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On Deficits and Symmetries in a Fiscal Capacity

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Non-Technical Summary

There is a growing debate about complementing the European Monetary Union by a more comprehensive fiscal union. Against this background, this paper emphasizes that there is a trade-off in designing a system of fiscal transfers ("fiscal capacity") in a union between members of different size. A system cannot guarantee symmetric treatment of members and simultaneously ensure a balanced budget.

We compute hypothetical transfers for the Eurozone members from 2001 to 2012 to illustrate this trade-off. Interestingly, a symmetric system that treats shocks in small and large countries symmetrically would have produced large budgetary surpluses. This particularly applies to 2009, the worst year of the financial crisis.

The magnitude of the surpluses that would have arisen under these adverse conditions cast doubt about the suitability of such a system. Under the same time, these figures illustrate the large political pressure that would have resulted and would have pushed toward rule changes.

On Deficits and Symmetries in a Fiscal Capacity

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There is a growing debate about complementing the European Monetary Union by a more comprehensive fiscal union. Against this background, this paper emphasizes that there is a trade-off in designing a system of fiscal transfers ("fiscal capacity") in a union between members of different size. A system cannot guarantee symmetric treatment of members and simultaneously ensure a balanced budget. We compute hypothetical transfers for the Eurozone members from 2001 to 2012 to illustrate this trade-off. Interestingly, a symmetric system that treats shocks in small and large countries symmetrically would have produced large budgetary surpluses in 2009, the worst year of the financial crisis.

Keywords: fiscal union, asymmetric shocks, federal transfers, optimum currency area

JEL Classification: H500, H600

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1. Introduction

Existing federations typically entail a common personal tax base, a social security system, a common unemployment insurance, and, in some cases, a system of federal fiscal transfers across regions. Such a fiscal scheme may act as an automatic insurance against asymmetric macroeconomic shocks in a currency union. Thus, regions that fall behind pay less federal taxes and may receive more benefits, although the effective magnitude of the stabilization may be debateable (Feld and Osterloh, 2013). In contrast, the euro area has no explicit mechanism for absorbing asymmetric shocks. This issue was heavily discussed when the Maastricht Treaty was drafted and the debate has been revived by the European debt crisis.

Increasingly, there are calls for such a transfer system in the Eurozone as a built-in insurance mechanism against asymmetric business cycle shocks. The past-president of the European Council, Van Rompuy, considers "an integrated budgetary framework"that includes a "fiscal capacity"for absorbing asymmetric shocks to be an essential building block for a "stable and prosperous EMU"(Van Rompuy, 2012). The idea is to provide temporary relief for members hit by a negative shock by conditioning the received transfers on the *change* in a performance measure relative to the rest of the union. A performance measure can be the unemployment rate or GDP per capita. Conditioning on the change in the performance measure instead of the level aims to avoid a continuous redistribution from rich to poor regions and the political resistance that would come with this. While the call for a stabilization mechanism has been recently repeated in Juncker (2015), many questions still arise.[1]

This note adds to this discussion by considering the design of an insurance mechanism and computing the amount of transfers that would have taken place in the Eurozone in the last decade. In particular, we highlight a trade-off in designing any system of fiscal transfers in a federation consisting of members of different sizes. There exists no transfer system that can satisfy two conditions simultaneously: 1) A balanced budget of the transfer scheme, and 2) an equal treatment among member countries, where equal treatment is defined as identical transfers per capita triggered by an identical shock. The intuition is that in case of an asymmetric shock, a large region requires a higher amount of transfers than a small region implying higher payments per capita from inhabitants in the smaller regions.

[1]Recent contributions on fiscal stabilisation schemes include Enderlein et al. (2013), Dolls et al. (2013), Fuest and Peichl (2012), De Grauwe (2013), Claeys et al. (2014), and von Hagen (2012).

