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Differential Welfare State Impacts for Frontier Working Age Families

Irina S. Burlacu
Cathal O'Donoghue

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Irina S. Burlacu
MGSoG, Maastricht University

Cathal O'Donoghue
Teagasc Rural Economy and Development Programme and IZA

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IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

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ABSTRACT

Differential Welfare State Impacts for Frontier Working Age Families

Benefits and taxes vary greatly across the European Union owing to incongruent welfare and taxation systems. This paper analyzes how welfare states achieve insurance and equity objectives for residents who work in other countries. The aim is to evaluate the impact of unemployment benefits and income taxation on these frontier workers' welfare in Luxembourg and Belgium that exhibit similar welfare state objectives. The analysis is based on social security coordination Regulation 883/2004 provisions on unemployment, taxation regimes and bi-lateral tax treaties. We find mixed results. First, while countries follow analogous welfare regimes and pursue similar welfare objectives, their ensuing outputs differ significantly. Second, differences in unemployment conditions and benefits favor high discrepancies in residents' incomes. Third, mobility creates high vertical and horizontal inequity among Belgian and Luxembourgish residents.

JEL Classification: I38

Keywords: frontier workers, social policy, policy coordination

Corresponding author:

Irina Burlacu
Maastricht Graduate School of Governance
Maastricht University
P.O. Box 616
6200 MD Maastricht
The Netherlands
E-mail: irina.burlacu@maastrichtuniversity.nl

1. Introduction

In the late 1950s, western European countries faced two major changes: freedom of movement (the Treaty of Rome, 1957) and the 'crystallization' of welfare state systems. At the European Union (hereafter, EU) level, free movement of labor is achieved through bi-lateral tax agreements and a coordinated social security system. These are subsequently provided in the respective national legislations and tax-benefit policies.

Coping with two or more welfare state systems is a prerequisite for free labor mobility. Welfare states prioritize however, divergent policy objectives in line with their pressing population needs. This complicates coordination efforts. Besides, it becomes difficult to estimate the impact of such policies on citizen's or frontier worker's welfare. The latter is further hindered by the minimal accessibility of social security and fiscal records of frontier workers. As such, there exists limited empirical proof of the extents to which current coordination complexities affect frontier workers' welfare. Indeed, uncertainties in taxation and social security-related issues limit individuals' decisions to move.[1]

While work mobility and access to welfare are key topics in the European social policy research, most literature originates from law and focuses largely, on case studies of how national and supranational legislations impact mobility.[2] Other streams of literature study the role of citizenship in accessing welfare benefits or compare and contrast different migration regimes[3] or social protection systems.[4] Other authors explore regional (over 70 cross-border European regions)[5] policy disparities linked to the role of free labor mobility on unemployment, taxation and other economic risks.[6]

This paper attempts to evaluate the impact of coordination complexities from an applied social policy perspective. In social policy however, individuals' welfare is affected by both taxation and social security benefits. Differences in taxation and social security systems are usually analyzed as separate policy segments and case studies. These differences are of concern to frontier workers who are subjects of two tax systems and two social security systems at the same time. By using tax-benefit analysis as an instrument to achieve welfare states' objectives, we propose a more integral holistic approach in examining such complexities.

Opinion polls[7] on frontier workers[8] in the EU clearly indicate that welfare systems[9] and taxation[10] differences affect individuals' welfare. The question that has remained unsolved

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[1] Greve and Rydbjerg (2003),
[2] Mei van A.P., (2004), Pennings F., (2010).
[3] Sainsbury D., (2006), Dougan M., (2009), Greve B., (2010)
[4] Johnson P. (1999), Kvist J. and Saari J., (2007), Champion, C., Bonoli, G., (2011), Schmitt C and Starke P., (2011).
[5] Mobility for work is low in the EU: On average, between 2000-2005, workers mobility in the EU amounted to only 1% compared to 2-3% or more in the US or Australia (refering to regional mobility, within the EU Member States), data presented by Bonin H. et al. (2008);
[6] Perkmann M., (2003, 2007), Heinz F.F. et al. (2006), Pierrard O. (2008), Corvers F. and Hensen M. (2003), Matha T. and Hall P. (2008), Wintr L., (2009), Hartmann – Hirsch, C. (2010), Hartmann – Hirsch, C. and Ametepe, S. F. (2011).
[7] Nerb G. et al., (2009).

however, is to what extent related workers have been affected. This paper attempts to answer this question by analyzing how fiscal agreements and social policy coordination affect frontier workers (i.e., individuals who work and reside in two similar welfare states - that pursue comparable welfare state objectives). The main research question is "how does the social security coordination Regulation 883/2004 and fiscal bi-lateral agreements between Luxembourg and Belgium affect the welfare of Luxembourgish and Belgian frontier and non-frontier workers".

We have decided to select two major welfare state objectives: insurance and inequity. Applying the Regulation 883/2004 provisions, the unemployment insurance is chosen to analyze how two welfare states succeed to cushion resident frontier and non-frontier workers against sudden income losses. The inequity component is examined based on national taxation rules and fiscal agreements to identify to what extent taxation affects frontier workers versus non-frontier workers (vertical equity) and how does it reflect upon the income of different types of families (horizontal equity).

The analysis is carried out using the tax-benefit micro-simulation methodology. A tax-benefit system refers to the national fiscal and social policy rules that reflect the objectives of a particular welfare state. The micro-simulation method allows us to simulate existent policies by combining rules from the coordination Regulation 883/2004 and the bi-lateral fiscal agreement between Luxembourg and Belgium. Considering the complexities in interaction between policies and population (due to differences in benefits and taxation) we simplify the complexity on population by using hypothetical data. These represent various income groups and working hours in cases as: frontier workers and resident non-frontier workers in Luxembourg and Belgium. The selection of the case studies is based on eliminating possible complexities and investigating solely two country cases that belong to the same welfare state regime. Luxembourg and Belgium belong to Conservator-Corporatist welfare regime that is a strong employment oriented model with developed insurance component. The first is one of the receiving countries with the highest number of cross-border workers, and the latter is one of the sending countries with the highest rate of cross-borders (Bonin H. et al., 2008).

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[8] A frontier worker is defined as someone who "is engaged in a remunerative activity of a Member State in which he or she does not reside", "who normally returns daily, or at least once a week in the residence country (The European Parliament report on "Frontier Workers in the European Union" Directorate General for Research (In 1997); The European Commission "Scientific report on the mobility of cross-border workers within the EU 27/EEA/EFTA countries" (2009). In terms of Taxation Agreements, a frontier workers is defined as a non-resident, and throughout this paper, we consider a frontier worker someone who is a non-resident, therefore combining both definitions.

[9] Dutch frontier workers in Belgium argue: "*If you live in the Netherlands and work in Belgium you can't request for childcare-support and healthcare-insurance-support*", similarly Irish frontier workers in Northern Ireland state that "*two completely different regimes exists, maternity and unemployment benefits are much higher in Ireland than in Northern Ireland*".

[10]Taxation problem as: "Cross-border commuters are taxed on both sides of the border and have to complete two tax returns" (Ireland – UK), "The current taxation law does not have specific regulations for cross-border workers. The waiting time in case of credit with the public authority tends to be too long. The legal framework is still not well known by the workers and employers. The current situation increases the black/hidden labour market (Slovenia – Italy)". "The region in which cross-border workers have to pay taxes only in their home country extends just 10 km on both sides of the border – a ridiculously outdated small strip. This leads to high taxation and hinders cross-border mobility" (Spain-France). "Too little information about that topic, tax officials are unfriendly" (Poland – Slovakia).

Before discussing the importance of welfare state objectives within the frontier work/residency context in Luxembourg and Belgium, section 2 contains a synthesis of the legal framework of the social security coordination based on Regulation 883/2004 and tax treaties characteristics. Section 4 explains the methodology that assesses the impact of selected policies on welfare. The subsequent three parts provide the study results. In particular, Section 5 examines impacts at the benefit level. Impacts at the taxation level (vertical inequity) are discussed in Section 6, while horizontal inequity is examined in Section 7. Section 8 concludes the paper.

