

External rebalancing in the EMU, the case of Portugal

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Abstract

This paper presents the argument for a fiscal devaluation as a policy to adjust to external imbalances within the eurozone applied to the case of Portugal. From 1995 to 2010 Portugal has accumulated a negative international asset position of 110 percent of GDP. In a developed and aging economy the number is astonishing and any argument to consider it sustainable must have relied on extremely favorable growth forecasts. Portuguese policy options are reduced in number: no autonomous monetary policy, no currency to devalue, and limited discretion in changing fiscal deficits and government debt. To start the necessary deleveraging, a remaining possible policy is a budget-neutral change of the tax structure that increases private saving and net exports. An increase in the value added tax (VAT) and a decrease in the employer's social security contribution tax (ESSC) can achieve the desired outcome in the short run if they are complemented with wage moderation or if nominal wages are sticky. To obtain a substantial improvement in competitiveness and a large decrease in consumption, the changes in the tax rates have to be substantial: a swap of 1 percentage point of GDP from social security contributions to VAT revenues achieves a decrease in real imports

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of 13.6 percent within 8 quarters and an improvement of real exports of 8.4 percent within 5 quarters without significantly affecting the fiscal budget. The increase in the effective VAT rate could be obtained by raising part of the reduced VAT rates to the general VAT rate. Finally, in theory, coordinated fiscal devaluations could be the basis for competitiveness realignments within the monetary union.

1. Introduction

Portugal has been running large current account deficits every year from 1995 that have accumulated to an astonishing minus 110 percent of GDP net external asset position. The sustainability of such a negative external position is questionable and must rely on fantastic productivity growth expectations. The recent global financial crisis appears to have anticipated the international investors reality check on those future expectations with the result of a large increase in the cost of external financing that ultimately forced Portugal to ask international assistance in 2011. The external rebalancing is difficult as the degrees of freedom of the Portuguese authorities are limited in number: they have no autonomous monetary policy, no currency to devalue, and little discretion in fiscal policy as deficit limits and debt targets are set by the Stability Growth Pact and the post-crisis consensus on medium-term fiscal consolidation. One possibility that remains is to change the fiscal policy mix for a given budget deficit. The purpose of this paper is to explore the effects of a “fiscal devaluation”¹ obtained through a tax swap

¹See Domingo and Cottani (2010) for an early proposal of fiscal devaluation in Portugal, Greece and Spain.

between employers' social security contributions and taxes on consumption² applied to the case of Portugal. The traditional objective of a currency devaluation is to achieve an improvement in external competitiveness to expand exports and reduce imports and, in this way, stimulate the economy. A fiscal devaluation corresponds to a change in the fiscal structure of a country aimed at achieving similar objectives. Several authors have studied different aspects of the question. The classical paper on the effects of a VAT on competitiveness for a small price-taking neoclassical economy is Feldstein and Krugman (1989). These authors find that "the substitution of value-added taxation for income taxation is likely to have an uncertain short-run effect on a nation's net exports but is likely to reduce net exports in the longer term". In their framework, the decrease in the income tax has a substitution effect that favors saving, and therefore the trade balance, in the first period. However when VAT is selective and fall more heavily on traded goods, it will distort demand towards nontradables pulling out resources from the tradable sector and decreasing net exports in the second period. More recently, Lipinska and Von Thadden (2009) use a two-country monetary union DSGE model to study unilateral shifts that direct the tax structure more strongly toward indirect taxes³. They find that the effects following such a shift are very small. Implicitly many recent papers that contain open economy models with taxes are related to this work. Most of these works introduce into an

²Germany employed such a policy in 2007 when they increased VAT by 3 percent and decreased employers' social security contributions. More recently France has also adopted a similar policy.

³Their motivation is broad but their first footnote refers to "the substantial increase in German VAT by 3pp in 2007 which was partly offset by reduced contributions to the unemployment insurance scheme". An exact example of fiscal devaluation.

economy that is neoclassical in nature in the long-run, some new-Keynesian feature in the short run. The choice of which feature to introduce in the model obviously has important consequences. For example, the cited Lipinska and Von Thadden (2009) which explicitly study the effects of a fiscal devaluation through a tax swap between VAT and labor income taxes use a model with price rigidities but competitive labor markets with flexible wages. Below I show that the flexible nominal wage assumption has important consequence as it neutralizes the short run effects of the fiscal devaluation. In other words with flexible nominal wage the effects of a fiscal devaluation are purely neoclassical in nature. Since the first version of this paper, several authors have examined both theoretically and empirically the question of a fiscal devaluation. Farhi, Gopinath and Itskhoki (2011), follow an approach similar to Adino, Correia and Teles (2009) and perform the useful theoretical exercise to find a set of tax instruments that allow to replicate the allocation achieved by a nominal devaluation under a new Keynesian open economy environment. They study several complex environments, including alternative pricing assumptions, arbitrary degree of asset market completeness and anticipated and not anticipated policies. They show that in some cases to obtain equivalence between fiscal and nominal devaluation, the value added increase coupled with the social security labor tax reduction must be augmented with some other policies such as changes in income taxes and consumption tax. The aim of this paper being purely applied, namely to study alternative policies to nominal devaluation to improve Portugal external position, and not equivalent policies, the model I present is much less ambitious and has the limited the scope to organize thoughts while the focus

is on the empirical results. De Mooij and Keen (2012) analyze a panel data of OECD countries to estimate the empirical effects of a swap between value added and social security labor taxes. They found that a shift of one percent of GDP from social security contributions to VAT would increase net exports by 3.44 percent of GDP for euro countries on impact and with an half life of 3.5 years. In this paper I estimate the effect of a fiscal devaluation for Portugal using a structural vector autoregression technique. The advantage relative to a panel data is the specificity of the empirical estimate for a single country as opposed to a an average estimate for very different OECD countries. Obviously idiosyncratic differences are handled in panel data, but second round effects and interactions in time and across large OECD countries of a fiscal devaluation, are likely to blur the true estimate for a small open economy such as Portugal. The paper begins by illustrating Portugal's macroeconomic evolution during the first decade of the euro. The third and fourth sections lay out a model to offer a qualitative assessment of the dynamic outcomes of the the tax swap. I show that the suggested tax swap can in theory achieve the desired outcomes in terms of competitiveness and consumption if complemented with wage stickiness. I also study the effects of a temporary version of the tax swap and show that it achieves a sharper improvement in the current account that accelerate the rebalancing. The fifth section moves to the empirical analysis and estimates the likely effects of the tax swap for the Portuguese economy. The sixth section concludes.

2. Portugal in the Euro

Figure (2) shows the evolution of Portugal's aggregate demand since the convergence towards the Euro until 2010. It shows that after the Euro entrance, private consumption as a share of GDP increased from 63 to 68 percent, private investment decreased from 28 to 19 percent, the trade deficit oscillated around 9 percent and government consumption went from 19 to 22 percent. The latter declined from 2005-6 but then started to increase again in 2008 when the global crisis started. The accumulated deficit of the last 15 years is reflected in the large negative net external position⁴ shown in Figure (1), which, according to the IMF, reached the all time record of 113 percent of GDP in 2009. A lucid and prescient account on the Portuguese economy evolution is given by Blanchard⁵ (2007), and can be synthesized as follows: 1) from 1995 to 2001 the participation in the ERM and the buildup of the euro caused a convergence in terms nominal interest rates⁶ coupled with expectations of convergence in productivity. The result was an increase in both consumption and investment. The expectations of real convergence justified a benign interpretation of the current account deficit increase; 2) from 2001

⁴Figure 1 shows the NIIP, which exists at annual frequency, together with the accumulated current account deficits. Until 2009 the two are almost identical. In 2010 a favorable change in the prices (capital gains) of assets and liabilities allowed Portugal to maintain the NIIP at 110 percent of GDP even if the current account deficit was close to -10 percent. A lucky year or a very good portfolio management.

⁵The abstract of Blanchard (2007) is self explanatory: "The Portuguese economy is in serious trouble: Productivity growth is anemic. Growth is very low. The budget deficit is large. The current account deficit is very large."

⁶Financial markets did not decouple country risk from currency risk during the first decade of the euro as they were unable to identify the relation between national debt, sovereign debt and national fiscal boundaries inside a single currency area. Admittedly they were not alone.

to 2007 real convergence did not occur and the boom turned into a bust. The current account continued to increase as the real exchange rate appreciated and competitiveness plummeted. The reality check on real convergence expectations shifted the interpretation of the current account deficits from benign to malign but Euro membership shielded Portugal from any difficulty to finance additional increases in debt as the interest rates spreads with the core euro zone countries were almost nonexistent.

2.1. The expected adjustment of Portugal

Figure (2) suggests that to correct its imbalances *Portugal should increase private saving and improve its net exports*. To see this formally consider the following thought experiment: describe the process that brought Portugal to its 2010 state with a non identified and unexpected reduced form aggregate shock, and compute the equilibrium responses of a canonical New Keynesian small-open economy that belongs to a monetary union⁷. For simplicity, in the simulation I assume that the long-run equilibrium (steady state) of the economy has a balanced current account and net foreign asset position but suddenly, because of the shock, finds itself with a negative NIIP of 110 percent of GDP and a current account deficit of 10 percent of GDP. Figure (3) shows that after such a shock the economy response is to reduce consumption and increase saving. The decrease in demand deflates the economy and, as the country has some monopoly power over its terms of trade, this increases competitiveness and allows to run a positive trade balance. Net foreign debt is repaid in time with the generated trade balance surpluses.

⁷The model is described below in section 3.

Notice that resources, here employment, shift from the non tradable to the tradable sector. This adjustment is known as an internal devaluation. In reality, there was no such shock but a lengthy process, illustrated in Figure (2), that brought the economy to the current position. In particular this process has been characterized by the absence of the self equilibrating forces implicit in the internal devaluation mechanism shown in Figure (3). This last observation suggests that the market based mechanism, the internal devaluation, is at best slow in Portugal. Two possible impediments to the internal devaluation are the difficulty to transfer resources from the non tradable sector to the tradable sector and nominal downward wage rigidity that precludes prices to fall. In the pre-EMU era, the natural policy to help the adjustment was to devalue the currency. Today Portugal must find policies that permit a “synthetic” devaluation. In the current limited policy option framework, this could be achieved with a decrease in wages and/or a tax swap from employers’ contributions to social security to VAT⁸. The former solution is politically difficult and possibly unconstitutional in Portugal. The latter can achieve an increase in savings by reducing the attractiveness of consumption and an increase in competitiveness by decreasing labor costs. I now turn to the description of the model underlying Figure (3) and the implementation of a fiscal devaluation within that model.

