

Imbalances in the euro area and fiscal devaluation: a model-based analysis*

S. Gomes[†]
Bank of Portugal

P. Jacquinot[‡]
European Central Bank

M. Pisani[§]
Bank of Italy

May 2014

Abstract

We assess to which extent the trade balance improves in correspondence of a fiscal devaluation by simulating a large-scale multi-country dynamic general equilibrium model calibrated to Spain (alternatively Portugal) and the rest of the euro area. Social contributions paid by firms are reduced by 1 percent of GDP for four years and are financed by increasing consumption taxes. Our main results are as following. First, in the case of Spain, the trade balance improves by 0.5 percent of GDP, while the real exchange rate depreciates by 1 percent. The Spanish GDP increases by 1 percent. Second, similar results to those of Spain are obtained in the case of Portugal. Third, the Spanish trade balance improves when the fiscal devaluation is enacted also in the rest of the euro area, albeit to a lower extent than in the case of Spanish unilateral implementation. Fourth, the effectiveness of the devaluation is robust to changes in the values of some key parameters.

JEL Classification Numbers: *F32; F47; H20.*

Keywords: *fiscal devaluation; trade deficit; dynamic general equilibrium modeling.*

*The views expressed in this paper are those of the authors and do not necessarily reflect those of the Bank of Italy, Bank of Portugal or the European Central Bank (ECB). We are grateful to Vesna Corbo and participants at the 2012 Dynare Conference, 2012 “Intra-European Imbalances, Global Imbalances, International Banking, and International Financial Stability”, 2014 International Symposium in Computational Economics and Finance for comments and suggestions. All errors are ours.

[†]Bank of Portugal, Economic Research Department, Av. Almirante Reis 71, 1150-012 Lisbon, Portugal; phone number: +351-21-313-0719; e-mail: sandra.cristina.gomes@bportugal.pt.

[‡]European Central Bank, Directorate General of Research, Kaiserstrasse 29, D-60311, Frankfurt am Main, Germany; phone number: +49-69-1344-8018; e-mail: pascal.jacquinot@ecb.int.

[§]Bank of Italy, Research Department, Via Nazionale 91, 00184 Rome, Italy; phone number: +39-06-4792-3452; e-mail: massimiliano.pisani@bancaditalia.it.

Introduction

A country belonging to a monetary union cannot rely on nominal exchange rate devaluation to increase, in presence of nominal price rigidities, its international relative price competitiveness and, hence, reduce in the short run its external trade deficit against other country members. Moreover, it cannot rely on the (common) nominal exchange rate of the monetary union against third countries, as its value depends on the performance of the union as a whole.

One way for increasing its short-run international price competitiveness is through a temporary “fiscal devaluation”.¹ The reduction of employers’ social contributions can reduce the unit labor costs and, as long as they are passed-through into final prices, the relative price of domestic goods. The improvement in price competitiveness should reduce the producer prices of domestically produced (non-traded and traded) goods and, hence, favors exports and reduces imports. The reduction of contributions could be financed by increasing the consumption tax. The latter is a destination-based tax. So it would raise the after-tax price of domestic and imported goods uniformly, but not the price of exported goods. Overall, the combination of lower unit labor costs and the higher consumption tax would decrease the price of exported goods and increase the after-tax relative price of the imported good. The terms of trade would deteriorate, as in the case of a nominal exchange rate devaluation that is passed-through in the prices of exported and imported goods.

A *temporary* fiscal devaluation can be a relevant measure for two reasons. First, it can speed up the convergence process towards the long-run equilibrium, where all prices are flexible and fully adjust to the shocks and fundamentals of the economy. Second, it can make the convergence process smooth and avoid future sudden rebalancings of the current account, that are likely to happen if the economy suffers from an external debt sustainability problem.²

¹In particular, two alternative ways can be considered. The first is via wage and price moderation in the deficit countries, the second via wage and price inflation in the surplus countries of the euro area. The second option is difficult to defend. Increasing inflation in surplus countries could jeopardize the inflation stability of the euro area as a whole, with negative implication for risk premia and the level of interest rates, jeopardizing even more the financial stability of the area. Moreover, it would not contribute to solve the problem of competitiveness of deficit countries, as long as the low competitiveness is related to the external performance of surplus countries not belonging to the euro area.

²In the paper we do not consider very persistent trade deficits and foreign borrowing, that can create problems of foreign debt sustainability. As the latter are likely to be a structural feature of the deficit economy, a *temporary* fiscal devaluation is not the most appropriate policy measure to deal with it. Structural reforms, aiming at improving the competitiveness of the country on a permanent basis, should be more effective. In this paper we take a short-run perspective, as we focus on fiscal devaluation

In this paper we assess to which extent the trade balance improves in correspondence of a temporary fiscal devaluation enacted by a country in the euro area. The analysis is based on a large-scale multi-country dynamic general equilibrium model of the euro area and the world economy. The model is new-Keynesian, as it features monopolistic competition in the labor and goods markets and, importantly for the purpose of this paper, nominal price and wage rigidities. The euro area is split in two regions, calibrated to Spain (alternatively Portugal) and the rest of the euro area. They share the monetary policy and the nominal exchange rate against third countries. The monetary policy is conducted at euro area level according to a Taylor-type rule. For the international dimension, the model features incomplete international financial markets (a riskless bond is internationally traded), home bias, international price discrimination and short-run adjustment costs on imports and distinguishes between tradable and non-tradable intermediate goods. As such, the model allows for an exhaustive characterization of the international relative prices and trade balance dynamics.

We initially simulate the implementation of the fiscal devaluation in Spain or Portugal. Subsequently, we consider the case of simultaneously implementing it in the euro area as a whole. The measures are implemented over a four-year horizon and reduce unit labor costs through a reduction in employers' social contributions equal to 1 percent of ex ante nominal GDP. The reduction in contributions is financed by increasing the taxation of consumption equal to 1 percent of ex ante nominal GDP. As such, the reform is ex ante revenue-neutral. Tax reforms are announced, immediately implemented and fully credible. We quantify the impact on the trade balance, the real exchange rate and terms of trade under alternative assumptions for nominal wage and price rigidities and elasticity of substitution across goods.³

Our main results are as following. First, in the case of Spain, the fiscal devaluation improves the external balance, as a ratio to GDP, by 0.5 percentage points. Exports increase because of the improvement in Spanish price competitiveness. Imports decrease only marginally as their loss of competitiveness is compensated by the increase in demand for investment goods. The real exchange rate depreciates and the terms of trade deteriorate by around 1 percent. GDP increases by 1 percent, sustained by the increase as a tool to overcome the lack of short-run adjustment associated with (short-run) nominal rigidities.

³We focus on the trade balance as the model does not allow to capture valuation effects, associated with the net foreign asset position of a country, that can characterize the dynamics of current account. Nevertheless, as suggested by Baxter (1995), at business cycle frequency trade balance and current account balance are positively correlated.

in net exports and investment. Second, Portuguese results are in line with the Spanish ones. The Portuguese trade balance improves by 0.7 percent of GDP and the real exchange deteriorate by 0.5 percent. Third, the Spanish external balance improves also in the case of a euro area-wide fiscal devaluation. The improvement is somewhat lower than in the case on unilateral devaluation, as tradables produced in the rest of the euro area are now more competitive than in the case of unilateral devaluation. However, exports towards the euro area still increase, as they benefit from the increase in investment in the rest of the euro area. Fourth, the effectiveness of the implemented measures is robust to changes in the values of some key parameters, such as nominal price and wage rigidities and the elasticity of substitution between domestic and imported goods. Overall, we do find that fiscal devaluation can be an effective policy measure to temporarily boost the (price) competitiveness of a country and contribute to reduce external imbalances in the short run.

The paper is organized as follows. Section 2 reports the related literature. Section 3 shows the model setup, the transmission mechanism of the fiscal devaluation and the calibration of the model. Section 4 illustrates the results. Section 5 concludes.

Related literature

Our results are related to contributions on trade and financial imbalances in the euro area. Jaumotte and Sodsriwiboon (2010) assess causes and consequences of large external deficits in the euro area based on standard current account regressions. Their results suggest that raising labor productivity and moderating unit labor costs could substantially improve current account positions. They argue that large external deficits pose serious sustainability risks to the economy and therefore matter, even in a currency union. Giavazzi and Spaventa (2010) show that in Ireland, Greece, Portugal and Spain growth has not been driven by an adequate increase of the country's production capacity of traded goods and services, but by an extraordinary growth of credit that fed the imbalances. They conclude for the relevance of policy measures to reduce the imbalances and improve the sustainability of the monetary union. Based on an estimated small open economy DSGE model of the Spanish economy within the euro area, in't Veld et al. (2012) also find that the build-up of imbalances in Spain was to a great extent due to the fall in interest rates and the easier access to credit associated with EMU accession and argue for the need to adjust domestic demand and improve the trade balance, finding that correction would be eased by a less risk averse scenario. Vogel (2011) simulates

a multi-country dynamic model of the euro area and finds that structural reforms are helpful to gain competitiveness and reduce external imbalances. His results are in line with ours, albeit we focus on the impact of labor market (tax-based) reforms on external imbalances.

Our paper also relates to the strand of international finance literature trying to assess the role of international relative prices for external adjustment. Many papers have focused on the US case. The size of the real dollar depreciation required to correct global imbalances differs across contributions. Obstfeld and Rogoff (2005) show that eliminating the US current account deficit of 5 percent of GDP would require that economy's real exchange rate to depreciate between 35 and 50 percent. Other contributions, however, do find that the magnitude of a real depreciation that would insure a sustainable correction of the US external imbalance may well be in the range of 10–20 percent, perhaps even less, in real effective terms. Faruquee et al. (2007) constructed scenarios with real effective dollar depreciation in the range of 15 percent, under the so-called soft-landing scenario. Similar figures are produced by Ferrero et al. (2010). Finally, Dekle et al. (2007) build a multilateral model calibrated to 40 countries using 2004 data on GDP and bilateral trade. In their exercise, closing the US deficit completely requires a very limited adjustment of relative wages (labor costs). For instance, wages in the US (the country with the largest deficit) only fall by 10 percent relative to wages in the Japan (the country with the largest surplus). Moreover, real wages do not greatly change because of the large weight of non-tradables in the consumption basket. Our results are in line with those reported, as estimates suggest that, following a fiscal devaluation, a 10 percent depreciation of Spanish or Portuguese real effective exchange rate would roughly imply an improvement of the trade balance of 5 percentage points.

