



LUXEMBOURG

SELECTED ISSUES

May 2017

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Approved By
European Department

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LUXEMBOURG: DIVERSIFICATION OF THE ECONOMY AND THE ROLE OF THE STATE¹

Luxembourg's economy is less diversified than other countries, even after excluding the financial sector or when comparing with other countries with a small population. In addition, a small group of firms accounts for a significant share of employment. Recently, the authorities have outlined plans to diversify the economy in the coming decades. Historically, the Luxembourgish State has played a key role in the economy, including fostering key industries in the financial sector and manufacturing. This chapter characterizes the diversification of the economy, discusses the role of the State in Luxembourg, the role of public investment in supporting growth, and policy options to help diversify further the economy, including by removing product market restrictions and bottlenecks in housing investment.

A. Introduction

1. This chapter studies the diversification of the Luxembourgish economy and the role of the State. Diversification is important to increase the resilience of the economy to shocks and to foster broad-based job creation, including low-skill employment. While Luxembourg's economy is less diversified than other countries from the point of view of output, employment is similarly concentrated as in other countries. Moreover, the sectors with larger output have higher labor productivity. Luxembourg's State has an important role: besides ensuring prudent and stable fiscal policies, regulating the economy, and low and predictable tax rates, it identifies areas of strength and sets strategic objectives in consultation with stakeholders, and offers an attractive business environment for innovative firms. It provides innovative legal frameworks, and, last but not least, it cooperates with the private sector to secure the future of Luxembourg as a financial center. The paper is organized as follows: first, it provides a comparative analysis of the diversification of the economy; second, it describes the role of the State in Luxembourg; third, it analyzes the role of public investment in Luxembourg; fourth, it concludes.

B. How Diversified is the Luxembourgish Economy?

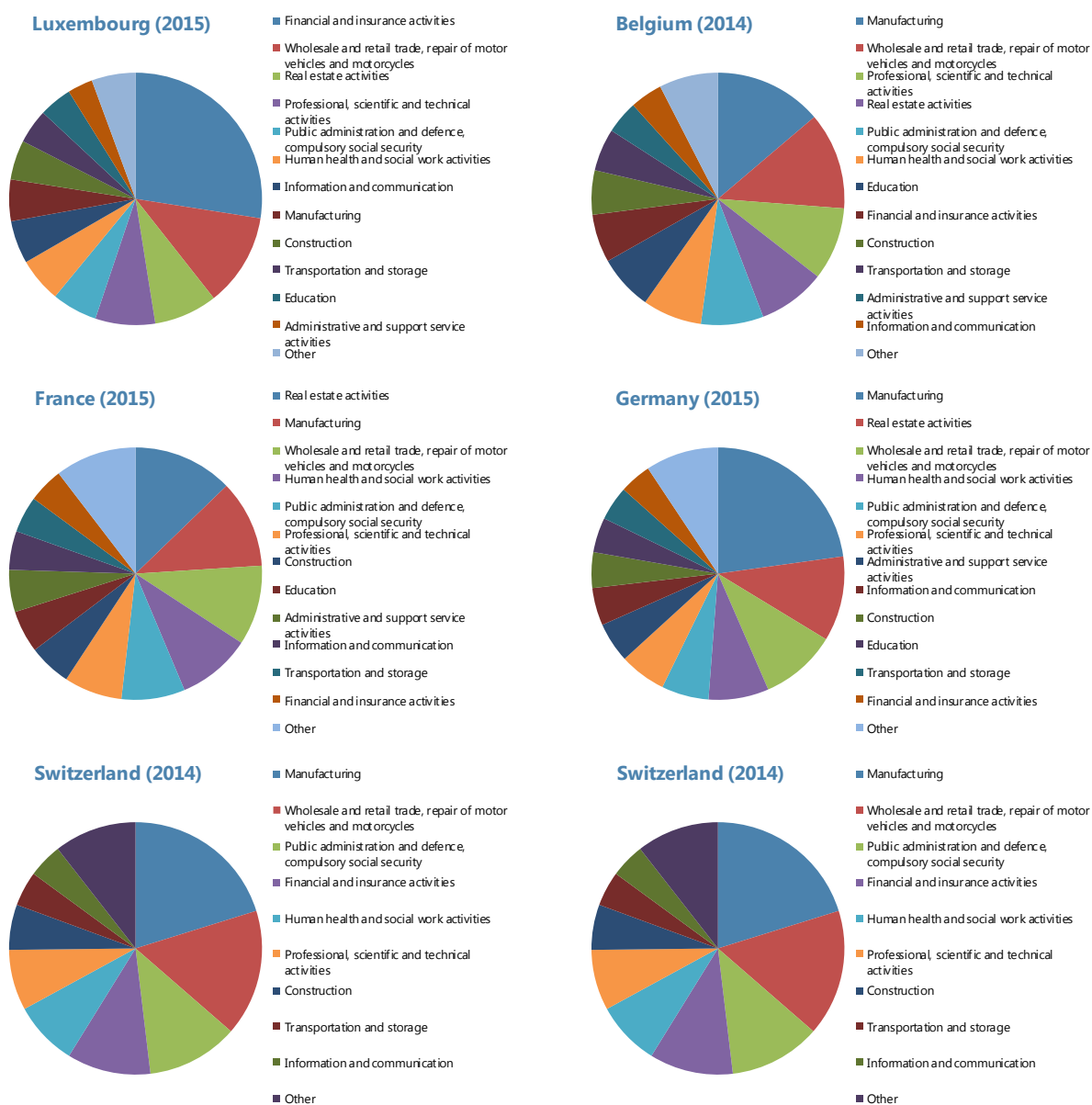
2. In terms of output, Luxembourg tends to be less diversified than other European economies. The financial sector directly accounts for about ¼ of GDP, and jointly with the real estate sector and wholesale and retail trade accounts for about 47 percent of GDP (Figure 1). While other countries (such as Germany and Switzerland) also have about three sectors accounting for slightly less than half of total value-added, the sectoral specialization of Luxembourg becomes more striking when considering a more disaggregated sectoral classification (Figure 2). This high level of specialization remains when comparing Luxembourg to other countries with relatively small populations (such as Iceland and Estonia), with another financial center (Switzerland), or when considering the distribution of value-added among sectors other than the financial sector.²

¹ Prepared by Anne Oeking (FIN) and Thierry Tresselt (EUR).

² OECD, gross value added broken down by detailed industries according to the classification ISIC rev.4 (International Standard Industrial Classification of All Economic Activities, Revision 4). The data officially distinguishes between sections (top level) and divisions (sub levels).

The financial sector in Luxembourg, based on investment funds and private and treasury banking activities, indirectly plays an even larger role in the economy, given the need for ancillary activities (auditing and accounting, IT support and legal services). The Herfindahl index confirms the lower level of output diversification.³ In 2014, based on gross value added in 64 sectors, Luxembourg had a Herfindahl index of 0.10 compared to values between 0.03 and 0.06 for a set of benchmark countries, including countries with small populations or financial centers. Excluding the financial sector, Luxembourg's Herfindahl index was still at 0.08.

Figure 1. Sectoral Composition of Value-Added, by Sectors: Cross-Country Comparisons

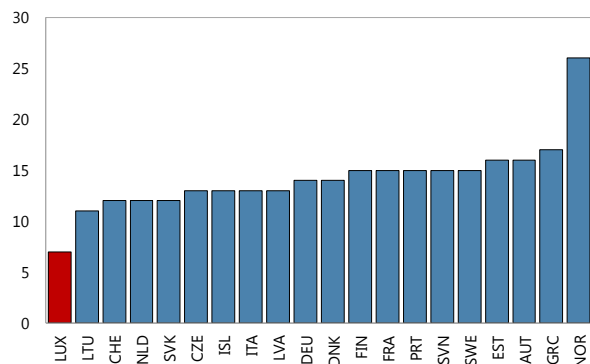


Source: OECD and IMF staff. Note: ISIC rev.4 sectoral classifications, top level Sections

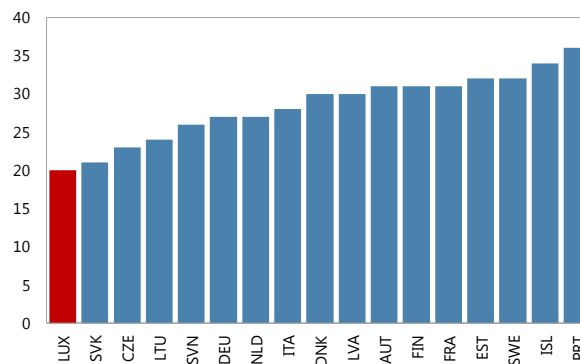
³ The Herfindahl index is calculated as the sum of the squared market shares. The index ranges from $1/n$ to 1 with n the number of sectors. A higher value implies more concentration among sectors, i.e., less diversification.

Figure 2. Sectoral Composition at a More Disaggregated Level

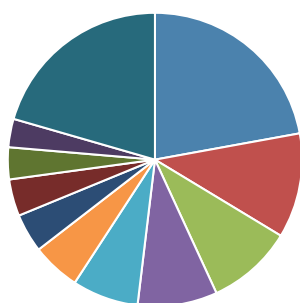
Number of Sectors Producing at Least 50 Percent of Total Gross Value Added



Number of Sectors Producing at Least 70 Percent of Total Gross Value Added

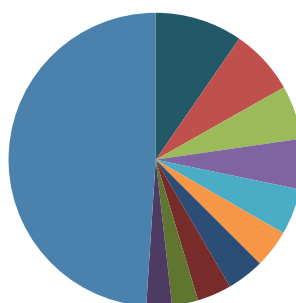


Luxembourg (2015)



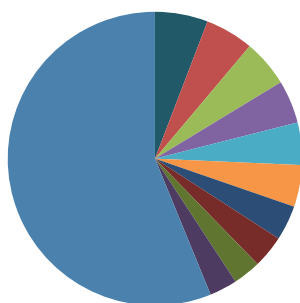
- Financial service activities, except insurance and pension funding
- Activities auxiliary to financial service and insurance activities
- Wholesale trade, except of motor vehicles and motorcycles
- Legal, accounting, management, architecture, engineering activities
- Legal, accounting, head offices, management consultancy activities
- Retail trade, except of motor vehicles and motorcycles
- Telecommunications
- Human health activities
- Residential care and social work activities
- Land transport and transport via pipelines
- Other

France (2014)



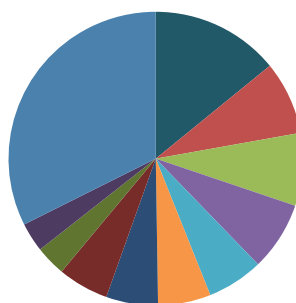
- Imputed rents of owner-occupied dwellings
- Human health activities
- Legal, accounting, management, architecture, engineering activities
- Wholesale trade, except of motor vehicles and motorcycles
- Retail trade, except of motor vehicles and motorcycles
- Legal, accounting, head offices, management consultancy activities
- Residential care and social work activities
- Financial service activities, except insurance and pension funding
- IT and other information services
- Manufacture of food products, beverages and tobacco products
- Other

Germany (2014)



- Human health activities
- Manufacture of transport equipment
- Wholesale trade, except of motor vehicles and motorcycles
- Manufacture of motor vehicles, trailers and semi-trailers
- Imputed rents of owner-occupied dwellings
- Legal, accounting, management, architecture, engineering activities
- Manufacture of machinery and equipment n.e.c.
- Retail trade, except of motor vehicles and motorcycles
- Legal, accounting, head offices, management consultancy activities
- Manuf. of basic metals and fabricated metal products, except mach. & equip.
- Other

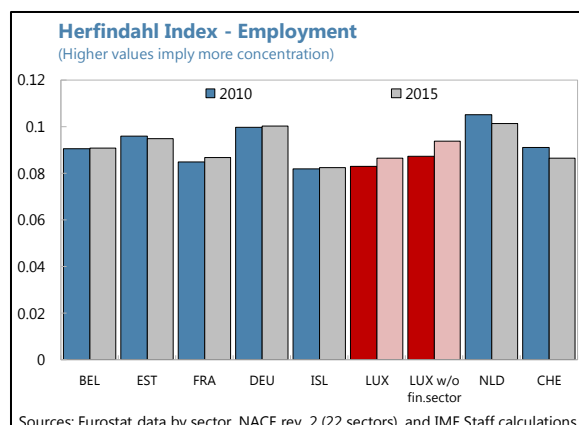
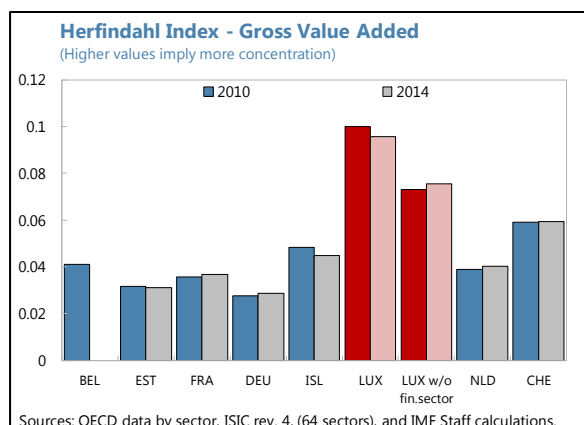
Switzerland (2014)



- Wholesale trade, except of motor vehicles and motorcycles
- Legal, accounting, management, architecture, engineering activities
- Financial service activities, except insurance and pension funding
- Human health activities
- Insurance, reinsurance and pension funding, except compulsory S.S.
- Retail trade, except of motor vehicles and motorcycles
- Manufacture of computer, electronic and optical products
- Manufacture of basic pharmaceutical products and preparations
- Residential care and social work activities
- IT and other information services
- Other

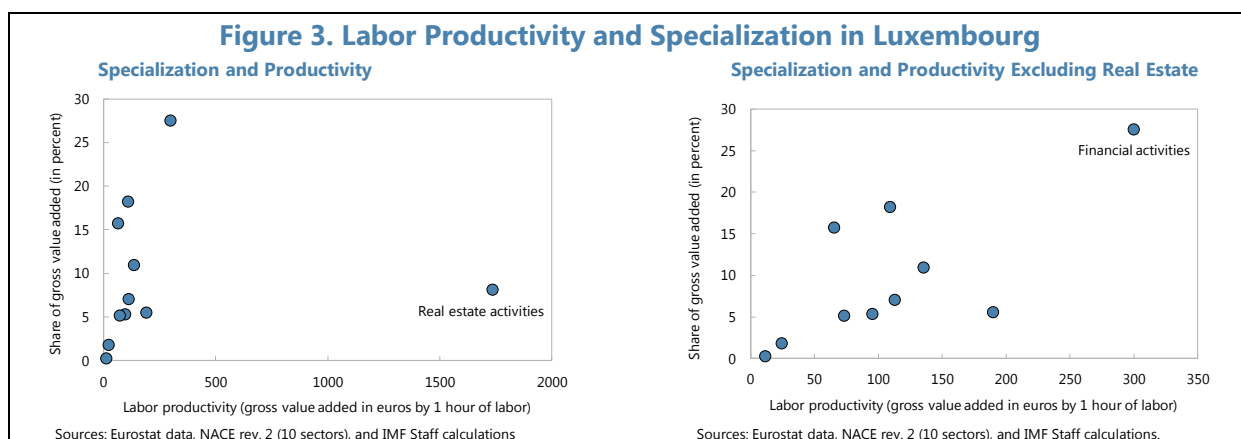
Source: OECD and IMF staff

Note: ISIC rev.4 sectoral classifications, sub level divisions



3. Diversification in employment across sectors is similar to other countries. Measuring concentration based on Herfindahl index for 22 sectors for Luxembourg is 0.09 in 2015.⁴ This compares to values between 0.08 and 0.10 for benchmark countries. Excluding Luxembourg's financial sector, the index remains at 0.09. These different levels of concentration imply that output and employment have different shares in several main sectors. Some sectors, such as financial services or real estate activities, provide a relatively large share of total gross value added (28 and 8 percent of total gross value added, respectively), but account for less of total employment (10 and 1 percent of total employment, respectively). Other sectors, such as the broad sector of public administration, defense, education, human health and social work activities, or the arts and entertainment sector, account for 16 and 2 percent of total gross value added, but 29 and 10 percent of total employment.

