Can Fiscal Budget-Balanced Reforms Stimulate Growth? Model Based Results

Matthieu Bussière† Laurent Ferrara‡ Michel Juillard§ Daniele Siena¶

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Abstract

This paper focuses on growth enhancing budget-neutral fiscal reforms, i.e. changes in the composition of government revenues and spending that stimulate GDP growth while keeping the ratio of the fiscal budget to GDP balanced. To this aim, we present simulation results using a three-country DSGE model with three large economic regions, the US, the euro area and the rest of the world. The model features a detailed government sector and its multi-country nature allows investigating cross-country spillovers. The paper focuses on the most growth-friendly budget-neutral fiscal measures: (i) a fiscal devaluation (ii) a rise in government investment compensated by a fall in government consumption and (iii) a rise in government investment compensated by a rise in consumption taxes, labor taxes and lump-sum taxes. Dampening or amplifying effects due to coordination across policy (monetary and fiscal) and across economic regions are also considered. The main result is that an increase in government investment financed by rising less distortionary taxes appears to be an optimal growth-friendly budget neutral reform in the sense that it generates GDP growth and improves fiscal sustainability. In addition, we find that budget-neutral reforms, even if coordinated across countries, do not have large cross-border spillovers.

Keywords: Fiscal Composition, Budget-Balanced Reforms, International Policy Spillovers

JEL classification: E62, E63, F42

*Preliminary and incomplete, please do not quote or circulate. The views expressed in this paper are those of the authors and do not necessarily reflect those of the Banque de France or the Eurosystem. We would like to thank Doug Laxton for helpful discussions.

†Corresponding author. Banque de France, 31 rue Croix des Petits Champs, 75001, Paris, France. Email: Matthieu.Bussiere@banque-france.fr. Tel. +33142922921.

‡Banque de France. Email: Laurent.Ferrara@banque-france.fr.

§Banque de France. Email: Michel.Juillard@banque-france.fr.

¶Banque de France. Email: Daniele.Siena@banque-france.fr.
1 Introduction

Since the start of the global financial crisis, fiscal policy issues have been at the core of the policy debate and the subject of numerous academic papers. Most of the studies so far have focused on the stance of fiscal policy and the size of fiscal multipliers, following empirical (see, for example, Blanchard and Leigh [2013] and Alesina et al. [2017]) or theoretical approaches (as, among others, Freedman et al. [2010], Christiano et al. [2011] and Coenen et al. [2012]). More recently, however, the debate shifted towards the composition aspect of fiscal policy, for a given fiscal stance (see Furman [2016] for a review on the recent debate on fiscal policies). This evolution partly stems from the fact that, in the aftermath of the crisis, many countries have experienced strongly disappointing growth performance while facing limited fiscal space. This constrained the possibility of moving towards more accommodative fiscal stances to enhance growth. Against this background, alternative fiscal growth drivers should not be ignored. The aim of this paper is to evaluate the impact on economic fluctuations of changes in the fiscal composition keeping the ratio of the fiscal budget to GDP balanced. Particular attention is devoted to the international dimension of these reforms and to the interaction between fiscal and monetary policy decisions.

Balanced budget reforms, i.e. changes in the composition of fiscal revenue and spending which do not modify the total government budget with respect to GDP, have been proposed and discussed in recent policy debates. The IMF and the OECD, in a note written under the auspices of the G20, stated that for countries that cannot (or do not need to) expand fiscal space, growth prospects can be enhanced through budget-neutral reforms. In 2014 in Cairns, G-20 Finance Ministers, Central Bank Governors and Leaders committed to consider how changes in the composition and quality of government expenditure and revenue may enhance the contribution of our fiscal strategies to growth. This message was repeated in subsequent G20 communiqués and is likely to be discussed again looking forward.

In a closely integrated global economy, domestic fiscal policy decisions tend to have important international spillovers. Investigating the role played by idiosyncratic vs coordinated fiscal policies across countries is one of the goals of our analysis. International flows of goods, interest and exchange rate movements and demand fluctuations are only some of the channels that influence growth spillovers across integrated countries.

The Great Recession highlighted also an additional important element to be considered when studying fiscal reforms within a country: the interaction between fiscal and monetary policy. Important emphasis will therefore be devoted to the interaction between the monetary policy stance and budget-neutral reforms, also for international spillovers.

Against this background, we want to further inform this growing policy debate by presenting results from a multi-country DSGE model on the macroeconomic impact of changes in fiscal composition while keeping the fiscal budget balanced. This is done using a three-country version of the Global Integrated Monetary and Fiscal model (henceforth GIMF) calibrated at yearly frequency. GIMF lends itself particularly well for this kind of exercise. First, it is a fully-fledged micro-founded

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1 See section (2) for a complete review of the literature.
2 Henceforth we will refer simply to budget-balanced reforms as changes in the fiscal composition keeping the fiscal budget to GDP ratio constant. More details are available in section 4
3 Laxton et al. [2010] provides a complete description of the model while Kumhof and Laxton [2013] highlight the international and fiscal details of the model.
general equilibrium model, which is well suited to analyze the effect of policy decisions. Second, within this class of models, it offers a detailed fiscal structure, allowing for multiple experiments using different compositional changes. Finally, GIMF is a multi-country open economy model in which the external sector is very carefully modeled and calibrated, which makes it possible to study international spillovers of fiscal policy and also the scope for international cooperation. The model features three countries/regions: the United States, the euro area and the rest of the world. Simulation results are presented for the first two economic areas.4

Throughout the paper, the analysis concentrates on the most growth-enhancing budget-neutral fiscal reforms selected first by separating fiscal revenues from spending and second by mixing the two budget sides. It is important to notice that our selection criteria will be GDP growth and not a measure of welfare. We claim that this selection criteria will help setting a clear upper bound to guide the policy debate. These reforms are modelled as permanent (and fully credible) shocks in the United States to one (or a combination) of the eight fiscal instruments, normalized to 1% of GDP. Changes in one of the fiscal instruments are then compensated by one (or a combination) of the remaining seven instruments to maintain the budget balanced. We assume that these unexpected changes in fiscal composition are made during normal economic times. We will therefore focus on deviations from a steady state calibrated at the mean of the economic business cycle.

We first comment the domestic reactions (e.g. of the US economy to a change in US policy) and subsequently the reaction of the foreign economy (e.g. of the euro area economy following a change in US policy). Responses on the economic activity and main macroeconomic variables are considered both at a short and at a medium horizon. The baseline results are computed assuming that monetary policy reacts according to a standard calibrated Taylor rule responding to inflation deviations from the target [Laxton et al., 2010]. The relevance of international and policy coordination is also analyzed first by comparing baseline results to ones in which both the US and the euro area implement the same policy change contemporaneously and second assuming different domestic monetary policy reactions.

To keep the analysis tractable, we focus on three policy experiments.5 First, we concentrate on the fiscal revenue side. We run a simulation in which labor and capital taxes are cut, compensated by an increase in consumption tax. This scheme is sometimes referred to as fiscal devaluation in the literature. This strategy is generally implemented in a country seeking to regain international competitiveness to boost the external trade channel without being able to devalue (e.g. countries belonging to a monetary union). However, as explained by Farhi et al. [2014] for a fiscal devaluation to mimic a standard nominal exchange rate devaluation, in some environment, it is necessary more than just increasing value-added tax and reducing payroll taxes.6 This is also the case in our implemented revenue side budget-neutral reform. For simplicity, we will anyhow refer to this reform as a fiscal devaluation.