⁸In 2011, Portugal asked for external assistance to a trio composed by the European Union, the European Central Bank and the International Monetary Fund and received a loan of 50 percent of GDP and tied his hands to an adjustment program that would favor the internal devaluation. The program contained the policy presented in this work but the Portuguese Government did not implement it.

3. A model

I use the framework⁹ by Farhi and Werning (2012) who develop an incomplete financial markets version of the Gali and Monacelli (2005) model of a small open economy. To their framework I add nominal wage stickiness as in Erceg, Henderson and Levin (2000) and a non tradable sector. The reader familiar with this literature can skip the presentation of the full model and go directly to the discussion of the fiscal devaluation in section 4 that uses a more intuitive and simplified log-linear representation of the model. For a full discussion of the fiscal devaluation in the complete New-Keynesian non-linear model see Farhi, Gopinath and Itskhoki (2011).

3.1. Countries

There is a continuum of countries indexed by $i \in [0, 1]$ of measure one. The small open economy is called Home and can be thought as a particular value $H \in [0, 1]$ that takes as given the rest of the world which is called Foreign.

3.2. Households

The model abstracts from uncertainty and only consider one-time unanticipated shocks to the relevant tax rates. Home has a continuum of households indexed by $h \in [0, 1]$. The household seeks to maximize a standard constant elasticity of substitution

$$\sum_{s=0}^{\infty} \beta^s \left[\frac{C_{t+s}^{1-\frac{1}{\sigma}}(h)}{1-\frac{1}{\sigma}} - \chi \frac{N_{t+s}^{1+\phi}(h)}{1+\phi} \right],$$

⁹This version of the paper uses a different version of New Keynesian small open economy model relative to the first version. The Farhi Werning (2012) version is certainly more readable.

where $N_t(h)$ is the quantity of labor supplied. Each household is assumed to specialize in the supply of a different type of labor, also indexed by $h \in [0, 1]$. Thus, σ is the elasticity of intertemporal substitution, ϕ determines the elasticity of the marginal disutility of work, and χ is an exogenous preference parameter. Each household has some monopoly power in the labor market, and posts the (nominal) wage at which it is willing to supply specialized labor services to firms that demand them. Following Calvo (1983), each period only a fraction $1 - \delta_w$ of households, drawn randomly from the population, reoptimize their posted nominal wage. Under the assumption of full consumption risk sharing across households, all households resetting their wage in any given period will choose the same wage, because they face an identical problem. Let me drop the index h to simplify notation. C_t is a composite consumption index defined by

$$C_t = \left[(1 - \alpha_T)^{\frac{1}{\xi}} (C_{N,t})^{\frac{\xi-1}{\xi}} + \alpha_T^{\frac{1}{\xi}} (C_{T,t})^{\frac{\xi-1}{\xi}} \right]^{\frac{\xi}{\xi-1}}.$$

$C_{N,t}$ is an index of consumption of domestic non traded goods given by a constant substitution elasticity aggregator

$$C_{N,t} = \left[\int_0^1 (C_{N,t}(j))^{\frac{\epsilon-1}{\epsilon}} dj \right]^{\frac{\epsilon}{\epsilon-1}}$$

where $j \in [0, 1]$ denotes an individual good variety. $C_{T,t}$ is a composite consumption index of traded goods defined by

$$C_{T,t} = \left[(1 - \alpha)^{\frac{1}{\eta}} C_{H,t}^{\frac{\eta-1}{\eta}} + \alpha^{\frac{1}{\eta}} C_{F,t}^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}},$$

where $C_{H,t}$ is an index of consumption of domestic goods given by a

constant elasticity of substitution aggregator

$$C_{H,t} = \left[\int_0^1 (C_{H,t}(j))^{\frac{\epsilon-1}{\epsilon}} dj \right]^{\frac{\epsilon}{\epsilon-1}},$$

where $j \in [0, 1]$ denotes an individual good variety. Similarly $C_{F,t}$ is a consumption index of imported goods given by

$$C_{F,t} = \left[\int_0^1 (C_{i,t})^{\frac{\gamma-1}{\gamma}} di \right]^{\frac{\gamma}{\gamma-1}},$$

where $C_{i,t}$, is in turn, an index of the consumption of varieties of goods imported from country i , given by

$$C_t^i = \left[\int_0^1 (C_t^i(j))^{\frac{\epsilon-1}{\epsilon}} dj \right]^{\frac{\epsilon}{\epsilon-1}}.$$

Thus, ξ is the elasticity of substitution between tradable and non tradable, ϵ is the elasticity of substitution between varieties produced within a given country, η is the elasticity between domestic and foreign goods, and γ is the elasticity between goods produced in different foreign countries. The parameter α indexes the degree of home bias, and can be interpreted as a measure of openness. The parameter α_T denotes the share of consumption allocated to traded goods. Maximization of utility is subject to a sequence of budget constraints of the form

$$(1+\tau_{c,t}) \left(\int_0^1 P_{N,t}(j) C_{N,t}(j) dj + \int_0^1 P_{H,t}(j) C_{H,t}(j) dj + \int_0^1 \int_0^1 P_{i,t}(j) C_{i,t}(j) dj di \right) + B_{t+1} + \int_0^1 B_{i,t+1} di \leq R_{t-1} B_t + \int_0^1 R_{i,t-1} B_{i,t+1} di + W_t N_t + \Pi_t + T_t$$

where $\tau_{c,t}$ is a proportional tax on consumption, $P_{H,t}(j)$ is the price of domestic variety j , $P_{i,t}$ is the price of variety j imported from country i ,

W_t is the nominal wage, Π_t represents nominal profits and T_t is a nominal lump sum transfer. B_{t+1} is a domestic nominal bond, R_t is the nominal gross interest rate on the nominal bond, $B_{i,t+1}$ is bond holding of country i of home household nominal gross interest rate equal to $R_{i,t}$. By solving the optimization problem, households decide how much to consume and save, how to allocate their consumption expenditure across goods, and set the nominal wage at which they are willing to supply labor. The optimal allocation of any given expenditure within each category of goods yields the demand functions

$$C_{N,t}(j) = \left(\frac{P_{N,t}(j)}{P_{N,t}} \right)^{-\epsilon} C_{N,t},$$

$$C_{H,t}(j) = \left(\frac{P_{H,t}(j)}{P_{H,t}} \right)^{-\epsilon} C_{H,t},$$

$$C_{i,t} = \left(\frac{P_{i,t}}{P_{F,t}} \right)^{-\gamma} C_{F,t},$$

$$C_{i,t}(j) = \left(\frac{P_{i,t}(j)}{P_{i,t}} \right)^{-\epsilon} C_{i,t}.$$

$P_{N,t} = \left[\int_0^1 P_{N,t}(j)^{1-\epsilon} dj \right]^{\frac{1}{1-\epsilon}}$, $P_{H,t} = \left[\int_0^1 P_{H,t}(j)^{1-\epsilon} dj \right]^{\frac{1}{1-\epsilon}}$, $P_{F,t} = \left[\int_0^1 P_{i,t}^{1-\gamma} di \right]^{\frac{1}{1-\gamma}}$, $P_{i,t} = \left[\int_0^1 P_{i,t}^i(j)^{1-\epsilon} dj \right]^{\frac{1}{1-\epsilon}}$ are the price indexes for each category of goods. The optimal allocation of expenditure in tradable goods between domestic and foreign implies

$$C_{H,t} = \left(\frac{P_t}{P_{H,t}} \right)^\eta (1 - \alpha) C_{T,t},$$

$$C_{F,t} = \left(\frac{P_t}{P_{F,t}} \right)^\eta \alpha C_{T,t},$$

where $P_{T,t} = \left[(1 - \alpha) (P_{H,t})^{1-\eta} + \alpha (P_{F,t})^{1-\eta} \right]^{\frac{1}{1-\eta}}$ is the tradable price index. Finally the optimal allocation of expenditure between tradable and non trad-

able is given by

$$C_{N,t} = \left(\frac{P_t}{P_{N,t}} \right)^\xi (1 - \alpha_T) C_t,$$

$$C_{T,t} = \left(\frac{P_t}{P_{T,t}} \right)^\xi \alpha_T C_t,$$

where $P_t = \left[(1 - \alpha_T) (P_{N,t})^{1-\xi} + \alpha_T (P_t)^{1-\xi} \right]^{\frac{1}{1-\xi}}$ is the consumer price index (CPI). A household resetting its wage $W_t^r(h)$ in period t , maximizes its utility subject to the budget constraint and the demand for labor services

$$N_{t+k|t}(h, j) = \left(\frac{W_t^r(h)}{W_{t+k}} \right)^{-\epsilon_w} N_{t+k}(j),$$

where $W_t = \left[\int_0^1 W_t(h)^{1-\epsilon_w} dh \right]^{\frac{1}{1-\epsilon_w}}$ is an aggregate wage index. The optimality for the wage setting condition is

$$\sum_{k=0}^{\infty} (\beta \delta_w)^k \left\{ N_{t+k} C_{t+k}^{-\frac{1}{\sigma}} \left(\frac{W_t^r}{P_{t+k}} - \frac{\epsilon_w}{\epsilon_w - 1} MRS_{t+k} \right) \right\} = 0,$$

where $MRS_t = (1 + \tau_t^c) \frac{N_t^\phi}{C_t^{-\frac{1}{\sigma}}}$ is the marginal rate of substitution and where the complete risk sharing assumption allows to omit to index the condition by households.