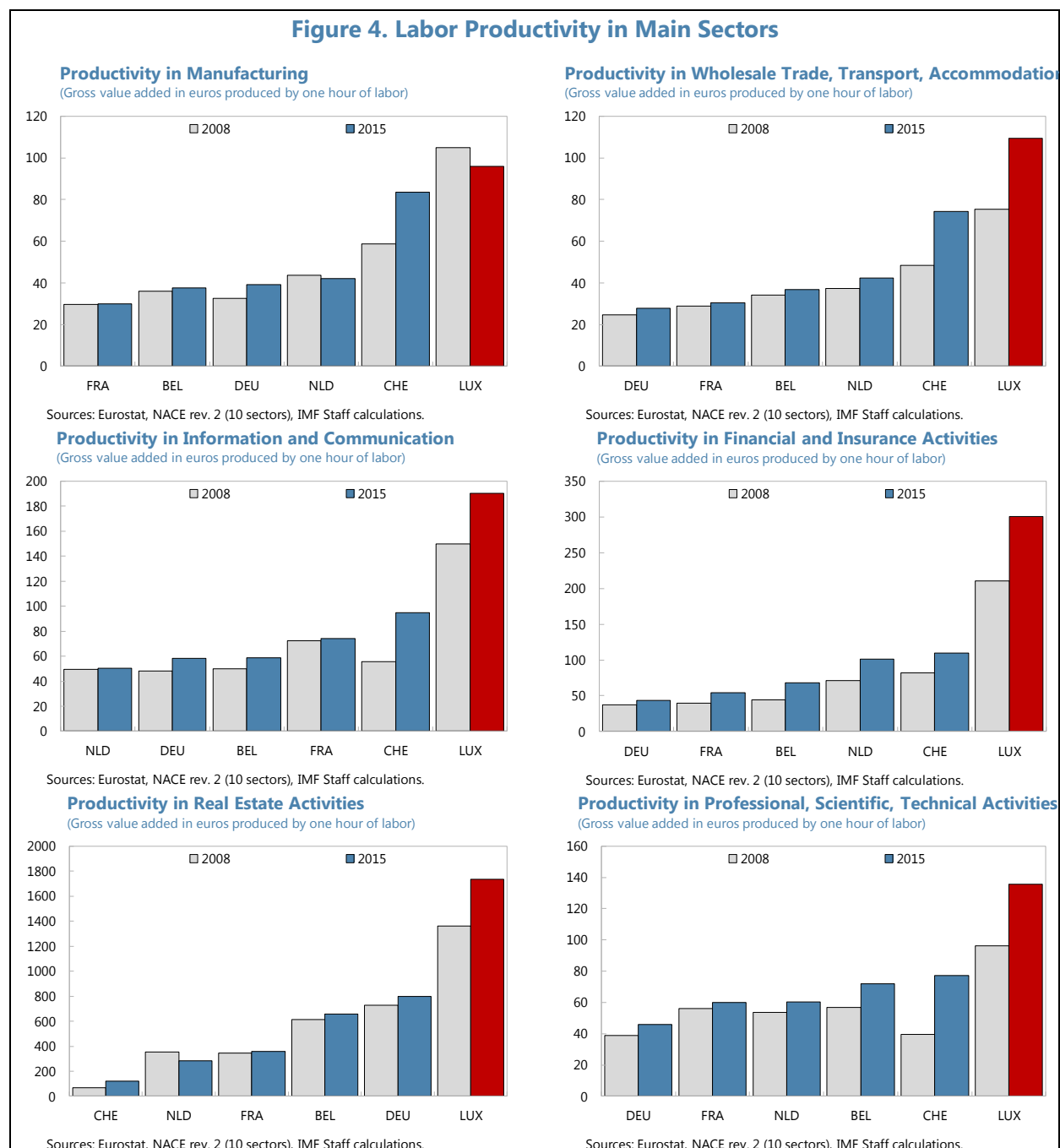
4. The differences in output and employment shares among sectors translate to specialization in more productive sectors.⁵ The real estate sector is an outlier when comparing specialization among sectors and labor productivity. Given high and increasing real estate prices, the sector has very high labor productivity compared to its share of gross value added in the total economy. Among all other sectors, a positive relation between the share of gross value added in sectors and the respective labor productivity can be found for Luxembourg (Figure 3). Output is



⁴ Based on Eurostat data, NACE rev. 2 classification, 22 sectors.

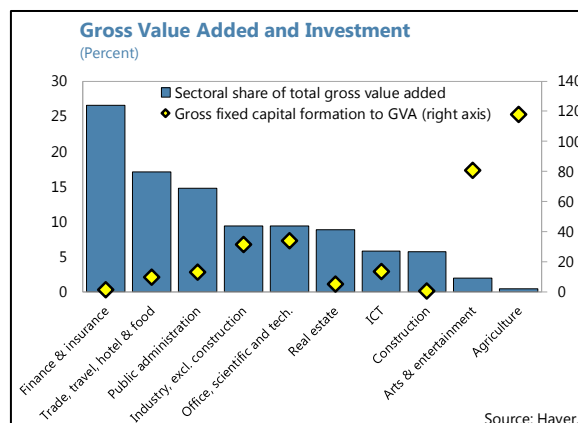
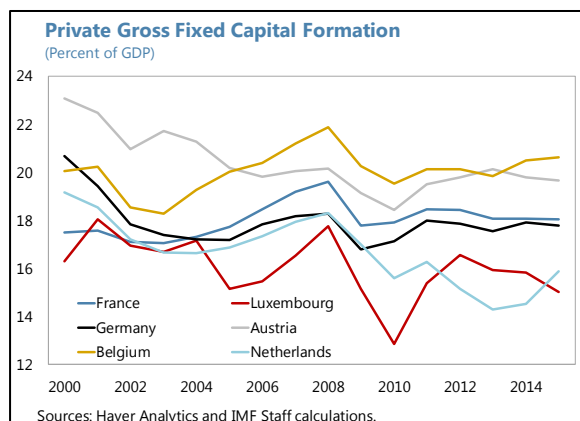
⁵ Eurostat, NACE rev. 2, 10 sectors.

therefore specialized in sectors with relatively higher labor productivity compared to other sectors. In addition, in Luxembourg's main sectors, labor productivity is much higher than in several benchmark countries (see Figure 4).



5. Private investment in Luxembourg has been moderate compared to other countries.

In several main sectors in Luxembourg, the share of gross fixed capital formation to their gross value added has been very limited, but since these sectors contribute the largest part of overall value added, overall private capital formation has been relatively low. In Luxembourg's main sector, the finance and insurance industry, investment has been small, including for example by renting instead of owning business space. In contrast, most investment has come from the industry, trade, and real estate sectors, mostly into construction (around 60 percent) and machinery and equipment (around 30 percent).



6. A small group of firms account for a significant share of employment, making Luxembourg's labor market dependent on their performance. These 32 firms account for almost ¼ of total employment, with the State and the city of Luxembourg being the top two employers. The public sector and firms that are majority state-owned account for about 10 percent of employment. Arcelor-Mittal Group remains the largest privately owned employer, in spite of the restructuring of the steel industry in the past decades, closely followed by a local retail distributor. A group of the five largest banks accounts for 2.5 percent of total employment. A group of large service sector firms, including in healthcare, security and catering, account for more than 6 percent of total employment. Many of the large employers are part of international groups.

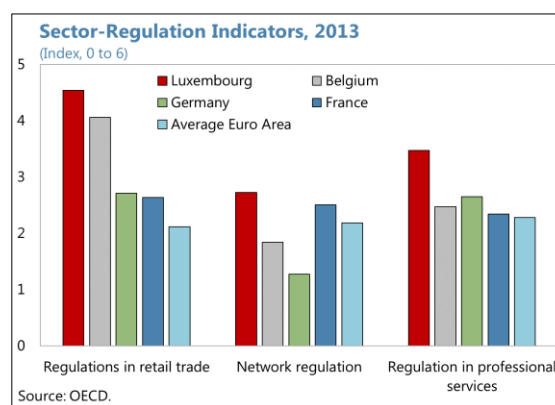
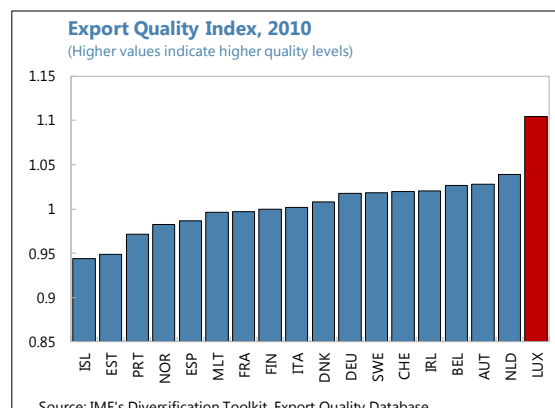
Large employers, in percent of total employment

State, Luxembourg city	7.4
Banks	2.4
Auditors	1.4
Manufacturing	2.4
Trade, distribution	1.3
Transport	1.9
Services (including health)	6.3
Total	23.1

Source: Statec and IMF staff calculations for 32 largest employers

7. Historically, the Luxembourgish economy has relied upon a few key activities or firms, but high restrictions on business services and the retail sector, and constraints on the supply of residential and commercial real estate may hamper firm entry.

During the post-WWII period, the health of Luxembourg's economy depended mostly on the performance of the steel industry. Luxembourg diversified into the Eurobond market (1970s), private banking (1980s), and the investment fund industry (since the late 1980s). The diversification of the economy has been focused on relatively high value-added and high technology activities. Priority sectors in the government's diversification strategy are space technologies (see Box 1), health sciences and technologies, eco-technologies, logistics, and information and communication technologies.⁶ The high value-added of these goods produced, many of which are exported, is reflected in high export quality of goods. However, restrictions on business services and retail investment and bottlenecks that hamper housing investments should be further removed; indeed, they may have hampered firm creation and contributed to concentration of employment among larger firms, lowering overall domestic productivity and private investment.⁷ According to the OECD, Luxembourg appears to have more stringent regulations than neighboring countries and the euro area on average in retail trade, and professional services. Some of these restrictions are related to: (i) shareholding requirements; (ii) voting rights and multidisciplinary limitations in the business services sector; as well as (iii) operational and establishment requirements in the retail sector.⁸ Regarding housing investment, the constraints are related to the availability of land for construction due to zoning restrictions, and inefficient procedures to grant building permits.



⁶ Luxembourg has set up a legal framework for space mining and recently became a key shareholder in a U.S. based asteroid mining company.

⁷ According to the "Global Entrepreneurship Monitoring" report, Luxembourg performs well in term of firm creation. See: <http://www.statistiques.public.lu/fr/publications/thematique/entreprises/LuxGEM-2016/index.html>.

⁸ These areas of restrictions are also noted in the 2016 EU Country Specific Recommendations which highlighted the need to ensure the long-term sustainability of public pensions and to remove barriers to investment and regulations in the business service sector and address bottlenecks that hamper housing investment.

Box 1. The Satellite Industry in Luxembourg¹

The space technologies sector has been one of five priority sectors in the government's economic diversification policy launched in 2004. The government has been involved in the sector by shareholding activities, investment, research and innovation support, and the provision of specific legal frameworks. Luxinnovation, the national agency for innovation and research, includes the Luxembourg Space Cluster to foster the development of new activities in the field and has been the national contact point for collaboration with the European Space Agency (ESA), which Luxembourg joined in 2005. Other initiatives in Luxembourg include GLAE (*Groupement luxembourgeois de l'aéronautique et de l'espace*), providing a permanent link between all leading companies in the space sector, and serving as an interlocutor for the government. Additionally, the University of Luxembourg and the Luxembourg Institute of Science and Technology provide and foster research activities in the sector.

The satellite industry in Luxembourg consists of 18 companies (as of 2013), dominated by SES (*Société européenne des satellites*), Europe's first private satellite operator which was founded in 1985 and currently the world's leading private satellite operator. At end-2014, the SES group employed 1,237 staff worldwide, of which 441 were based in the Luxembourg headquarters. This constitutes around 70 percent of employees in the space sector in Luxembourg. Overall, as of 2013, the sector provided around 1.7 percent of value added and 0.2 percent of employment to the overall economy. In 2015, in a public-private (50/50) joint venture with SES, the Luxembourg government founded the brand GovSat to provide satellite communication services to governments. Their first satellite GovSat-1, manufactured by Orbital ATK in the US, is scheduled for launch in the second half of 2017.

18 satellites are currently operated from Luxembourg, making it the 9th largest country with satellites in the world (excluding multinational projects and the ESA which is involved in another 36 satellites). As of 2016, there are reportedly 1,419 satellites in operation worldwide, mainly operated from the US (40 percent), China (13 percent) and Russia (10 percent). The main purposes of these satellites are: (i) Communications (50 percent), (ii) Earth observation/science (26 percent), and (iii) Technology Demonstration/Development (11 percent). The main users are commercial (41%), followed by governments (28 percent) and military (24 percent). Between 2000-16, an average of 72 satellites was launched in the world annually, with 150 in 2014 and 173 in 2015 (and 75 in the first half of 2016). The major satellite companies building satellites are Europe's Airbus Defence and Space, and Thales Alenia Space; Russia's JSC Information Satellite Systems; and the US' Boeing Defence, Space & Security, Lockheed Martin, Orbital ATK, and Space Systems/Loral. Together, these companies account for about 40 percent of all operational satellites. So far, two satellites have been built by a Luxembourgish company. LuxSpace built and launched the VesselSat-1 and VesselSat-2 in 2011 and 2012, respectively.

¹ Sources: 2016 Competitiveness Report by the Government of Luxembourg, www.ses.com, www.luxinnovation.lu, www.govsat.lu, www.luxspace.lu, Union of Concerned Scientists (UCS) database on operational satellites.

8. The Luxembourg authorities have strategically planned to further diversify the economy in the coming decades. For example, Luxembourg recently adopted a new space law providing a legal framework for private companies planning to undertake mining activities in outer space in accordance with international law, and the state has taken ownership stakes in a space mining company based in the U.S. A "Third Industrial Revolution Strategy" study on the long-term orientation of Luxembourg's economy was presented by the government in November 2016.⁹

⁹ <http://www.troisiemerevolutionindustrielle.lu/>

C. What Roles has the State Played in the Luxembourgish Economy?

9. Governments generally play a crucial role in the economy. The government: (i) provides the basic legal and social framework for economic activity and supplies public goods (such as education, infrastructure, social protection and healthcare); (ii) regulates the economy (property rights, contract enforcement, regulations of financial markets and of other sectors of the economy); (iii) reallocates resources if needed, including for social protection purposes; and (iv) stabilizes and supports the economy through fiscal policy. The stability and predictability of how the government performs these roles are important to provide incentives to invest in the future. The government can also play an active role by facilitating private investment and innovation, or by promoting specific industries and strategic plans (including through direct financing or incentives, taking direct stakes in firms, or through partnerships with the private sector).

10. In Luxembourg, the government plays all of these roles. The government of Luxembourg has played a key role in creating an enabling environment, with a stable political environment and prudent and business friendly fiscal policy (which earned the sovereign a triple AAA rating), and a culture of consultation with social partners, including in setting strategic directions in key sectors (finance, ICT, space industry, healthcare, communications, logistics, and other service sectors), while relying on an educated workforce made up of broadly equal shares of residents and of cross-border commuters.

