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Active labour market policies and short-time work arrangements: evidence from a survey of Luxembourg firms

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Wage dynamics network

This paper contains research conducted within the Wage Dynamics Network (WDN). The WDN is a research network comprising economists from the European Central Bank (ECB) and the national central banks (NCBs) of the EU countries. It aims to study in depth the features and sources of wage and labour cost dynamics and their implications for monetary policy.

The WDN initially operated from 2006 to 2009 and resumed activities, in part, in 2013. At present, 25 NCBs participate in the WDN, which is chaired by Juan F. Jimeno (Banco de España), with Ana Lamo (ECB) acting as secretary. The WDN's current research focus is to assess labour market adjustments in the period 2010-13 and firms' reactions to the labour market reforms which took place over this period in EU Member States. For this purpose, in 2014 the network launched an ad hoc survey of firms called the "WDN3 survey".

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The paper is hereto released in order to make the results of WDN's research widely available, in preliminary form, to encourage comments and suggestions prior to final publication. The views expressed in the paper are those of the author and do not necessarily reflect those of the ESCB.

Abstract:

We analyse the use of active labour market policy (ALMP) measures and short-time work arrangements (STWAs) by Luxembourg firms during the years of economic and financial crisis (2008-09) and the subsequent European sovereign debt crisis (2010-13). About 34% of Luxembourg firms used ALMPs between 2008 and 2013. Economy-wide, use of ALMPs increased along both the extensive margin (more firms) and the intensive margin (more measures per firm). The likelihood that a firm hired with recourse to ALMPs is greater for large, domestically oriented, multiple establishment firms, firms facing strong demand, with concerns about labour cost pressures and unavailability of skilled labour. The crisis saw a surge in firms using STWAs. The likelihood of applying for STWAs increases with demand volatility, the share of workers with permanent contracts, export orientation and the inability to shift workers between establishments. Firms reported that 20-25% of jobs in STWAs were saved by this measure.

Keywords: Firms, survey, crisis, active labour market policy, short-time work arrangements
JEL Codes: C25, J63, J68

Non-technical summary

Following the economic and financial crisis, the Luxembourg economy plunged into a recession between the second quarter of 2008 and the second quarter of 2009. Between peak and trough, real GDP contracted by 9.2%, which was a larger decline than at the level of the euro area at that time. This reflected greater exposure of the Luxembourg economy to financial services and the collapse of international trade. To mitigate the effects of the crisis on the labour market, the Luxembourg government introduced (i) activation measures to promote the reintegration of the unemployed and improve the matching of labour supply and demand; (ii) passive income replacement measures for those who lost their jobs; and (iii) other measures to promote worker retention within firms.

This paper studies the evolution, the determinants and the effects of active labour market policies and short-time work agreements on Luxembourg firms during the recent crisis. In the first part, we analyse the use of active labour market policies and the determinants of firms' participation in these measures. In the second part, we examine the extent to which firms used short-time work agreements and their effect in terms of preserving jobs. The analysis is based on the results of a survey carried out by the Central Bank of Luxembourg at the end of 2014, which was part of the Wage Dynamics Network of the European System of Central Banks. The survey gathered information on the characteristics of firms, how they were affected by the crisis in 2008-09 and subsequently in 2010-2013, as well as their responses to these economic shocks and adjustments in terms of employment, wages and prices.

The survey revealed that the use of active labour market policies increased over the years both in extensive terms ("number of participating firms") and in intensive terms ("number of measures per participating firm"). There are, however, differences between economic sectors and firms of different sizes. The number of firms that used active labour market policies increased for all firm size classes (except for micro-firms with fewer than 5 employees) and especially in the financial intermediation and construction sectors. At the same time, the number of measures per firm increased strongly for micro-firms and in the trade sector. Overall, financial aid for hiring older or long-term unemployed, re-employment support and apprenticeship subsidies were the most common measures during the crisis. Concerning the determinants, the analysis revealed a positive relationship between the likelihood that a firm would use active labour market policies and the following factors: positive demand, size, firms with multiple establishments, orientation towards the domestic market, concerns about wage costs and insufficient availability of skilled labour.

Moreover, the results of the survey confirmed the significant increase in the use of short-time work agreements during the recent crisis. In Luxembourg, this measure was mainly used in the manufacturing industry. The likelihood of a firm using short-time work agreements increases with the volatility of demand, the degree of export orientation, the impossibility of transferring its employees between establishments, the share

of its workforce being employed with permanent contract and the human capital specific to the firm. According to the survey 20% of employees involved in short-time work agreements would have lost their job without this arrangement in 2010-13 and 25% would have lost it in 2008-09.

1. Introduction

After a long period of sustained growth, Luxembourg was severely affected in the initial phase of the global economic and financial crisis in 2008-09. During the recession, Luxembourg authorities introduced a broad range of labour market policies in order to cushion the effects of the recession on the labour market. The policy package included a mix of *(i) activation measures* designed to increase job opportunities for the unemployed and improve the matching between labour supply and demand, *(ii) passive income replacement measures* for those who lost their jobs and *(iii) other measures* designed to support labour demand, e.g. loosening the eligibility criteria for short-time work arrangements (STWAs) (see Table 14 in Appendix 3 for further details). During 2009-2014, the number of people involved in active labour market policies (ALMPs) rose continuously from about 3 100 to 5 000 (ADEM, 2015a). The number of employees involved in STWAs rose rapidly to unprecedented levels in 2008-09 and quickly receded, only to gain new momentum in 2011-12 and remain at elevated levels compared to the pre-crisis period until 2015 (ADEM, 2015a; Comité de conjoncture). While ALMPs generally address structural and persistent labour market mismatches, STWAs address more transitory shocks. STWAs are designed to help firms limit costly redundancies, preserve firm-specific human capital and avoid hiring and training costs in the subsequent upswing. STWAs are normally of short duration (Arpaia et al., 2010) and were widely used in many EU countries during the economic and financial crisis.

This paper studies ALMPs and STWAs in Luxembourg during the crisis and analyses their evolution, determinants and effects. We exploit a firm survey conducted by the Central Bank of Luxembourg at the end of 2014. The survey asked firms established in Luxembourg detailed questions about company characteristics, how they were affected by the crisis during 2008-09 and 2010-13 and how shocks and changes in the economic environment led them to adjust labour, wages and prices. The survey also included a set of questions on the public employment support measures introduced by the government of Luxembourg. More specifically, we first analyse whether and to what extent Luxembourg firms used specific public employment measures. Then we examine which firms used STWAs and what effect this had on firm employment, or, put differently, how many jobs may have been saved through STWAs.

In this paper, we analyse ALMPs and STWAs from the firm perspective rather than the employee perspective. Firm-level analyses on ALMPs and STWAs are far less common, despite their relevance. In addition, this is the first ALMP and STWA study using firm-level data for Luxembourg. Zanardelli et al. (2006) studied the effectiveness of Luxembourg ALMPs but only using employee data. Our main findings are as follows. About 34% of Luxembourg firms used ALMPs to hire new employees in 2008-2013. On aggregate, ALMP use increased both on the extensive margin (more firms) and on the intensive margin (more measures per firm), with the intensive margin accounting for about 2/3 of the overall increase. Use of the extensive margin is higher among firms that were faced with strong demand, are larger in size, domestically-oriented and are concerned about high labour costs and the availability of labour with the required skills when hir-

ing under permanent contract. Second, as in several other European countries, the number of firms with STWAs surged during the crisis. The likelihood that a firm used STWAs increases with demand volatility, the share of workers with permanent contracts, the extent of firm-specific human capital, the degree of export orientation and with the inability to shift workers between establishments. Firms report that STWAs may have saved 20-25% of jobs involved. However, STWAs are largely a sector-specific phenomenon, concentrated in the manufacturing sector.

The remainder of the paper is organised as follows. Section 2 briefly describes the macroeconomic performance of Luxembourg during the sample period. Section 3 presents the dataset. Section 4 focuses on public employment measures and investigates the determinants of ALMP participation. Section 5 analyses STWAs and Section 6 concludes.

2. Macroeconomic and labour market performance in 2008-13

In the initial phase of the global economic and financial crisis, the Luxembourg economy plunged into a deep recession. In 2008-09, real GDP fell by 9.2% peak to trough, a sharper drop than the euro area average. This reflected Luxembourg's exposure to financial services and the collapse in international trade (OECD, 2010). After a short-lived rebound in 2010, real GDP slowed again in 2011 and receded the following year. Subsequently, Luxembourg's economy has been growing rapidly at more than 4% each year.

While employment growth slowed down, it did not turn negative between 2008 and 2015 despite the sharp contraction in the export-oriented manufacturing sector, but also construction, transportation, as well as banking activity. In the second half of 2009 job creation effectively came to a standstill, with employment remaining virtually unchanged (excluding independent workers). Despite the severity of GDP decline, employment adjustment remained small, reflecting significant labour hoarding. Firms' preference to reduce hours worked (labour hoarding) rather than employment levels relates to extensive use of STWAs (e.g. in manufacturing) and structural shortages of skilled labour (e.g. in the banking sector). In the latter case, firms' reluctance to cut jobs may reflect expected difficulties in the recruitment of new employees with required skills in the next upturn. Cross-border workers, who account for more than 40% of total domestic employment, were particularly severely affected by the crisis. This is mainly related to the fact that cross-border workers are overrepresented in sectors with high shares of temporary contracts or internationally-oriented sectors (e.g. manufacturing, finance, business services and transportation).

3. Data

The dataset draws on a survey among Luxembourg firms that asked them about their labour input adjustment in response to the economic and financial crisis. The questionnaire (see Mathä et al., 2016) collected firm characteristics as well as qualitative views on economic shocks and the use of ALMPs put in place by the government of Luxembourg. Most questions refer to two separate time periods; the years 2008-09 cover the initial phase of the economic and financial crisis while the years 2010-13 capture the European sovereign debt crisis.

The sample is derived from a target population of firms based on the Luxembourg firm register at the end of 2013. At the cost of possibly introducing a survival bias, the target population was restricted to firms in operation since end-2007.[1] The target population was furthermore restricted to firms in the 5 sectors: manufacturing (NACE2: C), construction (NACE2: F), wholesale and retail trade (NACE2: G), business services (NACE2: H,I,J,L,M,N) and financial services (NACE2: K). The firms were categorised into the following size classes: "1-4 employees" (micro firms), "5-19 employees" (very small firms), "20-49 employees" (small firms), "50-199 employees" (medium-sized firms) and "200+ employees" (large firms). Some firms were directly included in the sample because they participated in similar surveys conducted in 2008 and 2009. The remaining firms in the sample were selected via a stratified random selection procedure, to ensure good coverage in all 25 strata (defined by the combination of sectors and size classes). The final sample collected contains 674 firms, representing a total response rate of 13.5%.[2] The sample is post-stratified so that results are representative of either the target population of firms or the set of employees in the target firm population. In some cases, the size class provided by Luxembourg's national statistics institute STATEC did not match those indicated by the firms. These firms were re-classified to the size class reported by the firm. However, the number of firms or employees in the target population was not adjusted.

The WDN survey provides information on firms' assessments of the impact of a set of external factors linked to the economic crisis on their activity, specifically the *level of demand*, *demand volatility*, *access to finance*, *customers' ability to pay* and *availability of supplies*. Demand related factors were predominant in 2008-09, during the initial phase of the crisis, when 36% of firms representing 33% of employment reported that their activity was negatively affected by demand (Mathä et al., 2016). At the same time, one out of four firms actually reported that demand positively affected their activity during this period. In 2010-13, Luxembourg firms reported that *customers' ability to pay* became

[1] Information for firms that discontinued their operations after 2007 could not be obtained. Firms that started their operation after 2007 could in principle have been included in the sampling population. This would however have unduly complicated the weighting. In addition, changes in survey results between the two periods would need to be decomposed into true changes in firm behaviour and compositional changes. Finally, we find negligible differences in the share of small firms (with less than 20 employees) using ADEM ALMPs among those that started their operations before and after 2000.

[2] In the sample, 226 firms (33.5% of total) reported that they used at least one ALMP and 24 firms (3.6% of total) applied for STWA in 2010-2013. However, in Manufacturing, the sector with most firms applying for STWA, the share was 15.6% (12 of 77 firms in the sample) in 2010-13.

the most relevant factor negatively affecting their activity, followed by demand-related shocks. While few firms reported that customers' ability to pay had a positive impact on their activity, a substantial fraction of firms (35%) reported that demand had a positive effect on their activity in 2010-2013. Most Luxembourg firms were not (negatively) affected by the access to external finance and few firms reported a decrease in the availability of inputs from their usual suppliers.

The survey collects information on various structural characteristics of the firms to analyse how adjustments to the crisis vary across firm types. This information provides discriminating variables for the descriptive statistics reported below and covariates for regression analysis.

Table 1: Labour force characteristics

Share of type of employees in total	in 2007	in 2013
Permanent full-time	88%	87%
Permanent part-time	8%	9%
Temporary or fixed-term	4%	4%
Total	100%	100%
Agency workers and others	5%	4%
Cross-border workers	55%	57%
Employees with Luxembourg nationality	23%	22%

OCCUPATIONAL GROUPS		
Higher skilled non-manual	(ISCO: 1, 2, 3)	23.0
Lower skilled non-manual	(ISCO: 4 and 5)	28.2
Higher skilled manual	(ISCO: 7 and 8)	32.7
Lower skilled manual	(ISCO: 9)	16.2
Total		100.1
JOB TENURE		
Less than 1 year		10.8
Between 1 and 5 years		29.4
More than 5 years		59.4
Total		99.6

Note: Data refer to the end of 2013 (unless otherwise stated). Aggregate statistics are weighted to be representative of the number of employees in the target firm population.

The survey suggests that Luxembourg firms mainly employ full-time workers with permanent contracts (88% in 2007 and 87% in 2013 in employment-weighted terms). Part-time workers with permanent contracts account for around 8% of employees (Table 1). The remaining 4% are employees with fixed-term contracts. Aggregate statistics do not indicate any striking changes in this composition. In 2007, 55% of employees were cross-border workers. The share slightly increased to 57% in 2013 (all employment-weighted).[3] Luxembourg is the EU country with the highest share of immigrants, so it is not surprising that only about one fifth of employees are Luxembourg nationals. Firms reported that 55% of employees were highly skilled (23% non-manual and 32% manual) and that most were with the firm for more than five years (59%). The share of labour costs in total costs averaged 49% across all firms, ranging from 42% in the trade sector to 53% in business services.

