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Revenue equalization and stabilization in the Belgian federation.

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Revenue redistribution and stabilization in the Belgian federation[1]

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Abstract

This article presents an analysis of equalization of both regional household income and regional government income in Belgium. We look at the extent to which long-term fiscal disparities across regions are reduced (redistribution) and at the amount of smoothing provided against asymmetric macroeconomic shocks (stabilization). We discover that equalization of *household income* between regions through the tax and transfer system in Belgium represents a form of both redistribution and to a lesser extent stabilization. Social security transfers are the most important factor, in contrast to income and property taxes whose contribution to redistribution and stabilization is limited. The analysis w.r.t. equalization of *regional government income* shows that the funding system of regional authorities is clearly based on equity considerations, rather than on concern for interregional stabilization. The overcompensation of long-term interregional differences in regional government income reflects the lack of accountability in the current funding system.

JEL Classification: E63 and H77
Keywords: equalization, redistribution, stabilization, fiscal federalism

1 INTRODUCTION

Throughout the public finance literature, *redistribution of income* is seen as a basic function of government. The rationale for income redistribution is mainly the fact that a society's objectives for an equitable income are unlikely to be achieved in a system where markets are left free. The income earned from productive activity (wages, interest, rent and profits), or a person's *primary* income, is therefore modified by taxes and social security payments, resulting in a person's *secondary* or *disposable* income, which is more evenly distributed among the population.

In countries with multiple levels of governments, besides redistribution of household income from rich to poor, another form of redistributive activity is carried out, which is the transfer of fiscal resources across subnational governments. The reason is that most countries want to guarantee equal access to public services for

all households in all regions, at the same cost. This *horizontal equity-principle* can be threatened if the tax raising capacity, or the public service cost, differs across regions. A transfer system of financial resources from relatively rich to relatively poor regional governments is then put in place. Since funds of governments mostly come from (federal) taxes, equalization [3] of government income is also called "fiscal equalization". Fiscal equalization can also be seen as a way to provide a level playing field for competition among jurisdictions. Another way of looking at fiscal equalization of regional government income is seeing it as part of the transfer mechanism between secondary and tertiary income distribution through the allocation of local public goods and services. Tertiary income is then defined as disposable or secondary income, increased with imputed benefits from the subsidized part of locally provided public goods and services.[4]

However, the rationale for fiscal equalization between governments may not be as clear as the rationale for redistribution between rich and poor individuals, as Oates (2007) points out. After all, fiscal equalization between regions can involve some perverse redistribution at the individual level, since wealthy agents in poor jurisdictions will be on the receiving end of transfers that may come from poor individuals in the relatively rich jurisdiction. Oates looks at fiscal equalization as a transfer *on average* from rich to poor.

Fiscal equalization is closely related to fiscal decentralization, since a crucial condition for disadvantaged regions to agree with decentralisation will be the installation of an explicit solidarity system that replaces the implied solidarity in former national systems. Mostly, the redistribution or solidarity system is laid down in the constitution as part of the financing system of the federated entities. In Belgium, fiscal equalization was also a condition for federalization, and it was laid down in the Special Financing Act in 1989, as part of the financing system of regional governments.

In Figure 1 and Figure 2 we present some stylized facts, looking for the case for fiscal equalization in Belgium. Figure 1 illustrates the differing tax returns across Belgian regions for the personal income tax (PIT), which is the most important tax in terms of fiscal returns. Insofar these tax returns can be used as a proxy for fiscal capacity[5], the rationale for fiscal equalization becomes clear, since the gap between above-average per capita PIT collections in Flanders and below-average per capita returns in the Walloon Region is large and shows an increasing trend over time. The plummeting PIT returns of Brussels Capital Region can be explained by socio-economic factors and the growing unemployment rate of its population. Figure 2 shows the differences in regional government per capita expenditures. The gap between above-average spending in the Walloon Region and below-average spending in Flanders is large but shows a decreasing trend over time. Brussels above-average spending follows an unstable evolution. To the extent that these regional discrepancies reflect differences in "needs", there is a good reason for fiscal equalization among regional governments. Differences in needs can be explained by differing costs of providing public goods in different regions (e.g. because of area size, concentration of population), or by differences in demographic characteristics, in unemployment rates or in welfare of the inhabitants, However, also fiscal equalization itself can be an

Figure 1: Disparities in regional per capita PIT contributions relative to the national average

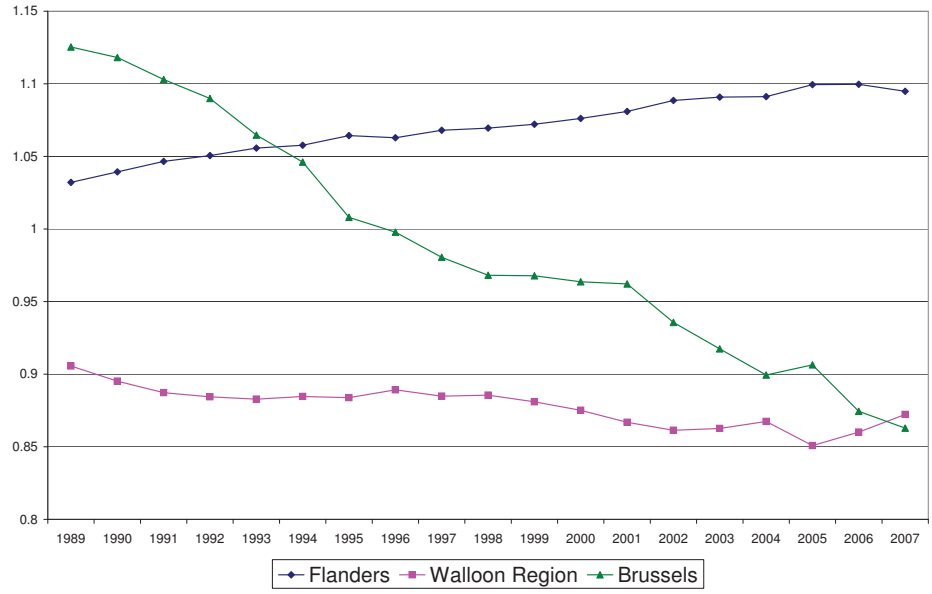
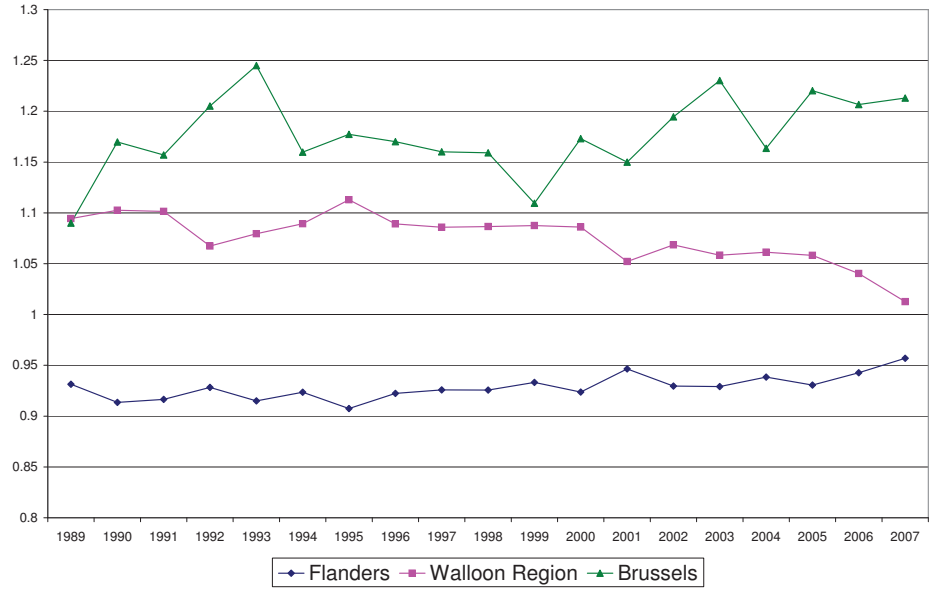


Figure 2: Disparities in per capita expenditures of regional governments relative to the national average



important driver of extra expenses, if moral hazard, soft budget constraints and/or common pool problems are present[6].

In this article, two analyses will be performed on Belgian data. First, we take a look at interregional redistribution of *household income* through taxes, social security and other transfers to individuals. Secondly, we will concentrate on the implicit

and explicit redistribution of *regional government income* through the financing system of regional governments.

Next to providing horizontal equity among the residents and governments of different jurisdictions, a second objective of equalization may be *stabilization and insurance* of income against asymmetric macroeconomic shocks. Risk-sharing emanating from region-specific shocks can come from free trade and mobility of capital and labour, from cross-ownership of productive assets in a developed capital market, from flexible exchange rates, or from lending and borrowing on national credit markets. The unavailability or (partially) failing of these market mechanisms provides rationale for income smoothing by means of a central transfer system. For example, regional governments face higher borrowing costs on the credit market than federal governments do in terms of risk and liquidity premiums. Exchange rates were never an instrument of smoothing at the regional level.
A second reason why mutual insurance of regional government income can be preferred to self-insurance by borrowing and lending on the credit market is that, if rational consumers anticipate future tax liabilities, and reduce their consumption accordingly, self-insurance against an adverse shock by borrowing on the credit market can not be effective. The demand effects of debt-financed transfers will be neutralized or overcompensated by the savings of consumers, which can exacerbate a recession (von Hagen, 2007). So in other words, if we live in a Ricardian world, stabilization by interregional transfers is preferred to intertemporal transfers via the credit market.
Thirdly, stabilization can lead to the provision of more public goods. Although a negative aspect of horizontal transfers among regional governments is that they lead to moral hazard problems and adverse incentives for regional tax collections and regional tax base development, Von Hagen and Hepp (2000) show in a theoretical model that the incentive effect of interregional transfers also consists of a second element: when more insurance against asymmetric macroeconomic shocks is offered, allowing for a steadier supply of public goods over time, a government is induced to provide more public goods and hence exerts a higher tax effort.

If asymmetric shocks are permanent instead of transitory, smoothing of regional government income will take the form of permanent redistribution between states, and this is mostly not desirable from a political economy point of view. Permanent asymmetric shocks ask for regional adaptations of taxes and expenses, or for a restructuring of the labour market.