4Detailed results regarding the rest of the world are available upon request.
5The choice of three policy experiments is made for clarity and tractability. However, all other set of fiscal combinations are available upon request.
6The reason is that a simple reduction in payroll taxes compensated by value-added taxes can generate a real exchange rate appreciation, not present in the standard nominal exchange rate devaluation. The reason being that while the combination of labor and capital tax cuts with an increase in consumption tax successfully deprecates the terms of trade, the overall effect of the consumption tax generates an increase in the overall consumption basket price index.
Second, we focus separately on the spending side of the fiscal budget. We look at the effect of a fall in government consumption compensated by a rise in public investment. In other words, this experiment would consist in deploying government resources towards the most productive outlets (those that are, for instance, complementary to private investments). Third, based on our learning of the two previous simulations, we consider the most growth enhancing mix of revenue and spending reforms. We look at the effects of an increase in government investment by 1 pp of GDP compensated by an increase in labor taxes, consumption taxes and lump-sum taxes.

Finally, to understand better the relevance of policy and international coordination of the three budget-balanced reforms we investigate (i) international spillovers from one country to the other (ii) the potential role of coordination across countries (iii) the role of the monetary policy for both the domestic and the international responses: we examine the size of fiscal multipliers and the effects of the these reforms when monetary policy is constrained and irrespinsive for two years, due for example by the Zero Lower Bound (ZLB henceforth).

The rest of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 presents the model and a first set of benchmark fiscal multipliers, for both tax and expenses: budgetary consolidations multipliers. This section mostly serves a pedagogical purpose, which is to introduce the key concepts and benchmarks, before starting to combine fiscal instruments. Section 4 turns to the budget neutral reforms, reviewing in turn each of the three policy designs. Section 5 looks at the effects on benchmark multipliers and on our set of three budget-neutral reforms when monetary policy is constrained. Section 6 investigates the international effects of budget-natural reforms: First it accounts for cross-border spillovers to the euro area of US reforms; second it analyzes the impact of a coordinated action in both the US and the euro area on the macroeconomic variables. Section 7 concludes.

2 Review of the literature

There has been a renewed interest in fiscal policies in advanced economies since the onset of the Great Recession. On one hand, in the US, fiscal stimulus were rapidly put in place through the American Recovery and Reinvestment Act, from 2009 to 2012, amounting to around 4% of GDP, when including automatic stabilizers (see Furman [2016]). On the other hand, in the euro area, fiscal consolidations occurred in some countries between 2011 and 2013, triggering an important debate on the size of fiscal consolidation multipliers. These were shown to be larger than initially expected (see Blanchard and Leigh [2013]), leading thus to stronger than expected negative macroeconomic shocks.

The non-linearity of fiscal multipliers and the idea that these might be larger during recessions than expansions has been put forward by different studies (e.g. Auerbach and Gorodnichenko [2012], Corsetti et al. [2012] and Michaillat [2014], among others), even though, not unanimously (e.g Owyang et al. [2013]). Today, in the current environment of low borrowing costs and negative output gaps in the main advanced economies, a greater role of fiscal policies to support growth appears justified (e.g. Furman [2016]).

Theoretical interactions between fiscal and monetary policies have been widely studied in the literature, especially in new-Keynesian model. A non-comprehensive list includes Eggertsson and
Woodford [2003], Eggertsson and Woodford [2004], Christiano et al. [2011], Eggertsson [2011] and Farhi and Werning [2012]. These papers argue that multipliers are indeed larger when the ZLB on the nominal interest rate is binding (or more broadly when the economy is in liquidity trap). This is the case because expansionary fiscal policies cause a fall in real interest rates due to both the increase in inflation expectations and the constrained nominal interest rates.

The non-linearity of fiscal policy, the larger fiscal multipliers in liquidity traps and the evidence that monetary policy might have reached its limit (ZLB and unconventional tools) support the recent argument put forward in policy circles to reassess the correct policy mix. International institutions like the IMF and the OECD are now supporting the possibility of a global fiscal stimulus. In the World Economic Outlook (henceforth WEO) report published in October 2014 (IMF [2014]), the IMF makes the point that the world growth is weak, interest rates are close to zero and the need of infrastructures in high. Based on those stylized facts, they show that by pushing up investment in infrastructures leads to higher growth for both short and medium terms horizons without increasing the debt to GDP ratio. More recently, Gaspar et al., (2016) explain the new IMFs 3C approach for economic policies (Comprehensive, Consistent and Coordinated) to boost the current global GDP growth and avoid a low-growth trap: at the current juncture a mix of fiscal and monetary policies associated with structural reforms, implemented simultaneously by all the G20 countries, would be a good way to generate economic growth at the global level.

In line with this approach, the WEO 2016 (IMF, 2016) shows that a coordinated fiscal stimulus relying on infrastructure investment, active policy on the job market, R&D expenses and targeted transfers to some households is able to stop a potential secular stagnation scenario. This is supported by the paper by Eggertson et al. (2016) showing that in a world with a low natural rate of interest and large capital integration, expansionary fiscal policy carries positive spillovers implying gains from coordination, while monetary policy has negative ones.

An issue often discussed by policy makers is that all the countries do not necessarily have a sufficient fiscal space to undertake a fiscal stimulus at the current juncture of high public debt. Defining fiscal space can be complicated. On one hand it can be seen as the room for undertaking discretionary fiscal policy without undermining fiscal sustainability, which is however difficult to measure. On the other hand it can be defined as the debt level at which a sovereign borrower loses market access (as for Ghosh et al., 2013, or Fournier and Fall, 2015), which is a too far limit for policy-makers. Complicating the figures, other variables can affect measurements of the fiscal space, as the non-linear ability of a government to collect taxes (see Pappada and Zylberberg, 2015).

The difficulties to measure fiscal spaces and the uncertainty on the true ability of given countries to implement fiscal stimulus, moved the attention on the composition of fiscal policies, in particular on the difference between taxes and expenses. Alesina et al, (2015) show that adjustments based
upon spending cuts are much less costly in terms of output losses than tax-based ones. They find that spending-based consolidations have been associated with mild and short-lived recessions, in many cases with no recession at all. Alesina and Ardagna (2013) even point out that certain combination of policies have made it possible for spending-based fiscal adjustments to be associated with growth. The possibility of different multipliers depending on fiscal instrument has been studied, among others, by Alesina and Ardagna, (2010) and Mertens and Ravn (2013). The punch line of these studies is that fiscal boost based upon tax cuts is more likely to increase growth than one based upon spending increases and tax composition matters. The OECD has also done recent research on the optimal fiscal composition for countries with low fiscal room of maneuver. Cournde, Goujard and Pina (2013) empirically show that during fiscal consolidations it is preferable for reducing excess debt to privilege education expenses, childcare and family or social security contributions instead of subsidies, pensions or property taxes.

In line with the idea that fiscal space might be limited for countries in recession with potentially high government debt, our paper will also be focusing on the composition of spending but with a new angle: change in fiscal compositions that keep the government budget-balanced with respect to GDP.