Several papers look at fiscal devaluation as a way to regain competitiveness. Mooij and Keen (2012) present empirical evidence that suggests that revenue-neutral shifts from the employers' social contributions towards the VAT in euro area could improve the trade balance in the short run in a sizable way though the effects disappear in the long run.⁴ Lipinska and Von Thadden (2009) develop a two-country DSGE model of a monetary union to analyze permanent shifts of the tax structure towards indirect taxes and find small effects of this measure. The authors show that the short-run impact

⁴In a theoretical oriented contribution, Farhi et al. (2011) show that the real allocations attained under a nominal exchange rate devaluation can be replicated by a small set of conventional fiscal instruments in various specifications of a standard New Keynesian open economy model (namely with expected and unexpected devaluations, producer and local currency pricing, and complete and incomplete international asset markets).

depends significantly on the speed at which fiscal adjustments take place, on the choice of the inflation index stabilized by the central bank, and on whether the tax shift is anticipated or not. Focusing on Portugal, Franco (2011) analyses the same type of policy measure by estimating a number of VAR equations with Portuguese data and by simulating its impact on a small-open economy DSGE model. His empirical analysis suggests that these measures imply a gain of competitiveness and an improvement in the trade balance, but the necessary changes in tax rates would have to be large. The author concludes that temporary version of the tax swap achieves a sharper improvement in the current account. The impact of a fiscal devaluation in Portugal is also simulated by Banco de Portugal (2011). A shift from employers' social security contributions to value added tax equivalent to 1 percent of GDP in the first year boosts total exports by 0.5 percent and improves the trade balance by 0.6 percent of GDP.⁵

Model setup

In this section we briefly describe the main theoretical features model, the transmission mechanism of the fiscal devaluation and the calibration.

General features

We simulate the Euro Area and Global Economy (EAGLE) model, a multi-country dynamic general equilibrium model of the euro area.⁶ In EAGLE the world economy is composed of four blocs. Two out of four are members of the euro area, which is formalized as a monetary union. The two countries have a common nominal exchange rate and a common nominal interest rate. Each of the remaining two blocs has its own nominal interest rate and nominal exchange rate. Similarly to the European Central Bank New Area Wide model (NAWM) and the International Monetary Fund Global Economy Model (GEM), EAGLE is micro-founded and features nominal price and wage rigidities, capital accumulation, international trade in goods and bonds.⁷

In each country there is a representative household, a representative firm in each productive sector and a public sector. The household is infinitely lived, consumes a final

⁵The fiscal devaluation has been widely discussed in Portugal as in the initial EU/IMF Financial Assistance Programme the implementation of a budget-neutral fiscal devaluation as a way to boost competitiveness was considered.

⁶The EAGLE model code was developed in both TROLL and DYNARE. For a detailed description of EAGLE, see Gomes et al. (2010).

⁷On GEM see Bayoumi (2004), Laxton (2008) and Pesenti (2008). On the NAWM see Coenen et al. (2008a, 2008b).

good and decides how to allocate her time between work and leisure. She offers a specific kind of labor services to domestic firms (there is imperfect substitution across labor services) in a monopolistic manner, thus she sets her wage by charging a markup over the marginal rate of substitution between labor and consumption. The household owns the portfolio of domestic firms and the domestic capital stock. The latter is rent to domestic firms in a competitive market. Labor and physical capital are immobile internationally. The households also buys and sells two bonds: a domestic bond issued by the local public sector denominated in domestic currency and an international bond (denominated in dollars) issued in zero net supply worldwide. When undertaking positions on the international bond, she pays a premium to financial intermediaries, whose size is a function of the aggregate net asset position of the country. Households residing in the monetary union trade also a bond denominated in the common currency.

On the production side, firms produce the non-tradable final goods, an array of differentiated intermediate goods, and provide intermediation services. There are two non-tradable final goods – a consumption good and an investment good – produced by perfectly competitive firms using all available intermediate goods, combined accordingly to a constant elasticity of substitution (CES) technology. There are many varieties of intermediate goods, which are imperfect substitutes. Each variety is produced by a single firm under conditions of monopolistic competition. The market power implies that firms set nominal prices charging a markup over marginal costs. Each intermediate good is produced using domestic labor and capital. They are combined according to a Cobb-Douglas technology. Intermediate goods are sold both in the domestic and in the export market. There is international price discrimination as firms set prices in the currency of the importing country (as such, markets are segmented across countries).

As for the monetary authority, the central bank sets the national short-term nominal interest rate according to a standard Taylor-type rule, by reacting to increases in consumer price index (CPI from now on) inflation and real activity. The interest rate rule is specified as follows for each region:

$$(R_t^4 - \bar{R}^4) = \rho_R (R_{t-1}^4 - \bar{R}^4) + (1 - \rho_R) \rho_\pi (\pi_{4,t} - \bar{\pi}_4) + \rho_y \left(\frac{gdp_t}{gdp_{t-1}} - 1 \right) \quad (1)$$

where R is the (quarterly) nominal interest rate, \bar{R} its steady state value, π_4 is the year-on-year CPI inflation rate, $\bar{\pi}_4$ is the central bank CPI inflation target (assumed to be constant), gdp is the gross domestic product. To capture inertia in the conduct of monetary policy, we assume that the current period policy rate reacts to its one period-

lagged value. In the euro area, π is defined as the weighted average of two region-specific CPI inflation rates and gdp as the sum of the regional gross domestic products. Note that in the euro area region-specific inflation rates determine the region-specific real interest rates, because the nominal interest rate is common and set by the central bank of the monetary union.

For fiscal policy, we assume that it is conducted at regional level. Each country sets its fiscal items, that include consumption expenditures, lump-sum taxes, labor and capital income taxes, consumption taxes. Moreover, in each country the public debt is stabilized through a fiscal rule, that induces lump-sum taxes to endogenously adjust.

The model uses standard functional forms, which allows firms and consumers to be aggregated as if they were a representative entity. Adjustment costs for real variables and nominal rigidities enable EAGLE to mimic the typical hump-shaped reaction of macroeconomic variables to shocks observed in more empirically oriented models of the euro area such as the estimated version of the NAWM (see Christoffel et al., 2008) and the model by Smets and Wouters (2003). There are investment and import adjustment costs and external habit formation in consumption. All (intermediate goods) prices and wages are sticky (Calvo, 1983) and indexed to a weighted average of previous period CPI inflation rate and the constant central bank's inflation target.

The transmission mechanism of fiscal devaluation

A fiscal devaluation is a change in taxes that mimics the effects of a nominal exchange rate devaluation. The nominal exchange rate devaluation is an effective (stabilization) policy instrument in presence of short-run nominal rigidities, as it allows the appropriate adjustment of relative prices to a given cross-country asymmetric shock. Therefore, its effectiveness depends on the type of nominal rigidities that characterize the economy.

When the nominal exchange rate is fixed, as in a monetary union, its depreciation can be replicated by an increase in the consumption tax and a decline of the employers' social contributions. The increase of the consumption tax is de facto imposed on imports, because its positive effect on prices of tradable goods that are domestically sold or non-tradable goods is compensated by the negative one of declining payroll tax paid by firms.

In EAGLE we consider nominal wage and price rigidities *à la* Calvo (1983).⁸ Firms in the intermediate sector act under monopolistic competition. They set prices taking

⁸Workers act under monopolistic competition. They set their wage taking into account of labor demand by firms and subject to nominal (wage) rigidities

into account of demand for their brand and subject to nominal (price) rigidities. In the case of the tradable good sold domestically, the implied optimal price setting equation, here reported in a stylized way, is:⁹

$$\frac{P_{H,t}}{P_t} = E_t \left(\sum_{s=t}^{\infty} MKP_{P_H,s} \frac{MC_s}{P_s} \right) \quad (2)$$

where P_H is the relative price of the tradable good H and P the price of consumption basket, E is the expectation operator, MKP_{P_H} is the markup on the nominal marginal cost, MC . The marginal cost depends on both labor and capital costs. Neglecting the latter for the sake of simplicity and including employers' social contributions, we get:

$$\frac{P_{H,t}}{P_t} \approx E_t \left(\sum_{s=t}^{\infty} MKP_{P_H,s} \frac{W_s (1 + \tau_s^w)}{P_s} \right) \quad (3)$$

where $0 \leq \tau^w \leq 1$ is the implicit tax rate associated with employers' social contributions. Ceteris paribus, a decrease in τ^w induces the decrease in P_H/P once firms have the possibility to adjust their prices and nominal wages do not change.

Suppose that a consumption tax $0 \leq \tau^C \leq 1$ is uniformly imposed on domestically (H) produced and imported goods (F). As the consumption tax is uniform it would not change the relative prices:

$$\frac{P_{H,t} (1 + \tau_t^C)}{P_t (1 + \tau_t^C)} = \frac{P_{H,t}}{P_t} \quad (4)$$

$$\frac{P_{F,t} (1 + \tau_t^C)}{P_t (1 + \tau_t^C)} = \frac{P_{F,t}}{P_t} \quad (5)$$

However, as soon as the lower employers' social contributions are passed-through into the price of domestically produced goods, the latter should become cheaper than the imported ones. Moreover, lower social contributions should be passed-through into the prices of exported goods and non-tradable goods as well, that, accordingly, should decrease. Overall, the reduction in social contributions, financed by rising consumption taxes, should favor the price competitiveness of domestic goods.

Finally, the consumption tax would also affect the inter-temporal relative price of

⁹A similar mechanism applies to goods produced in the non-tradable sector, as it is assumed that social contributions paid by all firms in the economy are reduced.

consumption, through the standard Euler equation:

$$C_t^{-\rho} = \beta E_t \left(R_t \frac{P_t}{P_{t+1}} \frac{(1 + \tau_{C,t})}{(1 + \tau_{C,t+1})} C_{t+1}^{-\rho} \right) \quad (6)$$

Ceteris paribus, an increase in current value of the consumption tax would induce households to postpone consumption, increasing saving. This should further contribute, jointly with the intra-temporal substitution effect, to reduce imports of consumption goods.

Calibration

We summarize in Tables 1 to 7 the (quarterly) calibration of the model. We illustrate the values of parameters affecting the relevant steady-state great ratios and the dynamics. They are set according to the empirical evidence or existing literature on the NAWM and the GEM.

We calibrate the model to Spain (SP), the rest of the euro area (REA), the United States (US) and the rest of the world (RW). Alternatively, we calibrate the two euro area regions to Portugal (PT) and the rest of the euro area. Table 1 reports the implied great ratios for Spain and Portugal.¹⁰ In the other tables we report only the Spain case to save on space.¹¹

Table 2 shows preference and technology parameters. Preferences are the same across households of different regions. We set the discount factor so that the steady-state annualized real interest rate is about 3 percent, the habit persistence parameter to 0.75, the intertemporal elasticity of substitution to 1.0 and the Frisch elasticity to 0.50. We set the quarterly depreciation rate of capital to 0.025, consistently with an annual depreciation rate of 10 percent.

As for the final goods baskets, the degree of substitutability between domestic and imported tradables is higher than that between tradables and non-tradables, consistently with existing literature. In particular, we set the (long-run) elasticity of substitution between tradables and non-tradables to 0.45 while the long-run elasticity between domestic and imported tradables is set to 3.3. Note that the short-run elasticity for imported goods is lower than its long-run value because of adjustment costs on imports.

The bias toward the tradable bundle is lower in the consumption basket than in the investment basket. The weight of domestic tradable goods in the consumption and

¹⁰National accounts data are from the European Commission AMECO database and from the Statistics Portugal.