Table 1: Correlation coefficient between shocks (first differences) to deflated primary income per capita of households in different regions

Correlation coefficient between	
Flanders and Walloon Region	0.91
Flanders and Brussels	0.87
Walloon Region and Brussels	0.93

Table 2: Correlation coefficient between shocks (first differences) to deflated primary income per capita of governments in different regions

Correlation coefficient between	
Flanders and Walloon Region	0.97
Flanders and Brussels	0.87
Walloon Region and Brussels	0.90

In this article we investigate to what extent regional households and governments are insured against asymmetric shocks in Belgium. For the federal budget to be able to generate any amount of income smoothing, regional incomes must not be perfectly correlated, since aggregate risk cannot be insured by interregional transfers. The case for income smoothing is illustrated in Table 1 and Table 2, where the correlation coefficients of yearly differences in deflated primary per capita income between regions are given for respectively household and regional government income. Correlation coefficients, which reflect the ratio of the covariance between two series of regional income over time and the product of the standard deviations of these respective series[7], are lower than unity, indicating that short term shocks (yearly differences) in the evolution of regional income are not perfectly correlated. Hence, stabilizing transfers through the federal government, which enjoys a more diversified income base, become possible. Since we did not correct for factors as changes in the tax system over time, which affect primary income of regional governments, the correlation of regional shocks to primary income will be lower in reality. Since we did not correct for factors as tax changes over the time series, which affect primary income of regional governments, the correlation of regional shocks to primary income will be lower in reality.

The contribution of this article is twofold.

First, we make an empirical investigation of the federal tax and transfer system regarding redistribution and stabilization of regional household income per capita in the Belgian federation. We also decompose the overall effect of the fiscal system to capture the respective roles of taxes and the social security system. We compare the results to estimates for three European federal countries, namely Germany, Spain and Austria.

Second, the same analysis was applied to the income of regional authorities to gain a better insight in the Belgian financing system of regional governments, as described in the Special Financing Act. We look at the separate effect of the different channels of funding (PIT transfers, solidarity grant, VAT transfers, ...).

This article is structured as follows: section II presents the state-of-the-art in literature w.r.t. the measurement of interregional redistribution and insurance, section III presents the model and estimation methods, and the results of the empirical analysis are shown in sections IV and V. Section VI concludes.

2 LITERATURE OVERVIEW

Many researchers have estimated the extent to which interregional redistribution and insurance is present in countries.[8] Most of the empirical work has concentrated on the US and Canada, and only little evidence was provided for other federal countries. The Belgian case has not received much attention in the literature. Estimation methods, accounting principles and consequently estimates differ a lot across studies.

The first study for the US was performed by *Sala-i-Martin and Sachs (1991)*. They examined the effect of movements in regional personal income on respectively taxes and transfers. Variables were defined as ratios of the corresponding national per capita aggregates. Following their analysis, the US federal fiscal system provides substantial insurance against asymmetric regional shocks, with a combined effect of taxes and transfers of about 40 percent. This means that a one dollar reduction in a region's per capita personal income, results in a disposable income per capita reduction of only 60 cents, since 40 cents of the adverse income evolution is absorbed by reduced federal taxes and increased federal transfers. The estimates are based on three-stage-least-squares regressions.

Von Hagen (1992) first noted that the estimations of Sala-i-Martin and Sachs are problematic, since they do not distinguish between permanent and transitory reduction of income disparities. Von Hagen's regression on first differences provides a measure of short-term insurance against asymmetric shocks. His estimate of short-term stabilization amounts to 10 percent, which is considerably lower than the estimate of Sala-i-Martin and Sachs. Remark that in this analysis, state gross product was used as the explanatory variable, as opposed to Sala-i-Martin and Sachs, who use personal income.

Bayoumi and Masson (1995) combine the effect of federal taxes and transfers in one regression, by taking disposable income as the dependent variable. By successively adding the effect of taxes and transfers to the dependent variable, they are able to estimate the incremental effect of both elements in the federal fiscal system in Canada and the US. Variables are defined in per capita terms relative to the national average and the estimation method for stabilization is three stage least squares. The stabilization estimate for the US amounts to 30 percent, when a broad definition of net transfers is used[9] and amounts to 23 percent for narrower defined transfers. This means that, for each dollar that relative primary incomes change, disposable incomes vary by only 70, respectively 77 cents. The estimate for long-term redistribution by a regression on long-term averages is 22 percent (broad definition of transfers) or 18 percent (narrow definition of transfers). The US government thus redistributes 22, respectively 18, cents of every dollar relative difference between richer and poorer states.

Asdrubali, Sorensen and Yosha (1996) provide estimates of overall market-based insurance between regions of the US federation. By decomposing the cross-sectional variance in gross state product, they are able to capture the effect of the different levels of smoothing. For the US, they find that 39 percent of shocks to gross state product are smoothed by capital markets, 13 percent by the federal government tax and transfer system, and 23 percent by credit markets. The authors use generalized

least squares (GLS) regressions to correct for state-specific variances.

Fatas (1998) draws our attention to the fact that estimates of stabilization in earlier work overestimate the real insurance provided by the fiscal system. The reason is that, in measuring the effect of income fluctuations to disposable income, we ignore the effects of taxes and transfers on the overall budget balance. A fall in tax revenues in one state, generates an overall country deficit if this fall is not offset by a rise in tax revenues in another state. The deficit will have to be paid through future taxes by all states, including the depressed state. So, the amount of insurance the depressed state receives is less than what the change in this period's state disposable income indicates. Fatas also postulates that separating the effects of redistribution and stabilization is just an approximation. If an output shock is persistent, it reduces relative income forever. Are transfers insurance or redistribution in that case? Therefore, in theory, one should exclude permanent shocks from the analysis.

Mélitz and Zumer (2002) try to explain the considerable differences in estimates of earlier work and re-examine results of former studies in a general framework. They also provide new estimates for the US, Canada, France and the UK. They introduce consistent accounting, and argue that the choice between personal income and gross product accounting explains a large part of the dissimilarities in estimates. When asking about stabilization of personal income, the corresponding transfers to consider are those to persons. When focusing on the stabilization of gross product in a region, the right transfers should include those to lower-level governments and firms as well, since these affect local production. Mlitz and Zumer (2002) add panel data econometrics to the analysis and conclude that for long time series, their estimates do not differ from three-stage-least-squares estimates. For the shorter time series for France and the UK, panel data econometrics prove to be beneficial, since the lower efficiency of the 3SLS procedure delivers implausible results. The authors find that international differences in redistribution are substantially larger than those for stabilization of personal income. Redistribution varies from 38% in France, over 26% in the UK, to 16% in the US and Canada, indicating that a one dollar difference in average regional per capita personal income over the considered time period is reduced by respectively 38, 26 and 16 cents. Stabilization fluctuates around 20% for most countries, meaning that a one dollar shock to regional personal per capita income is reflected in a shock in disposable per capita income of only 80 cents. Redistribution turns out to be higher in the two non-federal European countries.

Von Hagen and Hepp (2000) first develop a theoretical model to examine the optimal amount of equalization in a country. The derived optimal transfer rate can be decomposed in a purely redistributive part and an insurance component. The composition of the redistributive term indicates that low income regions prefer more redistribution, while high income regions may prefer no redistribution at all. The insurance term shows that the desired degree of equalization depends positively on the variance of regional per capita income relative to that of the aggregate, and negatively on the correlation between region-specific and nation-wide income, since the latter decreases a region's insurability. So different regional characteristics ask for different stabilization arrangements, and regions must agree on a compromise[10]. In the empirical part of their work, the authors use the transfers of the German

Finanzausgleich(FA) in the different stages of equalization as dependent variable and explore (1) the extent to which it serves as a buffer against regional GDP shocks and against shocks to local government tax collections, and (2) the redistributional properties w.r.t. regional income and tax contributions. They find that insurance and redistribution transfers are better characterized to offset differences and shocks to regional tax revenue than to regional gross product. The overall amount of insurance of the FA w.r.t. state GDP is only 3%, but w.r.t. state tax revenue it amounts to 56%. The supplementary vertical grants in the FA have a destabilizing effect. Marginal redistribution w.r.t. state GDP is found to be 8%, while it amounts to 111% w.r.t. tax revenues. The latter indicates that states may be better off in times of temporary tax revenue losses. Also permanent redistribution, which is captured by the state fixed effects, proves to be essential.

Baretti, Huber and Lichtblau (2002) try to capture the marginal redistribution between the German *Länder* by calculating marginal tax rates. They use a simulation model of Germany's fiscal equalization. The marginal tax rate (MTR) is defined as the fraction of one additional unit of income tax collection in a state which flows out of the region. In rich states, the MTR reflects the increase of contributions to the interstate equalization system if their tax collections go up. In poor states, the marginal tax rate reveals the reduction in received transfers through the fiscal equalization system. MTRs tend to be lower for rich states, which provides evidence of a development trap in Germany. MTRs vary from 70% to 91% across states.

Persyn and Algoed (2009) use the general specification of Bayoumi and Masson (1995) for deriving a rate of redistribution between the Belgian provinces. Estimating the effect of a change in a province's primary per capita income relative to the national average on disposable per capita income relative to the national average by OLS, they find that from a one euro income differencial across provinces, 36 cents is removed through interregional transfers in 1995. The four-year moving average of this measure is used as input for studying the effects of income equalization on regional growth and interregional convergence. This rate of redistribution however only looks at interregional transfers, without making a distinction between permanent and transitory reduction of income disparities, capturing both redistribution and stabilization in one parameter. Persyn and Algoed (2009) find that more redistribution leads to subsequent lower growth and slower interregional convergence.

3 FRAMEWORK

The regression equations for the measurement of stabilization and redistribution are derived from the framework proposed in Mélitz and Zumer (2002). Equation 1 measures the relation between primary income and disposable income, or between income before and after interregional flows are taken into account. Two kinds of influences on regional disposable income can be distinguished: the average primary income over the entire period, and temporary deviations from the average.

$$DI_t^i = \alpha + (1 - \beta_r)\overline{PI^i} + (1 - \beta_s)(PI_t^i - \overline{PI^i}) + \varepsilon_t^i \qquad (1)$$

with DI_t^i disposable income in region i at time t
PI_t^i primary income in region i at time t

To derive separate measures of redistribution and stabilization, formula 1 is decomposed, yielding two equations

$$\overline{DI^i} = \alpha + (1-\beta_r)\overline{PI^i} + \varepsilon^i \quad (2)$$

$$DI_t^i - \overline{DI^i} = (1-\beta_s)(PI_t^i - \overline{PI^i}) + \varepsilon_t^i \quad (3)$$

Rearranging equation 3 and taking first differences yields[11]

$$\Delta DI_t^i = \alpha^i + (1-\beta_s)\Delta PI_t^i + \varepsilon_t^i \quad (4)$$

Equation 2 provides a measure of long term redistribution through the central budget, or a measure of average risk-sharing over the entire period. In this equation only the cross-sectional or *between* variation in the panel data is used, making abstraction from short-term cyclical factors. Obviously, if a change in a person's average primary income $\overline{PI^i}$ is fully reflected in its disposable income $\overline{DI^i}$, no redistribution takes place, and $\beta_r = 0$. If on the other hand a person's average disposable income is not affected by earning more or less primary income, full redistribution takes place, causing the coefficient $(1-\beta_r)$ to be zero, and $\beta_r = 1$. Assuming β_r is equal to all regions, it measures interregional redistribution within a particular country, or the extent to which the income of both rich and poor countries is brought closer to the national average. β_r reflects the share of the primary income differential between regions which is removed through interregional redistribution.

