

# A survey of the effects of discretionary fiscal policy

Roel Beetsma<sup>1</sup>

*University of Amsterdam, CEPR and CESifo*

## 1. Introduction

Until the early eighties fiscal policy was widely regarded as a useful tool for economic stabilization. In response to the oil shocks of the seventies many governments relied on monetary and fiscal expansion. However, active fiscal policies did not prevent the widespread increases in unemployment, while at the same time it resulted in high deficits and rising public debts. The demonstrated ineffectiveness of fiscal policies has made many economists sceptical about the usefulness of fiscal policy as a tool for macroeconomic stabilization. Nevertheless, politicians continue to regard an active fiscal policy as an instrument for solving their economic problems. Quite recently, Japan has implemented (without success) large fiscal expansions to drag its economy out of its liquidity trap. Moreover, after they secured membership of the Euro-area, a number of countries relaxed fiscal policy, sometimes implementing tax cuts (such as in the case of Germany and France). In fact, at this moment of writing, prominent economists with close ties to policymaking such as Lawrence Summers and Martin Feldstein have been pleading for a fiscal stimulus to the weak U.S. economy (The Economist, 2008).

While fiscal expansion may work in simple textbook theory, it often fails in reality. This article discusses both from a theoretical and an empirical perspective the effectiveness of various types of fiscal expansion under different circumstances. We focus mostly on the short-run consequences of fiscal expansions, because the main question we are interested in is to what extent fiscal policy is able to stabilize the business cycle.

While the consequences of monetary policy changes have been widely studied in the literature and there is substantial consensus about their effects, we know relatively little about the effects of fiscal policy shocks. We are not even sure about the direction of the responses of some variables, let alone the magnitude of those responses. This may also not be surprising in view of the large variety of different fiscal instruments available. Fiscal expansions may take the form of a

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<sup>1</sup> Address: University of Amsterdam, Amsterdam School of Economics, Roetersstraat 11, 1018 WB Amsterdam. Phone: +31.20.5255280; fax: +31.20.5254254; e-mail: [R.M.W.J.Beetsma@uva.nl](mailto:R.M.W.J.Beetsma@uva.nl).

reduction in net taxes (taxes minus transfers) or an increase in government purchases. Government purchases may be divided into government investment and government consumption, which in turn is the sum of wage and non-wage consumption. Taxes can be divided into lump sum and distortionary taxes, with the most important ones being labour, corporate and value-added taxes. However, quite recently, and armed with the instruments used for monetary policy analysis, academic researchers have regained interest in the empirical study of the effects of fiscal policy changes.

The remainder of this paper is structured as follows. In section 2, we review the theoretical predictions of the consequences of fiscal expansions for the macro-economy, both in closed and open economies. Section 3 reviews the empirical evidence from the literature and presents some of our own estimates. Again we distinguish between closed and open economy effects of fiscal policy. Section 4 briefly discusses some evidence on the actual behaviour of fiscal authorities to see whether they have been affected by the EU fiscal restrictions. This is relevant for Sweden, should it at some point join the Eurozone or should it self-impose some fiscal constraint. Section 5 concludes this paper with a discussion of the practical pros and cons of using fiscal policy for cyclical stabilization.

## **2. Theory**

Not surprisingly, what theory says about the economic consequences of changes in fiscal policy depends much on the specific theoretical framework that is adopted. We are most interested in the effects of fiscal expansions on output and consumption. However, we shall also discuss the effects on other variables, such as investment and employment, which helps us to better understand the mechanisms through which fiscal policy affects the economy. In discussing the mechanisms we will distinguish between a closed economy and an open economy. For the open economy we are also interested in how fiscal expansions impact on specific “open economy” variables, such as the trade balance and the real exchange rate.

### *2.1. Fiscal policy in models of closed economies*

#### 2.1.1. The IS-LM model

Basic textbooks usually teach us fiscal policy in the context of the IS-LM model. As this is a short-run model, prices are assumed constant. The IS curve is formed by the combinations of output and the interest rate for which the goods market is in equilibrium. An increase in the interest rate reduces investment and a fall in output is needed to restore the goods market equilibrium. The LM curve is the (upward sloping) set of combinations of output and the interest rate for which the money market is in equilibrium. An increase in output implies more transactions in the economy and boosts the real demand for money. With the nominal money supply and the price level both fixed, the real money supply is fixed, and an increase in the interest rate is needed to reduce the real money demand to its original level and restore equilibrium in the money market. An increase in government purchases or a reduction in net taxes raises output for any given level of the interest rate and shifts the IS curve to the right. The economy settles at a new short-run equilibrium characterised by a higher level of income and a higher interest rate (see Figure 1).

The IS-LM model forms the demand side of the economy for given price level. An increase in the price level produces an inward shift of the LM curve, which implies equilibrium with lower output. The output-price combinations obtained in this way form the aggregate demand (AD) curve. Combining the AD-curve with the short-run aggregate supply (AS) curve yields Figure 2. The AD-AS framework abolishes fixed prices, but allows for sluggish price adjustment. A fiscal expansion shifts out the AD-curve and produces a new short-run equilibrium (point B) with higher output and a price level that exceeds the one that was originally expected by wage setters. The AS starts shifting upwards and the price level starts rising. Eventually the economy ends up at the new long-run equilibrium (point C) with output at the natural level and a permanently higher price level.<sup>2</sup>

### 2.1.2. Fiscal policy effects in inter-temporal models with micro-foundations

The AD-AS model neglects important inter-temporal aspects of fiscal expansions. A deficit-financed increase in government spending or a tax reduction not matched by a spending reduction results in additional public debt accumulation and requires higher future tax payments or spending reductions. To the extent that taxes are distortionary, potential short-run benefits of fiscal expansion need to be traded off against future contraction.

More recent literature analyzes the consequences of fiscal policy shocks in inter-temporal models with micro-foundations. Table 1 provides a systematic overview of the macro-economic effects of an increase in government purchases in different settings.

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<sup>2</sup> During the transition the economy may oscillate around the new long-run equilibrium and the AD curve may shift further. Also the equilibrium may be reached after one period if agents are rational and foresee the eventual outcome. We abstract from these aspects here.

In their seminal contribution, Baxter and King (1993) conduct a number of fiscal policy experiments in a neo-classical model. Utility is separable in consumption and leisure. Further, the marginal utilities of consumption and leisure are not affected by government purchases, which consist of government consumption and public investment. The latter affects the marginal products of labour and capital in production, though. Taxes are lump sum, hence, the government financing does not matter for a given path of government expenditures. Consider a temporary or permanent increase in government consumption. The discounted value of future taxes rises, which generates a negative wealth effect and induces individuals to reduce both private consumption and leisure (if both are normal goods, i.e. contract if discounted resources shrink). Labour supply increases, hence real wages fall and total output expands. Moreover, the rise in employment raises the marginal product of capital and induces more private investment. Obviously, the described effects are stronger when the spending increase is permanent instead of temporary. A permanent increase in government consumption is able to generate an output multiplier higher than unity in both the short and long run. In the long run, it is the effect of the higher employment level on the steady state capital stock that generates the high multiplier. In the short run, the higher investment needed to build up the higher capital stock boosts labour input. A larger inter-temporal elasticity of substitution in leisure produces a larger short-run response in the supply of labour and magnifies the short-run output multiplier. If the additional government consumption is financed by distortionary taxes, labour supply and output rise by less, or may even fall as Fatas and Mihov (2001) show in a closely related experiment, while raising public investment instead of public consumption produces additional positive effects on the economy by boosting the productivity of capital and labour. Private consumption may even increase (with some lag).

Burnside et al. (2004) further explore the role of distortionary taxes in a closely related neoclassical growth model. In addition, they introduce habit persistence in consumption and capital adjustment costs to produce responses to government purchases that better match the empirical responses (see below). A hump-shaped time profile in government purchases (e.g. a war) produces hump-shaped rises in output, taxes and employment. The elasticity of the labor supply is important for the relative reaction of consumption and employment. The less elastic is the labor supply, the less willing is the individual to increase work effort after the spending shock and the more consumption has to fall. Distortionary labor taxes may be important for the time profile of employment, depending on the ease with which individuals substitute labour over time. A high intertemporal elasticity of substitution in leisure shifts the peak of the labour supply to the onset of the spending rise, when labour taxes are still relatively low. Introduction of habit persistence mutes

the fall in consumption, while capital adjustment costs produce a hump-shaped investment pattern and, because of the complementarity between capital and labor, also a hump shape in employment.

Empirical analysis (discussed below) often suggests that a positive shock to government purchases is followed by an increase in consumption. The neoclassical model has substantial trouble in producing a consumption increase. Therefore, Linnemann (2006) introduces non-separability in the utility of consumption and leisure into this model. Provided the two “goods” are substitutes, a rise in government purchases may lead to higher consumption. The aforementioned wealth effect leads individuals to reduce leisure. However, because consumption and leisure are substitutes, the marginal utility of consumption increases and this has a positive effect consumption that may overturn the wealth effect on consumption. This is more likely the higher the degree of substitutability between consumption and leisure and the lower the inter-temporal rate of substitution. With low inter-temporal substitutability, the incentive (owing to the wealth effect) to reduce current relative to future consumption is suppressed.

Ramey and Shapiro (1998) build a two-sector neoclassical with costly capital reallocation between sectors (though labour is perfectly mobile). Either capital can be shifted between sectors at a loss or new capital has to be generated within the sector in which it is to be used. The argument for using a two-sector model is that government spending is often concentrated in specific sectors. For example, a shock to defense spending falls disproportionately on manufacturing and aircraft industry. Due to the costly reallocation of capital, the two sectors may show different dynamics in response to an increase in government purchases. This is in particular the case when the substitutability between capital and labour in production is low. Aggregate employment rises more than without reallocation costs; the capital stock declines in value as it is stuck in the sector that is not hit by the spending shock. Hence, the wealth effect is larger. However, aggregate consumption falls less, because the reallocation friction reduces investment opportunities in the sector unaffected by the shock. Finally, the relative price of output in the sector hit by the shock rises.

