MZE : a small macro-model for the euro area

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Abstract:

This paper describes a small macro-model for the euro area. It has been built using Eurostat quarterly data and is aimed at improving the current tools used for forecasting and analysing the economy of the area. Some key data, such as capital stock or households' disposable income, have been constructed beforehand by using partial data given by Eurostat.

The model mingles short run Keynesian dynamics with a consistent neo-classical supply side. In the current version, potential output is given by a constant-returns-to-scale Cobb-Douglas production function. Employment is determined within a wage-setting framework and the rate of participation to the labour force depends on the rate of unemployment. The short run dynamics is determined by an error-correction model, which implicitly assumes the presence of adjustment costs that smooth the convergence towards the long run equilibrium.

The properties of the model are satisfying in many ways. The forecasts given by the model can be favourably compared to those given by a Vector-Autoregression, using a few exogenous values reflecting both the foreign and monetary environment; the model also allows to understand the evolution of a range of macroeconomic variables. Moreover, the model's responses to standard shocks are in line with usual analytical exercises. In the long run, potential output is determined by the working age population, total factor productivity, the terms of trade, wage taxation and the real cost of capital.

The model also includes a public sector building block, which can be used to study the impact of shocks on public finance.

The model as it stands now is helpful in a variety of policy analyses. However, it is somehow constrained due to a lack of some important data and further works are needed in two directions. The external sector could be re-estimated once Eurostat would make available data on extra-zone trade flows. Data on wealth would also be useful to improve the financial linkages within the model. Besides, the model is backward looking and once the financial side of the model has been developed, it might be useful to introduce rational expectations.

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1 Introduction

The formation of the European Monetary Union and of the European Central Bank makes the analysis of the business cycle and of economic changes directly at the level of the euro area both relevant and necessary. Eurostat now provides reference data and it is no more necessary to go through the cumbersome exercise of building a whole set of aggregate data before being able to see the whole picture of the euro area.

Of course, this approach is not independent but rather complementary to traditional country-level assessments, which make full use of the detailed knowledge and experience of country experts. Indeed, asymmetries between economies are still persistent, but they are also difficult to measure (as put forward by Angeloni et al., 2002, in a study of the impact of euro area monetary policy on national economies).

In order to assess euro area performances, direct measures have been made using area-wide data or surveys in order to study the short run dynamics, as done at INSEE (cf. Buffeteau et Mora, 2000). For example, GDP growth has been calibrated on that of the common factor calculated at INSEE from the balances of opinion of the industrial survey for the euro zone. INSEE also uses purely statistical models, at detailed level, to predict evolutions in the retail price index (HICP) for the euro zone. For each heading in the index, an ARIMA model is estimated, sometimes incorporating exogenous explanatory variables (such as the price of oil).

In the toolbox to analyse the euro area, a small macro-econometric model, based on the estimated relations of agents' behaviour in a balanced accounting framework, can however be useful to improve the current analysis in many ways: it can provide short run forecast of the economy; it can help interpret the recent past through the lens of behavioural equations; eventually, it can also provide analytical exercises and explore the effect of unanticipated shocks or of policy change.

Presently a few models for the euro area already exist, such as those maintained by the European Central Bank (Fagan et al., 2001), the OECD (Rae and Turner, 2001) and the European Forecasting Network (Dreger, 2002). One of the distinctive features of this model rests on the special attention devoted to the construction of a coherent accounting framework based on the Eurostat database and to issues concerning intra- and extra-trade flows (usually not distinguished in other models). Other features include, as is traditional in the literature, a well-defined neo-classical long-term behaviour and a Keynesian short run dynamics.

The remainder of the paper is structured as follows. Section 2 presents the database used and how missing data were constructed. Section 3 develops the theoretical framework of the model and reviews the main equations and building blocks of the model. Section 4 compares the forecasting results of the model with that of a VAR while section 5 presents the analytical properties of the model.