How large is this trade-off in the Eurozone and what would be the amounts of these transfers in practice? To address these questions, we update the simple transfer system originally proposed by Italianer and Vanheukelen (1992) that defines transfers – recipients and payers – based on the deviation of the *change* in unemployment rate of a member country from the average of that of the rest of the union and caps transfers received at 2 percent of a member' GDP. In this system, the sum of transfers to below-average countries may not match "surpluses" generated in the above-average countries. Interestingly, according to our simulation, a symmetric system that treats shocks in small and large countries symmetrically would have produced a large budgetary surplus of 0.65 percent of Eurogroup GDP in 2009, the worst year of the financial crisis. In a further simulation, we modify the system to ensure a balanced budget and compute the net-contributions for all countries.

2. The Transfer Dilemma in a Federation: A Simple Proof

Assume there are n regions in a federation (a monetary union). The fraction of total population living in region i is x_i, $i = 1, .., n$. Regions are subject to idiosyncratic shocks to income, ϵ_i, affecting per capita performance measured for instance by the unemployment rate or per capita income. Let y_i denote a performance measure and $\bar{y}_i$ the trend (or average) of the federation. A shock can be measured as the deviation between the actual realized value and this trend value: $\epsilon_i = y_i - \bar{y}_i$, where $\epsilon_i > 0$ is a positive income or employment shock.

Definition 1 *A balanced transfer system is a set of differentiable transfer functions that relates the transfer made (or received) by region i to the per capita size of the shock and satisfies the budget constraint:*

$$T_i = f_i(x_1, .., x_n; \epsilon_1, .., \epsilon_n) \tag{1}$$

$$\sum_i^n T_i = 0. \tag{2}$$

As a convention, we define $T_i > 0$ as a net receipt of region i. We can distinguish between two cases.

Case 1 *Symmetric Regions:*

Let $\bar{\epsilon}$ be the average shock among all regions. Then, a linear system of transfers is defined as:

$$T_i = \beta(\epsilon_i - \bar{\epsilon}); \beta > 0 \tag{3}$$

Since $\bar{\epsilon} \equiv \frac{1}{n} \sum_i T_i = 0$, it implies that $\sum_i T_i = \beta(\sum_i \epsilon_i - n\bar{\epsilon}) = 0$.

Case 2 *Asymmetric Regions:*

Let regions be of different sizes. Without loss of generality, consider two identical shocks to the per capita performance variable y_i. An equivalent treatment is a situation in which an inhabitant in the large region receives (pays) the same amount as an inhabitant in the small region. Explicitly,

Axiom 1 *If* $\epsilon_i = \epsilon_j$ *then* $x_i T_i = x_j T_j \iff T_i = (x_i/x_j)T_j$.

Axiom 2 *For any arbitrary* $\hat{\epsilon}$,

$$\frac{1}{x_i} \frac{\partial T_i(\hat{\epsilon})}{\partial \epsilon_i} = \frac{1}{x_j} \frac{\partial T_j(\hat{\epsilon})}{\partial \epsilon_j} \tag{4}$$

Given two shocks with an identical size, Axiom 1 asserts that transfers per capita should be equal in both regions. Axiom 1 and the assumption about differentiability imply Axiom 2. Starting form an arbitrary level of shock, a small identical innovation in the shock in any two or more regions should trigger the same change in transfers per capita in these regions.

Proposition 1 Given arbitrary shock structures and asymmetrically sized regions, there exists no transfer system that complies with Definition 1, Axiom 1, and Axiom 2.

Proof. Consider two regions i and j. Assume that there exists a transfer system that respects the budget constraint and Axiom 1. Starting from the same initial condition $\hat{\epsilon}$, suppose that $d\epsilon_i = d\epsilon_j$. Totally differentiating the budget constraint $\sum_i^n T_i = 0$, we obtain $\frac{\partial T_i(\hat{\epsilon})}{\partial \epsilon_i} = \frac{\partial T_j(\hat{\epsilon})}{\partial \epsilon_j}$. This result contradicts Axiom 2 for $x_i \neq x_j$. ∎

This simple proof by contradiction reveals that in general it is not possible to design a transfer system that satisfies the budget constraint and implies equal per capita transfers.

