

What fiscal policy for Europe ?

The creation of the European Central Bank (ECB) had two different consequences for the conduct of monetary policy. First of all monetary policy has become the same for the 12 members. Secondly, having to fulfil a clear and measurable commitment to achieve moderate inflation, it ceased to be discretionary and activist and can be to a large extent assessed using a Taylor-type inflation rule. However, this does not automatically imply that monetary policy-making has become automatic. The ECB must continuously monitor inflation trends and identify to what extent they are the result of relative price changes on international markets, i.e. a rise in oil prices. In exceptional circumstances, for example a financial or bank crisis, it might be obliged to become the lender of last resort, deviating temporarily from its target. Nevertheless, in normal conditions it must achieve a publicly announced medium term inflation goal, which will be used by economic agents to form their decisions.

At the same time fiscal policies still pertain to national governments and are to a large extent discretionary. The Stability and Growth Pact sets limits to Government deficits, which are jointly established by the eurozone members. Moreover pan-European discussion led to some convergence in fiscal rules and tax rates. However the prudential constraints and the moves towards harmonisation established so far are different from full fledged fiscal rules. National Governments retain a substantial decisional power on their revenues and expenditures.

During the second half of the 90s several empirical works attempted to evaluate the effects of fiscal policies in industrialised countries. Bartolini, Razin et Symansky (1995) showed that fiscal consolidation lowers output in the short run but increases it for longer horizons. An increase in indirect taxes or a reduction in public expenditure have better long run effects than an increase in taxes on capital or labour. The international transmission of the effects of fiscal consolidation are important too. Cour, Dubois, Mahfouz et Pisani-Ferry (1996) showed that small fiscal adjustments have short run effects broadly in line with the Keynesian analysis, with a unit multiplier. However, larger adjustments have a much weaker short run impact, with a multiplier of around 0.1.

It is difficult to forecast the effect of discretionary fiscal policies, for example a reduction in profit taxes. Firms will try to assess whether such a measure is temporary or permanent before undertaking new investment. They might as well suspect a strategic behaviour by the Government, which commits itself to lower taxes permanently but it eventually renege its promise once private investment is undertaken. Moreover, all the economic agents would also consider the way the tax cut is financed. In the short run the government can simply do nothing, leaving the primary deficit widen and borrow. However, the debt GDP ratio cannot rise without a bound and at some point the Government will have to cut expenditures or raise taxes. Thus private agents will react to a discretionary policy taking into account their expectations about its duration and the effects it will have on the future course of fiscal policy. Private sector's forecast are obviously difficult to learn by the Government and probably very unstable.

Economists assess fiscal measures such as a cut in profit taxes evaluating their short run and long run impacts. In the short run the demand for goods and services (for example, investment) in the whole economy increases, triggering typically keynesian effects on output, employment, etc. In the long run, however, the efficiency and equity of the economic equilibrium are altered. More specifically, a reduction in corporate profit taxes will reduce the user cost of capital borne by the firms, which will raise the level of capital and potential production of the whole economy.

The analysis of the effect of fiscal policies can be carried out in a convincing way utilising a detailed simulation model. Such a model must include a description of the most important economies, since the effects of fiscal policies in one country normally spill over to the others. It must also consider the rational behaviour of the economic agents who base their current actions on a consistent forecast of the future. Moreover it must have a sensible representation of both the changes in the demand for goods and services caused by the fiscal shock and of the variation in potential production brought about by the changes in employment, wages and investment. Finally it must acknowledge the fact that a fiscal measure permanently worsening the primary deficit will inevitably lead the debt to increase on a diverging path, under the reasonable assumption of interest rates being higher than nominal GDP growth. Therefore it is useful to specify the means the Government will employ to reduce the deterioration of the debt ratio. MARMOTTE, the multicountry model developed by CEPII and CEPREMAP, has all these features.