2. Policy instruments of benefits and taxes of frontier workers in the EU

The aim of this section is to briefly describe how the social security coordination functions with respect to frontier workers. We seek to show the decisive role of the Regulation 883/2004 in managing free movement of workers' social security and raised challenges.

The 'coordination' term has various meanings in the European Union's policy context. This could refer to soft law, aiming at policy learning and sharing experience of national social policies (e.g. national poverty strategies, social inclusion policies, etc.). One of the most illustrative soft laws in coordination is the "Open Method of Coordination", and the OECD strategy "Making work pay". On the other hand, coordination could refer to legally binding rules that Member States have to implement. This paper refers solely to the latter mentioned type of coordination.

Free movement of workers is regulated by a set of legal instruments that derive mainly from the "social security coordination" (SSC) principle. The latter is based on the Regulation 883/2004 and is founded on the cooperation of national social security administrations. As such, it has the power to overrule national laws. Table 1 presents a schematic description of how this SSC principle works among Member States.

When a person decides to move to another country, several questions arise. The first concerns individual's insurance (against unemployment, pension and other life-cycle risks) in their country of residence. Afterwards, it is decided if the individual pays social premiums in the same country where they are insured or in another country. Frontier workers usually pay all contributions and receive family benefits in the country of work but earn other social assistance and are insured against unemployment in their country of residence.

Table 1. Rules Determining the Applicable Legislation of the Regulation 883/2004

<table>
<tr><td colspan="5">What is the Competent State – Where is someone insured?</td></tr>
<tr><td colspan="5">Competent State Pays, but can also levy premiums or contributions?</td></tr>
<tr><td colspan="2">National Law</td><td colspan="3">Reg.883/2004</td></tr>
<tr><td colspan="2">Problem: Double Insurance or
No Insurance at all</td><td colspan="3">Solution: Single State Rule -Art.11(1)</td></tr>
<tr><td rowspan="3">Residence based systems</td><td rowspan="3">Employment based systems</td><td colspan="3">Which State?</td></tr>
<tr><td>Workers</td><td>Inactive</td><td>Pensioners
(health care)</td></tr>
<tr><td>Lex Loci Laboris</td><td>Lex Loci Domicilii</td><td>Lex Loci Pensionado</td></tr>
</table>

Source: Dr. A.P. van der Mei, (2011), "Coordination of Social Security & Unemployment benefits", University of Maastricht.

One of the strong principles that relate free movement with the welfare state is defined by the territoriality principle by which national laws support the consumption of benefits within the territorial state where they are received by residents (Mei van A.P., 2003; Pennings F., 2010). These national laws exclude outsiders including frontier workers who reside in other countries but work in Member states that are bound by such exclusive laws. Regulation 883/2004 ensures that supranational (rather than national) laws are applied.

Free movement of labour in the EU is based on few major principles. One of the fundamental principles is that moving for work from one Member State to another should not disadvantage the earners. Instead they need to be treated fairly and equally as the residents of the country of work (four principles of SSC). [11] The Regulation 883/2004 refers to maintaining this principle in a variety of domains in social security: unemployment, pension, family, health care, sickness, invalidity. We will try to observe how this principle works in practice for the unemployment case.

[11] The social security coordination covers the risks in different life situation, of both the employee and its family. a) Equality of treatment regardless of nationality; b) Legislation of sonly one MS applies at any one time; c) Periods of insurance acquired in different MS can be aggregated; d) Benefits can be exported.

Table 1 illustrates a straightforward and easy to manage scheme showing which rules need to be applied in which cases. Nonetheless, in this paper we argue that the complexity of coordination entails coping with different multi-focused Member State rules.

Let us assume that a worker can commute in two types of settings: between countries with similar welfare state objectives and characteristics (Ireland-United Kingdom, Sweden-Denmark, Belgium – Luxembourg, Germany-France), and dissimilar (Spain-France, Slovenia-Italy, Denmark-Estonia). In the first case, one might expect fewer impediments for work mobility because the countries of residence and of work have similar welfare structures and objectives. Nonetheless, even if countries share similar welfare regimes accrued benefit entitlements and amounts could vary widely. Take the example of child benefits in a highly commuted region of Denmark with Sweden, Øresund. In Denmark, the basic annual allowance is allocated for children 0-2 (16,998 kroner), 3-6 (13,448 kroner) and 10,580 kroner for each child aged 7 to 17. While in Sweden, a monthly benefit is given per child (1,050 kronor) with supplements for families with two or more children. Both countries are clustered as Scandinavian welfare states that are based on strong universalistic principles, yet differences between the systems are still significant. Even if systems do not differ significantly, social security coordination instruments needs to account for such vulnerabilities.

In the second case, for example, a Spanish cross-border worker in France faces two different welfare state structures and cultures. In Spain, individuals rely, in the first place, on family rather than social structures. This is typical to Mediterranean countries. But France is one of the classical continental welfare states. These divergences can affect individuals' welfare in terms of benefits generosity and conditions.

Moreover, regardless of which country a frontier worker is based, Member States of employment and residence lack the social security or/and fiscal records of most frontier workers and their families. This fact, along with the differences in welfare state objectives, creates particular difficulties in policy setting. In other cases, frontier workers constitute mixed couples who work in different countries, lone parents and self-employed individuals whose plight is often sidelined.

Apart from social security coordination, based on which we simulate the unemployment benefits rules, we refer to income taxation. There is no fiscal coordination in the EU. Hence the bi-lateral fiscal agreements remain a core policy instrument in frontier work taxation management. The European Commission (2010) emphasizes that international double taxation is a major obstacle to cross-border activity and that such problems can be solved through better coordination of Member States' direct tax systems. A Tax Treaty (TA) has the objective to reduce double taxation, eliminate tax evasion and encourage cross-border trade efficiency. [12] Generally, these type of conditions are included in a tax treaty rather than in coordination provisions, since these refer to taxation. In this paper we consider both the national taxation rules in each country and the general rules from the latest bi-lateral tax treaties (2002) on income taxation of frontier workers.

In conclusion, the Regulation 883/2004 is the core legally binding mechanism that indicates to the Member States how frontier workers need to be treated in terms of their benefits' accessibility and contributions. Fiscal agreements on the other hand, indicate how frontier workers are taxed in

[12] OECD Tax Models http://faculty.law.wayne.edu/tad/Documents/Teaching_Materials/model_treaties.pdf

two countries’ setting. Both policy instruments are unrelated and are applied at different levels: supra-national and bi-lateral.

One of the major challenges is that SSC aims to facilitate labour mobility but at the same time the current set-up of social security coordination does not intend to address the differences in great detail between the systems. The variety of benefits amounts and conditions create challenges to frontier workers. Yet one of the fundamental principles of SSC that is moving for work from one Member State to another should not disadvantage the earners.

Another challenge is that SSC is founded on the cooperation of national social security administrations. At the same time, there is lack of micro-data and exchange of social security data between Member States. In the upcoming sections, we focus more on the importance of the welfare state objectives for social security coordination. We then make use of the national tax-benefit rules on hypothetical cases to see how coordination provisions of unemployment benefits and fiscal agreements affect income taxation in practice. We try to illustrate the underlying complexities across different social and fiscal systems by using two similar welfare states – that culminate in different outcomes. This proves the lack of synergy between the current policy instruments can affect the welfare of individuals even in less likely cases with fewer differences in system’s organization.

3. Welfare state objectives: Luxembourg and Belgium

The welfare state refers to state measures of key welfare services provision (Barr N. A., 2004). Welfare states vary in terms of their objectives and structures. These affect the welfare of mobile workers who travel from one welfare state to another (Pennings F., 2010).

We seek to test how certain welfare objectives reflect upon the welfare of those residents who, due to their employment, are offered some benefits in another state. Two welfare state core objectives are selected: insurance and inequality. Unemployment insurance has been chosen as a case study due to particular coordination provisions for frontier workers. Nonetheless, other policy instruments (e.g. health insurance) could equally have been chosen. Supporting living standards by ensuring against unexpected fall in income is one of the key strategic objectives of a welfare state.

Equity refers to the distribution of resources in a manner that would achieve the most equal distribution of welfare in a society (Dworking R., 1980). We assume that individuals who commute across borders have similar skills and capacities but are more advantaged compared to their neighbours – given attractive labor markets across the border.