The regression on first differences in equation 4 provides a measure of stabilization via the center, captured by the parameter β_s. Equation 4 makes use of the time series movements or *within* variation in the panel data regression to evaluate the impact of the central tax and transfer system in response to shocks to primary income. If a shock to primary income ΔPI_t^i is fully transposed into a disposable income shock ΔDI_t^i, no stabilization takes place, which makes $\beta_s = 0$. If on the other hand a shock to primary income is fully offset by the central transfer system (full risk sharing is provided), this shock is not felt in disposable income, and $\beta_s = 1$. Setting β_s coefficients equal in all regions, a measure of short term stabilization of income in a particular country is provided.

When running the regressions, we use per capita values to correct for the different size of the regions. We divide the variables by their national average[12] a correction for differences in scale[13] is made, trend growth in the time series is eliminated, and the effect of country-wide symmetric shocks is excluded in the stabilization regression.
Following the methodology of Bayoumi and Masson (1995), we run intermediate regressions to estimate the incremental contribution of different elements in the tax and transfer system (analysis w.r.t. household income) or in fiscal equalization through the regional financing system (analysis w.r.t. regional government income). In practice, we run regressions 5 and 6 to measure respectively redistribution and stabilization. Variables with superscript i denote regional per capita figures, while

the index N stands for national per capita means.

$$\overline{\left(\frac{PI^i - X^i + Y^i}{PI^N - X^N + Y^N}\right)} = \alpha + (1-\beta_r)\overline{\left(\frac{PI^i}{PI^N}\right)} + \varepsilon^i \quad (5)$$

$$\Delta\left(\frac{PI^i - X^i + Y^i}{PI^N - X^N + Y^N}\right)_t = \alpha^i + (1-\beta_s)\Delta\left(\frac{PI^i}{PI^N}\right)_t + \varepsilon_t^i \quad (6)$$

Equation 5 measures redistribution through the coefficient $1-\beta_r$, which should be interpreted as the amount of one unit of the initial difference in relative primary income that remains after fiscal transfers have been taken into account. β_r reflects the size of the offset to primary income differences caused by the transfer flows. The elements X and Y in equation 5, which represent intermediate fiscal flows (f.e. personal income tax, social security transfers, ...) are added successively and each time a new regression is performed. The difference between the resulting β_rs indicates the incremental effect of including the extra financial flow in the regression. In a similar way estimates equation 6 the relative stabilization effect of the diverse financial flows to yearly movements in primary income relative to the national average.

The cross-sectional regressions on long-term averages following equation 5 are performed by a panel data *between* regression. The between estimator is just the OLS estimator applied to the regional means over time. In this way, all the time series information in the data is neglected.

For the stabilization regressions 6, a panel data feasible generalized least squares (GLS) regression was run. GLS corrects for region-specific variances (heteroscedasticity across panels) and for autocorrelation within panels. The GLS estimator is more efficient than the OLS estimator, since observations with a higher variance get a smaller weight in estimation (so more accurate observations get a higher weight). In panel data, the GLS estimator is the more efficient one because it combines the information from the *between* and *within* dimensions in an efficient way. Apart from the GLS regression, the same equation was estimated by OLS, fixed effects and random effects models. The estimates turn out to be quite robust across different estimation methods.

Unit root processes are eliminated from the time series by the definition of variables relative to the national averages, and by the time differenced specification of equation 6. We include state dummies to capture state-specific effects. Including year dummies is not necessary, since year-specific effects are eliminated by the definition of variables relative to the yearly cross-sectional average. When the explanatory variable is measured with error, estimates could be biased towards zero, and the amount of smoothing in equation 6 could be overstated. As Asdrubali et al.(1996) point out, the problem is alleviated by weighting the regressions with the state-specific variance when using GLS. Measurement errors in the regressand don't affect estimates but could lead to increased standard errors, which inflate p-values.

4 REDISTRIBUTION AND STABILIZATION OF HOUSEHOLD INCOME

4.1 Data

We collected data w.r.t. primary and secondary (disposable) household income from the regional accounts of the National Bank of Belgium (NBB). Time series are available from 1995 till 2006. In addition, the following intermediary flows were gathered from the same source.

- Tax: taxes on income and property
- SC: social contributions
- SB: social benefits
- OC: other contributions
- OB: other benefits[14]

We use regional population figures from the National Institute of Statistics (NIS) to calculate the per capita values in euro. To run the regressions, all variables are divided by the national average.

In the empirical analysis, intermediate regressions will be run to capture the effect of respectively income and property taxes, and flows through the social security system. The relationship between primary and disposable income of households can be decomposed as follows:

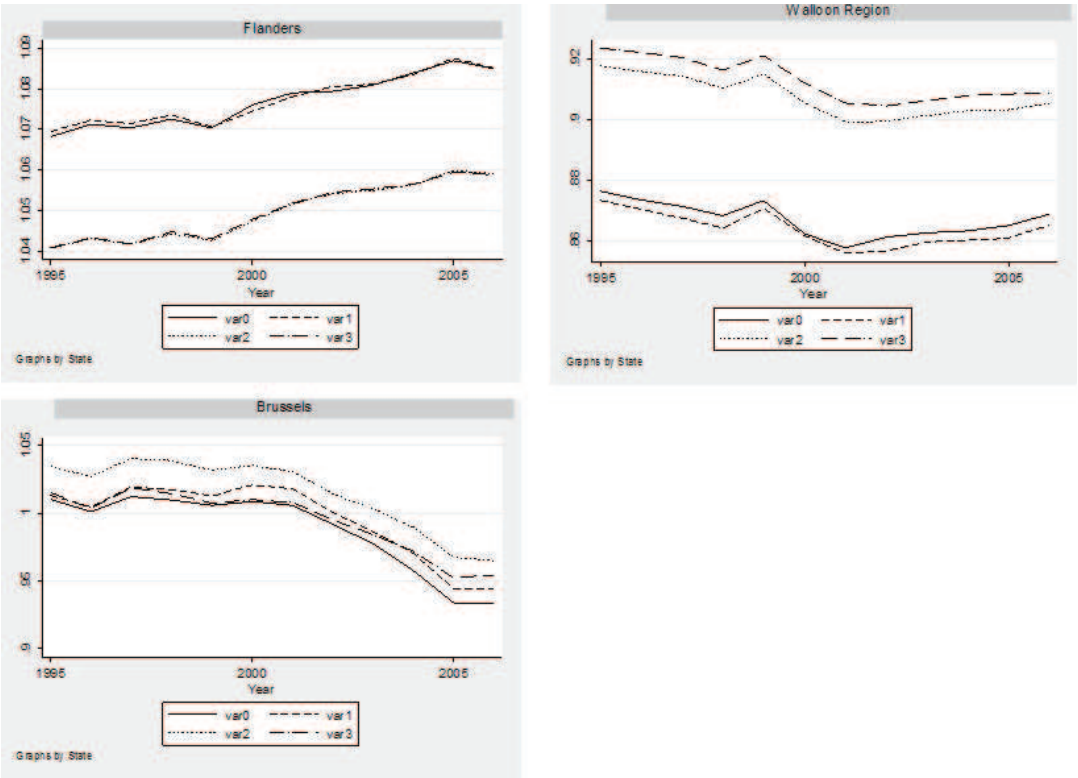
$$PI^i - Tax^i - SC^i + SB^i - OC^i + OB^i = DI^i \tag{7}$$

We define the following variables, which will be used in the empirical analysis.

$$\begin{aligned} var0 &= \frac{PI^i}{PI^N} \\ var1 &= \frac{PI^i - Tax^i}{PI^N - Tax^N} \\ var2 &= \frac{PI^i - Tax^i - SC^i + SB^i}{PI^N - Tax^N - SC^N + SB^N} \\ var3 &= \frac{PI^i - Tax^i - SC^i + SB^i - OC^i + OB^i}{PI^N - Tax^N - SC^N + SB^N - OC^N + OB^N} = \frac{DI^i}{DI^N} \end{aligned}$$

Figure 3 illustrates the evolution of these variables over time for the three regions. It gives a first idea about the extent tot which interregional income differences are offset by tax and transfer payments. The initial differences in primary income per capita relative to the national average are shown by the solid line, indicating that the representative Flemish household performs above the national average, that a

Figure 3: Evolution of defined variables in the three regions



representative Walloon's income is below average and that the average Brussels household evolved from an above-average to a below-average performer over time. Since pre- and post-tax income lines (var0 and var1) lay close together, only a limited equalizing effect is expected from income and property taxes. In the Walloon Region, taxes even seem to widen the gap with national income, a phenomenon which will be explained in the next section. The largest redistributive effect is noticed when taking into account social security transfers. Var2 brings Flanders and Wallonia a lot closer to the Belgian average. Brussels enjoys a positive effect of taxes and social security transfers over the entire period, even when it was an above-average performer. This is a consequence of persistent below-average per capita taxes and social contributions, and above-average social benefits till 2003 in the Brussels Region.

Table 3 presents the summary statistics. In this Table, we now can explore the *within*(over time) and *between* (across regions) variation of the panel data, given by the standard deviation in the third column. The closer the variable gets to disposable income, the lower both types of variation. A declining between variation, which points at a reduction of cross-sectional disparities, creates expectations about finding evidence of redistribution, since per capita disposable income relative to the national average is less dispersed than relative per capita primary income. The reduction of the variability of income *over time*, or the *within* standard deviation indicates that evidence of stabilization will be found in the empirical analysis.