3. Stabilisation Mechanism in the Eurozone: An Illustration

Intuitively, one can illustrate the trade-off by considering a polar case of a currency union between, e.g., Germany and Luxembourg. The insurance of one percent of German GDP would cost Luxembourg 63 percent of its GDP, whereas Germany can compensate one percent of Luxembourg GDP by paying only 0.016 percent of its GDP.[2] The important question is: how would transfers and the trade-off in the euro area look like in practice? We provide answers by simulating a built-in stabilisation scheme (IV) originally proposed by Italianer and Vanheukelen (1992). Let transfers received be denoted by R_i and contributions by C_i.

$$R_{it} = \left\{ \begin{array}{ll} 0 & \text{if } \Delta u_{it} - \Delta u_{EUt} \ \leq 0 \\ \alpha[\Delta u_{it} - \Delta u_{EUt}]y_i & \text{if } < \Delta u_{it} - \Delta u_{EUt} \ \leq 2 \\ 2\alpha y_i & \text{if } \Delta u_{it} - \Delta u_{EUt} \ > 2. \end{array} \right\} \tag{IV}$$

A member country i receives transfers R_{it} in year t if the percentage point change ("shock") in its unemployment rate Δu_{it} is positive and larger than the area average Δu_{EUt}, which is calculated excluding country i. Similarly to a suggestion in Van Rompoy (2012), IV is designed in terms of the changes and not the levels of the performance variable. The amount of transfers received is given by $\alpha[\Delta u_{it} - \Delta u_{EUt}]y_i$, where y_i denotes GDP. The parameter α is set by IV to 0.01. In addition, the system imposes a limit on the received transfers of 2 percent of GDP.[3] Note that since IV computes the average Δu_{EUt} excluding the own country i, it complies with Axiom 1:[4]

$$\frac{\partial R_i}{\partial \Delta u_{it}} = \alpha[1 - \underbrace{\frac{\partial \Delta u_{EU}}{\partial \Delta u_{it}}}_{=0}]y_i = \alpha y_i. \tag{5}$$

As we know from Proposition 1, a symmetric system cannot be balanced if countries are asymmetric. This leads to the natural question of how large the implied surpluses and deficits

[2]For a similar observation, see von Hagen and Hammond (1998, p. 335).

[3]Italianer and Vanheukelen (1992) discuss the benefits of using unemployment as the reference performance. For our purposes, considering GDP growth instead of unemployment growth would not matter. As clarified by our proof, the trade-off is present independent of the choice of the per capita performance variable.

[4]Note that if averages are computed including the own country then the term $\frac{\partial \Delta u_{EU}}{\partial \Delta u_{it}}$ is not zero. In this case, by definition, the sum of transfers received equals the sum of surpluses of above-average members. However, this means a country's own performance affects the reference measure. For a discussion of such effects within the German federal system see Konrad and Seitz (2003).

of the IV system would be when implemented in reality. For this purpose we use yearly data on past unemployment and GDP for 17 Eurozone member countries. A simplifying assumption is that transfers do not influence GDP. Obviously, there are a number of ways to define the contributions of above average performing countries. An intuitive suggestion is to relate the payments of each contributor to its above-average performance analogously to recipients; i.e., every above-average country denoted by j pays based on $\alpha[\Delta u_{EUt} - \Delta u_{jt}]y_j$.

Figure (1) presents the implied imbalances of the IV system in this symmetric case. In years 2002 to 2005 the insurance scheme would have been in deficit whereas, perhaps quite surprisingly, in the crisis years 2009 to 2012 there would have been a surplus of up to 0.65% of Eurozone GDP. This surplus would have resulted because some large countries, including Germany, had a relatively good labor market performance. In years, in which large countries pay in and small countries are recipients there would have been leftovers in the budget, while the reverse tends to be the case when its mainly larger countries that fall behind in the performance.