We assume that, the more similar welfare states are in their structures and objectives, the less inequity arises due to mobility. To observe such complexities, two countries with comparable settings are selected. Belgium and Luxembourg are classified as Conservative-corporatist welfare regimes although some authors place Luxembourg in a mix between Scandinavian and Continental (Hartmann – Hirsch C. and Ametepe S.F., 2011). Since we carry out benefit calculations similar to Ferrera M. (1996), we consider both countries to belong to the same regime.

Benelux countries were the first cluster of European countries to remove barriers at the border and allow free circulation of persons and services in Europe (1944). They were the first European countries to share a common currency and later on, a high fluctuation of job migration,[13] long cross-border cooperation and respect for mutual agreements. Luxembourg and Belgium have in particular, signed a series of social security and fiscal agreements. [14] The latter consists of articles (17) on: supply at birth, invalidity, sickness and maternity-leave benefits. Presently, Regulation 883/2004 has supremacy over these social security agreements. As such, unemployment benefit provisions with regards to the Belgian and Luxembourgish frontier workers stem on this supranational legislation (Regulation 883/2004).

Regarding taxation agreements, the "Convention for the prevention of double taxation" is composed from articles (14) that generally describe various types of taxes of which, some provisions refer to income taxation of frontier workers that need to be paid in each country. For the analysis, we consider national taxation regimes as the main reference to build up our model. Luxembourg taxes individuals jointly while Belgium relies on individual taxes. In Luxembourg[15] married couples are jointly taxed while in Belgium, couples are taxed as individuals – i.e., both spouses' incomes are added and then taxed as single individuals (e.g. $T(Y_1 + Y_2)$. Thus, when considering the case of Luxembourgish residents, both spouses' income was added up, placed on tax bands and taxed accordingly. Similar considerations were made in cases where either of the spouses worked in Luxembourg and the other in Belgium, but both lived in Belgium (i.e., Luxembourg income + Belgian income, taxed on Luxembourgish tax rates).

4. Methodology

Micro-simulation is a means of modeling real life events by simulating characteristics and actions of the individual units that make up the system where the events occur (Atkinson A.B. et al., 1999).

A tax-benefit system allows simulating of a wide array of contexts, majorly dealing with households' income and its recalculation under various scenarios (Immervol & O'Donoghue, 2002). There is an extensive literature in the field of comparative tax-benefit analysis (Rake J., Falkingham R. and Evans M., 1999, Evans M. and Lewis W., 1999, Immervoll and O'Donoghue C., 2002). This analysis is based on hypothetical cases to facilitate operationalization of national legislation rules and allow for a wide array of life situations. We compute tax-benefits rules at household level and assume equal sharing of resources. Each case represents different income groups and working hours.

To gain a deeper understanding about the redistributive mechanism of the welfare state, it is necessary to separate social transfers and taxation in components (Ferrara and Nelson, 1995). Social benefits included in this analysis are: social assistance, child benefits and unemployment

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[13] Nerb et al., (2009)

[14] Convention on social security for frontier workers in 1959; Convention on Allocation of childbirth benefits under the legislation of family allowances, 1963; Improved Convention in 1964; Last Convention on social security for frontier workers between Belgium and Luxembourg in 1995; The last convention is an improved of the previous one, from 1963; this due that in this period the Regulation 1408/71 was launched.

benefits. Both social assistance schemes include housing benefits, scoring higher benefit amounts for Luxembourg than for Belgium and also taking into account higher living and housing costs in Luxembourg.

In the year to which the simulation is applied (2010), Luxembourg had 17 tax bands and Belgium 5. These ranged from 8 – 38% tax rate in former and 25 to 50% in latter. Luxembourg has a joint taxation system based on the splitting method. Couples' taxable income is first halved and tax liabilities are then calculated as for single persons. However, the actual tax paid by couples is double this amount (in line with tax class 2). Both countries offer tax credits for children. Tax deductions are offered to low income spouses in Belgium and mobility deductions in Luxembourg.

The following methodology was used to analyze the welfare objectives. We first analyzed the insurance component of both States' welfare objectives. We relied on two parameters: unemployment benefit level and net replacement ratios. In Luxembourg, unemployed individuals are paid for the first six months, 80% of the national average wage. In Belgium however, this rate goes down to about 65%. While allocation periods and eligibility criteria for both unemployment benefit-schemes differ, we apply an average length to reduce the differences (short term unemployment: 0-6, long term: 7-12). Average production wage is used to compare the standard of living in each country.

Secondly, we focused on the vertical inequity dimension. Here, we calculate a tax-benefit redistribution indicator to show the differences in income of both residents and frontier workers. For a better understanding of the policy effect on income, we first calculate the concentration curves of the pre-tax and post-tax income:

$$g^{pre}(p) = \int_0^y x dF(x) / \int_0^\infty x dF(x) \qquad (1)$$

$$g^{post}(p) = \int_0^y x - t(x)\, dF(x) / \int_0^\infty x - t(x)\, dF(x) \qquad (2)$$

Similar income cases are compared and calculated to show the distances between the concentration curves. Since we are using hypothetical data that does not allow for a clear representation of the distributional incomes, the above continuous case is turned into a formula in which the integral sign is replaced by a sum sign (see Cichon M. et al., 2004). Reynolds-Smolensky Index is used to calculate income variations. To determine the number of cases to which the perfect equality line corresponds, the sum of taxes and benefits is cumulated until it becomes zero.

If the disposable income is perfectly equal among all individuals, it will be rotating around the average income. We divide the market income in half and consider such half to fall above or below the average. Assuming an equal proportion of income in different income cases, we determine how far to the right, the concentration curve bends. The Belgian instead of Luxembourgish market income was selected as a reference line to ensure the comparability of Belgian non-frontier worker-cases that are usually the lowest. Table 2 summarizes the calculations.

Thirdly, we consider horizontal inequity by the use of equivalence scales. Usually, these are either calculated based on "modified OECD equivalence scale" or given, depending on the

country. Researchers interested in public policy, particularly those who focus on inter- national comparisons, have become increasingly aware of the importance of equivalence scale choices in determining policy conclusions (Lacaster R., et al., 1999). The choice of a "particular equivalence scale depends on technical assumptions about economies of scale in consumption as well as on value judgements about the priority assigned to the needs of different individuals such as children or the elderly" (OECD, 1997). Considering that our hypothetical data set does not enable us to examine needs depending on age or other detailed characteristic of the household members, the equivalized income of the overall household is solely based on the presence or absence of an additional adult or child in the family.

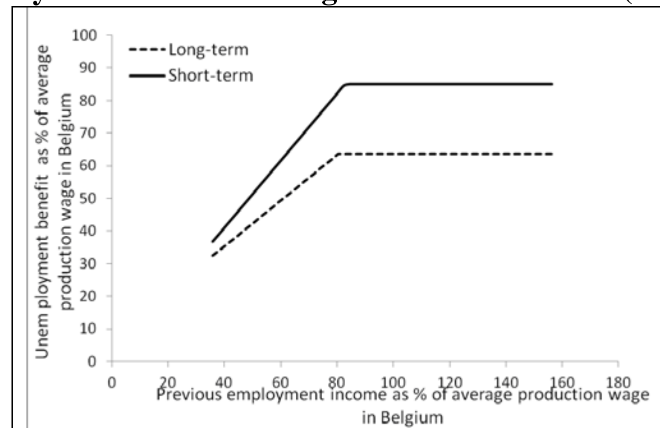
5. Study Results

5.1. Frontier work in Luxembourg and Belgium: Unemployment Benefits

Hitherto we have explored the importance of social security coordination and its relevance to the welfare state objectives. In this section, we aim to evaluate the impact of the Regulation 883/2004 as the main coordination mechanism used in this paper for the case of unemployment. Insurance component is one of the major welfare state objectives (Barr N, 2004) and is strongly characteristic to Luxembourg, Belgium and other continental countries (Arts&Gelissen, 2003).

Before embarking on the analysis, it becomes clear from the benefit levels (Fig. 2, 3) that Luxembourg (compared to Belgium) offers higher benefits and attracts commuters (Hartman H., 2009, 2010). As such we can assume that having a Luxembourgish unemployment benefit boosts Belgian frontier workers' income (see Fig.1).

