IMF Working Paper

Structural Unemployment in Luxembourg: Bad Luck or Rational Choice?

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INTERNATIONAL MONETARY FUND

IMF Working Paper

European Department

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November 2019

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Abstract

This paper combines both micro and macro approaches to identify the drivers of (un)employment and inactivity in Luxembourg. The young, low-skilled, and non-EU migrants are found to be the most vulnerable groups in the labor market. In addition to skills mismatches, work disincentives embedded in the tax-benefit system constitute a factor explaining structural unemployment. High unemployment of young and low-skilled workers reflects substantial unemployment traps, while disincentives for second earners (respectively the generosity of the pension system) contribute to lower labor market participation of women (respectively seniors). Further reduction of structural unemployment requires better integration of vulnerable groups into the labor market and improved targeting of benefits to make work more rewarding.

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I. INTRODUCTION

1.   **Individual labor market performance is driven both by individual characteristics and behavior as well as the economic developments.** People who are physically and mentally fit to work and are also willing to work at the going wage could be rendered unemployed due to bad luck, i.e., skills mismatches, deficiency of aggregate demand, or difficulties to integrate the labor market. On the other hand, individuals in economies endowed with a social safety net face a work-welfare trade-off in which not working could be a rational choice if the net income increase from working does not justify the sacrifice of leisure.

2.   **The labor market in Luxembourg has been characterized by robust employment growth, but the resident employment rate is relatively low.** Many newly created jobs go to cross-border workers, while employment is also shifting to high-skilled jobs deteriorating the labor market prospects of workers who lack the capability to adapt to new technologies. Moreover, the unemployment rate remains higher than its pre-crisis level while the job vacancy rate is increasing, which suggests the presence of skills mismatches. Notwithstanding innovative Active Labor Market Policies (ALMP) by the national employment agency (ADEM), the unemployment rate of low-skilled, young and older workers has worsened compared to the pre-crisis situation, and non-EU migrants are less integrated in the labor market. Therefore, a deeper analysis of the key determinants of individual labor market performance is needed to help improve the design of ALMP.

3.   **Well-targeted ALMP, including vocational training and lifelong learning programs, could mitigate skills mismatches, but will not suffice to substantially increase employment.** As skills mismatches and search inefficiency constraints are mitigated, two questions come to the fore: (i) to what extent does the employment status of some workers simply reflects rational individual decisions? and (ii) can a better design of the tax and benefit system to increase work incentives boost labor supply? Given the characteristics of the groups who are at higher risk, a better understanding of work incentives embedded in the tax and benefit system is needed to guide the design of reform to make work more rewarding.

4.   **This paper starts by a comparative analysis of developments in the Luxembourg labor market.** The labor market in Luxembourg is characterized by a strong job creation and the unemployment, low by European standards, is less than half the EU average. But, it remains substantially higher for young, low skilled, and non-native resident workers compared to the pre-crisis level. Moreover, the labor market participation lower than in neighboring countries, especially for women and older workers. This descriptive analysis is a suitable starting point but

does not control for the overlap between some vulnerable groups. For example, young workers could be a predominant share of low-skilled workers.

5.   **The paper assessed the vulnerability factors in the labor market, analyzes the work-welfare trade-off embedded in the tax-benefit system, and proposes policy options to improve labor market outcome for the vulnerable groups.** To disentangle the impact of a specific factor, we use microdata from the Eurostat Labor Force Survey to estimate the probability of being unemployed or employed, controlling for other relevant factors. Thereafter, we turn to the impact of the tax-benefit system on labor market performance. To this end, the paper first takes a fresh look at the work disincentives embedded in the tax-benefit system, considering the challenges faced by different groups of workers: young, low skilled, older workers and women. Then, it uses an empirical model to assess the effect of the tax-benefit system on unemployment and activity rates.

6.   **The novelty of this paper is three-fold**. First, making use of micro-level data, it controls for the overlap between vulnerable groups. Second, comparing the vulnerabilities before and after the crisis permits to assess how different vulnerable groups have been affected. Third, combining both micro-level and macro-level analysis provides further insights on how the interaction between structural individual characteristics and macroeconomic policies influences the labor market outcome for different groups of workers.

7.   **The results highlight that in addition to skills mismatches, work disincentives inherent to the tax-benefits system are a factor in explaining structural unemployment in Luxembourg.** The youth, low-skilled and non-EU born constitute the most vulnerable groups. Low employment of older workers and women is largely driven by low participation rates among these groups, while both higher involuntary unemployment and lower participation contribute to the low employment rates of low-skilled workers. The relative importance of the different benefit schemes varies across groups of workers. The relatively high unemployment of young and low-skilled workers reflects unemployment traps inherent to the tax-benefits system, while the disincentives for second earners contribute to lower participation of women, and the weak labor market attachment of seniors is predominantly driven by the generosity of the pensions system.

8.   **The structure of the paper is as follows**. Section II briefly discusses the literature. Section III identifies the key determinants of labor market performance. Section IV assesses the effects of the tax and benefit system on labor supply. Section V concludes with some policy implications.

II. Literature Review

9.   A large literature has analyzed the importance of demographic characteristics as determinants of labor market performance. Many of these studies have used risk-probit models to assess the importance of individual or family socio-economic characteristics as determinants of individual labor market outcomes (Ashenfelter and Ham (1979), Stratton (1993), McDonald and Worswick (1997)). Recent applications to advanced economies include, among others, Bruneau, Dherbécourt, Flamand and Gilles (2016) on France, Monastiriotis et al. (2013) on Greece, Gang and Rivera-Batiz (2015) on Germany, Stam and Long (2010) for the UK, and Batini et al. (2019) on Euro Area countries. Other papers look at the importance of specific demographic characteristic. For example, Guedj (2013); Chamkhi and Toutlemonde (2015); and Minni (2015) assess the impact of gender on unemployment probabilities, while Aeberhardt and Rathelot (2013), among others, focus on the impact of ethnic differences on wages and employment rates in the French labor market.

10.   A large research has also studied the determinants of aggregate unemployment or employment, including indicators of tax and benefit systems. This literature on labor supply considers many characteristics of the labor market, depending on the group of workers considered. Blanchard and Wolfers (2000), Bassanini and Duval (2006, 2009), de Serres and Murtin (2012, 2014), and Gal and Theising (2015) among others study the drivers of unemployment/employment for different groups. Jaumotte (2003), Duval (2004), Duval et al. (2012), Christiansen et al (2016), Olivietti and Petrangolo (2017), and IMF (2018) analyze the determinants of labor market participation.

11.   Many studies have focused on the effects of the unemployment benefits on unemployment. Layard et al. (1991), Nickell (1998), Krueger and Meyer (2002) indicate that high replacement levels create financial disincentives to work. Krueger and Meyer (2002), Van Ours and Vodopivec (2005), Lalive (2008), and Caliendo et al. (2009) among others find that longer duration of unemployment benefits may generate benefit dependency and increase unemployment duration. Other papers conclude that stricter initial entitlement criteria reduce unemployment inflows, while periodic re-examination of eligibility may increase unemployment outflows (Immervoll and Richardson (2011), Langenbucher (2015)).
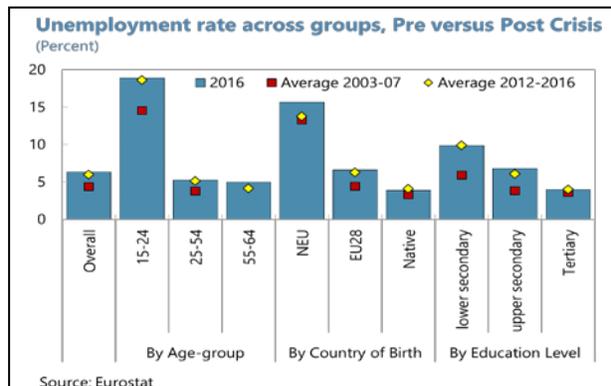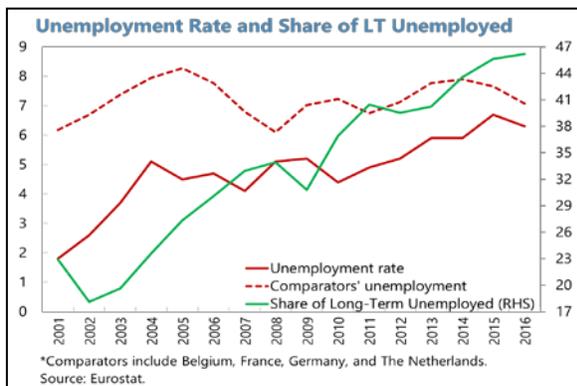
12.   Missing from the existing literature is the disentanglement of the impacts of individual structural characteristics and the work disincentives inherent to the tax-benefit system on the labor market outcome of different groups of workers. This paper contributes to both strands of the literature. It uses risk-probit regressions to quantify the importance of

individual characteristics in determining labor market outcomes, and relies on aggregate determinants of labor market participation and unemployment to assess the effects of tax-benefit structure on labor supply.[2]In contrast to the existing literature which generally focuses on one aggregate indicator to assess the effects of tax and benefits structure on labor supply, the analysis encompasses a broad range of tax and benefits variables allowing for deeper analysis of the challenges faced by different groups of workers in Luxembourg.

III. WHAT MAKES AN INDIVIDUAL MORE VULNERABLE IN THE LABOR MARKET?

A. Who Are the Most Vulnerable in the Labor Market?

13. **A decade after the financial crisis, unemployment remains higher than its pre-crisis-level.** In Luxembourg, unemployment is low by European standards, but remains substantially above its historical level. The unemployment rate has more than doubled over the last seventeen years standing at 5.8 percent in 2017, two percentage points or more above its pre-crisis level. Also, this evolution of the headline number hides striking differences across different groups of workers. Compared to the pre-crisis period, unemployment did not change substantially for workers who hold a tertiary education degree, but has significantly increased for youth, low- and medium-skilled workers, and non-native resident workers, suggesting that these groups are facing greater difficulty to succeed in the labor market. For example, workers with less than a secondary education represent less than 20 percent of the labor force but more than 50 percent of registered jobseekers at ADEM, the national employment agency, at the end of December 2017. The share of unemployed who have been out of a job for 1 year or more has steadily increased since 2009, and accounted for more than 45 percent of the unemployed in 2016. Moreover, unemployment persistence is the highest for workers older than 45 years, increasing the risk of discouragement and human capital deterioration.

Unemployment Rate and Share of LT Unemployed

*Comparators include Belgium, France, Germany, and The Netherlands.
Source: Eurostat.

Unemployment rate across groups, Pre versus Post Crisis
(Percent)

Source: Eurostat

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[2] Further details on the methodology used for each analysis is provided below.

Figure 1. Labor Market Overview

Unemployment prevalent among low skilled, ...

Registered Job Seekers
(Percent of total registered job-seekers, December 31, 2017)

Sources: ADEM and IMF Staff Calculation.

... and highly persistent for older workers.

Decomposition of Registered Job-Seekers
(Percent, December 2017)
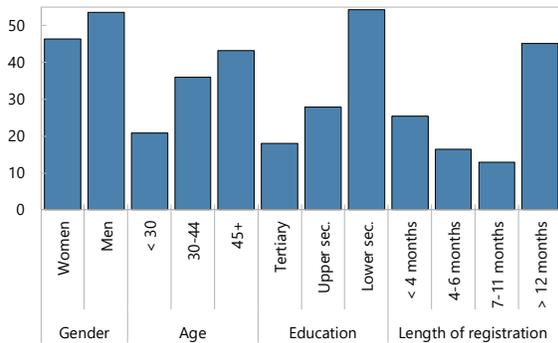
Sources: ADEM, and IMF Staff Calculation.

... Endemic part-time work among women.