2 The Database and the Accounting Framework

2.1 Accounting Equilibrium

The aim of the model is to provide an instrument to analyse the evolution of the GDP of the euro area and of its principal components, as well as that of prices, employment, etc. It might also be useful to forecast over a short-term horizon the evolution of the area. Current models analysing the euro area tend to add data produced by different national accounting systems and produce an aggregate level[†]. This is no longer necessary, since Eurostat provides the data in the case of the resource/use balance, in both volume and value. While these data are sometimes the subject of criticism, they are now accepted as having authority.

One of the major gaps as regards economic analysis remains trade in goods and services. These data are the simple aggregation of the trade figures for each country, the result being that in the Eurostat national accounts data, the trade of the zone is represented by the sum of intra-zone and extra-zone trade. This can be detrimental for economic analysis, and even for the measurement of the zone's GDP, since the intra-zone flows are not statistically in balance[‡].

In addition, certain crucial data for economic analysis are lacking. This means that, in addition to the extra-zone trade, data have been reconstructed for disposable income, productive capital, employment and public finances.

2.2 The Reconstruction of Disposable Household Income

Eurostat does not publish quarterly figures for gross disposable income (GDI) for the euro area. It has therefore been necessary to construct this series, while respecting the major aim of having an accounting framework that is easily integrated in the economic modelling for the euro zone. The interest of constructing an accounting framework defining GDI is to mobilise additional information for the purpose of econometric modelling (rates of tax and compulsory contributions for the euro zone, for example). The method used for constructing quarterly GDI can be divided into two stages:

- creation of a complete annual accounting framework for households in different euro-zone countries from 1991 to 2000, using the maximum information available from Eurostat (area-wide or country-specific data).
- putting this accounting framework on a quarterly basis using Eurostat's quarterly indicators when these are available (e.g. wages or gross operating surplus at the aggregate level).

2.3 The Construction of the Capital Stock

Data from Eurostat provide investment series, in value and in volume -- all products and all agents combined -- as well as the series for the consumption of fixed capital in value. Eurostat compiles this series by aggregating national series. It therefore includes information that is useful for the calculation of a series for the capital stock.

To calculate the stock of capital in volume, the following accumulation model is used:

$$K_t = (1 - d_t).K_{t-1} + I_t$$

[†] For example, the ECB reconstructs its data in terms of geometric means, in order to preserve the property that the growth rate of the zone is the weighted sum of the growth rates. The disadvantage of this method is that the resulting accounts are not in balance. The OECD reconstructs data by means of aggregation of national series, using as weightings GDP on a purchasing power parity basis. Eurostat simply aggregates the data, converting them into euros since 1999, into ECU previously. This possible disadvantage as regards the past is seen to be reduced when it is remembered that the model is used mainly to re-examine the recent past and forecasts.

[‡] In practice, it can be seen, in particular, that the recorded exports of country A to country B are generally higher than the imports of country B from country A. This is due especially to VAT fraud.

With information on investment and the consumption of fixed capital, deflated by the investment price, this equation makes it possible to compile the series for capital once a point in the series is chosen. This also amounts to setting the rate of depreciation at a given date, for example in Q1 1991, the start of the Eurostat series.

For this purpose, one takes the accumulation model in a stationary regime. In such a regime, the investment and the stock of capital grow with GDP, at a rate ? such that:

$$(1+g).K = (1-d).K + (1+g).I$$

The rate of depreciation is calculated as a function of the consumption of fixed capital and of investment:

$$d = \frac{g.(d.K)}{(1+g).I - (d.K)}$$

If the average growth rate of the economy is estimated to be 2.5%, it is deduced that the rate of depreciation was 0.9% in Q1 1991, and showed a trend rise during the decade to reach 1.3% in Q3 2001. This corresponds to the generally accepted fact that the rate of depreciation rose during the 1990s, because of the increasing use of high-tech materials that became rapidly obsolete. The series for capital reconstructed starting from Q1 1991 preserves the property of growth in the rate of depreciation during the 1990s[§].