[3] These figures are broadly in line with administrative data (reporting around 53% of cross-border workers).

4. Active labour market policy measures

4.1. Relevant ALMPs in Luxembourg

Main characteristics

ALMPs aim to improve the functioning of the labour market and are directed at the unemployed. In contrast to passive policy (i.e. income support, unemployment benefits), these measures include: i) job brokering, ii) training and iii) direct job creation through subsidies for jobs or public sector employment (Calmfors, 1994). Most ALMPs examined in the Wage Dynamics Network (WDN) survey are aimed at employment creation, subsidising the labour cost of hires from targeted groups (e.g. young, older or long-term unemployed). Typically, they subsidise employers directly (wage, social security contributions) or indirectly (tax credit) when hiring a jobseeker belonging to the targeted pool. In Luxembourg, most of these measures are administered by the employment agency (ADEM - *Agence pour le Development de l'Emploi*) and require employers to file a claim. Some measures even require that ADEM's placement service performs the match between a registered job seeker and a posted vacancy. Some of these ALMPs were either introduced or scaled up during the crisis.

In the WDN questionnaire, firms were asked whether they used any of the following seven ALMP measures in two different sub-periods (2008-09 and 2010-13):

1) Financial aid to hire older workers or long-term unemployed,
2) Re-employment support,
3) Tax relief for hiring an unemployed person,
4) Apprenticeships subsidies,
5) Employment initiation contract (CIE),
6) Work-lending facility and
7) Deduction of relocation expenses for highly skilled workers from abroad.

Measures (6) and (7) do not fall under the "narrow" definition of ALMPs in Calmfors (1994). In Luxembourg, these measures are not administered by ADEM because they are not addressed to the unemployed. Survey results indicate that few firms in Luxembourg used these measures, so the remaining analysis is limited to ALMP measures (1)-(5) administered by ADEM.[4] The following table briefly describes these measures and reports the share of firms using them (take-up rate).

[4] The work-lending facility was used by 1.7% of firms in 2008-09 (3.1% in 2010-13). The deduction of relocation expenses for highly skilled workers from abroad was used by 0.9% of firms in 2008-09 (1.4% in 2010-13).

Table 2: Main ALMP measures in Luxembourg

ALMP managed by national employment agency ADEM	Description	Take-up rate, %		
		2008 -2009	2010 -2013	2008 -2013
Financial aid to hire older long-term unemployed	Social security subsidy for hiring long-term registered unemployed aged >30	8.7	13.1	16.1
Re-employment support	Partial subsidy of the differential between current and previous wage for registered unemployed and employees	7.0	12.5	14.8
Tax-relief for hiring an unemployed person	Tax credit for hiring registered unemployed assigned by ADEM's placement service	8.0	9.9	13.3
Apprenticeship subsidies	Subsidisation of apprenticeship fees and social security contributions	11.0	9.6	14.7
Employment initiation contract	Contract for young jobseekers including on-the-job training and subsidizing salary and social security contributions	4.3	5.7	7.5
At least one ALMP managed by national employment agency ADEM		22.7	24.9	33.6
At least one ALMP		23.7	25.8	34.3

Note: Weighted to be representative of firm population. Sample size n=631. Excludes firms with only partial information on the use of individual ALMP measures for either of the sub-periods. Excludes the category "Other measures".

These ALMP measures differ according to the jobseekers' eligibility criteria, the employers' entitlement criteria and the type and maximum duration of the subsidy. As illustrated in the table below, these measures often impose complex conditions to ensure they target hard-to-place and/or vulnerable groups while limiting the deadweight loss resulting from granting subsidies for new hires that would have being hired irrespectively of receiving the subsidy.

Table 3: Characteristics of ALMP measures (managed by ADEM)

ALMP	**Restrictions**				**Type**			**Maximum duration (months)**	**Claimed by**
	Registered	Assigned	Unemployment duration (months)	Age (years)	Compensation	Social security	Tax credit		
Financial aid to hire long-term/ older unemployed	x		>12	>30		x		24	Employer
	x		>3	>40		x		36	Employer
	x		>1	>45		x		Up to retirement	Employer
Re-employment support					x			48	Jobseeker
Tax relief for hiring an unemploy	x	x	>3				x	36	Employer
Apprenticeship subsidies	APPRENTICESHIP				x	x			Employer
Employent initiation contract	x		>3	<30	x	x		18	Contract

Note: ADEM; publicly available information from: http://www.adem.public.lu/fr/index.html

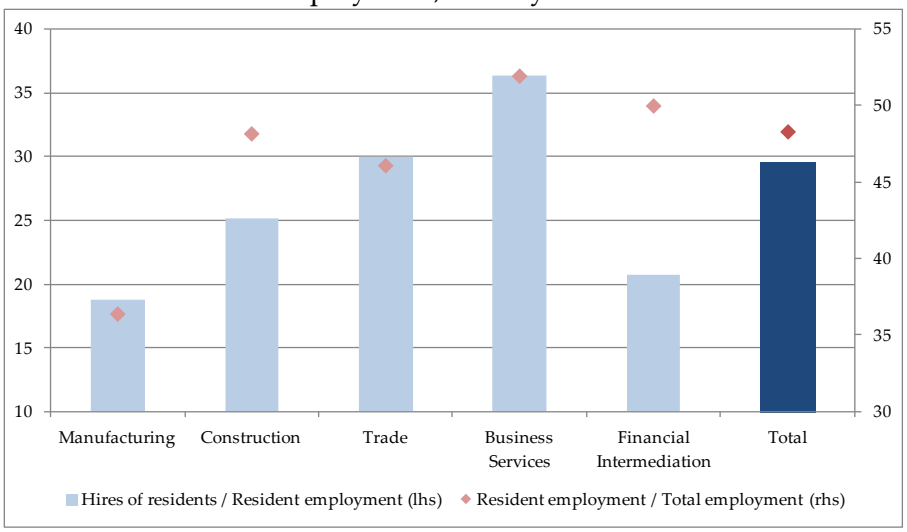
Jobseeker eligibility

Most ALMPs managed by ADEM apply only to registered, i.e. unemployed, jobseekers. The only exceptions are re-employment support, which can also be claimed by employees who were fired or quit and apprenticeship subsidies, which only require a

signature of an apprenticeship contract. All other measures are limited to jobseekers that meet a combination of age and unemployment duration criteria. In fact, financial aid for hiring long-term or older job seekers employs a mixed criterion for three distinct age groups, with the required unemployment duration falling as the age cut-off increases. An additional condition applicable for tax relief only is that the registered jobseeker be assigned by ADEM's placement service. Finally, unlike all other ALMPs, re-employment support is not claimed by the firm but by the jobseeker.

The vast majority of the registered unemployed are Luxembourg residents, but non-resident cross-border commuters constitute a large part of salaried employment in the country. Therefore, firm hiring patterns may determine the type of firms that benefit from ALMPs. According to data from *Réseau d'Etudes du Marché du Travail et de l'Emploi Luxembourgeois* (RETEL), the cumulated flow of new hires from March 2014 to March 2015 represented 27% of the stock of jobs at the end of that period.[5] Focussing on resident jobseekers, the cumulated flow of new hires represented 30% of the stock of jobs occupied by resident employees.[6] For that period, the ratio of cumulated new hires to the stock of jobs was highest in business services (36% for residents) and lowest in manufacturing (19% for residents). The share of residents (as opposed to cross-border workers) in total hires and in total employment is also the highest in business services and the lowest in manufacturing.

Figure 1: Resident hires to resident employment and resident employment to total employment, in % by sector



Note: RETEL, *Tableau de Bord du Marché de l'Emploi*, cumulated totals over 03/2014-03/2015 (monthly data); new hires and employment figures exclude work agency workers (interimaires). Total/All sectors corresponds to the sectors considered in the WDN survey, i.e. NACE codes C, F, G and H-N.

5 RETEL, excluding agency workers (intérimaires) hires and employment; NACE C,F,G, H-N.

6 The cumulated flow of terminated contracts over this period represented 28% of the stock of jobs occupied by residents (i.e. net job creation was 2%).

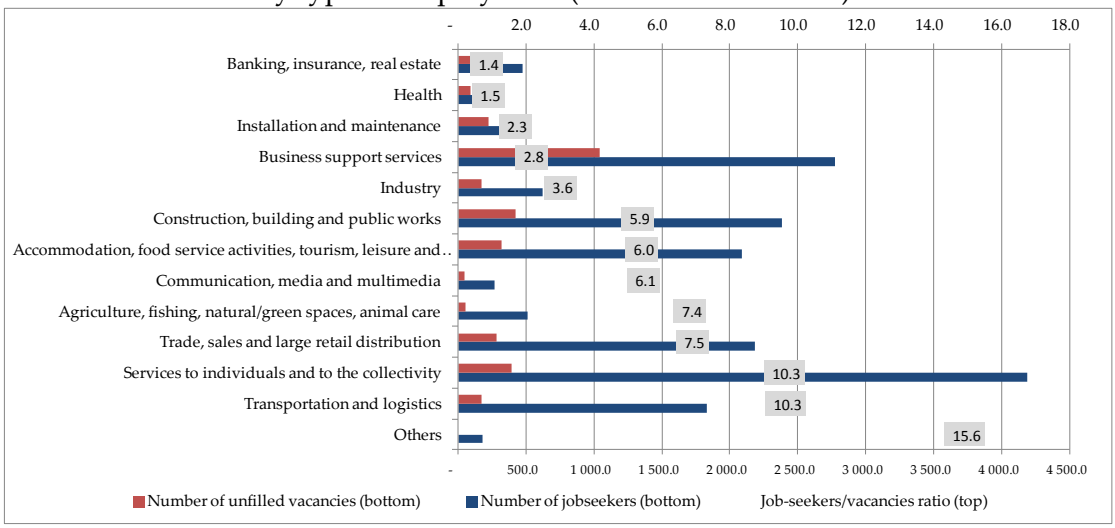
Type of subsidy

Almost all of the ALMPs considered involve full subsidy of social security contributions paid by the employer. ALMPs differ in the duration of this subsidy. However, the re-employment support consists of a (monthly) compensation subsidy, amounting to the difference between 90% of the employee's previous compensation and his/her current compensation. For this subsidy, previous compensation is capped at 3.5 times the social minimum wage for the unskilled, thus indirectly targeting a more vulnerable group within the unemployed. The tax credit for hiring an unemployed jobseeker assigned by ADEM is equal to 15% of the deductable amount of gross pay (over a maximum duration of 36 months). Apprenticeship subsidies reimburse the employer for either 27% or 40% of the legally mandated compensation over the whole apprenticeship, depending on the traineeship diploma conferred. Finally, the employment initiation contract (CIE) involves a subsidy covering 50%-65% of the new hire's base salary for the first 12 months. If a contract extension for an additional 6 months is granted, the subsidy falls to 30%.

Employer/vacancy eligibility

To qualify for the subsidy, employers are required to post a vacancy with ADEM and fill it with an eligible jobseeker found through ADEM. Luxembourg law requires employers to report all vacancies to ADEM, but in practice this obligation is not always respected. This means that labour market matches are usually formed by jobseekers and employers through other recruitment channels, such as advertisements or informal networks, and therefore do not qualify for the subsidies, although they would in principle be eligible except that they were not made through ADEM.

Figure 2: Jobseekers and vacancies (bottom) and jobseeker to vacancy ratio (top, in %), by type of employment (ROME classification)



Note: ADEM, 01/2014-12/2014 totals (monthly data); classification corresponds to the ROME (Répertoire Opérationnel des Métiers et des Emplois) nomenclature, adopted by ADEM on the 1st of January, 2014. Others included categories: arts and production of art items and entertainment/spectacle.

This means that the figures on new hires account for more than the flow of vacancies filled through ADEM. However, based on this subset of vacancies, ADEM provides a breakdown of the type of employment offered by employers that can be compared to the type of employment demanded by jobseekers to assess structural mismatch (Figure 2).[7] The ratio of jobseekers to vacancies ranges from just 1.4 in banking and insurance or real estate and to 10.3 jobseekers per vacancy in transportation. Business support services, which make up most vacancies in ADEM, are matched with fewer jobseekers (2.3) than other relatively important sectors by employment (industry, construction, food and accommodation or trade, in ascending order). All in all, jobs in banking and insurance or in business support seem to be more difficult to fill through ADEM, as opposed to jobs in transportation, in trade and distribution, or in construction. This result assumes that the ratio of jobseekers to vacancies in a given sector is related positively to the probability that a vacancy in that sector will be filled.

ALMPs during 2008-13

Finally, it should be noted that all but one ALMP measure had been created before 2008 and none of them was significantly changed during the crisis or its aftermath. The only exception is the employment initiation contract, CIE, which was implemented in July 2007 and temporarily modified from November 2009 to December 2010 to also cover qualified young job seekers (previously excluded). This temporary modification was extended twice, until December 2012, and became permanent in April 2013. It replaced two other measures, the CAT (*contrat d'auxiliaires temporaries*) *privé* and SIE (*stage d'insertion en enterprise*), which Zanardelli et al. (2006) found effective in raising employment prospects, especially in the short-run. However, in France a similar policy aiming to integrate young dropouts, the *Contrat Jeune en Enterprise* (CJE), seems to have been less successful (Roger and Zamora, 2011). In fact, this particular French ALMP was discontinued in 2008.

The number and share of jobseekers eligible for hire with the assistance of ALMPs rose after the onset of the crisis. In particular, the national unemployment rate increased from 4% in 2008Q4 to 7% in 2013Q4. Average unemployment duration also increased, with the long-term unemployed (>12 months) making up 45% of the unemployed in 2013Q4, as opposed to only 35% in 2008Q4. The number of low-skilled unemployed also increased and their composition shifted to older age (above 50) and longer duration.[8] The trend towards long-term unemployment increased the take-up rate of financial aid for older/long-term unemployed (see Figure 3). The temporary widening of the CIE (up to the end of 2012) also increased the number of participants. The slump in 2013 can be explained by the legal vacuum from January to April 2013, when the temporary widening of the CIE was made permanent. In the next section, we shift the focus from jobseeker participation in these ALMPs to the participation of firms.

