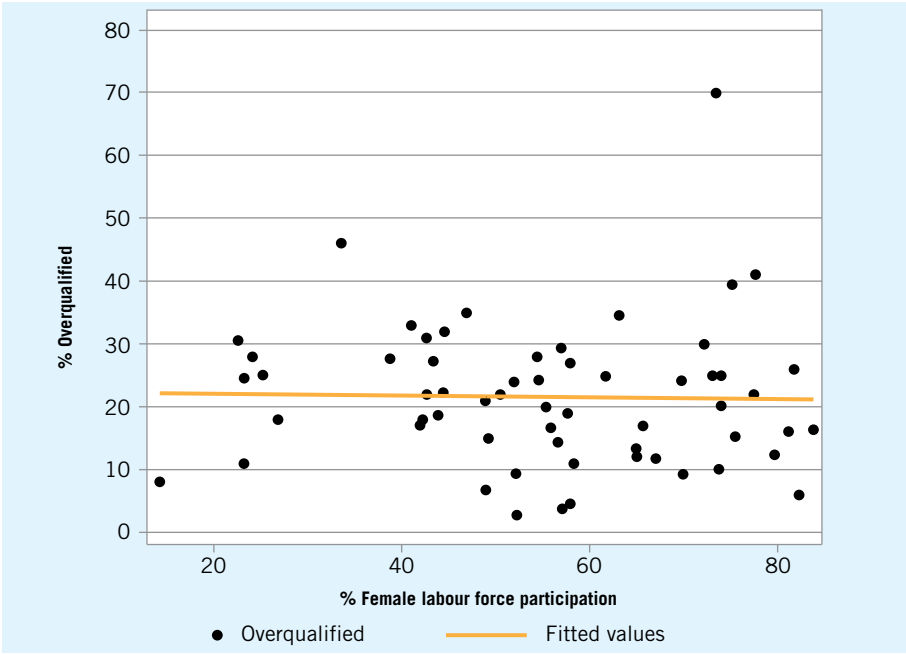


Source: Own calculations.

Female labour force participation

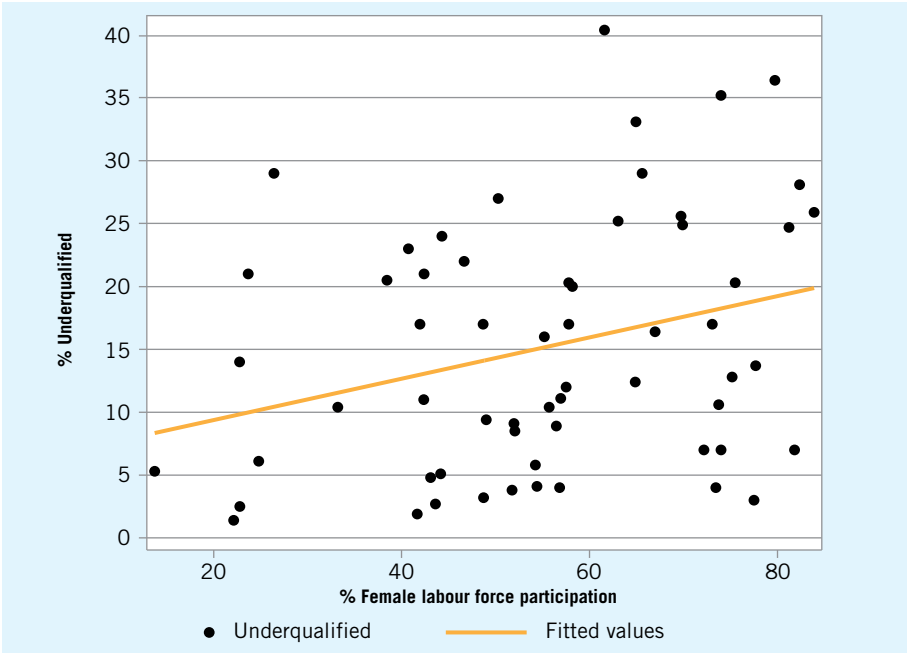
Several previous studies have identified a link between the incidence of mismatch and labour force participation. Overqualification, underqualification and matched employment are shown against female labour force participation rates in figures 6.19–6.21. There appears to be no relationship between overqualification and female participation. However, underqualification increases and matched employment decreases as female participation increases.

Figure 6.19 Overqualification and female labour force participation (percentages)



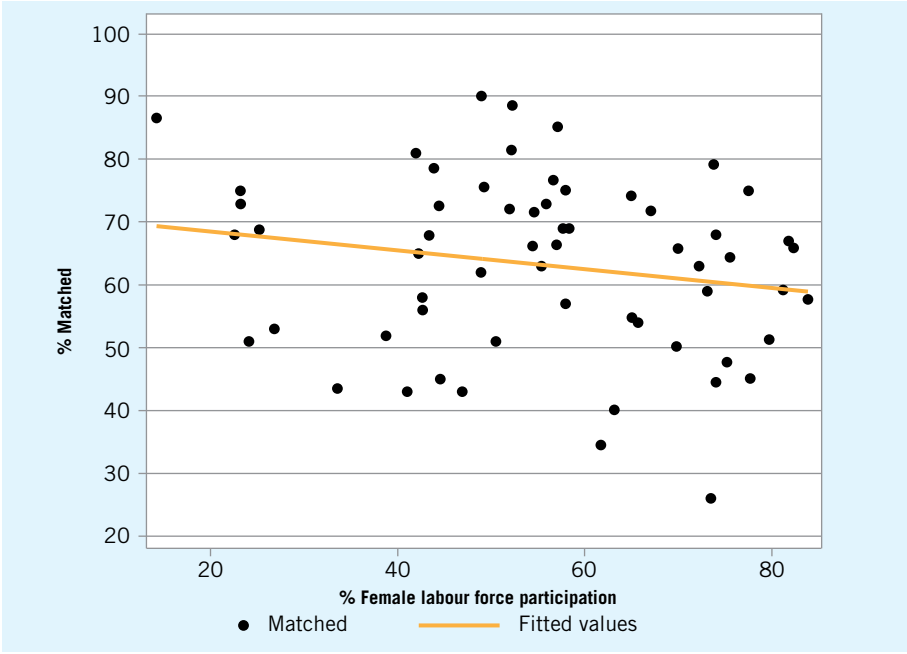
Source: Own calculations.

Figure 6.20 Underqualification and female labour force participation (percentages)



Source: Own calculations.

Figure 6.21 Matched and female labour force participation (percentages)

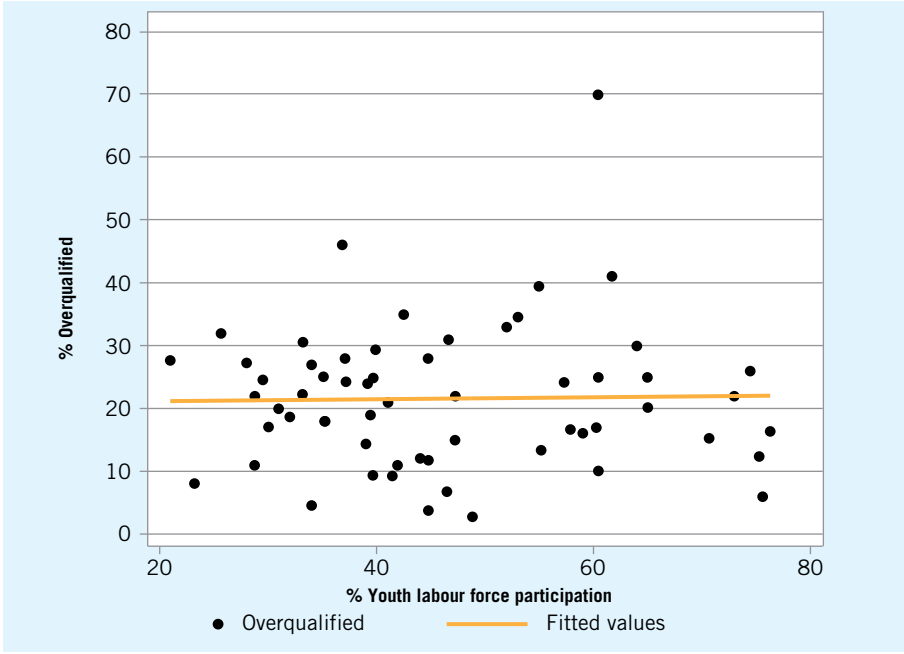


Source: Own calculations.

Youth labour force participation

Overqualification, underqualification and matched employment against youth labour force participation are shown in figures 6.22–6.24. While there is no relationship between overqualification and youth participation, there appears to be a slight positive association between underqualification and youth participation and a negative association with matched employment.