The neoclassical model thus has trouble to generate a positive effect of government spending on consumption. The main obstacle in this regard is the rightward shift of the labour supply curve, which for a given labour demand curve produces a lower wage. Hence, to have a positive effect on consumption it is necessary (though not always sufficient) to have a mechanism that shifts the labour demand curve also to the right. One mechanism is to introduce increasing returns as in Devereux et al. (1996) where more government spending raises the equilibrium number of firms in intermediate goods sectors characterized by increasing returns to specialization. The productivity of all firms in the sector rises and the outward shift in the labour demand may offset the negative wealth effect and produce a higher real wage. Another mechanism relates to the

“deep habits” introduced by Ravn et al. (2006) into a model with monopolistic competition in goods production. “Deep habits” refer to habit formation at the level of the individual variety of a type of good. Demand for the good is then composed of a price elastic component (as in standard monopolistic competition models) and an inelastic component (the lagged “stock of habit”). An increase in aggregate demand raises the weight of the elastic component, inducing producers to lower their price mark-up. On the one hand, an increase in government purchases produces the standard wealth effect, with higher labour supply. On the other hand, the counter-cyclical reduction in the mark-up on the wage acts like a positive supply shock. Hence, it increases labor demand, which pushed the real wage up. Overall, we may see an increase in the real wage and, hence, an increase in consumption.

A number of contributions try to remedy the negative consumption effect by introducing nominal rigidities into a New-Keynesian framework with monopolistic competition, so that the price of output exceeds marginal cost. Such a framework has originally been used to focus on the effects of monetary policy, but has recently become a vehicle for studying fiscal policy as well. As in the neoclassical model, in the New-Keynesian model with nominal rigidities an increase in government purchases generates a negative wealth effect owing to the rise in tax payments. As before, this puts downward pressure on consumption and raises the labour supply. However, with a sticky prices, and because the price of output exceeds the marginal cost under monopolistic competition, an increase in the demand for goods will be met with an increase in the supply of output; at the given price level, firms are prepared to produce the additional output as long as the price is not exceeded by the marginal cost. Hence, the demand for labour increases and this puts upward pressure on the real wage rate. However, even if this effect dominates the other one and the real wage rises, this does not guarantee a (substantial) positive consumption effect, because optimising consumers would spread the additional consumption over time. Some additional imperfection may be needed to produce higher consumption.<sup>3</sup>

Therefore, alongside the optimising “Ricardian” consumers, Gali et al. (2007) introduce “rule-of-thumb” consumers who consume their disposable income. Hence, these consumers put the entire increase in the real wage into consumption at the moment it materializes. Provided that the group of rule-of-thumb consumers is sufficiently large, this positive effect on current consumption may overturn the negative consequences for consumption of the wealth effect. Callegari (2007) proposes an alternative mechanism and combines Ricardian consumers with “buffer stock” consumers. Buffer stock agents keep a buffer of assets in order to avoid that consumption drops to zero in any single period (because of some restriction on borrowing against future income). As a

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<sup>3</sup> Van der Ploeg (2005) provides a critical overview of the ability of New-Keynesian models to account for key macro-economic facts.

result, these agents feature a negative relation between asset holdings (“cash-on-hand”) and consumption growth. When assets are too low for some reason, they replenish assets by reducing current consumption. Subsequently consumption will increase faster (as assets rise again). As before, higher government purchases produce a negative wealth effect. At the same time, with monopolistic competition and sticky prices, labour demand rises, thereby putting upward pressure on wages. A wage rise would lead buffer stock agents to consume more. The buffer stock effect is stronger and may dominate when the sensitivity of consumption growth to cash on hand rises. With this setup, government purchases shocks may indeed generate positive consumption effects.

Callegari (2007) also builds a model with durable and non-durable goods and Ricardian and rule-of-thumb consumers. The latter are subject to a borrowing constraint that depends on the amount of durables they possess. Durables are in fixed supply, while non-durables are constructed from intermediates produced by monopolistically competitive firms subject to a price-setting rigidity. Public consumption falls entirely on non-durables and, hence, produces a fall in the relative price of the durables, thereby tightening the borrowing constraint of the non-Ricardian consumers. This effect comes on top of the standard negative wealth effect on consumption and the positive effect of introducing non-Ricardian consumers. The extra effect raises the likelihood that consumption falls after an increase in government purchases.

### 2.1.3. Interactions with monetary policy

The effectiveness of a fiscal expansion depends on how the monetary authorities react to the expansion. For example, a central bank concerned about its independence or about its strategic position vis-à-vis the government may systematically contract monetary policy in response to a fiscal expansion. Any positive effect of the expansion on economic activity might then dissipate and the country would then face a harmful policy mix with a high interest rate that hurts investment. Of course, one can also conceive of situations in which the monetary and fiscal authorities coordinate their actions (maybe only informally). Such a situation would be particularly beneficial during a recession when inflation is low and a fiscal stimulus is supported by a monetary relaxation.

In the context of a sticky-price New Keynesian model, Linnemann and Schabert (2003) explore how the consequences of shocks to government purchases depend on the monetary policy rule followed by the central bank. Importantly, the model assumes a cash-in-advance constraint. That is, nominal consumption spending does not exceed money holdings plus transfers, defined as seigniorage minus government expenditures. Moreover, price rigidity is formulated as in Calvo

(1983), whereby each firm with exogenous probability gets the chance to change its price and otherwise must keep its price fixed.

In a regime with an exogenous money growth rate, the fiscal expansion has deflationary consequences. The wealth effect causes a rise in the labor supply and, hence, output. Given the cash-in-advance constraint, prices have to fall to accommodate the output increase. Firms want to cut prices, but some of them are unable to do so (due to the Calvo re-pricing mechanism). These firms reduce output and, hence, their demand for labour, thus putting downward pressure on the real wage. While output rises, it does not rise one-for-one with the government spending shock, implying that current consumption must fall.

When monetary policy follows a Taylor-type of rule, the results are very different. Under this rule, the nominal interest rate is set in response to expected inflation and expected output. The cash-in-advance constraint loses its relevance, because the nominal money supply endogenously adjusts to changes in the demand for money. First, suppose that the nominal interest rate only reacts to expected inflation. Consumption falls, but this fall is dominated by the increase in government purchases, implying a rise in output. Also, inflation rises. Because some firms are constrained not to raise their price in response to the higher inflation, they instead expand output even more, thereby hiring additional labor. Households are only willing to supply the additional labour if the real wage rises. This effect dominates the rise in the labor supply owing to the wealth effect. Suppose now that the monetary authority also reacts to expected output. As long as this reaction is not too fierce, the results just described continue to hold. However, beyond a certain threshold, the increase in goods demand and, hence, also the increase in labour demand becomes so weak that it is dominated by the rise in the labour supply. Prices fall and monetary policy induces a stronger rise in the real interest rate than when it does not react to expected output.

The authors also extend the model with capital. The rise in the real interest rate (associated with the consumption growth after the impact of the shock) depresses investment because it has a negative effect on the shadow price of capital. Under the selected parameterization, with the money supply rule, aggregate demand and employment now fall in equilibrium. For the interest rate rule, the extended model replicates qualitatively the results in the absence of capital. The real interest increase is smaller than under the money supply rule, implying that the investment decline is attenuated.

## *2.2. The open economy*



Like other EU countries, Sweden is best characterized as a open economy. Hence, the consequences of fiscal expansion for Sweden would best be studied in an open-economy framework. Such a framework not only allows us to explore the effects of fiscal policy changes on variables relevant for internal balance (output, consumption and employment), but also on the exchange rate, the terms-of-trade, the trade balance and its components.

### 2.2.1. The Mundell-Fleming model

The basic textbook treatment of fiscal policy in the open economy is the Mundell-Fleming model, which was developed in the early sixties and which is the open-economy counterpart to the IS-LM model. The model makes a distinction between flexible and fixed exchange rates. Moreover, one can use it to study the effects of policy under perfect and imperfect capital mobility. We assume perfect capital mobility, because this is the reality for industrialized economies nowadays. Again, the model describes the short run and assumes a fixed price level. A fiscal expansion shifts the IS curve out, putting pressure on the domestic interest rate to rise above the foreign interest rate. There will be an inflow of capital leading to excess demand for domestic currency on the foreign exchange market. Under a flexible exchange rate regime, the domestic currency appreciates, thereby undermining the competitive position of the country. Net exports fall and the IS curve shifts back to its original position, leaving output and consumption unchanged. With a fixed exchange rate, the pressure on the exchange rate is eliminated by increasing the supply of domestic currency (expanding the money supply). Equilibrium output (and consumption) rises, while net exports are unchanged.

Varying the price level in the Mundell-Fleming model, one again derives an aggregate demand curve, which combined with a short-run aggregate supply curve yields a diagram similar to Figure 2. A fiscal expansion leaves the aggregate demand curve unchanged under a flexible exchange rate, but shifts it to the right under a fixed exchange rate. Then, an adjustment mechanism starts that is similar to the one discussed above. Again, this open-economy model is not based on micro-foundations and the future consequences of a fiscal expansion in the form of debt accumulation and higher taxes are neglected. We now to the discussion of models that do take these aspects into account.

### 2.2.3. Fiscal policy effects in open-economy models with micro-foundations

The two major frameworks for studying fiscal policy are again the neoclassical and the New-Keynesian framework. Within each type of framework at least two important additional assumptions need to be made. The first assumption concerns the asset structure. One extreme is the assumption that the international asset market is complete (there exists a complete set of Arrow-Debreu securities contingent on all possible uncertainties). The other extreme is that there is only a single internationally traded bond (a real bond in non-monetary models). The second assumption is whether we are considering a small open economy (with no influence on internationally determined prices) or a large open economy.

Consider an increase in government purchases in a neoclassical open economy setting, such as Baxter's (1995). Taxes are lump-sum, implying that the time profile of taxes is irrelevant. Assume that the economy ("Home") is large relative to the rest of the world ("Foreign"). Moreover, there is a single good consumed everywhere. With unchanged private sector behaviour, the shock would one-for-one translate into a higher deficit on the trade balance. However, private sector behavior does change and, anticipating higher future tax payments, individuals start to save and work more now. As before, the additional labor supply raises the productivity of capital, which stimulates investment. Overall, the fall in public saving and the increases in private saving and investment produce a trade balance deterioration. The enhanced claim of the government on resources also raises the world interest rate, which deepens the fall in consumption (leisure) and raises its subsequent growth rate. With complete international asset markets, the fall in consumption is perfectly shared with Foreign. As a result, the output and investment responses in Foreign are the same as in Home. With incomplete asset markets, the entire wealth effect is borne by "Home". Hence, labor input in Home rises by more than under complete markets and the fall in the real wage will be larger. Labor input and wages in Foreign do also move, but by less than under complete markets, because now they are only affected by the real interest rate effect. Now, Foreign investment falls because only the interest rate effect is present. Under incomplete markets, in the new steady state Foreign holds net claims on Home, implying that production and labour input in Home are higher and consumption in Home are lower compared to the initial steady state. Foreign's new steady state is characterised by the opposite configuration.

Corsetti and Müller (2007), building on Corsetti and Mueller (2006), present a two-country "Home" and "Foreign" model in which government spending falls entirely on domestic goods and governments only have access to distortionary income taxes.<sup>4</sup> Government purchases are financed with debt. Taxes then adjust slowly in response to an increasing debt/GDP ratio. There is perfect competition at the intermediate and final good level and asset markets are internationally complete.