3.3. Firms

The economy is composed of two sectors, the tradable denoted with the subscript T and the non tradable sector denoted with the subscript NT . The non traded goods are consumed only at Home while the traded goods can be exported and imported. There is a continuum of firms indexed by $j \in [0, 1]$, each of which produces a differentiated good with the following technology

$$Y_{s,t}(j) = N_{s,t}(j)^{1-a} \text{ for } s = NT, T.$$

Given that the treatment of the two sectors is symmetric up to the market clearing I will omit the subscript that indexes the sector. $Y_t(j)$ denotes the output of good j , $a \in [0, 1]$ parametrizes the degree of decreasing returns in labor, and $N_t(j)$ is an index of labor input used by firm i and defined by

$$N_t(j) = \left[\int_0^1 N_t(j, h)^{\frac{\epsilon_w - 1}{\epsilon_w}} dh \right]^{\frac{\epsilon_w}{\epsilon_w - 1}},$$

where $N_t(j, h)$ is the quantity of type- h labor employed by firm i in period t . The parameter ϵ_w represents the elasticity of substitution among labor varieties. The demand schedule for each labor type is obtained by cost minimization

$$N_t(j, h) = \left(\frac{W_t(h)}{W_t} \right)^{-\epsilon_w} N_t(j),$$

for all $j, h \in [0, 1]$, where $W_t(h)$ is the nominal wage for type h labor and $W_t = \left[\int_0^1 W_t(h)^{1-\epsilon_w} dh \right]^{\frac{1}{1-\epsilon_w}}$ is an aggregate wage index. All firms face an iso-elastic demand schedule (specified below). Firms must pay a social contribution in the form of a proportional tax, $\tau_{w,t}$, on their wage bill so that their real marginal cost deflated by home PPI is given by $MC_t = \frac{1+\tau_{w,t}}{A_{H,t}} \frac{W_t}{P_{H,t}}$. Finally each firm may reset its price with probability $1 - \delta_p$ in any given period independently of the time elapsed since the last adjustment. Those firms that get to reset their price choose a reset price P^r to solve

$$\sum_{k=0}^{\infty} (\delta_p)^k \left\{ \Psi_{t,t+k} Y_{t+k|t}(j) (P_t^r(j) - P_{H,t+k}(j) MC_{t+k}) \right\}$$

where $Y_{t+k|t}(j) = \left(\frac{P_t^r(j)}{P_{H,t+k}} \right)^{-\epsilon} Y_{t+k}$ and $\Psi_{t,t+k} = \beta^k \left(\frac{C_{t+k}}{C_t} \right)^{-\sigma} \left(\frac{P_t}{P_{t+k}} \right)$ is the stochastic discount factor.

3.4. International Prices

We need two define to key prices. The real exchange rate is

$$Q_t = \frac{P_t^*}{P_t},$$

where $P_t^* = \left[\int_0^1 P_{i,t}^{1-\gamma} di \right]^{\frac{1}{1-\gamma}}$ and the terms of trade is

$$S_t = \frac{P_{F,t}}{P_{H,t}} = \left(\int_0^1 S_{i,t}^{1-\gamma} di \right)^{\frac{1}{1-\gamma}},$$

where $S_{i,t} = P_{i,t}/P_{H,t}$.

3.5. Aggregate Conditions

Given the assumed wage setting structure, the evolution of the aggregate wage index is given by

$$W_t = \left[\delta_w W_{t-1}^{1-\epsilon_w} + (1 - \delta_w)(W_t^r)^{1-\epsilon_w} \right]^{\frac{1}{1-\epsilon_w}},$$

while the assumed price setting structure implies

$$P_t = \left[\delta_p P_{t-1}^{1-\epsilon} + (1 - \delta_p)(P_t^*)^{1-\epsilon} \right]^{\frac{1}{1-\epsilon}}.$$

Market clearing in the tradable goods market requires that

$$Y_{H,t}(j) = C_{H,t}(j) + \int_0^1 C_{H,t}^i(j) di,$$

holds in every period. Letting aggregate output be defined as $Y_{H,t} \equiv \left(\int_0^1 Y_{H,t}(j)^{\frac{\epsilon-1}{\epsilon}} dj \right)^{\frac{\epsilon}{\epsilon-1}}$ it follows that

$$Y_{H,t} = \left(\frac{P_{H,t}}{P_t} \right)^{-\eta} \left[(1 - \alpha) C_t + \alpha \int_0^1 (Q_t^i)^\eta (S_{i,t} S_{i,t}^i)^{\gamma-\eta} C_t^i di \right].$$

Market clearing in the non tradable sector requires that

$$Y_{N,t}(j) = C_{N,t}(j)$$

holds in every period. It follows that $Y_{N,t} = C_{N,t}$. Market clearing in the labor market requires that

$$N_t = N_{N,t} + N_{T,t}$$

where the aggregate labor supply is given by

$$N_t = \left((1 + \tau_{c,t})^{-1} \chi^{-1} \frac{W_t}{P_t} C_t^{-\sigma} \right)^{\frac{1}{\phi}} \int_0^1 \left(\frac{W_t(h)}{W_t} \right)^{\frac{1}{\phi}} dh,$$

and

$$N_{s,t} = \frac{Y_{s,t}}{A_{H,t}} \int_0^1 \left(\frac{P_{s,t}(j)}{P_{s,t}} \right)^{-\epsilon} dj, \text{ for } s = N, T.$$

3.6. Fiscal Policy

The fiscal authority is assumed to rebate tax income to households

$$\tau_{c,t} C_t + \tau_{w,t} W_t N_t = T_t = \int_0^1 T_t(h) dh.$$

3.7. Monetary policy

The central bank runs a common monetary policy for all countries, responding only to aggregate union-wide variables (U) that is represented by a Taylor Rule

$$R_t^* = \bar{R} \left(\frac{P_t^U}{P_{t-1}^U} \right)^{\phi_p},$$

where ϕ_p denotes the feedback coefficient associated with the union wide inflation gap (where the target is assumed to be zero). Given the focus on the Home economy, the policy interest rate is exogenous and equal to \bar{R} .

Finally the nominal interest rate equals the policy rate plus a risk premium related to the difference of net external position NFA from its steady state value:

$$R_t = \bar{R} + \psi \left(e^{\left(\frac{NFA_t}{P_t} - \frac{NFA}{P} \right)} - 1 \right).$$

This completes the description of the model.

3.8. *The internal devaluation in the model*

Figure (3) is obtained by simulating the transitional dynamics of the model after an unexpected shock takes the economy to an initial position with NFA equal to -110% of GDP and the current account equal to -10% of GDP. The simulation is performed using benchmark parameters found in the literature¹⁰. The transitional dynamics that correspond to the adjustment towards steady state were commented in subsection (2.1) above. The presumption is the transitional dynamics are slow in practice and that the policy maker would wish to accelerate them. This is the scope of the fiscal devaluation to which I now turn.

4. Fiscal devaluation in the log-linear model

To discuss the central mechanism of the fiscal devaluation I present a log-linear approximation around the steady state of the above non linear model. I can follow this path when the fiscal devaluation is neutral in the long run on the allocations so that the initial and the final steady states are the same. Given that the objective is to understand the effects of a fiscal devaluation on competitiveness I start by the labor-production side of the economy and

¹⁰(for example Gali and Monacelli (2005)): $\phi = 3, \beta = 0.99, \sigma = 1, \epsilon = 6, \epsilon_w = 6, \alpha = 0.4, a = 0, \xi = 0.75, \eta = 1.5, \delta_p = 2/3, \delta_w = 3/4, \gamma = 1, \psi = 0.0025, \phi_p = 1.5$.

abstract from the non-tradable sector. Recall from the previous section that in their role of workers, households have some monopoly power, which allows them to set the wage, w_t , for the labor services they supply, as a mark-up μ_w over their marginal rate of substitution mrs_t

$$mrs_t = \frac{1}{\sigma}c_t + \phi n_t + \tau_{c,t} \quad (1)$$

where c_t is consumption, n_t is labour, $\tau_{c,t}$ is the effective consumption tax¹¹. Domestic firms produce using only labor and have market power in the goods market which allows them to set the price of the good they produce, p^H , as a mark-up, μ_p , over their marginal cost, mc_t

$$mc_t = \tau_{w,t} + (w_t - p_t) + \frac{a}{1-a}y_t - \log(1-a) \quad (2)$$

where $\tau_{w,t}$ is the social security contribution tax rate, p_t the consumption price index, y_t is output and $a \in [0, 1]$ parametrizes the degree of decreasing returns in labor. These two equations are key to the fiscal devaluation. Consider a decrease in the social security contributions tax rate $\Delta\tau_{w,t} < 0$, where Δ is the first difference operator. Other things equal, the marginal cost of the firm decreases, which allows the firm to lower its price p^H . This is the channel through which the fiscal devaluation improves competitiveness. Second consider an increase in the consumption tax $\Delta\tau_{c,t} > 0$. Other things equal, the marginal rate of substitution increases pushing the worker to ask for a higher wage. Combining the two changes in taxes it is immediate to

¹¹Recall from the previous section that σ is the intertemporal elasticity of substitution and ϕ is the labor supply elasticity

see that if $\Delta\tau_{c,t} = -\Delta\tau_{w,t}$, call it a “supply neutral” tax swap, the lower taxes effect on the marginal cost is exactly offset by the increase in the nominal wage, leaving the initial price set by the firm unchanged. In terms of competitiveness, when prices and wages are flexible, this proportional tax swap is neutral on unit labor costs and only increases the real wage.

The Calvo price adjustment, characterized by random price durations, leads to a New Keynesian Phillips Curve for domestic price inflation

$$\pi_t^H = \beta E_t \pi_{t+1}^H + \kappa^p m c_t \quad (3)$$

where β is the discount factor and κ^p the elasticity of domestic inflation to the marginal cost. Nominal price rigidity does not alter the neutral outcome of the proportional tax swap: as marginal costs did not change, there is no incentive for firms to change prices so that any impediment to price adjustment is irrelevant. Workers also face Calvo-type constraints on the frequency with which they can adjust wages and this leads to a New Keynesian Phillips Curve for domestic wage inflation

$$\pi_t^W = \beta E_t \pi_{t+1}^W + \kappa^w (m r s_t - (w_t - p_t)) \quad (4)$$

where π_t^W is wage inflation and κ^w the elasticity of domestic wage inflation to the gap between the marginal rate of substitution and the nominal wage. Now wage setters want to ask a higher nominal wage after the increase in $\tau_{c,t}$, but nominal wage rigidity implies that nominal wage will fully reflect the increase in the marginal rate of substitution only after a period of adjustment. During the time when nominal wages adjust to their higher level, the decrease

in the social security contribution decreases the marginal cost of the firm and allows firms to decrease prices. In other words nominal price rigidity is irrelevant while nominal wage rigidity is *necessary* for the proportional tax swap to affect competitiveness in the short run.