¹¹Tables for Portugal are available from the authors upon request. We also set the same values for markups given the lack of estimates for Portugal in the literature.

investment tradable baskets is different across countries, to match multilateral import-to-GDP ratios.

Table 3 reports nominal and real rigidities. We set Calvo price parameters in the domestic tradable and non-tradable sector to 0.9 (on average, firms adjust prices optimally every 10 quarters) in the euro area, consistent with estimates by Christoffel et al. (2008) and Smets and Wouters (2003).¹² Corresponding nominal rigidities outside the euro area are equal to 0.75, implying an average frequency of adjustment equal to 4 quarters, in line with Faruqee et al. (2007). Calvo wage and import price parameters are equal to 0.75 in all regions but Spain, where the Calvo wage parameter is 0.40 (nominal wages are relatively flexible and adjust roughly every two quarters). The indexation parameters on prices and wages are equal respectively to 0.50 and 0.75 so to get sufficiently hump-shaped response of wages and prices. For real rigidities, we set the parameters of the adjustment costs on investment changes to 6 in the euro area and to 4 in other regions. Adjustment costs on consumption and investment imports to 2. We set weights of bilateral imports to match the trade matrix reported in Table 4 (for details see Gomes et al., 2010).¹³ In particular, it is interesting to note that intra-euro area trade represents a significant share of total trade in the two euro area regions. The net foreign asset positions and interest rates are exogenously pinned-down, while export and import quantities as well as international relative prices consistently adjust.¹⁴

Table 5 contains markup values. We identify the non-tradable and tradable intermediate sectors in the model with the services and manufacturing sectors in the data, respectively. Markups in the euro area services and labor markets are higher than the corresponding values in the US and the RW. In each region the markup in the non-tradable sector is higher than that in the labor market. For the euro area, the latter is higher than the markup in the manufacturing sector. In other terms, in the euro area the degree of competition is particularly low in the services sector. Specifically, the (net) price markup in Spain and the rest of the euro area is set to 50, 30, 20 percent in the services, labor and manufacturing sectors, respectively. In the US and in the rest of the world the corresponding markups are set to 28, 16, 20 percent. Our values are in line with other existing similar studies, such as Bayoumi et al. (2004), Faruqee et al.

¹²In fact, given that we assume indexation, prices (and wages) change every period.

¹³The trade matrix covers intra and extra euro area flows of goods and services. Numbers are computed by the authors using AMECO and Eurostat data.

¹⁴The indeterminacy of steady-state net foreign asset positions standard in open economy models with representative households and incomplete international financial markets. See, for example, Pesenti (2008). To the opposite, along the transition dynamics the net foreign asset position endogenously adjusts to the given shock.

(2007), Everaert and Schule (2008). Usually these studies refer to Jean and Nicoletti (2002), Oliveira Martins et al. (1996) and Oliveira Martins and Scarpetta (1999) for estimates of markups.¹⁵ Some additional empirical evidence for the euro area is provided by Christopoulou and Vermeulen (2008). Their estimates suggest that the markup in the Spanish services sector is similar to the corresponding value for the euro area and that the markup in Spanish manufacturing sector is relatively low with respect to that in the Spanish services sector.

In Table 6 we report parameters in the monetary policy rules, where the (annualized) interest rate reacts to the its lagged value (inertial component of the monetary policy), annual inflation and quarterly output growth (see equation 1).

Results

In this section we report the results of our simulations. The impact on the Spanish economy of a unilateral temporary (4-year long) fiscal devaluation is initially evaluated. The reduction in employers' social contributions, equal to 1 percent of ex ante GDP, is financed by a concurrent 1 percent of GDP rise in the consumption tax (the reform is ex ante revenue neutral). The social security contributions rate decreases from 15.6 to 13.3 percent. The consumption tax rate increases from 7.6 to 9.5 percent. To make the transmission mechanism clear, we disentangle the contributions of lower social contributions and higher consumption taxes. Thereafter, it is shown the counterbalancing role of fiscal devaluation in response to an asymmetric demand shock that induces a trade deficit. We then run a similar exercise for the case of Portugal and for the case of a euro area wide fiscal devaluation (implemented simultaneously in Spain and in the rest of the euro area). Finally, a sensitivity analysis is performed, by changing the values of parameters regulating nominal wage and price rigidities and the elasticity of substitution between domestic and imported goods.

Fiscal devaluation in Spain

Figure 1 shows the results of the fiscal devaluation in Spain. The Spanish trade balance improves by 0.5 percent of GDP after two years from the beginning of devaluation. Thereafter, it gradually returns to the steady state level. The Spanish real effective exchange rate and terms of trade depreciate by roughly 1 percent. (Gross) real exports

¹⁵See also Organization of Economic Co-operation and Development (1997).

increase by 2 percent after two years, while gross imports marginally decrease. Net exports increase towards all destinations (rest of the euro area, US and rest of the world).

Spanish exports increase because of the improvement in international competitiveness, associated with the deterioration of Spanish international relative prices. Spanish imports decrease for two reasons. First, they loose competitiveness, as Spanish goods have become cheap. Second, Spanish consumption decreases (see Figure 2), as its after-tax price has increased. The lower consumption (-0.8 percent after 4 years) more than compensates for the increase in investment and, hence, drives down Spanish demand of imports. Investment increases by 2 percent after 3 years. The increase in consumption tax is an incentive to increase saving and, hence, investment. Moreover, lower social contributions favor employment. The latter increases capital productivity and, hence, investment.

Hours worked increase by 1.5 percent after two years. The unit labor cost immediately decreases, by 0.7 percent in nominal terms. The reduction is associated with the lower payroll taxes. Nominal wages (not reported) do not greatly change in the short run, as they are sticky. Subsequently, the unit labor cost continues to stay below the baseline. The low unit labor cost is not fully passed-through, in the short run, into the (nominal) prices of domestically produced goods. The latter are subject to short-run nominal rigidities and, as such, their before-consumption tax component decrease only gradually.

To further understand the transmission mechanism of the devaluation, Figures 3 and 4 report results obtained when the fiscal authority exploits lump-sum taxes to finance the reduction in payroll taxes and the increase in the VAT, respectively. The reduction in payroll taxes (Figure 3) has positive effects on Spanish trade balance and economic activity. The trade balance-to-GDP ratio improves by 0.3 percentage points. Exports increase because of the reduction in their relative price (the Spanish terms of trade deteriorate and the real exchange rate depreciates). Spanish imports increase to a lower extent than exports. The increase in imports is due to the higher Spanish consumption and investment (not reported).

As expected, the increase in consumption taxes has a positive effect on the trade balance and a negative impact on economic activity (see Figure 4). The trade balance-to-GDP ratio improves. Spanish exports and imports respectively increase and decrease. Higher exports are due to the deterioration of the terms of trade. The latter is caused by the drop in Spanish households' consumption (not reported). Given the relatively

large home bias, the relative prices of Spanish manufactured goods decrease to clear the excess supply. The drop in Spanish consumption, only partially compensated by the increase in investment, determines the reduction of GDP and imports.

The case of Portugal

We assume that policy-makers in Portugal implement a policy measure similar to the one considered for the case of Spain. Figure 5 reports the main results. The trade balance improves by 0.7 percent of GDP after two years. Thereafter, it gradually returns to the steady state level. The Portuguese real effective exchange rate depreciates by 0.5 percent, the terms of trade deteriorate slightly less than 1 percent. Gross exports increase in real terms by 2.5 percent after three years, driven by the favorable movement in the terms of trade. Gross imports are basically unchanged. Net exports increase towards all destinations (REA, US and RW).

Overall, results for Portugal confirm results obtained in the case of Spain. The fiscal devaluation benefits the trade balance in the short run, because of the increase in price competitiveness. As for Spain, the devaluation also favors the increase in investment and GDP.

Simultaneous fiscal devaluation in the euro area

In the previous section we have shown to which extent the Spanish and Portuguese external trade balances benefit from unilateral fiscal devaluation. In this section we show how results change when the fiscal devaluation is simultaneously implemented in Spain and the rest of the euro area.¹⁶ In each region we assume a 1 percent of ex ante GDP cut in employers' social security contributions and a concurrent 1 percent of GDP rise in consumption taxes for a period of 4 years so that the reform is ex ante revenue neutral. In the REA, the implied decrease in social security contributions and increase in consumption tax rate are equal to 2.2 and 1.7 percentage points, respectively.

Figure 6 contains results for the case of Spain and REA. The Spanish trade balance improves by 0.15 percentage points as a ratio to GDP. The Spanish real exchange rate depreciates by 0.4 percent, while the terms of trade deteriorate by 0.5 percent. Spanish gross exports increase by 1.8 percent, while imports by slightly more than 1 percent. The improvement in the Spanish external position is smaller than in the case of unilateral fiscal devaluation, where the trade balance-to-GDP ratio improves by 0.5 percentage

¹⁶Results for Portugal are similar to the Spanish ones and are available upon request.

points. Exports now increase less because of the decrease in REA aggregate consumption and the low prices of REA tradables. The latter also determine the increase in Spanish imports.¹⁷ As in the case of unilateral devaluation, Spanish GDP increases by 1 percent. Figure 7 shows responses of other main variables. Consumption decreases by 0.5 percent (0.8 percent in the case of unilateral devaluation), investment increases by 4 percent (2 percent). The cheap imports from the REA favor a larger increase in investment and a smaller drop in consumption than in the case of unilateral devaluation.

Overall, our results suggest that there is an improvement in one country external position also when the devaluation is implemented simultaneously in the euro area.

Sensitivity analysis

In this section we assess how our results change when we change the value of some key parameters. Specifically, we newly run our experiments for the case of Spain under alternative assumptions for the elasticity substitution, price and wage stickiness. We discuss the corresponding results in the next three sections.

Low elasticity of intra-temporal substitution

In Figure 8 we report results for the case of a low degree of elasticity of substitution between domestic and imported goods. We set it to 2.50 instead of 3.30 as in the benchmark simulations. The Spanish trade balance improves to a lower extent when the elasticity is relatively low, as now worldwide aggregate demand hardly shift towards cheaper Spanish tradeable goods.¹⁸ Consistently the Spanish real exchange rate slightly depreciates while terms of trade deteriorate as well. Exports increase to a low extent. Given the low positive effect from exports and the higher amount of imports, GDP increases to a relatively low extent.

Overall, in case of low elasticity of substitution the relevance of relative prices as a driving force of the trade balance increases relatively to change in real quantities. As relative prices deteriorate, the improvement in the trade balance is relatively lower. Results point out the relevance of the intra-temporal elasticity for the impact of reducing unit labor costs on the trade balance. In particular, it is not possible to exclude a priori

¹⁷The REA trade balance improves by 0.2 percent, while the real exchange rate and the terms of trade depreciate by 0.5 percent.