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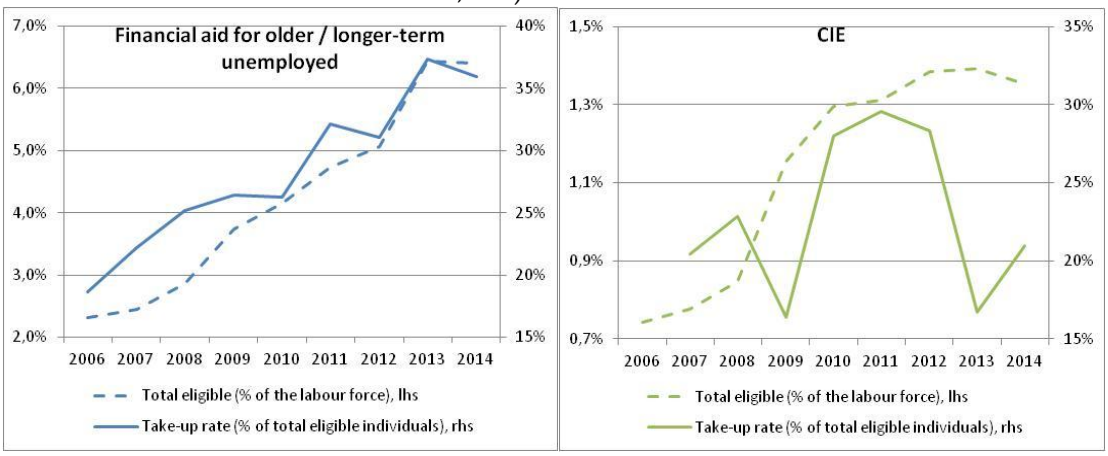
[7] It should be noted that the ROME classification used by ADEM is not perfectly consistent with the NACE2 classification.

[8] BCL (2015), Encadré 3: Le chômage de longue durée, tenants et aboutissants, BCL Bulletin 2015/1.

Figure 3: Eligible individuals (% of the labour force, lhs) and take-up rate (% of eligible individuals, rhs) for selected ALMPs



Note: ADEM and Statec (for labour force data). Total eligible individuals are defined as the resident registered and available jobseekers that meet the age and unemployment duration criteria for each ALMP measure, plus the individuals affected by the measure in question. All figures used are end-of-year readings (31/12).

4.2. WDN results on ALMP use by firms

Extensive versus intensive margin

According to the WDN survey, about one third of Luxembourg firms used at least one of these ALMPs over the period 2008-13 (Table 2). However, firms may also use several measures simultaneously (usually to hire different employees).[9] Thus, an increase in the use of ALMPs might reflect more firms using ALMPs or the same number of firms using a wider range of measures.[10] The take-up rate alone does not provide full information, so we separate aggregate ALMP participation into the *extensive margin* and the *intensive margin*. For any given category of ALMPs, we define total participation as the firm take-up rate of any measure (*extensive margin*) multiplied by the average number of different measures used per firm (*intensive margin*) (all weighted).

Differences across size classes and sectors

The extensive and intensive margins of ALMP participation increase almost steadily in the firm's number of employees, regardless of the time period (Table 4). Section 4.3 places this result in the context of related literature. The differences across sectors do not reveal a unique ranking across the two sub-periods. Over the entire sample (i.e. 2008-2013), extensive participation was highest in manufacturing and construction and lowest in financial intermediation. Considering the intensive margin, firms in trade

[9] In principle, more than one ALMP could apply to the same hire. For instance, re-employment support can be complemented with financial aid to hire long-term or older unemployed, since the latter is requested by the employer and the former by the employee. However, the CIE cannot be combined with any other ALMP.

[10] According to ADEM statistics covering 2008-2013, for every firm claiming financial aid to hire older / long term unemployed workers there were 1.4 individual workers involved, for every firm claiming tax relief for hiring an unemployed worker 1.7 workers were involved and for every firm using the employment initiation contract (CIE) 1.8 workers were involved.

used ALMP measures most intensively (on average more than 2.5 different measures per participating firm), followed by firms in manufacturing and construction. Business services firms used on average only 1.7 different measures, the lowest participation rate on the intensive margin.

Table 4: Extensive and intensive margins of ADEM ALMP measures used by firms

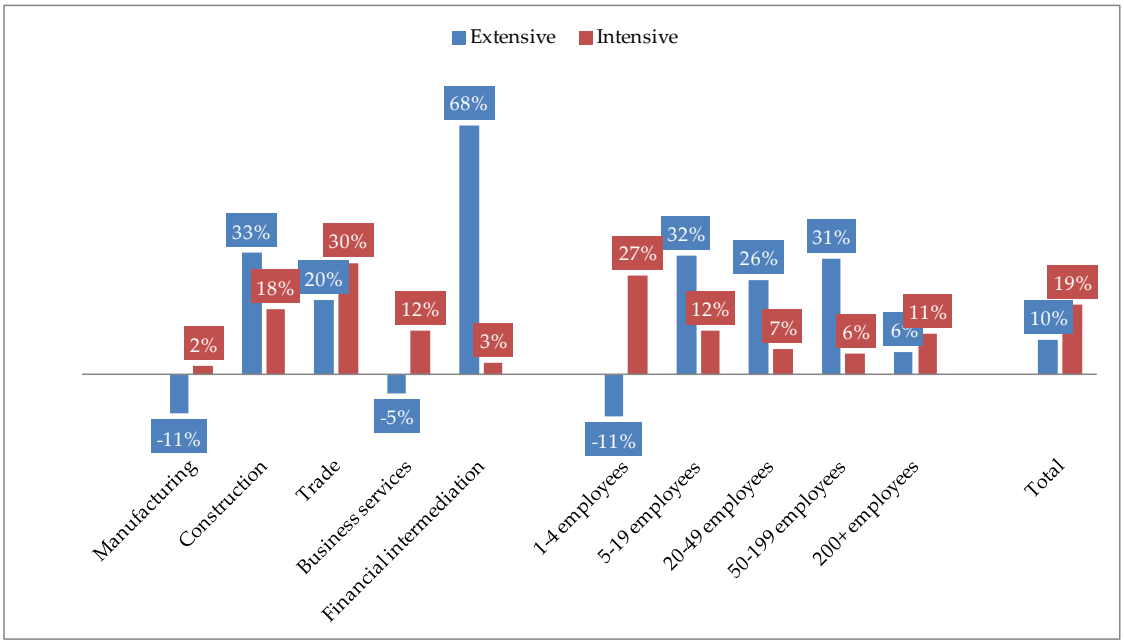
	2008-09		2010-2013		2008-13	
	Extensive	Intensive	Extensive	Intensive	Extensive	Intensive
	%	#	%	#	%	#
Sector						
Manufacturing	28.9	2.09	25.9	2.14	39.3	2.12
Construction	25.4	1.66	33.8	1.95	36.6	2.02
Trade	24.2	1.83	29.1	2.38	31.7	2.53
Business services	21.7	1.61	20.6	1.81	34.3	1.68
Financial intermediation	13.4	1.99	22.5	2.06	24.4	2.03
Size class						
1-4 employees	16.1	1.35	14.3	1.71	24.5	1.64
5-19 employees	32.2	1.89	42.6	2.11	49.0	2.19
20-49 employees	39.4	2.25	49.5	2.41	53.7	2.49
50-199 employees	56.0	2.21	73.6	2.34	76.6	2.39
200+ employees	62.9	2.68	66.9	2.98	70.2	2.93
Total	22.7	1.72	24.9	2.04	33.6	1.98

Note: Weighted to be representative of target firm population. Excludes firms providing partial information on ALMP use for either sub-period. Excludes the answer category "Other measures" and non-ADEM administered measures.

Changes in the extensive and intensive margins between the two sub-periods

Comparing the period 2008-2009 with 2010-2013, a few observations stand out. First, both the extensive and intensive margin increased in most sectors and size classes. According to the non-parametric McNemar test, minor decreases along the extensive margin in manufacturing and in business services were not statistically significant. The same is true for the somewhat larger decline among micro firms. Second, the extensive margin increased significantly in financial intermediation and among firms with more than 5 employees. Finally, the number of different ALMPs per firm rose generally. This increase is highly significant for the entire sample (based on two non-parametric paired tests – the Wilcoxon signed rank sum test and the sign rank test). The increase was especially steep among micro firms and firms in the trade sector. Applying firm population-representative weights, the intensive margin increased twice as much as the extensive margin, as shown in Figure 4. In other words, there is a very important increase in the share of firms that used several different ALMP measures simultaneously. The average number of different ALMPs per firm (intensive margin) rose from 1.7 to 2.0 while the number of firms participating (extensive margin) rose by 2.2 percentage points.

Figure 4: Change in the extensive and intensive margins by sector and firm size between 2008-09 and 2010-13



Note: Weighted to be representative of target firm population. Excludes firms providing partial information on ALMP use for either sub-period. Excludes the answer category "Other measures" and non-ADEM administered measures.

The extensive margin of participation, or take-up rate, depends on the time interval chosen. At the extreme, the same take-up rate for the two sub-periods could either mean that the same firms participated in both periods or that completely different firms participated in the two periods. In the first case, the take-up rate for the entire period will be equal to the one in either of the two sub-periods and in the second case it will be equal to the sum of the take-up rates of the two sub-periods. To shed more light on this issue, Table 5 separates the change in the extensive margin (Δ Extensive) between its constituent gross flows: only used in 2008-09 (*outflow in 2010-13)*, and only used in 2010-13 (*inflow in 2010-13)*. In business services, manufacturing and among firms with 1-4 employees, we observe a substantial turnover of firms using ALMPs despite little change in the extensive margin over the two periods. In other words, many firms in these categories used ALMPs only in one sub-period.

Table 5: Firm inflow and outflow, any ADEM ALMP measure

Sector	No use	Use only in 2008-09	Use in both periods	Use only in 2010-13	Δ Extensive	Turnover
	%	%	%	%	%point	%
	(a)	(b)	(c)	(d)	(d)-(b)	(d+b)/(100-a)
Manufacturing	60.7	13.4	15.5	10.3	-3.1	60.5
Construction	63.4	2.8	22.6	11.2	8.4	38.3
Trade	68.3	2.6	21.6	7.5	4.9	31.9
Business services	65.7	13.7	8.0	12.7	-1.1	76.8
Financial intermediation	75.6	1.9	11.5	11.0	9.1	52.9
Size class						
1-4 employees	75.5	10.2	5.9	8.4	-1.8	75.9
5-19 employees	51.0	6.5	25.7	16.8	10.4	47.5
20-49 employees	46.3	4.2	35.2	14.3	10.1	34.4
50-199 employees	23.4	3.0	52.9	20.6	17.6	30.9
200+ employees	29.8	3.3	59.7	7.3	4.0	15.0
Total	66.4	8.7	14.0	10.9	2.2	58.4

Note: Weighted to be representative of target firm population. Excludes firms providing partial information on ALMP use for either sub-period. (a)+(b)+(c)+(d)=100. Excludes the answer category "Other measures" and non-ADEM administered measures.

Combination of measures used

Finally, we look at how firms combined different ALMPs and how the composition of firms and individual measures changed over time. Table 6 reports measure combination frequencies, indicating that nearly 30% of ALMP users in 2008-09 were only using apprenticeship subsidies. This share falls to just 14 in 2010-13. The share of firms only using re-employment support or financial aid for older and long-term unemployed persons increased. Both may be linked to the pool of qualified and suitable (long-term) unemployed being increased during the crisis. Moreover, combinations that include re-employment support and aid for long-term and older unemployed are the most frequent combinations, especially in 2010-13. This core bundle shows up often combined with more measures yet, partly explaining the increase observed in the intensive margin of ALMP measure use. Larger combinations figure prominently among the most frequently used ones in 2010-13 and all of them invariantly include the financial aid and re-employment support.

Table 6: Combination of ADEM ALMP measures most frequently used (in % of firms)

2008-09		2010-13	
Total	22.7	Total	24.9
of which…		*of which…*	
(4)	29.6	(4)	14.4
(1)	8.7	(2)	13.3
(3)	8.3	(1)	12.9
(1) + (2) + (3)	7.6	(1) + (2) + (3)	10.6
(1) + (2)	6.5	(1) + (2) + (3) + (4) + (5)	5.9
(5)	6.4	(5)	5.5
(1) + (3)	5.7	(1) + (3)	4.9
(4) + (5)	5.1	(1) + (2)	3.9
(2)	3.4	(4) + (5)	3.5
		(2) + (3)	3.4
		(1) + (2) + (3) + (4)	3.4
		(1) + (2) + (3) + (5)	3.1
Other comb.	18.7	Other comb.	15.3

Note: Weighted to be representative of target firm population. Excludes firms providing partial information on ALMP use for either sub-period. Excludes the answer category "Other measures" and non-ADEM administered measures. Legend: "Total" refers to the percentage of firms that used at least one of the following ADEM ALMP measures: (1) Financial aid to hire older workers or long-term unemployed; (2) Re-employment support; (3) Tax relief for hiring an unemployed person; (4) Apprenticeship subsidies; (5) Employment initiation contract. The part "of which" shows the percentage of firms using at least one ADEM ALMP measure with the particular combination of measures (hence summing to 100). The table shows only individual combinations making up more than 3% of the total.

To sum up, approximately 1/3 of Luxembourg firms in the target population used ADEM ALMPs over the period 2008-13 and the average participating firm used 2 different measures. The larger the firm, the more likely it used at least one ALMP and the higher the number of ALMPs it used on average. Across sectors, firm participation was highest in manufacturing and in construction and lowest in financial intermediation. Between 2008-09 and 2010-13, the number of firms using ALMPs increased (*extensive margin)* as did the number of ALMPs per firm *(intensive margin)*. This change was not uniform across sectors and size classes. The relative importance of the extensive and intensive margins could be reversed by excluding firms with fewer than 5 employees. In fact, micro firms that only used the apprenticeship subsidy in 2008-09 dropped out entirely from ALMP use. Outflows were also substantial in manufacturing and business services. This loss was more than compensated by an inflow of firms from other sectors, and in particular firms hiring with re-employment support or with aid to long-term/older unemployed.