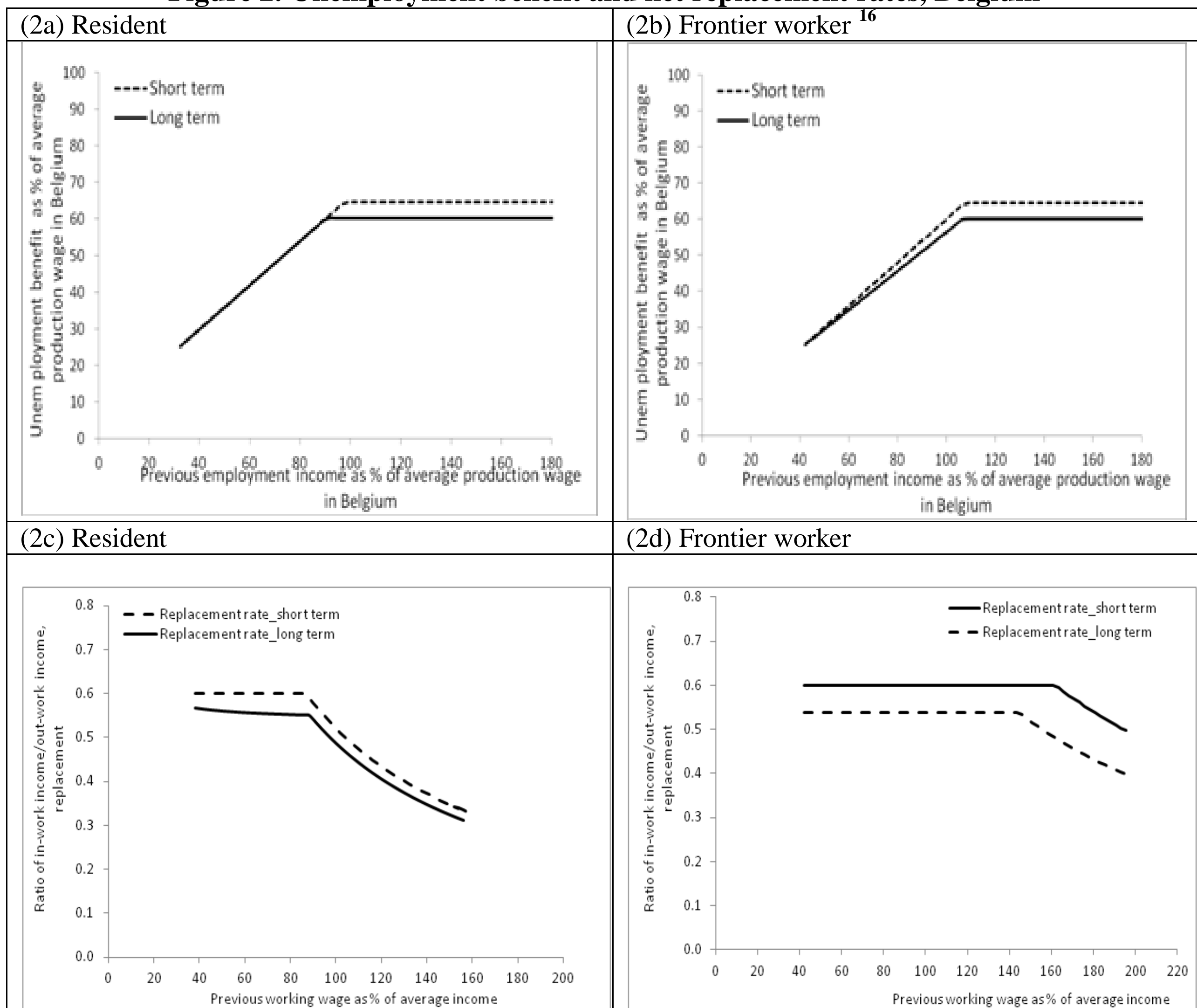
Figure 1. Unemployment benefit for Belgian frontier workers (theoretical scenario)



The use of replacement rates is a widely applied indicator to show the level of benefits in different countries – i.e., 'what percentage of earnings is replaced by the benefits' (Whitefold P., 1995). Replacement rates are generally considered as a consistent measure of relative levels of benefits comparable across countries. We show net replacement rates of earnings after taxation for different income groups. We calculate net rather than gross replacement rates as they offer a more precise income data at the disposal of commuters and non-commuters.

Applying the provisions of coordination Regulation 883/2004 (art. 65) however, unemployed frontier workers are entitled to unemployment benefits solely in the country of residence, as calculated based on the Belgian national legislation. In our case, former Belgian frontier workers are eligible to Belgian unemployment benefits. Hence, a Belgian frontier worker in Luxembourg contributes a 2,5% premium rate and benefits from 60% of the previous average earnings rather than 80% as his/her colleagues in Luxembourg. Luxembourgish frontier workers in Belgium on the other hand, contributes 0,87% of their income and are eligible to 80% of their previous earnings. Pennings F. (2010) argues that "this rule is quite problematic, since it deprives an unemployed person of benefits for which s/he has paid contributions". Our analysis proves the same. Figure 2 refers to two scenarios: previous work in Belgium (a), (c) and having worked in Luxembourg (b),(d).

Figure 2. Unemployment benefit and net replacement rates, Belgium

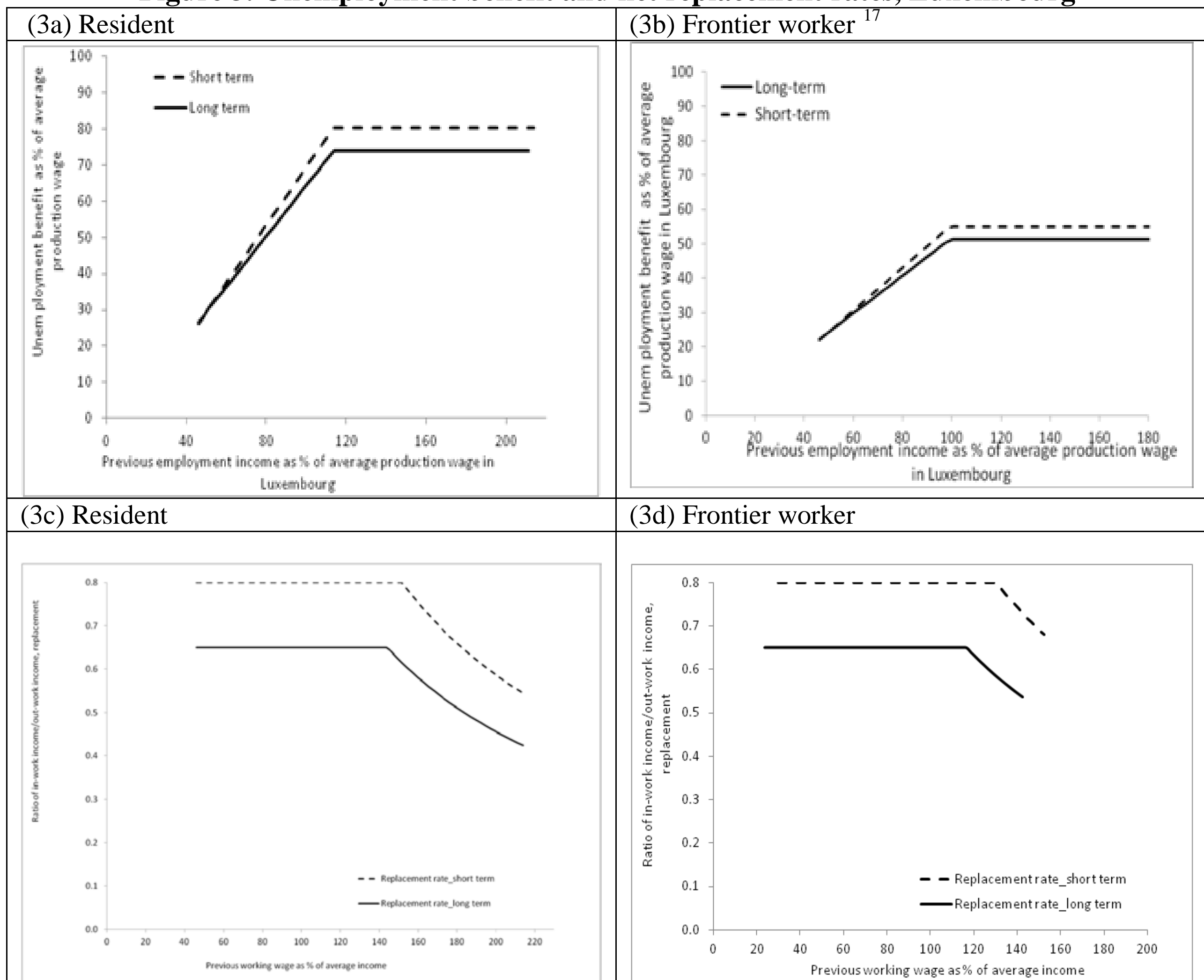


[16] A Belgian resident working in Luxembourg.