Table 3: Summary statistics

Variable		Std. Dev.	Min	Max	Observations
var0	overall	0.0890	0.8576	1.0868	N = 36
	between	0.1054	0.8669	1.0769	n = 3
	within	0.0174	0.9228	1.0020	T = 12
var1	overall	0.0907	0.8558	1.0874	N = 36
	between	0.1077	0.8637	1.0773	n = 3
	within	0.0166	0.9270	1.0038	T = 12
var2	overall	0.0635	0.8991	1.0598	N = 36
	between	0.0742	0.9073	1.0497	n = 3
	within	0.0163	0.9406	1.0162	T = 12
var3	overall	0.0588	0.9044	1.0594	N = 36
	between	0.0689	0.9129	1.0498	n = 3
	within	0.0143	0.9436	1.0101	T = 12

4.2 Redistribution results

To measure long-term redistribution of household income across regions, we run regression 5 on primary income. In the intermediate regressions, the dependent variable gradually takes more and more transfers into account, until total disposable income is reached. This is shown in the first column of Table 4, which reports the regressands to distinguish the different regressions. Performing panel data *between* regressions is equal to applying OLS on long-term averages. Table 5 gives an illustration of the long term averages of the different variables. The figures are in line with former observations in Figure 3. Taxes and transfers bring Flemish per capita income gradually closer to the national average, since the figures relative to the national average more and more approach unity. The same goes for the Walloon Region, except for the stage where taxes are taken into account (from meanvar0 to meanvar1, the gap with the national average widens, which is explained below). The small Brussels Region follows an unusual course in line with the former findings in Figure 3.

Looking at the regression results in Table 4, we first consider the last row with disposable income as regressand. We observe that the coefficient on primary income is estimated at 0.65, which means that, on average, long-term relative income inequalities are reduced with 35 percent. In other words, the Belgium federal government redistributes on average 35 cents of every euro difference between regions' incomes relative to the national average. The estimates in the second and third row of Table 4 specify the relative importance of respectively taxes, and the social security system. We see that, relative to the national average, there is no equalization through income and property taxes, since the estimated coefficient is larger than unity, making the measure of redistribution β_r negative (-0.02). This is a counterintuitive result, since it is expected that progressive income taxes, which redistribute from rich to poor individuals (interpersonal) also redistribute from relatively rich to relatively poor jurisdictions (interregional). The reason of this result, however,

could be that income disparities within regions are different across regions. In the Appendix, we give an illustration of how large income disparities in a poorer region could bring along a higher effective tax rate in that region. The difference between the β_rs in the second and third row of Table 4 measures the incremental contribution of flows through the social security system to the redistribution of regional individual income. Given that these redistributional flows amount to 34 cents in the euro, we conclude that interregional redistribution of household income in Belgium hinges almost entirely upon the flows through the social security system. The R^2 statistics in Table 4 indicate the good fit of the different equations; the linear connection between primary and secondary income is very close.

Table 4: Estimates of long term redistribution of household income in the Belgian federation

Adjustment to PI	$1-\beta_r$	β_r	s.d.	p-value	R^2 overall
var1=PI-Tax	1.02	-0.02	0.05	0.03	0.99
var2=PI-Tax-SC+SB	0.68	0.32	0.14	0.12	0.95
var3=Disposable income	0.65	0.35	0.01	0.01	0.99

Table 5: Long-term averages of variables in performed regressions

Region	meanvar0	meanvar1	meanvar2	meanvar3
Flanders	1.0769	1.0773	1.0497	1.0498
Walloon Region	0.8669	0.8637	0.9073	0.9129
Brussels	0.9873	0.9961	1.0149	0.9946

To investigate whether redistribution changed over time information which is lost by taking long term averages, Table 6 demonstrates the estimates for two subperiods, the first period from 1995 till 2000, and the second from 2001 till 2006. We conclude that redistribution of relative inequalities in household income per capita has decreased slightly over time from 0.38 to 0.32 cents in the euro, mainly by the reduced role of other contributions (OC) and benefits (OB), which declines from 0.06 to 0.01.

Table 6: Estimates of long term redistribution of household income in the Belgian federation for the sub-periods 1995-2000 and 2001-2006

Adjustment to PI	β_r 95-00	β_r 01-06
PI-Tax	-0.02	-0.01
PI-Tax-SC+SB	0.32	0.31
Disposable income	0.38	0.32

4.3 Stabilization results

To estimate stabilization, we perform a panel data regression following equation 6 with the variables in the first column of Table 7 as dependent variables. The estimate of β_s on the bottom row of Table 7 gives an idea about the overall stabilization of household income in Belgium. Total fiscal flows in Belgium reduce short-term differences in relative income by 15 cents in the euro. By using variables with the national average in the denominator, we only capture stabilization of asymmetric shocks (or idiosyncratic regional shocks) to regional primary income of households, excluding the effect of symmetric or country-wide shocks. When looking at the contribution of the different elements in the stabilization procedure, we first notice that personal income and property taxes provide no smoothing, since the estimated β_s is negative. Each euro that relative pre-tax income goes up, relative post-tax incomes vary by 1.08 euro. Premiums to and transfers from the social security system account for a smoothing of 19 cents in the euro.

In Table 8, we present the estimates of the time series regressions for each region separately. β_s is thus no longer assumed to be equal across regions, as was the case in the panel data analysis. We observe that the former result of negative stabilization through personal income and property taxes is determined by the particular result of Brussels, which acts as an outlier. The tax system does have a stabilization effect in Flanders and Wallonia of respectively 7 and 6 cents in the euro. In total, more income smoothing is provided in Flanders and the Walloon Region (22%) than in Brussels (13%). The offset of a shock to relative primary income of a region by the social security system amounts to 22% in Brussels, 13% in Flanders and 9% in the Walloon Region. The estimated coefficients are all significantly different from zero at the 1% level and the adjusted[15] R^2s indicate the good fit of the estimated equations.

Table 7: Estimates of short term stabilization of household income in the Belgian federation

Adjustment to PI	$1-\beta_s$	β_s	s.d.	p-value	R^2adj.
var1=PI-Tax	1.085	-0.08	0.04	0.00	0.94
var2=PI-Tax-SC+SB	0.89	0.11	0.04	0.00	0.92
var3=Disposable income	0.85	0.15	0.07	0.00	0.86

Figure 4 illustrates the smoothing properties of the Belgian fiscal and social security system visually by plotting the evolution of first differences in primary (diffvar0) and disposable (diffvar3) income. Stabilization is visualized by the extent to which the striped line of shocks to disposable income is more flat than the solid line of shocks to primary income.

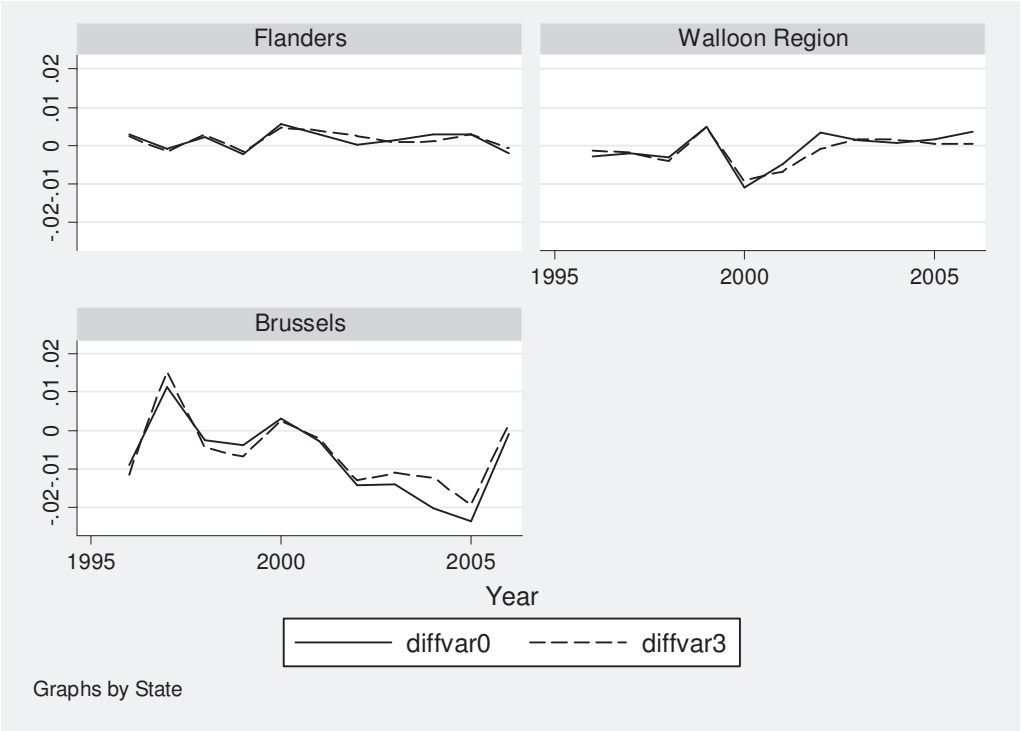
4.4 International comparison

We repeated the analysis for three other federal countries in Europe. Time series data from 1995 till 2006 is collected from Eurostat. The obtained estimates of β_r and

Table 8: Estimates of short term stabilization of household income: time series regressions for the three regions

Flanders				
Adjustment to PI	β_s	s.d.	p-value	R^2adj.
PI-Tax	0.07	0.14	0.00	0.80
PI-Tax-SC+SB	0.20	0.14	0.00	0.74
Disposable income	0.22	0.14	0.00	0.72
Walloon Region				
Adjustment to PI	β_s	s.d.	p-value	R^2adj.
PI-Tax	0.06	0.10	0.00	0.89
PI-Tax-SC+SB	0.15	0.09	0.00	0.88
Disposable income	0.22	0.12	0.00	0.80
Brussels				
Adjustment to PI	β_s	s.d.	p-value	R^2adj.
PI-Tax	-0.12	0.07	0.00	0.96
PI-Tax-SC+SB	0.10	0.08	0.00	0.92
Disposable income	0.13	0.09	0.00	0.88

Figure 4: Stabilization of regional household income



β_s for Germany, Spain and Austria[16] can be compared in Table 9. Regarding total redistribution and stabilization of regional household income per capita relative to the national average, the Belgian and Austrian fiscal system are very much alike. Germany and Spain provide respectively 1% and 13% less redistribution than Bel-

Table 9: Redistribution and stabilization in Germany, Spain and Austria

Adjustment to PI	β_r	β_s
Germany		
PI-Tax	0.10	-0.07
PI-Tax-SC+SB	0.33	-0.05
Disposable income	0.34	-0.06
Spain		
PI-Tax	0.06	-0.04
PI-Tax-SC+SB	0.21	-0.02
Disposable income	0.22	0.02
Austria		
PI-Tax	0.16	-0.02
PI-Tax-S+SB	0.36	0.13
Disposable income	0.37	0.15

Table 10: Results for the US and Canada (Source: Bayoumi and Masson (1995))

US		
Adjustment to PI	β_r	β_s
PI-Tax	0.07	0.08
PI-Tax-SC+SB	0.08	0.09
Disposable income	0.18	0.23
Canada		
PI-Tax	0.03	0.04
Disposable income	0.18	0.15

gium, and the fiscal systems of both countries have no stabilization properties. The contribution of the German, Spanish and Austrian tax systems to redistribution is positive, although this effect was not found in Belgium. Belgium is the country with the largest long-term transfers from rich to poor individuals by the social security system.