3 Model-based benchmark multipliers for non-compensated fiscal consolidations

3.1 A brief presentation of the GIMF model

The Global Integrated Monetary and Fiscal model (GIMF) is an open economy, multi-region, multiple-good, forward-looking and fully micro-founded DSGE model. The economies considered are characterized by sticky prices and wages, real adjustment costs, liquidity constraints and finite planning horizons households, allowing for an important role for monetary and fiscal policy in economic stabilization. The model explicitly accounts for all the bilateral trade flows and tracks relative price dynamics for each region, including exchange rates. The trade matrix, as the entire model, is calibrated at a yearly frequency. We constrain the model to consider 3 regions of the world: United States, Euro Area and Rest of the World.

GIMF lends itself particularly well for fiscal policy analysis as it has an accurately modelled fiscal sector. In particular it features eight different types of fiscal spending, transfers and revenues: (1) government consumption, (2) government investment, (3) general transfers, (4) targeted transfers, (5) labor tax rates, (6) consumption tax rates and (7) corporate tax rates and (8) lump sum taxes. This allows for a rich analysis of the compositional effects of each one of these instruments, which is the aim of this paper.

The non-linear solution of the model allows testing the different reactions of the economy in the presence of a constrained or unconstrained monetary policy. This will be important to relate our results to the literature looking at fiscal multipliers in a liquidity trap and, importantly, to understand if the size of international spillovers are somehow dependent on monetary policy reactions.

We cross-refer to Kumhof et al. (2010) for a detailed description of the model. The detailed calibration of the model and the trade matrix are available upon request.
3.2 Benchmark multipliers for the US and the euro area

In this section, for comparison purposes, we present benchmark model multipliers obtained by forcing a fiscal budgetary consolidation of 1% of GDP. Consolidation is undertaken by using individually all available instruments, both on revenues and spending sides, one at the time (i.e. not compensated by a change in any of the other six instruments). Shocks are assumed to be first permanent and then temporary (two years). Monetary policy is assumed to be able to react to the shocks (unconstrained by the ZLB), meaning that the monetary policy stance becomes more accommodative as all eight instruments generate a drop in GDP. In section 5 we will present the same results assuming that monetary policy is constrained at the ZLB. Table 1 summarizes the main results for the US, while Table 2 shows results for the euro area. The left-hand panel considers a permanent shock to each of the eight instruments and reports the effect on GDP in the short-run (after one and two years) and in the long-run (after ten years). It also reports the change in the ratio of government debt to GDP after two years. The right-hand panel presents the results of a temporary fiscal consolidation while keeping the same structure just described.

The main takeaways of this analysis are as follows. First, the effect of a fiscal consolidation on GDP crucially depends on the choice of the instrument. Looking first at how the US economy is responding to various shocks, we get that, starting with government spending, a consolidation that is taking place through a permanent reduction in public consumption has a sizeable negative effect in the short-run that dies out progressively. Indeed, after a drop of 0.72% the first year vs the baseline, it falls to 0.49% the second year and stays at low level in the long-run (drop of 0.32%). By contrast, when the consolidation takes place through a permanent reduction in public investment the effect is very long lasting and tends to increase over time to reach -2.23% in the long-run with respect to -1% in the short-run. The main reason is that public investments are important complements of private investments (e.g. roads, bridges, research, or infrastructures in general). Focusing on transfers (e.g. unemployment benefits), we see that transfers targeted to liquidity constrained agents (i.e. transfers to the hand-to-mouth consumers) have a larger effect than general transfers (to all agents).

Turning now to the revenue side, the results indicate that a permanent increase in all types of taxes would have a significant negative effect on GDP. However, an increase on capital taxes clearly leads to a larger effect, reaching -0.95% the second year and -1.67% in the long run. An increase in the consumption tax would have a more moderate effect reaching only -0.24% in the long-run.

An interesting point to notice is that our simulations suggest that tax consolidations are not always less costly, in terms of GDP, than spending consolidation (see Alesina et al, (2016) and Alesina et al, (2015)). In the short/medium run this seems to be the case if we compare consolidations resulting from increases in labor and capital taxes with respect to decreases in government consumption. However, if we look at government investments, cutting government investments is always more recessionary than any other increase in taxation, both in the short and in the long run.

In all those simulations, it turns out that government debt after two years is reduced, successfully consolidating the budget balance to GDP ratio. However, as expected, the effect on the debt/GDP ratio tends to be weaker for the instruments that have the largest negative impact on GDP, namely government investment and capital taxation. This is true because of two forces. On one side, the mechanical fall in GDP decreases the denominator; on the other side, a larger fall in GDP triggers a fall in tax revenues and an increase of automatic stabilizers which dampens the budget consolidation.
Table 1: Fiscal multipliers for permanent and temporary consolidation in the US

<table>
<thead>
<tr>
<th></th>
<th>United States</th>
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<tbody>
<tr>
<td></td>
<td>Permanent</td>
<td>Temporary (2 years)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Real GDP</td>
<td>Gov. Debt/GDP</td>
<td>Real GDP</td>
</tr>
<tr>
<td></td>
<td>First year</td>
<td>Second year</td>
<td>After 10y</td>
</tr>
<tr>
<td>Gov. consumption</td>
<td>-0.717</td>
<td>-0.49</td>
<td>-0.316</td>
</tr>
<tr>
<td>Gov. investment</td>
<td>-1.001</td>
<td>-0.922</td>
<td>-2.232</td>
</tr>
<tr>
<td>General transfers</td>
<td>-0.108</td>
<td>-0.044</td>
<td>0.167</td>
</tr>
<tr>
<td>Targeted transfers</td>
<td>-0.334</td>
<td>-0.338</td>
<td>-0.231</td>
</tr>
<tr>
<td>Labor tax</td>
<td>-0.373</td>
<td>-0.504</td>
<td>-0.602</td>
</tr>
<tr>
<td>Consumption tax</td>
<td>-0.266</td>
<td>-0.302</td>
<td>-0.241</td>
</tr>
<tr>
<td>Capital tax</td>
<td>-0.765</td>
<td>-0.949</td>
<td>-1.667</td>
</tr>
<tr>
<td>Lump sum tax</td>
<td>-0.108</td>
<td>-0.044</td>
<td>0.167</td>
</tr>
</tbody>
</table>

By contrast, temporary changes (the right-hand panel of Table 1) have all a short-lived effect on GDP, the dynamics practically going back to the steady-state after 10 years, except notably in the case of a temporary fall in government investment, which still lowers GDP by 0.3% in the long run. Differently from permanent shocks, now government expenses both have a clear larger multiplier after two years than taxes. Again, all the instruments obviously lead to reduction in the ratio of public debt to GDP, but the impact of government spending is lower, due to their stronger negative effect on GDP growth. Table 2 presents the same simulation results focusing on the euro area as a whole. It turns out that fiscal multipliers tend to be close to those obtained for the US, except the long-run multiplier of public investment which tends to be slightly higher (-3.0% vs -2.2% for the US).