The intertemporal consumption-saving decision is described by a standard intertemporal condition

$$c_t = c_{t+1} - \sigma (i_t - [\pi_{t+1} + \Delta\tau_{c,t+1}] - \rho) \quad (5)$$

where i_t is the one period run nominal interest rate, π_t is the CPI rate of inflation (net of VAT taxes). The relevant CPI inflation rate is given by

$$\pi_t = \pi_t^H + \alpha \Delta s_t \quad (6)$$

where $\pi_t^H = p_t^H - p_{t-1}^H$ is the domestic goods inflation, $s_t \equiv \frac{p_t^F}{p_t^H}$ is the terms of trade (ratio of the foreign goods price index over the domestic goods price index) and $\alpha \in [0, 1]$ is the weight of foreign goods in domestic consumption. A permanent tax swap does not affect the saving-consumption decision given that $\Delta\tau_{c,t+1} = 0$ in equation (5). However an anticipated transitory increase in the consumption tax creates an expected negative step in the relevant interest rate $i_t - E_t [\pi_{t+1} + \Delta\tau_{c,t+1}]$ for the household intertemporal decisions, increasing the attractiveness of future (post tax swap reversal) consumption relative to current consumption. Recall that the international asset market is restricted to a one-period nominal bond with a debt-elastic interest-rate premium on the rest of the union interest rate

$$i_t = i_t^* + \rho(nfa_t) \quad (7)$$

where i_t^* is the EMU one period nominal interest rate and $\rho(nfa_t)$ is the domestic risk premium that depends on the level in real terms of the net external position nfa .

Finally, the equilibrium in the goods market requires

$$y_t = \chi s_t + \chi^F s_t^F + \zeta c_t + \zeta^F c_t^* \quad (8)$$

where c_t^* is the EMU consumption, χ is the elasticity of domestic demand to the terms of trade, χ^F is the elasticity of exports to the terms of trade, ζ is the elasticity of output to domestic demand and ζ^F is the elasticity of output to foreign demand. This completes the description of the log-linear one sector version of the model.

4.1. Fiscal devaluation as a “supply-neutral” tax swap

I have described a fiscal devaluation as an unexpected proportional tax swap, namely a precise change in the two tax rates such that $\Delta\tau_{c,t} = -\Delta\tau_{w,t}$, and argued that when such a swap is permanent the final outcome of the policy is neutral on allocations and only results in a higher real wage. This neutrality is obviously a particular case¹² but is appealing as it permits to compare the fiscal devaluation to a classical nominal devaluation which is also neutral on allocations in the long run. Obviously non-proportional tax swaps would affect the allocations through well understood neoclassical supply channels, which in the case of the suggested tax swap tend to offset each other. In other words, in the model above, the proportional tax swap

¹²The neutrality result holds both because of the proportionality and the unexpected nature of the change (zero probability event) in the tax structure with incomplete financial markets.

only affects the allocations through demand channels, just like a nominal devaluation. A nominal devaluation is also usually implemented to reduce unit labour costs relative to foreign competitors, expand exports and reduce imports, i.e. to increase in competitiveness¹³. Both devaluations can only achieve those objectives if the switching-expenditure towards domestic goods is strong enough. In the benchmark model the latter requires the elasticity of substitution between domestic and foreign goods to be large enough. In the model net exports in terms of consumption, nx_t , are

$$nx_t = sh_x ((\eta - 1) s_t + c_t^*) - sh_m ((1 - \eta) q_t + c_t) \quad (9)$$

where η is the elasticity of substitution between foreign and domestic goods, $q_t \equiv \frac{P_t^*}{P_t}$ is the real exchange rate, sh_x is the share of exports in the trade balance and sh_m is the share of imports in the trade balance. It is easy to see that in this simplified benchmark New Keynesian Model, a devaluation has positive effect on the trade balance when the elasticity of substitution is greater than unity.

To recapitulate the proportional tax swap, when nominal wages are sticky, improves external competitiveness by allowing producers to lower their prices, increases foreign demand and can provoke an expenditure switching towards domestic goods that lowers imports if the elasticity of substitution between foreign and domestic goods is sufficiently large and the increase in domestic

¹³Notice also that, differently from the fiscal devaluation, the nominal devaluation affects real allocations irrespectively if the nominal rigidities are in the price or in the wage. The different assumptions on where the nominal rigidities are change the dynamics of the real wage but in the canonical model presented in the text households own the firms so that distributional effects between wages and profits are irrelevant.

demand is sufficiently low. The last two qualifications might appear restrictive but they are essentially the same restrictions for a nominal devaluation to have a positive effect on the trade balance. Finally, an important aspect is the duration of the tax swap. A permanent tax swap, only affects the competitiveness of the economy while a transitory tax swap also distorts the intertemporal choice by favoring saving and achieves a sharper improvement in the current account.

4.1.1. Nontradable sector

The presence of a nontradable sector in the benchmark model makes it more difficult for the suggested tax-swap to improve the trade balance. The details of how the non tradable sector is added to the benchmark model matter. For example the degree of labor mobility across the two sectors will influence the pace of the short run adjustment. In the complete model presented above reallocation between the two sectors occurs without any impediment. Generally, with a non tradable sector, part of the deflationary forces unleashed by the fiscal devaluation end up in favoring the domestic demand of non tradable relative to the demand of tradable. The labor costs decrease for firms in both sectors pushes price setters to decrease their price. However because of the price of imports does not change, the relative price of non tradable in terms of tradable decreases, pushing consumers to switch expenditure both from home produced and foreign produced tradable towards non tradable. In this case, all other things equal, the elasticity of substitution between domestic and foreign tradable goods must be higher than in the

benchmark case for the trade balance to improve. The trade balance is now

$$nx_t = sh_x((\eta - 1)s_t + c_t^*) - sh_m((1 - \eta)q_t + (\eta - \xi)p_t^T + c_t) \quad (10)$$

where ξ is the elasticity of substitution between tradable and non tradable and p_t^T is an index price for tradable relative to the CPI.

4.1.2. A transitory tax swap

As I mentioned above, a transitory tax swap also affects the relative price of future consumption (the relevant real interest rate). This additional channel is decoupled from competitiveness considerations but can achieve a much stronger improvement of the current account by increasing the household incentives to save. The saving channel might result important in light of the implications of the presence of large nontradable sector and absence of market power in foreign markets for the competitiveness channel. Figure (4) shows the theoretical adjustment paths after an initial ‘‘Portuguese shock’’ in the case of no-policy and in the case of a permanent and a transitory (8 quarters) proportional tax swap.

4.2. The Government budget

In the model I have abstracted from government budget considerations as tax revenues are rebated to the households in a lump sum manner and since Ricardian equivalence holds all government financing schemes have similar implications. While the neutrality on the budget is practically desirable, in the model it would cause allocational effects as the tax rates would not move proportionally and other instruments should be used. Obviously the revenue aspect is of a first order relevance in practical terms so I will try to quantify it on it in the empirical section.

5. Empirical Analysis

5.1. Empirical strategy

To have a sense of the empirical magnitudes involved in the effective tax rates swap, both on the external balance and on the government budget, I must depart from the precise but necessarily over simplistic model presented above and turn to a more reduced form empirical analysis. To quantify the effects of the proportional tax swap on the tax basis and the trade balance, I estimate two Structural Vector Autoregression to find the elasticities of private consumption and the wage bill (the two tax basis), and of exports and import (the trade balance), to a shock to the effective VAT rate (τ_c in the model above), and to a shock to the effective social security tax rate (τ_w in the model above). I estimate two distinct statistical models, one for each tax rate shock, because Portuguese quarterly data only exist since 1995 so that the number of observations is relatively small and does not allow to estimate large models. The data are quarterly values of private consumption, value added revenue, employees compensation, employer social security contributions, exports and imports. In the VAR estimation, I use four-quarter growth rates, which use differencing to eliminate the linear growth rate in the series and four-quarter averaging to eliminate high-frequency noise¹⁴.

5.2. Portugal tax revenue

A desirable aspect for the suggested policy would be to maintain as much as possible the tax revenue unchanged. In Portugal the general VAT tax

¹⁴The data and the codes, together with supplementary analysis not presented in the paper are available on my web page at the following address: <http://docentes.fe.unl.pt/~frafra/Site/code.zip>.

rate was 21 percent when this project started and subsequently raised to 23 percent after the country asked for external assistance. The employer's social security contribution tax rate is 23.75 percent of the gross wage. At the onset of the crisis, in 2007, these two taxes generated a revenue of approximately 8.6 percent of GDP each. Table (1) shows the tax basis, consumption net of VAT and compensation net of social security contributions as a share of GDP, the general tax rate, and effective tax rate, defined below, for 2007.¹⁵

Table 1: VAT and ESSC in Portugal, year 2007

	Tax Basis	Tax rate	Revenue	Effective tax rate
Consumption	57%	21%	8.3%	14.5%
Gross Wages s.t. Tax	39.7%	23.7%	8.5%	21.5%

A simple back-of-the-envelope calculation, keeping the tax basis fixed, indicates that for each percentage point (pp.) increase in the effective VAT rate, the Government could have decreased the effective ESSC rate by approximately 1.5 pp. and keep the revenue unchanged. Equivalently approximately 2.5 pp. of effective ESSC or a 1.75 pp. of effective VAT generate 1 pp. of GDP of tax revenues.

5.3. A shock to τ_c

Empirically the effective tax rate on consumption is defined as

$$\tau_c \equiv \frac{VAT}{PC} = \frac{\sum_{s=1}^{n_c} \tau_s p_{c_s} c_s + \sum_{s=1}^{n_i} \tau_s p_{i_s} i_s + \sum_{s=1}^{n_g} \tau_s p_{g_s} g_s}{PC} \quad (11)$$

¹⁵For what regards VAT, I consider only revenue generated by private consumption. Pereira and Rodrigues calculate that for the period 1990-1998, VAT revenue generated by private consumption was 11.4 percent of GDP, VAT revenue generated by private Investment was 1.84 percent of GDP and VAT revenue generated by public expenditure was 0.94 percent of GDP.

where n_j is the number categories in each type of expenditure $j = c, i, g$ (consumption, investment and government expenditure, see footnote 15), subject to possibly different tax rates and p_j is the price index of each category. A change in any of the terms of the right hand side of (11) leads to a change in τ_c .

Definition: I define a shock to the effective rate any shock that changes τ_c but does not change contemporaneously the nominal expenditures in consumption, investment and government consumption¹⁶.

There are potential issues in the suggested identification procedure. First I am not identifying the anticipated component of the tax rate change but only the unexpected part of the shock. To some extent this is truly the shock consistent with the theory part of section 4. Second total nominal expenditure in each aggregate demand component is different from the nominal expenditure subject to taxation: about two-third of consumption and only a small fraction of private investment and government expenditure are subject to VAT. Equation (11) also shows that to change the effective rate the government can change the tax rates τ_s and/or change the basis, n_j ¹⁷. Figure (5) shows the seasonally adjusted effective VAT rate together with the general rate. The figure shows that when the general rate changes, the effective rate changes in the same direction. However the effective rate exhibits a

¹⁶Expenditures in consumption are net of VAT. The identification is imposed using a standard recursive specification where none of the other variables react contemporaneously to the tax rate shock.