The Short-term line indicates the amount of benefit that an unemployed individual between 0-6 months would normally receive. The Long-term line indicates the amount received by job seekers for more than 6 months and up to one year. To avoid benefit dependency, the long term benefit is usually less and decreases with time – as shown in the graphs. Consequently, scenarios (c) and (d) indicate replacement rates for unemployment benefits among our comparison groups.

Fig. 1 has a higher unemployment benefit level than Fig. 2 (b). This indicates that a former Belgian frontier worker loses more income when the Regulation rules are applied. At the same time, the Regulation is provided to ensure that the best scenario is attained. When an unemployment authority is not financially responsible for the job seeker to find a job, it becomes more complicated to give benefits to particular individuals. For this reason, a former frontier worker is financed and based in the country of residence solely. Similarly, we observe a fall in income of Luxembourgish frontier workers (see Fig. 3b and 3c).

Figure 3. Unemployment benefit and net replacement rates, Luxembourg



[17] A Luxembourgish resident working in Belgium

The unemployment benefit level for Luxembourgish residents (Fig. 3, a) increases as the previous income increases. This reflects higher unemployment benefits as expected for those groups with higher previous earnings. For low income groups, replacement rates increase up to a certain point and then decrease as previous earnings increase. This is due to benefit-ceiling. The latter prevents receipt of higher benefits in cases where individuals earn high incomes in previous jobs.

Luxembourgish frontier workers naturally have lower benefit levels than the residents given their previous lower earnings in Belgium. Whereas the Luxembourgish legislation provides for an 80% (of previous earnings) initial benefit, Luxembourgish frontier workers are disadvantaged. This is unlike Belgian frontier workers who are not as disadvantaged - mainly due to their high previous earnings (Fig. 2, b). Moreover, they incur similar replacement rates as the Belgian residents for lower and higher income groups.

Generally, the results show that unemployment insurance affects both residents and frontier workers divergently. Regulation's provision on unemployment does not have a symmetric impact on the welfare of former frontier workers. In particular, the insurance component of comparable welfare states' objectives does not apply equally to both residents and frontier workers. This causes income discrepancies in case of unemployment.

5.1 Vertical Inequity and Labour Mobility.

This paper evaluates how welfare state objectives are achieved in a mobile setting. In section 5.1, we focused on the insurance component. Sections 5.2 and 5.3 focus on fair income redistribution through tax policies. We explore the effects of labour mobility on vertical inequity in the current section and horizontal inequity in section 5.3.

One of the core principles in vertical inequity is the increase in taxation as income increases. In other words, "unequals are treated equally" (Dworking, R., 1981). If the taxation is higher or lower than proportional to the raise in income of frontier workers we will assume a case of vertical inequity. The analysis refers to comparison between and among groups of resident and frontier workers. We examine whether frontier workers have higher disposable income than the residents. We use this to indicate whether or not mobility creates vertical inequity.

Table 2 consists of four indicators that vary depending on the family type. The first two indicators show the distance between the market and disposable income curves from the reference line (Belgian market income). The market income gap changes depending on the number of earners in the household. Disposable income on the other hand, varies depending on the family context and tax/deductions. The area between the reference line - market - disposable income is the 'Redistribution indicator' (division of disposable and market income). The negative sign stands for very small differences in income before & after taxes.

The 'Ratio indicator' suggests how much further or closer the income of compared groups is. When the coefficient is higher than 1, the residents have lower income than frontier workers and the vice versa. It clearly shows a pattern of income discrepancies between incomes of frontier workers and residents - within and across countries.

Table 2. Redistribution indicators

Family Types	Area_market income		Area_disposable income		Redistribution		Ratio
Single[18]	R	FW	R	FW	R	FW	**R/ FW**
L	0,354	0,354	0,048	-0,001	-0,306	-0,355	0,86
B	0,354	0,354	0,015	0,090	-0,339	-0,264	1,28
	Area_market income		**Area_disposable income**		**Redistribution**		**Ratio**
2 E	R	FW	R	FW	R	FW	**R/ FW**
L	0,352	0,352	0,043	-0,055	-0,308	-0,406	0,76
B	0,352	0,352	0,167	0,245	0,185	0,107	1,74
	Area_market income		**Area_disposable income**		**Redistribution**		**Ratio**
2 E 1 CH	R	FW	R	FW	R	FW	**R/ FW**
L	0,352	0,352	0,035	-0,057	-0,317	-0,409	0,78
B	0,352	0,352	0,095	0,176	-0,257	-0,176	1,46
	Area_market income		**Area_disposable income**		**Redistribution**		**Ratio**
1E0E1CH	R	FW	R	FW	R	FW	**R/ FW**
L	0,354	0,354	0,032	-0,002	-0,322	-0,356	0,62
B	0,354	0,354	0,173	0,098	-0,181	-0,256	1,27
	Area_market income		**Area_disposable income**		**Redistribution**		**Ratio**
1E0E0CH	R	FW	R	FW	R	FW	**R/ FW**
L	0,354	0,354	0,231	0,142	-0,123	-0,212	0,808
B	0,354	0,354	0,173	0,083	-0,181	-0,271	0,980
	Area_market income		**Area_disposable income**		**Redistribution**		**Ratio**
1E1E1CH	R	FW	R	FW	R	FW	**R/ FW**
L	0,352	0,352	0,119	0,184	-0,233	-0,168	0,84
B	0,352	0,352	0,018	0,033	-0,334	-0,319	1,15
	Area_market income		**Area_disposable income**		**Redistribution**		**Ratio**
1E1E0CH	R	FW	R	FW	R	FW	**R/ FW**
L	0,352	0,352	0,035	0,013	-0,317	-0,339	0,84
B	0,352	0,352	0,035	0,013	0,257	-0,166	1,20

Source: authors' calculations

Belgian coefficients are higher than Luxembourgish, indicating higher income of Belgian frontier workers in Luxembourg than Belgian residents. The coefficients for Luxembourg oppositely indicate that the Luxembourgish residents have higher income than Luxembourgish frontier workers in Belgium. Taxation instruments in Luxembourg can easily explain these discrepancies.

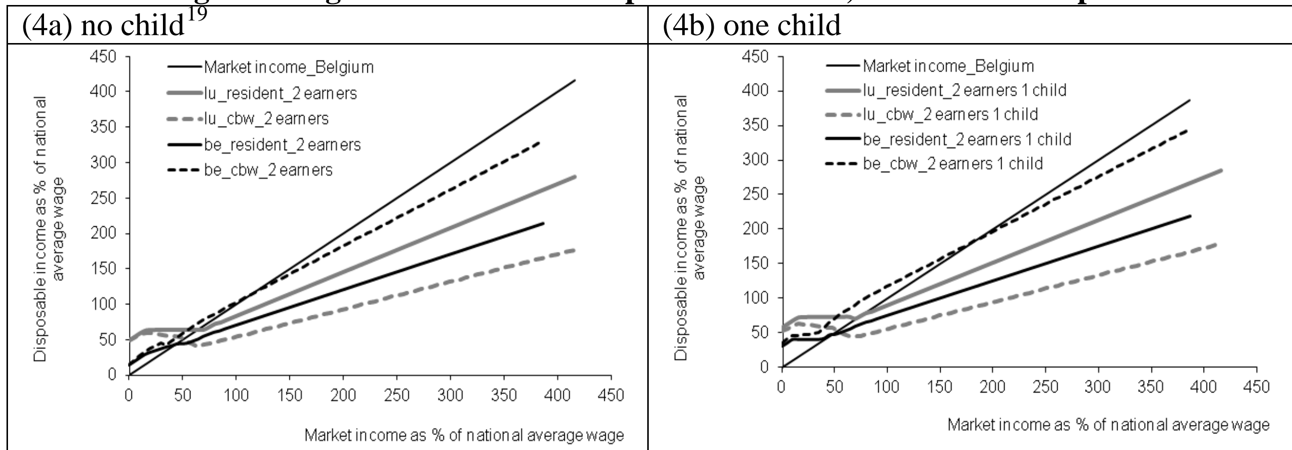
Luxembourg offers a variety of tax deductions among which mobility deduction plays an important role. A frontier worker in Luxembourg obtains a tax deduction of up to 3.000 E per year for their commuting expenses (2010). Moreover, a frontier worker is entitled to generous child benefits and child tax credit, which together consists of an almost double less amount than Belgian child benefits and credit.