- *The Ministry of Finance* plays an important role in regulating and promoting the financial sector (see below). In addition, it carries a general responsibility for the steering of macro-fiscal policy through which it can play a stabilizing role in the economy. The objective is carried out by setting fiscal policy, through the budget allocation process as well as through the orientation of its taxation policy. The tax administration also plays a central role in offering advance tax rulings to multinational companies that provide certainty on taxes and/or allow to lower effective tax rates for these firms. The Ministry of Finance also plays an important role in the national export-credit agency (“Office du Ducroire”), and is strongly involved with the national investment bank (“SNCI”), with both entities supporting local companies in their investment and export activities. Finally, it manages the government’s stakes in listed and non-listed companies through the Treasury.
- *The Ministry of the Economy* helps facilitate the development of key industries other than the financial sector, including through international cooperation.¹⁰ It ensures a competitive environment, and promotes Luxembourg brand name. It creates a transparent and attractive environment for firms and consumers, stimulates firm creation, promotes and facilitates investment in various sectors of the economy, including through direct ownership (such as in the space industry) and joint-ventures, import and export licenses, support structures for young and innovative firms, and the development and maintenance of infrastructures and energy supply. In 2004, the government initiated an economic policy of diversification defining five priority sectors in areas of strength: ICT, space technologies, logistics, health science and technologies, and eco-

¹⁰ For example, Luxembourg has been a member of the European Space Agency since 2005. Promotion of various sectors is undertaken by the Trade and Investment Board.

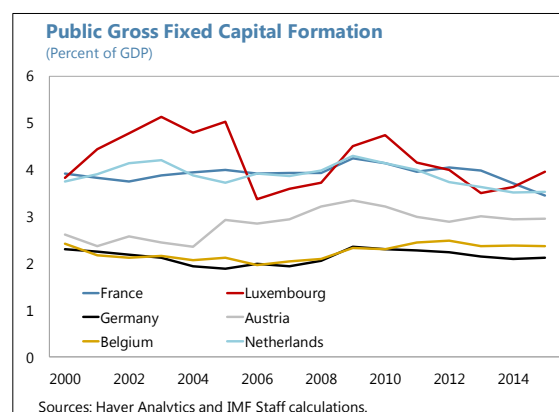
technologies, jointly accounting for about 10 percent of gross value added and 30,000 jobs. The Ministry of Economy has recently initiated a long-term strategic study, the “Third Industrial Revolution”, emphasizing durable economic development based on the convergence and interconnection of ICT, transport and energy sectors, while taking account of legislative and regulatory considerations. The study was undertaken jointly with the Chamber of Commerce, IMS Luxembourg (an independent association promoting corporate social responsibility), and with participation from Jeremy Rifkin.¹¹

11. The government directly impacts the economy, including as an investor, as the largest employer, and as a shareholder of commercially oriented firms.

The State and the Luxembourg municipality are the two largest employers, and account for 7.4 percent of total employment.

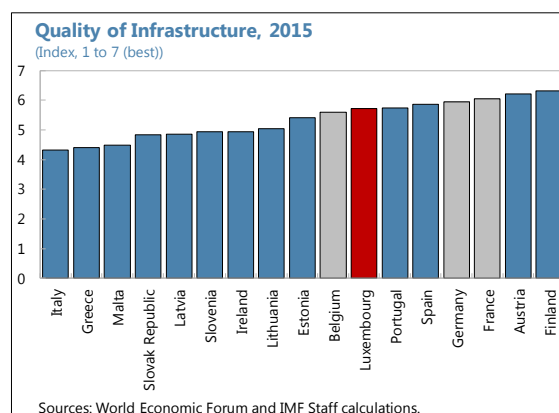
Excluding these two employers, four out of the top five employers have state ownership (of which two fully or almost fully state-owned), accounting for about 4 percent of total employment. Overall, the government has direct participation in 35 firms in Luxembourg.

The government involvement in the private sector does not aim at interfering with firms’ commercial orientation. The government has also been a key investor in high tech satellite companies. From a financing point of view, multinational groups, small and medium sized businesses, and start-ups can all tap into several state-backed measures designed to support and encourage economic diversification. Two dedicated financial institutions, the National Credit and Investment Company (SNCI) and the Office du Dueroire, offer financial support in the form of loans and export financing.



12. The generally high public investment in Luxembourg may have helped support high output growth.

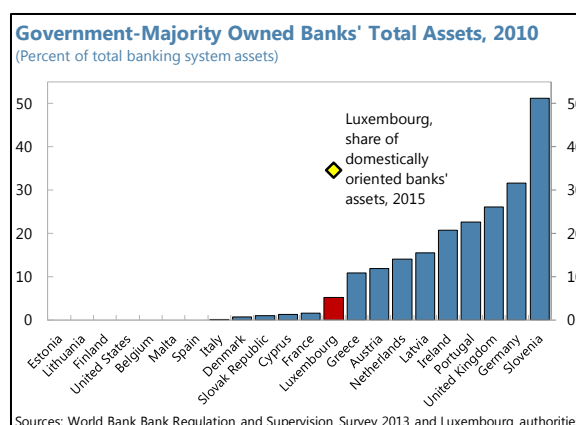
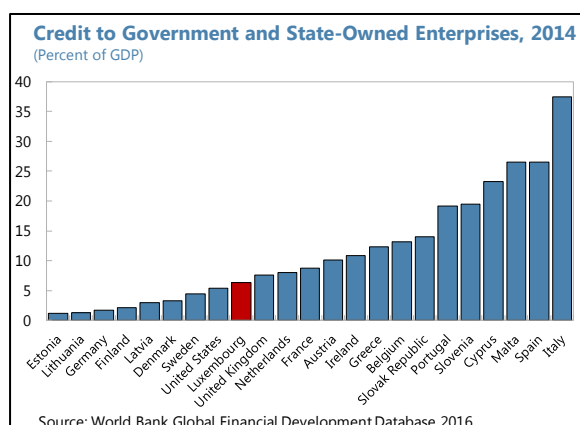
Public investment has generally been high compared to other European countries, which has helped compensate for the relatively lower level of private investment. As a result, the stock of public capital is high compared to peers, while the overall quality of infrastructure is good, although it varies across sectors. As shown in the October 2014 *World Economic Outlook*, public investment, especially when it is efficient and with adequately designed financing mechanisms, can have a very significant impact on economic growth.



¹¹ The Chamber of Commerce, created in 1841, is the oldest institution in Luxembourg: it is state-owned and represents the interests of Luxembourg businesses, promotes the general economic interests of Luxembourg, acts as an independent spokesperson for the market economy and a critical partner in the field of national, European and international policies, influences the legislative process, and provides services to businesses and to the public.

13. In the financial sector, the authorities and the private sector are united in their objective to secure the future of Luxembourg as a financial center inter alia by increasingly seeking to diversify the customer base outside Europe. With the financial services industry directly accounting for one quarter of GDP, the government attaches great importance to its competitiveness and strategic choices. Luxembourg for Finance (LFF), a public-private partnership between the Luxembourg Government and the Luxembourg Financial Industry Federation founded in 2008, together with the High Committee for the Financial Centre, aim to develop Luxembourg's financial services industry and identify new business opportunities. It helps connect international investors to the range of financial services provided in Luxembourg, cooperates with the various professional associations and monitors global trends in finance, and manages multiple communication and outreach channels. Examples of innovative finance are: (i) recent initiatives in Islamic finance (the issuance of Sukuk); (ii) steps to become a hub for cross-border renminbi business; (iii) the positioning of Luxembourg in the sphere of digital financial services and financial technology (fintech); and (iv) green finance, including through the launch of a new platform dedicated to green securities (Luxembourg Green Exchange) in September 2016.

14. The Ministry of Finance plays a role in regulating and overseeing the sector. It chairs the Systemic Risk Committee (CRS) and the regulators' (CSSF and CAA) non-executive boards. The government has stakes in four banks, which assets account for 95 percent of the five domestically-oriented credit institutions' assets, or 225 percent of GDP (120 percent of GDP when weighting each bank's assets by the stakes of the State in each bank). Credit by the banking system to the government or to state-owned enterprises is however rather low by international standards. The authorities transpose EU-wide Directives into national law.



15. State ownership of firms generally has pros as well as cons. Traditionally, state-owned firms play an important role in the provision of network infrastructures, in telecommunications, energy, and railroads, but they also operate in many other industries, including in high-technology industries and generally in strategic industries. In the banking sector, state-ownership has been pervasive around the world, and has increased following the global financial crisis as governments took over banks that failed or that experienced capital shortfalls and were shut-off from capital

markets.¹² State ownership may be desirable in regulated industries with natural monopolies, in presence of externalities, or where long-term financing plans may be important to undertake up-front fixed investment in specific technologies for which the returns accrue in the long-term (the space industry may be an example). State ownership may also allow to undertake countercyclical lending in the financial sector.¹³ However, state ownership may result in conflicts of interest as the political agenda could interfere with the commercial orientation and profit objective of firms, and result in inefficient support for incumbents or non-viable firms.

16. In Luxembourg, a formal framework should be introduced to govern the state’s relationship with the domestically oriented banks in which it has an ownership stake.

In Luxembourg, there is no evidence of interference by the State. However, to protect the integrity of the financial system well into the future, given the government’s role in the governance structure of the CSSF and on the *Comité de Risque Systémique* (CRS), a formal governance framework for state involvement in the banking sector and other sectors should ensure arm’s length involvement and that the relevant banks are free to operate prudently on commercial terms, and with adequate risk management processes in place.

D. Public Investment and Economic Performance in Luxembourg

17. Public investment plays an important role to sustain sufficiently high economic growth. While a large share of public investment usually consists of infrastructure investment, it can also include non-infrastructure components such as machinery and equipment or inventories. Public investment is generally associated with the provision of public goods, projects that generate externalities and help correct market failures, and the provision of essential inputs that are complementary to other inputs in the production process. In the short-run, public investment can provide a welcome boost to domestic demand through fiscal multipliers, especially when there is economic slack. It can help crowd-in private investment, given the highly complementary nature of infrastructure capital. There is also a supply side effect of public investment on potential growth as the productive capacity of the economy increases with a higher stock of infrastructure. Investments in education also improve the long-term productive capacity by raising human capital. The efficiency of the selection process, implementation and monitoring of projects affects the extent to which public investment impacts the long-term production capacity. Evidence from research suggests that the short-term and long-term impact of public investment in infrastructure are higher during

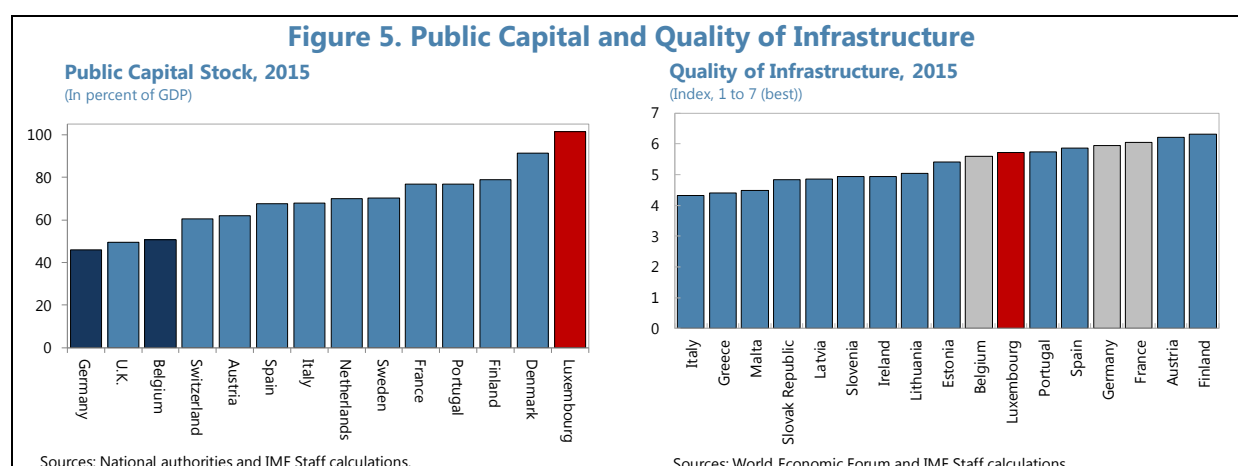
¹² See for instance the seminal study by La Porta, R., F. L. de Silanes, and A. Shleifer (2002), “Government Ownership of Banks,” *Journal of Finance*, 57(1), 265–301, and the book by Stijn Claessens, Ayhan Kose, Luc Laeven and Fabian Valencia “Financial Crises: Causes, Consequences and Policy Responses”, International Monetary Fund, 2014.

¹³ A World Bank study (“Rethinking the Role of the State in Finance”, World Bank Global Financial Development, 2013) found that lending by state-owned banks tends to be less procyclical and that some state-owned banks even played a countercyclical role during the global financial crisis. However, according to this study, the track record of state banks in credit allocation remains generally unimpressive, undermining the benefits of using state banks as a countercyclical tool.

periods of economic slack and when public investment efficiency is high.¹⁴ Moreover, countries with highly efficient public investment tend to have a higher stock of public capital, and each additional spending must take into account how marginal productivity depends on economic slack, economic needs and the costs of required operations and maintenance.¹⁵

18. Among European countries, Luxembourg enjoys a high stock of public capital and good efficiency, though public infrastructure could be further improved in certain areas.

According to an IMF database of public investment, Luxembourg enjoys the highest stock of public capital among European countries, suggesting that, over year, it built up infrastructure and other public capital that kept up with the demands of economic growth (left chart, Figure 5). The quality of infrastructure is measured by an index of opinions of business leaders around the world compiled by the World Economic Forum.¹⁶ Two facts stand out: first, its infrastructure quality is high (index of 5.7 out of a maximum of 7). Second, it is close to that of neighboring countries (Belgium, France and Germany). This index contains sub-components, for instance on the quality of transport infrastructure. According to these indices, Luxembourg ranks better for Roads, than for Air Transport and Railroads.



19. In Luxembourg, public investment generates short-term positive demand effects on economic growth. We perform a time series regression analysis of macroeconomic variables during 2000:Q1–2016:Q3 linking quarterly real gross value added growth to real gross fixed capital formation growth by the public sector and by the private sector, real GDP growth in the euro area, the quarterly growth rate of investment funds’ assets under management (an indicator of Luxembourg’s financial sector performance), an indicator of financial market volatility (VIX), and the

¹⁴ International Monetary Fund, *World Economic Outlook, Chapter 3, “Is it time for an infrastructure push? The Macroeconomic effect of public investment”*, October 2014.

¹⁵ Berg A, R Portillo, S C S Yang and L F Zanna (2013) “Public investment in resource-abundant developing countries”, *IMF Economic Review*, 61(1):92–129

¹⁶ The Executive Opinion Survey of the Global Competitiveness Index was audited by a team of survey experts from Gallups in 2008 and 2012 and is subject to annual internal reviews.

growth of EONIA as an indicator of the monetary policy stance in the euro area. In column (1), we find that all explanatory variables are statistically significant in the regression of total real gross value added (GVA) growth, with the sign as expected: an increase in real GVA growth is associated with an increase in the growth rates of public or private investment, a higher growth of funds' assets, a higher growth in the euro area, a lower market volatility, and a reduction in the overnight interest rate.