2.4 Public Finances

As regards public finances, Eurostat has annual data making it possible to reconstitute the resource-use table for general government from 1995 to 2000[**] and the evolution of the outstanding amount of public debt from 1991 to 2001. The outstanding debt used in the database, recalculated on the basis of the evolution in government financing capacity[††], comes very close to the series provided by Eurostat. Following the construction of a consistent annual accounting framework from 1995 to 2000, we proceeded to put it on a quarterly basis using the Chow-Lin method.

In the breakdown used for the modelling, the resources of general government are divided into, on the one hand, direct taxes on production and imports, income and property taxes and, on the other, spending corresponding to social contributions, interest payments, social benefits, public consumption and investment. Some secondary headings made it possible to reconstruct the production account of general government (gross operating surplus and operating subsidies) or other headings of the income account (other transfers, other current expenditure on capital).

2.5 Miscellaneous Variables

The gross data used for the employment series emanate from Eurostat. Seasonal adjustment using X11 has been carried out. In the case of the unemployment rate, this is the one contained in the Eurostat database, available since 1993. For the period between 1991 and 1993, the series was back-calculated using national data. The interest rates are calculated for the beginning of the period on the basis of aggregated national data expressed as shares of GDP. For the most recent period, we use short-term and long-term interest rate published in the *ECB Monthly Bulletin*. The real effective exchange rate and world demand for goods have been supplied by the Direction de la Prévision. A few other variables are also constructed: the rate of capacity utilization and series of trade flows by origin. As they depend heavily either on theoretical or behavioural hypotheses, we choose to present them below in the course of the discussion of the equations to which they are related.

[§] The ECB in its model uses a rate of depreciation of 1%, constant throughout the decade.

[**] On the other hand, for the period 1991-1994, Eurostat publishes only data using the previous base, which have not been back-calculated. The construction of the account for central government before 1995 has not for the moment been undertaken but could be partly carried out using as allocation scales the corresponding items in the household account or the aggregation of statistics at OECD level.

[††] Using, for the period before 1994, the deficit/GDP ratios supplied by the European Commission.

3 The Theoretical Framework of the Model and the Set of Equations

The following sections provide a general overview of the theoretical underpinning of the model as well as the main econometric results. We generally use standard notations and conventions for the variables presented in the equation below[##]. *Annex 1* details the variables and their meaning.

3.1 The Demand Side

3.1.1 Household's Income and Consumption

In the model, household's disposable income is endogenously determined by an aggregation of its different components:

- The gross operating surplus of households is determined as a variable proportion of the total gross operating income.
- Households' compensations result from the wage-setting and price-setting equations.
- Financial income is a function of the total value added.
- Income taxes are a function of an apparent tax rate. The base considered is the sum of households' gross operating surplus, workers' compensations, net property income, and social benefits minus social contributions.
- Social contributions are a function of the gross compensations including employers' social contributions.
- Social benefits and transfers are assumed to follow the same trend as the GDP at current prices.

Consumption expenditures have been estimated using a traditional formulation with an ECM term. In the long run, we impose a unitary indexation of consumption on gross disposable income. Long-run consumption is also reduced by an increase of the real short run interest rate (deflated by consumer prices) or by an increase of the inflation rate. Theoretically, the effect of interest rate could be ambiguous, as a decline of real interest rate might induce households to borrow more (substitution effect); however, it also reduces their property income from bonds (wealth effect), which may prompt them to save more and consume less. The first effect is most important for the euro area. The effect of inflation is also ambiguous: the real balance effect prompts them to save more to keep the purchasing power of their saving constant; but if households expect further price increase in the future, they are also prompted to consume more today. On balance, the real balance effect dominates.

In the short run, along with the variables already present in the long run, we add the rate of unemployment. A rise of unemployment reduces the expected future income of households and leads them to increase their precautionary savings. The econometric properties of the equation are satisfying and consumption converges rapidly towards its long-term level.