4 Model-based results for budget-neutral fiscal reforms

Budget-neutral fiscal reforms are defined as changes in the composition of government revenues and spending while keeping the fiscal budget-balanced with respect to GDP. In policy debates, what matters is however not the fiscal balance per se but its ratio to GDP. We will therefore focus on the ratio and define budget-neutral fiscal reforms those keeping constant the budget balance over GDP. Notice that this is an important and not innocuous assumption. When GDP decreases/increases, our definition of budget-neutral fiscal policy in terms of ratios implies a more contractionary/expansionary fiscal policy that we would have if we were simply looking at levels. However, in order to explicitly disclose the consequence of this assumption, throughout this section, we will compare our results to a case where effects of the increase in GDP are neutralized.

The analysis is implemented using the open economy DSGE Global Integrated Monetary and Fiscal model. The model features eight fiscal instruments, four on the spending side and four on
Table 2: Fiscal multipliers for permanent and temporary consolidation in the euro area

<table>
<thead>
<tr>
<th></th>
<th>Euro Area</th>
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<tr>
<td></td>
<td></td>
<td>Permanent</td>
<td>Temporary (2 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Real GDP</td>
<td>Gov. Debt/GDP</td>
<td>Real GDP</td>
<td>Gov. Debt/GDP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>First year</td>
<td>Second year</td>
<td>After 10y</td>
<td>After 2y</td>
<td>First year</td>
<td>Second year</td>
</tr>
<tr>
<td>Gov. consumption</td>
<td>-0.738</td>
<td>-0.534</td>
<td>-0.351</td>
<td>-2.167</td>
<td>-0.852</td>
<td>-0.745</td>
<td>0</td>
</tr>
<tr>
<td>Gov. investment</td>
<td>-1.170</td>
<td>-1.175</td>
<td>-3.005</td>
<td>-1.178</td>
<td>-1.078</td>
<td>-1.160</td>
<td>-0.432</td>
</tr>
<tr>
<td>General transfers</td>
<td>-0.122</td>
<td>-0.058</td>
<td>0.199</td>
<td>-2.681</td>
<td>-0.114</td>
<td>-0.096</td>
<td>0.019</td>
</tr>
<tr>
<td>Targeted transfers</td>
<td>-0.330</td>
<td>-0.330</td>
<td>-0.195</td>
<td>-2.418</td>
<td>-0.435</td>
<td>-0.387</td>
<td>0.004</td>
</tr>
<tr>
<td>Labor tax</td>
<td>-0.412</td>
<td>-0.564</td>
<td>-0.707</td>
<td>-2.245</td>
<td>-0.205</td>
<td>-0.250</td>
<td>0.040</td>
</tr>
<tr>
<td>Consumption tax</td>
<td>-0.280</td>
<td>-0.315</td>
<td>-0.228</td>
<td>-2.434</td>
<td>-0.292</td>
<td>-0.287</td>
<td>0.013</td>
</tr>
<tr>
<td>Capital tax</td>
<td>-0.760</td>
<td>-0.938</td>
<td>-1.601</td>
<td>-1.484</td>
<td>-0.267</td>
<td>-0.256</td>
<td>-0.030</td>
</tr>
<tr>
<td>Lump sum tax</td>
<td>-0.122</td>
<td>-0.058</td>
<td>0.199</td>
<td>-2.681</td>
<td>-0.114</td>
<td>-0.096</td>
<td>0.019</td>
</tr>
</tbody>
</table>

the revenue side of the balance sheet. We started by testing all possible combinations and decided to focus the paper on the three most growth-enhancing budget-neutral reforms.\textsuperscript{8}We first look at the two sides of the fiscal budget separately and then we select the one which guarantees the largest growth combining both spending and revenue sides. In details: first, we consider a scenario focusing only on the tax side, referred to as fiscal quasi-devaluation. Second, we concentrate on the expenses side, assuming that a boost on public investment is compensated by a cut in public consumption. Last, we propose a budget-neutral scenario based on a mix of taxes and expenses.

Note that throughout this section all fiscal reforms are unexpected and permanent. These reforms are also assumed to be implemented only in the US and during periods of unconstrained monetary policy (following a standard Taylor rule). We will first focus on the domestic macroeconomic effects. Then, Section 5 will show how results might change when monetary policy is constrained or accommodative and Section 6 investigates the spillovers from both unilateral and coordinated fiscal reforms across countries.

4.1 Budget-neutrality on the revenue side: An Incomplete Fiscal Devaluation

Fiscal devaluation is a policy tool aiming at boosting countries competitiveness through changes in their tax system. Typically cut in labor and capital taxes are compensated by a rise in VAT (see Fahri, Gopinath and Itshoki, 2013, for a theoretical approach). While the increase in VAT increases prices for all domestic and imported goods, the reduction in labor and capital taxes dampens only

\textsuperscript{8}Results from other budget-neutral reforms are available upon request. A clarification is also necessary regarding the selection of the three reforms selected in the paper. We decided to concentrate on the most growth-enhancing reforms which did not rely significantly on lump-sum taxes. While the fiscal literature teaches us that these can be the least distortionary source of government revenues (as we also saw in section 3), we also know that these are politically difficult to implement.
domestic production costs. This increases the competitiveness of domestic firms both on the domestic and export market. Fiscal devaluations are therefore often discussed in countries that cannot use the standard exchange devaluation, e.g., belonging to a monetary union. The main advantage of this policy tool is that it is not supposed to put pressure on the public deficit as it is budget-neutral while at the same time it is designed to support economic growth. In practice, however, there is no strong empirical evidence that this strategy can prove fruitful as it relies on many conditions, including the willingness of exporters to pass-through to export prices. Fahri et al. (2013) indeed show that the success to exactly replicate an exchange rate devaluation using fiscal composition is not easily granted and will depend crucially on the structure of the economy and fiscal instruments used. We will see that this is true also in our analysis and given our focus on a simple reform which does not mimic completely exchange rate devaluation we will refer to it as fiscal quasi-devaluation.

Our fiscal quasi-devaluation will consist in a permanent decrease in labor taxes and corporate taxes of respectively 0.50 p.p. of revenues with respect to GDP, compensated by a permanent increase in consumption taxes for an amount equivalent to 1% of revenues to GDP. Lump sum tax rates are also adjusted to make sure that lump-sum revenues to GDP, and consequently total revenues to GDP, stay constant over time. The logic of the shock is therefore to keep total tax revenues to GDP ratio constant forever while changing permanently the composition of revenues. Figure 1 shows the evolution of tax revenues and tax rates over time. The modification of tax rates in the first year is shown in Table 3. Figure 1 plots the small but necessary evolution of tax rates over time to keep the revenue/GDP ratio constant.

<table>
<thead>
<tr>
<th>Revenues/GDP</th>
<th>Permanent</th>
<th>Tax Rates (% points)</th>
<th>First year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor tax +</td>
<td>- 0.5%</td>
<td>Labor tax</td>
<td>-0.888</td>
</tr>
<tr>
<td>Corporate tax +</td>
<td>- 0.5%</td>
<td>Corporate tax</td>
<td>-2.978</td>
</tr>
<tr>
<td>Consumption tax +</td>
<td>1%</td>
<td>Consumption tax</td>
<td>1.581</td>
</tr>
<tr>
<td>Total Tax Revenue</td>
<td></td>
<td></td>
<td>0%</td>
</tr>
</tbody>
</table>

The macro impact of this fiscal devaluation is first analyzed using the aggregate variables in the real national account (Table 4). The reform is expansionary both on impact and after ten years. The effect on aggregate real GDP is hump-shaped peaking after fifteen years and stabilizing at a higher level of 0.84% in the very long run.