20. Public investment is positively associated with value added growth in the non-financial

sector. In columns (2) and (3), we study respectively the real GVA growth in the non-financial sectors and the real GVA growth of the financial sector. Interestingly, we find that the growth of real public investment is significantly associated with GVA growth in non-financial sectors. The impact is economically significant: an increase in the real public investment growth rate of 2 percentage points (which is about the sample mean) is associated with an increase of real GVA growth by 0.1 percentage point quarter-on-quarter (compared to a mean quarterly GVA growth of 0.7 percent). In the non-financial sector, GVA growth also appears to be impacted by macroeconomic performance of the euro area. In the financial sector, real GVA growth appears to be driven mainly by general conditions in global financial markets and monetary conditions. Considering an average quarterly public investment growth of 2 percent, and average real GVA growth of 0.7 percent, this would imply an elasticity of about 0.1, which is relatively low but consistent with the literature findings. For example, a recent study of the World Economic Outlook (2014) found short-term and long-term public investment elasticities of 0.4 and 1.4 respectively.¹⁷

21. Public investment is positively associated with long-term economic performance

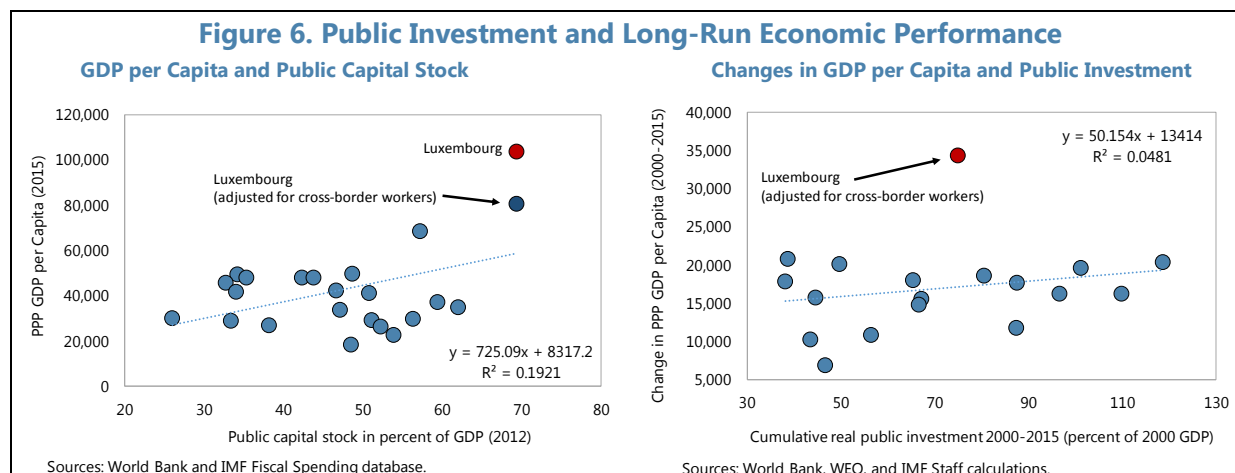
among European countries. The left-hand chart of Figure 6 plots the stock of public capital in percent of GDP against PPP per capita GDP. In the case of Luxembourg, we also consider the ratio of PPP GDP to population plus cross-border workers to take into account the fact that a large share of value-added is created by cross-border workers, even though this can also only be seen as a proxy as the cross-border workers' households are not fully being taken into account. The chart indicates that there is a clear positive relationship between the stock of public capital and the prosperity of a country, with causality that could go in both directions.¹⁸ The right hand chart plots the change in PPP GDP per capita between 2000 and 2015 against the cumulative public investment during the

Dependent variable: real value added growth (QoQ)			
	(1)	(2)	(3)
VARIABLES	Total GVA	Non-financial sectors	Finance & insurance
Growth of real public GFCF	0.0346*	0.0398**	0.0202
Growth of real private GFCF	0.0381**	0.0269	0.0743
Growth of investment funds	0.0737*	0.0251	0.223***
Real GDP growth euro area	0.815**	0.906**	0.514
VIX (-1)	-0.000409**	-0.000257	-0.000890*
Growth EONIA (-1)	-0.00218**	7.92e-05	-0.00967***
DW stat of OLS regression	2.6	2.7	2.5
Observations	66	66	66
R-squared OLS regression	0.357	0.246	0.351
Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1			
Note: Newey West standard errors allowing for autocorrelation up to 4 lags			

¹⁷ International Monetary Fund, *World Economic Outlook, Chapter 3, "Is it time for an infrastructure push? The Macroeconomic effect of public investment"*, October 2014. For a literature survey, see: Bom, Pedro R., and Jenny E. Ligthart, 2009, "What Have We Learned from Three Decades of Research on the Productivity of Public Capital?" *Journal of Economic Surveys* 28(3), November 2009.

¹⁸ For example, the positive association could illustrate the fact that richer countries can afford a higher stock of infrastructure.

same period. It provides suggestive evidence that countries with higher cumulative public investment tend to experience a faster increase in standards of living. However, infrastructure investment, either financed publicly or undertaken privately (such as in the framework of a public-private partnership), should be undertaken in an efficient manner and under strict oversight (Box 2).



Box 2. Considerations on the Efficiency of Public Infrastructure Investment¹

The quality of public investment management is an important determinant of the overall efficiency of public investment. It plays a crucial role at several stages: at the planning stage, when strategic decisions on the sustainable level of investment across the public sector, both at the national and local levels, are taken; at the stage of allocating resources, when deciding which sectors have priority and which projects are the right ones; and at the stage of implementation, with crucial considerations regarding project management, expenditure control, and reporting on project execution. Ensuring high quality of public investment management typically requires strong fiscal and budgetary frameworks, good coordination at various levels, national and sectoral planning, transparency of rules at each stage, adequate regulations of infrastructure companies, capacity to select and appraise, and to manage and monitor projects.

In the past decade, Public-private partnerships (PPPs) have accounted for a growing proportion of infrastructure services, though with important differences across countries. PPPs can offer advantages over public investment in term of mobilization of private resources and expertise, by bundling the design, construction and operation of an asset to provide incentives toward efficient, timely construction of infrastructure and maintenance of and cost recovery from those investments over time. However, to achieve long-term savings for the public sector over time taking into account net revenue flows, there should be strict oversight of the PPP, and risks between the public sector and the private firm to provide incentives and lower costs. Evidence from research also shows that PPPs work better when output, return and quality and predictable and measurable, and tend to perform poorly when PPPs are procured to circumvent budgetary constraints. In some cases, PPPs have also resulted in large fiscal costs due to poor contract designs, optimistic assumptions about revenues from user fees, and minimum income guarantees provided by the government.

¹ For references, see International Monetary Fund, 2015, "Making Public Investment More Efficient", International Monetary Fund, Washington D.C.; and: Engel, Eduardo, Fischer, Ronald, and Alexander Galetovic, 2013, "The Basic Public Finance of Public-Private Partnerships", *Journal of the European Economic Association*, 11(1):83–111.

E. Conclusion

22. The economy of Luxembourg appears to be relatively concentrated relative to comparator countries. Sectoral output is more concentrated than in other countries; this relative lack of diversification is observed even when the financial sector is excluded, or when comparing Luxembourg with other European countries with a small population. However, employment is similarly concentrated as in other countries. Luxembourg is specialized in sectors where its labor productivity is relatively higher than in several benchmark countries.

23. Public investment plays an important role in Luxembourg. Luxembourg enjoys a very high stock of public capital relative to other EU countries, with an overall good quality of infrastructure. Evidence suggests that public investment boosts demand in the non-financial sectors of the economy in the short-term, while helping sustain high standards of living in the long-run, consistent with the existing literature.

24. The State should continue to take steps to further diversify the economy by creating an enabling environment for future growth:

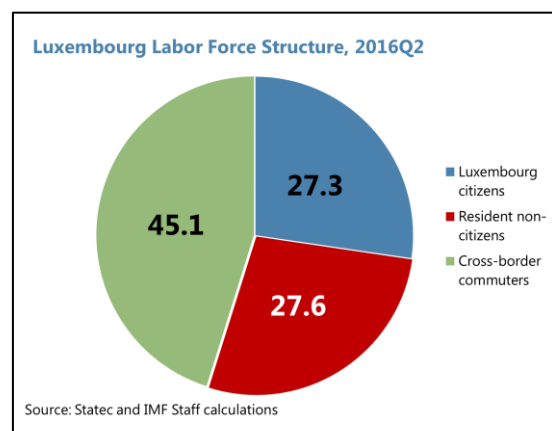
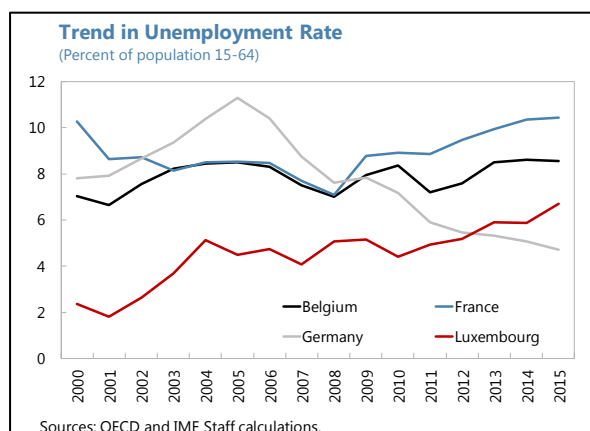
- First, the government should continue to regulate the economy in an arm's length and business friendly manner. Product market barriers to investment and innovation in the business services and retail sector should be removed. The central and local governments should take measures to ease zoning requirements for construction and shorten the period required to obtain permits. Administrative requirements on commercial buildings should be eased and better aligned with business demands. It should create a legal framework for its ownership participation in commercially oriented firms and further address concerns related to shareholding requirements, voting rights and multidisciplinary limitations in the business services sector.
- Second, the government should continue to invest in upgrading the infrastructure of the country to remove potential bottlenecks, such as in transport. Public investment should continue to follow rigorous planning, allocation and implementation of projects, and rely on strong fiscal and budgetary frameworks. Instead of publicly financed and managed projects, the government could consider public-private partnerships (PPPs). However, strict oversight of PPPs would be important to provide incentives to lower costs including through efficient risk sharing between the government and the contractor.

PROMOTING EMPLOYMENT OF VULNERABLE GROUPS TO MAKE GROWTH MORE INCLUSIVE¹

Luxembourg's unemployment rate is low by European standards, but it has risen since the global financial crisis. The youth and lower skilled workers are particularly at risk, in spite of innovative active labor market policies. Substantial employment disparities also remain across age and skill groups, and refugees as well as non-EU migrants are less integrated in the labor market. While public spending on education is high, it does not translate into higher students tests scores compared to other countries mainly due to Luxembourg's multilingual curriculum. To guide the design of policy reforms to promote employment of vulnerable groups and make growth more inclusive, this chapter first provides a comparative analysis of the recent performance of the labor market. Second, it identifies the role of individual socio-economic characteristics in determining labor market outcomes, using a standard probit regression model estimated on microeconomic data from the European Union Labor Force Survey. Third, it assesses the efficiency of active labor market policies and their interactions with the social benefits system. Fourth, it appraises the performance of the education system. Finally, it discusses policy options to ensure that growth benefits reach everyone in the society.

A. Recent Labor Market Dynamics

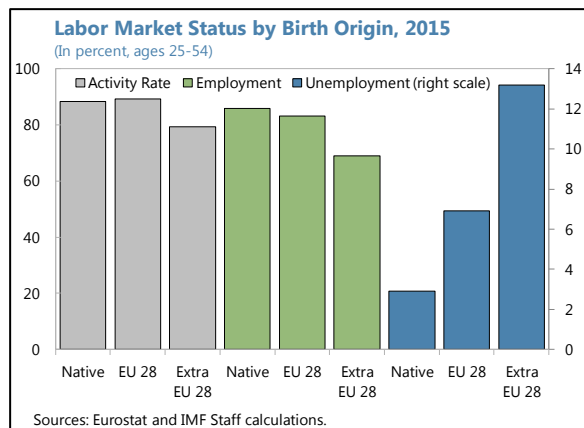
1. Luxembourg's unemployment rate is historically low by European standards, but it has steadily increased since 2010. At below 3 percent over 2000–03, the unemployment rate in Luxembourg was far below unemployment rates in neighboring countries. But, it was on an upward trend even before the onset of the financial crisis. Between 2010 and 2015, it increased by more than half and it currently exceeds the unemployment rate in Germany, despite a decrease from 2015 and onwards. In addition, an increasing share of new jobs accrue to cross-border workers who now represent more than 45 percent of the employed, reflecting skills mismatches.



¹ Prepared by William Gbohoui (EUR).

2. In Luxembourg, the unemployment rate is highest for low-skilled (below upper secondary) and young (15–24 years) workers (Figure 1). For instance, the share of people who did not finish secondary school accounts for 43 percent of the unemployed, more than double their share in the labor force. At the same time, comparison with the neighboring countries suggests that the unemployment rate for high skilled workers (graduated from tertiary education) is the second highest in Luxembourg after France. The unemployment rate of young workers remains higher than for older ones in Luxembourg as in neighboring countries. Overall, the unemployment rate is higher than in Germany, and lower than in France and Belgium for all age groups. In addition, the employment rate for older workers is lower in Luxembourg than in neighboring countries and the OECD average, mainly reflecting a lower participation rate.

3. Moreover, (un)employment disparities are substantial across birth origin subgroups within prime age in Luxembourg. Despite a slightly higher participation rate, EU migrants are less likely to be employed than natives. As a result, the unemployment rate of prime-age EU migrants is almost double that of natives. With relatively lower participation, non EU migrants end up with an unemployment rate which is four times that of natives. The difference in employment rates between natives and non EU migrants is almost twice the difference in participation rate, making non EU migrants potentially the most vulnerable group in the market.



4. Reforms to improve the activity rate of natives could help increase growth potential by increasing employment. Indeed, cross-country comparison suggests that the overall participation rate of natives is the lowest among most European countries, mainly due to low activity rates among young (15–24 years) and older (55–64 years) workers. In addition, the difference in the participation of natives, relative to EU 28 migrants is higher in Luxembourg than in most European countries. Together with the lower ratio of per capita GNI to per capita GDP than in neighboring countries, this suggests that there is a room to increase the participation of residents, including natives.

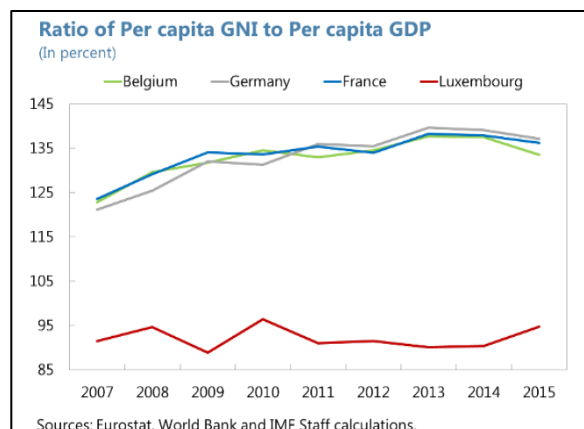
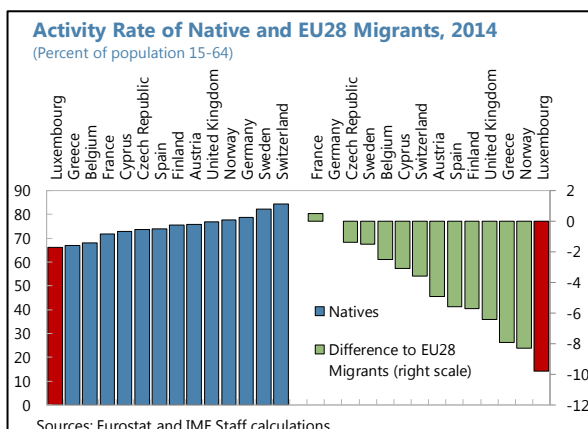
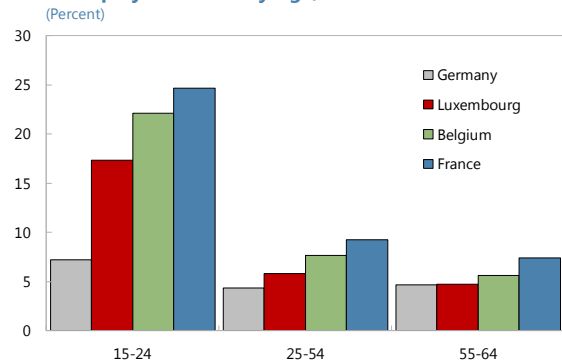


Figure 1. Labor Market Dynamics

Unemployment rate for young workers (15-24) is more than twice that of workers aged 25 to 54 years old, ...

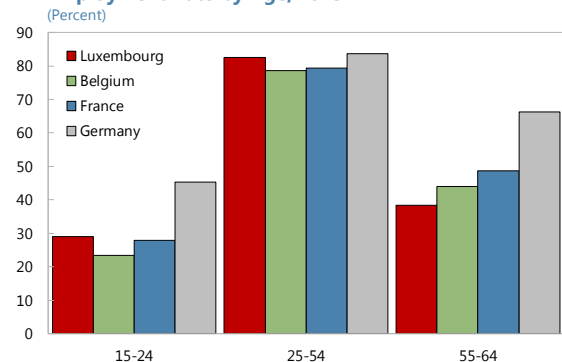
Unemployment Rate by Age, 2015



Sources: OECD and IMF Staff calculations.

Older workers' employment is the lowest, compared to neighbors, and ...