[##] E.g. lower-case for logarithm, Y for the value added and C for consumption... Δ is the difference operator and Δ_4 is the difference indicator with four lags.

$$\Delta c = \underset{(-2,36)}{-0,20}.(c-(gdi-pc))_{-1} \underset{(2,04)}{-0,14}.(r10a-\Delta_4 pc)_{-1}$$
$$\underset{(-1,89)}{-0,13}.\Delta_4 pc_{-1} \underset{(2,38)}{+0,90} - 0,010.(dum93q1 - dum92q4)$$
$$\underset{(-2,26)}{-0,29}.\Delta c_{-1} \underset{(2,39)}{+0,36}.\Delta(gdi-pc) \underset{(-1,80)}{-0,17}.\Delta(r10a-\Delta_4 pc) \underset{(-2,23)}{-1,36}.\Delta u$$
$$c^* = rdb - pc - 0,70.(r10a-\Delta_4 pc) - 0,65.\Delta_4 pc$$

$R^2 = 77\%$
$s = 0,30\%$
$DW(0) = 2,23$
$1992q3 - 2000q4$

3.1.2 Inventories

Inventory behaviour comes from a number of motives, including the desire to smooth the fluctuations of production, to constitute a buffer against unanticipated changes of demand or to avoid a stockout. In the long run, the desired level of stock is assumed to be a fraction of final demand (excluding stocks). In the short run, inventory changes reflect the sluggish response of stocks over the cycle, due to the revision of anticipations of entrepreneurs confronted to an unexpected shocks or to difficulties to accumulate or liquidate stocks rapidly. As both final demand and inventories tend to grow over time, we choose to study the ratio of inventory changes over final demand. The equation thus reads:

$$\frac{\Delta S}{(C+I+G+X)_{-1}} = \underset{(2,98)}{0,41}.\left(\frac{\Delta S}{(C+I+G+X)_{-1}}\right)_{-1}$$
$$\underset{(1,37)}{+0,19}.\left(\frac{\Delta S}{(C+I+G+X)_{-1}}\right)_{-2}$$
$$\underset{(3,00)}{+0,14}.\Delta\ln(C+I+G+X)_{-1}$$
$$(\Delta S)^* = 0,32.\Delta(C+I+G+X)$$

$R^2(adjusted) = 57\%$
$s = 0,22\%$
$DW(0) = 1,43$
$1992q1 - 2000q4$

3.1.3 Trade Flows and Trade Prices

One of the principal difficulties associated with macroeconomic modelling for the euro zone is to find statistics for external trade with countries outside the zone that are compatible with the national accounts data used for estimating most types of economic behaviour used in the model. The Eurostat national accounts include, at present, statistics for trade in goods and services in value and in volume that include intra-zone trade. At the same time, there exist data for exports and imports of goods within and outside the Community which Eurostat reconstructs on the basis of national customs data. Unit value indices are also published on a sectoral and geographic basis.

Given the data available, two types of modelling of external trade for the euro zone could in our view be envisaged:

(1) Reconstructing data for trade outside the zone in goods and services taking national accounts figures, at the cost of simplifying assumptions regarding trade behaviour within the zone (e.g. allocating a fraction of total trade to *intra*-area trade, either by assuming a constant fraction of or a constant elasticity to internal demand); such hypotheses are however easily open to criticism.

(2) Using the available trade statistics and unit value indices for the field covered by customs data and to model the service data on a somewhat mechanical basis.

Building extra-area trade flows

We first study the implications of the first method and assume that intra-area flows are proportional to internal demand of the euro area. In 2001, intra-area imports represented 11% of the value of the final demand of the euro area. Owing to the lack of data, we could not reconstruct a full series of intra-area imports and assume that this proportion also apply for the volume of trade flows and was constant during

the past decade. This hypothesis has two implications: we make the implicit assumption that trade prices for intra-area flows adjust instantaneously; besides, the elasticity of intra-area imports to area-wide demand is equal to one, which may lead to a under-adjustment or an over-adjustment of trade flows.