In the next three sections we investigate the determinants of participation in ALMPs focussing on the extensive margin. First, we review the relevant literature, then we introduce our regression specification and present our results.

4.3. *Determinants of ALMPs*

4.3.1. Related literature

The firm level determinants of participation in ALMPs have not been the subject of extensive research. To the best of our knowledge, only two papers focus directly on the link between structural firm characteristics and ALMP use. Bishop and Montgomery (1986) examine targeted employment subsidy programmes in the US, namely the Targeted Jobs Tax Credit (TJTC), the Work Incentive Program (WIN) tax credit and on-the-job training, as well as the Comprehensive Employment and Training Act (CETA). Bellmann and Stephan (2014) use German establishment data to study the association between firm-specific variables and the probability that a firm uses targeted wage subsidies. Both papers confirm the importance of firm size, labour force turnover and other characteristics. However, no link is made between the economic situation faced by the firms and the probability they take up the wage subsidy. Using the information provided by the WDN survey, we intend to fill this gap.

Since most of the ALMPs included in the WDN survey require that the hire be made through ADEM, firm recruitment practices may determine firm take-up of ALMP measures. Recruitment channels can be broadly divided into informal (private or social networks) and formal (posting vacancies at the employment agency, advertisements). Of course, recruitment strategies may be more complex, involving more than one channel and/or instrument. For instance, employers may vary their search along the extensive margin (number of candidates) or the intensive margin (time per candidate), across channels or even vacancies, depending on the characteristics of the job. Many studies have attempted to provide theoretical explanations of how firms choose recruitment channels and underpin these theories with empirical support. The literature generally agrees that employers select one or more channels to fill a vacant post with the objective of minimizing the total costs linked to the process of hiring subject to its associated benefit. Costs comprise i) direct costs, including resources devoted by the firm to generate a flow of applicants and collect relevant information and ii) indirect costs, including the opportunity cost of keeping the job unfilled until a suitable candidate is found. Benefits accrue to the firm from the productivity obtained from the match between the position and the selected worker. Below, we briefly present the firm characteristics the literature generally associates with a higher probability of using the employment agency to fill positions.

First, a strong and robust association has been found between firm size and use of ALMP subsidies to hiring. However, the literature is far from unanimous about the exact mechanism governing this link. Bishop and Montgomery (1986) found that large U.S. firms were more likely to use (and know about) employment/training programmes. They advanced three explanations: a) participation involves fixed costs, so average cost per new hire is lower for large firms; b) larger firms generate larger job applicant pools, increasing the probability of a match with an eligible jobseeker; c) if matching with targeted jobseekers is a risky investment, the costs of mistakes are more severe for smaller firms. Bellmann and Stephan (2014) support this finding using Ger-

man firm data, and conjecture that it reflects familiarity with subsidy programmes among large firms' human resource departments, a hypothesis also advanced by Bishop and Montgomery (1986). A closely related idea is that firms with multiple establishments can spread the fixed costs of participation and will therefore find it less costly overall (Bishop and Kang, 1991). Bellmann and Stephan (2014) also link firm size to possible hiring mistakes - but in the reverse direction: Employment Protection Legislation (EPL) raises firing costs for larger firms, providing them with an incentive to use hiring subsidies as insurance.

The recruitment literature also provides some useful intuition. The public employment agency provides a flow of applications and a first screening device at no cost to the employer, who subsequently incurs the cost of interviewing the applicants. Barron and Mellow (1982) suggest that firms with a low unit cost of interviewing will benefit most from a costless flow of applicants, so long as it compensates for the higher indirect costs resulting from the lower probability of finding an acceptable candidate (assuming lower quality on average). According to Barron and Mellow (1982), large firms are more likely to enjoy this comparative advantage because of increased specialisation within the firm. Indeed, Barron et al. (1985) found that firm size was associated with larger numbers of applicants interviewed (extensive search) and more hours spent on each interviewed applicant (intensive search). In a similar vein, Welters and Muysken (2006) maintain that regardless of their size, multi-establishment firms face lower direct costs because they can share expertise across establishments and enjoy economies of scale.

The skills required for the job are also likely to determine whether the employment agency is involved. Assuming that the productivity of a match is positively correlated with the level of required skills, the indirect cost of an unfilled high-skilled vacancy is higher for positions requiring more skills. However, the cost of a bad match is also expected to be larger for positions requiring more skills, which provides an incentive for more intensive search and, as a result, longer selection periods. Van Ours and Ridder (1993) estimate that selection periods tend to increase with the level of education and experience required. Gorter et al. (1996) also find that jobs that require higher education levels take longer to fill through most recruitment channels. In any case, longer and more intensive search periods will usually be required to reduce the probability of a bad match when using the employment agency instead of alternative recruitment channels. Indeed, Van Ours (1994) finds that vacancies requiring secondary or higher education level carry significantly lower hazard rates (longer duration) when filled through the public employment office. This may be expected since the distribution of jobseekers within the employment agency (registered unemployed) may be thinner on the high-skill end and because it may be rational for firms to increase their search effort to counter real or perceived "stigma" effects of unemployment on candidate productivity. Therefore, vacancies posted and filled through the employment agency are more likely to be for low-skill positions.

Collective pay agreements may also determine whether firms use ALMPs, even though the empirical evidence remains inconclusive about the direction as well as the significance of the effect. Bellmann and Stephan (2014) analyse hiring subsidies for hard-to-place jobseekers in the absence of deadweight loss, i.e. assuming that firms taking-up the ALMPs would otherwise not have hired the eligible jobseeker. Collective pay agreements usually include a fairness principle (Gerlach et al., 2008), which means they are not flexible enough to allow for the comparatively lower productivity of these new hires. This suggests ALMPs are likely to be more attractive for employers with collective pay agreements. However, Bellmann and Stephan (2014) find that collective pay agreements at both firm and industry level are associated with a lower probability of using wage subsidies. Bishop and Montgomery (1986) suggest that union coverage will raise the costs of dismissal when bad matches are formed and therefore will discourage firms from hiring jobseekers targeted by ALMPs. Thus, these authors expect the share of unionised workers to be negatively related to participation, but the estimated coefficients are not significant.

Bellmann and Stephan (2014) find that the share of fixed-term (temporary) workers appears to have a positive effect on the probability of using a targeted employment subsidy. In addition, Van Ours (1994) and Gorter et al. (1996) find that public employment agencies fill temporary jobs significantly faster than permanent jobs.

4.3.2. Regression specification and variables

To analyse firms' decision whether to take up ALMP measures, we model the likelihood of firm participation as a function of external factors affecting firm activity (i.e. the shocks) as well as structural firm characteristics. We pool the 2008-09 and 2010-13 sub-periods into one regression to increase the number of observations.[11] The dependent variable refers to a binary choice variable taking the value 1 if the firm uses ALMP measure(s) in period t and 0 otherwise. Assume that the observed answer in the survey is related to the continuous latent variable y^* according to the following mapping:

$$y_{it} = \begin{cases} 0 \text{ [no measure used]} & \text{if } y_{it}^* \leq 0 \\ 1 \text{ [ALMP measure(s) used]} & \text{if } y_{it}^* > 0 \end{cases},$$

we estimate a logit model with

$$\text{Prob}[y_{it} = 1] = \frac{\exp(x_{it}\beta + \varepsilon_{it})}{1 + \exp(x_{it}\beta + \varepsilon_{it})}, \quad (1)$$

where ε_{it} is the independently distributed error term. The set of covariates includes mainly variables related to the economic crisis and structural firm characteristics. In our model, we want to separate the decision to use ALMPs from the decision to hire, so we consider only firms that hired during the sample period. Since the survey did not include a direct question on firm hires, we construct a proxy variable from the question about workforce tenure at the end of 2013. Firms reporting that 100% of their work-

[11] We also experimented with including firm-specific random effects, but felt that this puts too much strain onto the firm-specific variables. In other words, the firm-specific random effects absorb too much variability given that we only have two periods at our disposal.

force had a tenure of 5 years or longer were assumed to have zero hires since 2008 and were excluded from the regression sample (16% of observations). Obviously, this is an imperfect proxy since new hires may have left the firm by end 2013. Moreover, employees hired early in 2008 would already have a job tenure of more than 5 years at the end of 2013. Nevertheless, we use the constructed variable to attribute our findings to hiring decisions rather than the absence of hiring.

The WDN survey does not discriminate between firms that regularly post vacancies with ADEM and firms that only use alternative recruitment channels. Therefore, in the observed data, the determinants of using the employment agency cannot be isolated from the determinants of taking up ALMP subsidies. In other words, the take-up variable cannot be conditioned on the use of ADEM as a recruitment channel. All we can estimate is the likelihood that a firm hired through ADEM and claimed a subsidy. Whether a firm hires via ADEM does not affect our results since we can reasonably assume that all Luxembourg firms are aware of the existence of ADEM and ALMPs in general. In other words, we assume that firms that were hiring at least implicitly considered the measures offered by ADEM.

Shock variables

The questions in the survey are phrased neutrally, i.e. how factors such as the level of demand affected the firm's activity in period *t*. The answer categories are formatted along a Likert scale ranging from 1 to 5, which we subsequently re-scaled and centred as follows: *strong decrease* (-2), *moderate decrease* (-1), *unchanged* (0), *moderate increase* (+1) and *strong increase* (+2). Given the ordinal nature of the answers, various specifications were tried to assess the validity of various parameter restrictions, i.e. (not) assuming the probability to be linearly increasing in the ordinal scale, merging answers indicating increases/decreases or restricting attention to strong changes only. Thus depending on the specification, the reference category is firms that experienced no effects on their activity or firms that experienced no or only moderate effects.

Firm characteristics

Firm size is taken into account through the dummy variables indicating the size class. The base category is firms employing 1-4 employees, complemented by classes for 5-19, 20-49, 50-199 and 200+ employees. Since we expect that *collective pay agreements* might matter, we also include a dummy variable if a collective pay agreement of any kind (firm-level or outside the firm) was applied in 2013.

Firm-specific variables include the *share of permanent full-time employees* and the *share of permanent part-time employees* in 2007. The share of fixed-term/temporary employees in that same year serves as base category. As described in section 4.3, Bellmann and Stephan (2014) found that temporary jobs are filled more easily by the public employment agency, which increases the likelihood of using ALMP employment subsidies. Therefore we expect a negative marginal effect from these two regressors. We also include the *share of employees with a tenure status exceeding 5 years* to capture the extent of labour turnover during 2008-13. Since in Luxembourg a large share of employees is

resident abroad, we also expect firms with higher *shares of cross-border employees* to be less likely to hire under ALMPs. This reflects ADEM's role as a national institution focussed on resident jobseekers eligible for unemployment benefits. Cross-border workers who lose their job in Luxembourg are supposed to register with their respective national employment agency.[12] We do not have information on the composition of firms' labour force by education or previous work experience, but the WDN questionnaire did ask firms to report the shares of skilled and unskilled, manual and non-manual employees in 2013 using the ISCO-08 classification. We included the share of *skilled employees (manual and non-manual)* and expect the corresponding marginal effect to be negative as found in the literature.[13]

Finally, we control for the firm's *sector of activity*. The preceding tables suggested heterogeneous firm participation across sectors. In the logit model, we identify the effect of economic disturbances, firm and labour force characteristics after accounting for differences across economic sectors. We also include a *set of structural firm-level controls* such as whether the firm is a multi-establishment firm, which we expect to be positively related to ALMP use. Furthermore, we include dummy indicators showing whether the firm is headquartered in Luxembourg ('*affiliate/subsidiary*'), is under domestic control ('*domestic ownership*'), and the *share of domestic revenue in total revenue*. The latter three variables capture, loosely speaking, the 'domestic orientation' of the firm. We conjecture that more domestically-oriented firms are more likely to use AMLPs, as they are better connected with the Luxembourg labour market institutions and economy. The variables *cost of labour* and *availability of skilled labour* capture firms' concerns to hire employees under permanent contract. Firms reporting that high wages are an obstacle to hire permanent employees are more likely to resort to ALMP use, as this effectively lowers their labour cost (at least temporarily). Similarly, firms with concerns about the unavailability of skilled labour are expected to be more likely to use ALMPs. For example, firms not being able to find skilled labour on the market invest in training their new hires until their productivity matches their wage. The final control variable is measure of the severity of competition on the product market.

4.3.3. Estimation results

Table 7 reports the estimated marginal effects from three different pooled logit specifications. Starting with external factors, only demand-related shocks have a statistically significant impact on ALMP participation. In particular, a demand-driven increase in activity is associated with an increase in the probability of using ALMPs. The size of this positive shock also seems to matter. In specification (2), demand shocks that

[12] Since May 2012, non-residents who lose their job in Luxembourg may also register at ADEM (in addition to their country of residence) to access job vacancies posted at ADEM and some active labour market measures, e.g. the re-employment support measure. These non-resident jobseekers are not eligible for unemployment benefits in Luxembourg.

[13] More than half the unemployed registered at the ADEM have a low educational level (45% primary education only, 11% lower secondary education).

strongly boost activity increase the probability of take-up by more than demand shocks that boost firm activity moderately.

In addition to changes in the level of demand, its volatility/uncertainty also appears to play a statistically significant role in firm decisions to use ALMPs. Probability of participation increases for firms reporting a negative effect of demand volatility/ uncertainty on their activity. The marginal effects for all other factors related to economic conditions are not significant in any of the three specifications.

Turning to firm characteristics, larger firms have a higher probability of using a ALMPs, even after controlling for other factors. The effect increases with size class (except for the largest size class), in line with the theoretical predictions. Multiple establishment firms are more likely to hire under ALMPs, consistent with the conjecture by Bishop and Kang (1991) that they are able to spread the fixed costs of participation across establishments. In terms of sectors, even controlling for other factors, firms in business services, manufacturing, financial intermediation and also construction (bar specification 1) appear to be significantly less likely to use ALMPs than firms in the trade sector. A similar finding is reported by Bellmann and Stephan (2014). While we find that the differences across sectors are significant, the ranking is not the same as observed in the descriptive section 4.2. Once we control for the economic environment and differences in firm characteristics, trade firms tend to have a higher likelihood of using ALMPs than firms in financial intermediation, business services, or manufacturing.