Employment Rate by Age, 2015

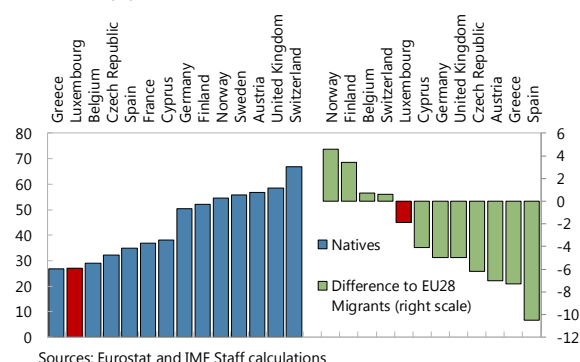


Sources: OECD and IMF Staff calculations.

Low activity rates among young and ...

Activity Rate of Native and EU28 Migrants, 2014

(Percent of population 15-24)

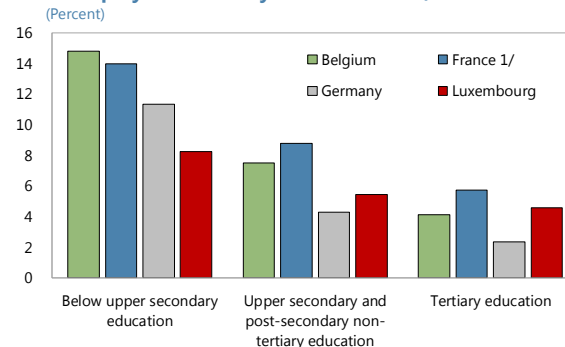


Sources: Eurostat and IMF Staff calculations

Source: OECD, Eurostat, and IMF staff calculations.

... and high skilled workers are more likely to be unemployed than in Germany and Belgium.

Unemployment Rate by Education Level, 2015



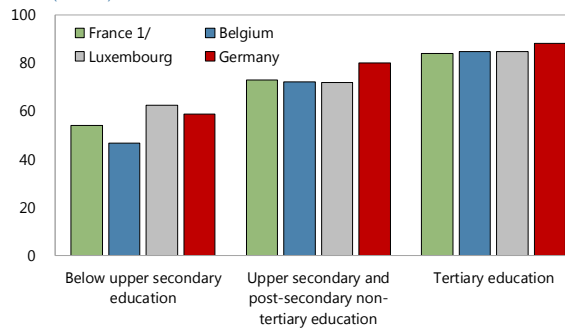
Source: OECD.

1/ France data refers to 2014.

... lower skilled workers are less likely to be employed than higher skilled ones.

Employment Rate by Education Level, 2015

(Percent)



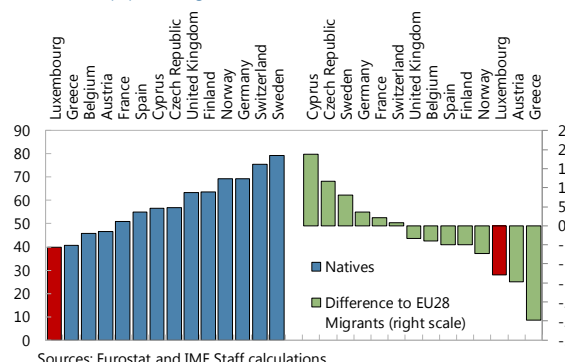
Source: OECD.

1/ France data refers to 2014.

... older workers contribute to lower overall participation rate relative to EU28 migrants.

Activity Rate of Native and EU28 Migrants, 2014

(Percent of population ages 55-64)



Sources: Eurostat and IMF Staff calculations.

B. Who Are the Vulnerable Groups in the Labor Market?

5. The design of policies to increase employment rates requires the identification of the groups at risk. To assess the factors underlying labor market performance, we explore the relative likelihood of being out or in a job conditional on belonging to a certain socioeconomic group. We use a standard probit regression model estimated on microeconomic data for Luxembourg and neighboring countries from the European Union Labor Force Survey (EU LFS).² In contrast to summary statistics, probit regressions allow controlling for overlap between vulnerable sub-groups. Thus, we compare the impact of individual background factors like age, gender, household composition, level of education, origin and years of residency in determining labor market outcomes both pre- and post-crisis. The study has been extended to neighboring countries (France, Belgium) to allow cross-country comparisons.³ To assess the potential effects of the global financial crisis on labor market performance, we consider 2006 as the pre-crisis reference year, and compare it to 2014, which is the most recent post-crisis year for which data are available.

6. The results show that young, non-EU immigrants and low-skilled workers, are more vulnerable than other subgroups.

- Age has a varied effect on the probability of being unemployed. Youth has the highest probability of unemployment both before and after the crisis. Indeed, an individual aged between 15 and 24 years old is 12.6 percentage points more likely to be unemployed in 2014 than an individual aged 25 to 54 years old. Cross-country comparison shows that the unemployment youth penalty is broadly in line with neighboring countries (Annex I, Table A1).
- In 2006, the unemployment risk of an individual who did not finish upper secondary school was 2.9 percentage points higher than the probability of being unemployed for an individual who has a university degree. This penalty went up with the crisis to 3.7 percentage points in 2014. This skill unemployment penalty is considerably lower than in Belgium and France (Annex I, Table A1).

Table 1. Probit Regression

Individual characteristics	Probability ^{1,2} of being			
	Unemployed		Employed	
	2006	2014	2006	2014
Age				
25-54 years (base)	0.036	0.044	0.794	0.817
15-24 years	0.139	0.126	-0.535	-0.561
55-64 years	-0.021	-0.004*	-0.495	-0.418
Gender				
Female (base)	0.056	0.051	0.440	0.476
Male	-0.024	0.002*	0.152	0.096
Country of birth				
Native (base)	0.032	0.032	0.510	0.526
EU born	0.020	0.035	0.026	0.005*
Non-EU born	0.088	0.097	-0.071	-0.072
Education attainment				
Lower secondary (base)	0.057	0.073	0.447	0.429
Upper secondary	-0.017	-0.013*	0.085	0.082
Tertiary	-0.029	-0.037	0.179	0.182
Years of residency				
Less than or equal to 1 year (base)	0.054	0.080	0.501	0.422
2 or 3 years	0.004*	0.009*	0.003*	0.078
4 years or more	-0.011*	-0.031*	0.014*	0.102
Observations	36,396	6,106	67,868	11,085

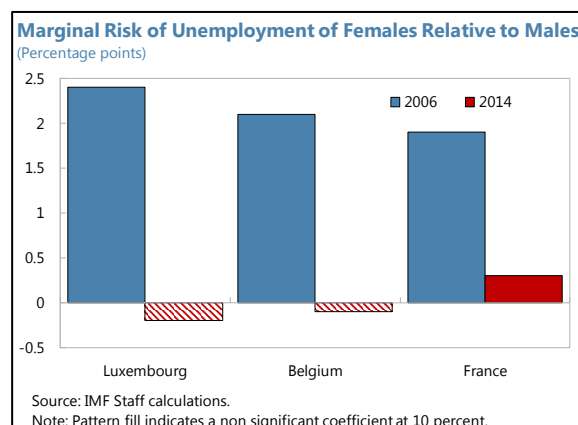
* Indicates that the result is not significant for $p < 0.1$
¹ Change in probability compared to the base category unless otherwise noted.
² Estimates are robust to heteroskedasticity. Full estimation results are presented in annex.

² For further details on data and econometric specification, please refer to Annex I.

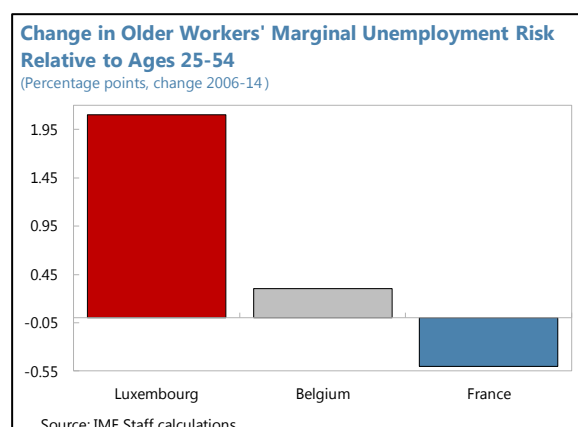
³ Germany is not included to the LFS data set.

- These results are broadly confirmed when looking at conditional employment probabilities.
- Conditional on all other individual background factors, the unemployment risk for non-EU born migrants is more than three times that of natives.

7. Cross-country comparison shows that before the crisis, Luxembourg had the highest marginal unemployment risk for females, relative to male workers. But, this gender difference has vanished after the crisis. In 2014, there was no significant difference between the risk of unemployment between male and female workers in Luxembourg, or Belgium. This finding is explained by an increase in the absolute unemployment risk of male workers after the crisis and an increase in the absolute employment probability of females after the crisis. Despite this increase in the female employment rate, male workers are 9.6 percentage points more likely to be employed in 2014, indicating a lower activity rate for females.



8. The unemployment risk for older workers has increased, more than proportionally to the increase in overall unemployment in Luxembourg after the crisis. In comparison to an individual aged 25 to 54 years old, the marginal probability of unemployment for older workers (55–64 years) was 2.1 percentage point lower in 2006. However, older workers in Luxembourg have lost this premium after the crisis and in 2014 there was no longer a significant difference in the risks of unemployment between these two age groups. Over the same period, this premium increased in France.

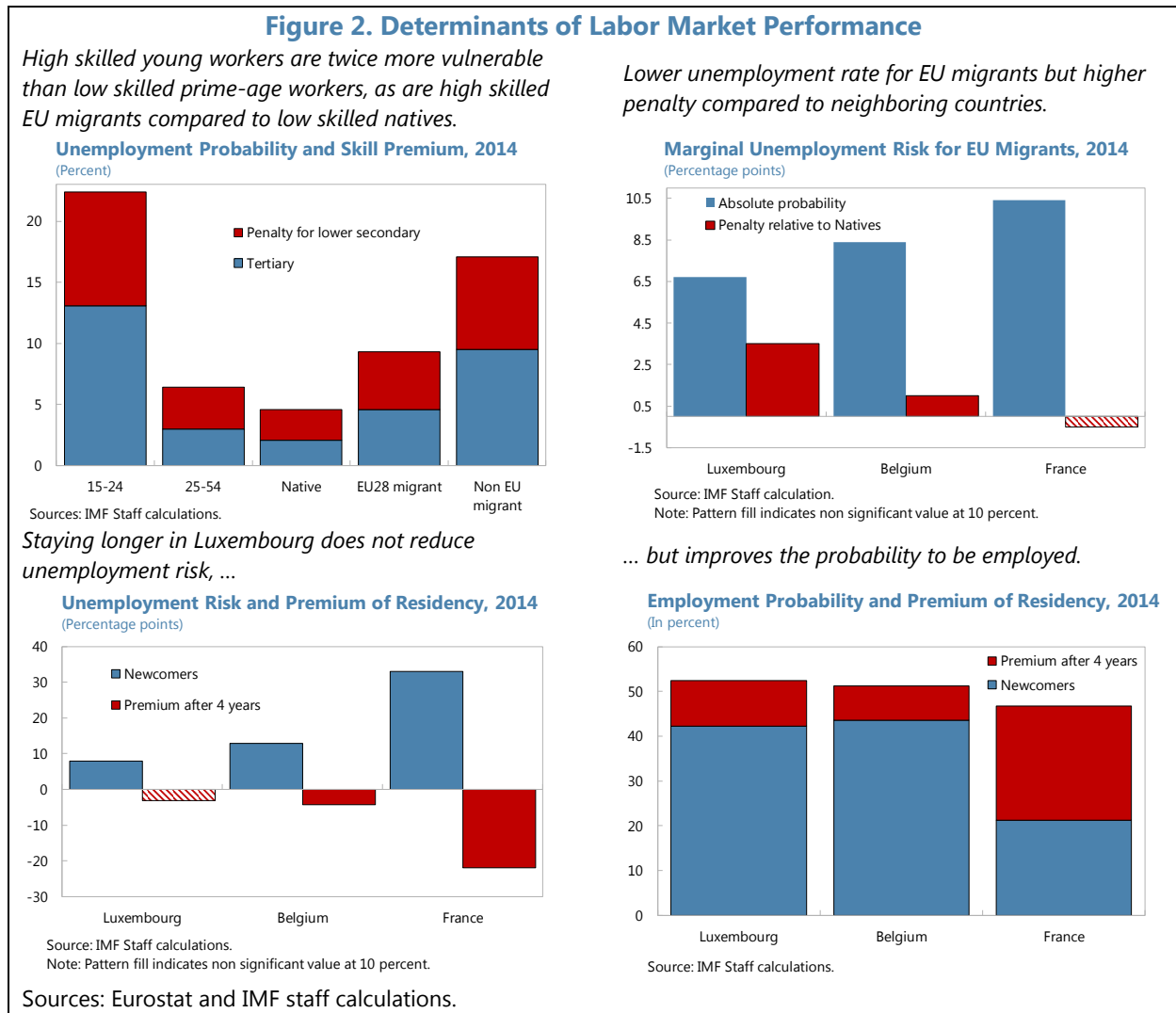


9. The absolute unemployment risk for EU born migrants was lower in Luxembourg than in neighboring countries but they incur the highest marginal unemployment risk (Figure 2). The absolute risk of being unemployed for EU born migrants in Luxembourg was 6.7 percent in 2014 (base category probability plus marginal effect), the lowest in comparison to neighbors, partially due to the higher overall unemployment rate in the other countries. But, relatively to natives, EU born migrants have the highest marginal unemployment penalty in Luxembourg. When focusing on employment probabilities, we find that in 2014, EU migrants have the same conditional probability to be employed as natives. Together, these findings imply EU born migrants participate more the labor market but have higher risk to be out of a job. Non-EU born migrants are much more likely to be unemployed than EU born migrants and natives in Luxembourg, as in neighboring countries.

Consistent with the summary statistics, these results suggest that efforts are needed to ease migrants' integration to the labor market, and to increase labor market participation among natives.

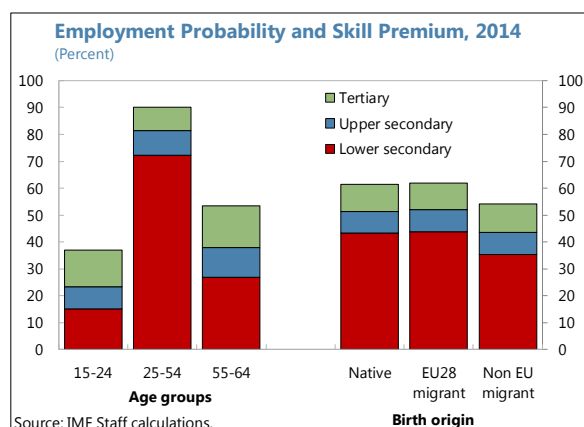
10. Staying longer in Luxembourg increases migrants' labor market participation

(Figure 2). Recently immigrated workers have a better chance to get a job in Luxembourg than in the other covered countries. But, years of residency do not affect the unemployment risk of migrants in Luxembourg, while they matter for the probability of being employed. In fact, there is no statistical difference between the unemployment risk of newcomers and those who stayed for more than 4 years, but the probability of being employed, relative to newcomers, increases by 10 percentage points after 4 years of residency. These findings suggest that activity rates of migrants increase over time, pointing to scope for targeted policies to accelerate migrants' integration to the labor market. In France, staying for 4 years or more reduces the risk of unemployment by 22 percentage points in France, compared to recently immigrated workers.



11. Joint probabilities estimates confirm the previous results that young, non-EU migrants and low skilled workers underperform compared to other groups (Annex I, Table A2). To better gauge the factors determining individual labor market performance, we compare the likelihood of being in or out of a job for sub-groups of age (young, prime-age, older), education levels (low secondary, upper secondary, and tertiary), birth origin (native, EU born and non-EU born), and gender. The results confirm that with comparable other socio-economic backgrounds, young workers underperform compared to other age groups; low skilled are more vulnerable than high skilled; non-EU migrants have less chance to be employed than natives and EU born migrants. Estimates also confirm that there is little difference between the unemployment probability of men and women with comparable socio-economic background.