¹⁷Define the difference between nominal expenditure and the actual expenditure subject to the VAT as ϵ_j . For example in the case of consumption $\epsilon_c \equiv \sum_{s=1}^{n_c} p_{c_s} c_s - PC$. Therefore the shock the effective rate will contain both changes in the different τ_s and changes in the ϵ_j .

much more volatile pattern characterized by a few large spikes. Some of the largest spikes can be explained by a change in VAT legislation that did not alter the general rate. For example Table (2) shows that the first large spike is in 1996q3 corresponds to the year in which an intermediate VAT rate of 12 percent was introduced.

Table 2: VAT history in Portugal

	General	Intermediate	Reduced	Effective tax rate
01.01.1995 – 30.06.1996	17%	-	5%	10.9%
01.07.1996 – 04.06.2002	17%	12%	5%	12.3%
05.06.2002 – 30.06.2005	19%	12%	5%	13.45%
01.07.2005 – 30.06.2008	21%	12%	5%	14.7%
01.07.2008 – 30.06.2010	20%	12%	5%	12.3%
01.07.2010 - 31.12.2010	21%	13%	6%	12.9%

For robustness, I estimate two SVAR, containing, real imports, nominal private investment, nominal government consumption, nominal private consumption (net of VAT) and the empirically measured effective tax rate, or the actual general VAT rate. All variables except the tax rate are in annual growth rates. I also estimate the same SVAR without government consumption and investment and the results are very similar although the IRF are estimated more precisely. I present the analysis performed on my favorite specification containing real imports, nominal private consumption (net of VAT) and the effective tax rate. I need to address a final problem before estimation. The estimation of the SVAR requires that all three variables are stationary around given levels, an assumption that appears to hold for the growth rate of consumption and real imports. However the effective VAT

rate exhibits a small but steady increase over the sample. I capture the trend in the effective VAT rate by a fitted-linear time trend regression line. The VAR is estimated with two lags and a dummy for the global financial crisis period. The sample is 1996q1-2010q3. I also estimate the VAR on a smaller sample, 1996q1-2008q4 to exclude the financial crisis (which is anyway controlled by the dummy) and obtain similar results. Figure (6) shows both the impulse response functions and the cumulated response functions of consumption expenditure and the quantity of imports to a one standard deviation of the identified VAT shocks together with 68% confidence intervals. The identified shock shows that an increase in the effective tax rate, consistently with the benchmark model, decreases persistently both consumption and imports. The cumulative responses show that a one standard deviation shock in effective VAT rate decreases the level of nominal consumption (the VAT approximate basis) by 0.7 percent after 2 years and by 1.2 percent after 5 years. The same shock appears to have an even stronger effect on the real level of imports: 4.8 percent after 2 years and 5.6 percent after 5 years. These elasticities appear to be large especially for what regards imports. Notice that the uncertainty on the effect is also large. Finally the a standard deviation shock increases the τ_c by 0.7 pp. on impact. Table (3) summarizes the results.

5.4. *A shocks to τ_w*

Evidence on the effects of a change in τ_w is somewhat harder to identify as I can only rely on the effective tax rate as there are no a time a series for

Table 3: Cumulative percentage response to a one standard deviation increase in τ_c , CI 68%

Horizon	τ_c on pc	τ_c on m
2 years	[-.014,-.0072,0.0025]	[-.073,-.048,-.023]
5 years	[-.023,-.012,-.006]	[-.035,-.074,-.114]

the social security general rate¹⁸. Figure shows the effective tax rate defined as follows

$$\tau_w \equiv \frac{SSC}{Compensation - SSC} = \frac{\sum_{s=1}^{n_w} \tau_{w_s} W_s}{W} \quad (12)$$

where SSC are the social security contributions paid by the employers and Compensation is the total compensation paid by the employers inclusive of social security contributions.

Definition: I define a shock to the effective rate any shock that changes τ_w but does not change contemporaneously the nominal wage bill W .

The identification assumption is subject to similar caveats than those expressed for the VAT shock. The estimated VAR contains real exports, the nominal wage bill (net of social security) and the effective social security tax rate. Again all variables except the tax are in annual growth rates. The effective τ_w exhibits an increasing trend and two evident spikes. The trend corresponds to the widening of the social security during the sample. The two spikes are due to above average revenues in social security contributions in the fourth quarter of 1995 and in the fourth quarter of 2003. Again, following a narrative approach, these two increases could be explained by new

¹⁸In practice until very recently, the social security contribution legislation was composed of a very large number of different laws which makes it difficult construct such a time series.

legislation passed at that time such a more punitive stance towards evasion and the creation of a “revenue minimum d’insertion”. I nevertheless decide to control for the two spikes with a dummy but results are not significantly affected by this choice. The growth rate of the wage bill exhibits a decline since 2003. To focus the discussion, I present the case with results from estimation allowing for a change in the growth rate of the wage bill, and for a trend increase in the effective tax rate, as captured by a fitted-linear time-trend regression line. The sample is again 1996q1-2010q3, the VAR is estimated with two lags, the dummy for the two spikes of 1995q4 and 2003q4 and a dummy for the global financial crisis period. I also estimate a VAR on a sample that excludes the crisis and find similar results. Figure (8) shows both the impulse response and the cumulated responses of the nominal wage bill and exports to a one standard deviation of the identified τ_w shock together with 68% confidence intervals. A positive shock decreases persistently both the wage bill and exports. The cumulative responses show that a one standard deviation shock in effective social security tax rate decrease the level of the nominal wage bill by 0.6 percent after 2 years and by 0.67 percent after 5 years showing that the effects vanish approximately after 2 years. The same shock decreases the real level of exports by 0.87 percent after 2 years and 0.91 percent after 5 years. Again the confidence intervals are large. The standard deviation of the shock corresponds to a 0.25 pp. increase in τ_w . Table (4) summarizes the results.

Table 4: Cumulative percentage response to a standard deviation shock in τ_w , CI 68%

Horizon	τ_w ON γ_x	τ_w ON γ_w
2 years	[-0.194,-.0087,0.0013]	[-.010,-.0063,-.002]
5 years	[-0.197,-.091,-0.0013]	[-.011,-.0067,-.002]

5.5. Discussion

A better empirical model would estimate and identify the two shocks in a single statistical model. Typically the omission of relevant information tends to bias estimates, and this is a serious concern for what regards the magnitude of the estimated elasticities. Unfortunately, leaving aside complications on the identification procedure, the number of observations, 59 data points, is too small to obtain meaningful results from a larger model. Although reporting results in terms of elasticities to a standard deviation shock is common in the literature a more economically interpretable measure is warranted. I therefore transform the shock in to a swap of 1 percent of GDP revenue from VAT to SSC. This also allows me to compare the results with those in De Mooij and Keen (2012) who found in a panel data of OECD countries an improvement in net exports of 3.4 pp. of GDP after three years and half following a 1 pp. swap between the VAT and SSC. In the exercise presented here, a shift of a 1 pp. of GDP from SSC towards VAT corresponds to an increase of 1.6 pp. in τ_c coupled with a decrease of 2.4 pp. in τ_w .

5.6. The empirical effects of the fiscal devaluation

Consider an increase in τ_c that generates 1 pp. of GDP in revenues coupled with a decrease in τ_w that generates a loss of 1 pp. of GDP in revenues. Figure (9) shows the effects of such a fiscal devaluation. The

estimated effect of τ_w on its own basis (wage) is relatively larger than the effect of τ_c on its own basis (consumption), therefore Figure (9) shows that a fiscal devaluation that would maintain the tax revenue balanced on impact, has a positive effect on the budget and improves substantially the trade balance. The budget improvement is estimated to be between 260 and 580 million euro (0.15% and 0.3% of GDP) with a 68% confidence level after 5 years. This is sufficiently small to label the policy “budget neutral”. For what concerns the trade balance real imports decrease by 13.6 percent and real exports improve by 8.4 percent. The 68% confidence interval show the trade balance would improve substantially. In the first 4 quarters exports improve significantly but the effect appear to end after the fifth quarter and his significance declines. The effect on imports is slower and more persistent as it stabilizes after 8 to 10 quarters. Overall the empirical analysis appears to support both the efficacy and the feasibility of a fiscal devaluation. Table (2) suggests that the effective VAT rate could be increased by using the new general VAT rate on more goods. Furthermore the estimated tax basis elasticities suggest that over time the revenue generated by the two taxes will not deteriorate but actually improve. It is important to understand that these numbers are conditional on the size of the shocks so that in practice the uncertainty on the estimates of the relevant elasticities involved in the tax swap requires a frequent monitoring of the tax revenues and its effects on the trade balance. Undoubtedly a permanent tax swap, as opposed to a transitory one, would alter the tax structure of Portugal. Figure (10) shows that Portugal’s reliance on payroll tax for generating tax revenue was just above the European average while VAT appeared to be more important than

for the rest of the European countries for generating tax revenues. The latter observation can only partly be explained by a high general VAT in Portugal relative to the other countries: first, Portugal does not have the highest VAT rate, and second, several reduced VAT rates on relevant goods and services appeared to be below other European rate. For example, Figure 11 shows the rates on electricity and natural gas, were much lower than in the rest of Europe¹⁹. In fact, I interpret part of the high dependence of Portugal on VAT revenues as another symptom of excessive Portuguese consumption.

6. Conclusion

In this work I study the short run effects of a swap between a consumption tax and a labor tax within a monetary union and perform an empirical analysis on Portuguese data. The tax swap has some attractiveness, as a uniformization of some reduced VAT rates²⁰ to the general rate could generate the revenues to finance the initial cut in the ESSC rate and allow the dynamic adjustment of lower consumption, higher competitiveness, and higher employment to take place. If the policy is successful, the larger ESSC tax basis would help to compensate the reduction in consumption. Importantly, the reduction in consumption would allow the Portuguese economy to start the much needed deleveraging. On a broader note, a sophisticated use of the tax structure by individual EMU members is a possible substitute for realignments to external imbalances. The use of the “budget neutral” temporary tax swap described here could substitute the old realignment of currencies that

¹⁹Those rates have been increased to the general rate of 23 percent as part of the external assistance conditionality program.