Gender Share of Part-time Worker, 2016
(Percent of total part time workers)

Source: OECD.
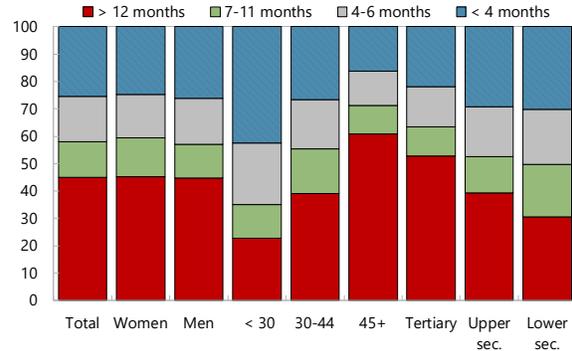
Most new jobs accrue to cross-border workers.

Employment Growth and Job Vacancy Rates
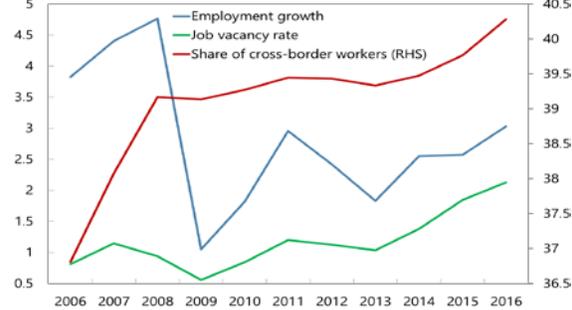
14. Despite sturdy job creation, participation is relatively low among some groups, and the overall employment rate lags behind the national target. The labor market is characterized by strong employment growth, accelerating to 3.8 percent in 2017. But, the strong net employment creation is benefiting mostly cross-border workers, who represent more than 40 percent of the employed, while the employment rate of resident workers aged 20–64 years (70.7 percent in 2016) remains below the national target of

Participation and Employment Rates across Groups, 2016
(Percent)
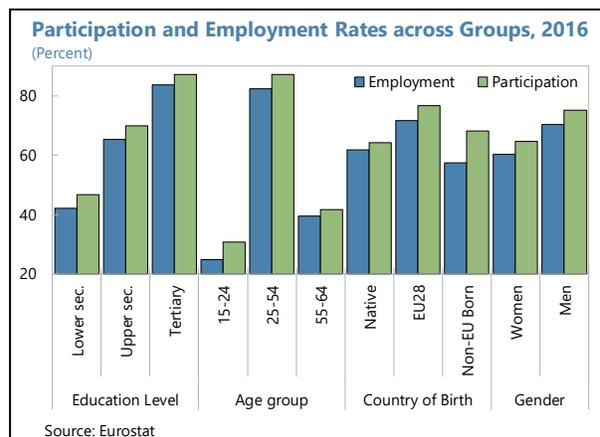
Source: Eurostat

73 percent.[3] The overall participation rate (70 percent) is also below the average of 74 percent in neighboring countries. Despite innovative measures by ADEM, activity rates of young and low-skilled workers are substantially below those in neighboring countries.[4] The youth participation rate at 30.7 percent, two-thirds of the neighbors' average, is relatively low even when taking into account the high share of 18–24 years old enrolled in education. Lower participation rate of natives compared to non-natives indicates that existing skills are underused in Luxembourg. The gender gap in activity rates is close to that in the neighboring peers, but labor market attachment is marginal for women who represent more than 80 percent of part-time workers. Low participation among these groups of workers is the main factor driving their low employment, suggesting that efforts are needed to increase incentives to work.

15.   Better ensuring that graduates are equipped with the skills needed in the labor market could substantially increase youth employment. Luxembourg spends almost the double per student than neighboring countries and more than almost all OECD countries, even after controlling for living standards. Requirements to enter the teaching profession are in line with neighboring countries and the student-to-teacher ratio is also relatively low in Luxembourg. However, the requirement of multilingual competency makes the recruitment of fully qualified teachers challenging despite high salaries by European standards. The 2015 PISA results indicate that less than a quarter of the stock of teachers in the primary education meet all the qualification requirements.[5] Moreover, the trilingual (Luxembourgish, French, and German) education system, while an asset, is a challenge for its highly diverse student population. For instance, difficulties with the language of instruction lead often 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. Socioeconomically disadvantaged students also underperform compared to their more advantaged peers in all fields, and more so than in neighboring countries.[6] Consequently, the

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[3] National Reform Program of the Grand Duchy of Luxembourg under the European semester, 2017.

[4] Among other initiatives, the professional classification scheme for partially incapacitated persons is reformed to keep reclassified persons at work, especially older persons. The professionalization placement program and the professional reinsertion contract give senior job seekers the opportunity to improve their knowledge and highlight their professional capabilities within a company. The Youth Guarantee Program, among other initiatives, and training and apprenticeship programs are targeted to young and low-skilled.

[5] Luxembourg provides some requirements to enter the teaching profession among which the need of succeeding to a competitive examination before entering pre-service teacher training, the need of a teaching practicum as part of the pre-service training, a minimum education attainment level at the end of the teacher training curricular. The language requirements make difficult the recruitment of fully qualified teachers.

[6] 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 percent students within their country.

high spending on education does not translate into higher average students' tests scores compared to other countries.[7] For instance, the 2015 PISA indicates that students in Luxembourg had lower performance in all fields (math, science and reading) than in neighboring countries, while average PISA scores of natives and second-generation immigrants are broadly in line with neighboring countries.[8]

Teachers with Required Training, PISA 2015
(In percent of teachers, primary education)

Source: OECD.

Average PISA Score vs. Public Spending per Student

Sources: OECD, and IMF Staff calculations.
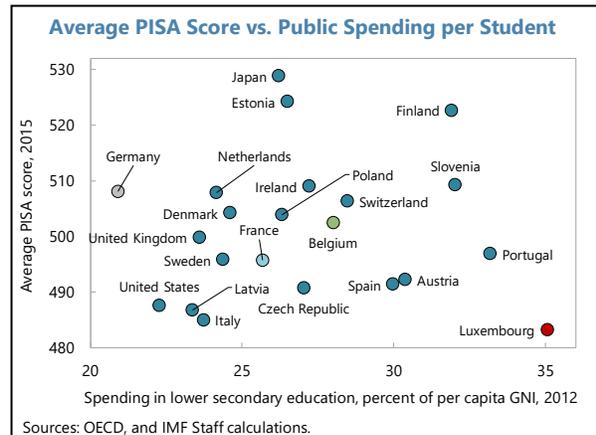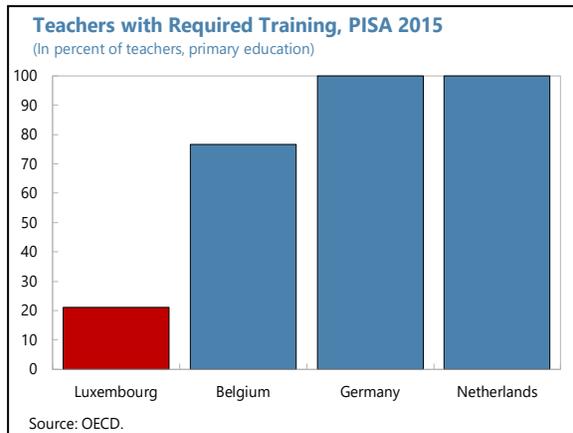
16. **Further improving the labor market prospects for some groups requires efforts to reduce skills mismatches.** Employment is shifting further to high value-added sectors that employ high-skilled workers. Consequently, the demand for skills needed to perform abstract tasks and non-routine manual tasks is strongly increasing at the expense of routine manual jobs, worsening the labor market prospects of low-

Change in Total Employment by Occupation Categories
(Annual average, thousand employed persons, 15-64)

Sources: Eurostat (2017), and OECD Economic Surveys, 2017.

skilled and older workers who lack the necessary capabilities to succeed in the digital economy. While the job vacancy rate is increasing, the integration of the low-skilled and long-term unemployed remains challenging, suggesting substantial mismatches between the qualification of the jobless and the skills required by job openings. At the individual level, a skills mismatch could imply lower job satisfaction and a higher risk of unemployment relative to well-matched workers, and can contribute to discouragement and labor market withdrawal (Montt, 2015). At the macro-level, it can lead to high inactivity, suggesting that reducing skills mismatches should
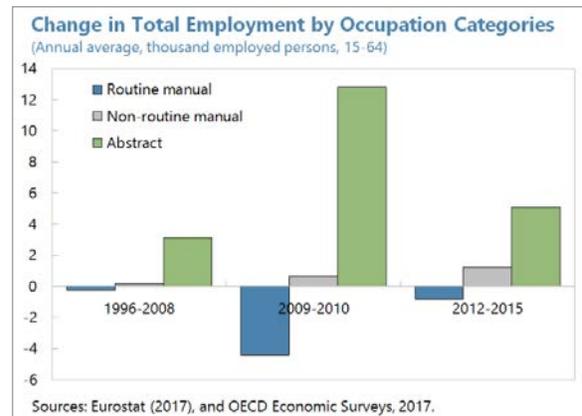
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[7] Further detailed analysis of the education system is done in Gbohoui (2017).

[8] https://ec.europa.eu/education/sites/education/files/monitor2016-lu_en.pdf

remain be a key policy objective. The recently implemented Digital Skills Bridge program can help employees to better adapt to digital transformation and reduce skill mismatches.[9]

B. Key Determinants of Labor Market Performance Using Micro-Data

17. To assess the factors underlying individual labor market performance, we explore the relative likelihood of being out or in a job conditional on belonging to a certain socioeconomic group. Estimating both unemployment and employment probabilities helps to assess the effects of labor force participation. In contrast to descriptive statistics, probit regressions allow controlling for overlap between vulnerable sub-groups.

18. **Empirical specification, data, and variable definition**.[10] Following the literature (see Heckman, 2009), 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). The (un)employment status is determined by an unobserved latent variable Y_i^* which depends on a set of individual characteristics. The observed (un)employment status Y is linked to this latent variable by the following condition:

$$(1) \qquad Y = \begin{cases} 1 \; if \; Y^* > 0 \\ 0 \; otherwise \end{cases}$$

The probability of observing $Y = 1$ can then be approximated by a standard normal cumulative distribution. More precisely, our probit model can be expressed as:

$$(2) \qquad Y_i^* = \beta_0 + \sum_{j=1}^{k} \beta_j X_{ij} + \mu_i$$

where Y_i^* is the probability of observing $Y = 1$; X is the set of individual characteristics: 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. In this study, we consider both unemployment and employment status. 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.

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[9] Launched in 2018, the Luxembourg Digital Skills Bridge aims to support companies and their employees whose business will be radically transformed by a major technological change through investing in employees' skills and securing their career paths. Further details on the initiatives are available at https://adem.public.lu/fr/publications/adem/2019/RA2018.html.

[10] For further data description is provided in Annex A.

19.   Estimation strategy and robustness. 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. 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 available at the time of writing the paper. 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).

20.   Results and interpretation.[11] The absolute probability of being (un)employed is shown in bold for the base category, 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.

21.   Young, non-EU immigrants and low-skilled workers are at higher unemployment risk 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 C, Table C.1).

	Table 1. Probit Regression			
	Probability[1,2] of being			
	Unemployed		Employed	
Individual characteristics	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.

- In 2006, the unemployment risk of an individual who did not finish upper-secondary school was 2.9 percentage points higher than for an individual who has a university degree. This

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[11] All estimation results are presented in Annex C.

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 C, Table C.1).

- Conditional on all other individual background factors, the unemployment risk for non-EU born migrants is more than three times that of natives.

22.   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.

23.   Compared to neighbors, Luxembourg had the highest marginal unemployment risk for females relative to male workers before the crisis. 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. 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.

24.   The absolute unemployment risk for EU born migrants is lower in Luxembourg than in neighboring countries but they incur the highest marginal unemployment risk. 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 in 2014, EU migrants had the same conditional probability to be employed as natives. Together, these findings imply that 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.