12. Surprisingly, young workers with a university degree are at least twice more likely to be unemployed than prime-age workers who do not finish secondary school. For instance, the unemployment probability of high skilled young workers is 13.1 percent, more than the double of the unemployment risk of low skilled prime-age workers. This finding remains when we consider employment probabilities. Indeed, high skilled young workers have a probability of 37 percent to get a job, while low skilled prime-age workers are employed with a chance of 72.2 percent. We also find that, across sub-groups, there is no statistical difference in the unemployment risks between workers who do not complete a university degree and those who did not finish secondary school. Indeed, jobseekers who complete upper secondary school face the same unemployment risk as those who just completed lower secondary school. However, finishing secondary school still increases the probability to be employed. This result could be explained by a higher activity rate among workers who finish secondary school compared to those who did not.

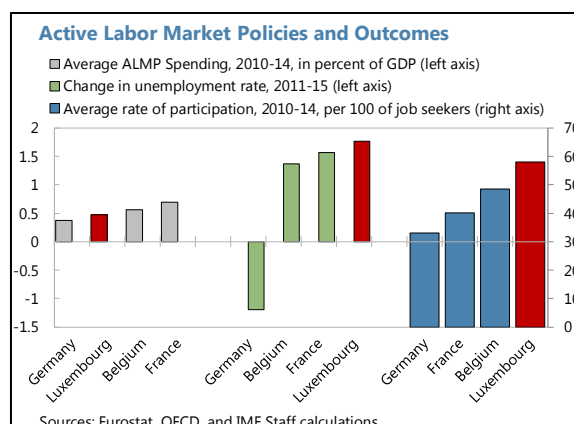
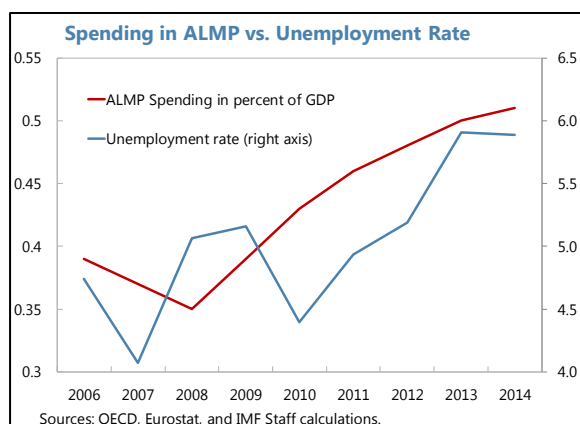


13. Finally, non-EU migrants with a university degree are twice more likely to be unemployed than low skilled natives (Figure 2). Indeed, subsample results indicate that the unemployment probability of non-EU migrants with a tertiary degree is more than twice that of low skilled natives. EU migrants need at least a university degree to be as successful as low skilled natives. However, there is no statistical difference in the employment probabilities of EU migrants and natives with the same qualification whereas non-EU migrants have a slightly lower probability to be employed. Moreover, additional education attainment provides a similar premium on employment probability for both natives and migrants.

C. Work Incentives and Labor Market Policies⁴

14. Recent studies by IMF staff suggest that effective Active Labor Market Policies (ALMP) can boost output and employment regardless of cyclical economic conditions.⁵ Indeed, *World Economic Outlook* estimates find that discretionary increases in public spending on ALMP have a statistically significant impact on medium-term output and employment. The effects are lower, but remain positive, in bad times than in expansions. The effects are amplified when higher spending is combined with other reforms intended to increase the efficiency of ALMP. If implemented in a budget-neutral manner, the effects remain significant and do not vary substantially with the business cycle, even though they are smaller. Moreover, higher budget-neutral spending in ALMP implies net positive fiscal benefits over the medium term.⁶

15. Higher unemployment has been accompanied with higher spending on Active Labor Market Policies (ALMP) in Luxembourg. Indeed, ALMP spending has increased from less than 0.35 percent of GDP in 2010, to more than 0.5 percent of GDP in 2014. However, average ALMP spending over the period 2010–14, in percent of GDP, was still lower in Luxembourg than in Belgium and France, but higher than in Germany. Moreover, cross-country comparison suggests that labor market policies cover a larger share of job seekers in Luxembourg than in neighboring countries. Despite these policy efforts to promote employment, Luxembourg's unemployment rate increased from around 4.5 percent in 2010 to almost 6 percent in 2014. While the unemployment rate rose also in France and in Belgium, it decreased by more than 1 percentage point in Germany.



⁴ The analysis in this section is based on the OECD's tax and benefits model. Definition of work incentives measures are provided in the note at the bottom of Figure 2.

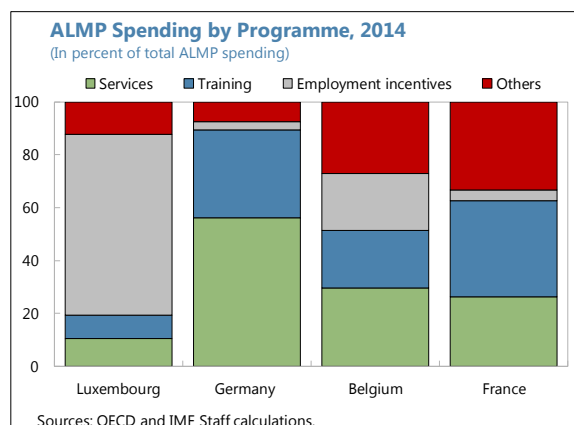
⁵ International Monetary Fund, *World Economic Outlook, April 2016, Chapter 3*.

⁶ Fiscal cost and gains from structural reforms, forthcoming IMF SDN.

16. Evaluations of ALMPs suggest that their effectiveness depends on program types and the targeted groups.⁷

The OECD breaks LMP into services, supports, and activation measures (Box 1). Activation measures include training, direct job creation, and employment and start-up incentives. Most recent evaluations in other OECD countries suggest that job search assistance programs (LMP services) yield the best impacts especially in the short run. Start-ups incentives for the minority among the unemployed who have entrepreneurial

skills and the motivation to survive in a competitive environment are also effective. Training programs are not particularly effective in the short run, but have more positive medium term effects (after 2 years). Programs targeting youths are significantly less likely to be effective unless they contain an appropriate mix of schooling, strengthening of occupational skills and on-the-job training, ideally in an integrated manner. Direct employment programs in the public sector are generally less successful than other types of ALMPs. In 2014, Luxembourg spent relatively more in employment incentives compared to other countries. Germany, whose ALMPs have proven to be highly successful, spent relatively more in public employment services and training. Employment subsidies should be limited and well monitored to avoid providing windfalls to employers without creating durable jobs.



17. Enhancing and continuously adapting the public employment agency (ADEM) policies to vulnerable groups could help improve the efficiency of ALMPs.

The Youth Guarantee Scheme initiated in 2014 aims to increase employment of the young. The professionalization placement program and the professional reinsertion employment contract, launched in 2016, offer opportunities to workers above 45 years old, to highlight their professional capabilities or to improve their knowledge and professional capacities within a company for a short period of time. A new interactive platform, JobBoard, officially launched in March 2016, is intended to improve the matching between job seekers and employers. Special measures to reconcile professional and family responsibilities, in order to promote women business entrepreneurs, are intended to improve the insertion of women in the labor market.⁸ The ADEM also developed internal language training for job-seekers from immigrant communities. Efforts to ease integration of refugees to the labor market include the Accelerated Integration Programme initiated to enroll newcomers into language classes, schools, and other training programs as also recommended by the 2016 consultation.

⁷ Grubb et al. (2001), Kluve (2010), Card et al. (2010), Martin (2014) provide a review of the most recent generations of ALMPs in OECD. Kluve (2010) focused on ALMP evaluations in Europe.

⁸ Luxembourg 2020, National plan for smart, sustainable and inclusive growth, 2016.

Box 1. OECD LMP Database: Coverage and Limits¹

Definition and coverage: Labor Market Policy (LMP) data published by OECD covers public interventions in the labor market intended to improve its efficiency and to correct disequilibria. Thus, they are limited to policy interventions targeted to favor vulnerable groups in the labor market. Data include public expenditure and participants and are collected annually from administrative sources. LMP distinguishes eight main categories of labor market interventions classified by type of actions: services (category 1), activation measures (categories 2–7), and supports (categories 8–9). LMP services and activation measures are generally considered as Active Labor Market Policies (ALMP), while LMP supports are referred to as passive LMP.

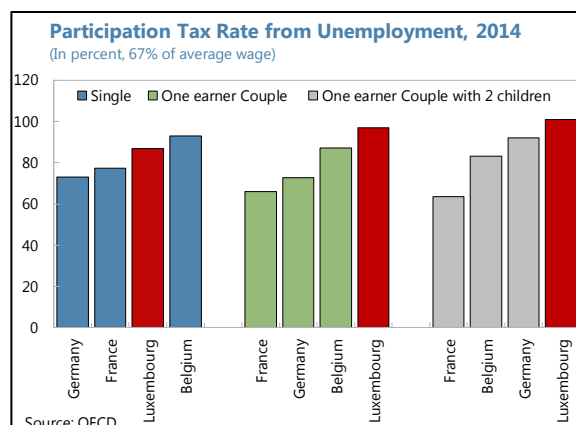
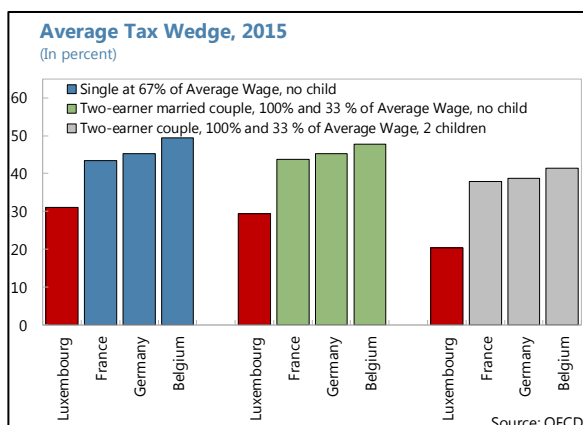
- **LMP services** cover all services and activities of the public employment service (PES) together with any other publicly funded services for jobseekers.
- **LMP measures** cover activation measures for the unemployed and other targeted groups, and consist in training, job rotation and job sharing, employment incentives, supported employment and rehabilitation, direct job creation, and start-up incentives.
- **LMP support** covers financial assistance that aims to compensate individuals for loss of wage or salary (out-of-work income maintenance and support, i.e. mostly unemployment benefits) or which facilitates early retirement.

Caveats: The OECD data set has some features which may limit the results of empirical evidence on the impact of ALMP. First, to be included, the labor market measures should be publically financed. Second, they should be targeted to a specific group of individuals who are at risk in the labor market. Third, it excludes in work benefits such as Earned Income Tax Credit in US or the Prime de l'Emploi in France when they are not conditional on the search for work, measures targeted to all members of a vulnerable group such as wage subsidies for young people or for people in depressed regions, and measures that pay a wage subsidy for an indefinite period. Fourth, cross-country data comparability issues also arise as some countries exclude some measures that others include. For example, France and Italy include most of their public spending on apprenticeships in the database while other do not due to the targeting criteria. Luxembourg includes the *Indemnité Compensatoire* in employment incentives while similar scheme does not necessarily exists in other countries. Differences in definitions and programs among the countries, and continuous changing of the mix of programs also make direct comparisons difficult.

¹ <https://www.oecd.org/els/emp/Coverage-and-classification-of-OECD-data-2015.pdf>

18. The labor tax wedge is lower than in neighboring countries but unemployment traps appear strong.⁹ The lower tax wedge implies higher incentives for employers to hire new staff. But, unemployment traps are relatively prevalent with a relatively higher participation tax rate from unemployment across a range of family situations compared to neighboring countries. For instance, in 2014, one-income earner couples with two children resuming work after unemployment at 67 percent of the average wage lose more in tax and reduced benefits than the gross income they earn. In fact, the participation tax rate exceeds 100 percent for this family situation. For a single parent with two children, it is 95 percent, against 75 percent on average in the EU. Replacement rates are also higher for both short-term and long-term unemployed than in neighboring countries across a range of family situations (Figure 3). A one-income earner unemployed couple with two children maintains 100 percent of its previous earnings in the first year and more than 89 percent in the long run.

⁹ For further details on the social benefits system, see “Addressing Disincentives to Work” in the [Selected Issues for the 2014 Article IV Consultation](#), pages 14–17.



19. Inactivity and low wage traps are also higher than in neighboring countries (Figure 3).

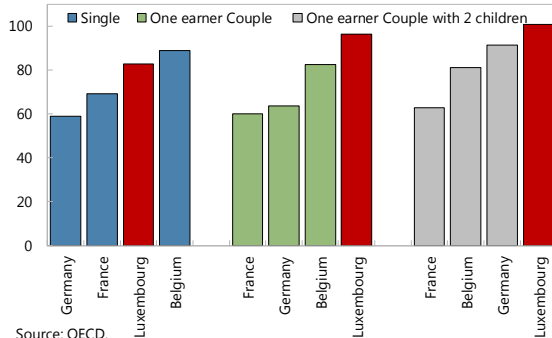
Compared to neighboring countries, the participation tax rate from inactivity is the highest in Luxembourg across a range of family situations. In addition, the Marginal Effective Tax Rate (METR) exceeds 99 percent for one-income earner couples with or without children when the pay is below 67 percent of average wage. Thus, it makes more financial sense, for these family situations, to stay inactive or unemployed than to take a job.

20. To enhance the efficiency of ALMPs, further adjustment of benefits to create incentives toward participation is needed. ALMPs are not a magic bullet. The individual decision of joining the labor force or taking up a job also depends on the generosity of social benefits and on the tax system. Hence, there are potential interactions between the welfare benefits, the size and mix of ALMP, and the benefit eligibility conditions in terms of job search and employability. Further steps should be taken to closely monitor unemployment benefits, further link them to job search, and tighten eligibility requirements.

Figure 3. Social Benefits and Labor Cost

Initial replacement rate is higher in Luxembourg across a range of family situations, ...

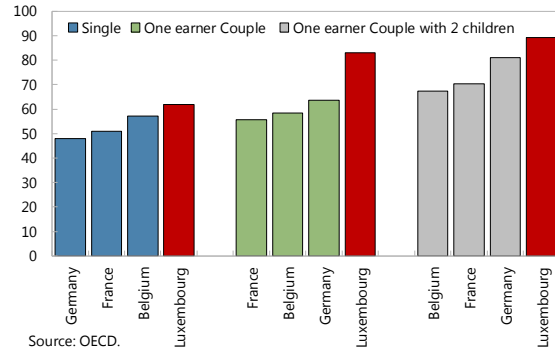
Initial Net Replacement Rate, 2014
(In percent, 67% of average wage)



Source: OECD.

...as is long term replacement rate, compared to neighbors. ...

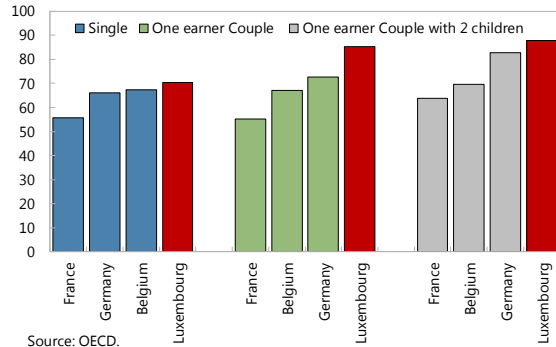
Long Term Net Replacement Rate, 2014
(In percent, 67% of average wage)



Source: OECD.

... Inactivity trap is also strong,

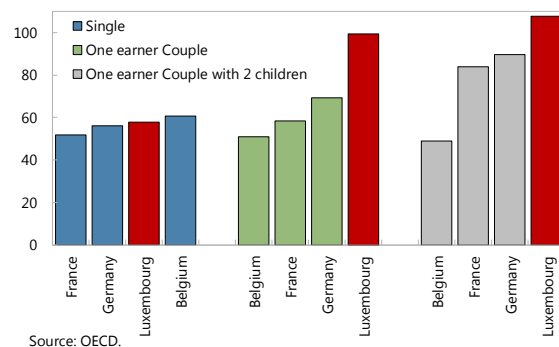
Participation Tax Rate from Inactivity, 2014
(In percent, 67% of average wage)



Source: OECD.