Behind this real GDP growth, two forces are at play but in opposite directions (Figure 2). On the one hand, the upward pressure on GDP is given by two factors: first the increase in investment, due to the decrease in capital taxation, and second the increase in employment and wages, which mostly affect liquidity constraint agents. On the other hand, the positive force is dampened by the fall in consumption, due to the increasing post-tax prices of retail goods. The strong increase in investment demand explains the negative net foreign asset position in the short run, which however starts to decrease after few years as net exports start to become positive in the medium run. The monetary authority tightens the nominal interest rate to respond to inflationary pressures coming from the increased aggregate demand, which leads to a short period of appreciation of the real exchange rate.
Blue solid lines represent the ratio of the variable of interest with respect to GDP. The Red dotted lines are indicating the evolution of the variable of interest relative to constant GDP. The top right panel represents (1) labor tax rate: solid/blue, (2) consumption tax rate: dashed/red, (3) capital tax rate: dotted/green. Initial shock equivalent to 1% of GDP.

The real effective exchange rate starts to depreciate only after a few years, once the effects of lower labor and capital costs start to be included in firms pricing (Figure 2).

It is noteworthy that the objective of the fiscal quasi-devaluation seems to be achieved but only in the medium-long run when it generates trade surpluses and a depreciated real exchange rate.

As regards to public finances, in particular the deficit and debt evolutions, we get that insuring zero movement in tax revenues does not mean constant deficit/GDP and debt/GDP ratios, as can be seen from Figure 3. Indeed, the debt/GDP ratio decreases over the years, reaching the plateau of -0.85 pp after eight years and then reverting back to a zero debt/GDP ratio in the new steady state. In opposition, deficit tends first to decrease rapidly, but marginally, and then rebounds back to zero after a period of overshooting (left panel of Figure 3). Both evolutions can be explained by focusing on the two forces at play. First, this fiscal quasi-devaluation proved to be expansionary resulting in decreased deficit/GDP and debt/GDP ratios. The role played by the booms in GDP can be seen in Figure 3 by comparing the blue and red lines. The red line is in fact obtained by plotting the evolution of the deficit and debt keeping the denominator, the GDP, constant. Therefore, the difference between the blue and the green line is exactly due to movements in nominal GDP. Second, higher inflation and consequently higher interest rates, dampens government consumption and investment in order to account for increasing interest payments, which start increasing from the
Table 4: US Real effects of a revenue-neutral decrease of consumption taxes by 1% of GDP

<table>
<thead>
<tr>
<th>Real Effects</th>
<th>First year</th>
<th>Second year</th>
<th>After 10y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Income</td>
<td>0.267</td>
<td>0.398</td>
<td>0.874</td>
</tr>
<tr>
<td>Consumption</td>
<td>-0.071</td>
<td>-0.080</td>
<td>0.420</td>
</tr>
<tr>
<td>OLG agent</td>
<td>-0.092</td>
<td>-0.116</td>
<td>0.366</td>
</tr>
<tr>
<td>Liquidity-constraint agent</td>
<td>0.030</td>
<td>0.092</td>
<td>0.682</td>
</tr>
<tr>
<td>Investment</td>
<td>2.613</td>
<td>3.801</td>
<td>3.030</td>
</tr>
<tr>
<td>Government Spending</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Exports</td>
<td>-0.193</td>
<td>-0.265</td>
<td>0.868</td>
</tr>
<tr>
<td>Imports</td>
<td>0.355</td>
<td>0.572</td>
<td>-0.017</td>
</tr>
</tbody>
</table>

Nominal Effects

| Real effective exchange rate (positive = depreciation) | -0.148 | -0.126 | 0.443 |
| Consumer Price Inflation %                          | 0.050  | 0.090  | -0.004|
| Nominal Policy rate %point                           | 0.116  | 0.189  | 0.007 |

Figure 2: Real macroeconomic impact of a revenue netural fiscal devaluation

(1) blue solid line, (2) red dashed line. Initial shock equivalent to 1% of GDP.

second year onwards. This explains the time series of the government deficit which first decreases, due to the anticipated contraction of government investment and spending and then starts increasing for few years.

Summarizing, these results show that a well-designed composition of a budget-neutral reform from the revenue side can contemporaneously generate growth and decrease the debt persistently.

12
Figure 3: Government deficit and debt in response to a revenue neutral fiscal devaluation

Blue solid lines represent the ratio of the variable of interest with respect to GDP. The Red dotted lines are indicating the evolution of the variable of interest relative to constant GDP. Initial shock equivalent to 1% of GDP.

4.2 Budget-neutrality on the spending side

While in the previous section we focused only on the revenue side of fiscal budget, we now move to isolating the spending side. The aim is to understand if we can generate economic growth just by changing the composition of government spending. By comparison with the previous subsection, the number of available tools to deal with is reduced: government investment, government consumption and government transfers are here considered. We select the change in fiscal combination that guarantees highest growth using fiscal transfers, as before for lump-sum taxes, just as a stabilizing force. Notice that today, in macroeconomic discussions among policy-makers, there is a great debate about the use of public investment to exit the current low growth-low inflation regime. In this respect, we consider in this simulation an increase in government investment of 1% of GDP that is compensated by a decrease of government consumption by 1% of GDP. In order to ensure that total government spending with respect to GDP does not change, we allow transfer to adjust to GDP movements, keeping the ratio equal to zero (Figure 4).

Figure 4: Spending neutral fiscal reform: increase in gov. investment compensated by fall in government consumption

Blue solid lines represent the ratio of the variable of interest with respect to GDP. The Red dotted lines are indicating the evolution of the variable of interest relative to constant GDP. Initial shock equivalent to 1% of GDP.
Macroeconomic results are strongly positive and are presented in Table 5. A compensated government investment increase generates a persistent boom in output, guaranteeing a positive average growth rate of GDP in the long-run (1.9% after 10 years), rapidly visible already in the first two years. All the components of the national account are positively impacted, though the biggest effect can be observed on investment. Indeed, increase in government investment crowds-in also private investment which also persistently increases. Net exports are also acting as a driver of growth in the long-run but not in the short run. On impact, the high aggregate demand for capital generates an inflow of capitals from abroad, resulting in a negative current account balance. Real exchange rate first appreciates on impact, mostly due to the monetary policy reaction to the increase in inflation and then slowly but persistently appreciates. The increase in inflation and the subsequent monetary reaction tend to mitigate the expansionary effect of this budget-balanced reform. This will be clear in section 5 where we will compare our results to a world where monetary policy is constrained.