The composition of firms' workforce (in 2007) also has an impact on the likelihood that a firm uses ALMPs. The estimated probability is lower for firms with higher shares of permanent employees, but the marginal effect is only statistically significant at the 10% level for part-time employees, not for full-time employees.[14] This may capture a turnover effect, assuming workers on temporary contracts are replaced at expiry. This result may also corroborate the hypothesis that firms tend to hire ALMP eligible jobseekers recruited through ADEM to fill temporary jobs. The share of cross-border workers in the firm also has a significant negative marginal effect on the probability of using ALMPs. To the extent that the existing cross-border worker share is a reflection of a firm's propensity to hire non-resident workers, this result is logical. Cross-border workers represent a large fraction of employment in Luxembourg but are much less likely to be registered with ADEM and therefore will not be eligible for ALMPs. The share of high-skill employees is not statistically significant, possibly indicating that firms recruit for high-skilled positions using channels other than ADEM. Finally, no significant effect is found for the application of a collective pay agreement.

[14] In the specification using all ALMPs, both the share of part-time and the share full-time permanent employees have a negative significant effect (see Appendix 2).

Table 7: Pooled logit estimates for probability of using ADEM ALMPs

ALMPs: Pooled, only ADEM ALMPs							
		vs. no change				vs. no change/moderate change	
		(1) Direction		(2) Size		(3) Size	
Level of demand: activity decreased	moderately	-0.064	(0.045)	-0.055	(0.046)		
	strongly			-0.081	(0.065)	-0.064	(0.058)
Level of demand: activity increased	moderately	0.085**	(0.037)	0.066*	(0.039)		
	strongly			0.173***	(0.062)	0.143**	(0.061)
Volatility/uncertainty of demand: activity decreased	moderately	0.107**	(0.042)	0.103**	(0.044)		
	strongly			0.120*	(0.069)	0.058	(0.067)
Volatility/uncertainty of demand: activity increased	moderately	0.052	(0.043)	0.081*	(0.046)		
	strongly			-0.061	(0.079)	-0.106	(0.075)
Access to external financing: activity decreased	moderately	0.033	(0.041)	0.034	(0.045)		
	strongly			0.039	(0.076)	0.034	(0.074)
Access to external financing: activity increased	moderately	-0.007	(0.058)	0.014	(0.062)		
	strongly			-0.135	(0.104)	-0.110	(0.101)
Customers' ability to pay: activity decreased	moderately	0.009	(0.033)	0.021	(0.035)		
	strongly			-0.013	(0.057)	-0.011	(0.057)
Customers' ability to pay: activity increased	moderately	-0.029	(0.055)	-0.022	(0.061)		
	strongly			-0.056	(0.101)	-0.043	(0.101)
Availability of supplies: activity decreased	moderately	-0.007	(0.047)	-0.020	(0.050)		
	strongly			0.064	(0.098)	0.055	(0.098)
Availability of supplies: activity increased	moderately	-0.026	(0.071)	-0.022	(0.071)		
	strongly			-0.098	(0.213)	-0.170	(0.211)
Manufacturing		-0.118**	(0.052)	-0.120**	(0.051)	-0.119**	(0.051)
Construction		-0.073	(0.045)	-0.077*	(0.045)	-0.079*	(0.045)
Business services		-0.134***	(0.039)	-0.141***	(0.039)	-0.139***	(0.040)
Financial intermediation		-0.165***	(0.056)	-0.172***	(0.056)	-0.183***	(0.054)
5-19 employees		0.214***	(0.046)	0.214***	(0.046)	0.215***	(0.046)
20-49 employees		0.269***	(0.048)	0.266***	(0.049)	0.271***	(0.049)
50-199 employees		0.459***	(0.037)	0.463***	(0.037)	0.465***	(0.037)
200+ employees		0.385***	(0.052)	0.389***	(0.051)	0.390***	(0.051)
Period 10/13		0.078***	(0.029)	0.076***	(0.029)	0.093***	(0.028)
Affiliate/subsidiary firm		-0.075*	(0.039)	-0.072*	(0.039)	-0.069*	(0.040)
Domestic ownership		0.051	(0.042)	0.054	(0.043)	0.046	(0.043)
Multi-establishment firm		0.137***	(0.046)	0.139***	(0.047)	0.143***	(0.046)
Full-time permanent empl., share		-0.183	(0.125)	-0.163	(0.130)	-0.187	(0.130)
Part-time permanent empl., share		-0.255*	(0.150)	-0.243	(0.154)	-0.256*	(0.155)
Cross-border empl., share		-0.226***	(0.043)	-0.224***	(0.043)	-0.233***	(0.043)
High-skill empl., share		0.013	(0.049)	0.019	(0.049)	0.012	(0.049)
Tenure >5 years, share		-0.016	(0.060)	-0.013	(0.061)	-0.024	(0.061)
Domestic revenue, share		0.147***	(0.047)	0.146***	(0.047)	0.132***	(0.046)
Collective pay agreement		0.053	(0.032)	0.046	(0.033)	0.046	(0.033)
Competition, severe/very severe (index)		0.060	(0.040)	0.057	(0.040)	0.060	(0.039)
Cost of labour: relevant/very relevant issue		0.086**	(0.034)	0.093***	(0.034)	0.096***	(0.034)
Availability of skilled labour: relevant/very relevant issue		0.065**	(0.033)	0.067**	(0.033)	0.071**	(0.033)
Pseudo-R sq.		0.19		0.20		0.19	
No. of obs.		993		993		993	
LogL		-551.7***		-548.7***		-556.0***	

Note: Robust standard errors in brackets. The coefficients denote unweighted average marginal effects. ***,** and * indicate significance at the 1%, 5% and 10% level, respectively. Base category is trade, 1-4 employees, in 2008-09, mainly foreign ownership, single-establishment. Excludes firms providing partial information on ALMP use for either sub-period. Regression excludes "other" measures and measure not administered by ADEM.

The results further suggest that affiliates and subsidiaries have a lower tendency to use ALMPs, possibly reflecting that hiring decisions are taken at parent level. The marginal effects for the share of domestic revenue in total revenue and for domestic ownership are both positive but only the former is statistically significant. Taken together, these results may indicate ADEM's greater importance for domestically oriented firms. Finally, firms under pressure from labour costs or facing shortages of skilled labour are more likely users of ALMPs.

Robustness of the estimates

We estimated alternative specifications to check the robustness of the baseline results.[15] The most robust findings are the negative marginal effect of cross-border employment and the positive effects of firm size, domestic orientation (in terms of revenue) and multi-establishment character. Comparing different regressions, there is no variable for which a significant marginal effect changes sign. For details, see Table 12, Appendix 2.

First, we used a less restrictive definition of ALMPs, redefining the dependent variable to include the two measures not managed by ADEM. This did not much affect the results, given how few firms used the additional ALMP measures. If at all, results are stronger, as for example the marginal effect of both the share of full-time and part-time permanent employees is statistically significant. We also ran separate logit regressions for firms that grew during 2008-13 (positive net change in employment) and those that did not (negative/no net change in employment). For both sets of firms, the demand-related effects are confirmed. A demand-driven increase in activity raises the probability of using ALMPs. For non-growing firms this effect is significant for moderate increases in activity and for growing firms it is significant for strong increases. The impact of demand volatility operates differently across the two categories of firms: for growing firms the likelihood of ALMP use was higher if activity was increased and for non-growing firms it was higher if activity was decreased by the demand volatility or uncertainty. Therefore, for firms with net employment creation over 2008-13, ALMP use is related to higher activity due to favourable conditions in the level or the volatility of demand. For firms zero or negative net changes in employment, ALMP use was more likely if activity fell because of demand volatility or if the level of demand increased activity. For non-growing firms, probability of ALMP use was not significantly affected by the sector, domestic orientation or pressure from labour costs. Only the share of temporary contracts has a significant (negative) effect for these firms (as in the baseline). In contrast, for firms with growing employment, the share of permanent contracts does not affect ALMP use.

Finally, we ran the baseline regression separately for individual measures (Table 13, Appendix 2). Focussing on demand-related factors, the most significant and robust finding is that participation in apprenticeship subsidies and the employment initiation contract is more likely among firms who saw their activity increase due to favourable

[15] Including firms that did not hire during the sample period does not change the sign or the significance of the results.

demand conditions. These two ALMPs targeting young jobseekers may be driving baseline results. Participation in financial aid for older/long-term unemployed and re-employment support, for which extensive margin rose sizably, appears to be associated with few or none of the shocks considered.

Furthermore, the share of cross-border workers is a robust predictor of lower ALMP use across measures. The marginal effect is negative and statistically significant for all individual measures. A higher share of temporary employees is associated with higher re-employment support use. Domestic orientation affects most individual ALMP measures. What differs across measures is whether it is domestic ownership, domestic revenue share or the domestic headquarter that drive the result. A higher share of skilled employees tends to increase use of apprenticeship subsidies, indicating that these firms invest in educating and training their workforce to reach the required productivity level. Labour cost concerns increase use of apprenticeship subsidies, while concerns of availability of skilled labour increase the use of the majority of individual measures. While competition was not significant in the pooled regression, it significantly increases the likelihood of using re-employment support, tax relief and employment initiation contracts. Firms with more stable workforce have a significantly lower likelihood of using financial aid to hire older/long-term unemployed, re-employment support and tax relief. The use of the deduction of relocation expenses is higher for large firms, firms with labour cost concerns, a high share of skilled employees and a lower domestic revenue share.

5. Short-time work arrangements

5.1. The evidence on STWAs in Luxembourg

STWAs are generally intended as measures to temporary fluctuations in demand. In Luxembourg, STWAs, also known as "partial unemployment" schemes, were introduced in the mid-1970s following the onset of the steel crisis. There are different types of STWAs:

- STWAs for economic reasons: applicable to firms that face a downturn in their activity, e.g. due to a temporary demand shock. The aim is to encourage labour hoarding and avoid layoffs.
- STWAs due to economic dependence: applicable to firms whose activity strongly depends on one or more firms with STWAs in place.
- STWAs for structural reasons: applicable to firms that face structural problems. The aim is to facilitate the adjustment process and limit layoffs.
- STWAs due to "force majeure": drop in production due to exceptional circumstances beyond the control of the firm (e.g. adverse weather conditions etc.).

The following analysis focuses on the two STWAs that are related to economic fluctuations. Nevertheless, the arguments generally apply to all the STWAs.

General characteristics of STWAs in Luxembourg[16]

Firms apply for STWAs at the "Comité de conjoncture", a tripartite committee including representatives of the government, employers' organisations and trade unions. Firms are asked to indicate the reason for their application, the expected duration and the number of employees (potentially) working short. Firms are also requested to provide detailed information on their economic and financial situation, e.g. their annual accounts. In case of STWAs for structural reasons, the application has to be accompanied by a restructuring plan. Firms must introduce a request for renewal every month. The committee's secretariat collects the monthly applications, provides a preliminary assessment and evaluates the firm's current economic, financial and social situation. This analysis enables also to assess the firm's medium- to long-term prospects. At its monthly meeting, the tripartite committee evaluates all applications (for the upcoming month) individually and decides whether they are accepted or rejected.

Employees in short-time work are entitled to a compensatory allowance for lost working hours. The (monthly) wage for the hours worked and the compensation for the non-worked hours are paid by the employer. Short-time compensation amounts to 80% of the employees' regular gross wages[17] (up to a threshold of 250% of the statutory minimum wage). A firm whose application has been accepted by the tripartite committee may request reimbursement of the compensation for the hours not worked, except for the first 16 (8) hours lost each month for full-time employees (part-time employees). Compensation for these initial hours lost is borne by the firm.

Duration

Partial unemployment arrangements are limited in time. For STWAs due to economic reasons, the scheme cannot exceed 6 months within a 12-month reference period. For STWAs for economic dependency, the duration depends on the situation in the firm on which it depends. For STWAs due to structural problems, the duration of the scheme is defined within the firm's restructuring plan. In any case, the individual reduction in working time is limited to 50% of the employees' average working hours per month.

Eligibility criteria

- STWAs apply to firms of all size classes. In principle, public support is only available for those sectors that have been declared to be "in a crisis" by the government and on the basis of the tripartite committee's proposal.[18] Firms from other sectors may be eligible if they depend on firms with STWAs. Sectors that are considered as "highly competitive" are not eligible for STWAs.
- STWAs are applicable to all permanent or fixed-term employees (including those working part-time). Agency workers and apprentices are excluded.

16 See Code du Travail (2015).

17 Compensation is increased to 90% of the regular gross wage if the employee accepts to participate in vocational training.

18 Even in these cases, firms have to apply every month to continue benefiting from public support.

Temporary changes during the crisis

Following the onset of the crisis, the government decided to encourage employment retention and work sharing by temporarily modifying the existing STWAs. These changes were originally intended to last until the end of 2009. However, as the recession continued to deepen, the government successively extended and scaled up the short-time work provisions over the years 2010-2015/16:

- *Coverage was extended*: e.g. to firms in sectors that have not been declared as being "in a crisis" (under certain conditions).
- *Duration was extended*: the reference period was extended up to 12 months, i.e. the reduction in the working time was extended from 50% of the employees' average monthly working hours to 50% of the employees' average annual working hours (but capped at a maximum of 130 days per year).
- *Entitlements were enhanced* (for both employees and employers): compensation was extended to include the first 16 hours lost[19] and compensation could be increased for training during short-time work (see Table 14 in the Appendix 3 for more detailed information).

Many firms apply for STWAs as a precautionary measure only, without necessarily resorting to the financial support. After approval, they may decide not to actually implement short-time work. Also, firms may decide to reduce the number of employees or the number of working hours lost relative to the request as approved.