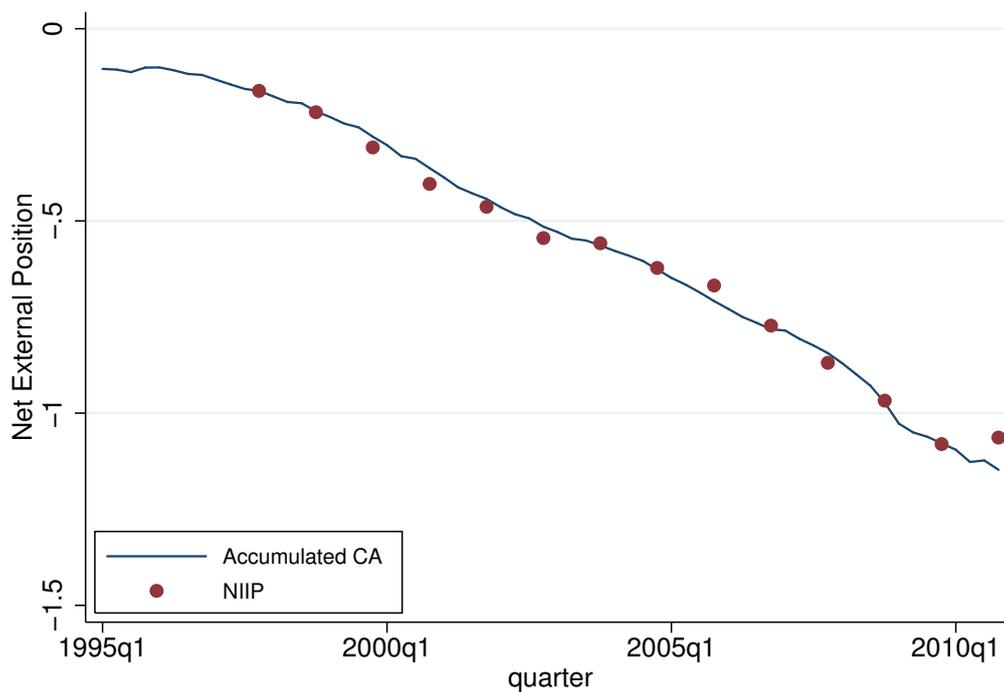
²⁰I did not discuss redistribution aspects of the tax swap which are obviously important.

were occurring in the European Monetary System arrangement before the creation of the single currency, at least as long as the prospects of a deeper fiscal integration appear remote. Certainly the construction of these policies requires a great research effort in order to have a more precise comprehension of their effectiveness and feasibility and a high degree of cooperation between members of the currency area.

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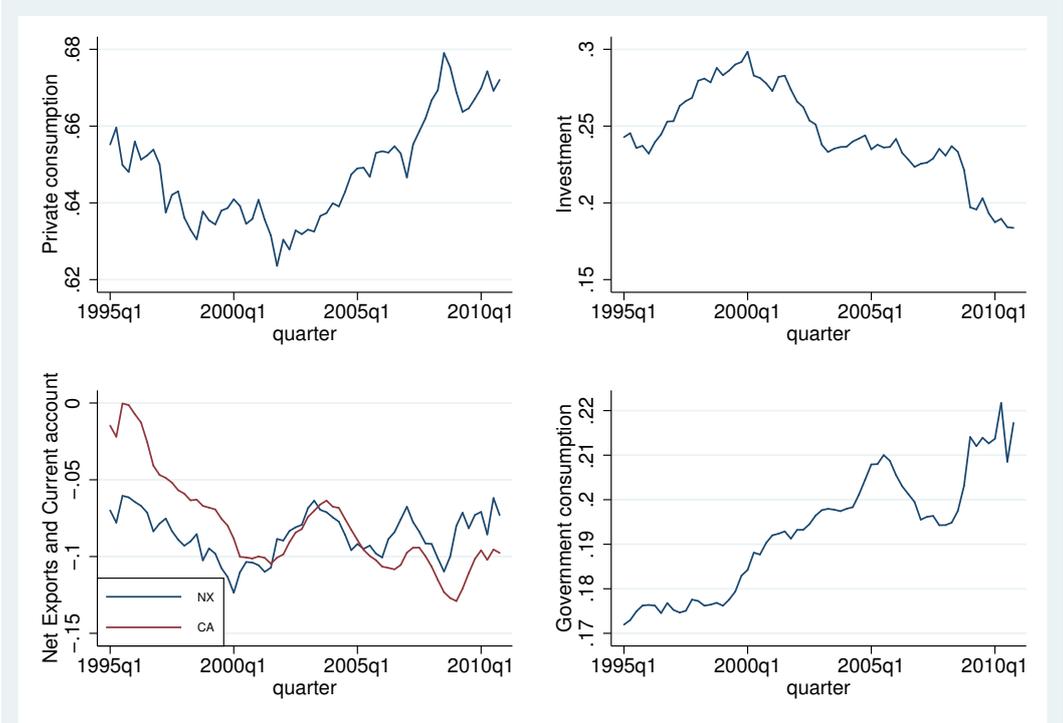
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Figures



The data are shown as a percentage of GDP. Sources: Banco de Portugal and Eurostat 2011

Figure 1: The solid line shows the accumulated current account to GDP ratio. The dots show the net international investment to GDP ratio. The data are shown as percentage of GDP. Sources: Banco de Portugal and Eurostat 2010.



The data are shown as a percentage of GDP. Source: Eurostat 2010

Figure 2: The evolution of aggregate demand in Portugal 1995-2010

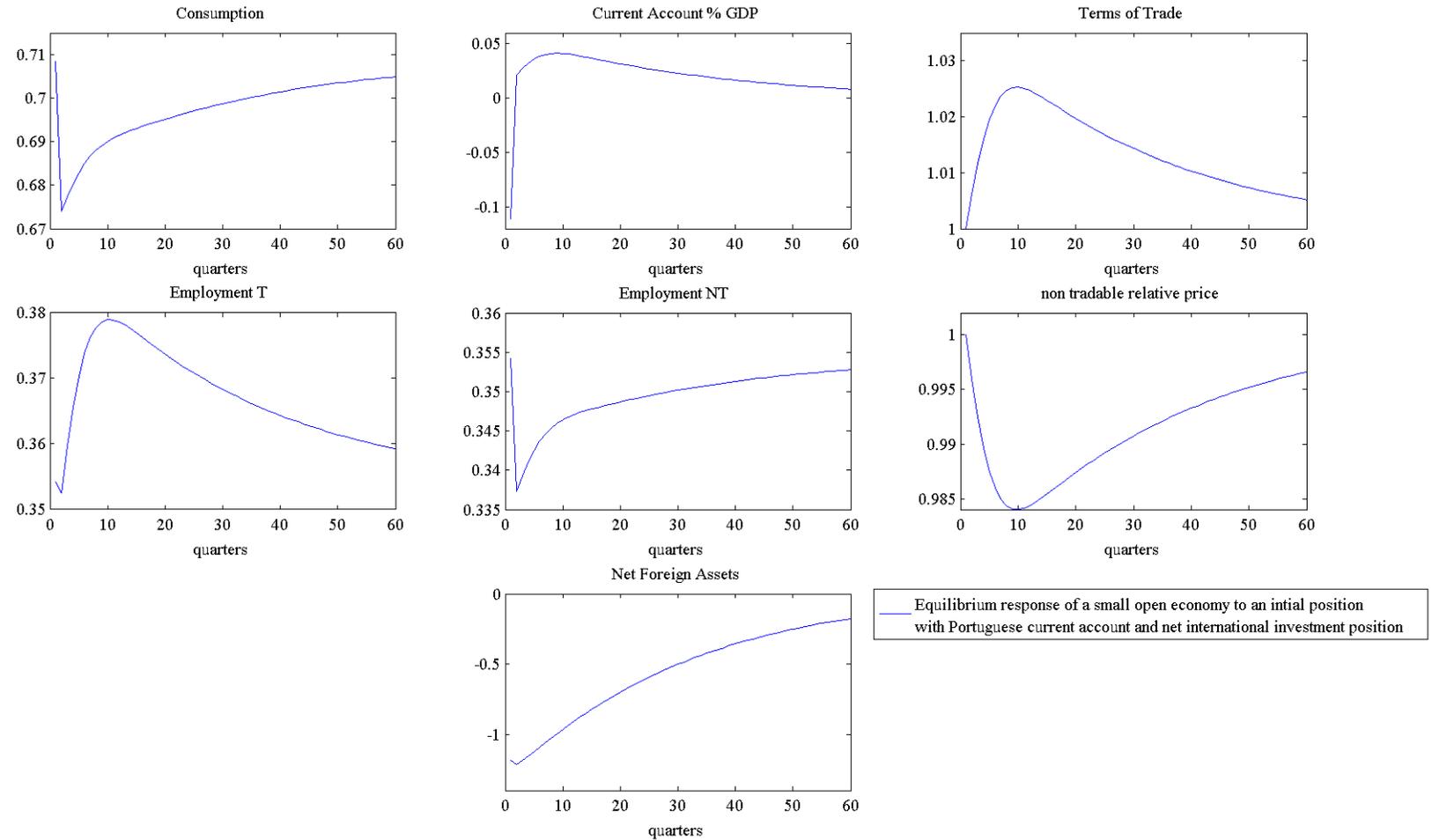


Figure 3: The process of Internal devaluation. Equilibrium responses in a canonical New Keynesian small open economy after an unexpected shock takes the economy an initial position corresponding to Portugal external position