Table (1) presents the results for individual countries of implementing System IV. The list of recipient countries in 2009 include Estonia, Ireland, and Spain; each receiving 2 percent of GDP. Spain would have received 2 percent of its GDP for 5 consecutive years from 2008 to 2012 and Greece for three consecutive years from 2010 to 2012. Germany would have been a receiver from 2001 to 2005 with received transfers reaching 1.1 percent of GDP in 2005. Finland would have almost never been a receiver of transfers (apart from very small amounts in 2005 and 2006) whereas Portugal was always a receiver with the exception of one year.

The figures for net-contributers in Table (1) are calculated on the basis of a balanced scheme.[5] To reach a balanced budget we take the total amount of money received ($R_t = \sum_i R_{ti}$) as implied by IV, and complete the transfer scheme as follows:

- Step 1: Analogously to the equation determining transfers received, the amount of money that has to contributed by country j is given by:

$$C_{it} = \min\{\beta[\Delta u_{EUt} - \Delta u_{jt}]y_j, 0.02y_j\} \text{ for any contributor } j. \tag{6}$$

Unlike in the unbalanced system, we cannot impose $\alpha = \beta$, but β is determined en-

[5] For net-receivers, the figures are independent of whether the scheme is balanced or not.

dogenously by the system and $\alpha \neq \beta$ reflects asymmetric treatment of shocks.

- Step 2: We impose the zero-sum transfers' constraint: $\sum_i R_{it} = \sum_j C_{jt}$. This constraint and equation (6) together give a unique value of β:

$$\beta = \frac{R_t}{\sum_j [\Delta u_{EUt} - \Delta u_{jt}] y_j}. \tag{7}$$

  The result of this step may yield $C_{tj} \leq 2$ percent of GDP $\forall\, j$. In this case, the algorithm ends here and the system is balanced without violating the thresholds. That would have been the case in most years. For example, in 2012, the highest contribution was by Finland with 1.8% of GDP. The second possibility gives $C_{lt} > 2$ percent of GDP for at least one country l. In this case, the upper cap is violated and the system would be imbalanced. That was the case in 2005 for Estonia, Slovakia and Spain and in 2003 for Slovakia. In such a case, we have to proceed with the algorithm in order to respect the upper cap and the balanced budget constraint.

- Step 3: If $C_{lt} > 0.02 y_{lt}$ for some donors $l = 1 \ldots L$, then let $C_{lt} = 2$ percent of GDP; i.e, make the 2 percent of GDP binding. This leaves $R_{t,rest} = R_t - \sum_{l=1}^{L} C_{lt}$ for the other donor countries. Accordingly, the value of β for the remaining countries derives as

$$\beta = \frac{R_{t,rest}}{\sum_j \; [\Delta u_{EUt} - \Delta u_{jt}] y_j}. \tag{8}$$

- Step 4: For sake of completeness, in the special case that all donor countries are hitting the cap of 2 percent of GDP, α for the receiving countries has to be reduced to secure a balanced budget. According to our simulations this would not have occurred during 2001-2012.

In 2005, contributions by Estonia, Slovakia, and Spain were capped at 2 percent of GDP and the contributions of other members, e.g., Finland, Greece, and Luxembourg, were increased such that the system is balanced without violating the caps. Additionally, Table (1) indicates heterogeneous country experiences. For instance, in the case of France, Germany, Luxembourg, and the Netherlands, we notice that the width of fluctuations in transfers over the years is relatively narrow compared to smaller members such as Estonia, Slovakia, and Spain, which confirms previous results by von Hagen and Hammond (1998).

4. Summary

We have contributed to the positive analysis of fiscal transfers as an insurance scheme against asymmetric macroeconomic shocks in a monetary union comprised of members of heterogeneous sizes. We show that generally there exists a trade-off between ensuring a symmetric treatment between contributors and receivers and having a balanced transfer system without deficits. We have computed the amount of transfers that in the past would have been received or contributed in the Eurozone with historical unemployment rates and GDP figures. The magnitude of the surpluses that would have arisen in 2009, the worst year of the financial crisis, cast doubt about the suitability of such a system. Alternatively, one may speculate that political pressure may have led to a change of the fiscal capacity. We should add that our illustrations per se have no normative implication.