STWAs during the recent economic and financial crisis

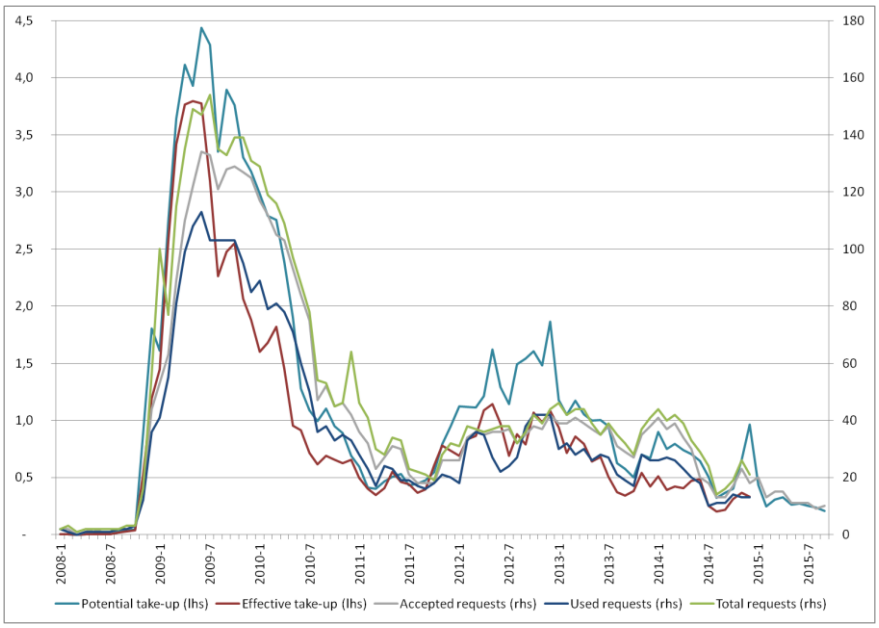
Administrative data shows that recourse to STWAs surged in the second half of 2008, in line with the sharp drop in economic activity (Figure 5). At the height of the crisis (2008Q2-09Q2), participation in STWAs peaked at nearly 4.5% of all employees[20] (actual take-up rather than approval). Following a steady decline through 2011Q2, the use of STWAs rose again in the wake of the renewed weakness in demand resulting from the emergence of sovereign debt concerns in Europe (about 1% of employees participating). Despite the downward trend observed since 2013, STWAs are still being requested by firms. The gap between potential and effective take-up may signal firm perceptions that the recovery continues to be fragile and that they may be using the scheme on a precautionary basis.

[19] This applies to short-time work for economic reasons, economic dependency or structural problems; the latter however only if the firm agrees to an E*mployment maintenance plan*.

[20] Total employees excluding agriculture and NACE2 sectors O-U.

Figure 5: Participation in STWAs

(left-hand scale: as a percentage of total employees, right-hand scale: absolute number of firms)



Source: Comité de conjoncture, own calculations

In 2009, short-time work participants lost on average nearly 30% of the usual working hours of a full-time worker (estimate based on monthly administrative data). The average reduction in hours worked per employee has been increasing (towards 40% in 2014), along with the gradual decline in the number of short-time work participants, probably reflecting diminishing work sharing over time.

Firms in the WDN survey were asked whether they applied for STWAs and whether their request was accepted. The share of firms applying for STWAs remained broadly stable in 2008-09 and 2010-13, at 1.5%-1.6%,[21] but the proportion of requests that were accepted fell from 56% in 2008-09 to less than half in the subsequent period (Table 8).

[21] To be precise, we assume that the proportion of firms with STW in each stratum in the sample is identical to the proportion in the population of the stratum. Estimates based on administrative data are more or less in line with these figures, suggesting that around 1.4% of firms applied for short-time work in the period 2008-09. For 2010-13 however, administrative data indicate a lower share (less than 1%). The discrepancy likely comes from weighting of the survey answers.

Table 8: Use of STWAs (percent of firms)

	(Yes,) our firm applied		*but the application was rejected*		*and the application was accepted*	
	[% of firms in the target population]		[% of firms that applied]		[% of firms that applied]	
Sector	2008-09	2010-13	2008-09	2010-13	2008-09	2010-13
Total	1.6	1.5	42	59	58	41
Manufacturing	11.6	10.3	11	13	89	87
Construction	3.9	3.2	64	49	36	51
Trade	0.7	1.6	0	100	100	0
Business services	0.8	0.5	70	75	30	25

Note: Weighted to be representative of the firm population. Financial intermediation is not shown in the table as all figures are nil.
Q3.3b Did your firm apply for STWAs since the beginning of 2008?

Applications for STWAs mostly originated in the manufacturing sector (where around 11% of firms applied) and were rarely refused.[22] Rejection rates were much higher in construction, business services (and trade in 2010-13). This reflects the legal provisions that govern the use of STWAs and how they were adapted as the crisis unfolded. Also, larger firms were more likely to apply and to be accepted.

5.2. STWAs: theory and empirics

Theoretical considerations

STWAs aim to avoid excessive layoffs in response to temporary fluctuations in demand. Given that labour is a quasi-fixed input of production, firms may engage in excessive layoffs in a context of demand volatility (Oi, 1962). A temporary drop in demand requires short-term adjustment of inputs, which will eventually be reversed once demand recovers. In the short-run, if capital is fixed and labour is variable, then the latter input bears the entire adjustment burden. However, in practice labour may not be completely variable due to fixed costs of hiring, firing and training. These expenses need to be amortised over the course of the employment relationship and, thus, require a sizeable fall in demand and, in turn, in the value of the worker's marginal product to justify a layoff on efficiency terms.

It follows that the size of the slump needed to make a separation efficient is increasing in the degree of fixity, which varies across types of workers and depends positively on the size of recruitment and training costs, and the expected length of the employment relationship (Oi, 1962). Recent studies of the effect of STWAs explore this argument in more detail. Arpaia et al. (2010) cite avoidance of dismissal costs and savings on recruitment and training costs as strong incentives for employers to participate in STWAs. Crimmann et al. (2010) also note that firms enrolling in such schemes must first assess the direct monetary costs associated with heavy workforce turnover.

[22] This is also confirmed by administrative data.

A firm is more likely to accept training expenses if the resulting productivity gains are firm-specific (Oi, 1962). As demonstrated by Hall and Laezar (1984), inefficient layoffs occur when the marginal product of the worker is higher within the firm than outside of the firm. Therefore, the firm decision to enrol in a short-time work programme depends on how much it has already invested in firm-specific human capital. Skilled, tenured and specialised employees are more costly to dismiss given firm-specific human capital loss (Crimmann et al., 2010; Arpaia et al., 2010). Along the same lines, Hijzen and Venn (2011) expect firms in manufacturing to be more inclined to resort to short-time work than firms in construction since their labour skills will be more firm-specific.

Short-time work arrangements can in principle promote efficient outcomes; however, they tend to give rise to complex effects due to their design and their interactions with other policies and labour market institutions. Burdett and Wright (1989) investigate how interactions between work-sharing compensation schemes and unemployment insurance tax incentives affect the efficiency of labour adjustments. They demonstrate that the absence of short-time work compensation leads to a bias in favour of layoffs, but its presence results in a distortion in hours and underemployment if the same tax parameters are imposed. The inefficiency often results from these two systems not being fully experience-rated. Working with a similar framework, van Audenrode (1994) stresses that the combined effect of subsidised hours reduction and firing restrictions usually favours adjustment through hours rather than layoffs. Van Audenrode (1994) demonstrates that short-time compensation schemes must be sufficiently generous compared to mandatory severance payments and unemployment benefits in order for adjustment in hours only to be efficient. Thus, strict Employment Protection Legislation (EPL) may make short-time work an efficient adjustment mechanism.

The effectiveness of short-time work arrangements will depend on their design and the context in which they are applied. To avoid deadweight loss (unwarranted hours subsidisation) and displacement effects (subsidisation of structurally inefficient matches), public authorities can adjust eligibility, compensation and duration. The effectiveness of short-time work arrangements also depends on other labour market institutions in the national setting. This explains why short-time work schemes differ widely across countries in terms of their generosity and eligibility and entitlement criteria (see Hijzen and Venn, 2010).

To conclude, short-time work arrangements aim to limit inefficient separations during temporarily adverse demand conditions. Theory predicts that firms are more likely to enrol in such schemes if their employees are more skilled, have long tenure, are hired under permanent contracts and are protected by high dismissal costs. Short-time work institutions can vary substantially across jurisdictions in their design parameters and in their effectiveness. Often, the latter is determined by interactions with other policies such as EPL and bargaining institutions. All in all, however, publicly funded short-time work arrangements can be mutually beneficial for employers and employees, sta-

bilising employment and income at the aggregate level while preserving otherwise viable firm-worker matches.

Empirical evidence

Substantial research on short-time work and its effects was produced following the economic and financial crisis of 2008-09. Labour adjustments to the recession differed across national settings, in particular the relative roles of reductions in employment (extensive margin) and in hours worked (intensive margin). The comparison between Germany and the U.S. captured the attention of many researchers. Although the size of the slump was comparable across the two countries, the employment response in Germany was considerably more muted, while the response of hours per worker was larger. However, Burda and Hunt (2011) and Möller (2010) downplay the contribution of STWAs to the muted response of employment in Germany. Both studies stress increased use of work time accounts.

Hijzen and Venn (2011) provide a cross-country study of the change in employment and average hours in relation to the take-up of STWAs during the recent recession. Of the 19 countries examined over 2003 Q1-2009 Q3, some had STWAs before the crisis, some adopted them and others did not. After controlling for the intensity of the recession, they estimate that countries with STWAs experienced a significantly more muted reduction in permanent employment. There is also evidence that average hours worked by permanent employees fell more in countries with STWAs. Hijzen and Venn (2011) show that the availability of STWAs cannot explain the different response of employment and average hours worked for temporary employees. However, the reduction in employment was considerably larger for temporary employees than for permanent employees in both sets of countries.

Boeri and Bruecker (2011) document the cross-country impact of STWAs during the crisis (including Luxembourg). They report that short-time work take-up dampens the response of employment and identify a threshold at which STWAs begin to help prevent employment losses (GDP contraction of 1.5% or more). Using these parameter estimates, they calculate the number of jobs potentially saved by these schemes during 2008-09. For Luxembourg, up to 0.3% of 2008 Q4 employment may have been saved. However, Boeri and Bruecker (2011) note that the application of the same coefficients across all countries may underestimate these effects for countries with efficient STWAs already in place.

Boeri and Bruecker (2011) also investigate how STWAs interact with labour market institutions. They find that EPL strictness and bargaining centralisation indices have positive effects on national short-time work take-up rates, supporting the hypotheses presented in the previous section. They also investigate the impact of firm business conditions, structural characteristics, human capital investment and labour force composition on firm take-up rates. Using German establishment data for 2009, they find that both a fall in past sales and low expectations for future revenue negatively affect the take-up rate, while high competitive pressures induce firms to increase it. The au-

thors conclude that short-time work "take-up rate are mainly affected by contemporaneous or anticipated shocks rather than by long-lasting structural problems" (Boeri and Bruecker (2011, p 737). Furthermore, the intensity of the use of STWAs increases with firm size, export share and share of research and development activities. Interestingly, the share of employees with higher educational attainment is associated with lower take-up, and the negative impact increases with the level of education. The share of employees on part-time or fixed-term contracts appears to reduce the share of firm employment in STWAs, supporting the hypothesis that permanent employees provide stronger incentives for firm participation. Finally, collective pay agreements do not have a clear effect on firm participation, although the impact may be negative.

Using the same dataset, Crimmann et al. (2010) turn to the question of firm selection into STWAs, or the extensive margin of participation. They report that, unlike in 2003, find that firms taking up STWAs in 2009 were less likely to have high shares of qualified or university-trained employees. They point to the specific nature of the 2008-09 recession as a possible explanation, since it hit exporting manufacturing firms particularly hard and presumably these had large shares of non-specialised, blue-collar workers. Most of their other evidence also confirms Boeri and Bruecker's (2011) findings on the intensive margin of take-up. These include a positive effect of establishment size and deteriorating performance (past profitability, future expectations) on the likelihood of using STWAs. In addition, flexible arrangements, such as part-time, fixed-term and agency contracts, tend to reduce the probability of participation. Exporting establishments are also more likely to participate in STWAs, even after controlling for other factors. Finally, they find no significant impact from the application of collective pay agreements.

5.3. Modelling firms' decisions to apply for STWAs

In this subsection we analyse the determinants of firms' decision to apply for STWAs in Luxembourg.[23] We estimate a logit specification analogous to the one discussed in the previous section. The dependent variable is equal to 1 if the firm applied for STWAs in period *t* (i.e. either 2008-09 or 2010-13) and 0 otherwise. In contrast to the regression on ALMPs, we focus on negative shocks only since STWAs are in principle designed to aid firms facing a (temporary) fall in demand. We also include other negative shocks in the baseline specification without any strong a-priori expectations about their effect. The shock variables are defined the same way as in the previous section.

We also include the same set of firm characteristics as in Section 3.4. Multi-establishment firms can shift work and employees between plants, so we expect them to be less likely to be applying for STWAs. Firing costs for permanent employees, full-time or part-time, are expected to be higher than for temporary workers or agency workers. To maintain their firm-specific human-capital, firms with higher shares of permanent employees are expected to be more likely to apply for STWAs. Firms with

[23] Results were similar when the dependent variable was limited to applications that were approved.

more skilled employees and firms reporting hiring costs to be relevant obstacles to hiring new employees are also expected to be more likely to apply for STWAs.

5.4. Estimation results

Firms facing strong declines in their activity due to demand volatility/uncertainty have a significantly higher likelihood of applying for STWAs. This is the only external shock consistently associated with application for STWAs in Luxembourg. Taken at face value, this result seems to suggest that STWAs are primarily requested and used by firms facing demand fluctuations or uncertainty rather than a demand level shock, and thus STWAs are used as intended by the public authorities without impeding structural adjustments to lasting negative demand shocks. After controlling for other factors, firms in manufacturing are more likely to apply for STWAs, consistent with our descriptive findings and the fact that STWAs were initially only applicable in this sector. With the exception of firms with 200+ employees, larger firms are also more likely to apply for STWAs. As found in other countries, the probability of applying for STWAs increases with the share of revenue originating in exports. However, we fail to find a significant impact of the share of skilled workers on the likelihood of applying for STWAs. The share of employees with at least 5 years tenure, which may also proxy for firm-specific human capital, does have a positive effect. Moreover, we find weak support for the notion that the relevance of firing costs as an obstacle to permanent hiring increases the probability of applying for STWAs (however, the effect is significant only in one of our specifications).