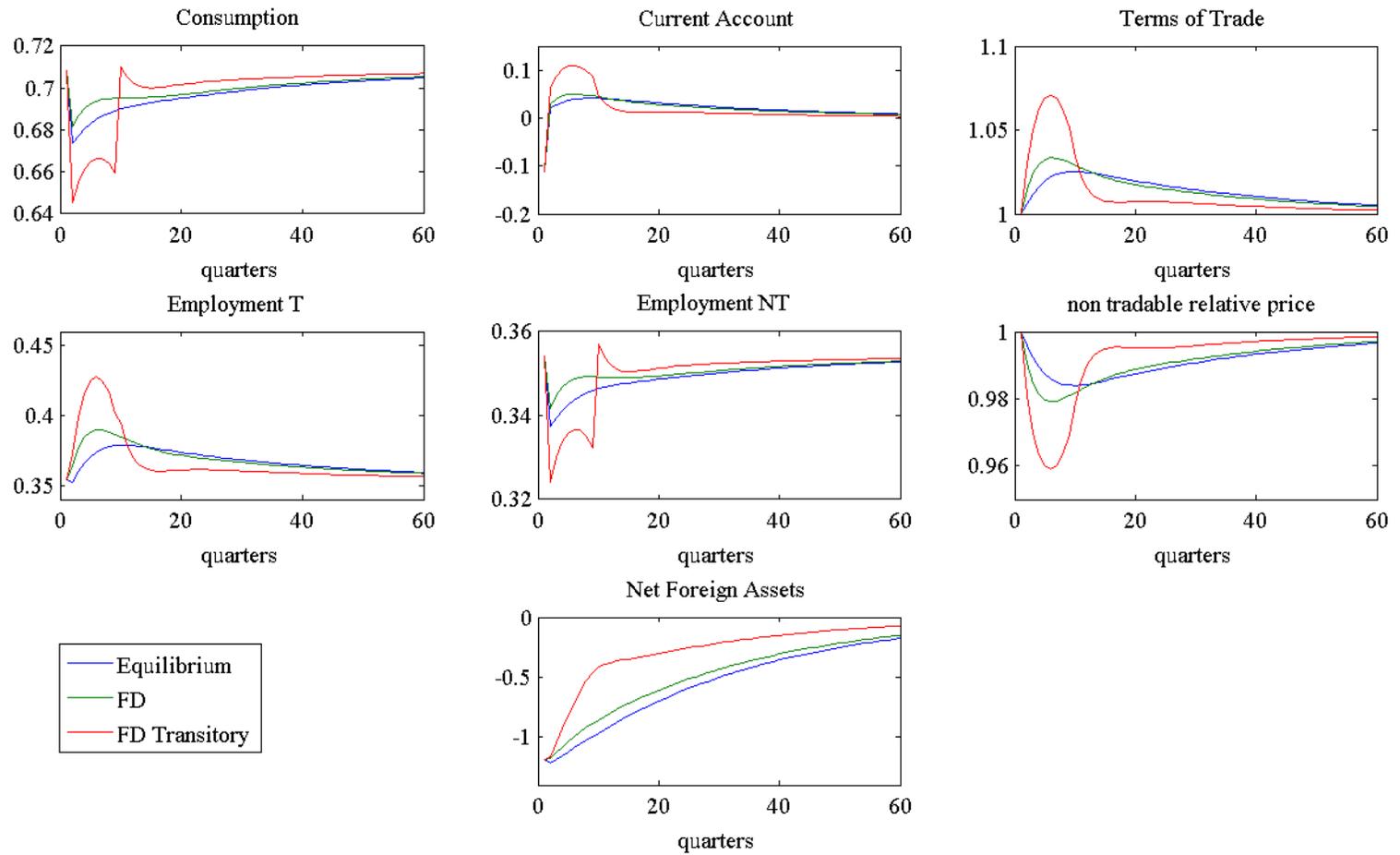
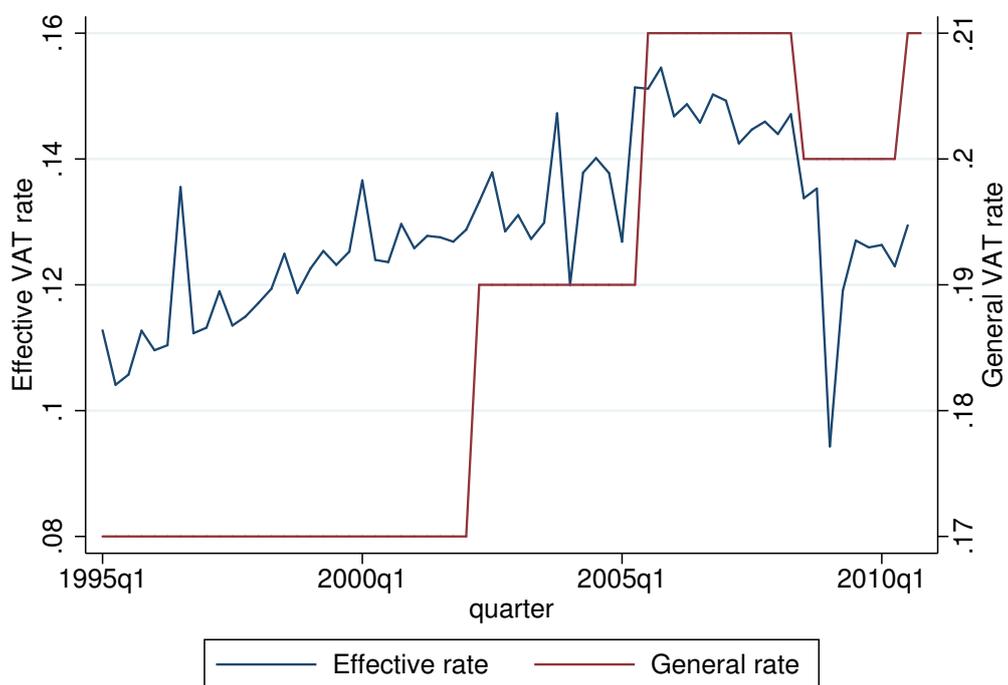


Figure 4: Accelerating the internal devaluation. Equilibrium adjustment path with and without a fiscal devaluation $\Delta\tau_c = -\Delta\tau_w = 0.1$.



Source: Eurostat, 2011

Figure 5: Effective and general VAT rates in Portugal. tc_sa is the seasonally adjusted effective VAT rate (see equation (11)) Source: Eurostat 2010.

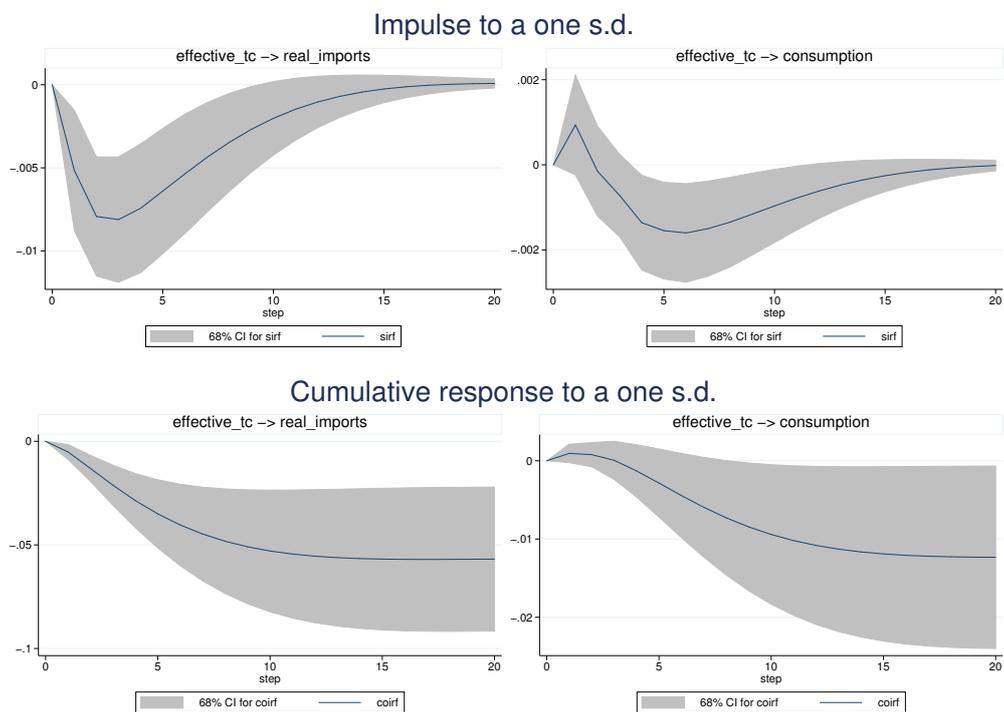
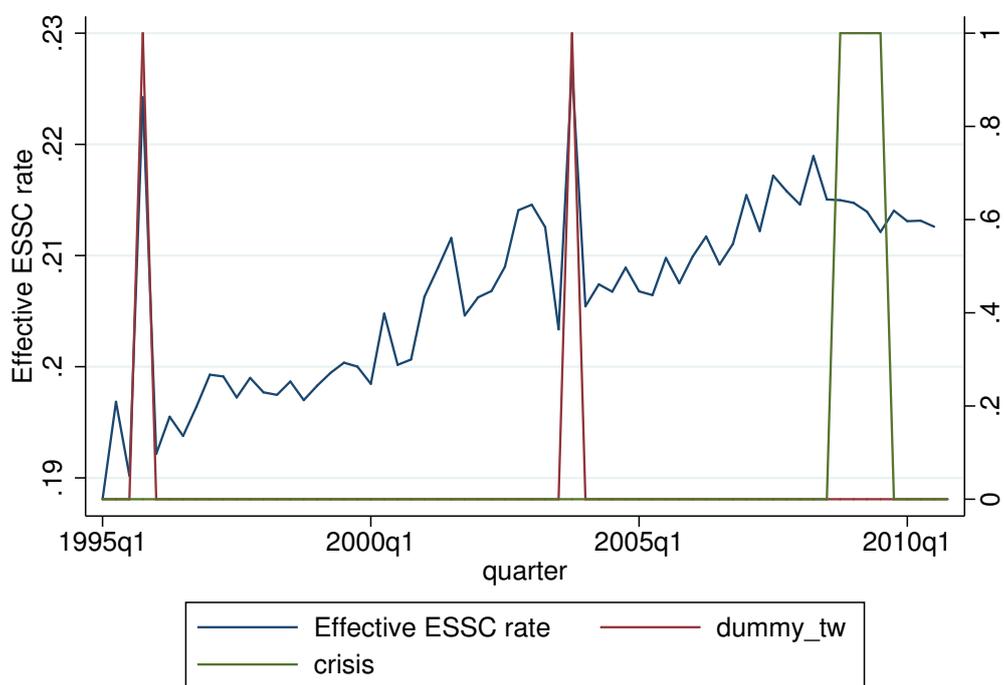


Figure 6: The effect of a shock to the effective VAT rate on consumption and imports. The upper panels show the impulse response function of imports and consumption. The lower panels show the cumulative response function of imports and exports.



Source: Eurostat, 2011

Figure 7: Effective SSC rate in Portugal. tw is the seasonally adjusted effective VAT rate (see equation (12)). Source: Eurostat 2010.