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<sup>4</sup> In contrast to Baxter (1995), consumption bundles are now allowed to differ between the two countries.

An increase in government purchases produces a fall in consumption due to the negative wealth effect. International asset market completeness implies the international risk sharing condition (after some normalisation),

$$u_C^H / u_C^F = Q, \quad (1)$$

which ensures that the consumption fall is shared with foreigners. Here, the left-hand side is the ratio of the marginal utilities of Home and Foreign consumption, while the right-hand side is the real exchange rate, defined such that an increase means an appreciation of Home real exchange rate. Because the Home real exchange rate appreciates, the fall in Home consumption is larger than the fall in Foreign consumption.

Investment responses are driven by opposing forces. One is the increase in the labour supply due to the wealth effect, providing an incentive to invest. Moreover, the terms-of-trade appreciate, implying that the price of goods produced with the additional investment equipment rises relative to the price of investment goods, because these are partly constructed from imported goods that have become relatively cheaper. This also stimulates investment. Further, there is the increase in the interest rate, which acts to crowd out investment, given that the government absorbs more resources. The shock persistence is key for which effect dominates. Absent any persistence, labour supply responds by very little and the interest rate increases strongly. Hence, investment falls. If the shock is very persistent, the labor supply increases strongly (a strong negative wealth effect) and the interest rate increases very little. In this case investment will rise.

Numerical simulations show that, *conditional* on government spending shocks, the model reveals a perfectly positive correlation between public budget balance and the trade balance,<sup>5</sup> while *conditional* on domestic technology shocks, there is a strongly negative correlation. Overall, drawing from a mixture of the two shocks, there is a negative correlation between the budget balance and the trade balance, indicating that domestic technology shocks dominate.

The authors also study the role of openness. With low openness, the trade balance deterioration is only small. With more openness, the effect on consumption is less negative and investment may become positive on impact. The fall in consumption is dampened, because the real interest rate falls with openness. Intuitively, with better terms-of-trade today, the price of today's consumption is relatively low and the more so, the larger the consumption share on foreign goods. The consumption based real interest rate still increases, but less so in more open economies. Hence, more openness dampens the negative wealth effect on consumption. Investment falls less with more

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<sup>5</sup> That is, over a certain horizon, the impulse responses of the budget balance and the balance have identical sign.

openness because the price of output rises relative to the cost of the investment good, while, moreover, the real interest increase becomes smaller. Obviously, the trade balance deterioration is larger with more openness.

Overall, the analysis yields two important lessons: the observed correlation between the budget and trade balances may not be very informative about the “twin deficits” hypothesis,<sup>6</sup> because it may largely be driven by shocks other than in fiscal policy. Even if the “twin deficits” hypothesis holds, an expansive fiscal policy is not necessarily a reason to be worried, because the effect on the external balance may only be small.

In a small open-economy model with monopolistic (though flexible) pricing at the intermediate stage, Monacelli and Perotti (2007) focus on the role of introducing two final sectors, tradables and non-tradables (“services”). These sectors are perfectly competitive. A share  $\omega$  of government purchases falls on traded goods. A share  $\alpha$  of traded goods bought by domestic agents or the government is imported from abroad. First, suppose government purchases have the same non-tradables intensity as private spending. An increase in government spending generates a terms-of-trade appreciation. Without openness ( $\alpha=0$ ) the relative price of the two sectors is unchanged. Production rises in both sectors, while owing to the wealth effect, consumption in both sectors falls (and thus is positively correlated between the sectors). With openness ( $\alpha>0$ ), the relative price of tradables falls, because part is imported from abroad and those prices do not move. The terms-of-trade appreciation dampens production in the traded sector (which may even fall), because individuals switch towards foreign tradables. This effect is larger, the higher is  $\alpha$  and the higher is the elasticity of substitution between home and foreign tradables. Now, suppose government purchases are biased towards non-tradables. (This is realistic, if one thinks of government purchases primarily consisting of civil servants’ wages). This generates a fall in the relative price of tradables. Labor starts moving from the tradable to the non-tradable sector, generating negative co-movements in production between the two sectors.

In an extension to a two-country (“Home” and “Foreign”) version of their (2006) model Ravn et al. (2007) study the consequences of an increase in government purchases for the real exchange rate. Both Home and Foreign firms are allowed to charge potentially different prices for the same product in the two countries (“pricing to habits”). In the most basic version of the model, there is no home bias in government purchases. That is, government purchases fall equally on Home- and Foreign-produced intermediates. Consider an increase in Home government purchases. This produces a Home increase in the demand for Home- and Foreign-produced intermediates. By

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<sup>6</sup> The hypothesis assumes that the budget balance and the trade balance both deteriorate after a discretionary fiscal expansion.

the mechanism that was described above both Home and Foreign producers lower the mark-up on their sales in Home. Hence, the Home consumer price index (CPI) falls relative to the Foreign CPI, thereby producing a real exchange rate depreciation for Home.

Monacelli and Perotti (2006) set up a small-open economy model with monopolistic competition, nominal price rigidity and internationally complete asset markets. A government purchases increase raises output and produces the familiar negative wealth effect and, hence, lower private consumption and additional labour supply. As before, asset market completeness implies an appreciation of the real exchange rate. As regards to the trade balance, the decline in private consumption leads to an improvement, while the real exchange rate appreciation worsens it (an “expenditure switching effect”). If the elasticity of substitution between Home and Foreign goods is sufficiently high, the switching effect dominates and the trade balance worsens after the government purchases increase, and vice versa. These effects are stronger if the economy is more open. The authors also experiment with different types of monetary policy (CPI targeting, PPI targeting and a Taylor rule), but find no qualitative differences for the various cases.

In the same spirit as Monacelli and Perotti (2006), Müller (2006) studies government purchases shocks in a two-country model with monopolistic competition, Calvo (1983) price stickiness and a home bias in consumption. Government purchases are spent entirely on domestically produced goods. However, all goods are internationally traded. Assume internationally complete asset markets. Again, an increase in government purchases raises the relative price of home goods relative to foreign goods. Müller (2006) discusses in detail the three channels through which the trade balance effect operates. First, there is a “valuation channel”: with domestic goods becoming more expensive relative to foreign goods, the value of exports rises, while that of imports falls. As in Monacelli and Perotti (2006), the fall in domestic consumption relative to foreign consumption as required by equation (1) exerts a positive effect on the trade balance. This effect is stronger the larger is the home bias in private spending and the higher is the inter-temporal elasticity of substitution, making it easier for individuals to substitute away from current consumption. Finally, the expenditure-switching effect is again stronger the larger is the intra-temporal degree of substitutability between domestic and foreign goods. The expenditure switching effect is also stronger the larger is the home bias. Overall, the trade balance effect is more likely to be positive if the intra-temporal elasticity of substitution is low relative to the inter-temporal elasticity of substitution. Finally, the author finds that the monetary regime does not matter for the sign of the trade balance effect. However, it matters for the strength of the effect, with a more accommodating monetary policy dampening the effect on the trade balance.

Callegari (2007) extends the model with durable and non-durable goods and Ricardian and rule-of-thumb consumers to an open economy. He uses the framework to study the consequences of a variety of fiscal impulses: government purchases and tax shocks, both temporary and permanent. Of the tax shocks, he studies changes in both lump sum and distortionary taxes. As an example, consider a cut in lump-sum taxes. The wealth effect reduces the labor supply. Further, disposable income of the rule-of-thumb consumers rises, inducing them to buy more durables, which relaxes their borrowing constraint. Hence, overall the demand for goods and services rises relative to its supply and a trade deficit is generated. Importantly, the model also allows one to explore the consequences of financial liberalization (a relaxation of the collateral constraint) and shows that a lump-sum tax cut produces a higher trade deficit, the more liberalized the economy is.

### **3. Empirical estimates of the consequences of discretionary fiscal expansions**

This section focuses on recent empirical literature that studies the effects of fiscal policy shocks on economic activity and other macro-economic variables. Before turning to a detailed discussion of this literature, it is useful to explain some concepts that are relevant for empirical analysis. In the absence of any “active” policy intervention, government spending and tax revenues automatically move with the economic cycle. Government transfers, such as unemployment benefits, increase as the economy slows down and unemployment rises, while at the same time tax revenues on labour, capital income and consumption fall. The opposite happens when the business cycle is improving. The *automatic* movements of the government budget as a result of the business cycle are referred to as the *cyclical component* of the budget. The *structural component* of the public budget (or the *fiscal stance*) is the component that is obtained when the cyclical component is subtracted from the actual fiscal budget. Also this structural component may be systematically linked to the economic cycle. For example, the government may systematically raise tax rates whenever activity rises above potential and reduce them whenever activity falls below potential. The structural component could also be systematically linked to other variables such as the stock of outstanding public debt or inflation. The systematic response of the structural component to economic activity or other macroeconomic variables will be referred to as the *endogenous* structural component. The other part of the structural budget is called the *exogenous* component. Examples are an increase in public spending to finance a war or a politically motivated extra transfer to the population prior to an election. The shocks to government purchases discussed in the previous section all refer to this *exogenous* structural component and in this section we are precisely interested in such exogenous shocks to net taxes and government purchases.

The main problem in the empirical analysis is in identifying exogenous and unexpected events. The literature has followed two major approaches. One is to study the effects of specific events that can reasonably be assumed exogenous. The most obvious examples in this regard are military expenditures in response to war or the threat of a war. Importantly, the shock should then be dated the moment that the news about the war (threat) becomes available.

The other major approach is to set up a structural vector autoregression (SVAR) model and impose restrictions that identify the exogenous shock(s). An example is:

$$A_0 Z_t = A(L)Z_{t-1} + e_t, \quad (2)$$

where  $Z_t = [g_t, \tau, y_t]'$  is the  $(3 \times 1)$  vector of endogenous variables in period  $t$ , where  $g_t$  is government purchases,  $\tau_t$  is net taxes (taxes minus transfers; possibly cyclically adjusted) and  $y_t$  is GDP (all in natural logarithms).  $A_0$  is a  $(3 \times 3)$  matrix with structural parameters that describe the contemporaneous relationships among the endogenous variables. Finally,  $A(L)$  is a  $(3 \times 3)$  matrix of polynomials in lag terms. Finally,  $e_t$  is a vector of structural shocks. Time trends (not shown) may also be included as additional independent variables in the system. The “trick” is to find the right restrictions, for example motivated by economic theory or institutional features, to identify the shocks. An identification scheme that is frequently employed is to assume that  $A_0$  is a lower triangular matrix with 1’s on the diagonal. This amounts to assuming that, within a given period, government spending does not react to the other two variables, while net taxes and output are both allowed to react to government spending. Net taxes, in turn, are restricted not to react to output in the same period, while output is allowed to react to net taxes. This identification scheme may be motivated by the fact that in reality government spending is fixed in plans made before the period starts and that taxes only adjust in response to changes in government spending.