The aim of this paper is just to contribute to the debate on discretionary fiscal policies, and therefore we limit our discussion to three possible measures, namely an increase in government expenditure, a reduction in corporate profit taxes and a reduction in wage taxation. They all entail a fiscal expansion and, although they last for a considerable number of year, are perceived as temporary once they are implemented. However they were not anticipated by the private sector, and constitute a true « surprise ». The short run effects depend largely on the expected duration of the measure and the way it is financed. However, they produce very different effects. The fiscal shocks have the same size for all the eurozone countries in order to simplify the analysis, as we will avoid to deal with the (thorny) subject of the international co-ordination of fiscal policies. Eurozone countries are linked to the United States, Japan and the EU Members not participating in the single currency by fully flexible exchange rate. We will focus our attention on the effects on the eurozone countries only: even though the fiscal expansion has the same size in each country their structural peculiarities, above all the different geographical patterns of trade specialisation, will lead to different results. In the short run the fiscal measures are financed through borrowing, which is stabilised in the medium long run by an increase in the less distortionary of the taxes present in the model. This tax, based on GDP, is a proxy of several small taxes differing across countries. The three fiscal shocks we investigate are motivated by the fact that they allow a neat interpretation of the fiscal measures under analysis. A more realistic scenario would require to combine in a credible way a dynamic revision of public expenditures and revenues with possibly a limited and transitory resort to borrowing. It is however important to notice that the ongoing changes in eurozone taxation lead to significant changes in the income subject to taxes and therefore to the fiscal revenues in all the members. Assuming that Government's fiscal solvability is guaranteed by taxes levied on GDP only is obviously not realistic. Therefore any scenario would have to foresee the fiscal adjustment in each country. The economic interpretation of such a scenario would be inevitably more difficult than that of the simulation presented in this paper. It will be therefore useful to decompose a complex fiscal scenario into simple shocks as those presented below.

A few important characteristics of MARMOTTE

A detailed presentation of the model can be found in Déés, Kadareja, Laffargue et Rzepkowsky (2001). Here we will just remind some features which are essential in order to understand the results.

1. Production technology is *putty clay*. Firms can pick the capital intensity of the investment undertaken in the period from a menu of available choices. This choice cannot be changed afterwards. The only decision firms can make about their existing capital units is to scrap them once they are no longer profitable. The new investment entails an increase in employment, whereas scrapping give rise to firings. This particular specification allows therefore a detailed formalisation of employment dynamics. A change in the factor costs will therefore affect the volume and the capital intensity of the new investment but just the scrapping of the old one.
2. Investment can be financed in four different ways : via retained earnings, or by issuing stocks, or short term bonds in domestic currency or in US dollars¹. The model assumes that profits are taxed in the country where enterprises are located, with no distinction among the nature of the profits (interest income, dividends, capital gains). Therefore, following the Modigliani Miller theorem, firms are indifferent among the financing methods. Households hold short term bonds both in domestic currency and in US\$. If these assets were perfectly substitutes uncovered interest parity will equate domestic rates to the US ones, after considering the expected currency depreciation rate. However we suppose that households tend to diversify their portfolio, and therefore short term interest rates on domestic bills increase when the share of dollar denominated assets in total wealth decrease. Savers are indifferent between acquiring stocks and domestic short run bonds. However, the ex-post payoff of the investment can change in an unanticipated way. For example, an unexpected rise in wages, lowering firms' profits, reduces stocks prices and dividends. Savers are supposed to be neutral towards this kind of risk. However, when it happens, shareholders' return is lower than expected. It is important to stress that forecast errors are totally borne by households located in the same country as the enterprise. MARMOTTE introduces two forms of capital market imperfections. First of all, only dollar denominated assets are traded internationally and are only imperfectly substitutes for the domestic ones. Moreover stocks issued by a firm in one country are entirely hold by the resident in that country.
3. Each country produces a single good, which is not perfectly substitutable with other countries' output, therefore real exchange rates can vary.
4. In each country or zone , the central bank has a reaction function determining its monetary policy. If observed inflation exceed the target, short term nominal rates increase with respect to its equilibrium value.² Interest rates overreact to higher inflation, giving rise to an increase in real rates. Inflation and exchange rate depreciation dynamics are therefore determined unambiguously. On the contrary the paths of the price level and the exchange

¹ MARMOTTE includes long term bonds issued in domestic currency by borrowers in every country too. There is therefore for each country a long term interest rate and a term structure equation. A country holds long term bonds and short term US bills according to fixed and exogeneous shares. Budget deficit are financed in each country by short and long term bonds whose shares are fixed.