References

Claeys, G., Darvas, Z. and Wolff, G. (2014), Benefits and Drawbacks of European Unemployment Insurance, Bruegel Policy Brief.

De Grauwe, P. (2013), Design Failures in the Eurozone: Can They Be Fixed?, London School of Economics, Europe in Question, Discussion Paper Series No. 57/2013.

Dolls, M., Fuest, C., Neumann, D. and Peichl, A. (2013), Fiscal Integration in the Eurozone: Economic Effects of Two Key Scenarios, ZEW Discussion Papers, No. 13–106.

Enderlein, H., Guttenberg, L. and Spiess, J. (2013), Blueprint for a Cyclical Shock Insurance in the Euro Area, Notre Europe, Brussels.

Fuest, C. and Peichl, A. (2012), European Fiscal Union: What Is It? Does It work? And Are There Really "No Alternatives"?, *CESifo Forum* 13, 03-09.

Feld, L. and Osterloh, S. (2013), Is a Fiscal Capacity Really Necessary to Complete EMU?, Paper Presented at the Workshop "How to Build a Genuine Economic and Monetary Union" on 30 May 2013.

Italianer, A. and Vanheukelen, M. (1992), Proposals for Community Stabilization Mechanisms: Some Historical Applications, The Economics of Community Public Finance, *European Economy* 5, 493–510.

Juncker, J.-C. (2015), Completing Europe's Economic and Monetary Union, Report in Close Cooperation with D. Tusk, J. Dijsselbloem, M. Draghi and M. Schulz. Brussels.

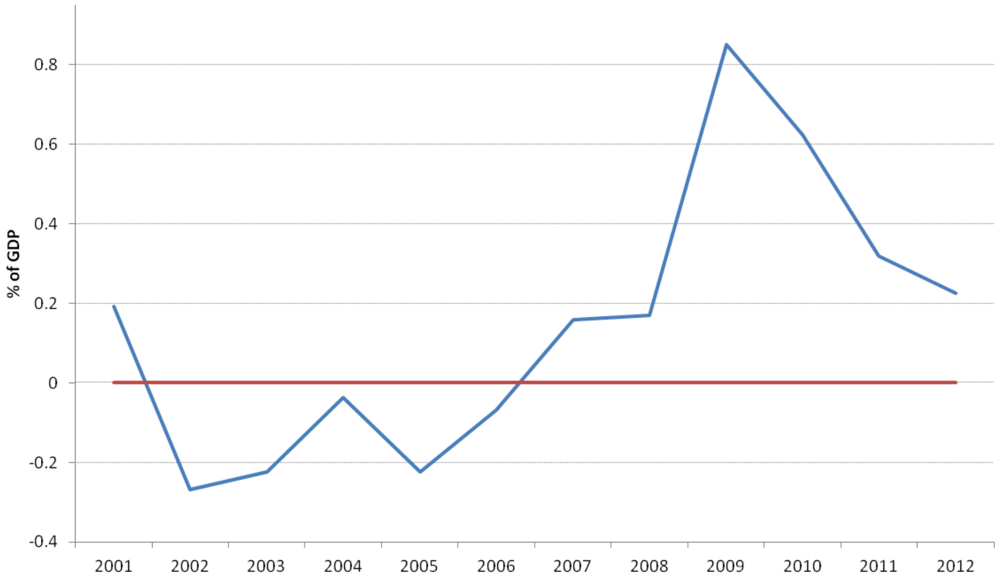
Konrad, K. and Seitz, H. (2003), Fiscal Federalism and Risk Sharing in Germany: The Role of Size Differences, in Cnossen, S. and sinn, H.-W. (eds), Public Finance and Public Policy in the New Century, Cambridge, MIT Press, 469–489.