The other complication with the SVAR approach is that fiscal events may be anticipated before they actually take place and thus show up in the data. This may lead to changes in private sector behaviour before the event actually takes place. Because information about the moment of a policy announcement is usually not present in the data available to the econometrician, this may lead to wrong inference. As an example, take an increase in government purchases that is announced well in advance. Immediately after the announcement, the negative wealth effect induces a fall in consumption. After that consumption starts rising again. The econometrician might only pick up the rising part of the consumption path, inadvertently concluding that a government spending shock raises consumption.

### *3.1. Domestic effects of fiscal shocks*

This subsection discusses the literature that investigates the effects of fiscal impulses in closed-economy empirical models. Hence, we explore the consequences of such impulses for economic activity, consumption, investment and monetary policy.

#### 3.1.1. Empirical analyses based on structural VARs.

One of the main contributions employing the SVAR approach is Blanchard and Perotti (2002), who apply it to study the effects of fiscal policy shocks in the U.S. after World War II. Their baseline model corresponds closely to (2). Their identification procedure assumes that government purchases do not contemporaneously react to output. This seems reasonable in view of the fact that they use quarterly data. Moreover, the procedure makes use of detailed institutional information about the tax system, as well as information on the elasticities of taxes and transfers to income. They find that an increase in government purchases affects economic activity positively with a multiplier that tends to be close to unity, while an increase in net taxes has the opposite effect. Further, an increase in government purchases boosts consumption, while both an increase in government purchases and a net tax increase exert a negative effect on investment. The effect of government purchases on consumption is consistent with some new-Keynesian models. In a variant the authors also take account of the possibility that the shocks may have been anticipated. However, this does not affect the results.

In a closely related empirical analysis for the U.S., Fatas and Mihov (2001) largely confirm the findings of Blanchard and Perotti (2002). They also study the consequences of fiscal expansions for other macroeconomic variables. In particular, they find that an increase in government purchases leads to a rise in private GDP (GDP minus government purchases) suggesting a multiplier larger than unity, higher taxes (which peak with some lag), a higher short-run interest rate, and, somewhat surprisingly, a fall in the GDP deflator (which starts rising only long after the shock). Consumption rises, driven by higher consumption of durables, nondurables and services. Investment rises with some lag, driven by a short-lived increase in inventories and a lagged rise in residential investment. However, non-residential investment remains largely flat. Private employment also goes up and, in particular, manufacturing employment rises strongly. While manufacturing wages rise significantly, overall wages move only little. In a further check for “anticipation effects”, the authors include forecasts of spending from the Economic Reports of the



President in their VAR. Qualitatively, the original results are not affected. Further, they explore response to shocks of the various components of government purchases (wage spending, non-wage spending and government investment). The main result is that in all cases consumption goes up and that this increase is most pronounced when government wage spending rises.

In another closely related study, Mountford and Uhlig (2005) identify shocks by imposing theory-motivated signs on the responses to these shocks. They assume three fundamental independent shocks: a business cycle shock, a monetary policy shock and a fiscal shock. For example, they identify a business cycle shock by requiring that output, consumption, non-residential investment and government revenue all move into the same direction for four quarters after the shock. The method allows in a natural way for anticipated policy changes. For example, if government purchases are announced to start increasing four quarters from now, then the system imposes them not to move until four quarters from now and be positive from then on for four quarters. The authors find that a surprise deficit-financed tax cut is the best fiscal policy to stimulate the economy. A deficit-financed spending shock has only a weak positive effect on activity. The response of consumption is small and is only significant on impact. The increase in government purchases crowds out both residential and non-residential investment. Although the government purchases shock stimulates activity, the negative effect of the higher taxes in the future more than offsets the benefit from higher spending in present value terms.

### 3.1.2. Analyses based on exogenous events.

The main problem with the SVAR based analyses is that they may have difficulty to pick up truly exogenous fiscal events. For example, the SVAR model may simply identify as shocks the actual money outlays resulting from a shock in the past.

Therefore, economists have been looking for major events that can be assumed exogenous and whose timing can be pinned down precisely. Ramey and Shapiro (1998) study the responses of the U.S. economy to large military buildups resulting from wars or war threats (the Korean War, the Vietnam War and the Carter-Reagan military buildup). These events can reasonably be considered exogenous to the economic model. Moreover, they occur rapidly and unexpectedly, so that they can be naturally modelled as shocks. Other advantages of looking at these episodes are that they are unlikely to affect the structure of the private sector because they are driven by foreign policy and that they allow to study differential sectoral effects because they are heavily concentrated in the manufacturing sector. The shocks are dated at 1950Q3 (Q = “quarter”) for the Korean War, 1965Q1

for the Vietnam War and 1980Q1 for the Carter-Reagan build-up. Defining a dummy  $D_t$  that equals one on these dates (and zero otherwise), the authors estimate:

$$x_t = a_0 + a_1 t + a_2 (t \geq 1973Q2) + \sum_{i=1}^8 b_i x_{t-i} + \sum_{i=1}^8 c_i D_{t-i} + e_t, \quad (3)$$

where  $x_t$  is some variable of interest whose response to the shock one wants to measure. The regression includes a time trend that contains a break in 1973Q2. The impulse responses following a “Ramey-Shapiro event” show a strong increase in government defence purchases and quite a large fall in non-defence purchases. Total GDP increases by a maximum of about 3%, while private GDP initially rises and then falls to a significantly negative level. Durables consumption initially increases, followed by a fall to a minimum of about –10% relative to the initial level. Also residential investment exhibits a strong fall, while non-residential fixed investment strongly increases. Further, non-durables and services fall. These latter effects are consistent with what the “wealth effect” predicts. Manufacturing employment increases significantly, while overall employment in the business sector does not move.

Edelberg et al. (1999) extend the Ramey and Shapiro (1998) dummy approach to a VAR that contains the various macroeconomic variables of interest in one system. By and large they obtain the same results as Ramey and Shapiro (1998), though there is now a positive effect on aggregate employment. Further, before and after tax real wages fall in a hump-shaped fashion. Edelberg et al. (1999) also do some robustness testing. Small perturbations to the dating of the dummies leave the results roughly unchanged. However, assigning dummies to arbitrary dates and re-estimating the model yields substantially different results, indicating that the Ramey-Shapiro episodes are indeed special. Burnside et al (2004), in turn, extend Edelberg et al. (1999) by introducing a separate dummy for each Ramey-Shapiro episode allowing for different responses to the different dummies. The motivation for this extension is that the magnitudes of the episodes were different, while moreover the financing of the additional defence outlays was different across the episodes. The results remain roughly unchanged. Further, aggregate investment (not studied by Edelberg et al, 1999) rises significantly upon impact, after which it quickly falls to zero.

The contribution that likely yields the most reliable results up to now is Romer and Romer (2007). Their approach has some similarity to the “event approach” pioneered by Ramey and Shapiro (1998) in that they search for direct observations of exogenous fiscal events, rather than trying to identify exogenous fiscal shocks from a structural VAR. They go back to official documents such as the Economic Report of the President to construct a series of legislated tax changes and their revenue effects. This way they disentangle revenue changes as a result of changes

in legislation from revenue changes occurring for other reasons. Legislated tax changes can be separated further into measures to counteract other influences on the economy (such as negative demand shocks leading to a fall in the output gap; mostly mid-1960s – mid-1970s); to pay for increases in government spending (mostly in 1950s - 1970s); to address inherited changes in the budget deficit (mostly late 1970s - early 1990s); and to promote long-run growth (measures employed throughout the period after World War II). Only the latter two types of measures can be reasonably assumed exogenous, because they are not motivated by current or projected economic conditions. Hence, their effects are the most interesting.

The authors use quarterly data for the post-war period and assign changes in legislation to the quarter when the associated changes in tax payments actually take place (which may be a series of several consecutive quarters). The basic regression is

$$\Delta \ln Y_t = a + \sum_{i=0}^{12} b_i \Delta T_{t-i} + e_t, \quad (4)$$

where the left hand side is the growth rate of real GDP and  $\Delta T$  is the exogenous tax revenue change as a percent of nominal GDP. The authors find that a permanent one-percent of GDP exogenous increase in tax revenues produces a maximum fall of GDP of 3% (after 10 quarters). If one instead uses cyclically adjusted tax revenues for  $\Delta T$ , the estimated maximum effect on output is a (still significant) decline of only 1.1%. Hence, the potential presence of endogenous policy-induced changes and non-policy effects in traditional measures of tax changes leads to an underestimation of the effect of exogenous tax changes on output. Also, using the series of *all* legislated tax changes for  $\Delta T$  produces a much weaker effect on output (a maximum (significant) fall of 1.3%). The authors also do a number of robustness checks, including additional controls (lagged GDP growth to check for hidden motivation, monetary policy shocks and government spending) and taking account of potential expectations effects by adding to (4) the present value of the legislated tax changes in a given bill which is then assigned to the quarter in which it is passed. None of these changes affect the estimates of the effects of  $\Delta T$  on output. A sample split at the end of 1980, however, shows that the estimated effect on output falls from 3.9% in the first sub-sample to 2.3% in the second sub-sample. This is consistent with the hypothesis that the enhanced role of financial markets has reduced the dependence of consumption on disposable income.

The authors also explore why output shows little tendency to return to zero at longer horizons. If tax changes only have supply-side effects, there is no reason for inflation or unemployment to change after the tax change (assuming the natural unemployment level is

unaltered). If the return to zero of output occurs only very slowly, one would expect unemployment to increase and inflation to fall after the tax shock. The evidence is consistent with the latter hypothesis.

Finally, the authors investigate how exogenous tax increases affect the components of GDP. Consumption falls by a maximum of 2.6%, while investment falls by a maximum of almost 13%. The negative effect on investment is consistent with investment depending strongly on cash flow and overall economic conditions. Further, splitting consumption into non-durables, services and durables, all three components exhibit a significant fall following the tax increase. However, by far the largest fall is found in durables consumption. Further, all components of investment (inventories, residential and non-residential) exhibit strong falls after the tax rise.