In Table 10, the estimates provided by Bayoumi and Masson (1995) are shown. It can be seen that Belgian redistribution in total, and especially by the social security system, is substantially higher than that of the US and Canada.

5 REDISTRIBUTION AND STABILIZATION OF REGIONAL GOVERNMENT INCOME

5.1 Data

In order to perform a similar analysis for redistribution and stabilization of regional government income, we need data w.r.t. primary and secondary (disposable) income of regional governments. Some problems arise. First, how do we define primary income of subnational governments? And second, what do we qualify as disposable income? Furthermore, the complex structure of the Belgian federal state, with regional competences dispersed over partly overlapping regions and communities, brings along some difficulties. The territories of the three regions are clearly separated, but the territories of the three communities may overlap, especially in Brussels, as illustrated in Figure 11 in Appendix. Regions have competences in fields that can be broadly associated with their territory. including among others economy, foreign trade, employment, housing, urban planning, public works and transport, energy, environment and development. Communities exercise their competences only over subjects related to personal matters: culture, education, health policy, social welfare, etc. The analysis is performed for the Belgian regions, as tax income can be assigned to the residents living in a particular region. This triggers the following problem: how do we allocate federal grants to the communities over the regions?

In theory, *primary income* could be defined as everything that would have been available for consumption by the regional government if there had been no fiscal intervention on the part of the federal government, or in other words, if states had full authority over taxes.
Except for the own regional taxes of the Flemish, Walloon and Brussels government, regional tax data are only available w.r.t. the personal income tax (PIT). Since regional governments receive also grants out of federal VAT revenues, we also want to include regional VAT contributions in the definition of primary income. Since regional VAT collection data are not available, we have to assign national data to the regions. To this purpose we use regional GDP adjusted for commuting[17](approximation of regional GNP) as a division key. Since no suitable division key for corporate taxes is available[18], we ignore these taxes. So we define primary income of regional governments as the sum of regional taxes, regional PIT contributions and regional VAT contributions[19].

The *disposable income* of regional governments consists of own regional taxes and of the financial resources they are entitled to in accordance with the stipulations in the Special Financing Act (1989) and the Lambermont Agreement (2001). In what follows, we explain how the receipts of the communities are assigned to the regions.

Time series are for 19 years, from 1989 till 2007. Variables are expressed in euros per capita relative to the national average. Per capita values correct for the different size of the three regions. Because of the division by the national average, no rescaling of variables of differing magnitude is required.

Belgian regional government financing system

The Special Financing Act (1989) describes the financing of the three regions and the three communities in Belgium. On the whole, receivings of regional governments make up about 38% of total government revenue (apart from social security contributions) in Belgium. In what follows we disregard the revenues of the German-speaking Community. Algoed and Van den Bossche (2009) explain the working of the Special Financing Act (SFA) and give an illustration of the determination of the revenues of regions and communities.

Three types of regional financial resources can be distinguished.

- First, about 20% of total subnational income (of regions and communities) comes from own-source taxes which solely accrue to the regions. The regions have full fiscal autonomy over these taxes since 2001. They include among other registration rights, inheritance taxes, property taxes and traffic taxes.

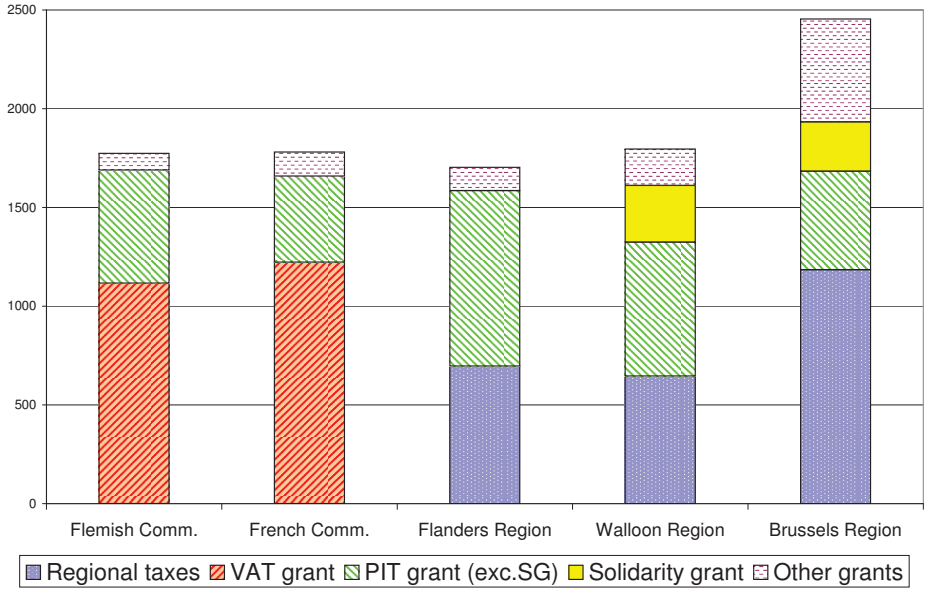
- Second, as is documented in detail below, the greater part of regional government revenue comprises federal grants from the personal income tax (PIT) to the regions and the communities, among which the solidarity grant, and grants out of the VAT tax to the communities.

- Third, about 8% of total regional revenues encompass other grants, such as the allocation for foreign students, radio and television license fees, and other funds given to the communities. The regions obtain extra grants for unemployment relief works, earmarked and other grants. Brussels obtains several extra grants linked to its special function as capital of Belgium.

Figure 5 illustrates the composition of regional government resources[20] in 2007.

We next take a brief look at how the solidarity grant and PIT and VAT allowances are determined and how they are divided between the regions. Both regions and communities are entitled to a fixed allocation from federal government PIT revenues. The historically determined amount is updated to CPI and economic growth on a yearly basis. The total grant is horizontally partitioned over the constituencies by the relative regional contribution to total government PIT revenues[21]. In order to make some correction for this horizontal division key, which clearly favours the economically more advantaged regions, the parties to the federalisation process agreed upon the installation of an explicit solidarity system between the three regions. The solidarity grant (SG) is a formula-based mechanism for fiscal equalization of regional government receipts, that is based on the lagged deviation of regional PIT contributions from the national average. In particular, when the average PIT-revenues per capita in a region are lower than the national average, the concerning region receives a fixed sum per inhabitant[22] times the number of inhabitants times the deviation in percentage points (of the average PIT revenues in the region in comparison with the national average).
In the period from 1989 till 1999 the SG could be seen as a mutual insurance system between the regions, since the total PIT grant to the regions was reduced by this amount[23]. From 2000 on, the federal government takes up the difference (positive or

Figure 5: Composition of the revenues of the Belgian Regions and Communities in 2007 (in euro per capita)



negative) in solidarity grant in comparison with 1999. The Belgian solidarity grant system is thus a combination of horizontal and vertical equalization.

Only the communities are entitled to a grant out of federal VAT revenues. This is basically a fixed historical amount, which is yearly updated to the evolution of the CPI and of a defined "denatality factor", based on the yearly evolution of the number of children (<18 years). Since the Lambermont agreement in 2001, the communities are also entitled to "extra means" out of total federal VAT revenues. These extra means encompass a yearly fixed grant (cumulated and indexed to CPI and to the "denatality factor" from the next year on) in the years 2002 till 2011, and extra revenues due to the indexing of VAT grants to 91% of the real growth of national GDP. The VAT grant is horizontally divided over the communities on the basis of two division keys. The original historical grant is partitioned by the number of pupils (aged 6 to 17). The extra Lambermont means are divided by a mixed division key that depends on relative pupil numbers and relative PIT contributions. In this mixed division key, the weight of the second criterion grows steadily over time, resulting in a division key only based on the relative regional contribution to PIT by 2012.

Assignment of the revenues of the communities to the regions

The federal government makes payments to the three regions and the two communities. Since we make the analysis for the three regions, we need to divide the payments granted to the communities over these regions. The Flemish and the French Community's revenues are assigned to the regions by applying formulas 8 till 10, where P^i stands for population in region i. The REV_t^i variable on the left

hand side of the equations, or the communities' revenues allocated to region i, are added to the region's revenues.

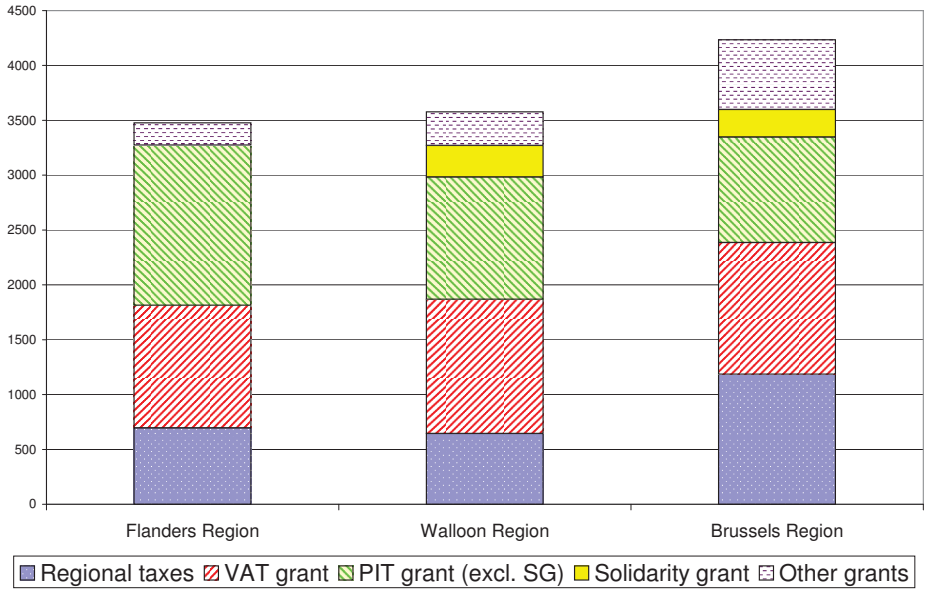
$$REV_t^{FlanR} = REV_t^{FlemC} * \frac{P_t^{FlanR}}{P_t^{FlanR} + P_t^{BrR} * 0.2} \tag{8}$$

$$REV_t^{WalR} = REV_t^{FrenchC} * \frac{P_t^{WalR}}{P_t^{WalR} + P_t^{BrR} * 0.8} \tag{9}$$

$$REV_t^{BrR} = REV_t^{FlemC} * \frac{P_t^{BrR} * 0.2}{P_t^{FlanR} + P_t^{BrR} * 0.2} + REV_t^{FrenchC} * \frac{P_t^{BrR} * 0.8}{P_t^{WalR} + P_t^{BrR} * 0.8} \tag{10}$$

We assume that 20 percent of the inhabitants of Brussels are part of the Flemish Community, and 80 percent are part of the French Community, which is the legal assignment key used for such calculations. The results of our calculations can be found in Figure 6.