² Eurozone inflation and interest rate are a weighted average of national data.

rate depend on their initial values. In short they provide nominal anchors to the economy. This hysteresis of the nominal variables for the central bank reaction functions without a nominal anchor is well known in economic theory at least since Wicksell.

5. There are two types of households. Those with no access to credit market consume out of their disposable income only. The others compute their total wealth (including human capital) and determine their current and future consumption plan, taking into account interest rates. As this specification can lead to a very volatile consumption, we introduced a certain level of inertia, assuming that households do not like to change too quickly their lifestyle .

Increase in government expenditure

In this simulation, government consumption is increased by 1% of GDP in all the eurozone countries for 10 years. Consumers, realise that this measure will be financed by an increase in taxes which will make them poorer, and therefore they will react to the *transitory increase* in public consumption with a *permanent*, but smaller reduction of their own consumption. Other things being equal, the economy will experience excess demand during the period of the shock and excess supply afterwards. Effective production, defined in MARMOTTE as the sum of all demand components, increases in the short run.

Excess demand creates inflation, which ECB fights raising real interest rates. If real rates are temporarily higher than households' impatience rate, consumption decrease in the first periods and decreases afterwards.

In the baseline simulation, competition drives expected profits of investment to zero given labour and capital cost. An increase in real rates makes, *ceteris paribus*, investment no longer profitable. Therefore, firms will keep firing workers belonging to the scrapped production units, but at the same time they slow down investment and the related employment. Employment will fall, reducing labour costs and re-establishing investment profitability. The reduced level of employment and investment tend to reduce progressively potential output.

Higher inflation leads to an higher price level in the long run. Given the transitory character of the shock , in the long run real exchange rate does not change. Therefore nominal rate must fall. Current exchange rate differs from its long run value by the cumulative sum of the interest rate differentials. The fact that ECB's Taylor rule links interest rates to inflation, the cumulating of interest rates equals that of inflation, i.e. the variation of the price level between the period preceding the shock and the long run (see box 1). The increase in government spending was unanticipated ; when it occurs, private agents revise upwards their long term expectation about prices. Consequently the Euro appreciates vis-à-vis the dollar, it will depreciates progressively afterwards until it reaches its depressed long term value.

The previous reasoning, nevertheless, needs some corrections. First of all, the fall in consumption following the shock is not abrupt but gradual : MARMOTTE imposes some degree of inertia to this variables, in order to capture the difficulty households face in changing rapidly their lifestyle. Moreover the model implicitly imposes some inflation inertia. Thus, once the fiscal expansion comes to an end, excess demand does not turn suddenly to an excess supply, as this would imply a sudden switch from inflation to deflation. Actually inflation slows down gradually and investment increases instantaneously, offsetting

the drop in government demand. Finally, if the ECB reacts more vigorously to European inflation, inflation increase is weaker, and real rates augment more. Consequently prices increase less in the long run, and the nominal rate less depressed. Thus, in the short run, Euro appreciation is stronger.

European countries' real exchange rates appreciate less than the nominal ones. Private consumption is crowded out by public expenditure, which is less intensive in imported goods. Therefore eurozone trade balance improves. The US economy is made worse off by this effect, but at the same time benefits from Euro's real appreciation : the net effect is therefore very weak.

The non keynesian nature of the results seems to stem mainly from the characteristics of the shock rather than the features of the model, as we explained in the introduction. Monetary policy is not very accommodative, interest rates increase and Euro experiences a real appreciation. The increase in government consumption is expected to last for a long period, much longer than a normal recession and to be financed by a future distortionary increase in taxes, which is perfectly anticipated (and not by a reduction in expenditures). Another interesting exercise would be the analysis of a short term increases in expenditure, financed by a reduction afterwards. We can reasonably expect that such a policy would lead to more keynesian effects.