Perotti (2007) compares the dummy variable (event) approach with the SVAR approach and tries to explain why the two approaches tend to yield different results regarding the effects of government purchases on consumption and real wages. He criticises Ramey and Shapiro (1998) for imposing the same dynamics on all Ramey-Shapiro episodes. Further, he criticises the VAR-based extensions of Ramey and Shapiro (1998) for introducing lags of the Ramey-Shapiro dummies into the equations other than those for government spending and taxes, thereby imposing that the residuals of those other equations are zero at all these lags. Hence, the effect of other potential exogenous events at these lags is excluded. It would be more appropriate to include only lag zero of the dummies in the equations for the non-fiscal variables. Then, after the impact, the behaviour of the non-fiscal variables is explained by their normal dynamics after a deviation from normal of a fiscal variable. Indeed, following this approach (and allowing for a specific dummy with specific responses for each episode), the Ramey-Shapiro episodes produce consumption and real wage increases, in line with the SVAR approach. A final criticism of Perotti (2007) on the dummy variable approach is that immediately after the news about the event the entire fiscal path is foreseen by the private sector, which is obviously a strong assumption.

### *3.2. Implications of fiscal expansions in open economies*

Most of the empirical work regarding the effects of fiscal expansions is based on U.S. data. However, the U.S. is a relatively closed economy, at least it is more closed than most other OECD economies, in particular also Sweden, the country that we are most interested in. Openness may influence the effectiveness of a fiscal expansion for domestic activity and other variables relevant for internal balance, for example, if part of the expansion leaks abroad in the form of higher

imports. Of course, we are also interested in the consequences of fiscal expansions for specific “open economy variables” such as the exchange rate, the terms-of-trade and the trade balance.

Below we first discuss some of the findings of the relevant literature. This is followed by some estimates of our own for the EU.

### 3.2.1. Fiscal expansions in the open economy

A large part of the empirical literature focuses again on the U.S. and is concerned with the twin deficits hypothesis. There are also a number of contributions exploring how fiscal expansions influence the external sector in other OECD countries or in the EU.

Kim and Roubini (2004) demonstrate the importance of controlling for the business cycle when investigating the twin deficit hypothesis. Doing so in the context of a VAR model for the U.S., they find that an increase in the budget deficit actually produces a real exchange rate *depreciation* and a short-run *improvement* of the current account, regardless of whether the budgetary expansion is caused by an increase in public spending or a reduction in taxes. This contrasts with much of the conventional wisdom. The authors’ explanation for the failure of the twin deficits hypothesis is that, first, the fiscal expansion raises private saving, as should happen under the assumption that consumers foresee that a current fiscal expansion has to met with higher taxes in the future. Moreover, the fiscal expansion raises the interest rate, which depresses private investment. The sum of these two effects more than offsets the effect of the initial deterioration of the public budget on the external balance. Obviously, if one were to do the same analysis on small open economies, one would expect the interest rate effect to be smaller and the twin deficits hypothesis would be more likely to hold, *ceteris paribus*. In the spirit of Kim and Roubini (2004), Müller (2006) also estimates a quarterly VAR for the U.S. and also finds that net exports rise.

Monacelli and Perotti (2006) and Ravn et al. (2007) estimate impulse responses to an increase in government purchases for Australia, Canada, the U.K. and the U.S. (using quarterly data). The estimations by the former are on a country-by-country basis, while the latter use a panel VAR. The sample periods are roughly the same. Both studies find that an increase in government purchases produces output and consumption increases and trade balance deterioration. Again, surprising in view of common wisdom, the shock also produces real exchange rate *depreciation*.

Based on an SVAR for the U.S. over the period 1954Q1 – 2006Q2, Monacelli and Perotti (2007) demonstrate that an increase in government spending produces an increase in GDP with a maximum multiplier of roughly two. Further, the terms of trade appreciate, the price of traded goods falls relative to the price of non-traded goods (proxied by a fall of the price of goods relative

to that of services) and, finally, the manufacturing and services both move up in terms of both consumption and production.

For a large set of OECD countries over the period 1960-1995, Lane and Perotti (1998) regress the trade balance, exports and imports as shares of GDP directly on movements in different components of the public budget (government wage consumption, government non-wage consumption and cyclically-adjusted labor taxes). They find that the composition of a change in fiscal policy and the exchange rate regime (which is interacted with the independent variables) matter for the effects on the external account. In particular, higher wage government consumption produces a fall in exports and a deterioration of the trade balance, especially under flexible exchange rates. Imports are also negatively affected, or unaffected, depending on the regression specification. On the basis of their results, Lane and Perotti (1998) argue in favor of reduction in government wage consumption, possibly in combination with devaluation, to improve the external account.

In a related analysis, using a panel of OECD countries over the period 1964-1993, Lane and Perotti (2003) explore the role of two transmission channels of fiscal expansions in the open economy. One is the “cost channel”. Higher wage government spending boosts real product wages and depresses profitability in the tradables sector. The effects are significantly larger under flexible exchange rates, i.e. when the “exchange rate channel” is operative. Non-wage government spending has only a small effect on the traded sector, while also the effects of tax policy are weaker. The general conclusion is that the composition of a fiscal expansion is important for its impact on the traded sector.

Giuliodori and Beetsma (2005) set up VAR models for Germany, France and Italy that include aggregate or bilateral imports from other EU countries, along with fiscal and other macro-economic variables. The effects of fiscal expansions on aggregate imports are significantly positive in half of the cases, while they are positive on bilateral imports in quite a large number of cases.

### 3.2.2. Some estimates for the EU

Based on Beetsma et al. (2007), I discuss the effects of an increase in government purchases on domestic activity and the external balance for a sample (and sub-samples) of 14 EU countries over the period 1970-2004. The countries are Austria, Belgium, Denmark, Finland, France, Ireland, Italy, Germany, Greece, the Netherlands, Portugal, Spain, Sweden and the U.K. I use data from the OECD Economic Outlook and Main Economic Indicators.

In contrast to most of the literature I use annual data instead of quarterly data for the VAR. This has a number of advantages. First, the shocks we identify with annual data may be closer to the actual shocks, because (substantial) fiscal revisions would not usually take place at the quarterly frequency. Also, anticipation effects should be less relevant, because the identified shocks are more likely to be truly unanticipated. After all, a given shock is less likely to be anticipated one year before it actually takes place than one quarter before it actually takes place. Further, there is less need to be concerned with the details of the institutional setting. For example, if tax revenues are systematically larger in one quarter than in another quarter (this is, in particular, the case for corporate tax revenues), then a model based on quarterly data should take this feature into account. Also, with quarterly data, it is more likely that spending decisions take place in a quarter different from that when the actual outlays are done. This raises the chance that the identified shocks are wrongly dated. Finally, with annual data potential seasonality effects are absent from the data.

The main drawback of an annual VAR is that the identifying assumptions become stronger. In particular, I assume that government spending does not contemporaneously react to output or net tax shocks. Obviously, this assumption is stronger with annual than with quarterly data. One may motivate this assumption by referring to the fact that spending plans are usually determined before the new fiscal year starts. Nevertheless, there are indirect ways of testing this assumption and the conclusion is that it is reasonable.

The second drawback of using annual data is that there are fewer observations available.<sup>7</sup> Hence, to obtain more precise estimates, I estimate the VAR model in panel format. Obviously, the new disadvantage is that one needs to impose cross-country homogeneity on the relationships among the variables. However, I eliminate at least part of the potential heterogeneity by including country-fixed effects and country-specific time trends. I also include time-fixed effects to eliminate any cross-country contemporaneous residual correlation. Given that the EU-14 countries share many similarities, there may not be too much heterogeneity left. Nevertheless, I will also investigate whether the effects of an increase in government purchases depend the degree of openness.

The vector of endogenous variables in my VAR is  $[g, nt, x, y, m, reer]'$ , where  $g$  is government purchases,  $nt$  is cyclically-adjusted net taxes (with country-specific cyclical adjustment),  $x$  is exports,  $y$  is output,  $m$  is imports (all real and in natural logarithms with  $y$  and  $nt$  deflated by the GDP deflator and  $g$ ,  $x$  and  $m$  deflated by their own deflators) and  $reer$  is the natural log of the real effective exchange rate (based on relative CPIs). (An increase in  $reer$  implies a real

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<sup>7</sup> However, even if I wanted to use quarterly data, this would not be possible for the country sample under consideration. Truly quarterly data (i.e., non-interpolated data) are only available for a limited number of countries.

domestic depreciation.)<sup>8</sup> Ignoring the fixed effects and the trends, the VAR obeys the format (2), where  $A_0$  is a lower-triangular matrix. Hence, I assume that  $g$  is not contemporaneously affected by the variables ordered below it. Variable  $nt$  is allowed to be contemporaneously affected by  $g$ , but not by the other variables. Etcetera. Details on the motivation for this identification are found in Beetsma et al. (2007).

Figure 3 depicts the impulse responses to a one-percent of GDP increase in government purchases.<sup>9</sup> On impact GDP rises by 1.2%, while it peaks at 1.6% after one year. This suggests a substantial multiplier of government purchases. However, one should realise that most countries in the sample feature only limited exchange rate flexibility against their main trading partners. Consistent with the Mundell-Fleming model, a fiscal expansion would then stimulate the economy in the short run. Somewhat surprisingly, (cyclically-adjusted) net taxes fall on impact. However, unadjusted net taxes (not reported here) increase on impact. Exports fall, a result that is not too surprising if it falls mainly on government wage consumption and in view of the findings of Lane and Perotti (1998, 2003). There is a substantial increase in imports, consistent with the increase in income being partly spent on foreign products. Finally, the real exchange rate appreciates,<sup>10</sup> although this happens with some delay.

Based on the responses of the other variables, we construct responses for the primary budget and the trade balance as shares of GDP (see also Figure 3 – for the details of construction, see Beetsma et al., 2007). Exports and imports both contribute to a fall in the trade balance, which amounts to 0.5% of GDP on impact and reaches a minimum of -0.8% of GDP after two years. The public budget falls by 0.7% on impact. While the latter shows a U-shaped time pattern, the trade balance returns in a monotonic fashion to its steady state. Overall, these results are consistent with the “twin deficit hypothesis”.

I also split our sample into groups of “open” and “closed” economies and re-estimate the baseline model for each of the two groups. The degree of openness is probably the most important dimension along which our sample countries differ and the relevance of this dimension is emphasised in a number of theoretical contributions that we discussed earlier. I classify as “open” (“closed”) those countries for which the ratio of exports plus imports over GDP has on average over time been in the upper (lower) half of the sample. The open economies are Austria, Belgium,

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<sup>8</sup> Of each variable I include two lags, which is enough to get rid of any autocorrelation in the residuals. However, the results are insensitive to the exact lag length.

<sup>9</sup> Statistical “significance” will always be based on the 10% confidence level.