Furthermore, we find that the probability of applying for STWAs significantly increases with the shares of both full-time and part-time permanent contracts vis-a-vis fixed-term contracts (the reference group in the regression) and for firms with a collective pay agreement. We interpret this as a sign that firms with less flexible contractual arrangements are more constrained in carrying out adjustments through the extensive margin and therefore more likely to apply for STWAs. This is also consistent with the probability of applying for STWAs being lower among multi-establishment firms or firms with a lower share of permanent employees, indicators that can be interpreted as mirroring the internal flexibility of such firms.

Table 9: Pooled logit estimates for firms' decision to apply for STWAs

STWAs: Pooled logit							
		vs. no change				vs. no change/moderate change	
		(1) Direction		(2) Size		(3) Size	
Level of demand: activity decreased	moderately	0.008	(0.014)	0.002	(0.017)		
	strongly			0.003	(0.021)	0.002	(0.019)
Volatility/uncertainty of demand: activity decreased	moderately	0.038**	(0.018)	0.031	(0.021)		
	strongly			0.091*	(0.047)	0.083**	(0.038)
Access to external financing: activity decreased	moderately	0.035*	(0.018)	0.024	(0.020)		
	strongly			0.031	(0.038)	0.019	(0.035)
Customers' ability to pay: activity decreased	moderately	0.018	(0.013)	0.012	(0.014)		
	strongly			0.048	(0.033)	0.052*	(0.031)
Availability of supplies: activity decreased	moderately	0.015	(0.022)	0.014	(0.027)		
	strongly			0.016	(0.035)	0.018	(0.037)
Period 10/13		-0.019	(0.013)	-0.018	(0.013)	-0.015	(0.013)
Manufacturing		0.106**	(0.046)	0.108**	(0.049)	0.107**	(0.048)
Construction		0.032	(0.021)	0.034	(0.023)	0.036	(0.024)
Business services		-0.012	(0.020)	-0.011	(0.021)	-0.011	(0.020)
5-19 employees		0.155**	(0.064)	0.168**	(0.066)	0.175**	(0.072)
20-49 employees		0.185**	(0.076)	0.208***	(0.080)	0.213**	(0.086)
50-199 employees		0.241**	(0.101)	0.271**	(0.106)	0.291**	(0.115)
200+ employees		0.133	(0.113)	0.146	(0.118)	0.143	(0.123)
Multi-establishment firm		-0.035***	(0.012)	-0.034***	(0.012)	-0.033***	(0.013)
FT perm. empl., share		0.531**	(0.243)	0.552**	(0.251)	0.481*	(0.255)
PT perm. empl., share		0.411*	(0.245)	0.462*	(0.251)	0.393	(0.262)
High-skill empl., share		0.010	(0.020)	0.007	(0.019)	0.007	(0.017)
Tenure >5 years, share		0.053*	(0.029)	0.053*	(0.031)	0.061**	(0.030)
Domestic revenue, share		-0.068***	(0.018)	-0.066***	(0.018)	-0.067***	(0.019)
Collective pay agreement		0.035***	(0.013)	0.032**	(0.014)	0.032**	(0.014)
Competition, severe/very severe (index)		0.008	(0.018)	0.005	(0.018)	0.012	(0.020)
Relevant hiring obstacle: hiring costs		0.001	(0.013)	-0.001	(0.012)	-0.003	(0.012)
Relevant hiring obstacle: firing costs		0.017	(0.013)	0.015	(0.012)	0.020*	(0.012)
Relevant hiring obstacle: skilled labour		0.004	(0.015)	-0.003	(0.015)	-0.008	(0.014)
Pseudo-R sq.		0.37		0.38		0.36	
No. of obs.		1045		1045		1045	
LogL		-125.2***		-122.0***		-127.2***	

Note: Robust standard errors in brackets. The coefficients denote unweighted average marginal effects. ***,** and * indicate significance at the 1%, 5% and 10% level, respectively. Base category is trade, 1-4 employees, in 2008-09, mainly foreign ownership, single-establishment.

5.5. *Effects of STWAs on employment and jobs saved*

The increased use of STWAs during the recent crisis may have helped to preserve jobs. Estimating this impact, however, is challenging given the data available as the necessary counterfactual scenario is not easy to model. Therefore, we included a specific question in the survey to collect views about the effectiveness of STWAs in preventing job losses. Firms were asked to provide the number of employees involved in this scheme and the number of employees that would have been laid off had it been unavailable. Firms reported that 20% of employees involved in STWAs in 2010-13 would have lost their job without this arrangement. In 2008-09 this share rises to 25% of employees in STWAs.

To assess the possible impact of STWAs on the Luxembourg economy, we assume that the proportion of jobs saved in each stratum (defined by sector and size class combinations) is the same as in the target employment population of the stratum. Clearly, this assumption might be too strong for strata with few firms in the sample or a low response rate. Indeed, Table 11 suggests that only in one stratum (manufacturing firms with 50-199 employees) we might have enough responses to make reliable inferences about the impact of STWAs in the population (out of 72 firms in the population in this stratum in 2010-13, 16 replied to the questionnaire, of which 7 used STWAs). In fact, in this stratum STWAs have a measurable impact on employment: firms in the sample reported that STWAs saved 4.3% of their total employment in 2008-09 (4.9% in 2010-13). Extrapolating to the population of this stratum, this would correspond to about 318 jobs in 2008-09 and 362 jobs in 2010-13.

Table 11: Use of STWAs by firm stratum

				Sample							
		Population		All sample		STWAs (firms)		STWAs (employees)			Extrapol. to population
Sector	Empl.	N	L	n	l	n^{STW}	l^{STW}	involved	saved	saved [% of l]	saved in L
2008-2009											
Manufacturing	5-19	268	2675	26	243	2	13	15	4	1.6	44
Manufacturing	20-49	99	3079	10	343	2	36	27	5	1.5	45
Manufacturing	50-199	82	7920	16	1743	4	523	305	70	4.0	318
Manufacturing	200+	32	23399	4	1159	2	631	180	50	4.3	1009
Construction	5-19	819	8336	47	547	1	5	6	4	0.7	61
Construction	20-49	306	9276	59	1829	2	69	35	6	0.3	30
Trade	5-19	1257	11246	53	562	1	8	4	2	0.4	40
Trade	20-49	226	7008	42	1314	1	38	3	3	0.2	16
Trade	50-199	76	5500	14	1228	1	68	50	10	0.8	45
Business services	20-49	195	5759	41	1398	2	51	45	13	0.9	54
2010 – 2013											
Manufacturing	5-19	193	1968	26	243	2	38	26	5	2.1	40
Manufacturing	20-49	91	2883	10	343	1	43	20	5	1.5	42
Manufacturing	50-199	72	7332	16	1743	7	807	433	86	4.9	362
Construction	5-19	705	7092	47	547	1	14	7	7	1.3	91
Construction	20-49	287	8854	59	1829	2	80	24	9	0.5	44
Construction	50-199	121	10612	20	1587	1	72	65	1	0.1	7
Business services	20-49	419	12865	41	1398	1	20	20	5	0.4	46

Notes: N and L denote the total no. of firms and employees in the target firm population; n and l denote the total no. of firms and employees in the sample; n^{STW} and l^{STW} denote the number of firms and employees with STWAs. The data for the firm population refers to end 2008 and end 2013. Thus, the number of employees in STWAs can exceed the number of total employees in a firm. Size categories based on 2013 employment figures.

If we consider all size classes in manufacturing where at least 1 respondent firm used STWAs (see Table 11), this arrangement saved 3.8% of employment in the target population in 2008-09 and 3.6% in 2010-13. At the peak of STWAs' take-up (2008-09), the estimated number of jobs saved in this part of manufacturing is 1416. The number falls to 444 in 2010-13 because we have no response from manufacturing firms with 200+ employees.

6. Concluding remarks

This paper analyses how various active labour market support measures by the government of Luxembourg helped to alleviate the effects of the economic crisis on firms. It contributes to the literature on the firm-level determinants of ALMPs and STWAs and it is the first such study using Luxembourg firm-level data.

Survey results indicate that about one third of Luxembourg firms made use of public employment support measures between 2008 and 2013. During the crisis, use of ALMPs increased economy-wide both through the extensive margin (more firms) and the intensive margin (more measures per firm). The likelihood that a firm participated in these measures is linked to demand-driven increases in activity, firm size, domestic orientation, being a multi-establishment firm, concerns about labour costs and unavailability of skilled labour and, to some extent, the stability of the workforce.

The economic and financial crisis led to a surge in the number of firms using STWAs. Firms reported that 20% of employees involved in STWAs would have lost their job without this arrangement in 2010-13 and 25% would have lost it in 2008-09. STWAs are concentrated in the manufacturing sector, where 1.5% to 4.9% of total jobs were reportedly saved by STWAs, depending on the size class and period. The likelihood that a firm used STWAs is higher for single establishment firms and firms reporting a negative impact of demand volatility/uncertainty on their activity. In addition, the likelihood of the use of STWAs increases with the share of permanent employees, the degree of firm-specific human capital and the degree of export orientation. Taken at face value, the results suggest that STWAs are primarily requested and used by firms facing demand fluctuations or uncertainty rather than a demand level shock. Furthermore, STWAs are used by firms with high levels of firm-specific human capital and thereby help to avoid costly and inefficient separations of employees. Altogether, this suggests that in Luxembourg STWAs are used as intended; we do not find evidence pointing towards STWAs impeding structural adjustments to lasting negative demand shocks.

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Appendix 1: Variables definition and summary statistics

Table 10: Variables definition and summary statistics (economic shocks)

			N	Mean
Description: 1 if factor	*firms' activity … in t, 0 otherwise*			
level of demand:				
	decreased		1316	0.34
		…moderately	1316	0.21
		…strongly	1316	0.13
	increased		1316	0.32
		…moderately	1316	0.27
		…strongly	1316	0.05
volatility/uncertainty of demand:	decreased		1314	0.28
		…moderately	1314	0.20
		…strongly	1314	0.08
	increased		1314	0.18
		…moderately	1314	0.15
		…strongly	1314	0.03
access to external financing:	decreased		1308	0.18
		…moderately	1308	0.12
		…strongly	1308	0.06
	increased		1308	0.07
		…moderately	1308	0.05
		…strongly	1308	0.01
customers' ability to pay:	decreased		1314	0.32
		…moderately	1314	0.25
		…strongly	1314	0.08
	increased		1314	0.08
		…moderately	1314	0.06
		…strongly	1314	0.02
availability of supplies:				
	decreased		1315	0.10
		…moderately	1315	0.08
		…strongly	1315	0.02
	increased		1315	0.05
		…moderately	1315	0.05
		…strongly	1315	0.00

Table 11: Variables definition and summary statistics

Variable	Description	N	Mean
Benefit from ALMP	discrete; 1 if benefited form any ALMP in t, 0 otherwise	1293	0.43
Applied for STW	discrete; 1 if applied for STW in t, 0 otherwise	1312	0.04
Manufacturing	discrete; 1 if firm belongs to NACE code C, 0 otherwise	1348	0.11
Construction	discrete; 1 if firm belongs to NACE code F, 0 otherwise	1348	0.22
Business services	discrete; 1 if firm belongs to NACE codes H, I, J, L, M or N, 0 otherwise	1348	0.30
Financial intermediation	discrete; 1 if firm belongs to NACE code K, 0 otherwise	1348	0.13
5-19 employees	discrete; 1 if firm had 5-19 employees at the end of 2013, 0 otherwise	1348	0.35
20-49 employees	discrete; 1 if firm had 20-49 employees at the end of 2013, 0 otherwise	1348	0.25
50-199 employees	discrete; 1 if firm had 50-199 employees at the end of 2013, 0 otherwise	1348	0.14
200+ employees	discrete; 1 if firm had 200 employees or more at the end of 2013, 0 otherwise	1348	0.05
Period 10/13	discrete; 1 if t is 2010/13, 0 otherwise	1348	0.50
Affiliate/subsidiary firm	discrete; 1 if firm was a subsidiary/affiliate at the end of 2013, 0 otherwise	1338	0.28
Domestic ownership	discrete; 1 if the firm's ownership was mainly domestic at the end of 2013, 0 otherwise	1336	0.75
Multi-establishment firm	discrete; 1 if the firm was a multiple-establishment firm at the end of 2013, 0 otherwise	1346	0.14
FT perm. empl., share	continuous; permanent full-time employees as a share of total employees at the end of 2007	1274	0.87
PT perm. empl., share	continuous; permanent part-time employees as a share of total employees at the end of 2007	1274	0.11
Cross-border empl., share	continuous; cross-border employees as a share of total employees at the end of 2007	1272	0.51
High-skill empl., share	continuous; employees belonging to ISCO classes 1,2,3, 7 or 8 as a share of total employees at the end of 2013	1330	0.58
Tenure >5 years, share	continuous; employees with job tenure exceeding 5 years as a share of total employees at the end of 2013	1338	0.60
Domestic revenue, share	continuous; sales in the domestic market as a share of total sales in 2013	1340	0.71
Collective pay agreement (based on 4.3)	discrete; 1 if the proportion of employees covered in 2013 by any collective pay agreement is greater than 0, 0 otherwise	1316	0.45
Competition, severe/very severe (index)	continuous, weighted average; 1=weak, 2=moderate, 3=severe, 4=very severe, weighted by the respective market share in 2013	1338	0.78
Cost of labour: relevant/very relevant issue	discrete; 1 if cost of labour was a relevant/very relevant issue for the firm in t, 0 otherwise	1284	0.61
Availability of skilled labour: relevant/very relevant issue	discrete; 1 if availability of skilled staff or experienced managers was a relevant/very relevant issue for the firm in t, 0 otherwise	1298	0.60
Relevant hiring obstacle: hiring costs	discrete; 1 if firing costs were a relevant/very relevant obstacle in hiring workers with a permanent, open-ended contracts at the end of 2013, 0 otherwise	1312	0.34
Relevant hiring obstacle: firing costs	discrete; 1 if hiring costs were a relevant/very relevant obstacle in hiring workers with a permanent, open-ended contracts at the end of 2013, 0 otherwise	1318	0.47
Relevant hiring obstacle: skilled labour	discrete; 1 if insufficient availability of labour with the required skills was a relevant/very relevant obstacle in hiring workers with a permanent, open-ended contracts at the end of 2013, 0 otherwise	1320	0.65