Reduction in corporate profits taxes³

Taxes on corporate profits are lowered by one percentage point of GDP during ten years. This reduces substantially the user cost of capital. Thus investment, other things being equal, has a positive ex post return. Therefore investment increases as well as hiring, stimulating employment. This rises the real labour cost, which brings profitability to its new equilibrium value. The higher level of investment gives rise to an excess demand, as effective production increases : this causes an inflation hike. At the same time capital accumulation and employment lead to a gradual increase in potential production. Excess demand dampens over time and eventually turns into excess supply leading to deflation. Real interest rate is then driven below its reference value.

The widespread wealth increase raises permanently consumption. Its dynamics is determined by both real rates (which first increase and then decrease) and consumption inertia. We have an increase throughout 9 periods and then a fall.

Prices increase during most of the fiscal simulation and then drop. In the long run they are slightly lower than the reference value. Being the real exchange rate unchanged in the long run, Euro appreciates slightly in the long run. As in the previous simulation, the gap between current and long term nominal exchange rate is proportional to the change in prices between the period immediately preceding the shock and the long run. When the unanticipated tax cut occurs, agents revise downwards their long term expectation about prices. Thus Euro depreciates with respect to the dollar and then follows the same dynamics as the lagged GDP deflator.

³ Mendoza (2001) undertake an exercise similar to our, using a much simpler model. It assumes a single good traded worldwide, which makes the real exchange rate fixed. The biggest difference between his results and ours is that in his simulation the effects of European fiscal policies on the rest of the world are much stronger than in our exercise. This is due to the fact that in Mendoza's paper the rest of the world is limited to United Kingdom (whereas MARMOTTE includes the US, Japan and the EU countries not joining the Euro) and that the real exchange rate is exogeneous.

The Euro-US\$ real exchange rates depreciate less than nominal ones. Stronger , investment-led demand provokes a deterioration in the European trade balance. The US benefits from this latter development but its competitiveness is harmed by Euro's real depreciation. The net effect on the Us economy, though bigger than in the previous case, is limited.

If ECB monetary policy gets more sensitive to inflation, its increase is more limited during the shock. Higher real interest rates limits the inflation spike, containing employment too. Prices are lower in the long run and the euro appreciation lower. In the short run Euro's depreciation is less pronounced.

Reduction in wage tax

Taxes on wages are reduced by one percentage point of GDP during ten years. In the model such a measure benefits mostly employees via higher real wages and to a lesser extent firms as labour costs decreases. Being labour supply exogenous in MARMOTTE, only the latter effect affects the equilibrium.

The reduction in real labour costs leads to a positive return on investment, other things being equal. Therefore capital accumulation and hiring grow gradually. Higher investment increases effective production leading to an excess demand and raising inflation. At the same time potential production climbs progressively, due to factor accumulation. Excess demand is thus gradually reabsorbed.

Higher national wealth leads to a permanent increase in consumption whose dynamics is determined by real interest rates and consumption inertia.

Prices increase during the shock and drops afterwards : in the long run they are slightly lower than the baseline. As the real exchange rate do not move in the long run, the euro shows a weak long run appreciation. As in the previous case, euro initially depreciates and then follows the dynamics of lagged GDP deflator.

If BCE is more sensitive to inflation, price increase is attenuated during the shock. With an higher real rate investment and employment grow slower. In the long run prices are lower and the euro less appreciated. In the short run, however, euro's depreciation is weaker.

The effects of a reduction in wage taxes have the same qualitative effects of a reduction in profit taxes, but are quantitatively much smaller. MARMOTTE assumes that lower taxes on wages benefits mainly employees and entails a limited reduction in labour costs with tiny gains on employment. There are two reasons for that. First of all in the wage equation, modelling the outcome of wage bargaining between unions and employers, labour cost is not very sensitive to the tax wedge. Moreover, in the same equation labour costs responds markedly to employment, or in other words employment is inelastic with respect to labour cost. On the other side a reduction in corporate taxes lowers the cost of capital, as the pre tax real interest rate is determined in the world market and does not move much. Such a measure, thus has an important effect on investment and employment, being the former financed by an inflow of foreign capitals. A reduction in wage taxes, on the contrary, lowers the capital intensity of the new investment, which is good for employment but does not trigger further capital accumulation.