Figure 6: Composition of assigned regional revenues in 2007 (communities' revenues attributed to the regions) (in euro per capita)



Definition of variables

In the empirical analysis, we will run intermediate regressions to capture the incremental effect of the PIT[24] grants, the solidarity grant (SG), and VAT grants. The

relationship between primary and disposable income for region i can be decomposed as follows:

$$PI^i - PITcontr^i + PITrev^i + SG^i - VATcontr^i + VATrev^i + OtherGrants^i = DI^i \tag{11}$$

The following variables are defined, which will be used in the regressions of the next two sections.

$$\begin{aligned}
var0 &= \frac{PI^i}{PI^N} \\
var1 &= \frac{PI^i - PITcontr^i + PITrev^i}{PI^N - PITcontr^N + PITrev^N} \\
var2 &= \frac{PI^i - PITcontr^i + PITrev^i + SG^i}{PI^N - PITcontr^N + PITrev^N + SG^N} \\
var3 &= \frac{PI^i - PITcontr^i + PITrev^i + SG^i - VATcontr^i + VATrev^i}{PI^N - PITcontr^N + PITrev^N + SG^N - VATcontr^N + VATrev^N} \\
var4 &= \frac{PI^i - PITcontr^i + PITrev^i + SG^i - VATcontr^i + VATrev^i}{PI^N - PITcontr^N + PITrev^N + SG^N - VATcontr^N + VATrev^N} \\
&\quad \frac{+ OtherGrants^i}{+ OtherGrants^N} = \frac{DI^i}{DI^N}
\end{aligned}$$

Figure 7 gives a graphical illustration of the evolution of these variables over time for the three regions. When looking at the graphs of Flanders and Wallonia, it can be seen that the different flows in regional government funding not only bring government income closer to the national average of one, but positions relative to the national average are even reversed. An above-average performer w.r.t. primary government income (tax contributions) receives below average disposable income (funding through the SFA) and vice versa. For Brussels on the other hand the positive gap w.r.t. national income is reinforced by the regional government financing system. The distance between plotted lines turns out to be the largest with the transition from var2 to var3, giving a first indication that implicit equalization may be the largest through VAT flows, an effect to be further tested in the regression analysis. Table 11 presents the summary statistics. A decline in the *between* and *within* standard deviation from the top to the bottom of Table 11 would point at the presence of respectively redistribution and stabilization in the data. However, this evolution is not found over the whole line, since the between and within standard deviation goes up at the stage where PIT flows are included in the variable, and the between variation increases when "other grants" are added.

5.2 Redistribution results

Regression 5 is carried out on the long-term averages that are reported in Table 13. The averages of the previously defined variables confirm that the evolution towards disposable income, gradually taking into account implicit and explicit solidarity

Figure 7: Primary income versus disposable income of regional governments and levels in-between

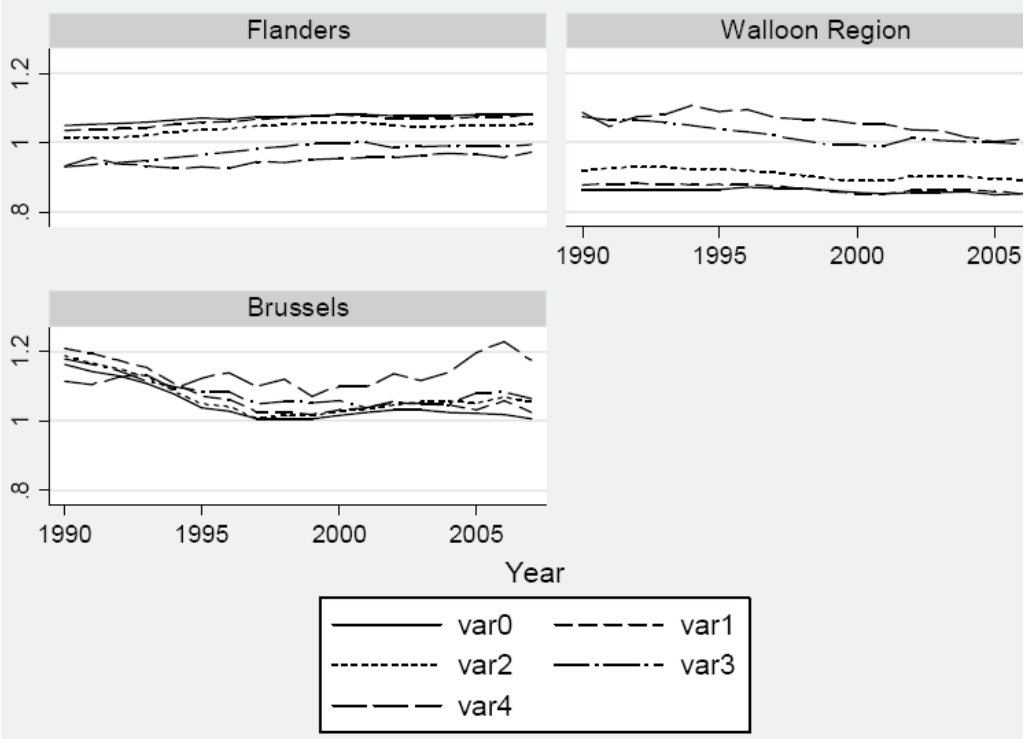


Table 11: Summary statistics

Variable		Std. Dev.	Min	Max	Observations
var0	overall	0.1006	0.8496	1.1635	N = 57
	between	0.1156	0.8613	1.0693	n = 3
	within	0.0324	0.9458	1.1051	T = 19
var1	overall	0.1035	0.8494	1.2093	N = 57
	between	0.1171	0.8664	1.0754	n = 3
	within	0.0373	0.9446	1.1354	T = 19
var2	overall	0.0803	0.8875	1.1885	N = 57
	between	0.0872	0.9086	1.0743	n = 3
	within	0.0358	0.9394	1.1216	T = 19
var3	overall	0.0597	0.9206	1.1899	N = 57
	between	0.0583	0.9714	1.0881	n = 3
	within	0.0355	0.9769	1.1299	T = 19
var4	overall	0.0811	0.9109	1.2263	N = 57
	between	0.0910	0.9462	1.1266	n = 3
	within	0.0309	0.9834	1.1434	T = 19

through the different revenues under the SFA, brings Flanders and Wallonia closer to the national average by each step. Brussels evolved away from the national average as more and more of its funding is taken into account. The results w.r.t. the

redistributional properties of the regional government financing system are shown in Table 12. The estimate of β_r in the last row postulates that the initial differences in relative tax contributions per capita are not only completely equalized, but new relative inequalities are created by carrying on redistributing beyond equal incomes. For any euro difference between richer and poorer tax contributors relative to the national average, 1.16 euro is redistributed. 28 cents is reallocated through the solidarity grant, 73 cents through the VAT grant[25], and 15 cents through other grants to regional governments. We conclude that not only the solidarity grant, but also VAT transfers and "other grants" can be classified as tools of implicit redistribution. In these results we find evidence of a development trap for regional governments. If, on average, a region's relative primary income goes *up* with one euro, its financial resources go *down* by 0.16. We conclude that, on the basis of *long-term* averages, there is no accountability in the funding system of regional governments. For a region, it is better to be permanently poor.

However, low R^2 statistics and high standard deviations and p-values indicate that the explanatory power of our model is not very good. The reason is that there is no good linear fit between the plots of long-term relative primary income versus secondary income for the three regions, as can be seen in Figure 8. In fact, variables are defined in per capita terms to be able to compare the different regions on an equal basis, neglecting the fact that smaller regions should get a lower weight in the regression than larger regions. In Figure 8, attributing a lower weight to Brussels causes the regression line to decline even steeper. Not only because the smaller region of Brussels capital should get a lower weight in the regressions, but also because it acts as an outlier (as previously explained), the analysis is repeated excluding Brussels. In Table 14 we take a look at the reduction in long-term regional government income disparities through the funding system of regional governments between Flanders and Wallonia only[26]. By leaving out Brussels, it is no longer interregional redistribution, but rather the reduction in income inequalities between Flanders and Wallonia we measure, which amounts to 153% as can be seen in the last row of Table 14. The per capita difference between the Flemish and Walloon government tax income relative to the national average, is reduced by 153% under the SFA. In Table 14 the regression boils down to exact calculations, based on the long term averages in Table 13[27].

Table 12: Estimates of long term redistribution of regional government income in the Belgian federation

Adjustment to PI	$1-\beta_r$	β_r	s.d.	p-value	R^2 overall
PI-PITcontr+PITrev	1.00	0.00	0.15	0.09	0.97
PI-PITcontr+PITrev+SG	0.72	0.28	0.20	0.17	0.90
PI-PITcontr+PITrev					
+SG-VATcontr+VATrev	-0.01	1.01	0.50	0.98	0.01
Disposable income	-0.16	1.16	0.77	0.86	0.03