Figure 6.22 Overqualification and youth labour force participation (percentages)

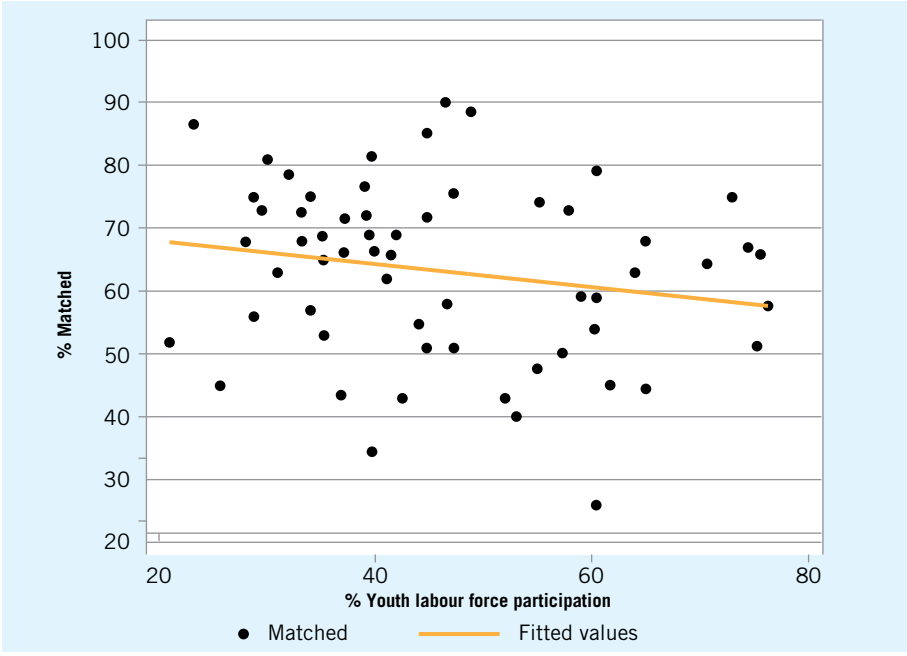


Source: Own calculations.

Figure 6.23 Underqualification and youth labour force participation (percentages)

Source: Own calculations.

Figure 6.24 Matched and youth labour force participation (percentages)



Source: Own calculations.

Income level

Finally, figures 6.25–6.27 show the rates of overqualification, underqualification and matched employment across the three different income classifications. Overqualification is highest for lower middle-income countries, at approximately 25 per cent on average. Underqualification increases in moving from upper middle-income to low-income countries. The average rates of matched employment are virtually identical in low-income and lower middle-income countries, at approximately 60 per cent, while slightly higher in upper middle-income countries, at just under 70 per cent.

Figure 6.25 Overqualification by income level (percentages)

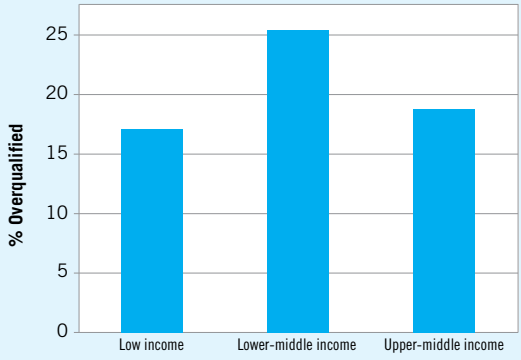


Figure 6.26 Underqualification by income level (percentages)

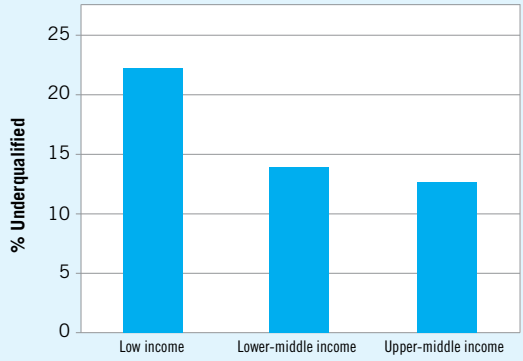
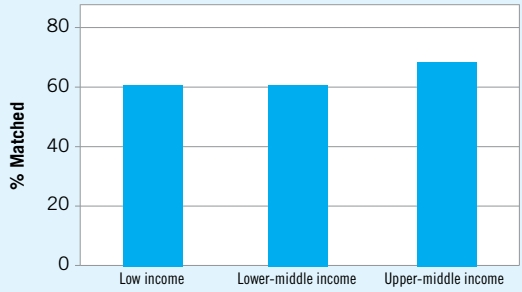


Figure 6.27 Matched by income level (percentages)



Source: Own calculations.

Measurement approach

Figures 6.28–6.30 show the rates of overqualification, underqualification and matched employment for both the subjective and empirical methodology. The two measures do not include the same set of countries: for certain countries there is a subjective estimate but not an empirical estimate. Figures 6.28–6.30 show that the empirical approach, on average, generates slightly higher estimates of overqualification and underqualification.

Figure 6.28 Overqualification by method (percentages)

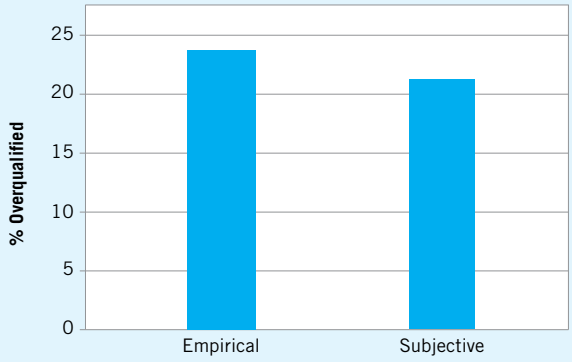


Figure 6.29 Underqualification by method (percentages)

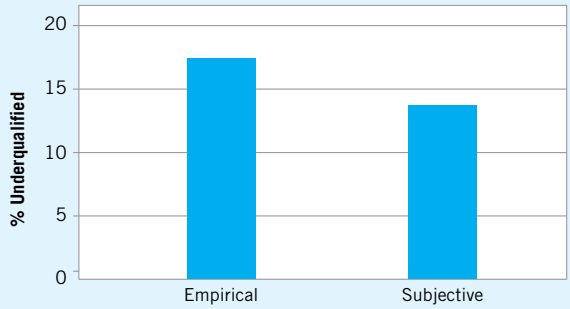
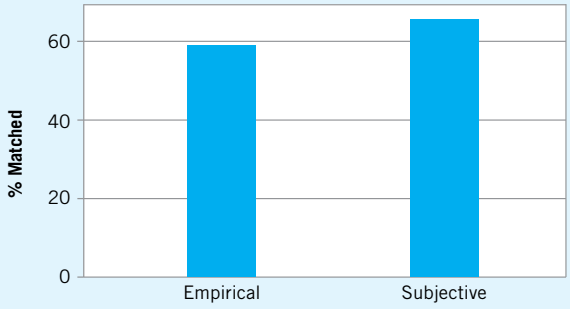


Figure 6.30 Matched by method (percentages)



Source: Own calculations.

6.2 Mismatch and country characteristics: Multivariate analysis

Stepwise regression

The data presented in the previous section provide useful insights into the bivariate relationships between the independent variables and the measures of mismatch, and a multivariate approach helps gauge the significance of these relationships while controlling for other factors. One approach to the multivariate analysis would be to specify a model which includes all of the 11 independent variables. However, given the relatively small sample size and collinearity between certain variables, a stepwise regression approach helps establish which of the key variables are related to each measure of mismatch. Stepwise regression is a method of choosing variables which are most significant in a regression; backward stepwise regression is used, performed in a series of iterative steps. To begin, all of the variables are included in the model and in subsequent iterations but, as the analysis progresses, any variable which is deemed not to be significant, as determined by a model fit criterion, is eliminated. The process stops when only statistically significant variables remain in the model. This cross-sectional approach does not seek to prove causal relationships, merely to identify the most significant patterns in the data. It starts with the following regression:

$$Mismatch_i = \beta_0 + \beta_1 YouthLFP_i + \beta_2 FemaleLFP_i + \beta_3 GDP_i + \beta_4 Population_i + \beta_5 Youth_i + \beta_6 Income_i + \beta_7 Unemployment_i + \beta_8 Year_i + \beta_9 Region_i + \beta_{10} Vulnerable_i + \beta_{11} Wage\&Salary_i + \beta_{12} Subjective_i + \varepsilon_i$$

In this equation the outcome variable, $Mismatch_i$, relates to the percentage of either overqualified, underqualified or matched workers in country i. The independent variables are explained in table 6.1. above which includes all variables in the main analysis and then lets the stepwise regression determine which ones should be retained. Note that the $Region_i$ variable is actually a vector of dummy variables to indicate the region in which country i is located. If South Asia and sub-Saharan Africa are kept in the regression and all other region variables excluded, then the reference categories for the model become East Asia and Pacific, Latin America and Caribbean, Europe and Central Asia, Middle East and North Africa. The variable *Subjective* is a binary variable which equals 1 if the measure of mismatch is constructed using the subjective approach and 0 otherwise.