[18] The acronyms for family types are: Single earner, 2E – 2 Earner couples, 2 E 1 CH – 2 Earners 1 Child, 1E0E1CH – 1st spouse is an earner, 2nd spouse is a social assistance receipient, not earning, 1 child. 1E0E0CH – 1 Earner couples without children. 1E1E1CH – Two earner mixed couple with 1 child, where 1 spouse work in a different country than that of residence, 1E1E0CH - Two earner mixed couple without a child, where 1 spouse work in a different country than that of residence.

Mobility creates vertical inequity among Belgian and Luxembourgish earners. Fig. 4(a) shows that the line closest to the market income is that of a Belgian frontier couple compared to the rest of the three groups. This indicates that Luxembourgish tax deductions on mobility and other taxation instruments boost frontier workers' income. At the same time, the least favoured by taxation instruments are Luxembourgish frontier workers in Belgium (last line at the bottom), showing the highest gap between market and disposable income. Moreover, if compared to Luxembourgish market income, the difference would increase.

Figure 4. Figure 4: Market vs. disposable incomes, Two earner couples

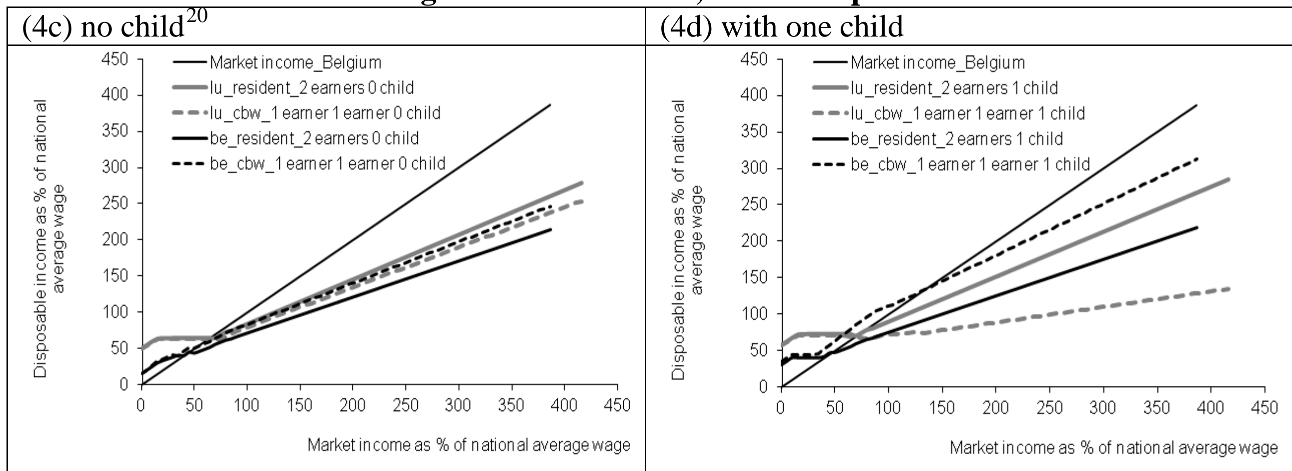
(4a) no child[19] | (4b) one child



A Belgian frontier couple with one child Fig. 4 (b) earns almost as much as the Belgian residents without being taxed. Single cross-border earners show similar pattern. Mobility deductions can create large differences in income and so does the child tax credit and benefit. Figs. 4(c) and 4(d) imply that child related tax instruments can play an important role in boosting income.

Figure 5. Two earners, mixed couples

(4c) no child[20] | (4d) with one child

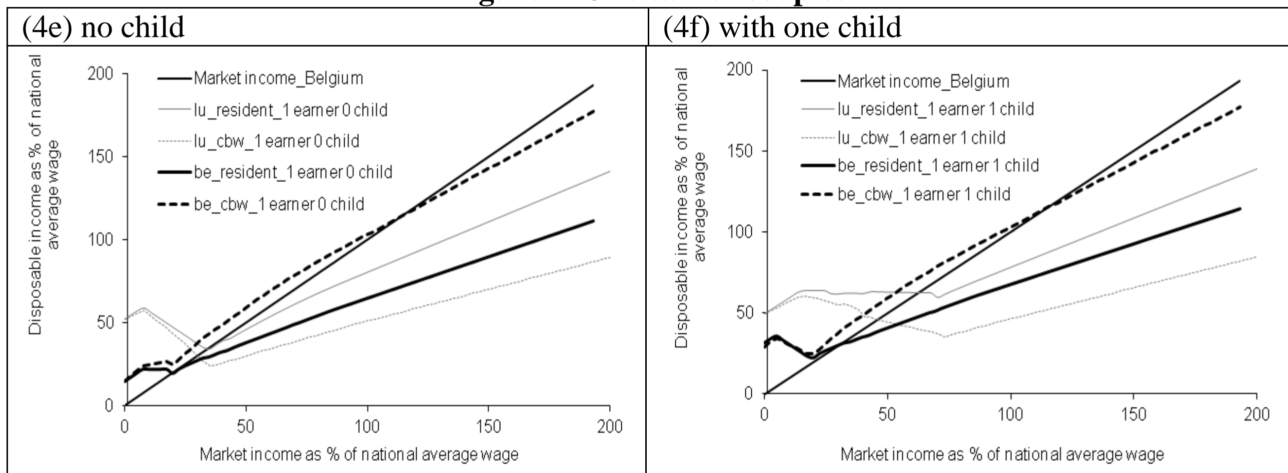


[19] The acronyms of income slopes are: Market income_Belgium – Belgian gross market income, lu_resident/be_resident – Luxembourgish/Belgian resident, lu_cbw– Luxembourgish resident working in Belgium, be_cbw – Belgian resident working in Luxembourg.

[20] The acronyms of income slopes are: Market income_Belgium – Belgian gross market income, lu_resident/be_resident – Luxembourgish/Belgian resident, lu_cbw– Luxembourgish resident working in Belgium, be_cbw – Belgian resident working in Luxembourg.

A mixed couple [21] means that spouses have access to social assistance for two earners with/without child in the country of residence, are eligible to two tax deductions and credits, and have the highest child benefits (Regulation 883/2004). Surprisingly, mixed childless couples are the least unequal - with lowest differences between their incomes (see Fig. 4c). This implies that, when a family operates in two systems at the same time, Belgian frontier workers earn less than what they would earn otherwise. Nonetheless, welfare for single earner couples decreases as they commute to neighboring countries (see Fig 4e).

Figure 6. One earner couples



The ‘winner’ according to the Redistribution Indicators and graphs on disposable incomes are the Belgian frontier workers versus the consequent cases: Luxembourgish residents, Belgian residents and Luxembourgish frontier workers.

When measuring inequality, one needs to take into account that individuals have different resources (equality of resources), skills and opportunities (equality of opportunity) that can increase or decrease the welfare gap between individuals. Work mobility for Belgian frontier workers offer, in this case, fiscal advantages that are not present in Belgium. These relate to: generous child benefits, mobility deductions and child tax credits.