To get an idea about how this redistribution evolved over time, Table 15 and

Table 13: Long-term averages of variables in performed regressions

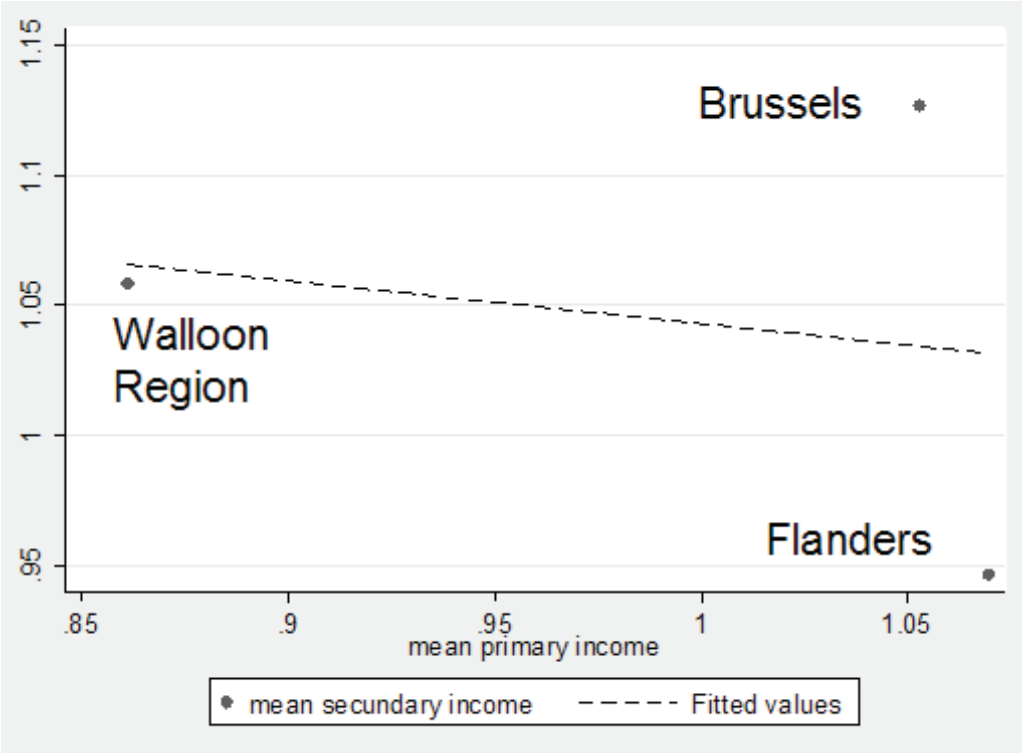
Region	meanvar0	meanvar1	meanvar2	meanvar3	meanvar4
Flanders	1.06935	1.06277	1.03912	0.97145	0.94623
Walloon Region	0.86134	0.86645	0.90865	1.02477	1.05834
Brussels	1.05283	1.07544	1.07431	1.08810	1.12663

Table 14: Reduction in regional government income disparities between Flanders and Wallonia

Adjustment to PI	β_rFl-Wa
PI-PITcontr+PITrev	0.06
PI-PITcontr+PITrev+SG	0.38
PI-PITcontr+PITrev+SG-VATcontr+VATrev	1.25
Disposable income	1.53

Table 16 repeat the analysis for the sub-periods 1989-1995, 1996-2001 and 2002 till 2007 with and without the Region of Brussels. Especially when Brussels is ignored in Table 16, transfers seem to have declined over time. This evolution may be attributed to different factors; e.g. for the last period the horizontal division

Figure 8: Redistribution between regional governments: mean PI versus mean SI per capita relative to the national average



key of the extra Lambermont means since 2002, which gradually takes relative tax realizations into account, may provide an explanation.

Table 15: Estimates of long term redistribution of regional government income for the sub-periods '89-'95, '96-'01 and '02-'07

Adjustment to primary income	β_{89-95}	β_{96-01}	β_{02-07}
PI-PITcontr+PITrev	-0.03	0.00	0.00
PI-PITcontr+PITrev+SG	0.24	0.28	0.26
PI-PITcontr+PIT rev+SG-VATcontr+VAT rev	0.93	1.002	0.97
Disposable income	1.11	1.42	0.99

Table 16: Reduction in income disparities between Flemish and Walloon regional governments for the sub-periods 1989-1995, 1996-2001 and 2002-2007

Adjustment to PI	β_r 89-95	β_r 96-01	β_r 02-07
PI-PITcontr+PITrev	0.14	0.03	0.03
PI-PITcontr+PITrev+SG	0.51	0.30	0.32
PI-PITcontr+PITrev+SG -VATcontr+VAT rev	1.62	1.07	1.05
Disposable income	1.81	1.57	1.23

5.3 Stabilization results

The β_ss in Table 17 indicate how year-by-year movements in primary income of regional governments are reflected in the evolution of relative disposable government income over the same period. We notice that PIT contributions and grants provide no smoothing of income. Movements in primary income are fully reflected in PIT transfers. The solidarity grant is found to destabilize relative shocks to primary income.[28] VAT grants provide smoothing, but only because they are quasi independent of regional economic evolution. The p-value in the last row of Table 17 illustrates that the regression coefficient $(1 - \beta_s)$ is not significantly different from zero. This illustrates that there is no significant link between movements in relative primary income of a regional government and the entirety of means it receives under the SFA in the same year. Theoretically, this independence could mean that total smoothing against macro-economic shocks is provided. However, other destabilizing factors make the receipts of regional governments rather unpredictable, as can be seen in Figure 9, which shows the evolution of yearly differences in primary and disposable income. We see that the latter is more variable over time. This is due to the unstable evolution of the residual revenue category of "other grants" to R&C, as can be seen in Figure 10.

We conclude that the Belgian regional financing system reveals limited stabilizational properties against asymmetric shocks in primary income of regional govern-

Figure 9: Stabilization of regional government income

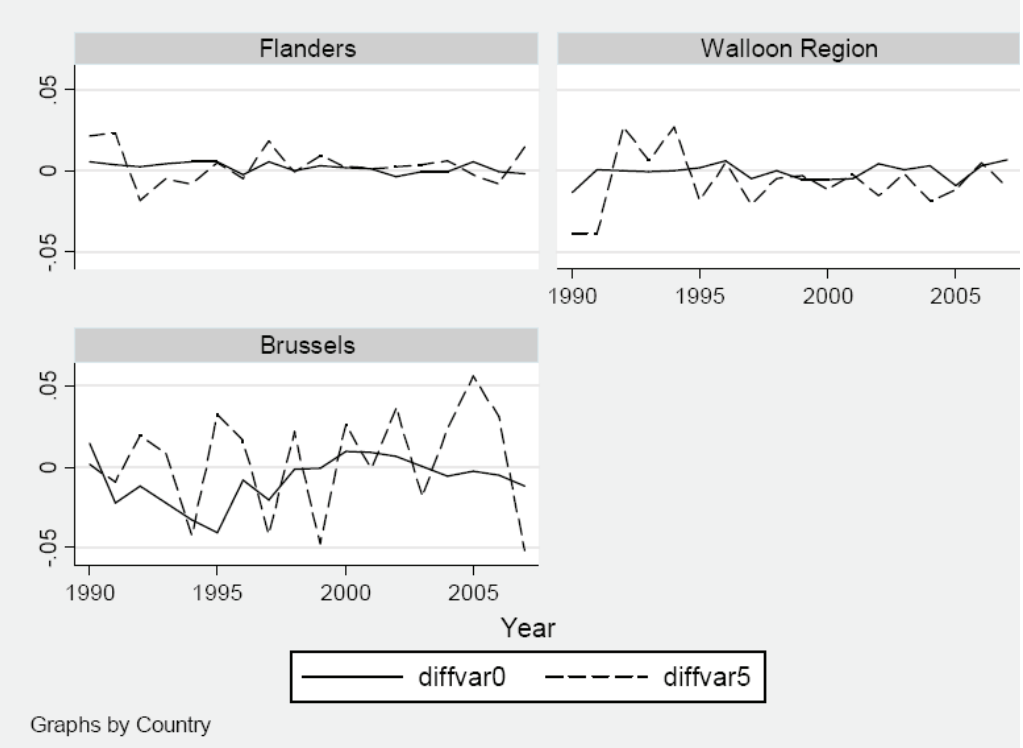


Figure 10: Evolution of "other income" relative to the national average over time: levels (first chart) and first differences (second chart)

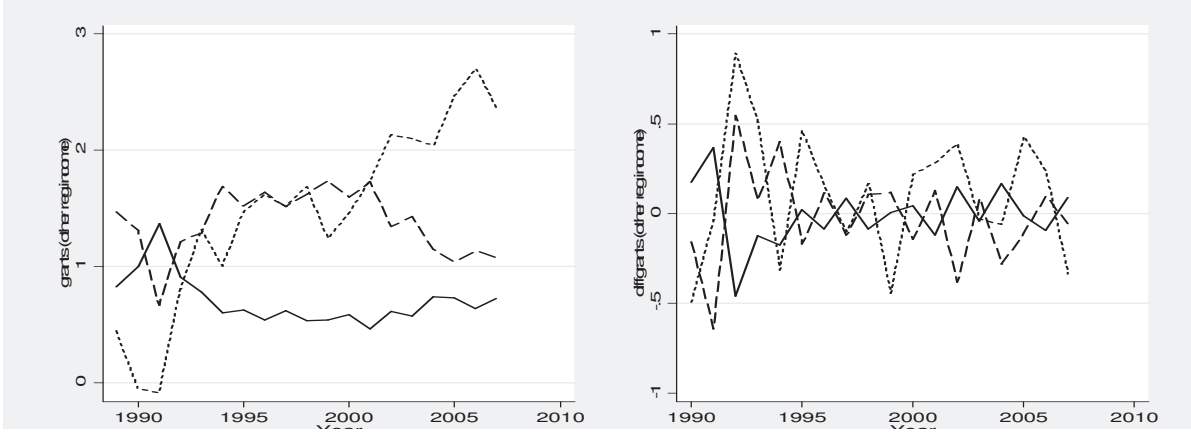


Table 17: Estimates of short term stabilization of regional government income in the Belgian federation

Adjustment to PI	$1-\beta_s$	β_s	s.d. β_s	p-value β_s	adj.R^2
PI-PITcontr+PITrev	1.00	0.00	0.13	0.00	0.58
PI-PITcontr+PITrev+SG	1.09	-0.09	0.14	0.00	0.64
PI-PITcontr+PITrev					
+SG-VATcontr+VATrev	0.64	0.36	0.17	0.00	0.12
Disposable income	0.67	0.33	0.50	0.18	-0.25

ments, not by means of stabilizing interregional transfers, but because particular grants are independent of regional economic performances. The large variation in disposable income is the result of unstable financing of the regions, and not of a reaction to region-specific shocks. The R^2s indicate that the fit of the model is very low. We conclude that the only insurance provided is the insurance against the risk of being a permanently poor region, as we saw in the previous section

6 CONCLUSIONS

This article presents an analysis of equalization of households and government income across the three regions in the Belgian federation. Two goals of income equalization are examined:

- First, the extent to which it reduces long-term income disparities across regions
- Second, the amount of smoothing it provides against asymmetric macro-economic shocks to primary income

First, transfers through the central tax and social security system are considered to measure redistribution and stabilization of household income. Second, the funding system of subnational governments is examined to carry out the analysis w.r.t. regional government income. The overall effect of both devices is decomposed in the respective contributions of intermediate transfers.