Results

Data for the *Wage&Salary* and *Vulnerable* variables are missing for 10 of the 60 countries in the sample. To utilize the full sample, analysis begins with all 60 countries but excludes *Wage&Salary* and *Vulnerable* workers as independent variables. Therefore, the variables included in the stepwise regression are the measurement approach (subjective or empirical), log of population, log of GDP per capita, region (defined as a dummy variable with six different regions), year dummies (2012–15), whether the estimate relates only to youth, overall labour force participation, youth

Table 6.2 Stepwise regression of incidence of mismatch

	(1)	(2)	(3)
Variables	**Underqualification**	**Overqualification**	**Matched**
Subjective		0.123***	–0.100**
		(0.034)	(0.045)
Youth		–0.205***	0.198***
		(0.032)	(0.041)
Labour force participation			0.009*
			(0.005)
Female labour force participation			–0.006*
			(0.003)
GDP	–0.027*		
	(0.015)		
Population			–0.028**
			(0.011)
Europe and Central Asia	–0.080***		0.099**
	(0.028)		(0.042)
Middle East and North Africa	–0.123***		
	(0.046)		
Constant	0.411***	0.237***	0.813***
	(0.124)	(0.020)	(0.181)
Observations	60	60	60
R-squared	0.318	0.427	0.443

Note: The reference category for subjective is empirical. For the underqualified model, the reference category is sub-Saharan Africa, South Asia, East Asia and Pacific, Latin America and Caribbean. For the matched model, the reference category for region includes all regions excluding Europe and Central Asia. Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Source: Own calculations.

labour force participation, female labour force participation, whether the country is middle- or low-income, and the unemployment rate. Some of the variables from this initial specification are not included in table 6.2 since they are deemed not significant in the stepwise regression.

For underqualification, the variables which remain significant after performing the stepwise regression are the log of GDP per capita and region. A 1 per cent increase

in GDP per capita is associated with a 2.7 per cent decrease in the national incidence of underqualification. Underqualification is lower in Europe and Central Asia and the Middle East and North Africa, relative to the other geographic regions.

For overqualification, region and log GDP per capita are no longer significant but the measurement approach and whether the estimates are based only on young people are now significant. The estimates of overqualification using a subjective approach are approximately 12 per cent higher than the empirical approach. Estimates of overqualification which focus exclusively on the young (aged 15–29) are about 20 per cent lower than in studies which focus on all workers. This is consistent with McGuinness et al. (2017), who find that underqualification decreases as the percentage of the labour force under 30 years of age increases.

For matched employment, the variables which remain statistically significant after performing stepwise regression are the measurement approach, whether the estimate focuses only on young people, labour force participation, female labour force participation, log of the population and region. Contrary to the findings for overqualification, estimates of matched employment using the subjective approach are 10 per cent lower than the empirical approach. Estimates of matched employment which focus only on young people are almost 20 per cent higher than estimates relating to all workers. A 1 per cent increase in overall labour force participation is associated with a nearly 1 per cent increase in the incidence of matched workers while a 1 per cent increase for female labour force participation results in a 0.6 per cent decrease in matched workers. Countries with a larger population are less likely to have matched employment. A 1 per cent increase in the population is associated with a 2.8 per cent drop in the incidence of matched employment. Europe and Central Asia displays the highest incidence of matched employment, almost 10 per cent higher than the other five regions.

This regression analysis is used as a tool for exploring relationships and associations between variables; in this regard, the stepwise regression analysis is a useful tool. However, there are no claims as to the causal relationships between these variables.

While table 6.2 includes the variables which allow using the full set of 60 observations, it does not include variables relating to the degree of informality. Each of the papers in the synthesis mentions that informality may be a key driver of mismatch in low- and middle-income countries, so it is important to include this variable in the analysis. Unfortunately, information on informality is not available for all countries and so the sample size decreases from 60 to 50 observations. Nevertheless, the findings that emerge from this are informative. In the absence of a direct measure for informality, wage and salary workers are used as a fraction of total workers. It is reasonable to expect that countries with lower percentages of wage and salary workers will also have more informal employment, allowing wage and salary workers to be a proxy variable for informality. An added variable measures the fraction of vulnerable workers in employment, where vulnerable employment includes own account workers and contributing family members. The inclusion of the informality variables leads to an increase in the overall fit of the model (as measured by the R-squared) for both underqualification and overqualification.

Table 6.3 Stepwise regression of incidence of mismatch

	(1)	(2)	(3)
Variables	**Underqualified**	**Overqualified**	**Matched**
Subjective		0.142***	
		(0.036)	
Youth		–0.226***	0.136***
		(0.035)	(0.033)
Female LFP	–0.003**		
	(0.001)		
Log Population	0.016*	0.018**	–0.023**
	(0.009)	(0.008)	(0.011)
Europe and Central Asia	–0.070**		
	(0.030)		
Latin America and Caribbean		–0.064*	
		(0.033)	
Middle East and North Africa	–0.206***		
	(0.071)		
South Asia	–0.149**		
	(0.068)		
Wage & Salary		–0.007*	0.001*
		(0.004)	(0.001)
Vulnerable Workers	0.002**	–0.007*	
	(0.001)	(0.004)	
Constant	–0.009	0.606	0.886***
	(0.140)	(0.372)	(0.185)
Observations	50	50	50
R-squared	0.340	0.536	0.358

Note: The reference category for subjective is empirical. For the underqualified model, the reference category is sub-Saharan Africa, Latin America and Caribbean, and East Asia and Pacific. For the overqualified model, the reference category for region includes all regions excluding Latin America and Caribbean. Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Source: Own calculations.

The results for the specification which includes the additional informality-related variables are shown in table 6.3. The variables which remain statistically significant in the stepwise regression for underqualification are female labour force participation, log of population, region and fraction of vulnerable workers. A 1 per cent increase in female labour force participation is associated with a 0.3 per cent decrease in underqualification, while a 1 per cent increase in the population is

associated with a 1.6 per cent increase in underqualification. Similar to the previous model which does not include informality-related variables, Europe and Central Asia as well as the Middle East and North Africa have lower rates of underqualification relative to sub-Saharan Africa, Latin America and Caribbean, and East Asia and Pacific. Estimates of underqualification for South Asia are also statistically significantly lower compared to these regions. Further, a 1 per cent increase in the fraction of vulnerable workers leads to a 0.2 per cent increase in underqualification. Since vulnerable workers include contributing family members, it may be the case that these individuals obtain employment due to family reasons rather than educational attainment, which could potentially explain the high rates of underqualification.

The variables which remain significant for overqualification are the measurement approach, youth sample, log of population, region, fraction of wage and salary workers and the fraction of vulnerable workers. Estimates of overqualification using the subjective analysis are approximately 14 per cent higher than those using the empirical approach. Estimates which focus only on young workers are approximately 23 per cent lower than those which include all workers. A 1 per cent increase in the population is associated with a 1.8 per cent increase in overqualification. In terms of region, overqualification in Latin America and the Caribbean is lower compared to the others. An increase of 1 per cent in the fraction of wage and salary workers is associated with a 0.7 per cent decrease in overqualification; the same is true of vulnerable workers.

The variables which remain significant in the matched model include youth, log of population, and the percentage of wage and salary workers. Estimates of matched employment in this sample which focus exclusively on young people are almost 14 per cent higher than estimates which include all workers. A 1 per cent increase in the population is associated with a 2.3 per cent decrease in the incidence of matched workers. A 1 per cent increase in the share of wage and salary workers is associated with a 0.1 per cent increase in proportion of matched workers; this is quite small but suggests that countries with higher levels of informality are more likely to have a higher incidence of mismatch.

Summary of main data results

- The results from the bivariate and multivariate analyses highlight relationships between different forms of educational mismatch and certain key labour market and macroeconomic variables. Specifically, the multivariate analysis shows that GDP is negatively related to underqualification. While not statistically significant in the stepwise regression, the bivariate analysis also suggests a positive relationship between GDP and matched employment. This is consistent with the findings of McGuinness et al. (2017).
- There also appears to be substantial variation in the rates of mismatch across regions. The Middle East and North Africa has a substantially lower rate of underqualification than any of the other five regions. Europe and Central Asia also has a relatively low rate of underqualification. Overqualification is shown to be relatively low in Latin America and the Caribbean.

- Population also appears to be related to mismatch in both the bivariate and multivariate analyses. There is a positive relationship between population size and both over- and underqualification: larger population is associated with lower rates of matched employment.
- The stepwise regression analysis indicates that an increase in labour force participation is associated with an increase in matched employment. However, an increase in female labour force participation, controlling for overall labour force participation, is associated with lower rates of matched employment.
- Estimates of overqualification which focus exclusively on young people are lower than estimates which include all workers. Estimates of matched employment for the young are higher than those which include all workers.
- With regard to the measurement approach, the estimates of over- and underqualification using the empirical approach, as shown in the bivariate analysis, are higher on average than the subjective estimates. However, in the multivariate analysis controlled for other factors, such as region, informality and population, the subjective estimates are higher than the empirical estimates, controlling for other factors. This suggests that studies which use the subjective measure may result in higher levels of mismatch.
- Finally, with the informality-related variables, an increase in the proportion of wage and salary workers is associated with lower overqualification and higher matched employment. An increase in the proportion of vulnerable workers is associated with high underqualification and lower overqualification.

6.3 Summary of findings from previous chapters

This section begins with a brief recap of the three different measurement approaches used in Chapters 3, 4 and 5. It then summarizes the three central outputs in each of the three chapters before identifying common trends.