25.   Staying longer in Luxembourg increases migrants' labor market participation rate. 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, compared to recently immigrated workers.

26.   Joint probabilities estimates confirm that young, non-EU migrants and low skilled workers underperform compared to other groups (Annex C, Table C. 2). To better gauge how important the factors determining individual labor market performance are, we compare the likelihood of being in or out of a job across sub-groups of age, birth origin, and gender. The results confirm that with comparable other socio-economic backgrounds, young workers underperform compared to other age groups; the low-skilled are more vulnerable than high-skilled workers; and 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.

27.   Young workers, even 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 double 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.
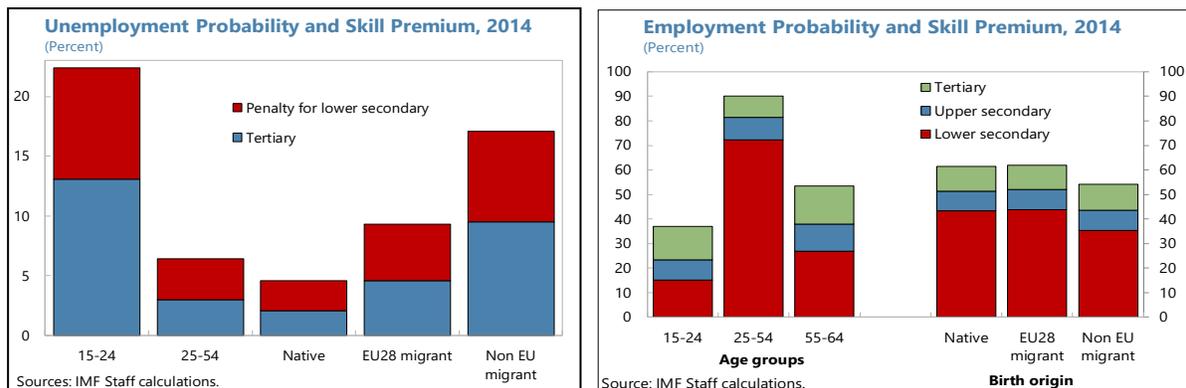
28.   Non-EU migrants with a university degree are also twice more likely to be unemployed than low skilled natives. Indeed, subsample results indicate that the unemployment probability of non-EU migrants with a tertiary degree is more than twice that of

low-skilled natives. EU migrants with a tertiary degree are as successful as low skilled natives while there is no statistical difference in the employment probabilities of EU migrants and natives with the same qualification, suggesting that EU migrants are more active than natives.

29.   Effective ALMPs can boost employment but will not suffice to substantially reduce unemployment. Policies to improve the matching of workers and jobs, and to avoid that the unemployed lose their attachment to the labor market are key to increasing unemployment outflows, but supply side policies are also needed in Luxembourg due to the characteristics of the vulnerable groups. For instance, the particularly low participation rate of some groups requires further efforts to increase work incentives. The next section assesses the tax-benefits system in Luxembourg in comparison to other countries, and evaluates its impact on work incentives across workers' groups.

IV.   WORK-WELFARE TRADE-OFF IN LUXEMBOURG[12]

A.   Does the Tax-Benefits System Affect Work Incentives?

30.   Two main trade-offs reside at the heart of the tax-benefit system. First, governments face a trade-off between equity and efficiency. Governments want to raise tax revenue for public good provision, to redistribute income from higher to lower income individuals and families, and to provide a temporary safety net for people who are unemployed or unable to work. However, in doing so they reduce work incentives, thereby reducing labor supply and in turn the total amount of income available to be redistributed. Second, while many factors affect individual labor supply decisions, work requires a sacrifice at least of leisure, and the individual worker's decision on whether to enter the labor force, the number of hours they will work if they do enter the labor force, and how long they will stay in the labor force is influenced by the tax and benefit systems. The incentive problems inherent to the tax-benefits system create a work-welfare trade-off in which not working could be a rational choice if the net income increase from working does not justify the sacrifice of leisure. Hence the tax-benefit system affects both the level of unemployment and the size of the labor force. Moreover, the literature suggests that the labor supply of low-income workers, older workers, and second earners is more responsive to taxation than that of other groups of workers, suggesting that these groups of workers deserve particular attention.[13]

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[12] This section uses tax-benefit indicators as defined by the OECD tax-benefits model (Annex B).

[13] For further details on the literature, please refer to Diamond (1980); Pissarides (1998); Nickell and Layardm (1999); Saez (2002); Bovenberg (2006); or Bassinini and Duval, 2006, 2009); Brewer *et al* (2010), OECD (2011); Diamond and Saez (2011); or Dorley (2015).

31.   Luxembourg's average tax wedge is broadly in line with neighboring countries but penalizes single parents at the margin. The tax wedge between total labor costs to the employer and the corresponding net take-home pay for single workers without children, at average earnings levels, is 38 percent in Luxembourg, slightly higher than the average tax wedge in OECD countries but lower than in neighboring countries. Across family

Average Tax Wedge Decomposition, 2016
(Percent of total earning, single without children at average earning)

Income tax   Employer SSC   Employee SSC

Source: OECD.

situations, the lowest tax wedge is observed for one earner married couples with an income above 50 percent of average earnings. On average, a single person without children bears the highest tax wedge at lower income levels. Beyond 1.75 times the average earnings level, the highest tax wedge is observed for a single parent with two children. At the margin, the combined effect of increasing personal income tax, employee and employer (including payroll taxes) social contributions and decreasing cash transfers, is the highest for single parents with two children at all income levels above 60 percent of average earnings, while married couples with or without children face the lowest marginal tax wedge at all levels of earnings.
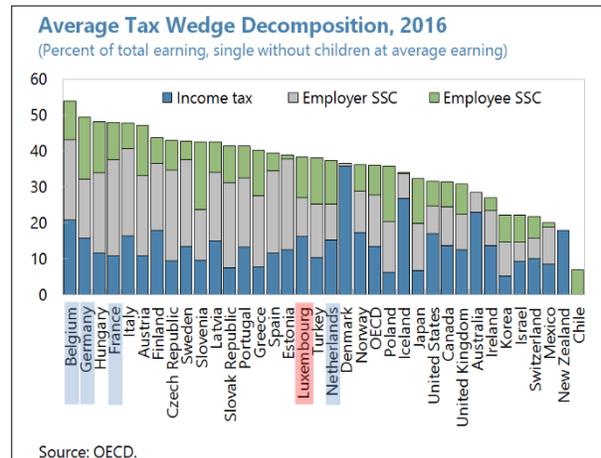
32.   Welfare benefits are generous enough to possibly make not working a rational choice for low earners. The social safety net in Luxembourg covers a wide set of benefits consisting of a means-tested social income and a broad range of unemployment, health, sickness, maternity, child, family, housing, disability, old-age and invalidity pension benefits[14] The welfare system in

Participation Tax Rate from Inactivity, 2015
(Married couple with 2 children, 67% of AW)

Source: OECD.
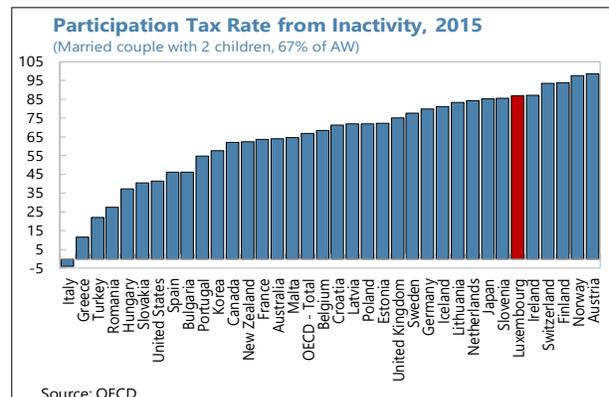
Luxembourg is more generous than in most neighboring countries. While receiving benefits equivalent to almost 50 percent of the median income for not working, some individuals might choose to remain out of work as working bears the additional burden of paying taxes on earned income. Participation tax rates are among the highest in OECD countries for inactive people when they take a full-time job, especially at a low wage, creating substantial inactivity traps. As illustration, for a one-earner married couple with 2 children taking a job at 67 percent of the

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[14] For further details on the Luxembourg's tax and benefit systems, please refer to 2018 EUROMOD Country Report—Luxembourg, European Commission, 2018.

average wage, taxes and benefits reduce the financial gain by more than 86 percent. Given the expenses associated with work and the loss of leisure and family time, not working could be a rational choice if the increase in net income does not justify the sacrifice. The replacement of the guaranteed minimum income (RMG) by the Social Inclusion Income (REVIS), introduced in January 2019, can increase incentives to actively search for jobs as the new scheme allows beneficiaries to keep a higher part of their welfare benefits after accepting a job.

33.   Conditionalities of unemployment benefits, and benefits duration are among the strictest amid European countries, but the number of benefit recipients has grown at a faster pace (Figure 2). Empirical evidence shows that countries with more stringent unemployment benefit systems are more likely to record lower unemployment levels. In Luxembourg, unemployment benefits' entitlement and eligibility criteria are among the

Strictness of UB System and Unemployment rate
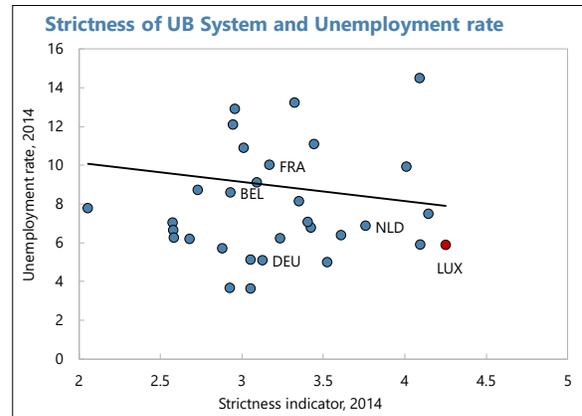
strictest across OECD countries, reflecting the continuous adaptation of AMLPs by ADEM. Available information also indicates that the maximum duration of unemployment insurance is 12 months in Luxembourg, as in Germany, against 24 months in France. However, the country has recorded the fastest increase in recipients among neighboring peers. For instance, the number of unemployment-benefits recipients in 2014 was more than 1.5 times the number of recipients in 2007, mirroring the fast increase in the number of jobseekers which has more than double between December 2007 and December 2014. The growth in the number of recipients of old-age pensions is also significantly higher in Luxembourg, suggesting that many people are benefiting from early retirement schemes.[15] At the same time, the number of disability benefits recipients has decreased, reflecting the effects of the reclassification program which re-integrates partially disabled workers to the labor market (Gbohoui, 2018).

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[15] The reform of the early retirement schemes, through the law of 30 November 2017, aimed at increasing the employment rate of seniors and the effective retirement age and is expected to slow down the pace of early retirement.