Indeed, though the estimations obtained by this method tend to be satisfactory for both the volume and the prices of trade flows, the equations also display an important over-adjustment of imports to final demand. These results may derive from our hypothesis on the split between extra- and intra-area trade flows. Indeed, if the demand elasticity of intra-area imports is above unity, the estimated demand elasticity of extra-area exports would be overestimated. To study the sensibility of the results to the above hypotheses, we relax in the short run the unit elasticity to intra-area trade flows and assume instead that intra-area imports are determined by the following equation:

$$\Delta m^{\text{intra-area}} = b.\Delta df - d\,(m^{\text{intra-area}} - df)_{-1}$$

In the long run, we maintain the hypothesis of unit elasticity. This equation enables us to construct intra-area imports, from which we derive extra-area imports. Reestimating the equation using those new data proves that the sensibility of the result to the underlying hypothesis on elasticity is quite strong, as shown in the table below:

Table: short-term elasticity of extra-area imports to final demand in function of the hypothesis on short run elasticity of intra-area imports (d = 0,25).

β (intra-area)	1.0	2.0	3.0	4.0
$\hat{\beta}$ (extra-area) [§§]	2.59 (0.27)	2.26 (0.29)	1.90 (0.34)	1.54 (0.40)

Given the sensibility of the results to the underlying hypotheses, we choose in the final version of the model, the second approach, using trade statistics corresponding to the customs coverage. Admittedly these data cover only trade in goods and are not directly compatible with data in the national accounts (differences in coverage, classification, etc.). However, for the moment they constitute the best statistical information available on trade flows with outside the zone.

Trade equations

The equations for trade volumes and trade prices are fairly traditional. Extra-area imports of goods depend in the long run on internal demand (df) and an index of competitiveness (measured as a ratio between the export price of foreign countries - excluding energy - and the domestic price of the value added). We assumed in the long run a unit elasticity of import to internal demand and add a time trend to the equation. This trend reflects the gradual openness of the euro area in the 1990s. In the short run, the elasticity of imports to internal demand ($dihs$) is high, in the range of 1.9.

$$\Delta m = \underset{(-2,25)}{-0,15}.(m-df)_{-1} \underset{(-1,44)}{-0,06}.(pm-p)_{-1} \underset{(-2,66)}{-16,46}$$
$$\underset{(4,55)}{+1,94}.\Delta dihs \underset{(1,61)}{+0,66}.\Delta dihs_{-1} \underset{(2,66)}{+0,008}.t \underset{(5,07)}{+0,49}.\Delta x \underset{(2,35)}{+0,23}.\Delta x_{-1}$$
$$\underset{(-4,21)}{-0,49}.\Delta(pm-p)$$
$$m = df - 0,41.(pm-p) + 5\%.t$$

$R^2 = 76\%$
$s = 1,46\%$
$DW(0) = 2,21$
$1991q4 - 2001q3$

[§§] In brackets, we provide the estimated standard errors.

Extra-area exports of goods depend in the long run on world demand for goods (with a unit elasticity) and of an index of competitiveness, measured as the real effective exchange rate. We choose to use the RER because we have a wide range of CPI for euro area countries, unlike export price index, which are only easily available for three countries (the United-Kingdom, the United-States and Japan). Besides, a competitiveness index built on those three countries only has a poorer predictive power that the RER, as the scope considered is insufficient to understand past changes of competitiveness. In the short run, the elasticity of exports to world demand is close to one.

$$\Delta x = \underset{(-7,46)}{-1,04}.(x - wd^*)_{-1} + \underset{(2,67)}{0,23}.(p\$^* - e - px)_{-1} + \underset{(7,87)}{54,8} + \underset{(4,46)}{0,98}.\Delta wd^* - \underset{(-6,62)}{0,023}.t + \underset{(5,22)}{0,63}.Dum_{t\geq 95q1}$$

$$x = wd^* + 0,22.(p\$^* - e - px) - 2,2\%.t$$

$R^2 = 79\%$; $s = 1,39\%$; $DW(0) = 1,98$; $1992q1 - 2000q4$

The price of goods imports is constructed by distinguishing the international price of raw materials and the import price of other goods. This last price reflects the mark-up behaviour and the competitive behaviour of foreign exporters in euro area markets. Thus, we assume that the import price of non-energy goods (*pmhe*) is a geometrical average of domestic and foreign prices.