<sup>10</sup> This finding is in line with what Clarida and Prendergast (1999) find for the G3 countries, but it contrasts with Monacelli and Perotti (2006) and Ravn et al. (2007) discussed above. However, they use a sample with different countries and data frequency. Moreover, there are differences in the details of the specification. In particular, some experimentation suggests that the absence of time effects is quite important for the Ravn et al. (2007) sample, at least when it is estimated on annual data.



Denmark, Ireland, The Netherlands, Portugal and Sweden. Figures 4.1 and 4.2 depict the impulse responses to a 1% of GDP government purchases shock for our two groups of countries.

Consistent with the hypothesis that less of the fiscal stimulus in closed economies leaks abroad, the output response for this group is much larger for the closed economies (on impact, 1.43 against 0.83). Hence, for the closed economies the spending multiplier does not even exceed unity! Owing to the different output responses, one cannot directly compare the responses of imports and exports for the two groups. Therefore, I compare “normalized” responses obtained by dividing the effects on imports by those on output. Perhaps surprisingly, the normalized import response of the closed economies is larger than that of the open economies (on impact, 0.72 versus 0.49). However, the normalized export responses are much smaller (in absolute value) for the closed than for the open economies (on impact, -0.41 versus -0.99). This is in line with the larger deterioration of the trade balance (over the first three years) for the open than for the closed economies. Further, as far as the public budget is concerned, for the closed economies the impact deficit is smaller and vanishes within a year. For the open countries, the response is U-shaped and the deficit takes a couple of years to vanish.

### *3.3. Further empirical contributions*

#### 3.3.1. Expansionary fiscal contractions

A number of articles have focussed on the consequences of large fiscal contractions mostly resulting from severe economic and/or fiscal crises. In these circumstances, a change in fiscal policy may have different effects than during “normal” circumstances. The original idea is due to Giavazzi and Pagano (1990), who found that the large consolidations in Denmark and Ireland in the 1980s were followed by strong positive effects on consumption. The hypothesis has subsequently been tested in a large number of contributions (e.g. Alesina and Perotti, 1986). The rationale behind an “expansionary fiscal contraction” is that it shifts government spending to a structurally lower level that can be supported by a structurally lower level of tax payments. If the contraction is credible, this will boost consumption because of a positive expected wealth effect. In addition, confidence in the economy and the policy makers might increase, which could contribute further to the consumption revival. In a panel data analysis for a large group of OECD countries, Perotti (1999) shows that initial fiscal conditions are an important determinant of the effects of fiscal expansions; at low debt or deficit levels, an increase in government spending works out expansionary, while the opposite is true if the initial fiscal conditions are highly unfavourable.

### 3.3.2. Monetary and fiscal interactions

Favero (2003) estimates semi-annual country-specific VARs for Germany, Italy, France and Spain. The VARs contain a detailed description of the behavior of the monetary and authorities. In particular, Favero (2003) includes a Phillipscurve, an aggregate demand curve (directly linked to lagged policy instruments), a Taylor-type of interest rate rule that also includes for the other countries the German interest rate (as an exogenous variable) to take account of German monetary leadership during the EMS, an equation describing the average cost of debt, equations for government spending and taxes both made a function of the debt-GDP ratio and the average cost of debt and, finally, a debt dynamics identity. Not surprisingly, Favero finds that inflation is highly persistent, while the output gap tends to exert a positive effect on inflation. Also output gaps are highly persistent, with higher taxes exerting a negative effect in three cases and higher government spending exerting a positive effect on the output gap in one case. Interest rates are highly persistent as well, with the German interest rate only reacting to the output gap and the other countries' interest rate primarily reacting to the German interest rate. Fiscal policy is tightened when debt interest payments increase.

Favero (2003) also simulates the model over the sample period setting to zero all (estimated) policy shocks. Such an exercise shows how the economies would have developed when the authorities would never have deviated from their policy rules. It is found that close to entry into the Euro-zone actual fiscal policies were more disciplined than in the absence of policy interventions. Finally, the author also tests whether the coefficients of the other policy variables in the output gap equation change when one policy variable is dropped. He finds that dropping monetary policy drives the estimates of the fiscal coefficients towards zero, and vice versa, indicating that it is important to *jointly* model monetary and fiscal policies.

### 3.3.3. Public debt and long-term solvency restrictions

Claeys (2007) criticizes the VAR-based contributions discussed above for not taking account of the intertemporal government budget constraint. There are two approaches in this regard. Favero and Giavazzi (2007) include debt into the standard VAR, thereby taking account of the potential responses of spending and taxation to the level of the public debt. They claim that ignoring the role of debt has non-negligible consequences for the results. Claeys (2007) follows a different approach and directly incorporates the intertemporal budget constraint into the empirical model. The implied

long-run relationship between spending and revenues is captured with a structural vector error correction model. This allows one to analyse the short-run dynamics following shocks that push the economy away from the long-term equilibrium determined by common trends driven by shocks with permanent effects. The advantage of this approach is thus that it uses additional restrictions implied by economic theory. Applying the approach to quarterly U.S. data from 1965 onwards, Claeys finds that a fiscal expansion has contractionary effects on output and inflation. Moreover, with the interest rate falling by less than the inflation rate, monetary policy effectively becomes more contractionary.

#### **4. Some evidence on the actual behaviour of the fiscal authorities**

Although Sweden is not part of the Eurozone, it is still bound by the requirements of the EU Treaty and subject to the Stability and Growth Pact (SGP) in the sense that it has to submit an annual Convergence Programme in which it sets out its budgetary projections for until the medium term. Of course, in contrast to the Eurozone members, Sweden is not subject to formal sanctions if it fails to comply with the EU fiscal criteria.

Experts have severely criticised the Maastricht/SGP fiscal criteria on several grounds. One of the main criticisms is that the criteria fail to take account of the cyclical condition of the economy, implying that fiscal stabilisation is hampered. In particular, countries will be forced to contract fiscal policy during downturns, making fiscal policy behave in a pro-cyclical way.

Gali and Perotti (2003) ask the empirical question whether the EU fiscal criteria have indeed hampered fiscal stabilisation and forced countries into following pro-cyclical policies. The answer to this question is of interest for Sweden, if it decides to join the Euro-area at some point in the future, or if it decides to self-impose some fiscal constraint on its government. The authors compare fiscal policy for the Euro countries during the period preceding the Maastricht Treaty (1980-1991) to the period after the Treaty was signed (1992-2002). They also compare Euro-area fiscal policy with fiscal policy in a control group of the other EU countries (Denmark, Sweden and the UK) and a group of other OECD countries (Australia, Canada, Japan, Norway and the US).

The authors decompose the primary deficit into a cyclical component, determined by the size and composition of government spending and taxes and the structure of the tax system, and a structural component, which is the primary deficit when output is at its natural level or the “cyclically adjusted primary deficit”. For the latter, the authors estimate the following regression equation:

$$d_t^{CA} = a_{BM} + a_{AM} + a_{x,BM} E_{t-1} y_t + a_{x,AM} E_{t-1} y_t + a_b b_{t-1} + a_s d_{t-1}^* + e_t,$$

where  $d_t^{CA}$  is the cyclically adjusted primary deficit as a share of potential output,  $y_t$  is the output gap and  $b_t$  is debt as a share of potential output. Hence, the cyclically adjusted primary deficit is split further into systematic components and a non-systematic component captured by the error term  $e_t$ . To model a potential regime shift in fiscal policy as a result of the ratification of the Maastricht Treaty, the authors allow coefficients to differ before and after the Maastricht Treaty was signed. They include the expected output gap rather than the actual output gap, because the fiscal policy stance is determined in the year before it is actually implemented, hence it should be based on expectations of the output gap. A positive value of  $a_{x,AM}$  or  $a_{x,BM}$  indicates that an increase in the expected output gap is met with a more relaxed fiscal stance. Hence, positive values of  $a_{x,AM}$  or  $a_{x,BM}$  imply a pro-cyclical fiscal policy. Further, a debt stabilization motive is captured by  $a_b < 0$ . Pursuing a budgetary target introduces autocorrelation into budgetary decisions if the authorities try to achieve the target gradually. This is captured by  $a_s > 0$ . The model is estimated by instrumental variables because of the potential feedback effects from  $d_t^{CA}$  to  $y_t$ .

The main findings are the following. Generally, comparing before and after Maastricht (1980-1991 versus 1992-2002), there is a trend towards a lower value of  $a_x$ , hence, towards *less* pro-cyclicality. This contrasts with the view that the EU fiscal rules have hampered stabilization. Specifically, panel estimation suggests that before Maastricht fiscal policies in Eurozone countries were pro-cyclical, while after Maastricht they were acyclical. This trend is not unique for the group of EMU countries. The group of five other OECD countries exhibit a shift from acyclical fiscal policy to counter-cyclical fiscal policy. Further investigation suggests that the reduction in fiscal pro-cyclicality is due to a reduction in the pro-cyclicality of government spending. Moreover, the reduction in pro-cyclicality does not seem to have come at the cost of less use of the automatic stabilizers during the period after Maastricht.

As a final result, Gali and Perotti (2003) document a fall in public investment in the EU, much in line with what critics of the Treaty had expected. However, this fall seems to be part of a global trend fall in public investment, while, moreover, the Eurozone in this respect even seems to lag behind the rest of the OECD.

While the findings by Gali and Perotti (2003) do not indicate that the EU fiscal restrictions have had a harmful effect on fiscal policy in Europe (a conclusion shared by Balassone and Francese, 2003), without further investigation they also cannot be considered good news. The fact that the restrictions have not hampered fiscal policy may simply be the result of them being ignored

by the national governments. As is well known, their credibility is generally thought to be quite low. Nevertheless, the fact that fiscal policy has shifted into the direction of more counter-cyclicality is a potential success of the restrictions.

Some potentially relevant factors influencing fiscal policy are missing from the Gali and Perotti (2003) analysis. One is that the analysis does not allow for asymmetries in the behaviour of the fiscal authorities in response to up and down movements of the output gap. There is quite a widespread perception that the larger degree of counter-cyclicality in European fiscal policy is due to the expansive reactions to a deteriorating business cycle that are not compensated by contractions during upturns. Further, the potential role of monetary policy, possibly as a complement or a substitute to fiscal policy, is also ignored.

## **5. Conclusions and discussion**

This paper has reviewed theory and evidence on the effects of discretionary expansions on the economy. We discussed the role of openness of the economy, the role of imperfections such as credit restrictions and the role of monetary policy. The bulk of the evidence seems consistent with an increase in government purchases or a reduction in net taxes having a short-run positive effect on economic activity and aggregate consumption. However, for a government purchases increase the cost resulting from higher future taxes may be quite large. Moreover, there is a lot of disagreement about the size of the short-run stimulating effect of a fiscal expansion. This may not be surprising because fiscal expansions can come in many forms and have theoretically different effects under different circumstances. Further, empirical analysis has a hard time identifying truly exogenous fiscal shocks and suffers from the potential presence of anticipation effects of fiscal policy changes.