¹⁸More precisely, for a given real exchange rate depreciation of 0.5 the trade balance (as a ratio to GDP) improves after 10 quarters by 0.3 percentage points when elasticity is low compared to more than 0.4 percentage points in the benchmark simulation.

that the trade balance would deteriorate in correspondence of very low values, usually below one, of the elasticity of substitution. Whether estimates below one are plausible is an empirical issue. We do not take a stand on this issue. We only say that the existing literature on trade and international finance has produced a very large range of estimates, below and well above one, relying alternatively on macro and micro data.

Price stickiness

Lower social contributions reduce unit labor costs. The size of labor costs pass-through into prices, both domestic and export prices, depends on how often prices are adjusted. In the benchmark simulation EAGLE has *à la* Calvo parameter of 0.9 on domestic prices (price reset every 10 quarters) and 0.75 on traded prices (they are reset every 4 quarters). In Figure 9 we report results for the case of the Calvo parameter set to 0.5 in both traded and non-traded sectors, which means prices are reset on average every two quarters. The trade balance improves by around 0.5 percent of GDP, as in the benchmark scenario. The Spanish real exchange rate and terms of trade depreciate more in the short term, by roughly 1.3 and 1.8 percent (roughly 1 percent in the benchmark scenario for terms of trade and a bit less for the real exchange rate). By lowering the degree of price stickiness, lower unit labor costs quickly pass-through into lower Spanish tradable prices in the short run. The resulting short-run change in international relative prices is relatively large, enhancing the strength of the intra-temporal substitution effect and the role of terms of trade in shaping the consumption and investment choices of households and firms. The incentive for domestic and foreign households to allocate consumption and investment demand towards Spanish tradables is now stronger, as the larger depreciation makes Spanish goods cheaper after few periods from the beginning of the reform implementation. The decrease of imports is more frontloaded than in the benchmark case, given the initial larger depreciation. The larger increase in (net) exports favors GDP, that in the short run has a larger positive response than in the benchmark simulation.¹⁹

The results make clear the relevance of nominal price responses for the short run effectiveness of fiscal devaluation tool to gain international price competitiveness and restoring the external equilibrium in the short run. The quicker the pass-through into final prices, the larger the short run beneficial effect on the trade balance.

¹⁹Spillovers to the rest of the euro area do not greatly change as well compared to the benchmark simulation. The same is true for spillovers to the US and the rest of the world, which are negligible.

Wage stickiness

We assume wages adjust more frequently, once every two quarters (instead of once every four quarters as in the benchmark scenario). Results are reported in Figure 10. Responses of the main trade variables and international relative prices are now slightly less strong. The reason is that wages (not reported) increase to a larger extent, limiting the convenience to increase employment. For this reason, the initial increase in GDP is more muted. Overall, results do not greatly change in comparison with the benchmark simulation. Moreover, they suggest that fiscal devaluation can be a helpful stabilization tool, because it favors the short run labor cost flexibility, when nominal wages are sticky and, hence, do not fully adjust to a given shock.

Conclusions

We have quantitatively assessed the impact of temporary a fiscal devaluation on the trade balance, relative prices and economic activity for Spain and Portugal. We find that the trade balance improves. The terms of trade deterioration do favor the increase of exports, which is larger than the increase in imports, associated with the increase in investment. The latter, jointly with the increase in employment, favors the increase in GDP.

In the paper we have assessed the short-run effects of a temporary fiscal devaluation. The latter should be considered as a possible useful complement but not a substitute to structural reforms aimed at increasing the long-run potential output of an economy.²⁰ From this perspective it would be interesting to compare the effects of a fiscal devaluation with those obtained by competition-enhancing reforms in the non-tradable sector. Structural reforms that increase competition in the non-tradable sector can make the external balance sustainable. For example, if non-tradable goods are inputs of the production process of tradables, their competitiveness would benefit from the higher competition in the non-tradables.²¹ Moreover, non-price factors can contribute to improve the trade balance as well. A reform that allows to increase the number of firms entering in and exiting from a sector or country can help in augmenting the number of exported varieties (extensive margin), reducing the size of internal devaluation (intensive margin) needed

²⁰See European Central Bank (2011).

²¹For an analysis of the macroeconomic impact of reforms in the euro area non-tradable sectors see Gomes et al.(2013).

for restoring the external equilibrium of the country.²² Similarly, policies that favor the reallocation of resources to the high productivity growth sectors can induce a change of the structure of the export sector, changing the specialization of a country in favor of low price-elastic goods. We leave all these interesting topics for future research.

²²Corsetti et al. (2013) calibrate a model to the US economy and find that real exchange rate movements needed to reduce the external deficit can be quite contained in the long run once net creation and destruction of product varieties are appropriately accounted for.

References

- [1] Banco de Portugal (2011), Box 2: The impact of a tax change aimed at increasing the external competitiveness of the Portuguese economy, in *Economic Bulletin*, Spring 2011, 39-42, Banco de Portugal.
- [2] Baxter, M., (1995). International trade and business cycles. In: Grossman G. and Rogoff, K. (Eds.). *Handbook of International Economics*, Volume 3, December.
- [3] Bayoumi, T., (2004). GEM: A New International Macroeconomic Model. Occasional Paper 239 (Washington: International Monetary Fund).
- [4] Calvo, G. A. (1983). Staggered Prices in a Utility-Maximizing Framework. *Journal of Monetary Economics* 12, 383-398.
- [5] Christoffel, K., G. Coenen and A. Warne (2008). The New Area-Wide Model of The Euro area: a Micro-founded Open-Economy Model for Forecasting and Policy Analysis. European Central Bank Working Paper 599, October.
- [6] Christopoulou, R. and P. Vermeulen (2008). Markups in the Euro Area and the US over the Period 1981-2004: A Comparison of 50 Sectors. European Central Bank Working Paper 856, January.
- [7] Coenen, G., P. McAdam and R. Straub (2008a). Tax Reform and Labour-Market Performance in the Euro Area: A Simulation-Based Analysis Using the New Area-Wide Model. *Journal of Economic Dynamics and Control* 32(8), 2543-2583.
- [8] Coenen, G., M. Mohr and R. Straub (2008b). Fiscal Consolidation in the Euro Area: Long-Run Benefits and Short-Run Costs. *Economic Modelling* 25, 912-932.
- [9] Corsetti, G., P. Martin and P. Pesenti (2013). Varieties and the transfer problem. *Journal of International Economics* 89(1), January, 1-12.
- [10] Dekle, R., J. Eaton and S. Kortum (2007). Unbalanced Trade, *American Economic Review Papers and Proceedings*, Vol. 97, No. 2.
- [11] European Central Bank (2011). Fiscal devaluation – A tool for economic adjustment. *Monthly Bulletin*, December, pp. 101-102.
- [12] Everaert, L. and W. Schule (2008). Why It Pays to Synchronize Structural Reforms in the Euro Area Across Markets and Countries. *IMF Staff Papers* 55(2).

- [13] Farhi, E., G. Gopinath and O. Itskhoki (2011). Fiscal devaluations. NBER Working Paper 17662, December.
- [14] Faruquee, H., D. Laxton, D. Muir and P. Pesenti (2008). Would Protectionism Defuse Global Imbalances and Spur Economic Activity? A Scenario Analysis. *Journal of Economic Dynamics and Control* 32(8), 2651-2689.
- [15] Ferrero, A. (2010). A Structural Decomposition of the U.S. Trade Balance: Productivity, Demographics and Fiscal Policy. *Journal of Monetary Economics* 57, 478-490.
- [16] Franco, F. (2011), Adjusting to external imbalances within the EMU, the case of Portugal, *mimeo*.
- [17] Giavazzi, Francesco and Spaventa, L. (2010). Why the current account may matter in a monetary union: Lessons from the financial crisis in the Euro area. CEPR Discussion Papers 8008, C.E.P.R. Discussion Papers.
- [18] Gomes, S., P. Jacquinot and M. Pisani (2010). The EAGLE. A Model for Policy Analysis of Macroeconomic Interdependence in the Euro Area. Working Paper 1195, May (Frankfurt: European Central Bank).
- [19] Gomes, S., P. Jacquinot, M. Mohr and M. Pisani (2013). Structural reforms and macroeconomic performance in the euro area countries: a model-based assessment. *International Finance*, 16(1), pp. 23-44, Spring.
- [20] in't Veld, J., A. Pagano, R. Raciborski, M. Ratto and W. Roeger (2012). Imbalances and rebalancing scenarios in an estimated structural model for Spain. Economic Papers 458, June (Brussels: European Commission).
- [21] Jaumotte, F. and P. Sodsriwiboon (2010). Current account imbalances in the Southern euro area, IMF Working Paper 10/139, June.
- [22] Jean, S. and G. Nicoletti (2002). Product Market Regulation and Wage Premia in Europe and North America: An Empirical Investigation. Economics Department Working Paper 419 (Paris: Organisation for Economic Co-operation and Development).
- [23] Lipinska, A. and L. von Thadden (2009). Monetary and fiscal policy aspects of indirect tax changes in a monetary union. ECB Working Paper 1097, October (Frankfurt: European Central Bank).

- [24] Laxton, D. (2008). Getting to Know the Global Economy Model and Its Philosophy. *IMF Staff Papers* 55(2).
- [25] Mooij, R. and M. Keen (2012). “Fiscal Devaluation and Fiscal Consolidation: The VAT in Troubled Times.” IMF Working Paper 12/85, March.
- [26] Oliveira Martins, J. and S. Scarpetta (1999). The Levels And Cyclical Behaviour Of Markups Across Countries And Market Structures. Economics Department Working Paper 213 (Paris: Organisation for Economic Co-operation and Development).
- [27] Oliveira Martins, J., S. Scarpetta, and D. Pilat (1996). Markup Ratios in Manufacturing Industries – Estimates for 14 OECD Countries. Economics Department Working Paper 162 (Paris: Organisation for Economic Co-operation and Development).
- [28] Organization for Economic Co-operation and Development (1997). OECD Report on Regulatory Reform (Paris: Organisation for Economic Co-operation and Development).
- [29] Pesenti, P. (2008). The Global Economy Model (GEM): Theoretical Framework. *IMF Staff Papers* 55(2).
- [30] Smets, F. and R. Wouters (2003). An Estimated Dynamic Stochastic General Equilibrium Model of the Euro Area. *Journal of the European Economic Association* 1(5), 1124-1175.
- [31] Vogel, L. (2011). Structural reforms and external rebalancing in the euro area: A model-based analysis. *Economic Papers* 443, July.

Table 1: Steady-State National Accounts (percentage of GDP)

	SP	REA	US	RW	PT
Private consumption	54.5	59.6	63.2	64.5	<i>53.4</i>
Private investment	24.0	20.0	20.0	20.0	<i>19.7</i>
Public expenditure	21.3	20.0	16.0	16.0	<i>21.0</i>
Imports	28.7	23.8	11.5	14.9	<i>32.9</i>
Consumption goods	17.3	7.3	4.8	4.0	<i>17.0</i>
Investment goods	11.5	4.9	3.3	4.7	<i>15.9</i>
Public debt (% of yearly GDP)	60.0	60.0	60.0	60.0	<i>60.0</i>
Share of services sector	56.7	61.7	63.1	62.5	<i>52.5</i>
Share of world GDP	2.1	20.9	28.2	48.7	<i>0.20</i>

SP=Spain; REA=Rest of euro area; US=United States; RW=Rest of the world; PT=Portugal.