Figure 2. Tax Wedge and Social Spending

Labor taxation favors couples,   *… at the expense of single parents.*

Average Tax Wedge Across Income Levels, 2016 (In percent of of total earnings)

Marginal Tax Wedge, 2016 (In percent of total earnings)

Tight and strict conditionalities, …   *… but increasing number of recipients.*

Strictness of Unemployment Benefits System

Recipients of Unemployment Benefits
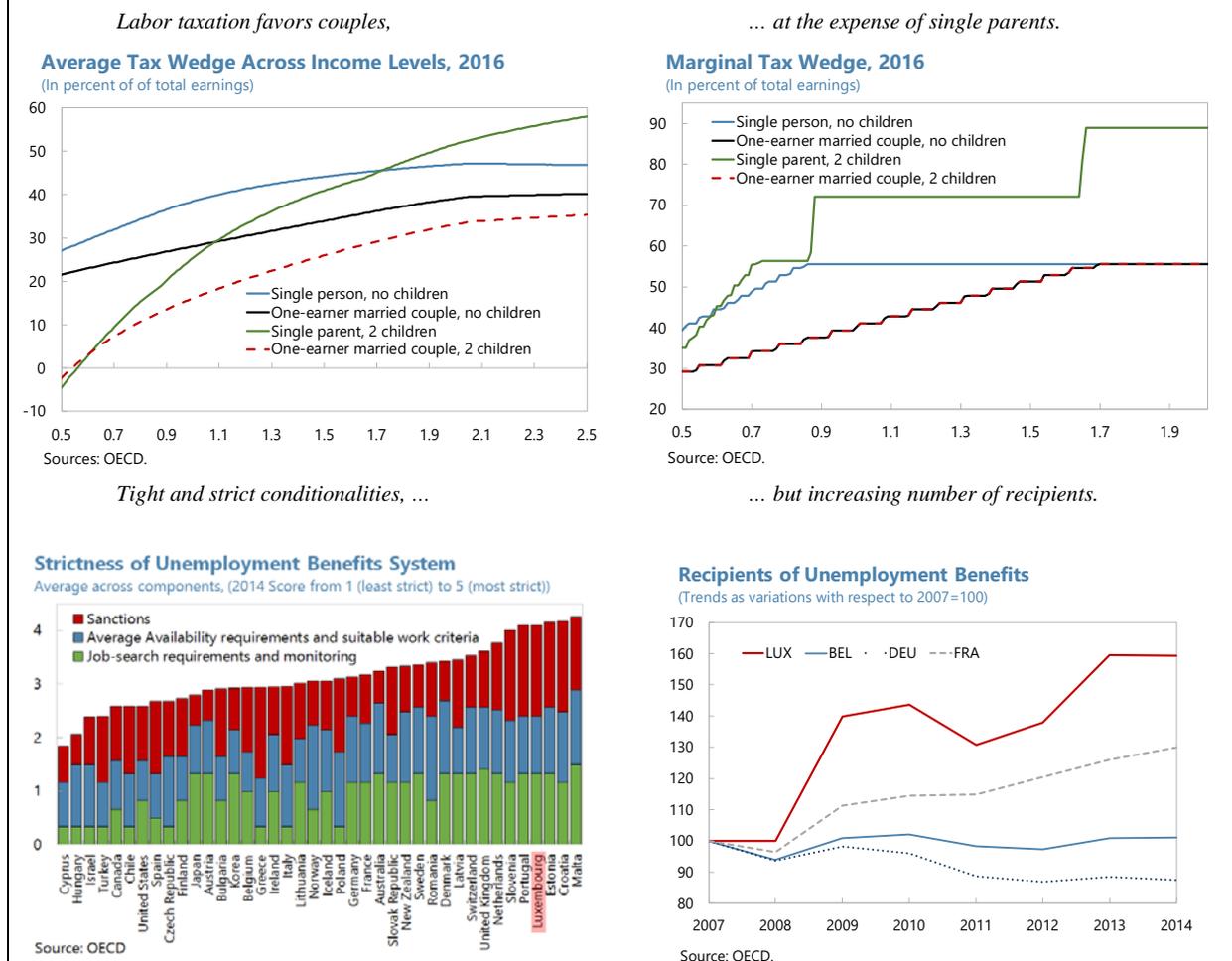
34. **Generous unemployment benefits reduce incentives to actively search and take up jobs, especially for some family situations** (Figure 3). Generous unemployment benefits might reduce incentives to work and create long-term benefit dependency (Mortensen, 1997; Shavell and Weiss, 1979). In addition, Krueger and Meyer (2002) find that a 10 percent increase in unemployment benefits raises the average duration of unemployment by around 5 percent

and that the impact is likely much higher in countries with relatively weak eligibility conditions. In Luxembourg, unemployment benefits, measured by net replacement rates, are relatively generous, with an initial net replacement rate among the highest across OECD countries. For instance, a one-earner married couple with 2 children earning previously 67 percent of the
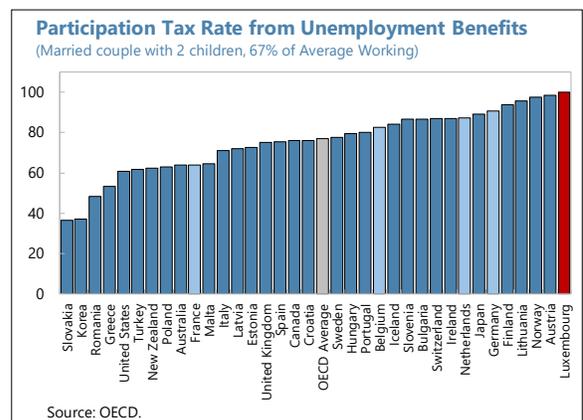
average wage[16] is better-off living on unemployment benefits than taking a job as its net replacement tax rate is more than 100 percent. Such a high participation tax rate reduces the incentives to look for a job when unemployed, and generates unemployment traps especially for low-skilled, low-wage workers.

Unemployment Rate and Net Replacement Rate
(Percent)

Unemployment Rate and Participation Tax Rate from UB
(Percent)

$y = 0.07x + 10.27$

$y = 0.04x + 3.21$

$y = 0.07x + 7.99$

$y = 0.04x + 1.64$

Source: OECD.

Source: OECD.
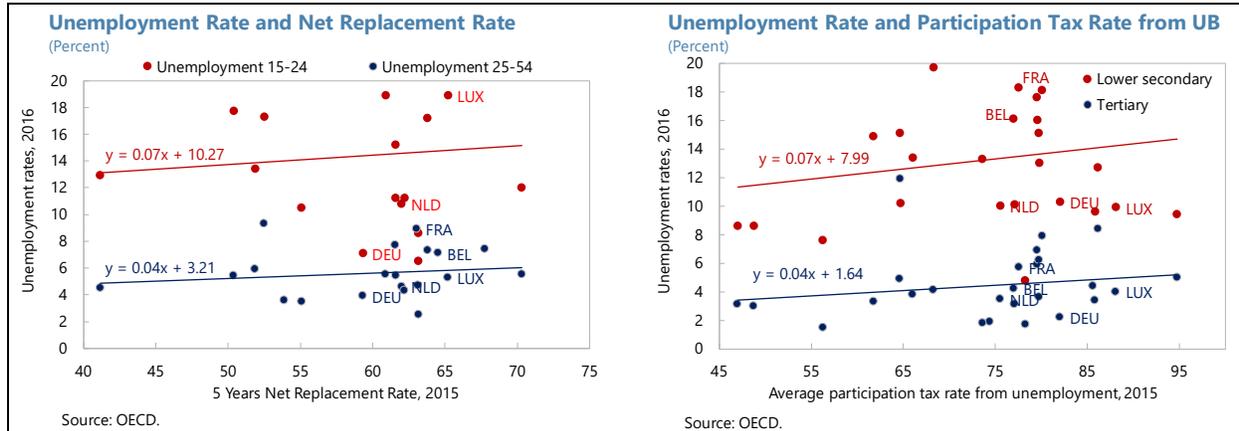
35.   The labor supply of young and low-skilled workers is sensitive to the generosity of the tax benefits system. Cross-country scatter plots suggest that the elasticity of the unemployment rate to the generosity of the tax-benefit system differs across groups of workers. For instance, the unemployment rate of young workers is twice more responsive to the generosity of the unemployment benefits system than that of for prime-age workers. In the same vein, the unemployment rate of workers with lower secondary education is more sensitive to the generosity of the unemployment benefits system than that of workers with a university degree. One reason is that as high skilled-workers earn high wages, they are less likely to be content with unemployment benefits and actively search for a new position when they lose their job. Overall, the analysis suggests that higher unemployment rates are likely to be observed in countries with more generous unemployment benefit systems, but the slopes are not steep.

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[16] For 2015, the average wage used in the OECD tax-benefit model is 55,858 euros for Luxembourg.

Figure 3. Unemployment and Inactivity Traps

High replacement rates …

Initial Net Replacement Rate, 2015
(Married couple with 2 children, Previous Earnings 67% of AW)

Source: OECD

… generate considerable unemployment traps, …

Unemployment Traps, 2015
(Taxes on single persons without children, 67% of the AW)
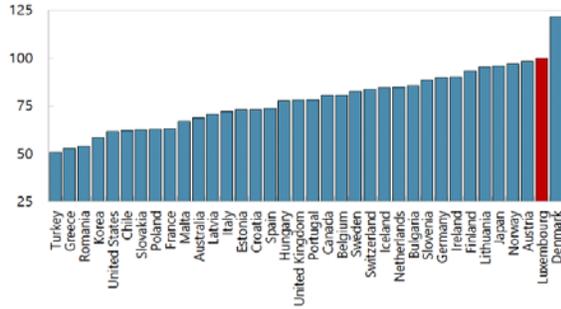
Source: Eurostat.

… … especially for low wage-earners.

Participation Tax Rates From Unemployment Benefits, 2015
(Percent of total earnings, 1 earner couple without kids across income levels)
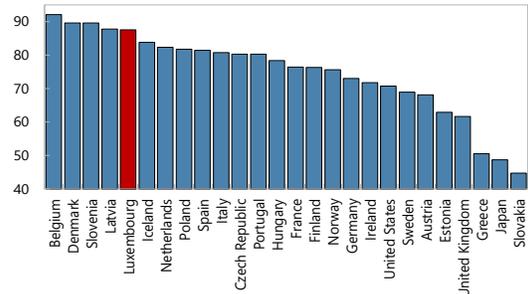
Source: OECD.

Generous welfare benefits reduce …

Ratio of Welfare Benefits to Median Income, Single
(Net income of people receiving minimum income, single person)
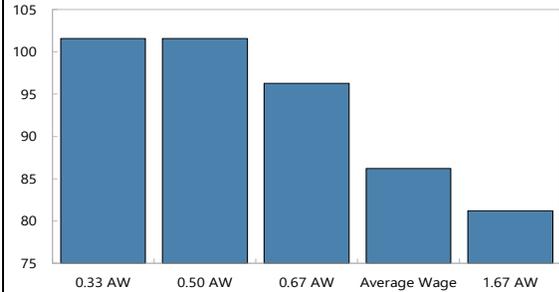
Source: OECD.

… work disincentives, especially for low-earners, …

Participation Tax Rates From Inactivity, 2015
(Percent of total earnings, Single person without children across income levels)
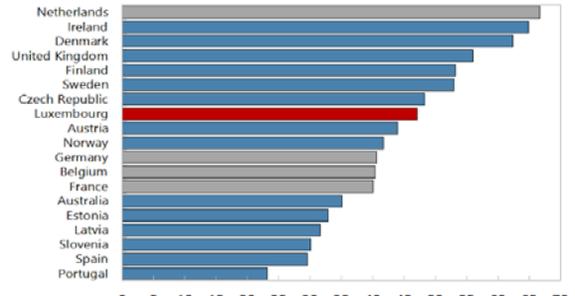
Source: OECD.

… single persons, and one-earner couples.
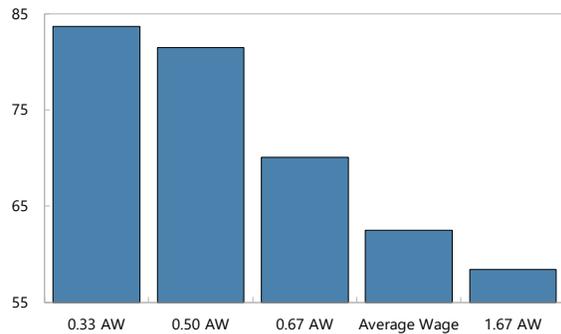
Participation Tax Rates From Inactivity, 2015
(Percent of total earnings, across family types and income levels)
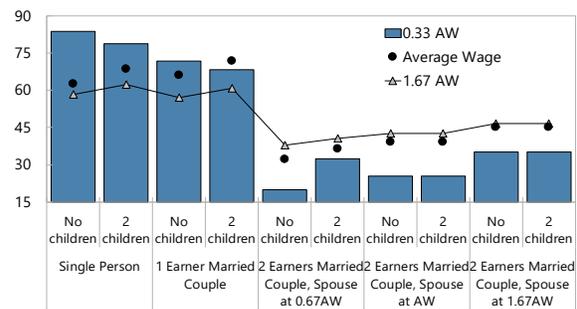
Source: OECD.