Combined with the fact that there are lags between the identification of an economic slowdown and the implementation of a discretionary fiscal policy, using an active fiscal policy as instrument for short-run stabilisation is usually beyond the capabilities of a government. To complicate matters further, macro-economic data often undergo substantial revisions when going from the preliminary figures to final figures. Hence, basing policies on preliminary figures is a risky business and there will be a serious chance that trying to employ discretionary fiscal policy for macro-economic stabilisation produces higher rather lower economic variability. In fact, for a panel based on a large set of countries Fatas and Mihov (2003) show that discretionary fiscal policy induces macro-economic instability, which, in turn, may affect growth negatively.

Taking my own empirical results at face value, given that Sweden is a very open economy, a discretionary increase in government purchases crowds out private spending and would leave Sweden with both a higher budget deficit and a higher deficit on the trade balance.

There is another reason to be careful with discretionary fiscal expansions, in particular increases in government purchases. Such expansions are almost inevitably unevenly distributed across the sectors. For example, infrastructure investment benefits the construction sector and defence expenditure benefits part of the manufacturing sector. The stimulus to these sectors may come at cost of hurting other sectors, as the above discussion has suggested. An increase in government wage consumption (attracting more workers into the public sector) likely drives up the general wage level and hurts the competitiveness of the export sector.

In view of the complications with an active fiscal policy, for lack of a better alternative the best advice may be to simply let the automatic stabilizers work. They dampen business cycle movements without any active policy intervention. If the economy slows down or falls into a recession, tax revenues from any source that is sensitive to the business cycle fall, while government transfers (in particular, unemployment benefits) increase. Both factors protect disposable income against the slowdown of the economy. Given the empirical sensitivity of consumption to disposable income, this dampens the downward movement of the business cycle.

Surely, reliance on automatic stabilisers has its disadvantages too. Automatic stabilisers (movements in tax revenues and transfers) make no distinction between the specific sources of shocks, nor between whether a shock is permanent or temporary. For example, letting automatic stabilizers operate freely in the case of a permanent or very persistent adverse shock (such as occurred in the seventies) could lead to unsustainable budget movements. However, in that case, an automatic link between the cyclically adjusted primary deficit (taxes) and the public debt level would easily restore fiscal sustainability without having to give up the advantages of the automatic stabilisers.

## References

- Alesina, Alberto, and Roberto Perotti (1996). Reducing Budget Deficits, *Swedish Economic Policy Review* 3, 13-34.
- Balassone, Fabrizio, and Maura Francese (2003). Cyclical Asymmetry in Fiscal Policy, Debt Accumulation and the Treaty of Maastricht. *Mimeo*, Banca d'Italia.

- Baxter, Marianne (1995). International Trade and Business Cycles, in Grossman, Gene M. and Kenneth Rogoff (eds.), *Handbook of International Economics*, Amsterdam; North-Holland, 1801-1864.
- Baxter, Marianne, and Robert King (1993). Fiscal Policy in General Equilibrium, *American Economic Review*, 83, 315-334.
- Beetsma, Roel, Giuliodori, Massimo, and Franc Klaassen (2006). Trade Spill-overs of Fiscal Policy in the European Union: a Panel analysis. *Economic Policy*, 21, 640-687.
- Beetsma, Roel, Giuliodori, Massimo, and Franc Klaassen (2007). The Effects of Public Spending Shocks on Trade Balances and Budget Deficits in the EU. *Journal of the European Economic Association, Papers and Proceedings*, forthcoming.
- Blanchard, Olivier, and Roberto Perotti (2002). An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output. *Quarterly Journal of Economics*, 117, 1329-1368.
- Burnside, Craig, Eichenbaum, Martin and Jonas D.M. Fisher (2007). Fiscal Shocks and their Consequences. *Journal of Economic theory* 115, 89-117.
- Callegari, Giovanni (2007). Fiscal Policy and Consumption. *PhD thesis*, European University Institute, Florence.
- Calvo, Guillermo (1983). Staggered Prices in a Utility-Maximizing Framework, *Journal of Monetary Economics* 12, 383-98.
- Claeys, Peter (2007). Estimating the Effects of Fiscal Policy under the Budget Constraint, *mimeo*, University of Barcelona.
- Clarida, Richard, and Joe Prendergast, 1999, Fiscal Stance and the Real Exchange Rate: Some Empirical Estimates, *NBER Working Paper*, No. 7077.
- Corsetti, Giancarlo and Gernot Müller (2006). Twin Deficits: Squaring Theory, Evidence and Common Sense. *Economic Policy* 21, 598-638.
- Corsetti, Giancarlo and Gernot Müller (2007). Twin Deficits, Openness and the Business Cycle. *Journal of the European Economic Association, Papers and Proceedings*, forthcoming.
- Devereux, Michael B., Head, Allan C. and Beverly J. Lapham (1996). Monopolistic Competition, Increasing Returns, and the Effects of Government Spending, *Journal of Money, Credit, and Banking* 28, 2, 233-254.
- Edelberg, Wendy, Eichenbaum, Martin and Jonas D.M. Fisher (1999). Understanding the Effects of a Shock to Government Purchases. *Review of Economic Dynamics* 2, 166-206.
- Fatás, Antonio, and Ilian Mihov (2001). The Effects of Fiscal Policy on Consumption and Employment: Theory and Evidence. *CEPR Discussion Paper* 2760.

- Fatás, Antonio, and Ilian Mihov (2003). The Case for Restricting Fiscal Policy Discretion. *Quarterly Journal of Economics* 118, 4, 1419-1447.
- Favero, Carlo (2003). How Do European Monetary and Fiscal Authorities Behave? in Buti (ed.), *Monetary and Fiscal Policies in EMU*, Cambridge University Press, Chapter 7.
- Favero, Carlo, and Francesco Giavazzi (2007). Debt and the Effects of Fiscal Policy. *Mimeo*, IGIER.
- Galí, Jordi and Roberto Perotti, 2003, Fiscal Policy and Monetary Integration in Europe, *Economic Policy* 18, 37, 533-572.
- Galí, Jordi, Vallés, Javier, and J.D. López-Salido (2007). Understanding the Effects of Government Spending on Consumption, *Journal of the European Economic Association* 5, 1, 227-70.
- Giavazzi, Francesco, and Marco Pagano (1990). Can Severe Fiscal Adjustments Be Expansionary? in Blanchard, Olivier, and Stanley Fischer (eds.), *NBER Macroeconomics Annual*, MIT Press: Cambridge, MA.
- Giuliodori, Massimo, and Roel Beetsma (2005). What Are the Trade Spillovers from Fiscal Shocks in Europe? An Empirical Analysis, *De Economist*, 153, 167-197.
- Kim, Soyung, and Nouriel Roubini (2004). Twin Deficit or Twin Divergence: Fiscal Policy, Current Account, and Real Exchange Rate in the US, *Mimeo*, Korea University and New York University.
- Lane, Philip, and Roberto Perotti (1998). The Trade Balance and Fiscal Policy in the OECD. *European Economic Review*, 42, 887-895.
- Lane, Philip, and R. Perotti, 2003, The Importance of Composition of Fiscal Policy: Evidence from Different Exchange Rate Regimes, *Journal of Public Economics* 87, 2253-79.
- Linnemann, Ludger (2006). The Effect of Government Spending on Private Consumption: A Puzzle?, *Journal of Money, Credit, and Banking*, 38, 7, 1715-35.
- Linnemann, Ludger, and Andreas Schabert, 2003, Fiscal Policy in the New Neoclassical Synthesis, *Journal of Money, Credit, and Banking* 35, 6, 911-929.
- Monacelli, Tommaso, and Roberto Perotti (2006). Fiscal Policy, the Trade Balance and the Real Exchange Rate: Implications for International Risk Sharing. *Mimeo*, IGIER.
- Monacelli, Tommaso, and Roberto Perotti (2007). Openness and the Sectoral Effects of Fiscal Policy. *Journal of the European Economic Association, Papers and Proceedings*, forthcoming.
- Mountford, Andrew, and Harald Uhlig (2005). What are the Effects of Fiscal Policy Shocks? *Mimeo*, Royal Holloway College and Humboldt University.
- Müller, Gernot (2006). Understanding the Dynamic Effects of Government Spending on Foreign Trade. *Journal of International Money and Finance*, forthcoming.