Table 5: US Real effects of a spending-neutral increase in government investment

<table>
<thead>
<tr>
<th>Real Effects</th>
<th>First year</th>
<th>Second year</th>
<th>After 10y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Income</td>
<td>0.358</td>
<td>0.507</td>
<td>1.918</td>
</tr>
<tr>
<td>Consumption</td>
<td>0.523</td>
<td>0.751</td>
<td>1.753</td>
</tr>
<tr>
<td>OLG agent</td>
<td>0.447</td>
<td>0.669</td>
<td>1.722</td>
</tr>
<tr>
<td>Liquidity-constraint agent</td>
<td>0.896</td>
<td>1.151</td>
<td>1.904</td>
</tr>
<tr>
<td>Investment</td>
<td>0.682</td>
<td>0.887</td>
<td>2.461</td>
</tr>
<tr>
<td>Government Spending</td>
<td>0.383</td>
<td>0.562</td>
<td>1.8</td>
</tr>
<tr>
<td>Exports</td>
<td>-0.41</td>
<td>-0.554</td>
<td>0.978</td>
</tr>
<tr>
<td>Imports</td>
<td>0.61</td>
<td>0.886</td>
<td>0.689</td>
</tr>
</tbody>
</table>

Nominal Effects

| Real effective exchange rate (positive = depreciation) | -0.294 | -0.259 | 0.967 |
| Consumer Price Inflation %                            | 0.078  | 0.119  | 0.074 |
| Nominal Policy rate %point                             | 0.157  | 0.25   | 0.2   |

It should be noted that the economic gain achieved through this simulation is much larger than the one obtained in the previous fiscal quasi-devaluation simulation. In fact, it turns out that public investment appears to be a very powerful tool, with large multipliers that offsets all the negative effects. It is important to notice however, that this is also due to the particular choice of modelling public investment as a complement to private investment. The positive growth implied by this reform would be significantly smaller if we were to assume that public investments crowd-out private ones.

As in the previous simulation of a fiscal quasi-devaluation, even though total government spending to GDP ratio does not move, the deficit/GDP and the debt/GDP ratios will indeed fluctuate. This is, exactly as before, mainly due to GDP growth and interest rate payments. Figure 6 shows the dynamics of both ratios. The long-run effect on the debt/GDP ratio is about twice the one obtained when fiscal quasi-devaluation is implemented.

4.3 Budget-neutral reform mixing revenue and spending sides

In this subsection we use as input all lessons learned from the previous analyses. The goal is now to find the effects of the most growth-enhancing budget-neutral mix using both the revenue and
Figure 5: **Real effects of a spending neutral fiscal reform**

(1) solid blue line (2) dashed red line (3) dotted green line. Initial shock equivalent to 1% of GDP.

Figure 6: **Change in government deficit and debt to a spending neutral reform**

Blue solid lines represent the ratio of the variable of interest with respect to GDP. The Red dotted lines are indicating the evolution of the variable of interest relative to constant GDP. Initial shock equivalent to 1% of GDP.

spending side of the government budget. The simulation will therefore be a combination of the two reforms considered before. We implement (Figure 7) an increase in government investment to GDP of 1% compensated by an increase of labor taxes, consumption taxes and lump-sum taxes by an equal amount of 0.3% of the tax-revenues to GDP. All other fiscal instruments are allowed to adjust following their standard rule, therefore will be moving when GDP increases. This assumption explains why in Figure 7 we see government consumption responding to the increase in the interest rate (blue line) and capital-tax revenues increasing in response to more capital revenues in the economy. Abstracting from endogenous movements in GDP, this specific policy should increase
government spending exactly to offset the increase in government revenues (to compare the policy keeping GDP constant focus on the red dotted line in Figure 7). The fiscal room left by an increase in revenues from labor (0.33% of GDP), consumption (0.34% of GDP) and lump sum taxes (0.33% of GDP) is used to increase government investment (1% of GDP).

This simulation is considered to be the most growth-enhancing in the sense that it uses the tool with the higher multiplier for expenses, namely public investment, and the lower multiplier for taxes, namely labor and consumption. Lump-sum taxes are here allowed to change by a third of the total necessary amount, which seems a reasonable assumption. All other combinations are available upon request, also the one not using lump-sum taxes to increase revenues, but it turns out that the composition presented in this section is able to deliver the highest economic growth without relying extensively on lump-sum revenues.

Figure 7: Increase in gov. investment compensated by labor, consumption and lumpsum taxes

Blue solid lines represent the ratio of the variable of interest with respect to GDP. The Red dotted lines are indicating the evolution of the variable of interest relative to constant GDP. The top right panel represents (1) labor tax rate: solid/blue, (2) consumption tax rate: dashed/red, (3) capital tax rate: dotted/green. Initial shock equivalent to 1% of GDP.
The construction of the shock in terms of constant ratio implies that tax rates adjust through time to account for the movement in GDP. Total Tax Revenues to GDP is constantly higher and government spending is constantly higher. Therefore we claim that this can be considered as an ex ante budget-balanced fiscal neutral reform. Table G.1 summarizes the initial change in revenues and tax rates necessary to implement such a policy. The dynamic adjustment of tax rates can be seen in the top-right panel of Figure 7.

Table 6: Change in revenues and spending from a mixed budget-neutral reform

<table>
<thead>
<tr>
<th>Revenues/GDP</th>
<th>Permanent</th>
<th>Tax Rates (p.p.)</th>
<th>Spending/GDP</th>
<th>Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumpsum tax +</td>
<td>0.330%</td>
<td></td>
<td>Gov Investment -</td>
<td>1%</td>
</tr>
<tr>
<td>Labor tax +</td>
<td>0.330%</td>
<td>0.373</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption tax +</td>
<td>0.340%</td>
<td>0.598</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Government Deficit/GDP$_{t-1}$ = 0%

Looking at the macro impact (Figure 8 and Table 7) of this simulation, we observe that it is by a large amount expansionary in terms of GDP. Indeed, GDP increases permanently by 1.8% in the long-run. Consumption first decreases in the short-run because of the augmented consumption tax, but then increases to 0.59% in the long-run. At the same time, the jump in government spending (5.3% after 10 years) generates a boom in private investment (2.2% after 10 years) through large crowding-in effects. In turn, this boom leads to an increase in labor demand that pushes up wages and inflation. The monetary authority responds to this evolution on prices by tightening the monetary policy stance, which generates an increase in the deficit burden of governments as well as an appreciation of the real exchange rate. As in both previous simulations, this policy is also generating an increased, but slowly recovering, trade deficit.

Table 7: US Real effects of a mixed revenues and spending balanced-budget reform

<table>
<thead>
<tr>
<th>Real Effects</th>
<th>First year</th>
<th>Second year</th>
<th>After 10y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Income</td>
<td>0.770</td>
<td>0.644</td>
<td>1.804</td>
</tr>
<tr>
<td>Consumption</td>
<td>-0.154</td>
<td>-0.295</td>
<td>0.593</td>
</tr>
<tr>
<td>OLG agent</td>
<td>-0.131</td>
<td>-0.227</td>
<td>0.678</td>
</tr>
<tr>
<td>Liquidity-constraint agent</td>
<td>-0.269</td>
<td>-0.627</td>
<td>0.177</td>
</tr>
<tr>
<td>Investment</td>
<td>0.794</td>
<td>0.936</td>
<td>2.271</td>
</tr>
<tr>
<td>Government Spending</td>
<td>5.094</td>
<td>5.679</td>
<td>5.279</td>
</tr>
<tr>
<td>Exports</td>
<td>-0.658</td>
<td>-0.905</td>
<td>0.766</td>
</tr>
<tr>
<td>Imports</td>
<td>1.156</td>
<td>1.252</td>
<td>0.754</td>
</tr>
</tbody>
</table>

Nominal Effects

| Real effective exchange rate (positive = depreciation) | -0.510 | -0.464 | 0.853 |
| Consumer Price Inflation %                          | 0.108  | 0.160  | 0.076 |
| Nominal Policy rate %point                           | 0.212  | 0.322  | 0.208 |

Even though the fiscal policy we put in place is constructed to be fiscal neutral, it turns out that it is actually leading to a reduction in government deficit (at least in short-run) and to a persistent
Figure 8: Macroeconomic impact of a revenue-spending mixed budget-balanced reform

(1) solid blue line (2) dashed red line (3) dotted green line. Initial shock equivalent to 1% of GDP.

debt reduction (as shown in Figure 9). This can be thought as a budget-neutral fiscal consolidation achieved in virtuous way, that is through economic growth. Indeed, this economic growth factor leads to a fiscal consolidation through two channels. On the one hand, it mechanically pushes down the deficit/GDP and second due to an even further reduction in government consumption due to the increase in the interest rate. The temporary increase in the deficit/GDP ratio from period two onward, as before, is due to the increase in interest payments due to the monetary tightening.