5.2 Horizontal Inequity and Labour mobility.

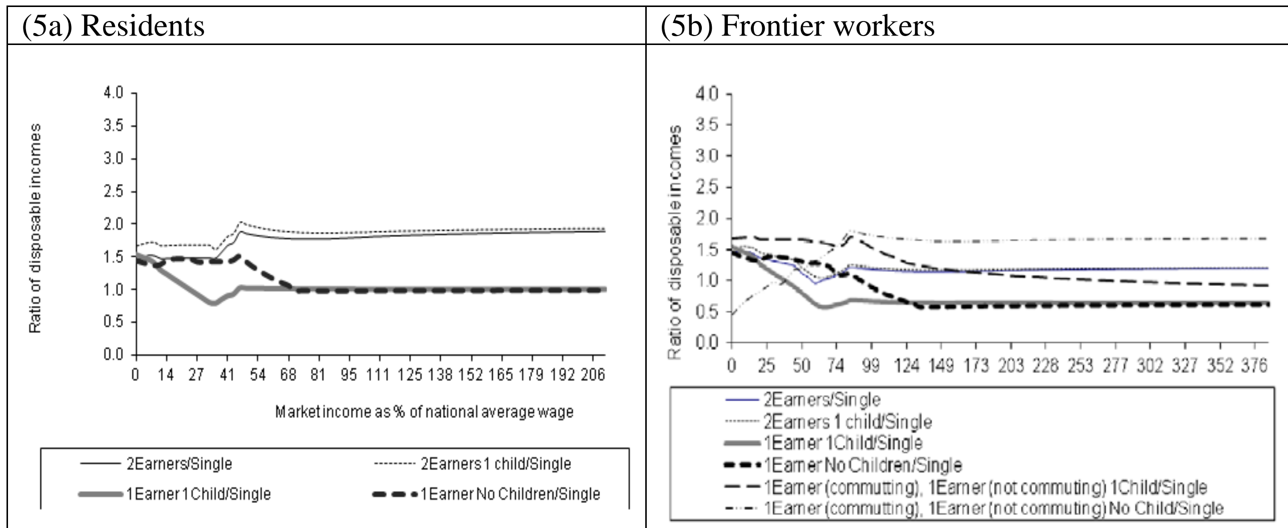
Section 7 seeks to examine horizontal equity – i.e., ‘equal treatment of equals’. A family with children should be as better off as a family without children. To determine the difference in income levels between families that commute to other countries and those who do not, the “equivalized disposable income” is deducted by computing the overall income of the households after taxes divided by the number of members in the household (Eurostat definition). The disposable income of various family types is divided into the disposable income of the reference group (a single earner in the country of residence).

The higher the coefficient on the y axis the higher the equivalence scales. If the ratio on the y axis is 1, the equivalence scale is 1. This means that the needs of a certain family type are achieved in a similar manner as the needs of a household of a single earner. If the coefficient is lower than 1

[21] Mixed couple is refers to couples in which spouses work in two different countries.

however, the particular household type is not well supported by the prevailing taxation system. Fig. 5 (a) presents the case where disposable incomes of one or two earners with/without children is divided by the disposable income of single earners in Luxembourg. This estimates how different their income is from 1.

Figure 7. Equivalence scales, Luxembourg



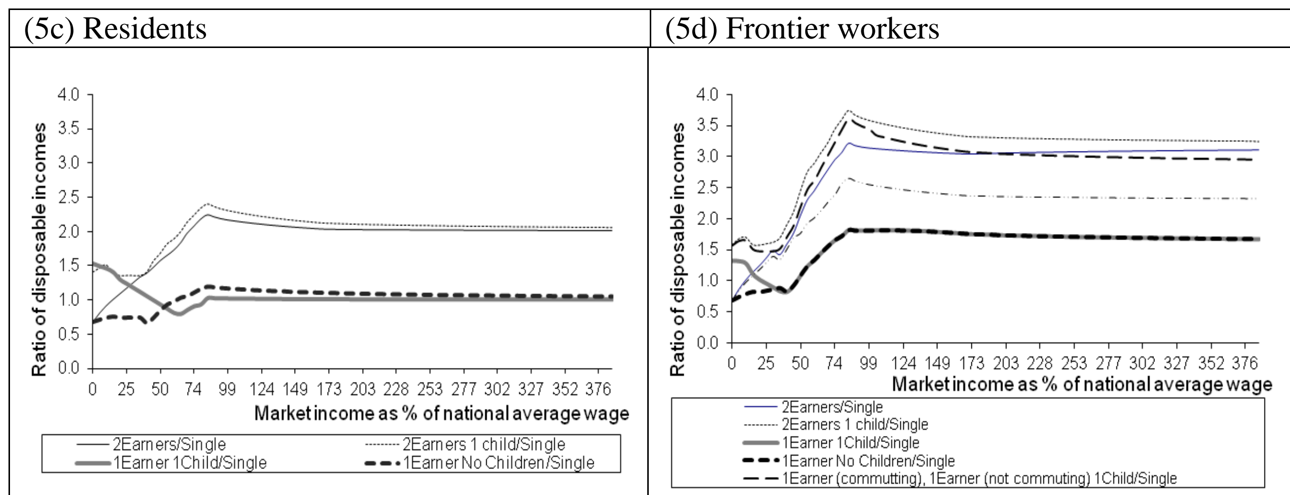
A couple of one earner with/without a child is as better off as a single earner with no family working and residing in Luxembourg. On the contrary, similar family-types that commute to Belgium for work earn much less (see Fig. 5b).

Two earner couples should have an equivalence scale of two, compared to one in case of a single earner. As we can observe, this is the case of two earner couples with/without children working and residing in Luxembourg, see Fig. 5(a). They seem to be equally better off. However they have an equivalence scale of less than 1.5 when commuting to Belgium for work (see Fig. 5b). Similarly, mixed couples without children are worse off than frontier workers and resident couples without children, see Fig. 5 (b).

Figure 5 (a) and 5 (c) illustrates that the Belgian resident families working in Belgium seem to be slightly better off than Luxembourgish-two earner couples without/with children. Full-time earners show an equivalence scale of 2,2/2,4 versus 1,8/2,0 in Luxembourg. One of the explanations might refer to the individual Belgian tax system versus joint taxation in Luxembourg. Studies on joint versus individual taxation (Immervoll et al., 2009, Piggott and Whaley, 1994) illustrate that joint taxation, especially at the bottom of the distribution, display negative impact and tax burden on married couples.

Low earner-couples without children in Belgium have an equivalence scale of 0,7 rising till 2,2. This is due to low social assistance benefits for childless couples. Similarly, the Luxembourgish low income couples have a low equivalence scale rising from 1,4 to 1,8. "Marriage penalties" result reveals that penalties depend primarily on the incomes of the lowest-earning spouses (OECD Report, p.29, p.67).

Figure 8. Equivalence scales, Belgium



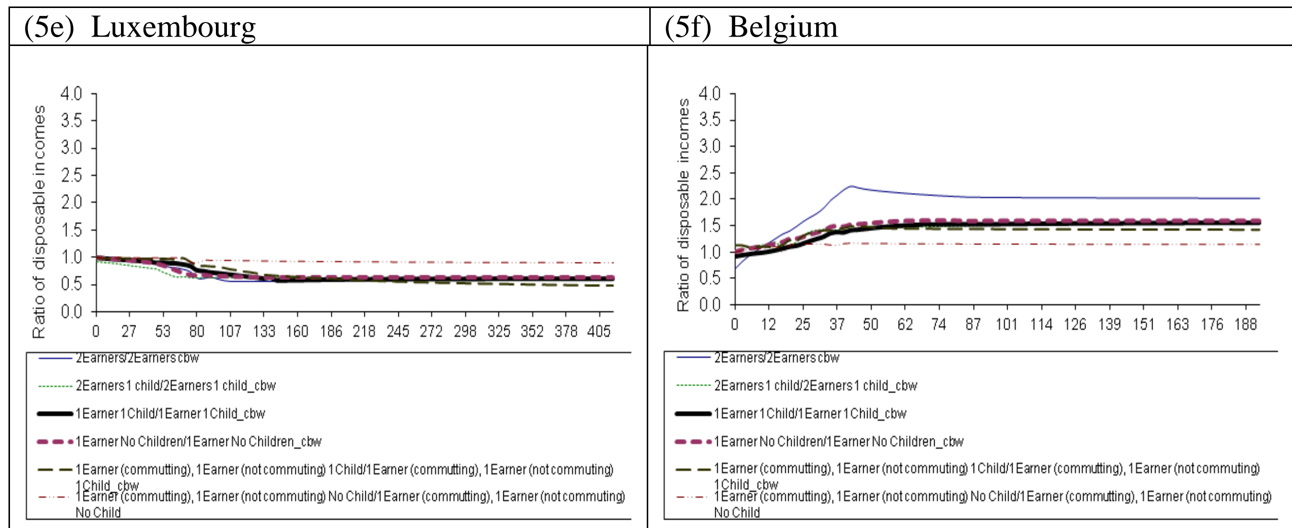
In both countries, full-time single earner residents with children have an exact equivalence scale of 1 - meaning that these households do not differ in income with single couple earners with children. Luxembourgish and Belgian child tax credit and social assistance for couples with children seem to favour single earner-couples with children. Low income one earner couples with children are more favoured in Luxembourg than in Belgium - due to the generous social assistance scheme.