36.   High marginal effective tax rates (METR) reduce incentives to work more hours, generating low-wage traps (Figure 4). Cross-country comparison suggests that higher METR are associated with higher shares of women working part-time. In Luxembourg, METR are high across family situations for part-time workers, especially at the bottom of the income distribution. Among OECD countries, it is the highest for a one-earner married couple with two children who will not obtain any increase in net income, after accounting for the loss of benefits, when increasing work hours from 33 percent to 67 percent of the average wage as its METR is more than 100 percent. With such METRs, it is not surprising that part-time work is widespread, especially among women.

37.   Work disincentives are substantial for second earners. Empirical evidence highlights the high elasticities of hours worked of second earners, mostly women, to the disincentives inherent to the tax benefits system. Higher tax wedges on second earners are associated with higher unemployment rates for women working part-time, corroborating the existing empirical evidence (Figure 4). Although evidence from policy changes in several countries indicate that breaking the link between a husband's income and a wife's tax rate increases female labor market participation, the 2016 tax reform in Luxembourg will likely have a limited impact on the tax wedge on second earners.[17] For instance, any additional incentive received by the second earner under the optional individual taxation is at the cost of the principal earner, mainly because the tax scale applied to the first earner under the joint taxation is more favorable than that under individual taxation, implicitly subsidizing couples who file jointly. Further steps are then needed to increase work incentives for women.[18]

38.   Further expanding the daycare and after-school programs could improve the labor market attachment of women. There is a clear consensus from the literature that the labor market participation of women, especially single mothers, is highly responsive to work incentives.[19] In Luxembourg, the net cost of childcare bore by workers are relatively high, reducing incentives for women with young children to participate to the labor market. The recently introduced free 20 hours/week multilingual childcare is a step in the right direction. Additional steps to enlarge the availability of daycare and after-school programs could further encourage women's labor market participation.

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[17] The cases of Canada, the United States, the Czech Republic, and Sweden are assessed in Crossley and Jeon (2007), LaLumia (2008), Kaliskova (2014), and Selin (2014), respectively.

[18] The new government plans to move to fully individual taxation over the medium term.

[19] Brewer et al. (2006); Keane and Moffitt (1998), and Eissa and Liebman (1996) report higher elasticity for women than for men, and for lone mothers than for married women. Arrufat and Zabalza (1986); Pencavel (1998), and Aaberge et al (1999) find that elasticities are higher for women in poorer household.

Figure 4. METR and Low-Wage Trap

High METRs discourage…

Marginal Effective Tax Rate, 2016
(From 33% to 67% of AW on increasing working hours, married couple - 2 children)
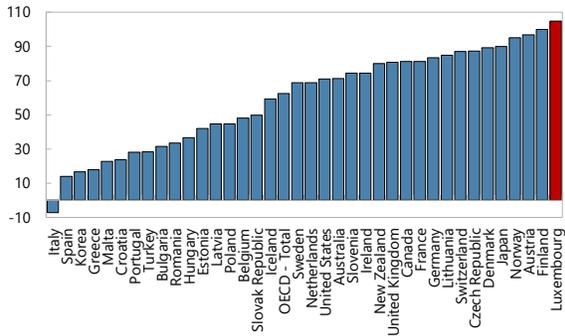
Source: OECD.

… workers from working more hours, …

Part-time Work and Marginal Effective Tax Rate
(Second earner, married couple with two children, spouse at 167% of AW)
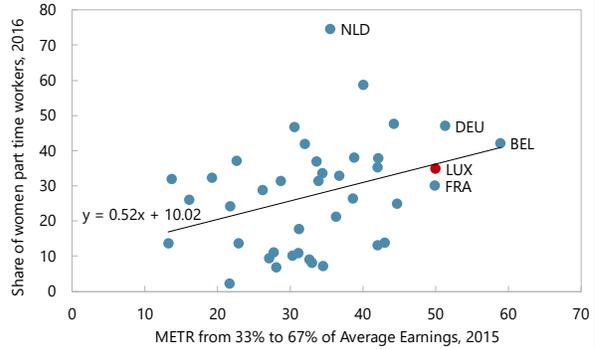
Sources: OECD and IMF Staff Calculation.

… generating substantial low-wage traps.

Low Wage Traps, Married Couple with 2 Children, 2015
(Tax rate on one-earner married couple with 2 children, 33% to 67% of AW)
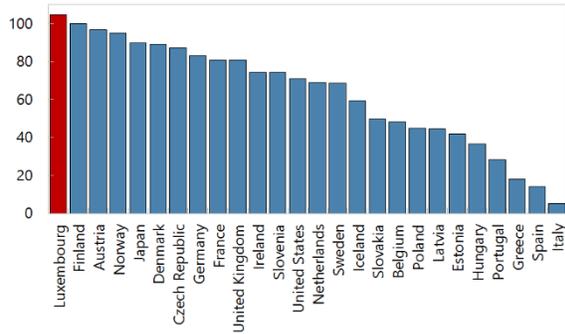
Source: Eurostat.

High tax wedge on second earner and …

Net Personal Average Tax Rate on Second Earner, 2015
(Percent of total earnings, at 67% of AW (primary earner at AW), no children)
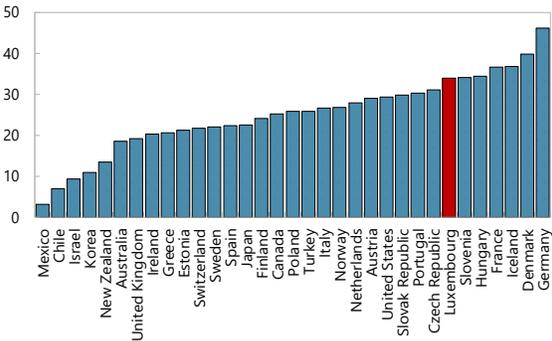
Sources: OECD and Thomas and O'Reilly (2016).

… expensive childcare discourage women participation, …

Sole-Parent Mothers Employment Rate and Childcare Cost
(2015, or the latest)
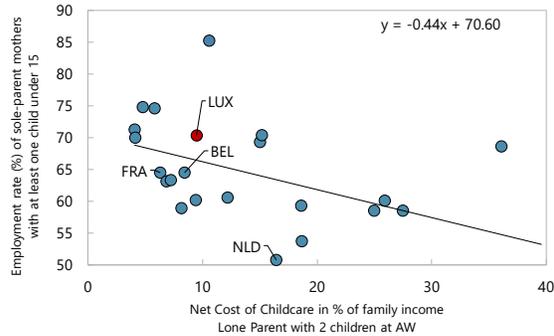
Source: OECD

… reducing their employment.

Unemployment Rate and Tax Wedge for Second Earner
(Percent)
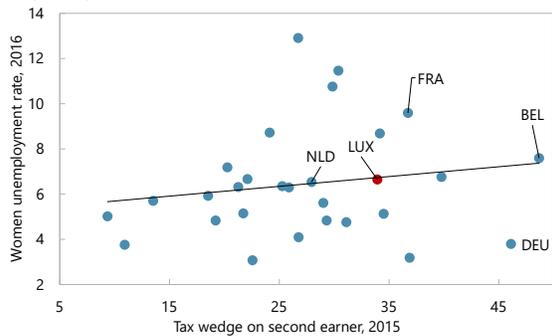
Source: OECD.

39. **Incentives for older workers to keep working could also be improved** (Figure 5). While the decision to work or retire is likely to be influenced by many factors, empirical evidence suggests that the financial incentives to retire faced by older workers play a significant role both for men and women. Taxation will affect the financial incentive to retire by affecting both the financial return to continued work, and the level of net retirement income. In Luxembourg, the generous pension system with several options of early retirement discourages older workers' labor market participation, and encourages them to exit early.

Average Net Pension Replacement Rate, 2014 (Percent of Earnings)

Sources: OECD
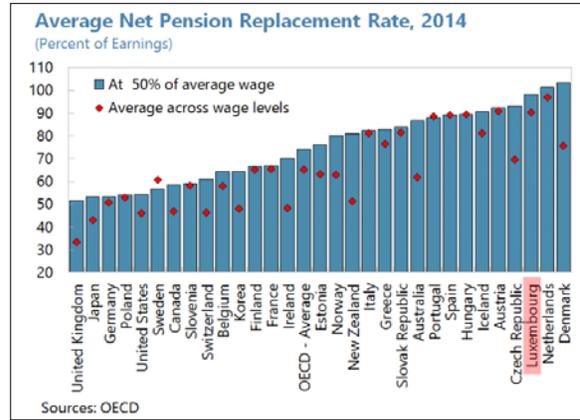
Figure 5. Work Incentives for Older Workers

Generous pension benefits discourage …

Net Pension Replacement Rate for Male, 2014 or latest (Percent of previous earnings)

Source: OECD

… older workers' labor market participation, …

Older Worker Participation and Net Pension Replacement (Percent)

Male   y = -0.12x + 75.90
Female y = -0.25x + 71.16
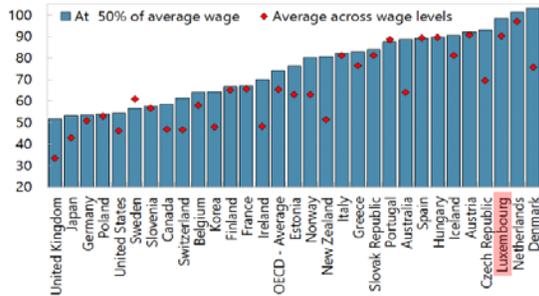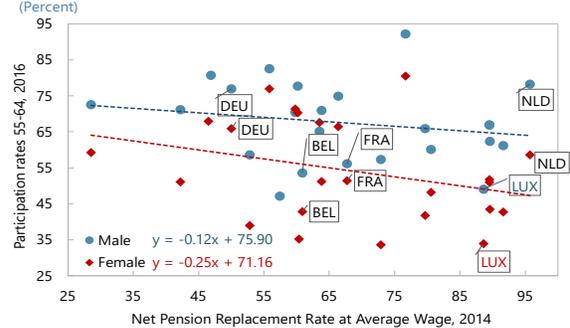
Sources: OECD and Eurostat.

… who reduce their working life, …

Duration of Working Life, 2016 (Years)

Source: Eurostat

… and exit the labor market earlier.

Effective Labor Market Exit Age (Years, 2014 or latest)
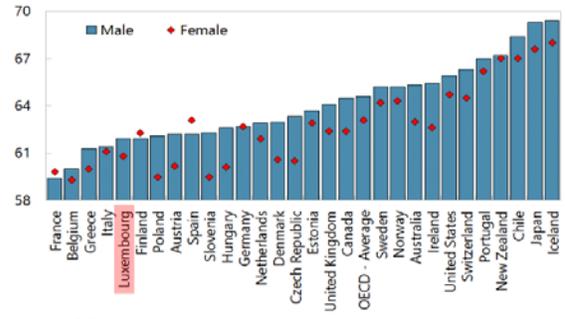
Source: OECD

B. Modeling the Effects of the Tax-Benefits System on Labor Market Outcomes

40.   Empirical specification. To assess the role of the tax-benefits structure, this section estimates a reduced-form specification of labor market participation (or unemployment) that relates the participation (or unemployment) rate of specific groups of workers to indicators of the tax-benefit system, controlling for differences across countries that are constant over-time and time-specific effects. Although the potential set of drivers of participation and unemployment rates is large, and their importance may vary across worker groups, the analysis focuses predominantly on tax-benefits factors. More precisely, the analysis is based on the estimation of the following equation:

$$LMI_{k,t}^g = \beta^g X_{k,t}^g + \delta^g Z_{k,t}^g + \gamma_k^g + \theta_t^g + \varepsilon_{k,t}^g$$

in which $LMI_{k,t}^g$ refers to the labor market indicator – here participation rate or unemployment rate- of worker group g in country k at time t. X represents the set tax-benefits indicators considered in the analysis – the participation tax rates from unemployment or inactivity, the tax wedge, and the net replacement rate of unemployment benefits over 5 years. Z includes an indicator of the cyclical position of the economy (output gap/GDP growth rate) and other determinants of labor supply (share of population with secondary/tertiary education).