$$\Delta pmhe = \underset{(-3,79)}{-0,31}.(pmhe - p)_{-1} + \underset{(-3,91)}{0,44}.(p\$^* - e - p)_{-1} - \underset{(-3,60)}{0,08} + \underset{(5,66)}{0,40}.\Delta(p\$^* - e)$$

$$pmhe = 0,3p + 0,7(p\$^* - e)$$

$R^2 = 55\%$; $s = 1,54\%$; $DW(0) = 1,4$; $1991q2 - 2001q4$

Similarly, the price of goods exports is in the long run a geometric mean of unit labour costs and foreign prices.

$$\Delta px = \underset{(-2,41)}{-0,15}.(px - uwc)_{-1} + \underset{(2,98)}{0,12}.(p\$^* - e - uwc)_{-1} + \underset{(0,86)}{0,11} + \underset{(1,42)}{0,18}.\Delta px_{-2} + \underset{(4,81)}{0,21}.\Delta(p\$^* - e) - \underset{(-1,51)}{0,06}.\Delta(p\$^* - e)_{-1} + \underset{(2,33)}{0,26}.\Delta uwc$$

$$px = 0,18.uwc + 0,82.(p\$^* - e)$$

$R^2 = 63\%$; $s = 0,61\%$; $DW(0) = 1,86$; $1992q1 - 2000q4$

Eventually, trade flows in goods *and* services are obtained by assuming that the flows of services have the same behaviour as flows of goods. In particular, in the long run, the contribution of trade balance to the commercial balance is constant (at 90%). In the short run, the trade balance is determined by the evolution of internal demand, world demand and competitiveness.

3.2 The Supply Side

As a theoretical underpinning, we assume that the potential output is given by a Cobb-Douglas production function. This assumption, which leads to assume a constant elasticity of substitution between labour and capital, is not rejected by the data when tested against the more general form of a CES production function. This theoretical functional form is used in the model to derive the specification of the equations of factors demand, the rate of capacity utilization and the wage-setting curve.

3.2.1 Production function

The production function is a constant-returns to scale Cobb-Douglas function with Hicks-neutral technological progress:

$$\text{Cobb-Douglas}: \; y = a.l + (1-a).k + g.t + cte$$

where y is the value added at factor costs, l employment, k the capital stock in volume and t a deterministic linear trend, which represents technological progress. Variables shown in lower case are expressed as logarithms. In order to circumvent the dependence of the estimates obtained on the choice of estimation period, the preceding equation was estimated correcting for the auto-correlation residuals using the Cochrane-Orcutt method and the log of the capacity utilisation rate was added. It is therefore possible to use the Cobb-Douglas specification with a = 0.60 and a trend growth in global factor productivity of 0.92% a year, as shown by the following estimation:

$$y = \underset{(c)}{(1-0{,}40)}.l + \underset{(4{,}40)}{0{,}40}.k + \underset{(9{,}87)}{0{,}92\%}.t + \underset{(2{,}95)}{0{,}12}.cur - \underset{(-13{,}27)}{18{,}70} + h$$

$$h = \underset{(4{,}50)}{0{,}80}.h_{-1} - \underset{(-1{,}86)}{0{,}25}.h_{-2} + e$$

$$R^2 = 0{,}996 \qquad s_e = 0{,}23\% \qquad DW = 2{,}21 \qquad 1992q1 - 2000q4$$

With these estimates adopted, this equation does not enter the model in this form, but solely in derivative forms (first-order conditions for employment and capital stock, providing the long-term aspects of the employment equations, prices of value added and investment.

The Cobb-Douglas functional form is a specific case of the CES production function. With neutral technological progress, the CES production function reads:

$$\text{CES}: Y = e^{g.t}.(a.L^{-r} + (1-a).K^{-r})^{-1/r}$$

with $\sigma = 1/(1+\rho)$ the elasticity of substitution between L and K.