Table 2: Households and Firms Behavior

	SP	REA	US	RW
Households				
Subjective discount factor	$1.03^{-0.25}$	$1.03^{-0.25}$	$1.03^{-0.25}$	$1.03^{-0.25}$
Depreciation rate	0.025	0.025	0.025	0.025
Intertemporal elasticity of substitution	1.0	1.0	1.0	1.0
Habit persistence	0.75	0.75	0.75	0.75
Inverse of the Frisch elasticity of labor	2.00	2.00	2.00	2.00
Tradable Intermediate Goods				
Bias toward capital	0.30	0.30	0.30	0.30
Non-tradable Intermediate Goods				
Bias toward capital	0.20	0.30	0.30	0.35
Final consumption goods				
Substitution btw domestic and imp. goods	3.30	3.30	3.30	3.30
Bias toward domestic goods	0.20	0.20	0.85	0.20
Substitution btw tradables and non-trad.	0.45	0.45	0.45	0.45
Bias toward tradable goods	0.45	0.45	0.35	0.35
Final investment goods				
Substitution btw domestic and imp. goods	3.30	3.30	3.30	3.30
Bias toward domestic goods	0.20	0.20	0.85	0.20
Substitution btw tradables and nontr.	0.45	0.45	0.45	0.45
Bias toward tradable goods	0.75	0.75	0.75	0.75

SP=Spain; REA=Rest of euro area; US=United States; RW=Rest of the world.

Table 3: Real and Nominal Rigidities.

	SP	REA	US	RW
Real Rigidities				
Investment adjustment	6.00	6.00	4.00	4.00
Import adjustment (consumption)	2.00	2.00	2.00	2.00
Import adjustment (investment)	2.00	2.00	2.00	2.00
Nominal Rigidities				
<i>Households</i>				
Wage stickiness	0.75	0.75	0.75	0.75
Wage indexation	0.75	0.75	0.75	0.75
<i>Manufacturing</i>				
Price stickiness (domestically produced goods)	0.90	0.90	0.75	0.75
Price indexation (domestically produced goods)	0.50	0.50	0.50	0.50
Price stickiness (imported goods)	0.75	0.75	0.75	0.75
Price indexation (imported goods)	0.50	0.50	0.50	0.50
<i>Services</i>				
Price stickiness	0.90	0.90	0.75	0.75
Indexation	0.50	0.50	0.50	0.50

SP=Spain; REA=Rest of euro area; US=United States; RW=Rest of the world.

Table 4: International Linkages (percentage of GDP)

	SP	REA	US	RW
Substitution between consumption imports	3.30	3.30	3.30	3.30
Imported consumption goods from				
SP	...	0.9	0.0	0.2
REA	9.6	...	0.6	2.1
US	0.3	0.4	...	1.7
RW	7.3	6.1	4.1	...
Substitution between investment imports	3.30	3.30	3.30	3.30
Imported investment goods from				
SP	...	0.3	0.0	0.1
REA	7.0	...	0.5	1.8
US	0.5	0.7	...	2.8
RW	4.0	4.0	2.8	...
Trade balance (%yearly GDP)	0.05	-0.05	0.20	-0.12
Net foreign assets (%yearly GDP)	-3.75	3.75	0.00	10.0
Financial intermediation cost function	0.01	0.01	0.01	0.01

SP=Spain; REA=Rest of euro area; US=United States; RW=Rest of the world.

Table 5: (Gross) Price and Wage Markups

	SP	REA	US	RW
Manufacturing (tradables) price markup	1.20	1.20	1.20	1.20
Services (non-tradables) price markup	1.50	1.50	1.28	1.28
Wage markup	1.30	1.30	1.16	1.16

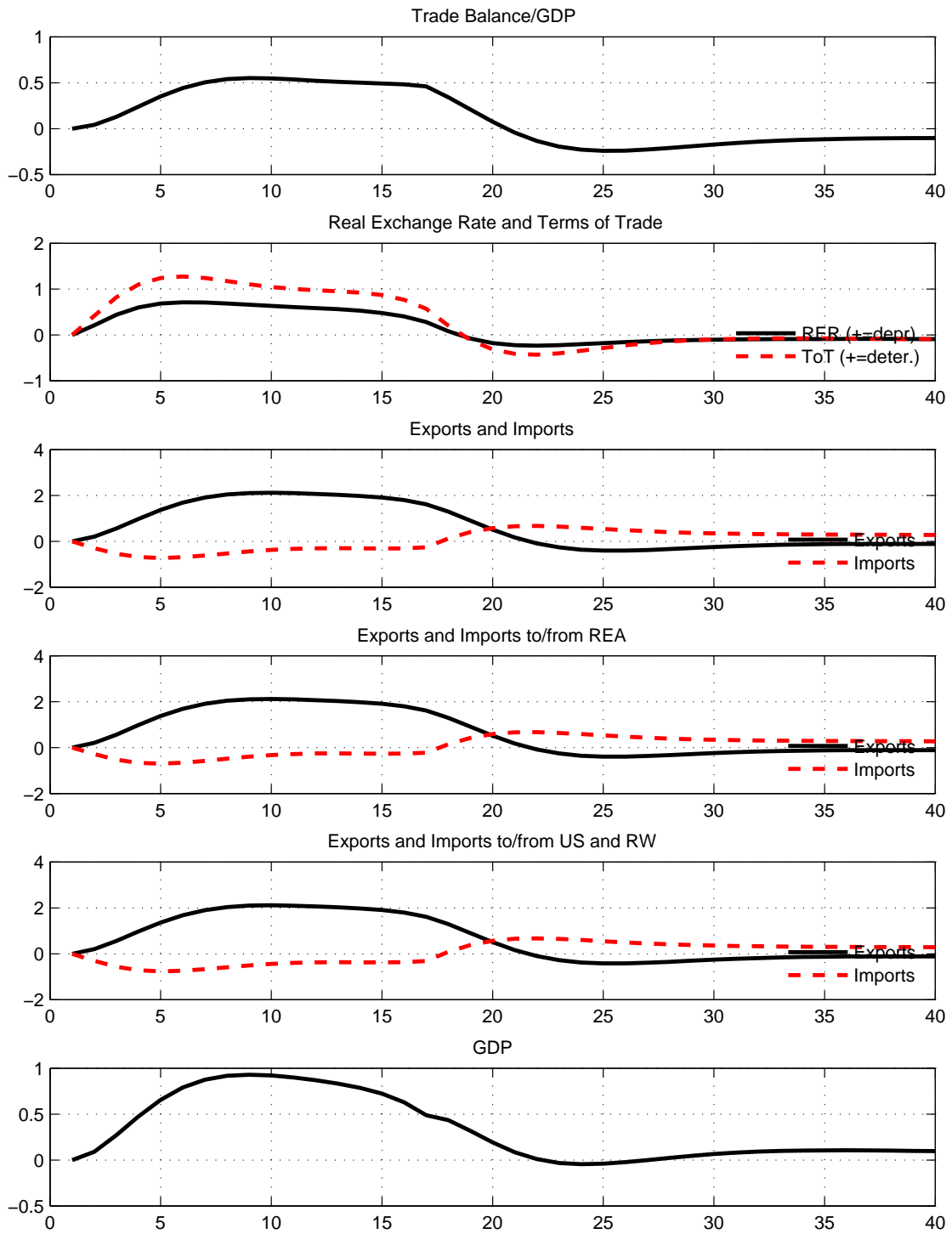
SP=Spain; REA=Rest of euro area; US=United States; RW=Rest of the world.

Table 6: Monetary Policy

	EA	US	RW
Inflation target	1.02	1.02	1.02
Interest rate inertia	0.87	0.87	0.87
Interest rate sensitivity to inflation gap	1.70	1.70	1.70
Interest rate sensitivity to output growth	0.10	0.10	0.10

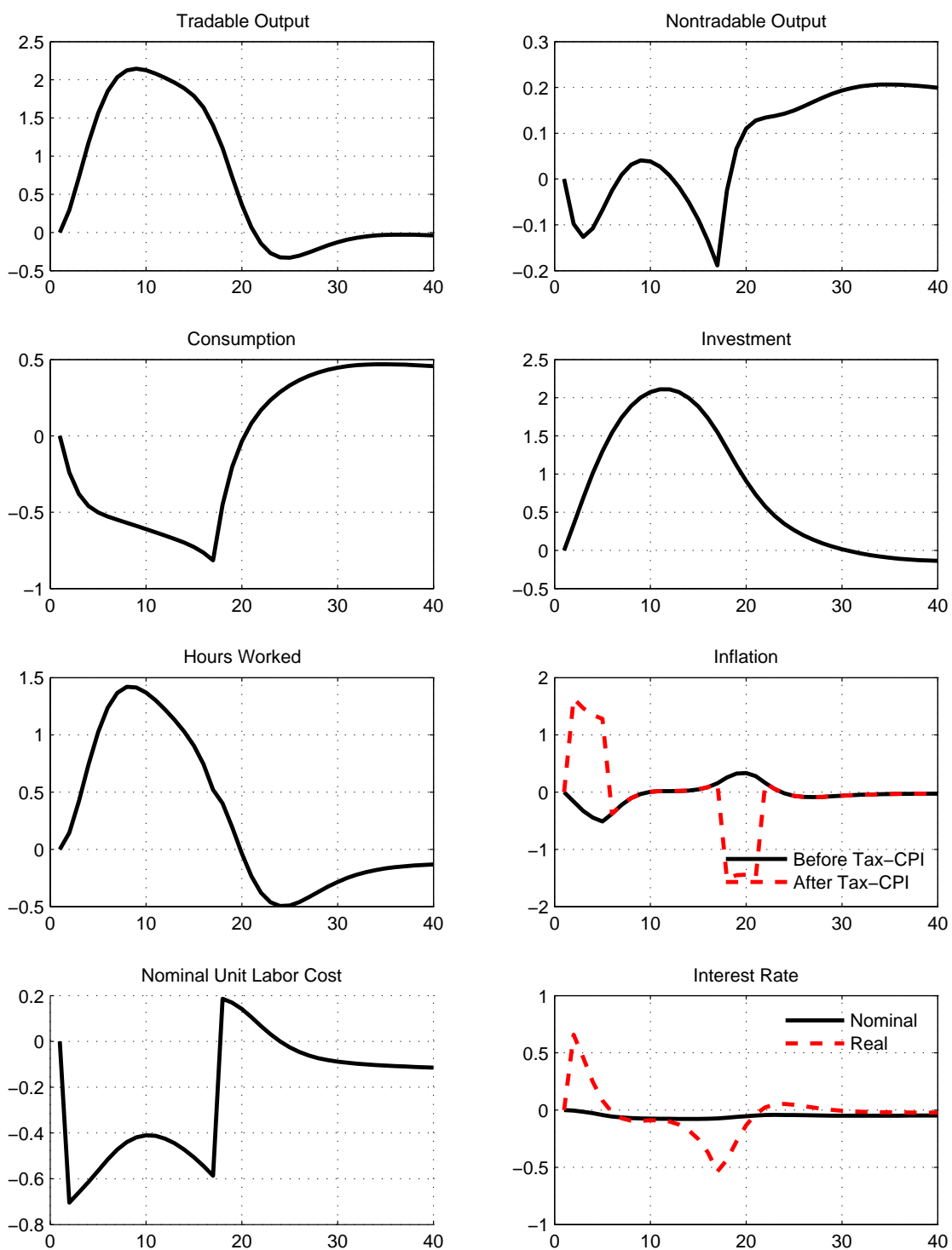
EA=euro area; US=United States; RW=Rest of the world.