41.   Data, sample, and variable definition.[20] The estimation sample covers 35 advanced OECD countries over the period the period 2001–15. Tax-benefits indicators come from the OECD tax-benefits data and are simple-averages across all levels of income and all family situations to focus on measures that are comparable for all groups of workers. The groups include the whole working age population (15–64), as well as the following subgroups: young (15 to 24), prime-age (25–54), and senior (55–64); education attainment: low secondary, upper secondary, and tertiary; and gender.

42.   Estimation strategy and robustness. The reduced form equation is estimated using cross-country panel regressions with country and time fixed effects. The standard errors are corrected using the Hubert/White method to control for heteroskedasticity and intragroup correlation. The use of cross-country panel regression provides average elasticities for the set of countries in the regression sample which may not be necessarily appropriate for all individual countries in the sample. To address this issue, the analysis re-conducts the estimations while excluding Luxembourg from the country sample. The results remain broadly unchanged, suggesting that the estimated coefficients are appropriate for Luxembourg. In addition, we

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[20] See annex B for further details on the country sample, the definition of variables and the sources of the data.

augment the baseline specification with an interaction term between tax-benefits variables and a country dummy for Luxembourg. For almost all the results, the coefficient on the interaction term is not statistically significant, implying that the cross-country coefficient is valid for the individual case of Luxembourg. A summary of the baseline results are presented below, and full results are shown in annex D, E, and F.

43.   Results.[21] The estimated coefficients describe how changes in taxes and benefits cause changes in the unemployment rate or labor force participation. Table 2 (respectively Table 3) presents the effects of a 1-percentage point increase in each indicator of work disincentives on the unemployment rate (respectively the participation rate) across groups of workers in Luxembourg.

Table 2. Effects on Unemployment Rate				Table 3. Effects on Participation Rate		
Groups	Average Participation Tax Rate from Unemployment Benefits	Average Tax Wedge	Average 5-Years Net Replacement Rate	Groups	Average Participation Tax Rate from Inactivity	Average Tax Wedge
Age				Age		
15-64	0.221***	0.327*	0.264***	15-64	0.029	-0.108
15-24	0.446***	0.726**	0.556***	15-24	0.059	-0.216
25-54	0.191**	0.298**	0.230***	25-54	0.061	-0.095
55-64	0.151**	0.304**	0.203***	55-64	-0.363***	-0.729***
Education attainment				Education attainment		
Lower Secondary	0.227**	0.247	0.338**	Lower Secondary	-0.030	-0.055
Upper Secondary	0.224**	0.356*	0.300***	Upper Secondary	0.067	0.080
Tertiary	0.069	0.113	0.120***	Tertiary	0.103	-0.075
Gender				Gender		
Men	0.246***	0.404**	0.312***	Men	0.012	-0.181**
Women	0.180**	0.221	0.208***	Women	0.153***	0.022
*Note: ***, ** and * denote significant at 1%, 5% and 10% respectively.*				*Note: ***, ** and * denote significant at 1%, 5% and 10% respectively.*		

44.   On average, a 10-percentage points reduction in the participation tax rate from unemployment benefits would reduce the overall unemployment rate by 2.2 percentage points. A similar reduction in the net replacement rate of unemployment benefits would lower the unemployment rate by 2.6 percentage points. The highest elasticity is estimated for the tax

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[21] All estimation results are presented in Annexes D, E, and F.

wedge: a 10-percentage reduction in the average tax wedge would reduce the unemployment rate by 3.3 percent.

45.   These aggregate elasticities conceal significant differences among sub-groups of workers. Across age-groups, the elasticity of the youth unemployment rate to the tax benefits system is more than double that of prime-age or older workers, irrespective of the indicator considered. Between skill groups, low-skilled workers are more responsive to the financial disincentives inherent in the tax-benefits structure than high-skilled workers. Men's unemployment rate has a relatively larger elasticity than that of women. This gap could be explained by the fact that the female labor supply is more determined by other factors such as the accessibility of childcare, and the size of spouse-dependent and family benefits.

46.   Only the labor supply of older workers is significantly responsive with the expected sign to either the participation tax rate from inactivity, or the tax wedge. More precisely, a 10-percentage point reduction in the participation tax rate from inactivity would increase the seniors' labor market participation rate by 3.6 percentage points. The responsiveness of the older workers' activity rate to the tax wedge is even higher. The relatively high elasticity of seniors' labor supply to financial disincentives mirror the generosity of the pension system as well as the existence of early retirement options.[22]

V. CONCLUSION

47.   Overall job creation in Luxembourg is strong, but unemployment of young and low-skilled workers declines only gradually and activity rates of women and seniors remain low while non-EU migrants and refugees are less integrated to the labor market. Despite robust employment growth, resident employment remains below the national target, and lags behind European peers, and a rising share of unemployed workers face longer spells without a job. Compared to the pre-crisis level, unemployment has increased for young, low skilled, and non-native resident workers, and is highly persistent for seniors. Labor market attachment is weak for seniors, and marginal for women who work mostly part-time.

48.   Skills mismatches are a predominant factor in explaining structural unemployment, but work disincentives inherent to the tax-benefits system are also important. Weakening demand for routine manual jobs increases unemployment persistence,

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[22] The positive elasticity of women activity rate to the average participation tax rate is striking and might hide a non-linear relationship between the two variables given the numerous other factors affecting women labor market participation.

especially for low-skilled workers. 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. High unemployment rates among the young and low-skilled reflect significant unemployment traps. The relatively low participation rate of women and the high gender-gap in part-time work mirror the high marginal effective tax rates for second-earners, especially at lower wages. Low participation of seniors is driven by inactivity traps generated by the generosity of the pension system.

49.   Further easing labor market integration for vulnerable groups would make growth more inclusive. To bring the growth benefits to all, labor market interventions, including ALMPs, should continue to increasingly target the most vulnerable groups, 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. 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.

50.   Making work more rewarding, especially for low earners, would improve their employment prospects. Refocusing unemployment and welfare benefits to promote active job search and vacancy acceptance, and a greater use of in-work tax credits would ensure that the unemployed are better off taking up a job than remaining unemployed, and hence reduce unemployment traps, especially for the low-skilled. The recent introduction of the Revenu d'Inclusion Sociale (REVIS) is a good step in this direction.

51.   Improving participation of women and seniors. The 2016 tax reform has introduced optional individual taxation for married or co-habiting workers. Consideration should be given to increasing the second-earner income tax-deduction. Moving to fully individual income taxation would make the tax system more gender neutral by reducing the marginal tax rate applied to the earnings of second earners, often women. Further expanding the availability of daycare and after-school programs could also improve women labor market participation. Raising the participation of seniors would require significantly limiting access to benefits for early retirement.

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I. ANNEX

A. Data Sources and Country Coverage

1.   Probit regression. The micro-level analysis is based on data from the European Union Labor Force Survey form Eurostat. 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. Data collection covers the years from 1983 and onwards, are available for individual countries depending on their date of accession date to the European union. In this analysis, we focus on the yearly dataset for 2006 and 2014. The database contains nearly 85,000 individual responses for 2006 and 14,000 for 2014. LFS data cover residents—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 the country (though some of them have foreign citizenship), and as "migrants" all the respondents who moved to the country at some point in the past (though some of them have since acquired the country citizenship).

2.   Tax-benefit regression. OECD is the primary data source for the tax-benefits indicators. Unemployment and activity rates, population by education attainment, GDP growth are from OECD and Eurostat. The analysis covers the period 2001-2015. The sample of countries consists of 35 advanced countries: Austria, Belgium, Bulgaria, Switzerland, Czech Republic, Germany, Denmark, Estonia, Greece, Spain, Finland, France, Hungary, Croatia, Cyprus, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherland, Norway, Poland, Portugal, Slovakia, Romania, Slovenia, Sweden, Turkey, U.K., U.S., Canada, and Japan. The number of countries used in each estimation depend on the availability of data for unemployment and activity rates and explanatory variables used in the specific estimation for this country over the sample period.

B. Definition of Tax and Benefit Indicators[23]

Financial incentives to work or to hire can be captured through several tax and benefits indicators mainly defined by the OECD. This annex focuses mainly on those used in this chapter.

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[23] http://www.oecd.org/els/benefits-and-wages.htm - http://www.oecd.org/tax/tax-policy/taxing-wages-20725124.htm - https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/tax-and-benefits-indicators-database_en

The **total labor cost** is the sum of gross wage earnings of employees, employer social security contributions and—in some countries—payroll taxes.

The **personal average tax rate** is defined as income tax plus employee social security contributions as a percentage of gross wage earnings.

The **net personal average tax rate** is the personal income tax and employee social security contributions net of cash benefits as a percentage of gross wage earnings. The **net personal average tax rate of the second earner** is the increase in income tax and employee social contributions (net of in-work benefits) paid by the family because of the second earner entering workforce divided by the increase in family gross income because of the second earner entering in the workforce.

The **tax wedge**, the difference between the total labor cost of employing a worker and its net earnings, is calculated by expressing the sum of personal income tax, employee plus employer social security contributions together with any payroll tax, minus benefits as a percentage of labor costs. The **average tax wedge** measures the part of total labor costs which is taken in tax and social security contributions net of cash benefits. The **marginal tax wedge** is the percentage of the marginal increase in labor costs that is deducted through the combined effect of increasing taxes and social security contributions and decreasing cash benefits.

The **marginal effective tax rate** measures what part of an increase in earnings, due to an increase in the number of hours worked or to a change in employment situation, is "taxed away" by the imposition of personal income taxes and employee social security contributions, considering the possible withdrawal of social and other earnings-related benefits.

The **net replacement rate** is 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 and is calculated at different points in time because unemployment benefits decline over unemployment spell. Similarly, the **net pension replacement rate** is defined as the individual net pension entitlement divided by net pre-retirement earnings, considering personal income taxes and social security contributions paid by workers and pensioners.

The **average effective age** of retirement is defined as the average age of exit from the labor force during a 5-year period calculated as a weighted average of (net) withdrawals from the labor market, net labor force exits being estimated by the difference in the participation rate for

each 5-year age group (40 and over) at the beginning of the period and the rate for the corresponding age group aged 5-years older at the end of the period.

The **participation tax rate**, the proportion of gross earnings taken in tax or reduced benefits, is measured by one minus the financial gains to working (net income in work – net income out of work) as proportion of gross earnings, and is calculated for moving form inactivity (or unemployment benefits) to work.

The **trap,** calculated as the share of additional gross income of such a transition that is taxed away by the combined effects of higher taxes and lower benefits, refers to the financial incentive to move from one labor market situation to another. Hence, the **inactivity (unemployment) trap** measures the incentive for an inactive person (an unemployed person) not entitled to unemployment benefits but potentially receiving other benefits such as social assistance (receiving unemployment benefits) to move to paid employment. The **low-wage trap** measures the financial incentive to increase a low level of earnings by working additional hours.