Figure 9: Gov. deficit and debt response to a revenue-spending mixed budget-balanced reform

Blue solid lines represent the ratio of the variable of interest with respect to GDP. The Red dotted lines are indicating the evolution of the variable of interest relative to constant GDP. Initial shock equivalent to 1% of GDP.

Overall, the macroeconomic effects of this simulation are similar but quicker than the ones
obtained in the previous simulations involving only the expenses side. Especially, both polices are expansionary and allow for fiscal consolidation in terms of deficit and debt but the combination of spending and revenues reforms is the one that maximizes the short-run effects, in terms of growth, of the reform. However, when comparing those two simulations, a clear trade-off appears. The question that has to be solved by policy-makers is how to compensate the necessary increase in public spending in order to achieve an initial budget-neutral reform? Two options appear: (i) a simultaneous rise in labor tax and consumption taxes for faster growth at the cost of making liquidity constrained agents paying a large amount of the costs or (ii) a decrease in public consumption with slower growth but more uniformly distributed. Both options have pros and cons, especially from a social point of view, and need a political answer by the government.

5 The role of monetary policy

In this section we investigate the role of monetary policy reactions for the evaluated real effects of the presented fiscal reforms. In line with the literature investigating fiscal multipliers in periods of constrained monetary policy (e.g. in the presence of the ZLB), we want to evaluate if real effects are amplified or mitigated by the absence of an instantaneous monetary reaction. We start by assessing the differential size of the baseline fiscal consolidation multipliers presented in section 3 by constraining monetary policy at the ZLB. Second we implement the three budget-neutral reforms analyzed in section 4 assuming that monetary policy is not reacting for two years. Contrary to the multiplier analysis, were the constrained monetary policy is restrictive, here it will be accommodative. By not reacting to the increase in real and nominal economic activity, the monetary authority can be seen as expansionary.

5.1 Benchmark fiscal consolidation multipliers at the ZLB

We start by assessing the basic multipliers from a fiscal consolidation, as in section 3, but assuming that monetary policy is not reacting, for two years, to the negative consolidations’ effects on growth and inflation. Typically this is the case when countries are constrained by the Zero Lower Bound (ZLB) on nominal interest rates. In this respect, we expect from the literature higher multipliers in absolute terms (see e.g. Christiano et al., 2011, or Farhi and Werning, 2012). The intuition of why that is the case is straight-forward. The inability of monetary policy to decrease nominal rates while facing a fall in GDP and inflation, raises the real rates, contracting further the demand and the overall economy. In addition, in an open economy, there is no nominal depreciation of the exchange rate due to a fall in interest rates, thus no support on activity from the net exports.

As before, and for both the US and the EA, we implement two types of fiscal consolidation shock: a permanent and a temporary one of 2 years. Comparing the baseline multipliers with the case of constrained monetary policy, we see that in response to permanent shocks, multipliers are larger in the short run for all fiscal instruments considered. As the constraint in monetary policy lasts only two years and the fiscal shock is permanent, multipliers are similar in the long-run. The most sensitive permanent fiscal consolidation with respect to monetary policy reactions is capital taxation. The multiplier, as shown in table 9, is 97 percent higher for both years. Government investment and
transfers also sharply increase between 60 and 70 percent. In the case of a permanent reduction of
government investment the GDP effect goes from -1.0 to -1.6 in the first year and from 0.9 to 1.6
during the second year. Overall, all multipliers tend to increase in the short-run, in line with the
literature.

When we implement a temporary shock, the enlargement of the multiplier is generally smaller,
up to being negative when considering an increase in labor taxation. The temporary nature of the
reforms makes the impact on the labor equilibrium muted, causing a smaller contraction in response
to the consolidation, and therefore a smaller drop in GDP. The anticipation of a short-lived increase
in labor taxation not only reduces the labor fall but also generates a future increase in aggregate
labor due to postponement of labor supply and demand decisions. Figure 5.1 shows the different
multiplier

Looking at the debt/GDP ratio, the larger recessionary effect of the fiscal reforms due to the
constrained monetary policy are naturally reflected in smaller decrease of the government debt to
GDP ratio (see both tables 8 and9).

Table 8: Benchmark multipliers at the ZLB for the United States

<table>
<thead>
<tr>
<th>United States</th>
<th>Permanent</th>
<th>Temporary (2 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Real GDP</td>
<td>Gov. Debt/GDP</td>
</tr>
<tr>
<td></td>
<td>First year</td>
<td>Second year</td>
</tr>
<tr>
<td>Gov. consumption</td>
<td>-0.98</td>
<td>-0.75</td>
</tr>
<tr>
<td>Gov. investment</td>
<td>-1.61</td>
<td>-1.55</td>
</tr>
<tr>
<td>General transfers</td>
<td>-0.19</td>
<td>-0.13</td>
</tr>
<tr>
<td>Targeted transfers</td>
<td>-0.45</td>
<td>-0.45</td>
</tr>
<tr>
<td>Labor tax</td>
<td>-0.44</td>
<td>-0.57</td>
</tr>
<tr>
<td>Consumption tax</td>
<td>-0.36</td>
<td>-0.40</td>
</tr>
<tr>
<td>Capital tax</td>
<td>-1.51</td>
<td>-1.70</td>
</tr>
<tr>
<td>Lump sum tax</td>
<td>-0.19</td>
<td>-0.13</td>
</tr>
</tbody>
</table>

5.2 Budget-neutral reforms with constrained monetary policy

All the three simulations presented in the previous section allow for a monetary policy reaction in
the wake of the budget-neutral fiscal consolidation. Indeed, GDP and inflation increases lead to a
tightening of the monetary stance through a Taylor-type rule. Yet, we know that such a reaction
weigh on growth through the exchange rate channel. Indeed, the uncovered interest parity relation-
ship leads to a sharp increase in the nominal exchange rate. This nominal appreciation is somewhat
compensated by higher inflation, but typically this leads to a real exchange rate appreciation, putting
some downward pressure on exports. As imports are boosted by the increasing domestic demand,
the contribution to growth of net exports is negative. In addition, the real interest rate channel is also at play and more inflation will translate into lower real interest rates, thus boosting investment and GDP growth. Overall turning off the monetary reaction in the model is thus likely to generate more growth.

We implement permanent reforms and look at the effects on GDP growth after two years. Results for the US for the three scenarios are presented in Table 5.3. We clearly see that the absence of monetary tightening generates significantly higher GDP growth after two years. Especially, when we carry out the third scenario that funds a rise in public investment by a rise in the less distortive taxes (on consumption and on labour), the effect on GDP is twice as much.