Figure 1: Spanish fiscal devaluation. Trade variables and GDP



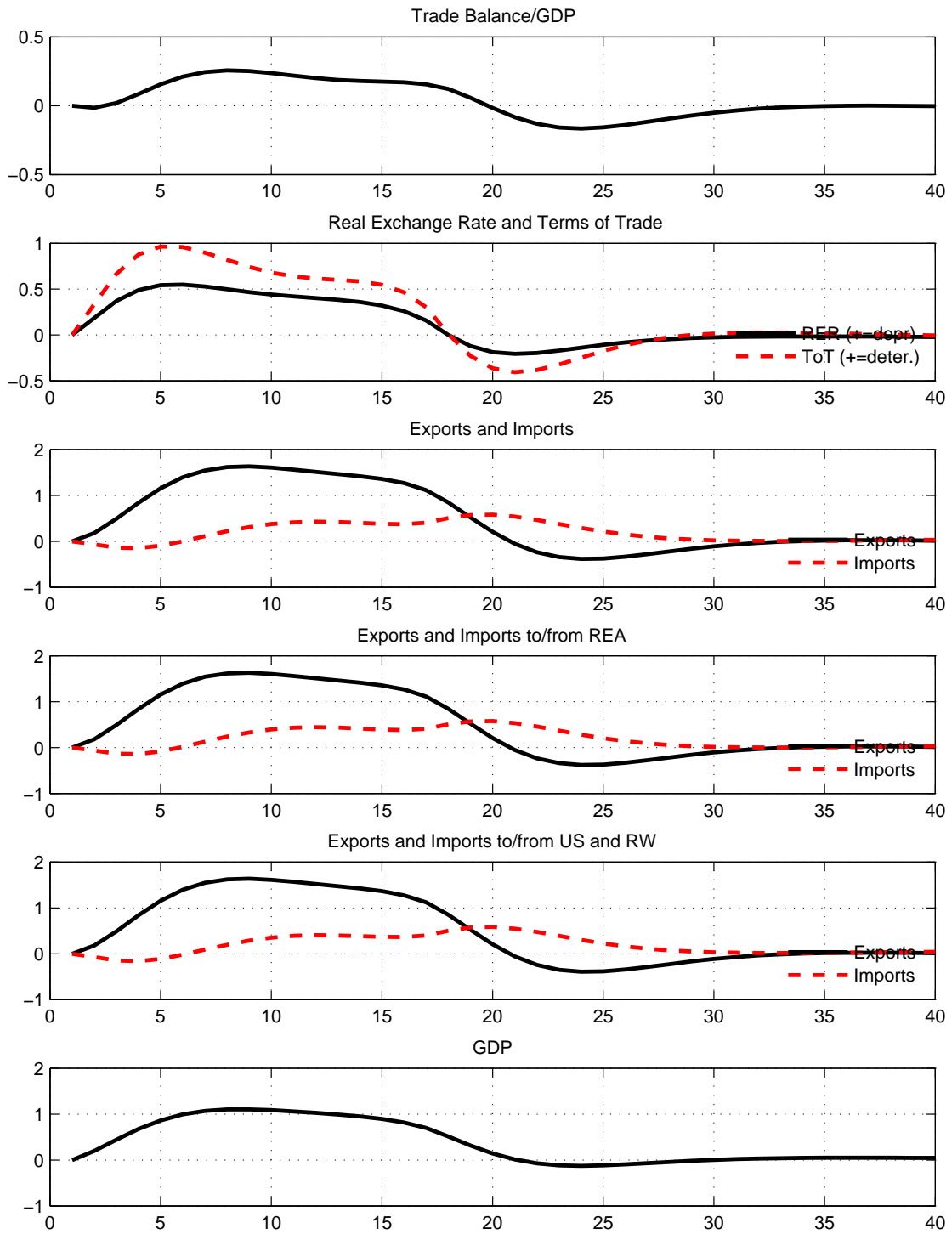
Horizontal axis: quarters. Vertical axis: percentage deviations from the baseline; trade balance-to-GDP ratio in percentage point deviations

Figure 2: Spanish fiscal devaluation. Other main macroeconomic variables



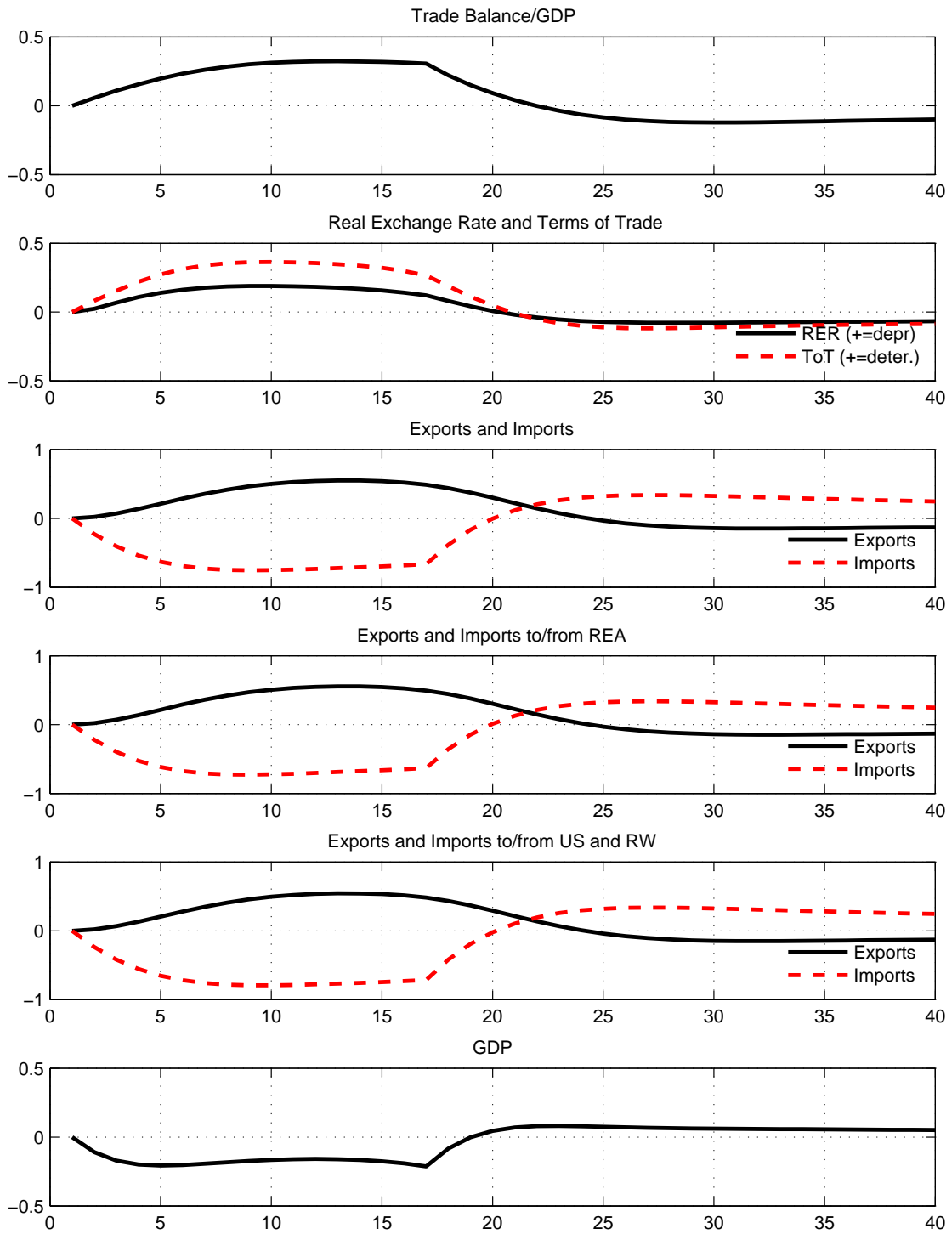
Horizontal axis: quarters. Vertical axis: percentage deviations from the baseline; inflation and interest rates in annualized percentage point deviations.

Figure 3: Spanish fiscal devaluation. The firms' social contributions



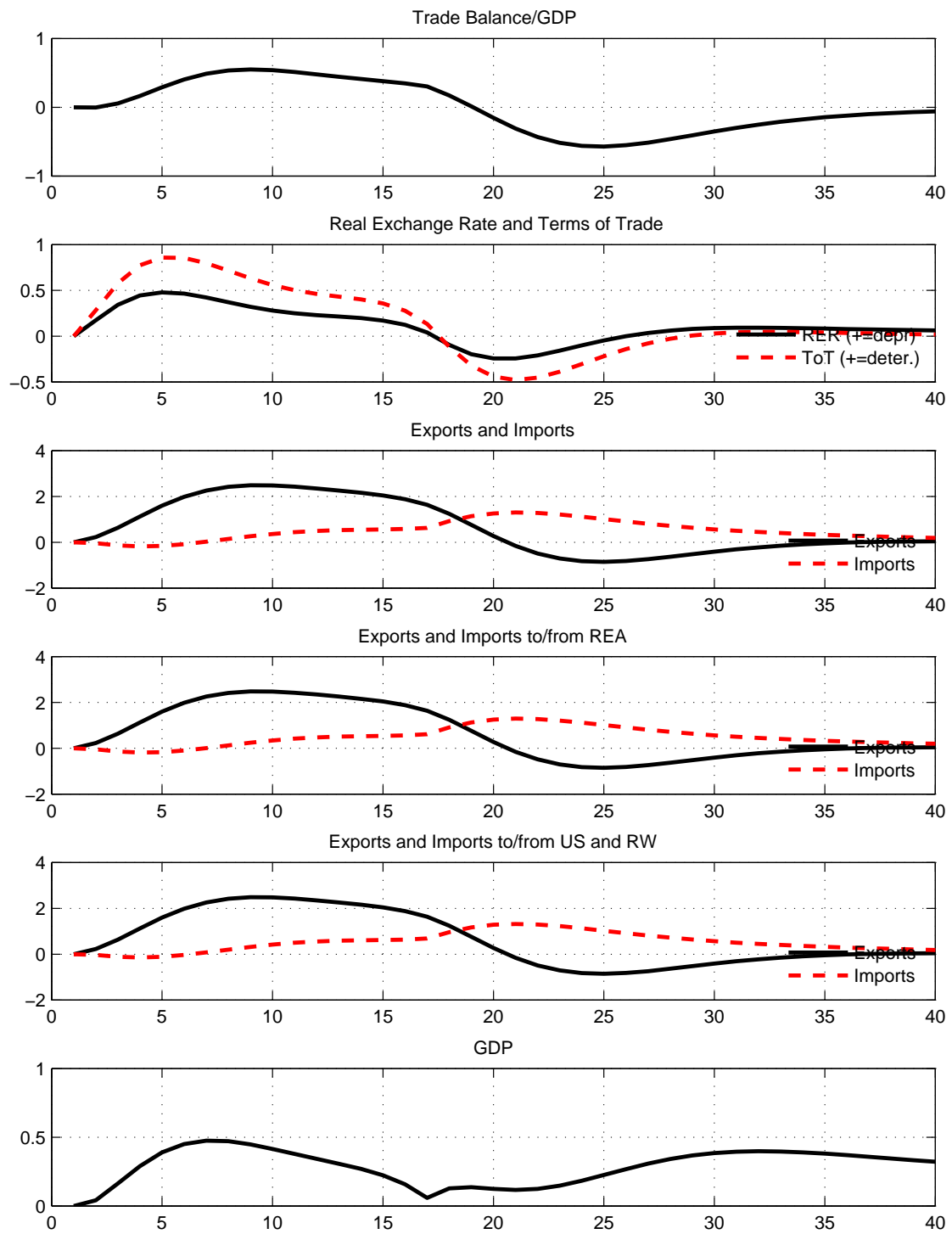
Horizontal axis: quarters. Vertical axis: percentage deviations from the baseline; trade balance-to-GDP ratio in percentage point deviations