C.   Determinants of Individual Labor Market Performance

Table C.2. Joint Effects of Two Individual Characteristics[1]

Probability of being unemployed

	Luxembourg[1]		Belgium		France	
	2006	2014	2006	2014	2006	2014
Age						
25-54 years (base)	**0.036**	**0.044**	**0.075**	**0.080**	**0.082**	**0.105**
15-24 years	0.139	0.126	0.127	0.138	0.129	0.134
55-64 years	-0.021	-0.004*	-0.028	-0.024	-0.030	-0.035
Gender						
Female (base)	**0.056**	**0.051**	**0.096**	**0.087**	**0.103**	**0.114**
Male	-0.024	0.002*	-0.021	0.001*	-0.019	-0.003
Country of birth						
Native (base)	**0.032**	**0.032**	**0.075**	**0.074**	**0.087**	**0.104**
EU born	0.020	0.035	0.009	0.010	-0.004*	-0.005*
Non-EU born	0.088	0.097	0.113	0.109	0.090	0.098
Household Composition						
Single, no child (base)	**0.056**	**0.050**	**0.138**	**0.135**	**0.113**	**0.134**
Single with children	0.013	0.015*	0.043	0.013*	0.034	0.035
Couple, no child	-0.025	-0.011*	-0.067	-0.073	-0.039	-0.052
Couple with children	-0.011	-0.004*	-0.082	-0.068	-0.040	-0.050
Other	-0.018	0.017*	-0.061	-0.043	0.003*	0.012
Education attainment						
Lower secondary (base)	**0.057**	**0.073**	**0.131**	**0.139**	**0.134**	**0.176**
Upper secondary	-0.017	-0.013*	-0.047	-0.048	-0.050	-0.065
Tertiary	-0.029	-0.037	-0.081	-0.085	-0.070	-0.106
Years of residency						
Less than or equal to 1 year (base)	**0.054**	**0.080**	**0.123**	**0.129**	**0.297**	**0.331**
2 or 3 years	0.004*	0.009*	-0.017*	-0.034	-0.108	-0.123
4 years or more	-0.011*	-0.031*	-0.039	-0.043	-0.205	-0.219
Number of Observations	36,396	6,106	51,893	46,649	147,527	223,434

Probability of being employed

	Luxembourg[1]		Belgium		France	
	2006	2014	2006	2014	2006	2014
Age						
25-54 years (base)	**0.794**	**0.817**	**0.749**	**0.763**	**0.786**	**0.751**
15-24 years	-0.535	-0.561	-0.458	-0.506	-0.499	-0.479
55-64 years	-0.495	-0.418	-0.405	-0.325	-0.420	-0.291
Gender						
Female (base)	**0.440**	**0.476**	**0.453**	**0.473**	**0.447**	**0.440**
Male	0.152	0.096	0.119	0.074	0.080	0.053
Country of birth						
Native (base)	**0.510**	**0.526**	**0.525**	**0.523**	**0.492**	**0.473**
EU born	0.026	0.005*	-0.023	0.001*	0.010	0.017
Non-EU born	-0.071	-0.072	-0.139	-0.128	-0.080	-0.078
Household Composition						
Single, no child (base)	**0.565**	**0.542**	**0.491**	**0.479**	**0.495**	**0.464**
Single with children	-0.066	-0.005*	-0.071	-0.051	-0.085	-0.079
Couple, no child	-0.036	-0.037	0.003*	0.032	0.012	0.010
Couple with children	-0.082	-0.037	0.017	0.035	-0.034	-0.002*
Other	-0.019	0.008*	0.062	0.058	0.022	0.021
Education attainment						
Lower secondary (base)	**0.447**	**0.429**	**0.394**	**0.379**	**0.406**	**0.354**
Upper secondary	0.085	0.082	0.141	0.140	0.110	0.129
Tertiary	0.179	0.182	0.254	0.254	0.167	0.226
Years of residency						
Less than or equal to 1 year (base)	**0.501**	**0.422**	**0.446**	**0.436**	**0.205**	**0.212**
2 or 3 years	0.003*	0.078	0.021*	0.036	0.106	0.107
4 years or more	0.014*	0.102	0.067	0.076	0.282	0.255
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 C.2. Joint Effects of Two Individual Characteristics[1]

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*	-0.023*	-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.

D. Effects of Tax-Benefit System: Baseline Specification

Table D.1. Dependent Variable: Unemployment Rate									
	15-64	15-24	25-54	55-64	Lower Secondary	Upper Secondary	Tertiary Education	Men	Women
PTRUB	0.221***	0.446***	0.191**	0.151**	0.227**	0.224**	0.069	0.246***	0.180**
	(0.076)	(0.146)	(0.070)	(0.059)	(0.106)	(0.084)	(0.046)	(0.080)	(0.076)
Education (% Tertiary)	0.090	0.273	0.072	0.341	0.224	0.168	0.109	0.122	0.053
	(0.172)	(0.318)	(0.155)	(0.212)	(0.232)	(0.211)	(0.098)	(0.192)	(0.155)
GDP Growth	-0.279**	-0.528**	-0.273**	-0.143**	-0.353**	-0.296**	-0.181**	-0.319***	-0.233**
	(0.100)	(0.207)	(0.100)	(0.066)	(0.150)	(0.110)	(0.072)	(0.108)	(0.092)
Observations	300	300	300	283	300	299	294	300	300
R-squared	0.324	0.391	0.328	0.300	0.364	0.330	0.355	0.365	0.259
Number of countries	21	21	21	21	21	21	21	21	21
Average Tax Wedge	0.327*	0.726**	0.298**	0.304**	0.247	0.356*	0.113	0.404**	0.221
	(0.163)	(0.340)	(0.144)	(0.143)	(0.264)	(0.175)	(0.072)	(0.169)	(0.158)
Education (% Tertiary)	0.030	0.056	0.018	0.249	0.139	0.116	0.080	0.049	0.012
	(0.184)	(0.355)	(0.166)	(0.189)	(0.229)	(0.216)	(0.093)	(0.203)	(0.167)
GDP Growth	-0.300***	-0.571***	-0.287***	-0.172***	-0.330**	-0.320***	-0.182**	-0.354***	-0.233**
	(0.087)	(0.171)	(0.089)	(0.056)	(0.135)	(0.089)	(0.066)	(0.088)	(0.084)
Observations	432	432	432	412	432	430	423	432	432
R-squared	0.258	0.316	0.266	0.261	0.306	0.282	0.328	0.305	0.192
Number of countries	26	26	26	26	26	26	26	26	26
NRR5Y	0.264***	0.556***	0.230***	0.203***	0.338**	0.300***	0.120***	0.312***	0.208***
	(0.082)	(0.175)	(0.068)	(0.070)	(0.125)	(0.094)	(0.043)	(0.096)	(0.069)
Education (% Tertiary)	-0.030	-0.008	-0.038	0.209	0.089	0.045	0.038	-0.020	-0.041
	(0.174)	(0.334)	(0.155)	(0.188)	(0.238)	(0.202)	(0.087)	(0.189)	(0.160)
GDP Growth	-0.293***	-0.586***	-0.284***	-0.165**	-0.393***	-0.313***	-0.182***	-0.342***	-0.238***
	(0.090)	(0.188)	(0.089)	(0.062)	(0.125)	(0.097)	(0.062)	(0.098)	(0.081)
Observations	429	429	429	411	429	428	423	429	429
R-squared	0.345	0.404	0.352	0.332	0.405	0.365	0.402	0.388	0.276
Number of countries	33	33	33	33	33	33	33	33	33

Source: IMF Staff Calculation.
Notes: Standard errors are in parentheses.
* denotes significant at the 10 percent level, ** at 5 percent, *** at 1 percent.

PTRUB (respectively NRR5Y) is the participation tax rate from (repectively net replacement rate of) unemployment benefits averaged across all levels of income and family situations.

	15-64	15-24	25-54	55-64	Lower Secondary	Upper Secondary	Tertiary Education	Men	Women
Table D.2. Dependent Variable: Participation Rate									
PTR Inactivity	0.029	0.059	0.061	-0.363***	-0.030	0.067	0.103	0.012	0.153***
	(0.041)	(0.132)	(0.050)	(0.086)	(0.070)	(0.052)	(0.087)	(0.088)	(0.043)
Education (% Tertiary)	0.145	-0.067	0.205**	0.123	-0.266**	-0.157**	-0.071	-0.062	0.192
	(0.094)	(0.130)	(0.072)	(0.269)	(0.113)	(0.072)	(0.132)	(0.128)	(0.126)
GDP Growth	-0.043	-0.072	-0.024	0.036	-0.073	-0.050	0.051	0.026	-0.056
	(0.038)	(0.144)	(0.026)	(0.084)	(0.082)	(0.048)	(0.047)	(0.043)	(0.048)
Observations	300	300	300	300	300	300	300	300	300
R-squared	0.358	0.416	0.404	0.723	0.159	0.082	0.140	0.089	0.588
Number of countries	21	21	21	21	21	21	21	21	21
Average Tax Wedge	-0.108	-0.216	-0.095	-0.729***	-0.055	0.080	-0.075	-0.181**	0.022
	(0.100)	(0.246)	(0.101)	(0.230)	(0.169)	(0.125)	(0.088)	(0.087)	(0.153)
Education (% Tertiary)	0.130	0.031	0.197**	1.060***	-0.226*	-0.146*	-0.033	-0.024	0.195
	(0.100)	(0.136)	(0.082)	(0.121)	(0.120)	(0.078)	(0.116)	(0.108)	(0.140)
GDP Growth	-0.081**	-0.102	-0.033	-0.025	-0.119	-0.084*	-0.008	0.005	-0.110**
	(0.037)	(0.118)	(0.031)	(0.055)	(0.075)	(0.045)	(0.033)	(0.032)	(0.049)
Observations	432	432	432	432	432	432	432	432	432
R-squared	0.466	0.273	0.408	0.622	0.125	0.082	0.035	0.068	0.585
Number of countries	26	26	26	26	26	26	26	26	26

Source: IMF Staff Calculation.
Notes: Standard errors are in parentheses.
* Denotes significant at the 10 percent level, ** at 5 percent, *** at 1 percent.

PTR Inactivity is the participation tax rate from inactivity averaged across all levels of income and family situations.