Those results point out that a monetary policy guided by a Taylor rule that reacts mechanically to inflation during growth-friendly budget-neutral reform is likely to significantly reduce the impact on economic activity.

### 6 International spillover effects and collective action

International spillovers are a key point in the discussions among policy-makers in international fora and, as noted in the introduction, international organizations as the IMF and the OECD are currently pushing a lot for putting in place a collective fiscal stimulus in order to benefit from the positive spillovers between countries. In this section we take advantage of the fact that the GIMF model is a multi-country one to assess the potential gains from spillovers and from a collective action in the framework of budget-neutral fiscal reforms.
Table 9: Benchmark multipliers at the ZLB for the euro area

<table>
<thead>
<tr>
<th></th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Permanent</td>
</tr>
<tr>
<td></td>
<td>Real GDP</td>
</tr>
<tr>
<td></td>
<td>First year</td>
</tr>
<tr>
<td>ZLB ZLB ZLB ZLB ZLB ZLB ZLB ZLB</td>
<td>Gov. consumption</td>
</tr>
<tr>
<td></td>
<td>Gov. investment</td>
</tr>
<tr>
<td></td>
<td>General transfers</td>
</tr>
<tr>
<td></td>
<td>Targeted transfers</td>
</tr>
<tr>
<td></td>
<td>Labor tax</td>
</tr>
<tr>
<td></td>
<td>Consumption tax</td>
</tr>
<tr>
<td></td>
<td>Capital tax</td>
</tr>
<tr>
<td></td>
<td>Lump sum tax</td>
</tr>
</tbody>
</table>

Table 10: Effects on US GDP of the three budget-neutral scenario, with and without monetary reaction (in % vis--vis the baseline)

<table>
<thead>
<tr>
<th></th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Real GDP - Second year</td>
</tr>
<tr>
<td></td>
<td>Permanent Reform</td>
</tr>
<tr>
<td>E1: Fiscal Devaluation</td>
<td>0.398</td>
</tr>
<tr>
<td>E2: Government investment</td>
<td>0.509</td>
</tr>
<tr>
<td>E3: Mixing spending and taxation</td>
<td>0.644</td>
</tr>
</tbody>
</table>
6.1 International spillover effects

To start with, let’s have a look at spillovers on euro area GDP when a fiscal consolidation of 1% of GDP is implemented in the US using one of the eight available instruments at a time. Those multipliers can be referred to as benchmark spillover multipliers and are presented in Table 6.1 below. We simulate both a permanent and a temporary shock of two years and we allow for monetary policy reaction. In both cases, it turns out that international spillovers are quite small, the maximum impact being observed for government investment, in line with the domestic results presented in section 3.2. In fact, it turns out that the boost in the US domestic demand is not sufficient enough to have a significant effect on euro area exports. Also we allow for monetary policy reaction in both areas that mitigates the effect on US demand as well as on the activity in euro area. Financial spillovers are also integrated in GIMF, but do not seem to be at play in this simulation.

Note also, that spillovers from the euro area to the US are also very small (not presented here but available upon request).

Table 11: Benchmark spillover multipliers to the euro area GDP of permanent and temporary consolidations in the US for the first year

<table>
<thead>
<tr>
<th>Spillovers to Euro Area of a US shock</th>
<th>Permanent</th>
<th>Temporary (2 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP First year</td>
<td>Real GDP First year</td>
<td></td>
</tr>
<tr>
<td>Government consumption</td>
<td>-0.05</td>
<td>-0.06</td>
</tr>
<tr>
<td>Government investment</td>
<td>-0.07</td>
<td>-0.06</td>
</tr>
<tr>
<td>General transfers</td>
<td>-0.04</td>
<td>-0.01</td>
</tr>
<tr>
<td>Targeted transfers</td>
<td>-0.04</td>
<td>-0.04</td>
</tr>
<tr>
<td>Labor tax rates</td>
<td>-0.02</td>
<td>0.00</td>
</tr>
<tr>
<td>Consumption tax rates</td>
<td>-0.03</td>
<td>-0.02</td>
</tr>
<tr>
<td>Capital tax rates</td>
<td>-0.06</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

Let’s turn now to the spillovers on euro area GDP of the three budget-neutral experiments described in section 4, namely fiscal quasi-devaluation (E1), spending reform (E2) and budget composition (E3). Results are presented in Table 6.2 below, decomposed following the national accounts. Again, note that we allow for monetary reaction.

When fiscal quasi-devaluation (E1) is implemented in the US, spillovers to the euro area are practically zero. These are mostly a consequence of the increase in exports generated by the real exchange rate depreciation of impact of the euro against the US dollar, related to Federal Reserve monetary tightening.

When a budget-neutral increase in government investment (E2) is implemented in the US, spillovers are overall small but positive on euro area GDP, via net exports, but decrease foreign consumption and investment. This explains why the positive effect on GDP is only temporary and reverts to negative in the long run.

When a budget-neutral fiscal composition (E3) is put in place in the US, spillovers to the euro...
area are quite small and temporary, but however positive in the short run. These are mostly a consequence of the increase in net exports generated by the real exchange rate depreciation of the euro against the US dollar. The appreciation of the dollar is due to the US monetary tightening.

6.2 Results from a coordinated action

In this part, we ask whether there is scope for a collective action on both sides of the Atlantic Ocean. The main idea is to check if a simultaneous implementation of budget-neutral fiscal policies is likely to generate additional growth in each area. In this respect, the IMF tends to insist on the gains from coordination putting emphasis on the increase in the multipliers following a collective fiscal stimulus package in all the G20 countries. In this section, we simply restrict the analysis to two countries and we dont consider fiscal boost but budget-neutral fiscal reforms simultaneously implemented in the US and the euro area.

Table 13: Effects on US GDP growth after two years of the three budget-neutral scenarii, with and without monetary reaction and with and without collective action (in % vis–vis the baseline)

<table>
<thead>
<tr>
<th>United States</th>
<th>Real GDP - Second year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Fiscal devaluation</td>
<td>0.398</td>
</tr>
<tr>
<td>Spending reform</td>
<td>0.509</td>
</tr>
<tr>
<td>Mixed budget composition</td>
<td>0.644</td>
</tr>
</tbody>
</table>

7 Conclusions

This paper has focused on the issue of fiscal composition, i.e. whether changes in the composition of government revenues and spending can effectively stimulate GDP growth while keeping the fiscal budget-balanced. We used simulation results from a multi-country DSGE model, focusing on the US and the euro area. The paper investigated three types of fiscal composition measures: a fiscal
devaluation, a rise in government investment compensated by a fall in government consumption and a rise in government investment compensated by a rise in consumption taxes, labor taxes and lump-sum taxes. We also considered dampening or amplifying effects due to coordination across policy instruments (monetary and fiscal) and across economic regions. The main result is that an increase in government investment financed by rising less distortionary taxes appears to be an optimal growth-friendly budget neutral reform in the sense that it generates GDP growth and improves fiscal sustainability. In addition, we find that budget-neutral reforms, even if coordinated across countries, do not have large cross-border spillovers.

References


IMF. World economic outlook. Imf occasional papers, International Monetary Fund, 2014.