... as is low-wage trap.

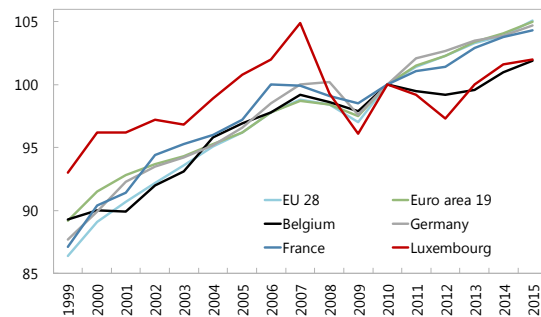
Marginal Effective Tax Rate, 2014
(In percent, 33% to 67% of average wage)



Source: OECD.

Declining labor productivity contributed to ...

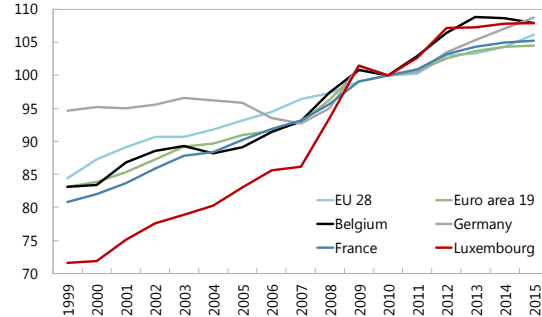
Real Labor Productivity per Hour Worked
(Index, 2010=100)



Source: Eurostat.

... increasing unit labor cost.

Unit Labor Cost per Hour Worked
(Index, 2010=100)



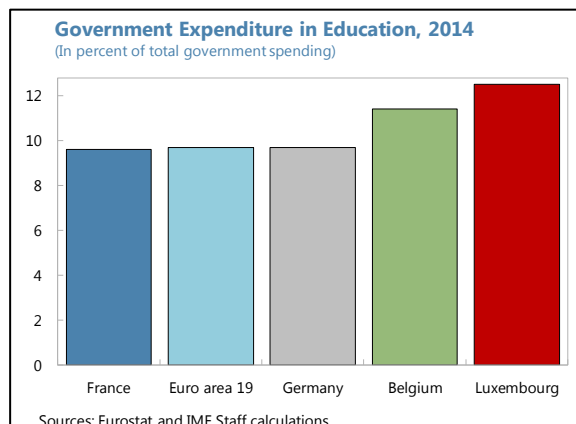
Source: Eurostat.

Note: OECD defines the Net Replacement Rate (NRR) as the net income of an unemployed person receiving unemployment and possibly other benefits, expressed as a share of the income earned previously in the job before becoming unemployed. It is measured at different points in time because unemployment benefits decline over the unemployment spell. The Marginal Effective Tax Rate (METR) measures the part of an increase in earnings due to increase in the number of hours worked or to a change in employment situation that is taxed away by personal income taxes and social contributions while taking into account the possible withdrawal of social benefits. The Participation Tax Rate (PTR) is the proportion of gross earnings taken in tax or reduced benefits when an unemployed (or inactive) person gets employed. It is measured by one minus the financial gains to working as proportion of gross earnings.

Sources: OECD and IMF staff calculations.

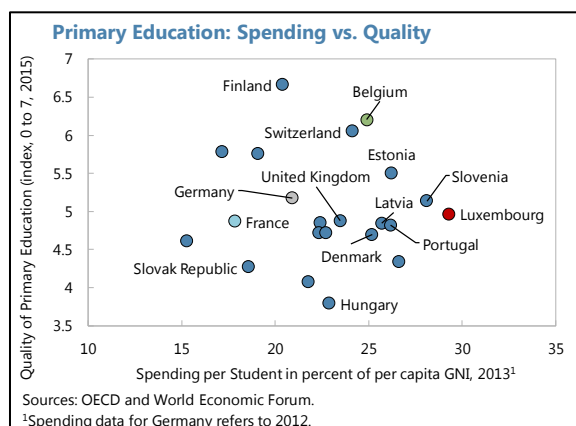
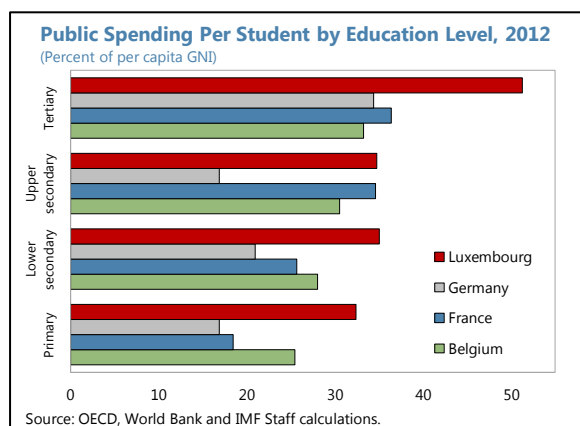
D. Performance of the Educational System

22. Public spending on education in Luxembourg, at 12.5 percent of total government outlays, represents a higher share of government expenditure than in neighboring countries and the Euro Area average. This result remains true even after controlling for school enrollment and living standards. Indeed, in 2012 public spending per student, in percent of per capita GNI, was higher in Luxembourg than in all neighboring countries, and this is the case for all levels of education.¹⁰



In primary and upper secondary education, public spending per student in Luxembourg is double that in Germany.

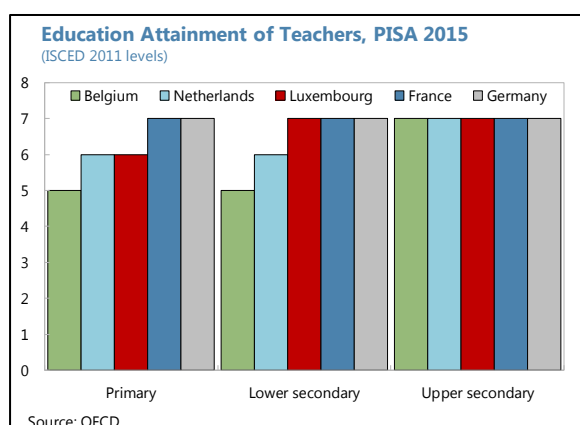
23. The high level of education spending is not reflected in overall education attainment, indicating scope for efficiency orientated reforms. In 2015, in all fields (math, science and reading), students in Luxembourg had lower performance than in neighboring countries. A simple cross-country scatter plot of spending per student in secondary school and average PISA scores shows that Luxembourg spends almost the double per student—even after controlling for living standards—than its neighboring countries, but student test scores are among the lowest (Figure 4). For instance, Luxembourg spent more than 35 percent of per capita GNI per student in 2012, but test scores rank far below those of Japan which spent less than 27 percent of per capita GNI per student.¹¹ This finding holds true even when we focus only on primary education. Indeed, the primary education system in Luxembourg is not perceived to be of better quality than in other countries while it spends far more than almost all European countries. Also, the higher unemployment rate of high skilled workers, compared to Belgium and Germany, suggests the presence of skill mismatches partly reflecting deficiencies in education and training.



¹⁰ While 2013 is the most recent data available from OECD, Germany data are not available for 2013.

¹¹ In absolute terms, Luxembourg spent more than 22,000 USD per student in 2012 while Japan spent 10,000 USD.

24. Requirements to enter the teaching profession are in line with neighboring countries, but less primary teachers have the required qualification. Duration of pre-service teacher training, and teachers' education attainment are in line with neighboring countries. Teaching practicum is required as part of pre-service training for both primary and secondary education, and teachers are required to be certified, as in neighboring countries. The student-to-teacher ratio is also relatively low in Luxembourg (Figure 4). Moreover, teachers are highly paid by European standards. Indeed, average salaries of lower secondary school teachers with minimum training and 15 years of experience is the highest in Luxembourg compared to neighboring countries, even after controlling for living standards. While higher salaries should help school systems to attract the best candidates to the teaching profession, the requirement of multilingual competency makes the recruitment of fully qualified teachers challenging. For instance, in schools attended by 15-year-olds, a lower percentage of teachers are fully certified in Luxembourg than in neighboring countries. Furthermore, less than a quarter of primary teachers in Luxembourg has the required training against 77 percent in Belgium and 100 percent in Germany and The Netherlands.



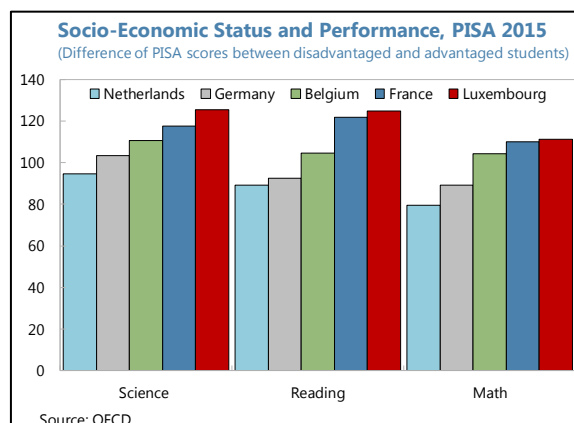
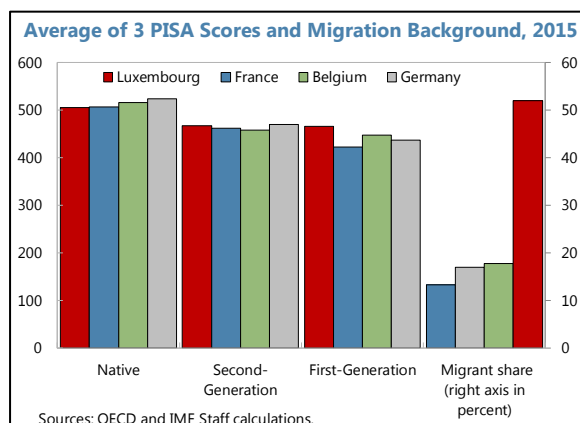
25. The lower performance of the educational system can be partially explained by the trilingual curriculum, the diversity of the student population, and the difficulties encountered by socio-economically disadvantaged pupils.¹² Luxembourg's trilingual (Luxembourgish, French, and German) education system is both an asset and a challenge for its highly diverse student population. In addition, students speaking a different language at home than Luxembourgish represent 62 percent of the student population in the academic year 2014–15.¹³ Students with an immigrant background represent 52 percent of the student population, more than three times their share in neighboring countries.¹⁴ Difficulties with the language of instruction lead to failure in other disciplines for numerous students, especially students from families where another language than Luxembourgish is spoken, thus diminishing their chances of academic success. In Luxembourg,

¹² https://ec.europa.eu/education/sites/education/files/monitor2016-lu_en.pdf

¹³ Ministry of education (2016), <http://www.men.public.lu/catalogue-publications/themes-transversaux/rapport-activites-ministere/2015/1-fr.pdf>

¹⁴ Table I.7.1, PISA results 2015, Volume I. <http://www.oecd.org/education/pisa-2015-results-volume-i-9789264266490-en.htm>

average PISA scores of natives and second-generation students are broadly in line with neighboring countries, while first-generation immigrant students perform better than in neighboring countries. The overall lower students' performance is partially explained by the high share of migrants because students with an immigration background perform less well than natives. In addition, strong correlation exists between socioeconomic status and education performance, with socioeconomically disadvantaged students underperforming compared to their more advantaged peers in all fields.¹⁵ Compared to neighboring countries, differences in performances between the two groups are the highest in Luxembourg.



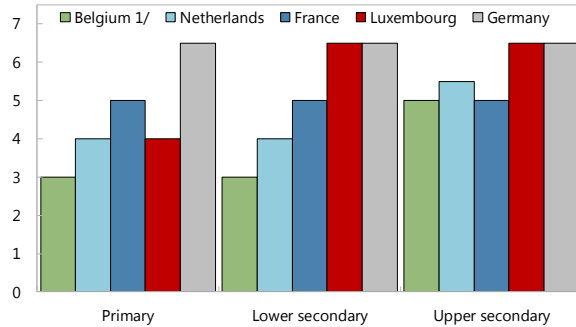
26. Further reforms to improve the quality of education and vocational training are essential to ensure that the educational offer is in line with the skills needed in the labor market. The authorities have undertaken some measures to diversify education and training curricula through the creation of public European schools and public English primary schools, and to improve the quality of early childhood education and care. A newly created National Education Training Institute took over the initial training of teachers from the University of Luxembourg and will also be in charge of in-work training of teachers. An agreement signed between the ministry of education and the University of Luxembourg in June 2016 envisages the creation of the Luxembourg Centre for School Development, which will draft a report on the quality of the educational system and assist schools in developing curricula and creating teaching materials. But, further steps such as on-job training for teachers, and additional support for struggling and socio-economically disadvantaged students are still needed to improve education outcomes.

¹⁵ PISA 2015 defines an index of Economic, Social and Cultural Status (ESCS) using several variables related to students' family background: parents' education, parents' occupations, proxies for material wealth, and the number of books and other educational resources available in the home. Students are considered socio-economically advantaged (disadvantaged) if their ESCE values are among the top (bottom) 25% students within their country.

Figure 4. Education Input and Outcome

Requirement to enter the teaching qualification is in line with neighboring countries, ...

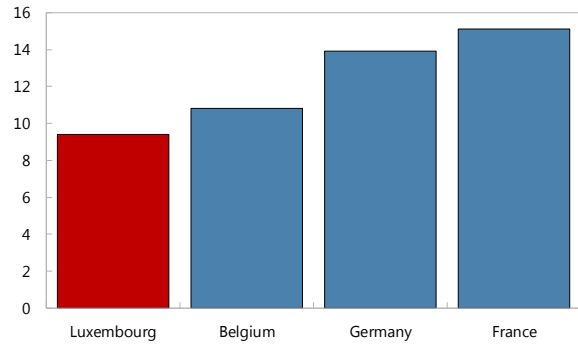
Duration of Teacher's Training, PISA 2015
(In years)



Source: OECD.
1/ Training duration of Belgium refers to the minimum of the Flandrois and French system

... and student-to-teacher ratio is lowest, ...

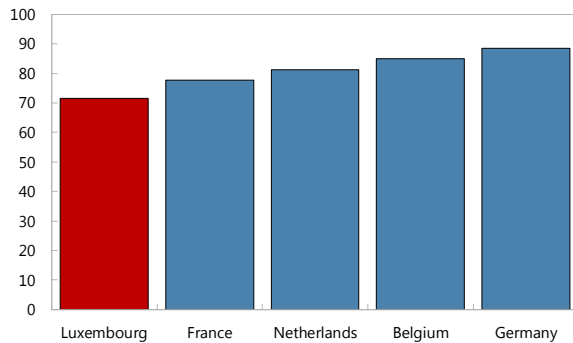
Student to Teacher Ratio, PISA 2015
(In number of students per teacher in primary and secondary school)



Source: OECD.

... but a lower share of teachers is fully certified.

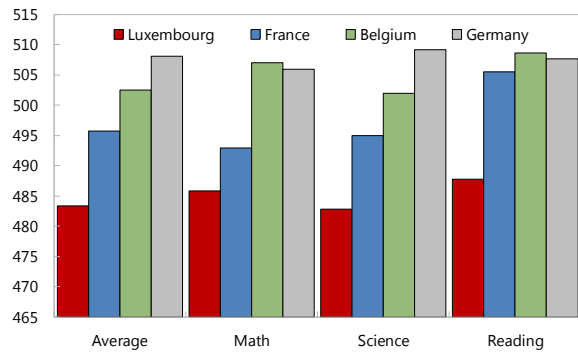
Fully Certified Teachers, PISA 2015
(In percentage of total teachers)



Source: OECD.

In addition, student test scores, in all subjects, are lower than in neighboring countries, ...

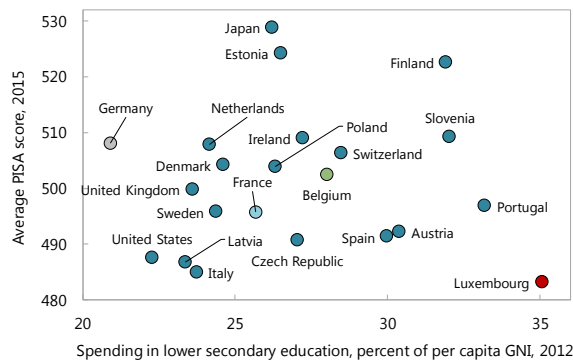
Student Performance, 2015
(In mean PISA score)



Sources: OECD and IMF Staff calculations.