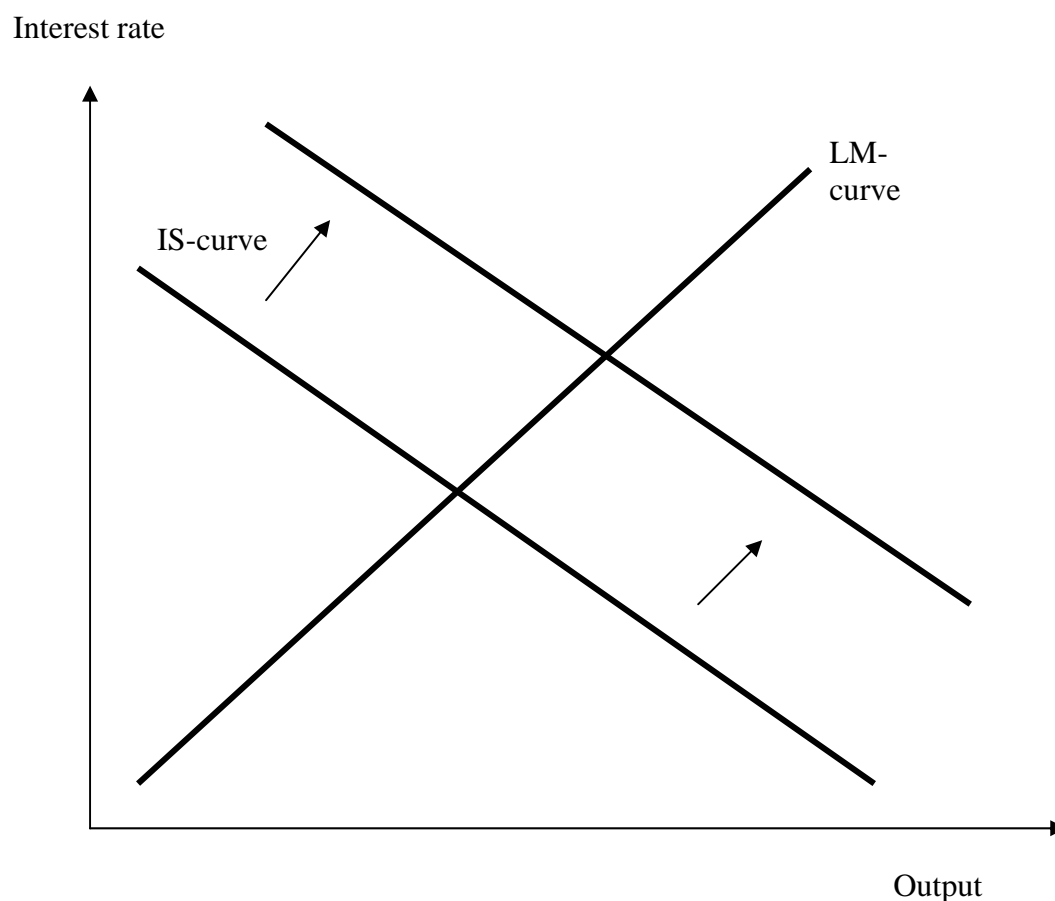
- OECD (2005). *Economic Outlook*, June, Paris.
- Pappa, Evi (2006). Discussion of “Comparing Alternative Methodologies to Estimate the Effects of Fiscal Policy by Roberto Perotti”. *Mimeo*, London School of Economics.
- Perotti, Roberto (1999). Fiscal Policy in Good Times and Bad. *Quarterly Journal of Economics* 114, 1399-1436.
- Perotti, Roberto (2007). In Search of the Transmission Mechanism of Fiscal Policy. *NBER Working Paper*, No. 13143.
- Ramey, Valerie (2006). Identifying Government Spending Shocks: It’s All in the Timing. *Mimeo*, University of California at San Diego.
- Ramey, Valerie and Matthew Shapiro (1998). Costly Capital Reallocation and the Effects of Government Spending. *Carnegie-Rochester Series on Public Policy* 48, 145-94.
- Ravn, Morten, Schmitt-Grohé, Stephanie, and Martin Uribe (2006). Deep Habits. *Review of Economic Studies* 73, 1, 195-218.
- Ravn, Morten, Schmitt-Grohé, Stephanie, and Martin Uribe (2007). Explaining the Effects of Government Spending Shocks on Consumption and the Real Exchange Rate. *Mimeo*, EUI Florence and Duke University.
- Romer, Christina D. and David H. Romer (2007). The Macroeconomic Effects Tax Changes: Estimates Based on a New Measure of Fiscal Shocks. *NBER Working Paper*, No.13264.
- The Economist (2008). Aspirin, Not Morphine. January 5, p.9-10.
- Van der Ploeg, Rick (2005). Back to Keynes? *CESifo Economic Studies* 51, 4, 777-822.

**Table 1: Predicted effects of a positive government purchases shock in a closed economy**

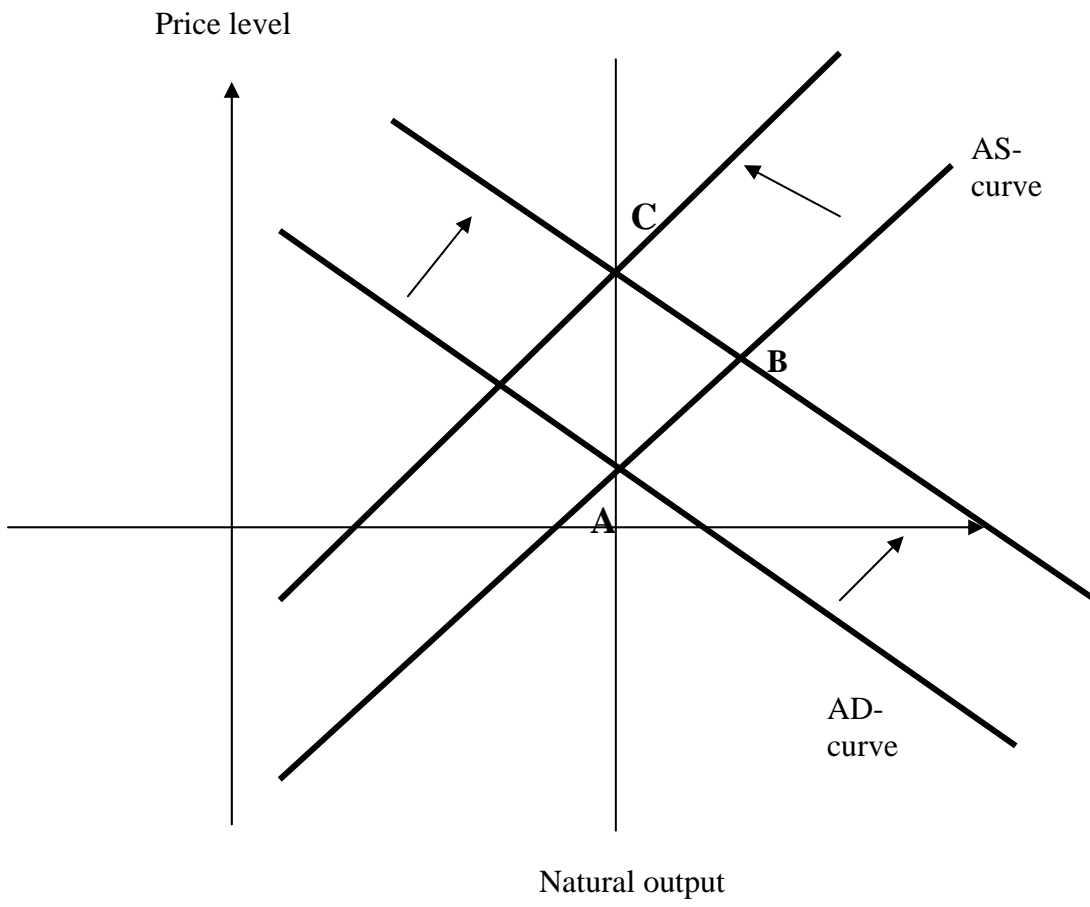
	Y	C	w	L <sup>s</sup>	L <sup>d</sup>	L
Neoclassical	↑	↓	↓	↑	0	↑
Non-separable utility	↑	↑	↓	↑	0	↑
Deep habits	↑	↑	↑	↑	↑	↑
NK – Nominal rigidities	↑	↓	↑	↑	↑	↑
NK – Rule - of - thumb	↑	↑	↑	↑	↑	↑

Note: his table is based on Pappa (2006). The symbols and mnemonics are as follows: Y = output, C = consumption, w = real wage, L<sup>s</sup> = labour supply, L<sup>d</sup> = labour demand, L = employment, rer = real exchange rate (↑ is an appreciation), tby = trade balance as a share of GDP. NK = New-Keynesian.

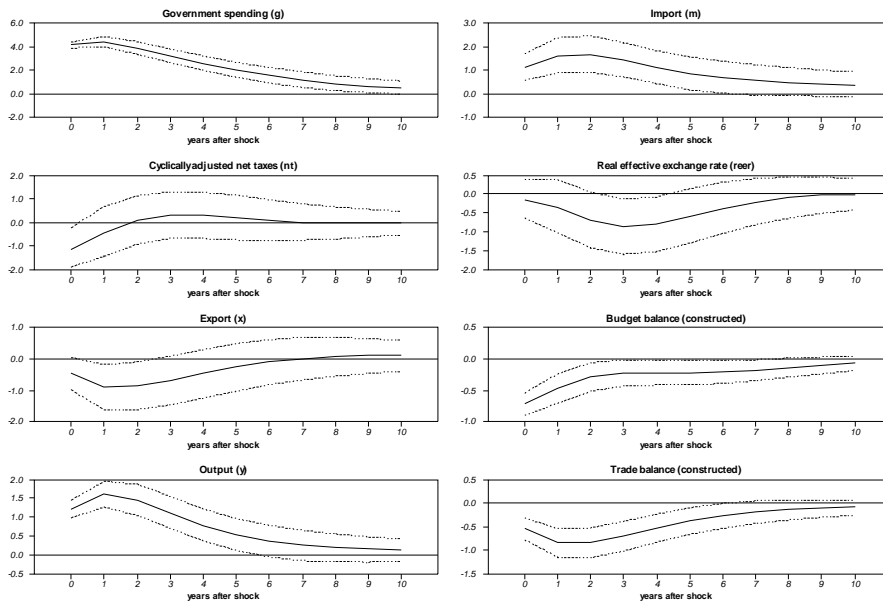
**Figure 1: Fiscal expansion in the IS-LM model**



**Figure 2: Fiscal expansion in the AD-AS model**

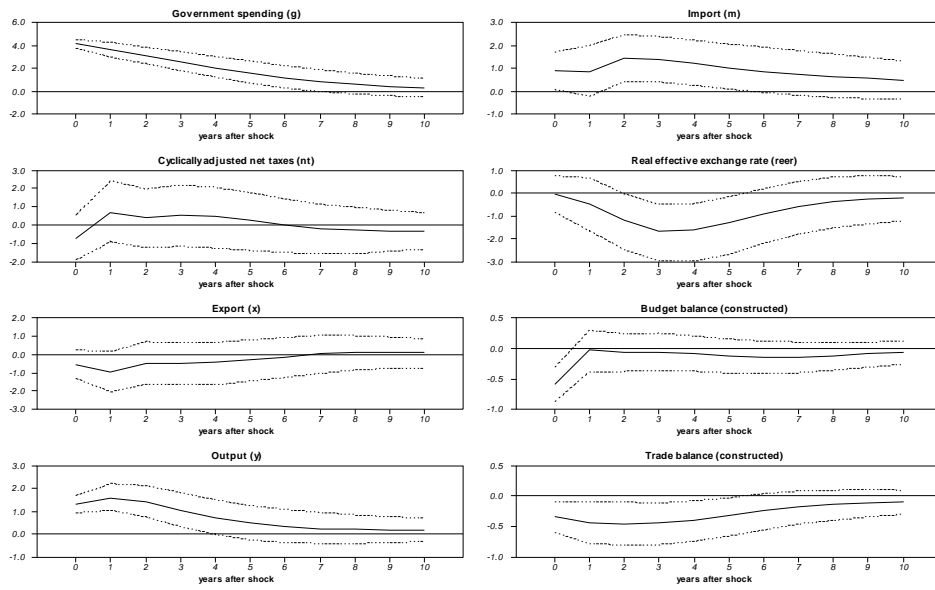


**Figure 3: Impulse responses after a government purchases shock**



Note: Confidence bands are the 5<sup>th</sup> and the 95<sup>th</sup> percentiles from Monte Carlo simulations based on 1,000 replications.

**Figure 4.1. Baseline for Closed EU countries**



**Figure 4.2: Baseline for Open EU countries**