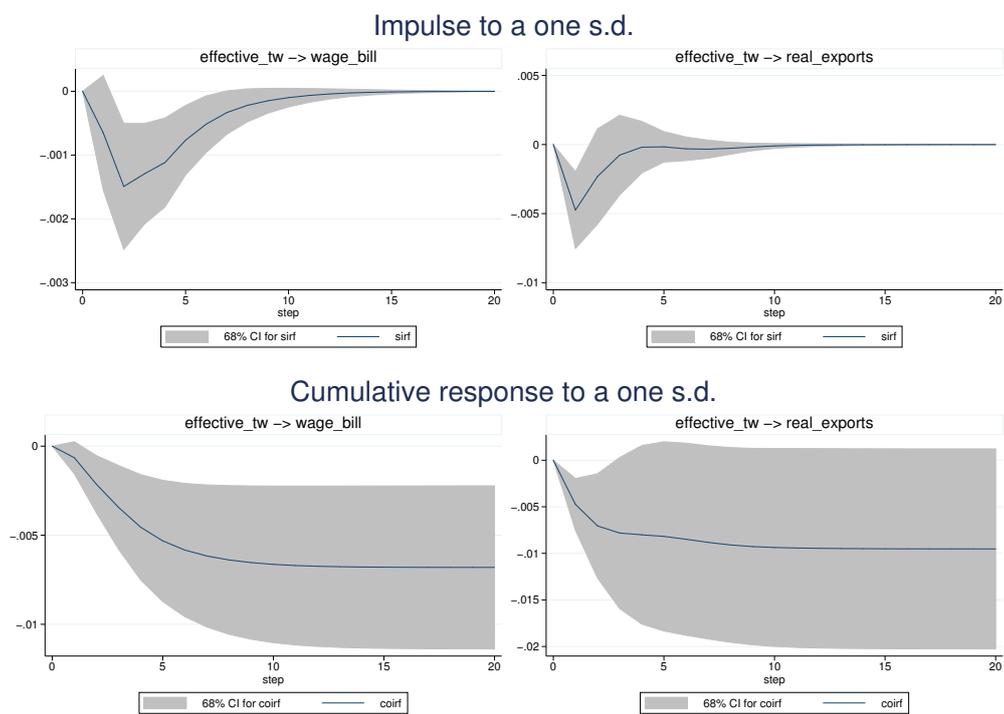


Figure 8: The effect of a shock to the effective social security rate on wages and exports.

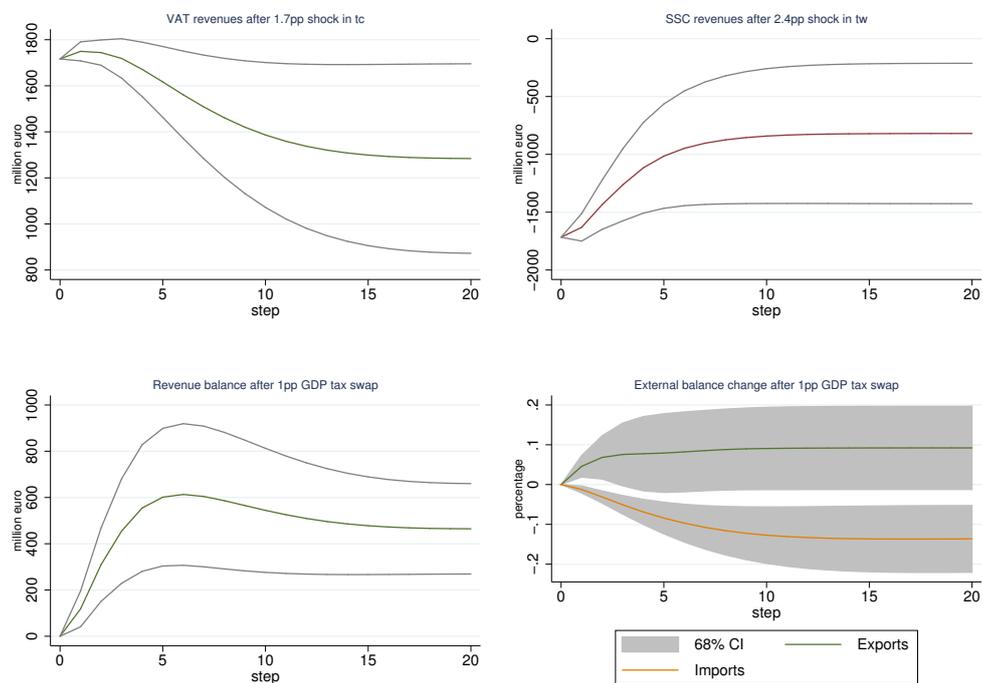


Figure 9: The empirical effects of a fiscal devaluation on tax revenues and the external balance.

Tax structure: average during 2000–2007

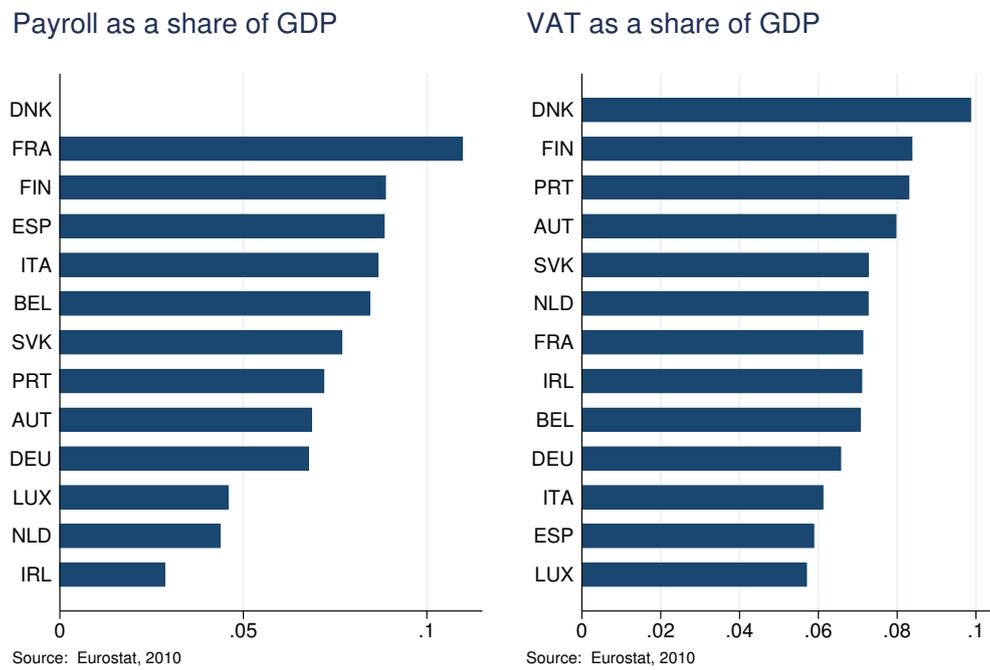
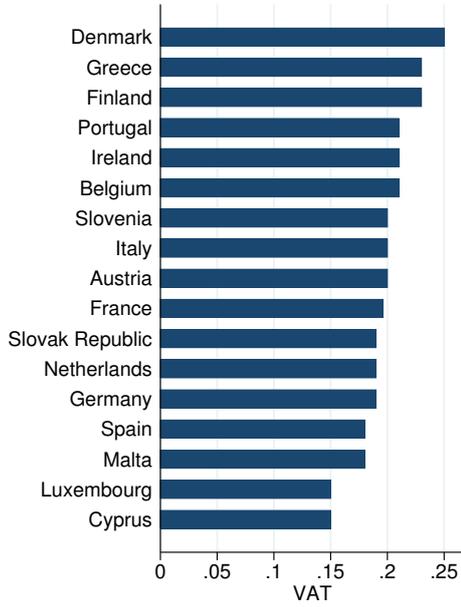


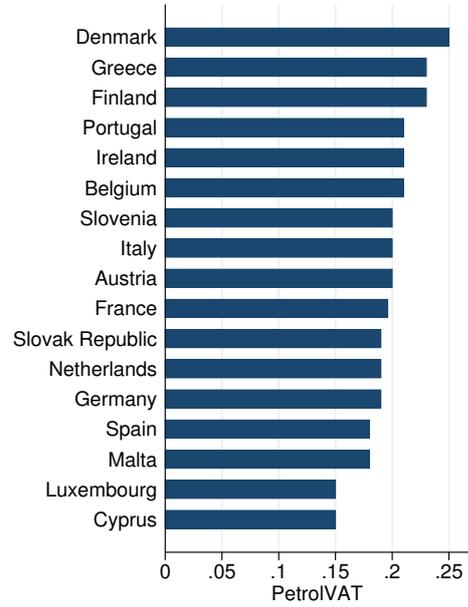
Figure 10: Tax revenues as a share of total tax revenues for VAT and payroll tax collection. The numbers shows are average shares from 2000 to 2007.

VAT general rate



Source: Eurostat, 2010

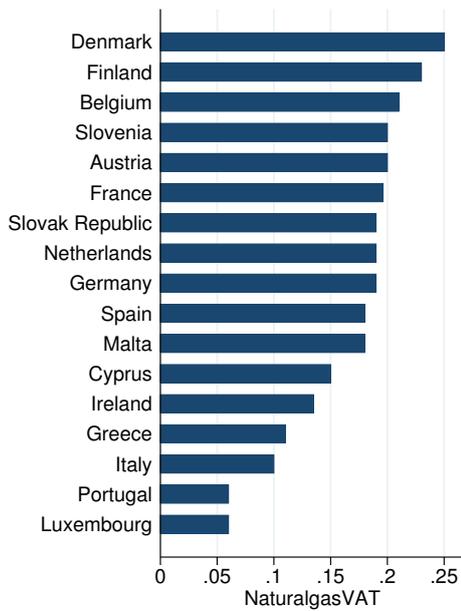
VAT on Petrol 2010



Source: Eurostat, 2010

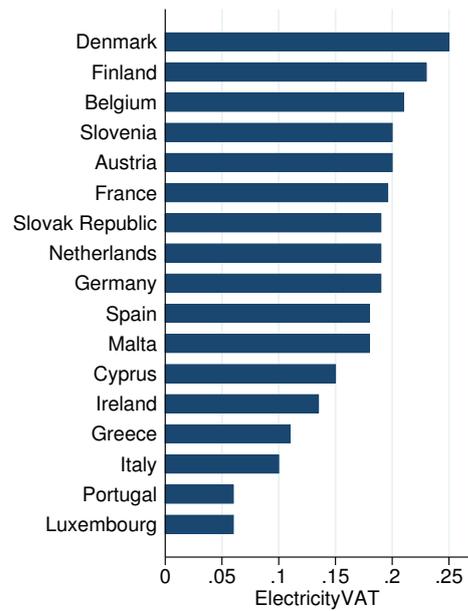
(a) VAT rates in Europe, general rate and petrol.

VAT on gas 2010



Source: Eurostat, 2010

VAT on electricity 2010



Source: Eurostat, 2010

(b) VAT rates in Europe, electricity and natural gas.