Figure 4: Spanish fiscal devaluation. The consumption tax



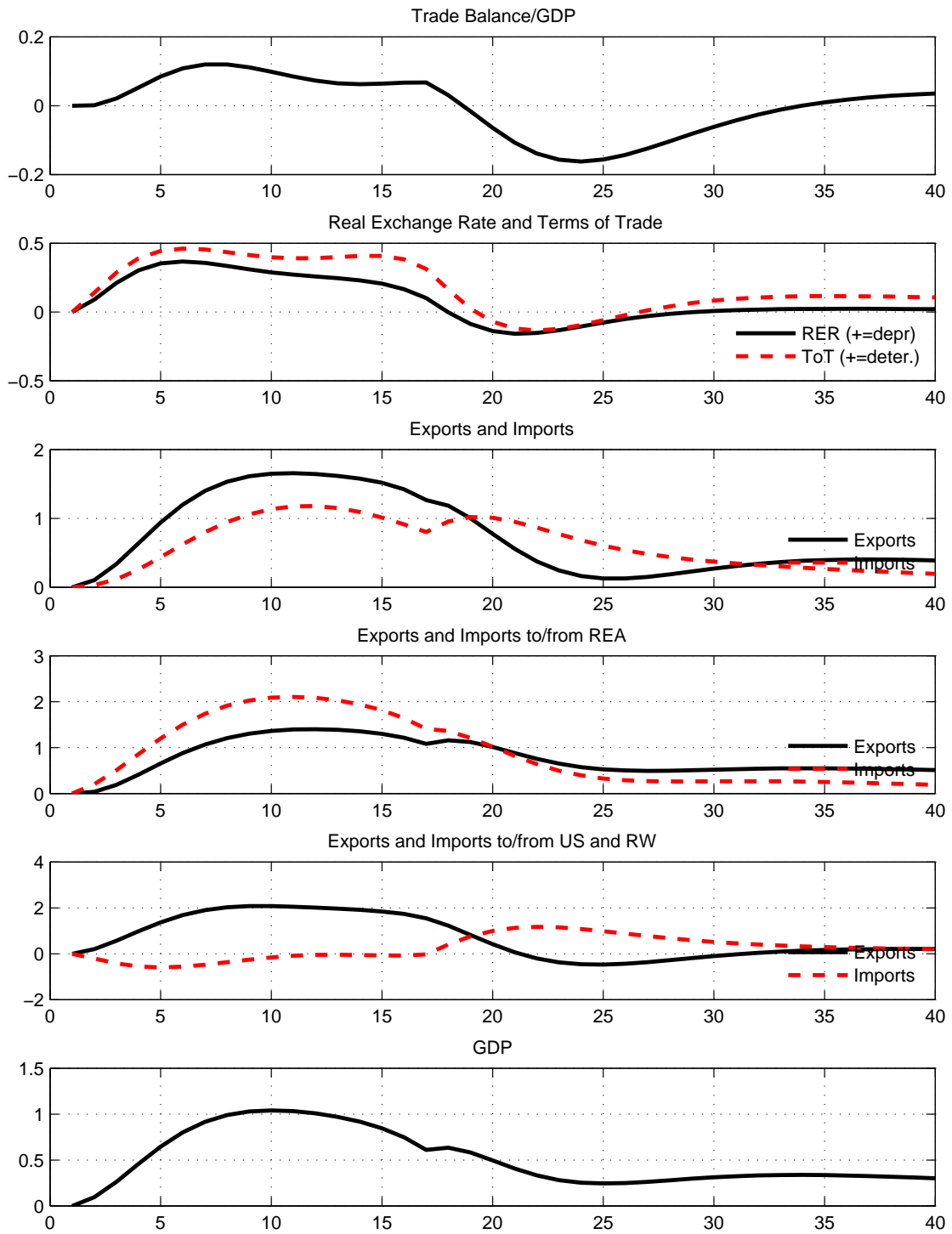
Horizontal axis: quarters. Vertical axis: percentage deviations from the baseline; trade balance-to-GDP ratio in percentage point deviations

Figure 5: Portuguese fiscal devaluation. Trade variables and GDP



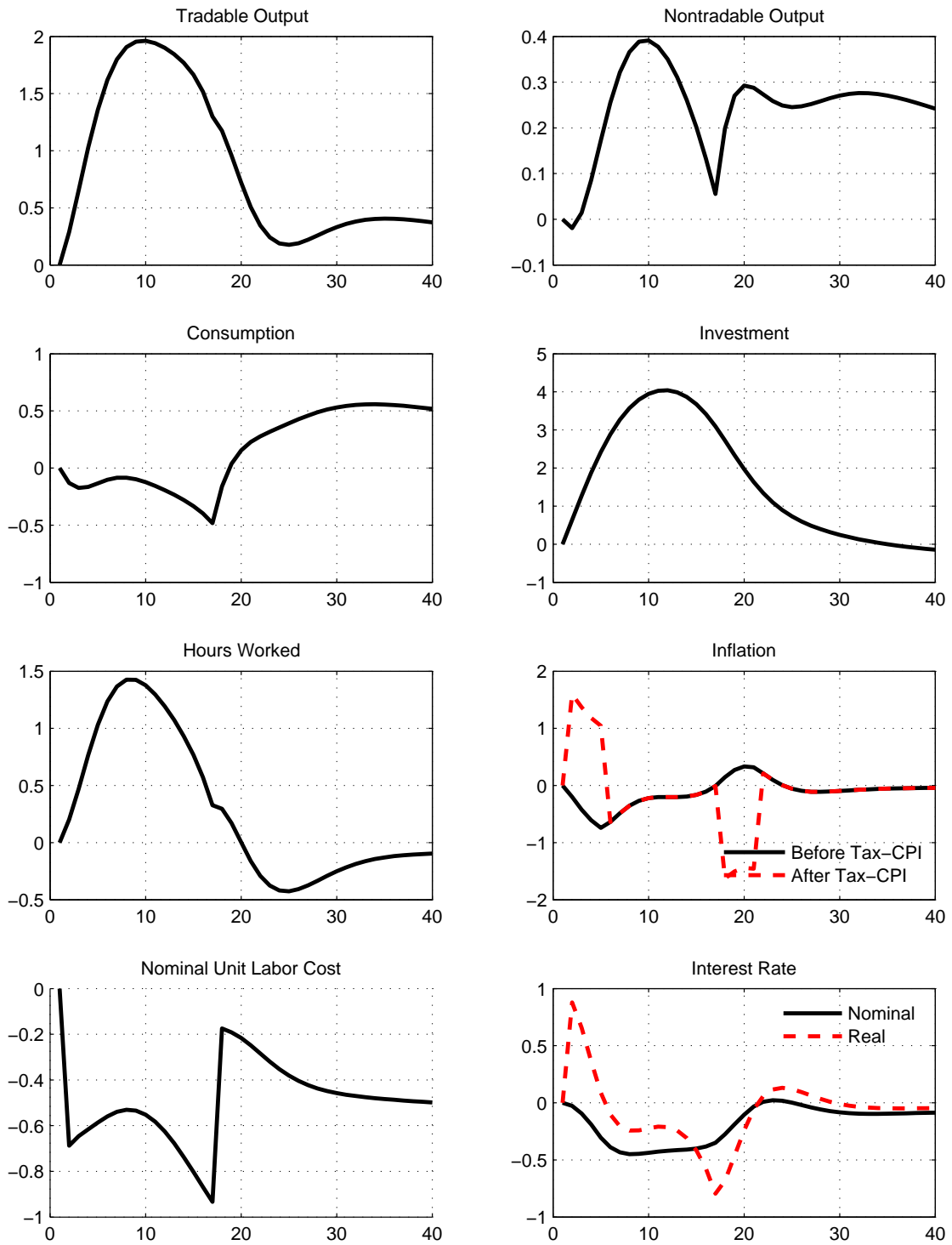
Horizontal axis: quarters. Vertical axis: percentage deviations from the baseline; trade balance-to-GDP ratio in percentage point deviations