Owing to the generous social assistance scheme moreover, low income one earner childless couples are more advantaged in Luxembourg than in Belgium. The kink in slope for low income earners in the Figure 5(c) to the left is due to marital quotient tax deduction, which increases as spouse's income increase. Full time one earner childless couples are slightly better off in Belgium than in Luxembourg.

If formerly, couples with two earners with/without children had the highest equivalence scale, in the case of cross-border earners, the peak was reached by *mixed couples* (one spouse commutes to another country, while another works in the residence country) without children, in the case of Luxembourg and mixed couples with children, in the case of Belgium. Although, the difference is quite substantial for Belgian frontier workers (coefficient of 3,9) and Luxembourgish commuters (of 1,7), it becomes obvious that being part of two systems at the same time, can bring significant advantages (as is the case of Belgians).

The second highest equivalence scale in both countries is for mixed couples with children. Compared to ordinary Luxembourgish resident couples with one child, the Luxembourgish cross-border commuters in Belgium have a much lower equivalence scale. Figure 6(d), clearly shows very high equivalence scale for various types of families, illustrating a clear advantage compared to the Belgian residents. Last but not least, we aim to display the variation of frontier workers' disposable income for different types of families compared to the residents (division of Luxembourgish resident disposable income to Luxembourgish frontier worker's income). See Figs. 5(e) and (f).

Figure 9. Equivalence scales, frontier workers versus residents



Figures 5(e) and (f) illustrate the fact that the Luxembourgish frontier workers in Belgium are more disadvantaged working in Belgium. This applies to all types of families, especially to the mixed childless couples. For Belgian families, the equivalence scales are higher than one for all types of families - except for those income groups that receive social assistance. It can be concluded that the equivalence scales present high discrepancy in incomes for Belgian frontier workers versus Belgian residents.

6 Conclusions.

Labour mobility in the European Union is dependent of the Social Security Coordination provisions and fiscal agreements between the country of residence and the country of employment. These two national and supra-national policy instruments regulate and determine the welfare of mobile earners across Europe. The current legal framework of coordination leaves unaffected the procedural differences between the national social security systems - "it does not intend to set up, not even gradually, a unified European social security system" (DG Employment, Social Affairs and Equal Opportunities, 2009). At the same time, the wide variation of fiscal rules and social benefits procedures present administrative challenges and reduced level of contentment of people moving for work within the EU. This is due to discrepancies in social and fiscal systems. [22]

Our analysis attempted to quantify the impact of mobility on individual's welfare, by analyzing the objectives that the welfare states try to achieve through their national policies. We analyze how changes in life-cycle (such as unemployment, family extension or poverty) can affect the welfare of "mobile" families. Under the functionality of two welfare states at the same time, we examine how the Belgian and Luxembourgish frontier workers are ensured against unemployment and poverty and moreover, how these compare to the earners who work locally in

Luxembourg and Belgium. Ebert and Lambert (2004) argue that, future research should seek to extend the analysis to combined tax and benefit systems. We propose a more integrated approach of impact evaluation on welfare by examining the impact of tax-benefit systems in two countries with relatively similar welfare state characteristics. The analysis focused on three welfare state objectives: unemployment insurance, vertical inequity and horizontal inequity.

Coping with two welfare states' systems that follow similar objectives (e.g. to ensure its residents against sudden fall in income) produces different impacts on welfare for its citizens. The Regulation 883/2004 provisions (art. 65) on unemployment were applied on national unemployment benefits rules in Belgium and Luxembourg.

On one hand, we find that differences between unemployment entitlements and benefit amounts, along with costs of living can negatively affect the income of Luxembourgish frontier workers. They pay low Belgian insurance contributions, and due to lower previous earnings in Luxembourg suffer of income loss compared to their Luxembourgish neighbors who worked in Luxembourg. On the other hand, Belgian frontier workers are not treated fairly compared to their Luxembourgish colleagues, since they pay high unemployment contributions, but have to comply with Belgian legislation when it comes to unemployment benefits. At the same time, high social insurance payment in Luxembourg and low Belgian unemployment benefits can still cover for the unexpected loss of income of Belgian frontier workers at a higher level than Belgian non frontier residents.

The general assumption on coordination of unemployment benefit is that former frontier workers pay insurance contributions in the country of work but receive benefits in their home country - because they are most likely to find a job in their residence country (similar language, education). Nonetheless, as Pennings F. (2010) argues that still this does not explain why frontier workers can not receive unemployment benefits in the country where they have previously paid social insurance contributions. Figure 1, proves significant income gain for Belgian frontier workers in Luxembourg. Contrary, such a rule would affect negatively former Luxembourgish frontier workers. In both cases, in the light of our next question on inequity between residents and frontier workers, such scenarios would increase inequity in society.

Furthermore, we have examined the impact of difference in taxation. Since frontier workers and non frontier workers are two active wage earners groups who are not different in terms of their skills, except for one opportunity (moving across borders/within borders). We assume that both groups are and should be treated equally. However, this is not the case. Large discrepancies in incomes of Belgian frontier workers and non-frontier workers are identified. The Belgian cross-border workers are the most favoured group throughout the analysis, compared to Belgian residents (and sometimes to Luxembourgish residents). If hypothetically considering solely Belgian-Luxembourgish cross-border movement, it would conclude in high vertical and horizontal inequity in Belgian society and to a less extent in Luxembourgish.

The normative question arises, whether frontier workers need to be equally treated to the residents who do not commute daily to another country, or they need to be compared to their earner peers in the country of employment. From the start, frontier workers have a different income than non-frontier, considering that they move to another country for higher earnings (as in migration theories). At the same time, based on territoriality principle and Regulations

provisions, they are entitled to consume unemployment and social assistance benefits in the home country to which they hypothetically have already accumulated higher incomes from the country of employment. Hence, generally, frontier workers would be better off than non frontier workers in their home country.

May be instead of comparing frontier workers with the residents of their home country, we need to question whether frontier workers are equally treated with the earners from the country of employment. Assuming frontier workers earn equally as the residents in employment country, we then face the issue of cheaper living costs and lower average wages in the country of residence. This would make frontier workers better off than the residents of employment country. In both cases, frontier workers seem to be in a better situation than the compared above groups.

Lastly, if we rely on the ‘equals treated equally’ principle and apply the “mobility criteria” as a selection variable rather than comparing frontier workers with residents in home or employment country, we should compare frontier workers with frontier workers. It is then when we can observe the sporadic effect of coordination policy on frontier workers. As our results illustrate, frontier workers are affected differently despite similar welfare objectives and characteristics.

This leads us to the next question, considering continuously increasing labour mobility in the European Union and high gains or losses of individuals’ welfare. Is mobility considered as one of the prerequisites in designing welfare states policies and achieving its objectives? The estimation of mobility impact on welfare involves a wide array of rules and is highly complex. This is due to a large amount of interactions of all sorts (national-supranational rules, taxation-social security coordination, wide array of individual life situations, e.g. mixed couples, one earner frontier workers, etc). It goes beyond the objective of a single welfare state. Further research is needed to address this gap of complexities.

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