Conclusion

An increase in government consumption has positive effects on effective production: however they are not very big and prove to be ephemeral. Investment and private consumption and employment drop. A reduction in profit taxes has beneficial effects on investment, consumption and employment. Lower wage taxes have similar, but less relevant effects.

One of the distinguishing features of monetary policy is its flexibility. It is extremely easy for a central bank to modify short term rates. Fiscal policy are much more sluggish, however is of course much easier to modify quickly taxes on wages and profits than to readjust expenditure. A discretionary fiscal policy has uncertain impacts on the economy, and much depends on the private sector's forecast about its duration and the adjustment measures to be taken later in order to correct the ensuing deficit. These consideration motivates recommending the following system.

Fiscal measures are taken in order to comply with the allocative and redistributive tasks of the administration, without taking into account their short run effects. Resource allocation and distribution policies do not evolve quickly over time and therefore their future developments are quite easy to be anticipated by the private sector. A probably better rule is to fix the tax and transfer rates in order to secure on average adequate resources over the cycle, in order to let the automatic stabilisers play their role. Such rules can be implemented through the taxation of the different components of profits, linking their rates to different short term indicators. Variable rates would magnificate the effect of the automatic stabilisers already obtained with constant rates. These rules should be designed such that the extra borrowing they create in recession would be compensated by a reduction of debt during an expansion. This kind of rules can be analysed by stochastic simulation with MARMOTTE.

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BOX 1 The euro-dollar exchange rate

Be e the euro-US dollar exchange rate, p the price level in the eurozone i the eurozone short term interest rate. We assume that just these three variables can change. The first two are measured in relative deviation from the baseline and the latter in absolute deviation. Current variables do not have a time index, the others are indexed according to lead or lags from the current period, ∞ means the long run. The first equation is the uncovered interest parity. In order to simplify the exposition we assumed that assets in euro and dollar are perfect substitutes :

$$e = e_{+1} - i$$

The second equation is ECB reaction function:

$$i = 1.5(p - p_{-1})$$

Plugging the second equation into the first and integrating forward we get :

$$e = e_{\infty} - 1.5(p_{\infty} - p_{-1})$$

The variation of nominal exchange rates in the very long run equals the sum of the price level variation in the eurozone and the euro-dollar real exchange rate. Since we are dealing with temporary shocks and that hysteresis affects nominal variables only, the real exchange rate does not move. Thus, the previous equation can be rewritten as

$$e = p_{\infty} - 1.5(p_{\infty} - p_{-1})$$

the first term on the right hand side represents the PPP, which is verified in the long run as the real exchange rate does not move ; the second term represents the transition dynamics.