Figure 6: Euro area fiscal devaluation. Spanish trade variables and GDP



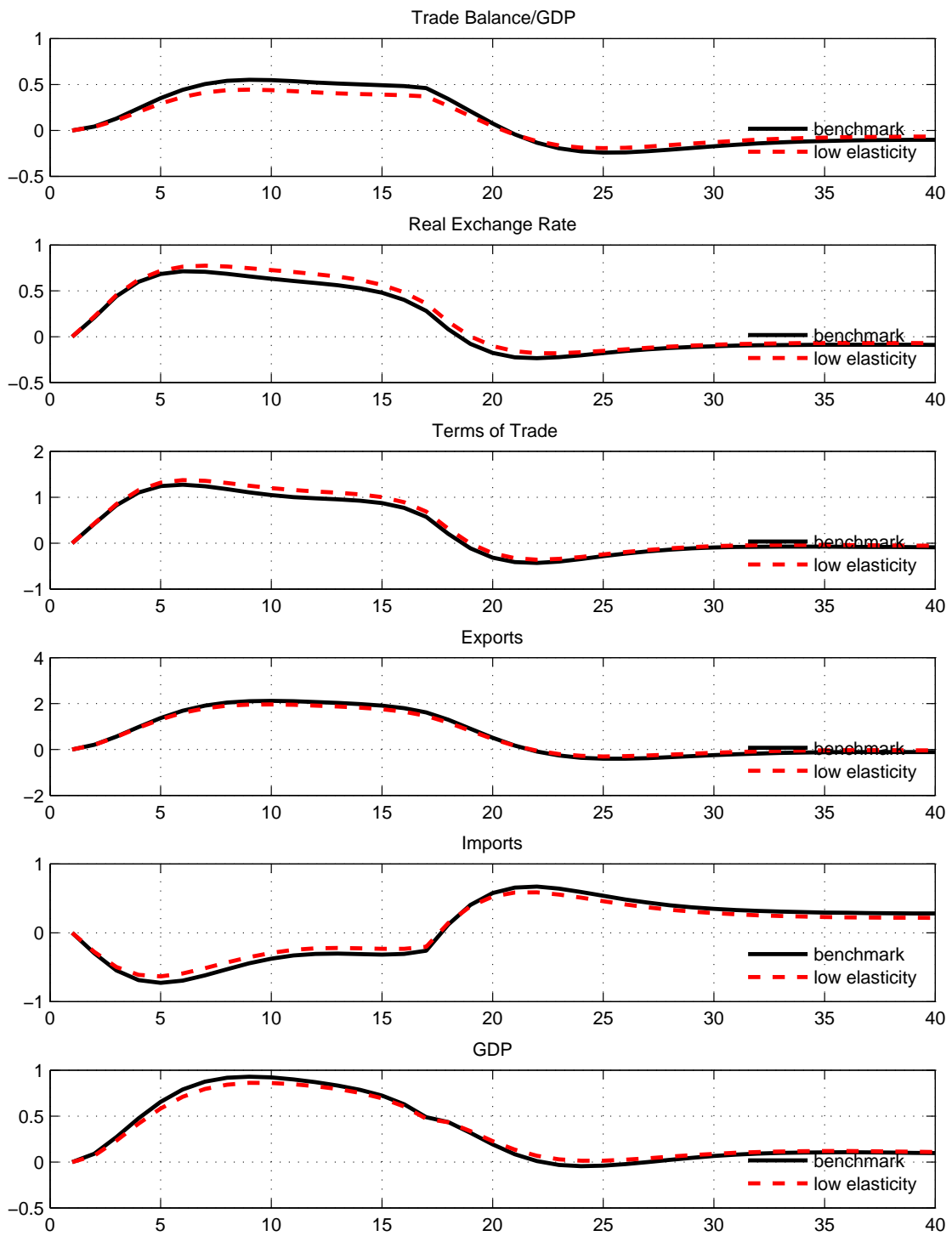
Horizontal axis: quarters. Vertical axis: percentage deviations from the baseline; trade balance-to-GDP ratio in percentage point deviations

Figure 7: Euro area fiscal devaluation. Other main Spanish variables



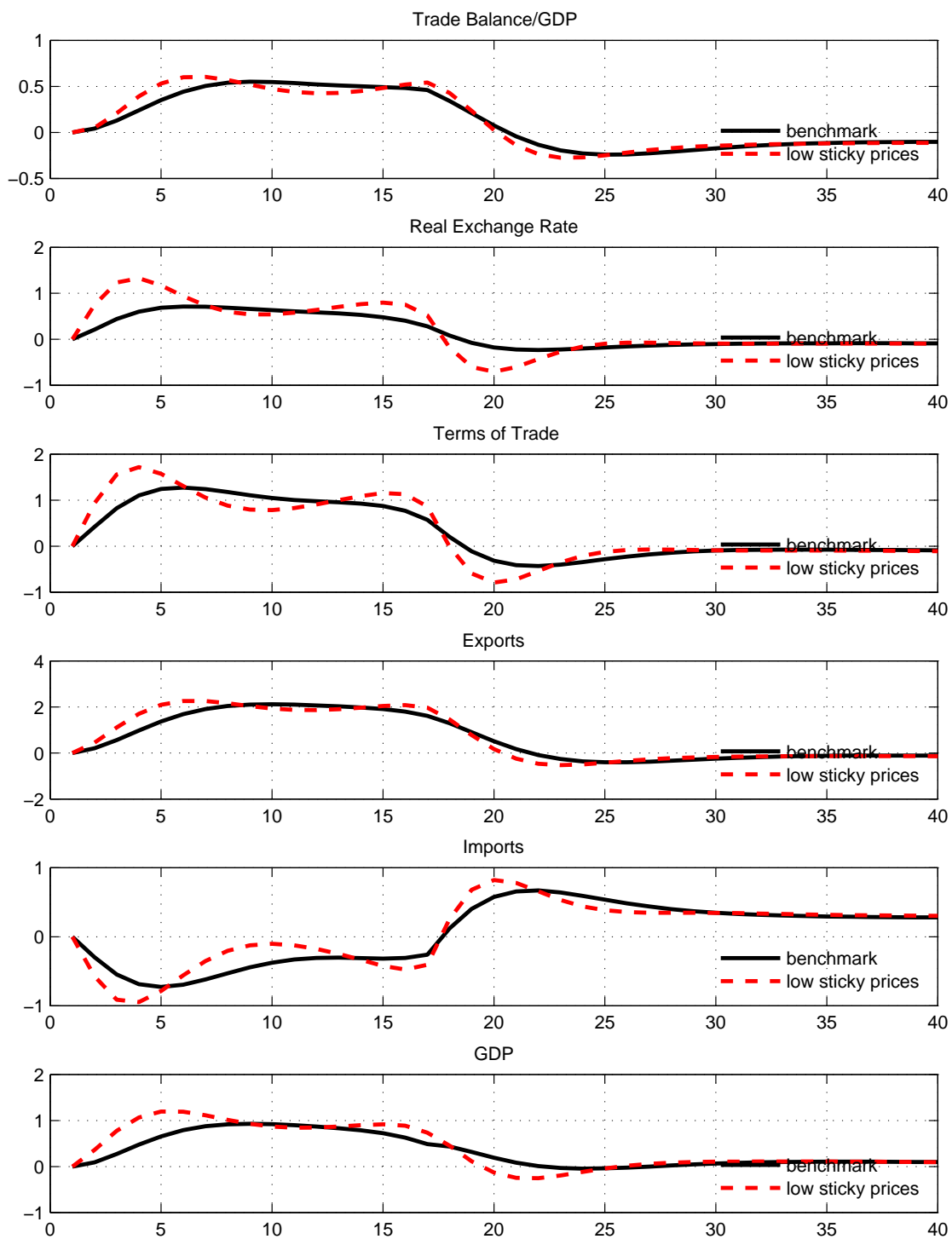
Horizontal axis: quarters. Vertical axis: percentage deviations from the baseline; inflation and interest rates in annualized percentage point deviations

Figure 8: Spanish fiscal devaluation and low elasticity. Trade variables and GDP



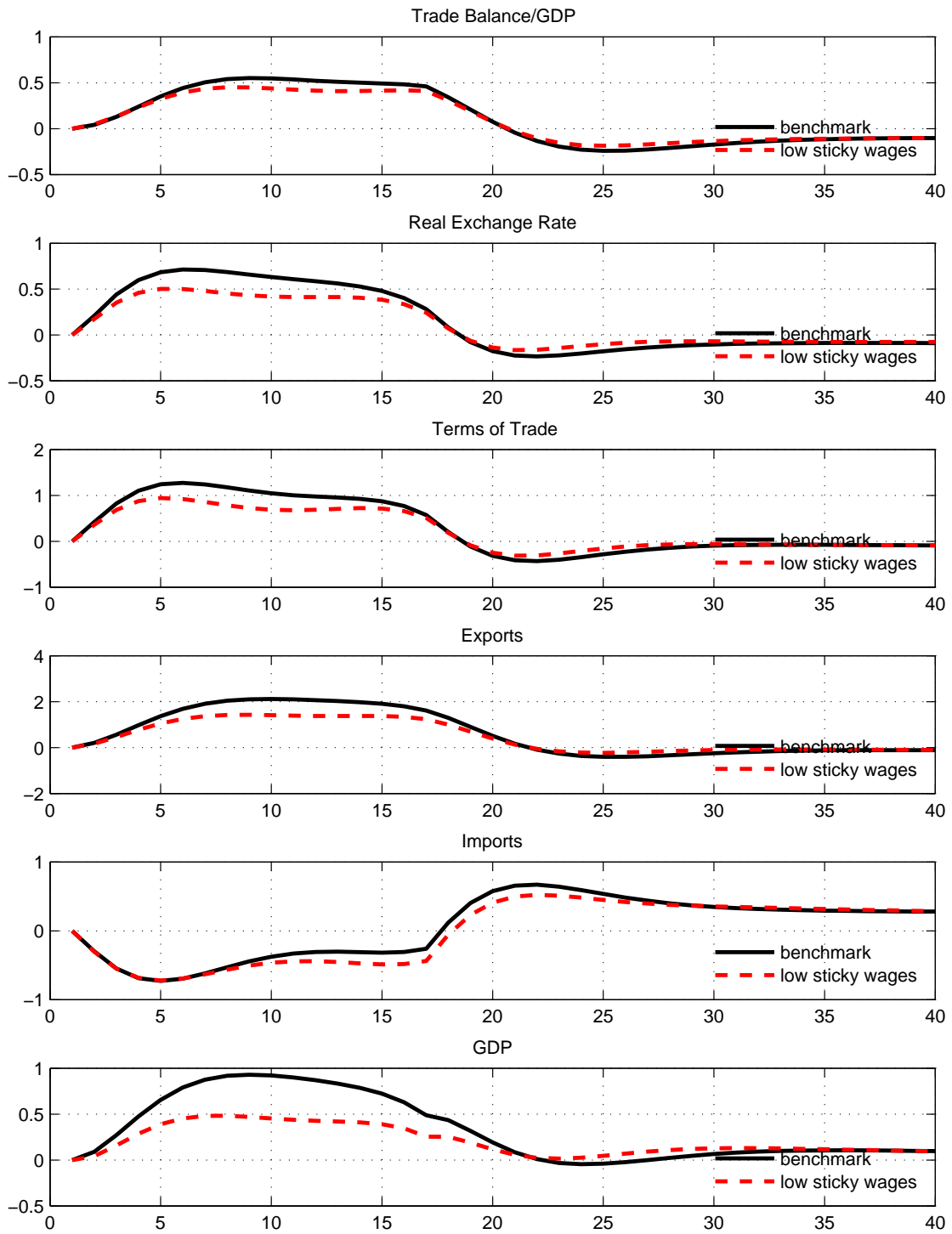
Horizontal axis: quarters. Vertical axis: percentage deviations from the baseline; trade balance-to-GDP ratio in percentage point deviations

Figure 9: Spanish fiscal devaluation and low price stickiness. Trade variables and GDP



Horizontal axis: quarters. Vertical axis: percentage deviations from the baseline; trade balance-to-GDP ratio in percentage point deviations

Figure 10: Spanish fiscal devaluation and low wage stickiness. Trade variables and GDP



Horizontal axis: quarters. Vertical axis: percentage deviations from the baseline; trade balance-to-GDP ratio in percentage point deviations