Measurement approaches

As discussed in section 2.1 of Chapter 2, educational mismatch can be measured in a number of different ways, with the approach often determined by data availability. Three measurement approaches were used in this book: the subjective method (used in Chapters 4 and 5), the empirical method (used in Chapter 3) and the normative method (used in Chapter 5). Chapter 5 uses both subjective and normative approaches but concedes that within the study the subjective measure is more suitable to cross-country analysis. For this reason, the summary of Chapter 5 focuses on the patterns and relationships that are revealed in that chapter using the subjective measure.

Main findings from Chapter 3

Chapter 3 seeks to replicate the approach adopted in an earlier European study by McGuinness et al. (2016) by using national LFS data to examine the incidence,

evolution and causes of overqualification and underqualification in low- and middle-income countries. The study begins by assessing the quality of data from labour force surveys for over 50 countries, and finds that only 20 of these surveys were assessed to be of sufficient quality to allow effective measurement of overqualification and underqualification rates at a point in time. Of the 20 surveys, ten had sufficient data to allow the authors to study trends in educational mismatch over time and model the drivers of overqualification, underqualification and matched employment.

The cross-sectional evidence, based on the 20 labour force surveys, covers a mix of both low- and middle-income countries; however, the subset of ten counties with consistent time series data were exclusively middle-income. The sample was restricted to adult employees. Overqualification was measured using an empirical approach whereby an individual was defined as overqualified (underqualified) if their level of attained education was above (below) the modal value for their 2-digit occupation. Country level averages were then calculated based on how individuals were assigned (overqualified, underqualified or matched) in the microdata. The average overqualification and underqualification rates were 24 and 17 per cent, respectively. The average overqualification rate is in line with the incidence of 24 per cent reported for mainly high-income countries (Chapter 2) but the underqualification rate is above the 11 per cent European average. Consistent with the other findings (Chapter 5), higher overqualification does not necessarily imply lower underqualification; several of the countries which exhibited some of the highest rates of underqualification, were also some of the worst performers with respect to overqualification. Relative to developed economies, overqualified workers in low- and middle-income countries were also more likely to be educated to post-secondary level and less likely to be graduates. Conversely, underqualified workers were more likely to have no or primary level education compared to their counterparts in high-income countries. Access to education and its quality are major issues influencing educational attainment in many low- and middle-income countries.

In terms of the longitudinal evidence from the ten middle-income countries, overqualification was generally observed to be decreasing while underqualification has been on the rise, confirming the view that the latter is a much bigger issue in developing labour markets compared to high-income countries. Analysis of the causes of overqualification, underqualification and matched employment for these ten countries used a fixed effects panel model. Unemployment and overqualification were found to be interrelated. The results also show that overqualification is positively related to high levels of self-employment and a higher labour market share of younger workers. Conversely, overqualification was found to be negatively related to the participation rate. The separate model estimates by gender showed that while an increase in per capita GDP reduced overqualification among females, it was found to reduce underqualification among males. In both cases, matched employment increased as a result of a rise in per capita GDP, if for different reasons. Wage equations were estimated for 11 low- and middle-income countries that had sufficient data, with results indicating large overqualification penalties, averaging

29 per cent, in nine of the sample countries.[3] Underqualification was also found to have substantial positive wage impacts in nine countries, with underqualified workers receiving an average premium of 19 per cent relative to their well-matched counterparts with similar levels of schooling.

Main findings from Chapter 4

Chapter 4 examines data from 12 low- and middle-income countries using the World Bank's STEP survey. The STEP is a household survey of 15–64 year-olds collected during 2012 and 2014. It is important to note that the survey was restricted to urban areas and so will not be fully representative at the national level. The study reports the incidence of over- and underqualification at country level, before measuring the impact of mismatch on wages and life satisfaction. Overqualification is measured subjectively across both employees and own-account workers: it was found to range from 70 per cent in Viet Nam to just over 20 per cent in North Macedonia, Kenya and Ukraine. Underqualification was reported to range from 40 per cent in Kenya to around 4 per cent in Viet Nam, Georgia and Ukraine.[4] The average of over- and underqualification in the STEP sample was 35.7 and 12.4 per cent respectively; these compare to subjective averages of 24.2 and 11 per cent reported in Chapter 2 based on a literature review of studies of mainly developed countries. While it must be recognized that the two sets of averages are not fully comparable,[5] the analysis suggests that the average rate of overqualification is even higher in low- and middle-income countries relative to what is observed in advanced labour markets. This may be due to a large share of jobs in low- and middle-income countries requiring low levels of skill; even individuals with basic levels of education may see themselves as overqualified in menial jobs, contrary to the findings in Chapter 3. The average incidences of underqualification appear to be more broadly comparable across developed and developing labour markets. In terms of the impact of mismatch on earnings, the findings were consistent with those for developed economies. Overqualification was found to lower earnings by an average of 19 per cent among employees, a figure consistent with but higher than the 13.5 per cent average reported for developed economies in Chapter 2. The average pay penalty among self-employed workers in the STEP sample was somewhat higher, at 23 per cent. Overqualification wage penalties of varying magnitudes were found in 11 of the 12 STEP countries, Lao PDR being the only country where no impacts were detected. As is generally the case for advanced economies, there was little evidence of wage impacts associated with underqualification. Underqualified workers who were self-employed were found to earn a

[3] There was not a direct match between the countries exhibiting an overqualification pay penalty and those where an underqualification pay premium was found.

[4] The incidence of overqualification was higher than that of underqualification in all countries except Kenya.

[5] The studies reviewed in Chapter 2 generally focused on employees, whereas Chapter 4 estimates the incidence for all workers.

wage premium in Ghana though, unusually, underqualification was found to be associated with wage penalties among employees in Kenya and Lao PDR.[6]

Chapter 4 also assessed the impacts of educational mismatch on life satisfaction which is likely to be correlated with job satisfaction. The results were, again, broadly consistent with the evidence for advanced economies, with the finding of widespread negative impacts on life satisfaction for overqualification and little or no relationship between underqualification and satisfaction. In line with the existing literature, impacts were largely restricted to employees, but overqualified self-employed workers in Georgia, Ukraine and North Macedonia were also found to have lower rates of life satisfaction. As was the case for wages, the magnitude of impacts is much larger in the STEP sample, with overqualified employees almost 40 per cent less likely to report life satisfaction relative to their well-matched counterparts. This is much more substantial than the impacts found for advanced economies where the marginal effect of overqualification on job satisfaction is typically much lower than that of other forms of mismatch such as overskilling.[7] Overqualification was found to have no impact on life satisfaction in Ghana and Yunnan Province, China.

In addition to examining the impacts of educational mismatch on earnings and job satisfaction, Chapter 4 also examines the relationship between labour market informality, job search methods and levels of mismatch. Informality was identified as a key characteristic of developing labour markets, one likely to impact on decisions to accept mismatched employment. The STEP study examines attitudes to informality and reports that approximately 40 per cent of respondents indicated that they would be willing to take informal jobs (those that do not offer social security benefits) mainly because individuals had no choice other than to accept. The measure of informality used in the analysis was the existence of a formal written agreement between the worker and the employer. Where contracts were in place, the probability of overqualification was reduced in five of the ten STEP countries for which it was tested. The informality measure was found to increase the odds of underqualification in Viet Nam. Finally, Chapter 4 examines the impact of job search on mismatch and finds that the use of formal agencies reduces the probability of overqualification in seven of the ten STEP countries. The impacts of job search on underqualification are less pronounced.

Main findings from Chapter 5

The research uses data from the ILO's SWTS which has information on 15–29-year-olds in 34 low- and middle-income countries.[8] The research is distinct from that based

[6] Where wage impacts are detected for underqualification, these typically take the form of wage premiums.

[7] This describes the situation whereby a worker reports that their skills and abilities (as opposed to education) exceed the requirements of the job.

[8] The countries included in the study are: Armenia, Bangladesh, Benin, Brazil, Cambodia, Colombia, Congo, Dominican Republic, Egypt, El Salvador, Jamaica, Jordan, Kyrgyzstan, Lebanon, Liberia, North Macedonia, Madagascar, Malawi, Republic of Moldova, Montenegro, Nepal, Occupied Palestinian Territory, Peru, Russian Federation, Samoa, Serbia, Sierra Leone, United Republic of Tanzania, Togo, Tunisia, Uganda, Ukraine, Viet Nam, Zambia.

on the STEP data (Chapter 4) and the LFS data (Chapter 3) because it focuses on mismatch among young people in the labour market. With respect to subjective overqualification rates, the incidence for employees and own-account workers is calculated separately. Taking the averages of the 31 countries reporting rates of overqualification among young employees, the average rate of overqualification was 15.3 per cent, with the corresponding rate for underqualification 14.1 per cent. The estimated averages for young, own-account workers are 18.1 and 16.8 per cent respectively. The underqualification rate is above the overqualification rate in 24 out of 34 countries. This contrasts with the results reported in Chapter 4, where the overqualification rate exceeded that for underqualification in all but one country. However, it should be noted that the SWTS data used focus only on young people (aged 15–29), which may explain the relatively high rate of underqualification and low rate of overqualification.