The results show that, on average, long-term relative income inequalities between *households* of different regions are reduced with 35 percent. This redistribution hinges almost entirely upon the flows through the social security system, and it decreased slightly over time. An important result for the discussion about PIT regionalization in Belgium is the finding that the interregional redistributional properties of the PIT are limited.
Stabilization of primary incomes is only provided to a lesser extent, since short-term differences in relative income inequalities are only reduced by 15 cents in the euro. When running time series regressions for each region separately, we find that 9 percentage points more stabilization is provided to Flanders and Wallonia than to Brussels. We compared the results to other federal countries in Europe, and found that the redistributional properties of the Belgian fiscal system are close to those

of the German and Austrian system, but larger than those of Spain. Upon international comparison, Belgium manages quite well to stabilize regional household income per capita.

Concerning the income of *regional governments*, it is found that the funding system overcompensates long term differences in the relative position of a region, which is measured by its tax capacity relative to the national average. The transfers through VAT contributions and -grants, the solidarity grant and "other grants" can be classified as tools of redistribution. We conclude that the largest part of permanent equalization is not explicitly laid down in equalization formulas, like that of the solidarity grant, but is more or less "hidden" in the practical implementation of the Special Financing Act and the Lambermont Agreement. The combination of funding and equalization in a compound system does not really contribute to the transparency of the system, and it doesn't contribute to accountability. On the basis of long-term redistribution, the absence of accountability is reflected in the existence of a development trap. Since, on average, if a region's relative primary income goes *up* with one euro, his financial resources go *down* by 0.16, we can say that for a region it is better to be permanently poor.
Interregional equalization represents only a limited form of macro-economic stabilization against idiosyncratic shocks to primary income. PIT grants provide no relative smoothing. VAT grants provide smoothing, but this is due to their independence of regional economic performance. The absence of a significant link between movements in relative tax contributions and in relative disposable income, is explained by the unpredictable evolution of "other grants" to governments. We conclude that, as in most countries, the driving force for equalization in Belgium is equity and not stabilization.

This study has a few shortcomings, which may be resolved in future research. First, the data we used for the analysis w.r.t. redistribution and stabilization of regional government income, could be improved. The assignment of VAT collections to the regions and the division of community revenues over the regions could be refined. Second, an important methodological criticism could be raised w.r.t. the fact that regions are compared on an equal base by using per capita values. Measurement and estimation methods should attribute a larger weight to larger regions. Otherwise, the results are affected by a certain leverage effect. For example, if a certain amount of income is redistributed from Flanders to Brussels, a small per capita reduction in the income of Flanders matches with a large increase in per capita income of Brussels. Third, since the analysis of income equalization between regional governments was not earlier performed in this exact way, we were not able to compare our findings to other countries.[29] Fourth, other ways of fiscal equalization between jurisdictions, like direct investment, public employment and public procurement, were left untouched in this article. Finally, it is interesting for further research to try to measure the effect of smoothing of regional government income, which is caused by the smoothing of household income, since also tax collections on social security benefits affect revenues of regional governments.

Notes

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[3]Throughout this paper, the term "equalization" refers to all interregional transfers, denoting both redistribution and stabilization.

[4]Remark that households only receive a small part of regional government revenues and that some of the benefits go to people outside the region (not only because of tourists, transients and commuters, but also because of network externalities and public good considerations)(Mélitz and Zumer, 2002).

[5]Remark that tax returns do not perfectly reflect tax capacity since tax efforts can differ across regions.

[6]The idea of soft budget constraints is used to describe the situation where the central government cannot commit not to bail out regional governments when they are in financial trouble. The common pool problem refers to the fact that if regional governments' expenditures are financed out of general central taxation (=the commons), they all try to externalize the costs of their expenditures onto other jurisdictions.

[7]For household income, the calculation is based on a time series from 1995 till 2006, for regional government income it is based on the period 1989-2007

[8]Much of the interest in this field was sparked by the preparation of the European Monetary Union in the nineties. Concern was raised by the fact that countries, when joining the EMU, will lack sufficient tools to mitigate the effects of asymmetric shocks.

[9]This broad definition includes federal grants to state and local governments.

[10]The authors refer to Persson and Tabellini (1996), who point out that such a political compromise involves a trade-off between redistribution and stabilization, which may lead to underprovision of the latter. In another equilibrium, high-risk regions pay permanent unconditional transfers to low-risk regions for obtaining more insurance than low-risk regions would choose for themselves.

[11]Averages are absorbed by a constant term, which disappears when taking first differences. The first differences specification still contains a regional constant if the error term contains a drift element.

[12]This is the average of regional per capita values weighted by the population.

[13]For example, regional GDP has another order of magnitude as regional government revenues.

[14]Other contributions and benefits cover net non-life insurance premiums and claims and miscellaneous current transfers from and to households resident in a specific region

[15]The adjusted R^2 makes -in contrast with the regular R^2- an adjustment for the number of variables included in the regression.

[16]The results in Table 9 are significant at the 1% level and the R^2s indicate a good linear relation between the variables.

[17]This division key was also used in the ABAFIM study *Financiële transfers tussen de Belgische gewesten*(2004) w.r.t. interregional transfers in Belgium, but the usage of this key can be contested on several grounds. For example, a division based on regional disposable income or on household surveys could refine the results.

[18]In most Belgian regional studies corporate taxes are assigned to the regions on the basis of the regional share in the gross value added of corporations. Including this tax gives a distortion for the region of Brussels since a disproportionate number of corporations are located in the neighbourhood of the capital.

[19]These three tax categories together represent about 87% of the total receipts of the consolidated government (apart from social security contributions).

[20]Remark that the Flemish Community and the Region of Flanders merged into one government in 1980.

[21]Regional PIT revenue data are only available for the Regions. To calculate the division key needed to divide the fixed grant to the communities, 20% of the PIT contribution of Brussels is assigned to the Flemish Community, and 80% of the PIT contribution of Brussels is assigned to the French Community.

[22]An amount of 11,6 euro, which is indexed with CPI from 1989 on.

[23]But in practice this is the same as lower PIT grants to the regions and a federally financed vertical solidarity grant.

[24]In what follows, revenues from the PIT (the variable $PITrev^i$) exclude the solidarity grant, which is reported separately.

[25]Remark that this estimate of redistribution through VAT contributions and revenues is sensitive to the division key we use to assign national VAT contributions to the regions.

[26]The coefficients of β_r just indicate the slope of the connecting line between two regions in Figure 8.

[27]For example, the ratio of the Flanders-Wallonia difference in $meanvar4$ and in $meanvar0$ equals -0.53.

[28]This effect could be attributed to the lag in the calculation of the SG, which is based on PIT data of the previous year. A lag is expected to diminish the immediate stabilization effect. This theory proves to be difficult to test empirically, since it is difficult to separate the effect of the contemporaneous and the lagged variable.

[29]After finishing this paper, we found that Hepp and von Hagen (2009) made a similar analysis w.r.t. redistribution and stabilization of regional government tax revenues through the German "Finanzausgleich". In Germany, fiscal equalization turns out to redistribute 78% of state tax revenue, while 87% of shocks to state tax income are smoothed away through stabilization

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Appendix A: Explanation of increasing interregional disparities due to the tax system

In a progressive tax system, it is possible that the effective tax rate of a poorer region is higher, because of large income differentials within that region. This statement is illustrated with an example in Table 18. Suppose there are two regions, and each region has three inhabitants, with taxable income in the second column of Table 18. The tax rate system is progressive if we apply the formula $Tax = Max(PI * 0.47 - 7; 0)$. This formula approximates the results that we find when inserting the primary income figures in the tax calculator on the website of the Belgian federal government[30].

We notice that the region which is poorer on average, has a higher effective tax rate. Region 1's effective tax rate is 30% (13.1/43) while that for Region 2 is 35% (14.9/41). This phenomenon can be explained by the poor individual in Region 2, who should in theory pay negative taxes.

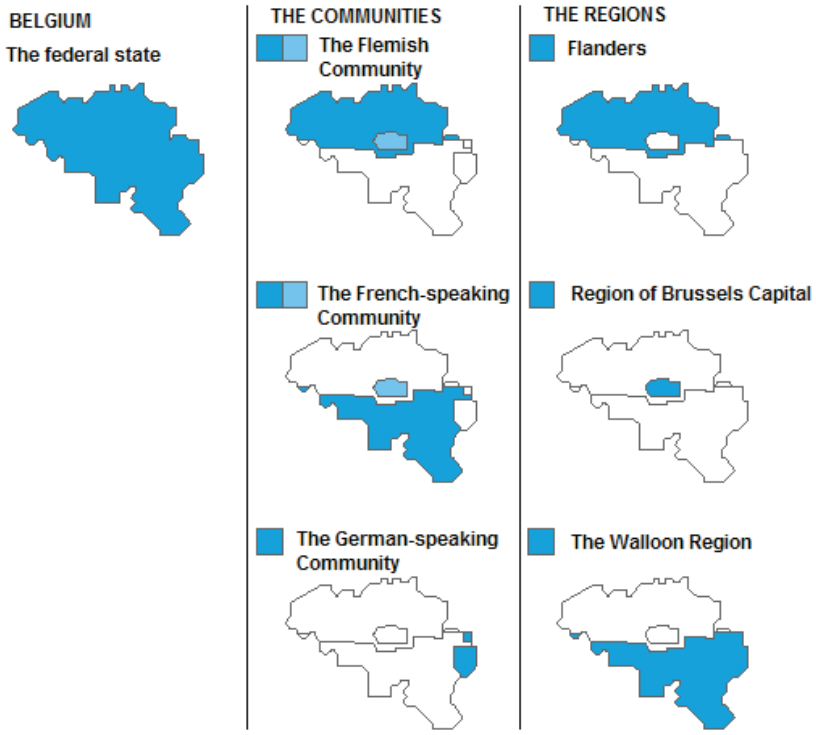
The variables we use in our cross-sectional estimation of redistribution in section 4.2 are the reported per capita values relative to the national average. We see that the cross-sectional difference between Region 1 and Region 2 is higher in terms of net disposable income than for primary income, which explains why the estimate of $1 - \beta_r$ could be larger than unity.

Table 18: Illustration of increasing interregional disparities via a progressive tax system

		PI	Tax	PI-Tax
Region 1	ind 1	50	16.3	33.7
	ind 2	44	13.5	30.5
	ind 3	35	9.6	25.4
Region 2	ind 1	100	39.7	60.3
	ind 2	25	5	20
	ind 3	0	0	0
Country	national avg	63.5	21.027	42.472
Region 1	per capita	43	13.136	29.863
	pc relative to nat. avg	0.6772	0.6247	0.7031
Region 2	per capita	41.666	14.9	26.7667
	pc relative to nat. avg	0.6562	0.7086	0.6302

Appendix B: Illustration of the structure of the Belgian federal state

Figure 11: Structure of the Belgian federal state



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