As σ tends towards unity, the CES takes the form of a Cobb-Douglas constant returns to scale production function. Indeed, for $s = 1$ (i.e. $\rho = 0$), we obtain (cf. Kmenta, 1967):

$$y = a.l + (1-a).k - \frac{1}{2}r.a.(1-a).(l-k)^2 + g.t + cte$$

It can be verified in this way that the Cobb-Douglas specification used is not rejected by the data in comparison with a less constraining specification such as a CES. In fact the coefficient $\rho.\alpha.(1-\alpha)$ is not significant in the following regression [***]:

$$y = \underset{(c)}{(1-0{,}40)}.l + \underset{(4{,}28)}{0{,}40}.k + \underset{(0{,}28)}{0{,}71}.(k-l)^2 + \underset{(6{,}91)}{0{,}90\%}.t + \underset{(2{,}91)}{0{,}12}.cur - \underset{(-8{,}33)}{21{,}27} + h$$

$$h = \underset{(4{,}46)}{0{,}80}.h_{-1} - \underset{(-1{,}78)}{0{,}26}.h_{-2} + e$$

$$R^2 = 0{,}996 \qquad s_e = 0{,}24\% \qquad DW = 2{,}22 \qquad 1992q1 - 2000q4$$

[***] In this regression, it is seen that the dimension of K (or of L) changes the estimated values of a and of the constant, but not of the other coefficients, nor of the standard deviations. In the previous regression, K was multiplied by a coefficient in order to have a = 0.40, as subsequently used.

3.2.2 Factor demand

Theoretical background

Dependent employment derives simply from the first-order condition of the maximisation of corporate profits under monopolistic competition. This means that, with a Cobb-Douglas production function, the share of wages is fixed as a function of a and of the elasticity h of the demand for goods at prices:

$$\text{FOC :} \qquad \frac{W}{P} = a.k.\frac{Y}{L}$$

with $\kappa = 1\text{-}1/\eta$. The above first-order condition naturally constitutes the long-term relationship of the employment equation. In the short term, the demand for labour adjusts gradually to fluctuations in activity.

As regards the stock of capital, the first-order condition of profit maximisation has been combined with the long-term relationship between capital and investment derived from the accumulation equation:

$$\text{FOC :} \qquad \frac{R}{P} = (1-a).k.\frac{Y}{K}$$

$$\text{Accumulation:} \quad \frac{I}{K} = d + \left(\frac{\dot{K}}{}\right)^{long-run}$$

Thus, we estimate an equation of investment, which takes the following form in the long run:

$$\frac{Y}{I} = \frac{1}{(1-a).k.(d + \left(\frac{\dot{K}}{}\right)^{long-run})}.\frac{R}{P}$$

The estimate R/P is evaluated by the long-term real interest rate, with correction for the risk premium and the depreciation rate. We also preferred to adopt the specification using investment rather than capital stock, since the specification using the latter results in an extremely slow adjustment in the capital stock. The investment equation also includes in the short term a strong accelerator effect.

Equations

In the long run, given the Cobb-Douglas functional form, employment is perfectly indexed on the value added minus the real wage.

$$\Delta l = \underset{(-3,39)}{-0,080}.(l-(y-(w-p))_{-1} + \underset{(3,39)}{0,14}$$
$$+ \underset{(2,50)}{0,33}\Delta l_{-1} + \underset{(4,92)}{0,17}.\Delta y + \underset{(1,90)}{0,07}.\Delta y_{-1} - \underset{(-3,47)}{0,13}.\Delta(w-p)$$
$$l^* = y-(w-p)$$

$R^2 = 94\%$
$s = 0,08\%$
$DW(0) = 1,89$
$1991q4 - 2001q3$

Symmetrically, the investment in the long run depends on the value added and of the real cost of capital. The short run dynamics reflects a strong accelerator effect. We choose this specification rather than a more traditional equation of capital because it is more reactive and has a better fit.