TABLE 1 Increase in Government consumption by 1 percent of GDP

Year	1	2	3	4	5	6	7	8	9	10
Euro area										
Effective output	0,2177	0,1047	0,0531	0,0067	-0,0389	-0,0860	-0,1368	-0,1934	-0,2593	-0,3393
Consumption	-0,2199	-0,3743	-0,4726	-0,5337	-0,5700	-0,5893	-0,5974	-0,5979	-0,5941	-0,5880
Investment	-2,7668	-2,6587	-2,4797	-2,4396	-2,5082	-2,6706	-2,9182	-3,2482	-3,6661	-4,1859
Employment	-0,0252	-0,0759	-0,1170	-0,1516	-0,1874	-0,2248	-0,2661	-0,3123	-0,3650	-0,4247
Real cost of labour	0,0273	0,0244	-0,0248	-0,0671	-0,1029	-0,1373	-0,1713	-0.2075	-0.2479	-0.2956
Output deflator	0,0667	0,1318	0,2017	0,2752	0,3519	0,4317	0,5146	0.6007	0.6895	0.7795
Nominal exchange rate	-0,8421	-0,7781	-0,7049	-0,6219	-0,5320	-0,4357	-0,3323	-0.2200	-0.0968	0.0385
Nominal interest rate	0,0868	0,0964	0,1060	0,1129	0,1187	0,1239	0,1288	0.1336	0.1375	0.1393
Real interest rate	0,0208	0,0256	0,0316	0,0353	0,0381	0,0401	0,0419	0.0440	0.0468	0.0509
Government surplus	-1,0319	-0,9810	-0,9374	-0,8938	-0,8522	-0,8144	-0,7809	-0.7522	-0.7284	-0.7094
Trade balance surplus	9162,11	5799,85	3327,69	1650,40	761,34	670,51	1395,90	2949.97	5334.11	8517.74
Real exchange rate										
Germany	-0,4806	-0,4857	-0,4863	-0,4865	-0,4867	-0,4866	-0,4853	-0.4816	-0.4739	-0.4605
France	-0,5036	-0,5182	-0,5205	-0,5171	-0,5105	-0,5016	-0,4903	-0.4755	-0.4551	-0.4260
Italy	-0,4879	-0,4946	-0,4927	-0,4894	-0,4865	-0,4841	-0,4818	-0.4786	-0.4735	-0.4659
United States										
Effective output	-0.0013	0.0011	0.0027	0.0028	0.0009	-0.0029	-0.0087	-0.0160	-0.0237	-0.0297
Employment	-0.0006	-0.0029	-0.0034	-0.0025	-0.0007	0.0015	0.0038	0.0056	0.0064	0.0057
Output deflator	-0.0003	0.0009	0.0026	0.0041	0.0045	0.0030	-0.0011	-0.0078	-0.0171	-0.0280
Real exchange rate	0.0235	0.0346	0.0454	0.0551	0.0636	0.0710	0.0773	0.0828	0.0875	0.0912
Government surplus	-0.0039	-0.0040	-0.0040	-0.0036	-0.0029	-0.0021	-0.0013	-0.0007	-0.0006	-0.0011

TABLE 2 Decrease in the taxes of profits by 1 percent of GDP

Year	1	2	3	4	5	6	7	8	9	10
Euro area										
Effective output	1,1733	1,3692	1,4382	1,4931	1,5270	1,5286	1,4783	1,3438	1,0710	0,5699
Consumption	0,2190	0,3085	0,4080	0,5122	0,6148	0,7106	0,7947	0,8629	0,9114	0,9280
Investment	4,2948	4,7870	4,7528	4,7186	4,6550	4,5128	4,1979	3,5476	2,2881	-0,0014
Employment	-0,1602	0,0186	0,1139	0,2085	0,3036	0,3988	0,4957	0,5952	0,6950	0,7293
Real cost of labour	0,1967	0,3174	0,3919	0,4527	0,5031	0,5378	0,5479	0,5214	0,4452	0,4825
Output deflator	0,4138	0,8248	1,2153	1,5816	1,9184	2,2162	2,4596	2,6231	2,6656	2,5331
Nominal exchange rate	1,2539	1,8411	2,3772	2,8553	3,2722	3,6216	3,8935	4,0710	4,1262	4,0126
Nominal interest rate	0,6628	0,6260	0,5876	0,5469	0,4990	0,4382	0,3551	0,2350	0,0550	-0,2043
Real interest rate	0,2472	0,2329	0,2201	0,2103	0,2023	0,1964	0,1930	0,1928	0,1859	-0,0795
Government surplus	-1,3627	-1,1910	-1,0591	-0,9367	-0,8211	-0,7108	-0,6032	-0,4946	-0,3786	-0,2264
Trade balance surplus	-14672,11	-15618,24	-17229,94	-19599,67	-22700,80	-26340,82	-30110,47	-33297,66	-34757,43	-32670,12
Real exchange rate										
Germany	0,4788	0,5638	0,6394	0,7038	0,7562	0,7972	0,8281	0,8522	0,8746	0,8959
France	0,5499	0,6573	0,7402	0,8009	0,8396	0,8580	0,8586	0,8460	0,8274	0,8121
Italy	0,4366	0,5354	0,6239	0,7026	0,7721	0,8329	0,8862	0,9338	0,9786	1,0154
United States										
Effective output	0.0288	0.0474	0.0691	0.0917	0.1132	0.1315	0.1448	0.1507	0.1474	0.1347
Employment	-0.0042	-0.0118	-0.0198	-0.0260	-0.0290	-0.0278	-0.0218	-0.0109	0.0044	0.0230
Output deflator	0.0095	0.0264	0.0521	0.0865	0.1281	0.1745	0.2223	0.2675	0.3058	0.3330
Real exchange rate	0.1336	0.0833	0.0286	-0.0283	-0.0857	-0.1420	-0.1955	-0.2454	-0.2908	-0.3307
Government surplus	-0.0055	-0.0044	-0.0042	-0.0035	-0.0018	0.0012	0.0057	0.0116	0.0186	0.0259