... despite highest spending per student ...

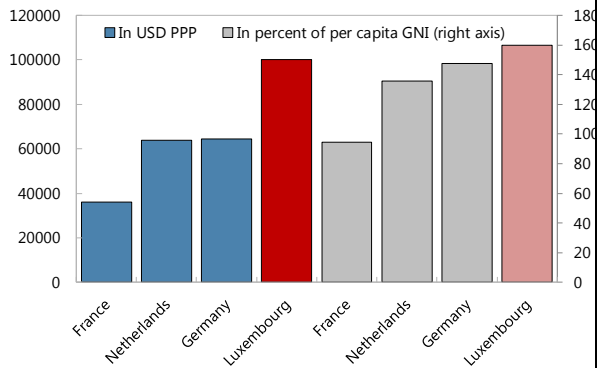
Average PISA Score vs. Public Spending per Student



Sources: OECD, and IMF Staff calculations.

... and highest teachers' salaries.

Teacher's Salaries in Lower Secondary School after 15 Years



Sources: OECD, World Bank, and IMF Staff calculations.

E. Conclusion

27. Luxembourg's unemployment rate has been on an upward trend since the financial crisis, despite higher spending on Active Labor Market Policies. The unemployment rate remains relatively high, by historical standards. In spite of innovative measures by ADEM, many young and low skilled persons are not working, and non-European migrants and refugees are less integrated to the labor market. In addition, more than half of new jobs created go to cross border commuters, mainly due to skills mismatches, reflecting deficiencies in education and training. The generosity of the unemployment and social benefits also creates substantial unemployment and inactivity traps.

28. This paper identifies a range of policy options to make growth more inclusive and fully unleash the potential of the economy.

- Promoting employment. To bring the growth benefits to all, the public employment agency (ADEM) should continue to increasingly target its interventions at the most vulnerable groups in the labor market, notably the young and low-skilled, as well as non-EU immigrants and refugees, including by expanding job search assistance and enhancing the apprenticeship system.
- Easing integration of refugees. Further steps to speed up diploma recognition, and to provide language classes and other training for refugees are needed to facilitate their integration. Coordination between the Ministry of Family and ADEM is important for an efficient implementation of the Accelerated Integration Programme.
- Reducing inactivity and unemployment traps. The social benefits system could be rationalized to promote participation and to reduce work disincentives, with the aim to increase the share of take-home income related to activity. Further linking unemployment benefits to job search is also needed to promote active job search and acceptance of available vacancies. The tax system could also be re-designed to increase the wedge between inactivity income and work income, and reduce the speed of the reduction in existing social benefits received as work income rises.
- Improving education outcomes. To better ensure that graduates are equipped with the skills needed in the labor market, education reforms should focus on upgrading education outcomes in the context of a multi-lingual society with pupils coming from diverse backgrounds, and on improving the quality of vocational training. Enhancing teachers' participation in professional development activities through practical training initiatives could help strengthening teachers' knowledge base for teaching. Establishing early-warning mechanism and providing additional instructional support for struggling students, as well as providing additional support for socioeconomically disadvantaged students constitute examples of measures which could improve the efficiency of the educational system.

Annex I. Regression Analysis of Labor Force Survey Data

Data coverage and limitations. The Eurostat Labor Force Survey (LFS) contains yearly and quarterly variables, but the anonymized LFS microdata do not contain the information which would allow tracking people across cohorts because the household numbers are randomized each year. In this analysis, we focus on the yearly dataset. The database contains nearly 85,000 individual responses for 2006 and 14,000 for 2014. LFS data cover residents—Luxembourg natives and former migrants living in the country, but does not cover cross border workers. For the purposes of this study, we identify as “natives” all LFS respondents born in Luxembourg (though some of them have foreign citizenship), and as “migrants” all the respondents who moved to Luxembourg at some point in the past (though some of them have since acquired Luxembourg citizenship).

Variables definition. We are interested in analyzing how individual labor market performance depends on individual characteristics. For example, we want to assess how education attainment or age affect the probability to be in or out of a job. We do this by estimating the probability of being un(employed) using a probit regression model as function of individual backgrounds. Estimating both unemployment and employment probabilities helps to assess the effects of labor force participation. Our probit model can be expressed as:

$$y_i^* = \beta_0 + \sum_{j=1}^k \beta_j X_{ij} + \mu_i$$

Where:

- y_i^* is a latent variable that is not observed but determines an outcome. What we actually observe is a labor market outcome y_i . In this study, we consider two dummy variables. To estimate unemployment probability, y_i is a dummy variable which takes value 1 if the individual “i” is unemployed, and 0 if the individual “i” is employed. For employment probability estimates, y_i is a dummy variable which takes value 1 if the individual “i” is employed, and 0 if the individual “i” is unemployed or inactive.
- X is the set of individual characteristics. We focus on age, gender, education attainment, migration status, years of residency in the country, and household composition.
- μ_i is an error term, and β are the coefficients to be estimated.

Estimation. First, we estimate the probability of being (un)employed in 2006 and 2014 for Luxembourg and neighboring countries, except for Germany which is not covered by the Eurostat LFS database and present the results in Table A1. Second, we estimate the likelihood of being in or out of a job across sub-groups of age (15–24, 25–54, 55–64), education levels (lower secondary, upper secondary, tertiary), migration status (native, EU born and non EU born), and gender (male, female). This step allows to assess the joint effect of combining two individual characteristics on the probability of being un(employed). The results are presented in Table A2.

Results and interpretation. When presenting the results, the absolute probability of being (un)employed is shown for the base category in bold, and marginal effects are shown for other categories. This means that the interpretation of the model is relatively easy. The marginal effect is the change in the probability of being (un)employed compared to the base category. For example, Table A1 shows that an individual aged between 25 and 54 years old (the base category) has a probability of 3.6 percent to be unemployed in 2006, and an individual aged between 15 and 24 years old is 13.9 percentage points more likely to be unemployed in 2006 than an individual aged between 25 and 54 years old. So, the total probability of being unemployed for someone aged between 15 and 24 years old is 17.5 percent (3.6 +13.9 percent).

Table A1. Effects of Individual Characteristic¹

Probability of being unemployed	Luxembourg ¹		Belgium		France		Probability of being employed	Luxembourg ¹		Belgium		France	
	2006	2014	2006	2014	2006	2014		2006	2014	2006	2014	2006	2014
Age							Age						
25-54 years (base)	0.036	0.044	0.075	0.080	0.082	0.105	25-54 years (base)	0.794	0.817	0.749	0.763	0.786	0.751
15-24 years	0.139	0.126	0.127	0.138	0.129	0.134	15-24 years	-0.535	-0.561	-0.458	-0.506	-0.499	-0.479
55-64 years	-0.021	-0.004*	-0.028	-0.024	-0.030	-0.035	55-64 years	-0.495	-0.418	-0.405	-0.325	-0.420	-0.291
Gender							Gender						
Female (base)	0.056	0.051	0.096	0.087	0.103	0.114	Female (base)	0.440	0.476	0.453	0.473	0.447	0.440
Male	-0.024	0.002*	-0.021	0.001*	-0.019	-0.003	Male	0.152	0.096	0.119	0.074	0.080	0.053
Country of birth							Country of birth						
Native (base)	0.032	0.032	0.075	0.074	0.087	0.104	Native (base)	0.510	0.526	0.525	0.523	0.492	0.473
EU born	0.020	0.035	0.009	0.010	-0.004*	-0.005*	EU born	0.026	0.005*	-0.023	0.001*	0.010	0.017
Non-EU born	0.088	0.097	0.113	0.109	0.090	0.098	Non-EU born	-0.071	-0.072	-0.139	-0.128	-0.080	-0.078
Household Composition							Household Composition						
Single, no child (base)	0.056	0.050	0.138	0.135	0.113	0.134	Single, no child (base)	0.565	0.542	0.491	0.479	0.495	0.464
Single with children	0.013	0.015*	0.043	0.013*	0.034	0.035	Single with children	-0.066	-0.005*	-0.071	-0.051	-0.085	-0.079
Couple, no child	-0.025	-0.011*	-0.067	-0.073	-0.039	-0.052	Couple, no child	-0.036	-0.037	0.003*	0.032	0.012	0.010
Couple with children	-0.011	-0.004*	-0.082	-0.068	-0.040	-0.050	Couple with children	-0.082	-0.037	0.017	0.035	-0.034	-0.002*
Other	-0.018	0.017*	-0.061	-0.043	0.003*	0.012	Other	-0.019	0.008*	0.062	0.058	0.022	0.021
Education attainment							Education attainment						
Lower secondary (base)	0.057	0.073	0.131	0.139	0.134	0.176	Lower secondary (base)	0.447	0.429	0.394	0.379	0.406	0.354
Upper secondary	-0.017	-0.013*	-0.047	-0.048	-0.050	-0.065	Upper secondary	0.085	0.082	0.141	0.140	0.110	0.129
Tertiary	-0.029	-0.037	-0.081	-0.085	-0.070	-0.106	Tertiary	0.179	0.182	0.254	0.254	0.167	0.226
Years of residency							Years of residency						
Less than or equal to 1 year (base)	0.054	0.080	0.123	0.129	0.297	0.331	Less than or equal to 1 year (base)	0.501	0.422	0.446	0.436	0.205	0.212
2 or 3 years	0.004*	0.009*	-0.017*	-0.034	-0.108	-0.123	2 or 3 years	0.003*	0.078	0.021*	0.036	0.106	0.107
4 years or more	-0.011*	-0.031*	-0.039	-0.043	-0.205	-0.219	4 years or more	0.014*	0.102	0.067	0.076	0.282	0.255
Number of Observations	36,396	6,106	51,893	46,649	147,527	223,434	Number of Observations	67,868	11,085	92,927	83,619	275,089	425,700

* Indicates that the result is not significant for $p < 0.1$ ¹ Coefficients represent the change in probability compared to the base category unless otherwise stated. Estimates are robust to heteroskedasticity.* Indicates that the result is not significant for $p < 0.1$ ¹ Coefficients represent the change in probability compared to the base category unless otherwise stated. Estimates are robust to heteroskedasticity.

Table A2. Joint Effects of Two Individual Characteristics¹

Probability of being unemployed

	Age groupe			Education level			Country of birth			Gender	
	15-24	25-54	55-64	Lower sec.	Upper sec.	Tertiary	Native	EU 28	Non EU 28	Female	Male
Age											
25-54 years (base)				0.064	0.052	0.03	0.025	0.056	0.115		
15-24 years				0.16	0.142	0.101	0.094	0.154	0.222		
55-64 years				-0.005*	-0.005*	-0.003*	-0.003*	-0.005*	-0.009*		
Gender											
Female (base)	0.167	0.043	0.039	0.071	0.059	0.035	0.032	0.066	0.127	0.051	0.051
Male	0.005*	0.002*	0.002*	0.003*	0.002*	0.001*	0.001*	0.002*	0.004*	0.002*	0.002*
Country of birth											
Native (base)	0.119	0.025	0.022	0.046	0.037	0.021				0.032	0.033
EU born	0.091	0.031	0.029	0.047	0.04	0.026				0.034	0.036
Non-EU born	0.218	0.09	0.084	0.125	0.11	0.074				0.095	0.098
Household Composition											
Single, no child (base)	0.169	0.043	0.039	0.072	0.059	0.034	0.03	0.065	0.127	0.049	0.051
Single with children	0.037*	0.014*	0.013*	0.020*	0.018*	0.012*	0.011*	0.019*	0.031*	0.015*	0.016*
Couple, no child	-0.029*	-0.010*	-0.009*	-0.015*	-0.013*	-0.008*	-0.007*	-0.014*	-0.024*	-0.011*	-0.011*
Couple with children	-0.009*	-0.003*	-0.003*	-0.005*	-0.004*	-0.003*	-0.002*	-0.004*	-0.007*	-0.003*	-0.004*
Other	0.040*	0.015*	0.014*	0.022*	0.019*	0.013*	0.012*	0.021*	0.033*	0.016*	0.017*
Education attainment											
Lower secondary (base)	0.224	0.064	0.059				0.046	0.093	0.171	0.071	0.074
Upper secondary	-0.029*	-0.012*	-0.011*				-0.009*	-0.015*	-0.024*	-0.012*	-0.013*
Tertiary	-0.093	-0.034	-0.032				-0.025	-0.047	-0.076	-0.037	-0.038
Years of residency											
1 year or less (base)	0.236	0.069	0.064	0.109	0.092	0.056	0.053	0.103	0.185	0.078	0.081
2 or 3 years	0.018*	0.008*	0.008*	0.011*	0.010*	0.007*	0.006*	0.011*	0.016*	0.009*	0.009*
4 years or more	-0.072*	-0.028*	-0.026*	-0.040*	-0.035*	-0.022*	-0.022*	-0.038*	-0.060*	-0.030*	-0.031*
Observations	6,106	6,106	6,106	6,106	6,106	6,106	6,106	6,106	6,106	6,106	6,106

* Indicates that the result is not significant for p < 0.1

¹ Coefficients represent the change in probability compared to the base category unless otherwise stated. Estimates are robust to heteroskedasticity.

Probability of being employed

	Age groupe			Education level			Country of birth			Gender	
	15-24	25-54	55-64	Lower sec.	Upper sec.	Tertiary	Native	EU 28	Non EU 28	Female	Male
Age											
25-54 years (base)				0.722	0.814	0.901	0.821	0.826	0.737		
15-24 years				-0.571	-0.581	-0.531	-0.562	-0.561	-0.561		
55-64 years				-0.452	-0.436	-0.367	-0.417	-0.415	-0.438		
Gender											
Female (base)	0.194	0.769	0.326	0.378	0.461	0.565	0.48	0.485	0.406	0.476	0.476
Male	0.126	0.102	0.152	0.109	0.106	0.096	0.096	0.095	0.1	0.096	0.096
Country of birth											
Native (base)	0.259	0.821	0.403	0.433	0.515	0.614				0.48	0.576
EU born	0.006*	0.005*	0.008*	0.005*	0.005*	0.005*				0.005*	0.005*
Non-EU born	-0.083	-0.084	-0.105	-0.08	-0.079	-0.073				-0.074	-0.07
Household Composition											
Single, no child (base)	0.282	0.838	0.431	0.453	0.533	0.631	0.546	0.55	0.475	0.497	0.592
Single with children	-0.007*	-0.005*	-0.008*	-0.006*	-0.006*	-0.005*	-0.005*	-0.005*	-0.005*	-0.005*	-0.005*
Couple, no child	-0.048	-0.039	-0.057	-0.041	-0.04	-0.037	-0.036	-0.036	-0.038	-0.038	-0.035
Couple with children	-0.047	-0.039	-0.057	-0.041	-0.04	-0.037	-0.036	-0.036	-0.038	-0.038	-0.035
Other	0.011*	0.008*	0.013*	0.009*	0.009*	0.008*	0.008*	0.008*	0.009*	0.008*	0.008*
Education attainment											
Lower secondary (base)	0.151	0.722	0.27				0.433	0.439	0.354	0.378	0.487
Upper secondary	0.083	0.092	0.109				0.081	0.081	0.082	0.083	0.08
Tertiary	0.219	0.179	0.265				0.181	0.18	0.187	0.187	0.174
Years of residency											
1 year or less (base)	0.147	0.696	0.259	0.321	0.402	0.508	0.426	0.431	0.352	0.375	0.476
2 or 3 years	0.081	0.097	0.107	0.085	0.085	0.08	0.078	0.078	0.079	0.08	0.076
4 years or more	0.111	0.124	0.144	0.112	0.111	0.105	0.102	0.102	0.104	0.104	0.099
Observations	11,085	11,085	11,085	11,085	11,085	11,085	11,085	11,085	11,085	11,085	11,085

* Indicates that the result is not significant for p < 0.1

¹ Coefficients represent the change in probability compared to the base category unless otherwise stated. Estimates are robust to heteroskedasticity.