While the average incidence of underqualification is slightly above the figure reported in Chapter 4, the average overqualification rates are well below the mean overqualification value of 35.7 per cent reported in Chapter 4 using the STEP data. The finding of lower overqualification rates among younger workers is consistent with some European evidence (McGuinness et al., 2017a) although intuitively one might assume higher levels of overqualification amongst youth due to generally rising levels of educational attainment. When countries are grouped by region or income level, large variations in the incidence of total mismatch (overqualification + underqualification) become apparent, driven mainly by high levels of underqualification. For instance, in sub-Saharan Africa and Southern Asia, over 45 per cent of employees are mismatched due to the relatively high underqualification rates of 30 per cent or above.

When the determinants of educational mismatch among young people are assessed within a multivariate framework, a number of findings emerge. Overqualification was found to increase with age, the magnitude of the effect declining as one gets older, while underqualification was more common among older workers in the data set. The level of educational attainment raised the probability of overqualification and lowered the likelihood of underqualification and there was also limited evidence that mismatched workers are more likely to come from poor families. While de jure and de facto informal employment was found to be consistently related to higher levels of overqualification,[9] the relationship with underqualification was found to be less consistent. Somewhat counterintuitively, the study also found that previous episodes of training tended to lower the likelihood of overqualification and raise the probability of underqualification. One possible reason is that the amount or quality of training provided is not sufficient to cover existing knowledge and skills gaps among young employees although it is more likely that those individuals who are most underqualified are the ones who receive training, while those with relatively higher qualifications do not receive training.

[9] De jure informal employment refers to employment on the basis of an oral agreement, both in the formal and informal sectors. De facto informal employment is defined as employment on the basis of a written contract in the formal sector but without access to paid annual leave, paid sick leave or social security contribution.

Factors such as temporary employment status, overtime and underemployment raised the likelihood of both forms of mismatch, while working in the public sector lowered it. The importance of country-specific factors within a pooled model was tested in Chapter 5 and found overqualification to be higher in countries with higher productivity growth, share of agricultural employment, unemployment rate, employment rigidity and general enrolment to secondary education ratio. Underqualification was found to be higher in low-income countries and those with higher rates of productivity growth and employment rigidity. In line with the results from STEP (Chapter 4), overqualification was also found to lower earnings; however, at 6.3 per cent, the average overqualification pay penalty experienced by young people appears to be considerably below the economy-wide average. Consistent with the STEP data, underqualification was found to have no impact on earnings. In terms of job satisfaction among young workers, overqualified workers had a lower rate of job satisfaction while underqualification was found to increase it. Both over- and underqualification increase respondents' desire to change jobs, reinforcing the view that mismatch (and particularly overqualification) is viewed as an adverse employment state.

Common trends identified in low- and middle-income countries

Caution must be exercised when attempting to identify common trends from the previous studies for several reasons. First, the selection of countries is ad hoc and based largely on data availability; the evidence is not necessarily representative in either a spatial or economic development sense. Second, the samples and methods adopted to measure mismatch vary across the studies and each data set relates to different time periods. Nevertheless, bearing in mind these caveats, the following common factors emerge consistently across studies:

- Both overqualification and underqualification are common features of low- and middle-income labour markets.
- The incidences of underqualification and, to a lesser degree, overqualification (Chapter 4 results only) in low- and middle-income countries are, on average, higher than those observed in advanced labour markets.
- The modal level of education by occupational group in developing countries is lower than in developed countries. Underqualified workers are more concentrated among individuals with very low levels of education relative to what is observed in developed labour markets.
- Overqualification and underqualification are not directly opposite or symmetrical concepts; they can move in different directions and are driven by distinct influences.
- Underqualification appears to be a much bigger issue in developing labour markets compared to high-income countries.
- Overqualification is found consistently to lower earnings in low- and middle-income countries, with penalties generally higher than what is observed in developed economies. The evidence with respect to underqualification is more

mixed; on balance, where pay impacts are observed these generally take the form of wage premiums.

- Overqualification is found consistently and adversely to impact job and life satisfaction in low- and middle-income countries.
- All data analyses point to the relatively high level of informality as a key driver of educational mismatch in low- and middle-income labour markets.
- Poor job quality is also identified as a common feature of mismatch in low- and middle-income countries.

6.4 Conclusion and policy recommendations

Although the goal of this book was to consider skills mismatch in low- and middle-income countries in all its forms discussed in Chapter 2, because of the lack of available data, the research presented has only covered overqualification and underqualification. While Chapters 3 to 5 examine the situation in different countries and relate to different time periods and sample populations, a number of key trends were identified. Overqualification and underqualification are problematic for both developed and developing economies, with overqualification consistently imposing very significant wage costs on affected individuals as well as lowering levels of life and job satisfaction. In line with research for developed countries, factors such as the level of per capita GDP, the unemployment rate, and participation rates were found to be important in explaining differences in international rates of educational mismatch. The meta-analysis has also demonstrated the existence of important regional differences, with underqualification being a particular problem for countries in South-East Asia and sub-Saharan Africa compared with overqualification in North Africa.

However, there are a number of key differences in both the nature and determinants of educational mismatch between developed and developing labour markets. In developing economies, both overqualification and underqualification are more common among individuals with lower levels of schooling. Insufficient access to education and training causes underqualification among those with little or no schooling. To cope with such a situation, underqualification results in lowered skill requirements for available higher-skill jobs. At the same time, overqualification among those with sub-tertiary education is a reflection of the scarce availability of better-quality skill-intensive jobs.

In contrast to developed labour markets, which are characterized by high rates of educational attainment, the much lower levels of basic and intermediary level education in low- and middle-income countries have resulted in higher levels of underqualification; this makes underqualification much more of a policy concern relative to advanced economies.

Further, both the individual studies and the meta-analysis confirm that levels of informality are a key component in understanding the process by which individuals become mismatched in developing economies. It is not surprising to find high rates of overqualification in labour markets where formal employment opportunities are relatively scarce.

In terms of overqualification, it is clear from the evidence presented here that underutilization of human capital is an issue in developed and developing economies alike. There are strong grounds for believing that substantial benefits would accrue to individuals, firms and the economies should policy interventions in this area prove successful. It is important that policy continues to focus on tackling the issue of skill shortages and skill gaps; however, a greater balance needs to be struck between policies aimed at improving the productive capacity of human capital and those that remove constraints for its better utilization.

Furthermore, the policy debate requires greater clarity in the form of mismatch to be addressed, and the interdependence of various forms of mismatch should also be understood. Policy measures designed to address one form of mismatch may well have spillover effects on other related forms. For instance, policy responses to vertical mismatch are likely to impact simultaneously both overqualification and overskilling, and policy spillover effects are likely to be strong.

The central policy responses necessary to address each respective problem will tend to differ. Policies aimed at reducing underqualification will tend to focus on improving access to education and incentivize both workers and employers to engage in and provide training. Such policies will tend not to resolve overqualification mismatch. However, policy initiatives targeted at overqualification, such as matching labour supply with demand, labour mobility and reducing information asymmetries, may also influence rates of underqualification.

There appears to be misalignment between the existing evidence demonstrating the costs associated with surplus human capital, and the direction of skills and labour market policies. The reasons for such policy inertia are unclear but possibilities can be suggested. Supply-side measures are easier to implement and might be more popular in a political discourse. In addition, policy-makers may not view overqualification or overskilling as being overly problematic, viewing it simply as a short-term phenomenon despite convincing evidence to the contrary.

The usual set of policies that address skills mismatch tend to concentrate on developing initiatives aimed at enhancing the responsiveness of the education and training system to emerging labour market needs, thus more directly addressing the forms of mismatch known as skill gaps and shortages. Approaches adopted in the pursuit of this goal include assessment of current and future skill needs through the use of occupational forecasting models, the use of sectoral or occupational analyses, and may also involve improving labour market information systems and career guidance and counselling services. Without doubting the value of such policy initiatives and their potential positive effect on all forms of skills mismatch, on balance, currently policies do not deal sufficiently with the problem of surplus human capital – overqualification and low skills utilization. On the contrary, the discussion about skill gaps and shortages often makes the case for the argument about growing demand for higher-level skills and calls for greater investment in education and training. While it may be useful for countries with high rates of underqualification/underskilling, for many developing and advanced economies where overqualification is already very high, without adequate demand-side measures,

such an approach would further decrease returns on investments in training, both public and private.