E. Effects of Tax-Benefit System: Luxembourg Effects

Table E.1. Dependent Variable: Unemployment Rate

	15-64	15-24	25-54	55-64	Lower Secondary	Upper Secondary	Tertiary Education	Men	Women
PTR Unemployment Benefits (PTRUB)	0.222***	0.439***	0.193**	0.151**	0.234**	0.226**	0.071	0.251***	0.176**
	(0.076)	(0.144)	(0.070)	(0.059)	(0.108)	(0.085)	(0.048)	(0.081)	(0.075)
PTRUB#LUX	-0.026	0.300	-0.069	0.555	-0.297	-0.075	-0.082	-0.185	0.179
	(0.301)	(0.557)	(0.272)	(0.442)	(0.388)	(0.374)	(0.156)	(0.334)	(0.271)
Education (% Tertiary)	0.093	0.242	0.079	0.341	0.255	0.176	0.118	0.141	0.034
	(0.201)	(0.377)	(0.180)	(0.212)	(0.263)	(0.247)	(0.108)	(0.221)	(0.182)
GDP Growth	-0.279**	-0.530**	-0.273**	-0.143**	-0.351**	-0.295**	-0.181**	-0.318***	-0.234**
	(0.101)	(0.210)	(0.101)	(0.066)	(0.150)	(0.111)	(0.072)	(0.109)	(0.094)
Observations	300	300	300	283	300	299	294	300	300
R-squared	0.324	0.392	0.328	0.300	0.365	0.331	0.356	0.365	0.260
Number of countries	21	21	21	21	21	21	21	21	21
Average Tax Wedge (ATW)	0.345**	0.757**	0.318**	0.304**	0.265	0.385**	0.145*	0.426**	0.236
	(0.162)	(0.353)	(0.144)	(0.145)	(0.277)	(0.174)	(0.073)	(0.170)	(0.155)
ATW#LUX	-0.303	-0.529	-0.341	-0.024	-0.293	-0.438	-0.473**	-0.367	-0.238
	(0.420)	(0.869)	(0.381)	(0.201)	(0.611)	(0.500)	(0.227)	(0.461)	(0.380)
Education (% Tertiary)	0.059	0.106	0.050	0.249	0.166	0.158	0.127	0.084	0.034
	(0.213)	(0.413)	(0.191)	(0.190)	(0.266)	(0.250)	(0.096)	(0.233)	(0.197)
GDP Growth	-0.297***	-0.566***	-0.284***	-0.172***	-0.327**	-0.316***	-0.178***	-0.350***	-0.231**
	(0.087)	(0.171)	(0.089)	(0.056)	(0.135)	(0.089)	(0.063)	(0.088)	(0.084)
Observations	432	432	432	412	432	430	423	432	432
R-squared	0.259	0.317	0.268	0.261	0.307	0.285	0.337	0.307	0.193
Number of countries	26	26	26	26	26	26	26	26	26
Net Replacement Rate	0.265***	0.558***	0.232***	0.203***	0.343***	0.302***	0.122***	0.314***	0.209***
	(0.081)	(0.173)	(0.068)	(0.070)	(0.124)	(0.093)	(0.042)	(0.095)	(0.068)
NRR5Y#LUX	-0.529	-0.772	-0.542	-0.210	-1.882	-1.017	-0.825	-0.923	-0.092
	(1.305)	(2.404)	(1.168)	(1.203)	(1.692)	(1.521)	(0.507)	(1.414)	(1.195)
Education (% Tertiary)	0.012	0.053	0.004	0.210	0.237	0.125	0.103	0.053	-0.034
	(0.269)	(0.508)	(0.239)	(0.191)	(0.337)	(0.307)	(0.104)	(0.288)	(0.249)
GDP Growth	-0.291***	-0.583***	-0.282***	-0.165**	-0.385***	-0.309***	-0.178***	-0.339***	-0.238***
	(0.091)	(0.192)	(0.090)	(0.062)	(0.126)	(0.099)	(0.061)	(0.099)	(0.083)
Observations	429	429	429	411	429	428	423	429	429
R-squared	0.346	0.404	0.353	0.332	0.409	0.368	0.409	0.390	0.276
Number of countries	33	33	33	33	33	33	33	33	33

Source: IMF Staff Calculation.
Notes: Standard errors are in parentheses.
* Denotes significant at the 10 percent level, ** at 5 percent, *** at 1 percent.

PTRUB (respectively NRR5Y) is the participation tax rate from (repectively net replacement rate of) unemployment benefits averaged across all levels of income and family situations.

	15-64	15-24	25-54	55-64	Lower Secondary	Upper Secondary	Tertiary Education	Men	Women
Table E.2. Dependent Variable: Participation Rate									
PTR Inactivity (PTRIn)	0.024	0.047	0.055	-0.376***	-0.035	0.066	0.091	0.002	0.143***
	(0.042)	(0.135)	(0.051)	(0.086)	(0.070)	(0.054)	(0.089)	(0.090)	(0.040)
PTRIn#LUX	0.285	0.687*	0.333**	0.811	0.279	0.056	0.691***	0.616***	0.598***
	(0.172)	(0.397)	(0.154)	(0.542)	(0.337)	(0.281)	(0.182)	(0.196)	(0.189)
Education (% Tertiary)	0.096	-0.186	0.147*	-0.017	-0.314*	-0.167	-0.191*	-0.168	0.089
	(0.108)	(0.155)	(0.072)	(0.315)	(0.153)	(0.108)	(0.109)	(0.115)	(0.125)
GDP Growth	-0.047	-0.079	-0.028	0.027	-0.076	-0.051	0.044	0.020	-0.063
	(0.037)	(0.143)	(0.026)	(0.077)	(0.083)	(0.049)	(0.043)	(0.040)	(0.045)
Observations	300	300	300	300	300	300	300	300	300
R-squared	0.365	0.424	0.415	0.727	0.161	0.082	0.186	0.129	0.602
Number of countries	21	21	21	21	21	21	21	21	21
Average Tax Wedge (ATW)	-0.127	-0.266	-0.124	-0.668***	-0.060	0.086	-0.108	-0.206**	-0.016
	(0.105)	(0.273)	(0.102)	(0.240)	(0.184)	(0.140)	(0.088)	(0.090)	(0.156)
ATW#LUX	0.334	0.841	0.495***	-0.830*	0.092	-0.100	0.566**	0.424*	0.632**
	(0.218)	(0.575)	(0.161)	(0.474)	(0.396)	(0.304)	(0.227)	(0.208)	(0.279)
Education (% Tertiary)	0.098	-0.049	0.151**	1.091***	-0.235	-0.136	-0.087	-0.064	0.135
	(0.107)	(0.168)	(0.071)	(0.132)	(0.148)	(0.099)	(0.104)	(0.103)	(0.138)
GDP Growth	-0.084**	-0.109	-0.037	-0.020	-0.120	-0.083*	-0.013	0.001	-0.116**
	(0.036)	(0.117)	(0.032)	(0.054)	(0.076)	(0.046)	(0.032)	(0.031)	(0.049)
Observations	432	432	432	432	432	432	432	432	432
R-squared	0.470	0.281	0.420	0.625	0.125	0.082	0.054	0.079	0.592
Number of countries	26	26	26	26	26	26	26	26	26

Source: IMF Staff Calculation.

Notes: Standard errors are in parentheses.

* Denotes significant at the 10 percent level, ** at 5 percent, *** at 1 percent.

PTR Inactivity is the participation tax rate from inactivity averaged across all levels of income and family situations.

F. Effects of Tax-Benefit System: Excluding Luxembourg

Table F.1. Dependent Variable: Unemployment Rate

	15-64	15-24	25-54	55-64	Lower Secondary	Upper Secondary	Tertiary Education	Men	Women
PTRUB	0.221***	0.435***	0.192**	0.151**	0.233**	0.225**	0.071	0.250***	0.175**
	(0.076)	(0.144)	(0.070)	(0.059)	(0.107)	(0.084)	(0.046)	(0.080)	(0.075)
Education (% Tertiary)	0.149	0.366	0.139	0.347	0.361	0.289	0.233	0.219	0.072
	(0.343)	(0.642)	(0.306)	(0.222)	(0.442)	(0.410)	(0.135)	(0.375)	(0.312)
GDP Growth	-0.277**	-0.525**	-0.271**	-0.144**	-0.346**	-0.287**	-0.174**	-0.316**	-0.231**
	(0.109)	(0.223)	(0.107)	(0.068)	(0.161)	(0.119)	(0.071)	(0.118)	(0.100)
Observations	285	285	285	277	285	284	279	285	285
R-squared	0.326	0.392	0.330	0.302	0.365	0.337	0.370	0.371	0.258
Number of countries	20	20	20	20	20	20	20	20	20
Average Tax Wedge	0.344**	0.748**	0.317**	0.302**	0.267	0.385**	0.146*	0.427**	0.230
	(0.162)	(0.351)	(0.144)	(0.145)	(0.278)	(0.174)	(0.074)	(0.171)	(0.154)
Education (% Tertiary)	0.082	0.091	0.073	0.253	0.225	0.213	0.159	0.132	0.028
	(0.268)	(0.521)	(0.239)	(0.195)	(0.328)	(0.312)	(0.111)	(0.288)	(0.248)
GDP Growth	-0.296***	-0.567***	-0.284***	-0.172***	-0.325**	-0.311***	-0.177**	-0.350***	-0.228**
	(0.091)	(0.179)	(0.093)	(0.056)	(0.141)	(0.093)	(0.065)	(0.093)	(0.088)
Observations	415	415	415	405	415	413	407	415	415
R-squared	0.260	0.317	0.270	0.262	0.305	0.288	0.339	0.310	0.195
Number of countries	25	25	25	25	25	25	25	25	25
NRR5Y	0.262***	0.552***	0.229***	0.203***	0.338**	0.297***	0.120***	0.310***	0.205***
	(0.081)	(0.174)	(0.068)	(0.070)	(0.124)	(0.092)	(0.041)	(0.095)	(0.068)
Education (% Tertiary)	0.022	0.052	0.013	0.213	0.254	0.150	0.128	0.061	-0.020
	(0.297)	(0.561)	(0.263)	(0.195)	(0.373)	(0.339)	(0.112)	(0.318)	(0.274)
GDP Growth	-0.293***	-0.586***	-0.284***	-0.166**	-0.388***	-0.309***	-0.180***	-0.342***	-0.237***
	(0.094)	(0.197)	(0.093)	(0.063)	(0.130)	(0.101)	(0.062)	(0.102)	(0.084)
Observations	414	414	414	405	414	413	408	414	414
R-squared	0.348	0.406	0.354	0.333	0.408	0.371	0.411	0.393	0.278
Number of countries	32	32	32	32	32	32	32	32	32

Source: IMF Staff Calculation.
Notes: Standard errors are in parentheses.
* Denotes significant at the 10 percent level, ** at 5 percent, *** at 1 percent.

PTRUB (respectively NRR5Y) is the participation tax rate from (respectively net replacement rate of) unemployment benefits averaged across all levels of income and family situations.

Table F.2. Dependent Variable: Participation Rate

	15-64	15-24	25-54	55-64	Lower Secondary	Upper Secondary	Tertiary Education	Men	Women
PTR Inactivity	0.024	0.050	0.054	-0.374***	-0.037	0.067	0.091	0.005	0.141***
	(0.040)	(0.135)	(0.050)	(0.086)	(0.069)	(0.053)	(0.088)	(0.089)	(0.039)
Education (% Tertiary)	0.063	-0.185	0.118	-0.131	-0.320*	-0.185	-0.261**	-0.238*	0.047
	(0.120)	(0.187)	(0.078)	(0.356)	(0.182)	(0.127)	(0.109)	(0.119)	(0.138)
GDP Growth	-0.051	-0.070	-0.033	0.016	-0.072	-0.055	0.038	0.014	-0.067
	(0.036)	(0.145)	(0.026)	(0.075)	(0.086)	(0.049)	(0.042)	(0.040)	(0.044)
Observations	285	285	285	285	285	285	285	285	285
R-squared	0.302	0.425	0.310	0.719	0.141	0.079	0.202	0.154	0.535
Number of countries	20	20	20	20	20	20	20	20	20
Average Tax Wedge	-0.130	-0.268	-0.128	-0.655**	-0.055	0.084	-0.121	-0.215**	-0.025
	(0.106)	(0.274)	(0.102)	(0.242)	(0.187)	(0.143)	(0.089)	(0.092)	(0.155)
Education (% Tertiary)	0.058	-0.013	0.104	1.111***	-0.205	-0.166	-0.187**	-0.156*	0.068
	(0.122)	(0.212)	(0.071)	(0.141)	(0.182)	(0.119)	(0.077)	(0.082)	(0.152)
GDP Growth	-0.088**	-0.099	-0.040	-0.022	-0.119	-0.083*	-0.015	0.000	-0.119**
	(0.036)	(0.121)	(0.033)	(0.056)	(0.080)	(0.047)	(0.033)	(0.033)	(0.050)
Observations	415	415	415	415	415	415	415	415	415
R-squared	0.445	0.276	0.367	0.615	0.103	0.082	0.080	0.110	0.559
Number of countries	25	25	25	25	25	25	25	25	25

Source: IMF Staff Calculation.
Notes: Standard errors are in parentheses.
* Denotes significant at the 10 percent level, ** at 5 percent, *** at 1 percent.

PTR Inactivity is the participation tax rate from inactivity averaged across all levels of income and family situations.