Van Rompuy, H. (2012), Towards a Genuine Economic and Monetary Union, Report by President of the European Council Herman Van Rompuy, Brussels, December 2012.

von Hagen, J. (2012), Common Pools – Why a European Fiscal Union will Make Things Worse, *The Bonn Journal of Economics* 1 (1), pp. 65–73.

von Hagen, J. and Hammond, G.W. (1998), Regional Insurance against Asymmetric Shocks: An Empirical Study for the European Community, Manchester School 66, 331–353.

Figure 1: Implied Imbalances of the transfer system IV



Note: The figure plots the difference between the amount of received transfers and contributions as implied by the system IV for $\alpha = \beta$ and based on realized annual data for GDP and unemployment.

Table 1: Fiscal Transfers in the Eurozone

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
β		0.011	0.012	0.014	0.013	0.027	0.012	0.008	0.006	0.003	0.005	0.005	0.005
Austria	R	0.006	0.003		0.004	0.004	0.003	0.005					
	C			0.006					0.004	0.003	0.006	0.001	0.006
Belgium	R	0.003	0.006	0.002		0.002	0.005	0.001					
	C				0.0004				0.003	0.003	0.001	0.006	0.005
Cyprus	R			0.001	0.003	0.008	0.000	0.002			0.004	0.016	**0.020**
	C	0.004	0.009						0.001	0.001			
Estonia	R								0.009	**0.020**	**0.020**		
	C	0.005	**0.020**	0.010	0.008	**0.020**	0.016	0.003				**0.020**	0.018
Finland	R						0.000	0.001					
	C	0.001	0.004	0.008	0.005	0.008			0.003	0.0004	0.002	0.003	0.007
France	R			0.002	0.002	0.001	0.007	0.001					
	C	0.003	0.003						0.004	0.001	0.003	0.001	0.004
Germany	R	0.007	0.006	0.009	0.006	0.012							
	C						0.005	0.008	0.009	0.006	0.010	0.008	0.011
Greece	R	0.001			0.006			0.003			**0.020**	**0.020**	**0.020**
	C		0.009	0.016		0.014	0.004		0.004	0.0004			
Ireland	R	0.003	0.003				0.008	0.011	0.017	**0.020**	0.014	0.008	
	C			0.005	0.004	0.0003							0.007
Italy	R							0.002	0.007		0.001		0.012
	C	0.006	0.012	0.010	0.009	0.007	0.003			0.003		0.0002	
Luxemburg	R	0.003	0.004	0.007	0.010		0.007	0.005	0.007			0.002	
	C					0.008				0.005	0.006		0.005
Malta	R	0.015				0.002	0.003	0.005					
	C		0.006	0.003	0.009				0.003	0.003	0.003	0.002	0.007
Netherlands	R	0.000	0.003	0.007	0.007	0.003		0.001			0.003		
	C						0.003		0.003	0.004		0.001	0.002
Portugal	R	0.007	0.008	0.010	0.002	0.013	0.007	0.012		0.002	0.009	0.009	0.017
	C								0.002				
Slovakia	R	0.012			0.005					0.006	0.019		
	C		0.012	**0.020**		**0.020**	**0.020**	0.012	0.009			0.004	0.005
Slovenia	R	0.001				0.003	0.002				0.009	0.009	
	C		0.003	0.001	0.008			0.002	0.003	0.001			0.003
Spain	R		0.007				0.000	0.007	**0.020**	**0.020**	0.019	0.019	**0.020**
	C	0.008		0.008	0.010	**0.020**							

Note: R denotes received transfers according to system IV. C denotes implied contributions by the algorithm described in the text. All figures are expressed as ratios to GDP. β is computed as described in the text, and it measures a country's contribution, as a fraction of GDP, for each percentage point the unemployment rate is lower than the rest of the area average. In 2005, the value of β corresponds to contributors for which the cap of 2 percent of GDP is not binding.

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