Given this, and taking into account the findings from the analysis presented in this book on the patterns and determinants of education mismatch in low- and middle-income countries, a greater balance in the mix of the following policy measures can be argued for:

- Improve access to secondary education and technical and vocational education and training (TVET) in low-income developing countries, because low educational attainment results in widespread underqualification and low potential for productivity growth and economic diversification. The main three challenges of secondary education in developing countries are increasing participation, improving learning and enhancing relevance (Null et al., 2017). To increase school enrolment and attendance, it is important not only to develop the school system, but also to overcome financial and non-financial barriers to school attendance. Conditional cash transfers that provide support to poor families are found to have a positive effect on child nutrition, health, school enrolment and attendance of children from disadvantaged households (ibid.; WEF, 2014). Continued expansion of online courses and other forms of distance learning should be pursued, as should increasing access of households to computers and the Internet along with training in basic digital skills. It is also useful to change perceptions of children and their parents on the value of secondary education and TVET to boost participation and learning outcomes (Null et al., 2017). Given the large number of children leaving secondary school without basic skills, remedial education can raise completion rates and develop the foundational skills needed for work.
- Develop career guidance and labour market information systems to guide career choices of young people at both secondary and tertiary level, reduce job search costs and improve job matching, as information asymmetries have also been shown to be an important driver of skills mismatch in developed countries (McGuinness et al., 2016). Improving the information flow between jobseekers, employers offering jobs and the institutions offering education and training will help reduce existing qualification and skills mismatches and youth unemployment.
- Encourage employers to adopt better recruitment practices, provide on-the-job training and better utilize the skills of their employees in the workplace. This can be partly achieved by providing incentives to encourage innovation through enhanced skills use and human resource management practices and by providing incentives and programmes that promote investment by employers in further training of workers, especially young graduates without prior work experience.
- Attract investments to diversify economy and create technologically advanced skill-intensive jobs to utilize human capital to its full productive potential and improve the quality and stability of jobs in the private sector, especially in micro and small enterprises. Skills development alone is not enough to

generate economic growth in these low- and middle-income countries; it is also necessary to support creation of higher skilled jobs to take advantage of the capabilities of high-skilled workers. This calls for creating a business environment conducive to domestic and foreign investment, innovation and private sector development. Policy interventions need to take a holistic approach by addressing the key barriers to doing business in developing and emerging countries, such as macroeconomic and political instability, red tape, weak rule of law, widespread informal practices and corruption, and limited access to finance and land. Demand-side measures should also target macroeconomic, fiscal and industrial policies with a strong pro-employment growth and job quality component. Global partnerships and support from international organizations are important for developing practical approaches to tackling the jobs agenda in low- and middle-income countries.

- Tackle informal employment and supporting the smooth transition of young workers to the formal sector. Taking into account that a large proportion of young people in low-and middle-income countries start their working life in lower-skilled jobs in the informal sector, it is important to devise policy measures to break young workers out of the informal employment and mismatch trap. Policies focused on enhancing formal job creation are likely to prove influential in combating both the incidence and impacts of overqualification and underqualification in low- and middle-income countries.
- Given the fact that the prevalence of underqualification can partly be explained by the lack of certification amongst skilled individuals, particularly in the informal economy, greater policy attention should be given to the recognition or validation of prior learning, so that the skills people hold can be appropriately recognized and so that better matched employment can be made.
- Improve the quality and relevance of all levels of education, especially of tertiary education, in middle-income countries, as overqualification in these countries often stems from a rapid growth in college and university graduates who have diplomas but lack the necessary skills to find better matched jobs. It is important to align education and training with the current and future needs of the labour market to ensure high levels and relevance of skills acquired by students in the formal system of education. An important step to increase the relevance of TVET and tertiary education is to engage employers, sector councils or economic chambers in closer and more effective cooperation with education institutions.

Finally, a much greater amount of data and research is required before reaching the point where definitive policy initiatives can be developed to counteract the causes and consequences of skill mismatches in low- and middle-income countries. The studies discussed here provide only a partial view of the situation as they relate to a subset of countries, regions and labour market populations and examine just one form of skills mismatch. There is a need for more consistent and standardized collection and

publication of national labour force surveys to aid more comprehensive international comparisons. Development of survey tools such as STEP or SWTS, covering more countries and regions and collecting information of other forms of skills mismatch regularly, such as overskilling and underskilling, skill gaps, skill shortages or skill obsolescence, is also a necessary requirement if future policy is to be properly informed.

References

McGuinness, S.; Bergin, A.; Whelan, A. 2017. *Overeducation in Europe: Trends, convergence and drivers*, IZA Discussion Paper No. 10678 (Bonn, Institute of Labor Economics).

–; Whelan, A.; Bergin, A. 2016. "Is there a role for higher education institutions in improving the quality of first employment?", in *The BE Journal of Economic Analysis & Policy,* Vol. 16, No. 4, pp. 1–15.

Null, C.; Cosentino, C.; Sridharan, S.; Meyer, L. 2017. *Policies and programs to improve secondary education in developing countries: A review of the evidence*, Mathematica Policy Research, available at: https://static1.squarespace.com/static/5593ebbce4b016944c16f3c6/t/58dee5631b631bf0ffc9792d/1491002724866/PSIPSE+Literature+Review.pdf.

WEF (World Economic Forum). 2014. *Matching skills and labour market needs. Building social partnerships for better skills and better jobs* (Geneva).

Annex 6.1 Tables

Table A.6.1 Summary of observations

Country	Over	Under	Matched	Income status	Method	Youth / Adults	Salaried workers	GDP per capita	Unemployment	LFP	LFP (female)
Albania	0.18	0.17	0.65	UMI	E	-	0.3566	10369.76	0.13438	0.52116	0.4224
Argentina	0.35	0.22	0.43	UMI	E	-	0.7615	19224.87	0.07217	0.6062	0.46905
Armenia	0.217	0.087	0.696	LMI	JA	15–29	0.5719	7971.118	0.176	0.63042	0.54589
Armenia	0.093	0.024	0.883	LMI	JA	15–29	0.5719	7971.118	0.176	0.63042	0.54589
Armenia	0.28	0.058	0.662	LMI	S	15–64	0.5719	7727.929	0.162	0.62909	0.54424
Armenia	0.243	0.041	0.716	LMI	S	15–29	0.5719	7971.118	0.176	0.63042	0.54589
Armenia	0.185	0.044	0.771	LMI	S	15–29	0.5719	7971.118	0.176	0.63042	0.54589
Bangladesh	0.31	0.11	0.58	LMI	E	-	0.2941	2835.767	0.0426	0.62074	0.4264
Bangladesh	0.029	0.628	0.344	LMI	JA	15–29	0.2941	2835.767	0.0426	0.62074	0.4264
Bangladesh	0.021	0.604	0.376	LMI	JA	15–29	0.2941	2835.767	0.0426	0.62074	0.4264
Benin	0.124	0.612	0.264	LI	JA	15–29	0.081	2001.129	0.01043	0.71648	0.69964
Benin	0.013	0.814	0.173	LI	JA	15–29	0.081	2001.129	0.01043	0.71648	0.69964
Benin	0.093	0.249	0.658	LI	S	15–29	0.081	2001.129	0.01043	0.71648	0.69964
Benin	0.091	0.437	0.472	LI	S	15–29	0.081	2001.129	0.01043	0.71648	0.69964
Bolivia, Plurinat. State of	0.346	0.252	0.401	LMI	S	15–64	0.3894	6090.696	0.0289	0.72764	0.63159
Brazil	0.177	0.208	0.615	UMI	JA	15–29	0.6867	15430.27	0.07132	0.67081	0.55881
Brazil	0.089	0.376	0.535	UMI	JA	15–29	0.6867	15430.27	0.07132	0.67081	0.55881
Brazil	0.167	0.104	0.729	UMI	S	15–29	0.6867	15430.27	0.07132	0.67081	0.55881

Table A.6.1 Summary of observations *(cont.)*

Country	Over	Under	Matched	Income status	Method	Youth/ Adults	Salaried workers	GDP per capita	Unemployment	LFP	LFP (female)
Brazil	0.174	0.102	0.725	UMI	S	15–29	0.6867	15430.27	0.07132	0.67081	0.55881
Cambodia	0.22	0.03	0.75	LMI	E	-	0.4603	2807.007	0.002	0.82121	0.77502
Cambodia	0.102	0.365	0.533	LMI	JA	15–29	0.444	3124.319	0.001	0.80815	0.75519
Cambodia	0.022	0.546	0.432	LMI	JA	15–29	0.444	3124.319	0.001	0.80815	0.75519
Cambodia	0.153	0.203	0.644	LMI	S	15–29	0.444	3124.319	0.001	0.80815	0.75519
Cambodia	0.147	0.157	0.696	LMI	S	15–29	0.444	3124.319	0.001	0.80815	0.75519
Colombia	0.217	0.208	0.575	UMI	JA	15–29	0.4741	12296.3	0.09696	0.68186	0.57102
Colombia	0.228	0.16	0.612	UMI	JA	15–29	0.4741	12296.3	0.09696	0.68186	0.57102
Colombia	0.038	0.111	0.852	UMI	S	15–29	0.4741	12296.3	0.09696	0.68186	0.57102
Colombia	0.078	0.138	0.785	UMI	S	15–29	0.4741	12296.3	0.09696	0.68186	0.57102
Congo	0.051	0.61	0.339	LMI	JA	15–29	-	5542.894	0.10618	0.69827	0.67062
Congo	0.031	0.844	0.125	LMI	JA	15–29	-	5542.894	0.10618	0.69827	0.67062
Congo	0.118	0.164	0.718	LMI	S	15–29	-	5542.894	0.10618	0.69827	0.67062
Congo	0.224	0.321	0.456	LMI	S	15–29	-	5542.894	0.10618	0.69827	0.67062
Dominican Rep.	0.168	0.289	0.543	UMI	JA	15–29	0.5555	13371.52	0.14397	0.65309	0.52259
Dominican Rep.	0.142	0.459	0.399	UMI	JA	15–29	0.5555	13371.52	0.14397	0.65309	0.52259
Dominican Rep.	0.028	0.085	0.886	UMI	S	15–29	0.5555	13371.52	0.14397	0.65309	0.52259
Dominican Rep.	0.142	0.088	0.77	UMI	S	15–29	0.5555	13371.52	0.14397	0.65309	0.52259