Appendix 2: Robustness Checks

Table 12: Robustness checks (hiring firms), All ALMPs

ALMPs: Pooled, only firms with hires in 2008-13										
All ALMPs (a-f)		Growing firms			Non-growing firms			All firms		
		(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Level of demand : activity decreased	moderately							- *		
	strongly									
Level of demand : activity increased	moderately				+ ***	+ ***		+ *		
	strongly		+ ***	+ ***			- *		+ ***	+ ***
Volatility/uncertainty of demand : activity decreased	moderately				+ *	+ *		+ **	+ **	
	strongly									
Volatility/uncertainty of demand : activity increased	moderately	+ *	+ **					+ *	+ **	
	strongly									
Access to external financing : activity decreased	moderately									
	strongly									
Access to external financing : activity increased	moderately									
	strongly									
Customers' ability to pay : activity decreased	moderately									
	strongly									
Customers' ability to pay : activity increased	moderately									
	strongly									
Availability of supplies : activity decreased	moderately									
	strongly									
Availability of supplies : activity increased	moderately									
	strongly									
Manufacturing			- *	- *				- **	- **	- **
Construction		- **	- **	- **						
Business services		- ***	- ***	- ***				- ***	- ***	- ***
Financial intermediation		- *	- **	- **				- **	- **	- ***
5-19 employees		+ **	+ **	+ **	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***
20-49 employees		+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***
50-199 employees		+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***
200+ employees		+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***
Period 10/13		+ ***	+ ***	+ ***				+ ***	+ ***	+ ***
Affiliate/subsidiary firm										
Domestic ownership										
Multi-establishment firm		+ *	+ **	+ **	+ **	+ **	+ **	+ ***	+ ***	+ ***
Full-time empl., share					- ***	- ***	- ***	- **	- *	- **
Part-time empl., share					- **	- **	- ***	- **	- **	- **
Cross-border empl., share		- ***	- ***	- ***	- **	- ***	- ***	- ***	- ***	- ***
High-skill empl., share										
Tenure >5 years, share										
Domestic revenue, share		+ **	+ **	+ **				+ ***	+ ***	+ ***
Collective pay agreement		+ *								
Competition, severe/very severe (index)					+ ***	+ ***	+ ***	+ **	+ **	+ **
Cost of labour: relevant/very relevant issue		+ **	+ **	+ **				+ ***	+ ***	+ ***
Availability of skilled labour: relevant/very relevant issue		+ **	+ **	+ **				+ **	+ **	+ **
Pseudo-R sq.		0.21	0.23	0.21	0.24	0.25	0.22	0.2	0.21	0.2
No. of obs.		602	602	602	391	390	390	993	993	993
LogL		***	***	***	***	***	***	***	***	***

Note: Based on robust standard errors. +/- indicates the coefficient sign of the average marginal effects.
* p<0.1, ** p<0.05, *** p<0.01

Table 13: Robustness checks (individual measures)

ALMPs: Pooled, only firms with hires in 2008-13

		Financial aid to hire older/lt. unemployed			Re-employment support			Tax relief for hiring unemployed workers			Apprenticeship subsidies			Employment initiation contract			Workforce lending facility			Deduction of relocation expenses		
		(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Level of demand : activity decreased	moderately										- *						- **	- *				
	strongly																	- ***	- **			
Level of demand : activity increased	moderately										+ **			+ *								
	strongly											+ ***	+ **		+ **	+ *						
Volatility/uncertainty of demand : activity decreased	moderately	+ *									+ **	+ **										
	strongly								- *	- *						- **						
Volatility/uncertainty of demand : activity increased	moderately	+ ***	+ **																			
	strongly																					
Access to external financing : activity decreased	moderately										+ *	+ **									- *	
	strongly																					
Access to external financing : activity increased	moderately				- *												+ *					
	strongly											- ***	- ***								- *	- *
Customers' ability to pay : activity decreased	moderately							+ *	+ *								- **	- *				
	strongly											- **	- **					- *				
Customers' ability to pay : activity increased	moderately																					
	strongly																					
Availability of supplies : activity decreased	moderately											- *		- *		- *						
	strongly																					
Availability of supplies : activity increased	moderately													- **		- ***				+ *		
	strongly																				+ *	
Manufacturing					- **	- *	- *	- *	- **	- **	- *	- **	- *									
Construction					- ***	- ***	- ***	- **	- ***	- **		- *		- **	- *	- **						
Business services					- **	- **	- **			- *	- ***	- ***	- ***	- **	- **					- ***	- ***	- ***
Financial intermediation							- *		- *	- **	- ***	- ***	- ***									
5-19 employees		+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***									
20-49 employees		+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ *	+ *	+ *				+ *		+ *
50-199 employees		+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ **	+ **	+ **						
200+ employees		+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ **	+ *	+ **	+ ***	+ ***	+ ***
Period 10/13		+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	+ *		+ **												
Affiliate/subsidiary firm											- ***	- ***	- ***									
Domestic ownership		+ *	+ *					+ **	+ ***	+ ***				+ ***	+ ***	+ ***						
Multi-establishment firm											+ ***	+ ***	+ ***		- *							
Full-time permanent empl., share					- **	- **	- ***															
Part-time permanent empl., share					- **	- **	- **															
Cross-border empl., share		- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- ***	- **	- **	- **
High-skill empl., share											+ *	+ **	+ *				+ *			+ ***	+ ***	+ ***
Tenure >5 years, share		- **	- **	- **	- **	- **	- **	- ***	- **	- ***									- *			
Domestic revenue, share					+ **	+ **	+ *	+ **	+ **	+ *	+ **			+ ***	+ ***	+ **				- *	- **	- *
Collective pay agreement											+ ***	+ ***	+ **									
Competition, severe/very severe (index)					+ *	+ **	+ **	+ **	+ **	+ **				+ **	+ **	+ **						
Cost of labour: relevant/very relevant issue					+ *						+ ***	+ ***	+ ***				+ ***	+ ***	+ ***	+ *	+ **	+ *
Availability of skilled labour: relevant/very relevant issue		+ ***	+ ***	+ ***				+ **	+ **	+ ***	+ *	+ *	+ **				+ ***	+ ***	+ ***			
Pseudo-R sq.		0.13	0.13	0.15	0.15	0.15	0.14	0.15	0.15	0.14	0.19	0.20	0.19	0.16	0.18	0.16	0.18	0.20	0.17	0.32	0.34	0.31
No. of obs.		993	993	993	993	993	993	993	993	993	993	993	993	993	993	993	993	993	993	882	871	871
LogL		***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***

Note: Based on robust standard errors. +/- indicates the coefficient sign of the average marginal effects.
* p<0.1, ** p<0.05, *** p<0.01

8. Appendix 3: Characteristics of ALMPs and STWAs in Luxembourg

Table 14: Labour market measures

	Name	Type of measure	Type of changes	Implementation date and modification of the law (if applicable)	End date of the temporary changes made (if applicable)
Maintaining / supporting labour demand					
Job subsidies, employment retention or recruitement incentives	Short-time work	Subsidized reduction in hours worked	i. Extension of coverage and duration; ii. Loosening of eligibility criteria; iii. Enhancement of entitlements (in favour of both employees and employers)	January 2009	December 2015
	Work-lending facility	Work sharing	No changes	Before 2009	n/a: permanent measure
	Financial aid to hire older workers or long-term unemployed	Reductions in non-wage labour costs for hiring older workers and long-term unemployed	No changes	Before 2009	n/a: permanent measure
	Re-employment support	Incentives to hire unemployed people	No changes	Before 2009	n/a: permanent measure
	Tax relief for hiring an unemployed person	Tax reduction			
	Apprenticeship subsidies	Incentives to increase the number of apprentices			
	Deduction of relocation expenses for highly skilled workers from abroad				
	Contrat Initiation Emploi / Contrat Appui Emploi	Compensation for wage and non-wage costs incurred when hiring of young people.	Existing employment support contracts extended to qualified young people.	July 2007, modified temporarily in November 2009; again, permanently in April 2013	n/a: permanent measure
Improve the match between labour demand and supply					
Work experience programs	Contrat Initiation Emploi / Contrat Appui Emploi	cf. above		July 2007, modified in November 2009	n/a: permanent measure
Training programs			Compensation for unemployed people enrolled in training programs has been increased.	Before 2009	
(Passive) income support measures					
Unemployment benefits	/	Scaling up of unemployment benefits.	Lower degressivity and broader elibility critera for extensions in the benefits duration.	August 2010	December 2015
Compensation for community work	/		Compensation for unemployed people enrolled in community work has been increased.	August 2010	n/a: permanent measure
Other labour supply measures					
Enhanced activation of the unemployed	Reform of the National Employment Agency		Profiling of the unemployed, early assessment of skills, individual guidance and trianing, career counseling, enhanced job-search support.	January 2012	n/a: permanent measure
Stricter requirements for the unemployed			Benefit entitlement linked to compliance with obligations (e.g. early registration at the public employment services, active job-search, acceptance of suitable job offers etc.)		

Table 15: Changes applied to the existing STWAs

ECONOMIC REASONS / ECONOMIC DEPENDENCY			
Period of application (effective date)	**Eligibility requirements (firms)**	**Duration**	**Compensation**
Jan. 2009 – Dec. 2009 (Mar. 2009)[a]	/	The reduction in the employees' average working time may exceed 50% per month, provided that it does not exceed 50% of the employees' annual average working time (with a maximum duration of 6 months within a 12-month reference period).	Compensation was extended to the first 16 hours lost per month (for full-time employees, to the first 8 hours lost per month for part-time workers).
Jan. 2009 – Dec. 2010 (May 2009)[b]	/	The reduction in the employees' average working time may exceed 50% per month, provided that it does not exceed 50% of the employees' average annual working time.	Idem.
Aug. 2010 – Jul. 2012 (Aug. 2010)[c]	Eligibility was extended to firms which do not belong to eligible sectors but which face a reduction in their working time of at least 40% and provided that they concluded an *Employment maintenance plan* or upon agreement with the social partners (applicable from August 2010 – July 2012).	The reduction in the employees' average working time may exceed 50% per month, provided that it does not exceed 50% of the employees' average annual working time (prolonged until December 2011).	Compensation was extended to the first 16 hours lost per month (for full-time employees, to the first 8 hours lost per month for part-time workers) (prolonged until December 2011). Employers' social security contributions are reimbursed for firms that have been on short-time work for the last six months and that face a reduction in their normal working time of at least 25% (per month) (applicable from August 2010 – July 2012).
Jan. 2012 – Dec. 2012 (Dec. 2011)[d]	/	Idem (prolonged until December 2012).	Compensation was extended to the first 16 hours lost per month (for full-time employees, to the first 8 hours lost per month for part-time workers) (pro-

			longed until December 2012).
Aug. 2012 – Dec. 2013 (Jul. 2012)[e]	Idem (prolonged until December 2013).	Idem (prolonged until December 2013).	Compensation was extended to the first 16 hours lost per month (for full-time employees, to the first 8 hours lost per month for part-time workers) (applicable from August 2012 – December 2013). Employers' social security contributions are reimbursed for firms that have been on short-time work for the last six months and that face a reduction in their normal working time of at least 25% (per month) (prolonged until December 2013).
Jan. 2014 – Dec. 2015 (Dec. 2013)[f]	Idem (prolonged until December 2015).	Idem (prolonged until December 2015).	Compensation was extended to the first 16 hours lost per month (for full-time employees, to the first 8 hours lost per month for part-time workers) (applicable from August 2012 – December 2015). Employers' social security contributions are reimbursed for firms that have been on short-time work for the last six months and that face a reduction in their normal working time of at least 25% (per month) (prolonged until December 2015).
STRUCTURAL REASONS			
Period of application (effective date)	**Eligibility requirements (firms)**	**Duration**	**Compensation**
Jan. 2009 – Dec. 2009 (Mar. 2009)[a]	/	/	Compensation was extended to the first 16 hours lost per month (for full-time employees, to the first 8 hours lost per month for part-time workers), provided that the firm concluded an *Employment maintenance plan* or upon agreement with the social partners.
Jan. 2009 – Dec. 2010 (May 2009)[b]	/	/	Idem.
Aug. 2010 – Jul. 2012	/	/	Compensation was extended to the first 16 hours

(Aug. 2010)[c]			lost per month (for full-time employees, to the first 8 hours lost per month for part-time workers), provided that the firm concluded an *Employment maintenance plan* or upon agreement with the social partners (prolonged until December 2011).
Jan. 2012 – Dec.2012 (Dec. 2011)[d]		Idem (prolonged until December 2012).	Idem (prolonged until December 2012).
Jan. 2013 – Dec. 2013 (Jul. 2012)[e]		The reduction in the employees' average working time may exceed 50% per month, i. provided that it does not exceed a duration of 10 months over a reference period of 12 months and ii. provided that a restructuring plan is added to the *Employment maintenance plan*.	Idem (prolonged until December 2013).
Jan. 2014 – Dec. 2014/15 (Dec. 2013)[f]	/	Idem (prolonged until December 2014).	Idem (prolonged until December 2015).
Jan. 2015 – Dec. 2016 (Dec. 2014)[g&h]	/	Idem (prolonged until December 2016).	Idem (prolonged until December 2016).

References: **a.** Legilux. 2015a. **b.** Legilux. 2015a. **c.** Legilux. 2015c. **d.** Legilux. 2015d. **e.** Legilux. 2015e. **f.** Legilux. 2015f. **g.** Legilux. 2015g. **h.** Legilux. 2015h.

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