TABLE 3 Decrease in the taxes of labour by 1 percent of GDP

Year	1	2	3	4	5	6	7	8	9	10
Euro area										
Effective output	0,1823	0,3001	0,2903	0,2953	0,2978	0,2980	0,2934	0,2823	0,2609	0,2224
Consumption	0,2127	0,2435	0,2538	0,2666	0,2791	0,2910	0,3017	0,3106	0,3174	0,3215
Investment	0,1568	0,5514	0,4687	0,4535	0,4373	0,4202	0,3919	0,3425	0,2524	0,0877
Employment	0,0227	0,2057	0,1917	0,2042	0,2153	0,2271	0,2379	0,2487	0,2594	0,2667
Real cost of labour	-0,0771	-0,3526	-0,3439	-0,3392	-0,3325	-0,3298	-0,3283	-0,3302	-0,3360	-0,3426
Output deflator	0,0548	0,1082	0,1584	0,2053	0,2485	0,2875	0,3210	0,3474	0,3636	0,3654
Nominal exchange rate	0,2169	0,2954	0,3640	0,4245	0,4766	0,5201	0,5543	0,5783	0,5903	0,5870
Nominal interest rate	0,0882	0,0819	0,0762	0,0707	0,0649	0,0582	0,0499	0,0388	0,0235	0,0017
Real interest rate	0,0340	0,0310	0,0287	0,0269	0,0255	0,0242	0,0232	0,0224	0,0216	0,0133
Government surplus	-1,0482	-0,9809	-0,9070	-0,8361	-0,7721	-0,7146	-0,6624	-0,6148	-0,5708	-0,5291
Trade balance surplus	-2122,60	-2242,12	-2340,88	-2562,33	-2898,59	-3342,22	-3857,43	-4387,52	-4839,93	-5068,67
Real exchange rate										
Germany	0,0933	0,1082	0,1219	0,1331	0,1422	0,1489	0,1534	0,1560	0,1570	0,1571
France	0,0943	0,1062	0,1138	0,1184	0,1206	0,1203	0,1179	0,1136	0,1081	0,1020
Italy	0,0929	0,1075	0,1194	0,1297	0,1385	0,1458	0,1517	0,1563	0,1596	0,1618
United States										
Production	0.0031	0.0054	0.0079	0.0107	0.0133	0.0158	0.0177	0.0191	0.0196	0.0192
Emploi	-0.0005	-0.0013	-0.0024	-0.0034	-0.0041	-0.0044	-0.0041	-0.0033	-0.0018	0.0002
prix	0.0010	0.0029	0.0059	0.0101	0.0152	0.0212	0.0276	0.0341	0.0401	0.0452
taux de change réel	0.0148	0.0076	0.0001	-0.0076	-0.0152	-0.0226	-0.0295	-0.0359	-0.0415	-0.0463
balance publique	-0.0005	-0.0004	-0.0004	-0.0004	-0.0003	0.0000	0.0004	0.0010	0.0017	0.0026

The shock starts in 2001. The data are expressed in relative deviation from the baseline except real and nominal interest rates, expressed in absolute deviation, the government surplus, expressed in percentage of GDP and the trade balance, expressed in US\$ millions. In 2001 Eurozone GDP was