Table A.6.1 Summary of observations *(cont.)*

Country	Over	Under	Matched	Income status	Method	Youth/ Adults	Salaried workers	GDP per capita	Unemployment	LFP	LFP (female)
Ecuador	0.21	0.17	0.62	UMI	E	-	0.57	10922.83	0.038	0.64114	0.48907
Egypt	0.119	0.418	0.463	LMI	JA	15–29	0.6083	9879.799	0.1317	0.49262	0.22578
Egypt	0.145	0.353	0.501	LMI	JA	15–29	0.6083	9879.799	0.1317	0.49262	0.22578
Egypt	0.306	0.014	0.68	LMI	S	15–29	0.6083	9879.799	0.1317	0.49262	0.22578
Egypt	0.398	0.012	0.59	LMI	S	15–29	0.6083	9879.799	0.1317	0.49262	0.22578
El Salvador	0.096	0.312	0.592	LMI	JA	15–29	0.5345	7707.069	0.05921	0.62655	0.48958
El Salvador	0.039	0.663	0.298	LMI	JA	15–29	0.5345	7707.069	0.05921	0.62655	0.48958
El Salvador	0.068	0.032	0.901	LMI	S	15–29	0.5345	7707.069	0.05921	0.62655	0.48958
El Salvador	0.157	0.052	0.791	LMI	S	15–29	0.5345	7707.069	0.05921	0.62655	0.48958
The Gambia	0.3	0.07	0.63	LI	E	-	0.2347	1574.597	0.2976	0.77453	0.72215
Georgia	0.294	0.04	0.664	LMI	S	15–64	0.3844	8254.011	0.1456	0.66803	0.56985
Ghana	0.395	0.128	0.477	LMI	S	15–64	0.225	3807.333	0.052	0.76769	0.75194
Guatemala	0.33	0.23	0.43	LMI	E	-	0.4523	7147.429	0.0291	0.61256	0.41024
India	0.18	0.29	0.53	LMI	E	-	-	4827.56	0.03623	0.53965	0.26829
Jamaica	0.211	0.144	0.645	UMI	JA	15–29	-	8105.414	0.13308	0.64849	0.57671
Jamaica	0.044	0.281	0.674	UMI	JA	15–29	-	8105.414	0.13308	0.64849	0.57671
Jamaica	0.19	0.12	0.69	UMI	S	15–29	-	8105.414	0.13308	0.64849	0.57671
Jamaica	0.127	0.193	0.681	UMI	S	15–29	-	8105.414	0.13308	0.64849	0.57671
Jordan	0.051	0.479	0.47	LMI	JA	15–29	-	8491.022	0.13103	0.3997	0.14238
Jordan	0.039	0.707	0.254	LMI	JA	15–29	-	8491.022	0.13103	0.3997	0.14238

Table A.6.1 Summary of observations *(cont.)*

Country	Over	Under	Matched	Income status	Method	Youth/ Adults	Salaried workers	GDP per capita	Unemployment	LFP	LFP (female)
Jordan	0.081	0.053	0.866	LMI	S	15–29	-	8491.022	0.13103	0.3997	0.14238
Jordan	0.097	0.09	0.812	LMI	S	15–29	-	8491.022	0.13103	0.3997	0.14238
Kenya	0.249	0.404	0.345	LMI	S	15–64	0.9646	2682.976	0.11894	0.66788	0.61721
Kyrgyzstan	0.13	0.19	0.679	LMI	JA	15–29	0.5269	3120.542	0.052	0.62507	0.49238
Kyrgyzstan	0.092	0.098	0.81	LMI	JA	15–29	0.5269	3120.542	0.052	0.62507	0.49238
Kyrgyzstan	0.15	0.094	0.756	LMI	S	15–29	0.5269	3120.542	0.052	0.62507	0.49238
Kyrgyzstan	0.174	0.13	0.696	LMI	S	15–29	0.5269	3120.542	0.052	0.62507	0.49238
Lao PDR	0.411	0.137	0.451	LMI	S	15–64	0.1563	4830.237	0.01344	0.77195	0.77681
Lebanon	0.119	0.377	0.504	UMI	JA	15–29	-	13491.69	0.0623	0.46921	0.23226
Lebanon	0.06	0.633	0.307	UMI	JA	15–29	-	13491.69	0.0623	0.46921	0.23226
Lebanon	0.246	0.025	0.729	UMI	S	15–29	-	13491.69	0.0623	0.46921	0.23226
Lebanon	0.226	0.053	0.721	UMI	S	15–29	-	13491.69	0.0623	0.46921	0.23226
Liberia	0.27	0.17	0.57	LI	E	-	0.1787	804.7199	0.03623	0.60881	0.5795
Liberia	0.011	0.732	0.257	LI	JA	15–29	0.1787	804.7199	0.03623	0.60881	0.5795
Liberia	0.031	0.637	0.332	LI	JA	15–29	0.1787	804.7199	0.03623	0.60881	0.5795
Liberia	0.046	0.203	0.751	LI	S	15–29	0.1787	804.7199	0.03623	0.60881	0.5795
Liberia	0.116	0.309	0.574	LI	S	15–29	0.1787	804.7199	0.03623	0.60881	0.5795
North Macedonia	0.223	0.051	0.726	UMI	S	15–64	0.719	11877.67	0.29	0.55883	0.44425
North Macedonia	0.195	0.075	0.73	UMI	JA	15–29	0.7333	12298.38	0.2803	0.55897	0.43877

Table A.6.1 Summary of observations *(cont.)*

Country	Over	Under	Matched	Income status	Method	Youth/ Adults	Salaried workers	GDP per capita	Unemployment	LFP	LFP (female)
North Macedonia	0.347	0.067	0.587	UMI	JA	15–29	0.7333	12298.38	0.2803	0.55897	0.43877
North Macedonia	0.187	0.027	0.786	UMI	S	15–29	0.7333	12298.38	0.2803	0.55897	0.43877
North Macedonia	0.446	0	0.554	UMI	S	15–29	0.7333	12298.38	0.2803	0.55897	0.43877
Madagascar	0.164	0.411	0.424	LI	JA	15–29	0.1059	1376.334	0.018	0.86441	0.8385
Madagascar	0.061	0.61	0.33	LI	JA	15–29	0.1059	1376.334	0.018	0.86441	0.8385
Madagascar	0.164	0.259	0.577	LI	S	15–29	0.1059	1376.334	0.018	0.86441	0.8385
Madagascar	0.161	0.366	0.473	LI	S	15–29	0.1059	1376.334	0.018	0.86441	0.8385
Malawi	0.027	0.789	0.184	LI	JA	15–29	-	1090.367	0.06436	0.80938	0.81197
Malawi	0.015	0.838	0.147	LI	JA	15–29	-	1090.367	0.06436	0.80938	0.81197
Malawi	0.161	0.247	0.592	LI	S	15–29	-	1090.367	0.06436	0.80938	0.81197
Malawi	0.185	0.305	0.509	LI	S	15–29	-	1090.367	0.06436	0.80938	0.81197
Rep. of Moldova	0.253	0.068	0.679	LMI	JA	15–29	0.6544	4746.785	0.049	0.42017	0.38758
Rep. of Moldova	0.31	0	0.69	LMI	JA	15–29	0.6544	4746.785	0.049	0.42017	0.38758
Rep. of Moldova	0.277	0.205	0.519	LMI	S	15–29	0.6544	4746.785	0.049	0.42017	0.38758
Rep. of Moldova	0.319	0.217	0.465	LMI	S	15–29	0.6544	4746.785	0.049	0.42017	0.38758
Mongolia	0.11	0.2	0.69	LMI	E	-	0.4747	9788.825	0.08227	0.63974	0.58333
Montenegro	0.092	0.132	0.776	UMI	JA	15–29	0.7912	15291.48	0.1752	0.48877	0.41952
Montenegro	0.245	0.142	0.612	UMI	JA	15–29	0.7912	15291.48	0.1752	0.48877	0.41952

Table A.6.1 Summary of observations *(cont.)*

Country	Over	Under	Matched	Income status	Method	Youth/ Adults	Salaried workers	GDP per capita	Unemployment	LFP	LFP (female)
Montenegro	0.171	0.019	0.81	UMI	S	15–29	0.7912	15291.48	0.1752	0.48877	0.41952
Montenegro	0.2	0.031	0.77	UMI	S	15–29	0.7912	15291.48	0.1752	0.48877	0.41952
Namibia	0.2	0.16	0.63	UMI	E	-	0.6362	9630.698	0.29593	0.58945	0.5537
Nepal	0.092	0.534	0.374	LI	JA	15–29	-	2163.95	0.033	0.83123	0.79709
Nepal	0.088	0.5	0.412	LI	JA	15–29	-	2163.95	0.033	0.83123	0.79709
Nepal	0.124	0.364	0.513	LI	S	15–29	-	2163.95	0.033	0.83123	0.79709
Nepal	0.134	0.291	0.575	LI	S	15–29	-	2163.95	0.033	0.83123	0.79709
Occ. Palestinian Terr.	0.123	0.508	0.369	-	JA	15–29	-	-	-	-	-
Occ. Palestinian Terr.	0.11	0.492	0.398	-	JA	15–29	-	-	-	-	-
Occ. Palestinian Terr.	0.354	0.049	0.597	-	S	15–29	-	-	-	-	-
Occ. Palestinian Terr.	0.392	0.004	0.604	-	S	15–29	-	-	-	-	-
Pakistan	0.28	0.21	0.51	LMI	E	-	-	4367.452	0.05989	0.54062	0.24112
Peru	0.17	0.29	0.54	UMI	E	-	0.4537	10943.92	0.036	0.74678	0.65698
Peru	0.262	0.171	0.568	UMI	JA	15–29	0.464	11430.26	0.04	0.73629	0.64966
Peru	0.175	0.154	0.671	UMI	JA	15–29	0.464	11430.26	0.04	0.73629	0.64966
Peru	0.134	0.124	0.742	UMI	S	15–29	0.464	11430.26	0.04	0.73629	0.64966
Philippines	0.22	0.27	0.51	LMI	E	-	0.5716	5988.804	0.0699	0.64957	0.50505

Table A.6.1 Summary of observations *(cont.)*

Country	Over	Under	Matched	Income status	Method	Youth/ Adults	Salaried workers	GDP per capita	Unemployment	LFP	LFP (female)
Russian Fed.	0.168	0.087	0.746	UMI	JA	15–29	0.9279	24124.33	0.05567	0.63481	0.56636
Russian Fed.	0.144	0.089	0.767	UMI	S	15–29	0.9279	24124.33	0.05567	0.63481	0.56636
Russian Fed.	0.215	0.073	0.712	UMI	S	15–29	0.9279	24124.33	0.05567	0.63481	0.56636
Samoa	0.11	0.14	0.75	UMI	E	-	0.6409	5644.293	0.0872	0.41164	0.232
Samoa	0.261	0.082	0.658	UMI	JA	15–29	0.6409	5644.293	0.0872	0.41164	0.232
Samoa	0.123	0.017	0.86	UMI	JA	15–29	0.6409	5644.293	0.0872	0.41164	0.232
Serbia	0.22	0.21	0.56	UMI	E	-	0.6961	12898.61	0.239	0.50868	0.42676
Serbia	0.172	0.164	0.665	UMI	JA	15–29	0.6984	13277.71	0.1766	0.51452	0.43367
Serbia	0.166	0.289	0.545	UMI	JA	15–29	0.6984	13277.71	0.1766	0.51452	0.43367
Serbia	0.273	0.048	0.679	UMI	S	15–29	0.6984	13277.71	0.1766	0.51452	0.43367
Serbia	0.357	0.025	0.617	UMI	S	15–29	0.6984	13277.71	0.1766	0.51452	0.43367
Sierra Leone	0.061	0.626	0.313	LI	JA	15–29	-	1316.06	0.0297	0.6677	0.65041
Sierra Leone	0.031	0.748	0.221	LI	JA	15–29	-	1316.06	0.0297	0.6677	0.65041
Sierra Leone	0.121	0.331	0.548	LI	S	15–29	-	1316.06	0.0297	0.6677	0.65041
Sierra Leone	0.08	0.456	0.464	LI	S	15–29	-	1316.06	0.0297	0.6677	0.65041
South Africa	0.32	0.24	0.45	UMI	E	-	0.8481	12329.63	0.24727	0.51638	0.4456

Table A.6.1 Summary of observations *(cont.)*

Country	Over	Under	Matched	Income status	Method	Youth/ Adults	Salaried workers	GDP per capita	Unemployment	LFP	LFP (female)
Sri Lanka	0.461	0.104	0.435	LMI	S	15–64	0.5572	10238.71	0.0441	0.53852	0.33567
United Rep. of Tanzania	0.25	0.07	0.68	LI	E	–	0.134	2402.099	0.021	0.78615	0.74022
United Rep. of Tanzania	0.129	0.324	0.547	LI	JA	15–29	0.1617	2316.443	0.0293	0.78623	0.74021
United Rep. of Tanzania	0.133	0.449	0.418	LI	JA	15–29	0.1617	2316.443	0.0293	0.78623	0.74021
United Rep. of Tanzania	0.202	0.352	0.445	LI	S	15–29	0.1617	2316.443	0.0293	0.78623	0.74021
United Rep. of Tanzania	0.157	0.462	0.381	LI	S	15–29	0.1617	2316.443	0.0293	0.78623	0.74021
Togo	0.079	0.486	0.434	LI	JA	15–29	-	1315.34	0.06817	0.80839	0.81128
Togo	0.016	0.798	0.186	LI	JA	15–29	-	1315.34	0.06817	0.80839	0.81128
Tunisia	0.168	0.323	0.508	LMI	JA	15–29	0.7197	10579.04	0.15934	0.47776	0.2522
Tunisia	0	0.416	0.584	LMI	JA	15–29	0.7197	10579.04	0.15934	0.47776	0.2522
Tunisia	0.251	0.061	0.688	LMI	S	15–29	0.7197	10579.04	0.15934	0.47776	0.2522
Tunisia	0.255	0	0.745	LMI	S	15–29	0.7197	10579.04	0.15934	0.47776	0.2522
Uganda	0.26	0.07	0.67	LI	E	-	0.1961	1635.143	0.01456	0.84387	0.81785
Uganda	0.034	0.787	0.179	LI	JA	15–29	0.1961	1692.53	0.02147	0.84969	0.82316
Uganda	0.008	0.919	0.073	LI	JA	15–29	0.1961	1692.53	0.02147	0.84969	0.82316
Uganda	0.06	0.281	0.659	LI	S	15–29	0.1961	1692.53	0.02147	0.84969	0.82316
Uganda	0.064	0.326	0.61	LI	S	15–29	0.1961	1692.53	0.02147	0.84969	0.82316

Table A.6.1 Summary of observations *(concl.)*

Country	Over	Under	Matched	Income status	Method	Youth/ Adults	Salaried workers	GDP per capita	Unemployment	LFP	LFP (female)
Ukraine	0.301	0.056	0.642	LMI	JA	15–29	0.8407	7464.94	0.0914	0.59071	0.52163
Ukraine	0.533	0.091	0.376	LMI	JA	15–29	0.8407	7464.94	0.0914	0.59071	0.52163
Ukraine	0.24	0.038	0.721	LMI	S	15–64	0.8088	8338.915	0.072	0.58792	0.51963
Ukraine	0.094	0.091	0.815	LMI	S	15–29	0.8407	7464.94	0.0914	0.59071	0.52163
Ukraine	0.058	0.128	0.814	LMI	S	15–29	0.8407	7464.94	0.0914	0.59071	0.52163
Viet Nam	0.25	0.17	0.59	LMI	E	-	0.3478	4910.314	0.018	0.77643	0.73098
Viet Nam	0.12	0.28	0.6	LMI	JA	15–29	0.3931	5667.411	0.0212	0.78344	0.73778
Viet Nam	0.345	0.21	0.445	LMI	JA	15–29	0.3931	5667.411	0.0212	0.78344	0.73778
Viet Nam	0.7	0.04	0.26	LMI	S	15–64	0.3483	5121.741	0.0195	0.78061	0.73477
Viet Nam	0.101	0.106	0.792	LMI	S	15–29	0.3931	5667.411	0.0212	0.78344	0.73778
Viet Nam	0.107	0.079	0.814	LMI	S	15–29	0.3931	5667.411	0.0212	0.78344	0.73778
Yunnan Province, China	0.326	0.107	0.566	-	S	15–64	-	-	-	-	-
Zambia	0.132	0.393	0.475	LMI	JA	15–29	0.2077	3632.504	0.07726	0.75284	0.69797
Zambia	0.148	0.389	0.464	LMI	JA	15–29	0.2077	3632.504	0.07726	0.75284	0.69797
Zambia	0.242	0.256	0.502	LMI	S	15–29	0.2077	3632.504	0.07726	0.75284	0.69797
Zambia	0.152	0.226	0.622	LMI	S	15–29	0.2077	3632.504	0.07726	0.75284	0.69797

Editors
Paul Comyn
Olga Strietska-Ilina

Authors
Adele Bergin
Judith Delaney
Michael Handel
Seamus McGuinness
Olga Kupets
Konstantinos Pouliakas
Paul Redmond

ISBN 978-92-2-131561-2