$\Delta i = \underset{(-2,36)}{-0,18}.(i-y)_{-1} - \underset{(-1,69)}{0,22}.(r10-\Delta_4 pi+d)_{-1} - \underset{(-2,42)}{0,26} + \underset{(5,07)}{2,36}.\Delta y$	$R^2 = 69\%$
	$s = 0,85\%$
$i^* = y - 1,18.(r10-\Delta_4 pi+d)$	$DW(0) = 2,6$
	$1992q3 - 2000q4$

3.2.3 The wage-price loop

Theoretical background

Prices are set by firms at the same time as their demand for factors, without immediately ensuring equilibrium on the market for goods. The usual "factor price frontier" is not explicitly the restraining force for prices. Rather, the assumption has been made that firms calculate their labour costs over the long term as a function of the wage rate and the long-term labour productivity and adjust their mark-ups in line with the imbalances recorded on the market for goods. The imbalance on this market is given by the capacity utilisation rate:

$$p = w - gfp/a + \frac{1-a}{a}.cur$$

That capacity utilisation rate is modelled in traditional manner:

$$CUR = \frac{Y}{p_K.K}$$

Assuming π_K to be constant, one obtains in logarithmic form an expression from which constants are omitted:

$$cur = y - k$$

Taking into account the long-term relationship in the equation for the prices of value added, one arrives at the factor price frontier. In fact, combining the two previous equations with the FOC for the capital stock, one obtains:

$$cur = r - p$$

and hence:

$$a.(w-p) + (1-a).(r-p) = gfp$$

Two options are possible for the modelling of wages.

Case 1 (Phillips): the first is that of a Phillips curve, linking over the long-term evolutions in the real wage and the rate of unemployment.

$$D(w - pc) = -b.u + l$$

In the short term, the indexing of wages on consumer prices is not immediate.

Case 2 (WS): in a second option, wages are modelled using a WS curve, as seen in models for wage bargaining, for example. The wage curve is identified (in relation to that of prices) through the introduction of "wedge" variables (terms of trade and tax wedge):

$$w - p = (pc - p) + wedge + gpf/a - b.u$$

In the short term, the indexing of wages on consumer prices is quasi-unitary.

Equations

The long run of the capacity utilization rate derives from the Solow residuals while the short run reflect the gradual and rather slow (two lags) adjustment of the rate of capacity utilization.

$$\Delta cur = \underset{(-3,90)}{-0,32}.(cur-(y-k))_{-1} + \underset{(3,90)}{2,26} + \underset{(1,50)}{0,21}.\Delta cur_{-1} + \underset{(1,64)}{0,23}.\Delta cur_{-2} + \underset{(1,77)}{0,49}.\Delta cur^{*} + \underset{(1,29)}{0,39}.\Delta cur_{-1} + \underset{(2,43)}{0,76}.\Delta cur_{-2}$$

$$cur^{*} = y - k$$

$R^2 = 67\%$
$s = 0,69\%$
$DW(0) = 2,42$
$1992q1 - 2000q4$

Case 1 (Phillips) : the Phillips curve reads :

$$Dw = \underset{(-2,44)}{-0,0016}.u + \underset{(2,64)}{0,018} + \underset{(3,54)}{0,68}.Dpc + \left(1 - \underset{(c)}{0,68}\right).Dpc$$

$R^2 = 34\%$
$s = 0,39\%$
$DW(0) = 1,69$
$1992q1 - 2000q4$

Case 2 (WS): the wage-setting equation is derived from the theoretical foundations presented above. Note that in the very short run, there is almost a unit elasticity between wages and consumer prices.

$$\Delta w = \underset{(-3,13)}{-0,27}.(w-(wedge+pc+gpf/a))_{-1} - \underset{(-4,28)}{0,28}.u_{-1} + \underset{(2,11)}{0,96} + \underset{(4,86)}{0,95}.\Delta pc - \underset{(-3,45)}{0,0041}.t$$

$$w^{*} = wedge + pc + gpf/a - 1,0.u$$

$R^2 = 63\%$
$s = 0,35\%$
$DW(0) = 1,78$
$1992q1 - 2000q4$

The equation of value added prices reads:

$$\Delta p = \underset{(-3,76)}{-0,13}.\left(p-(w-gpf/a)-\frac{1-a}{a}.cur\right)_{-1} + \underset{(3,76)}{3,17} + \underset{(4,97)}{0,55}.\Delta w$$

$$p^{*} = w - gpf/a + \frac{1-a}{a}.cur$$

$R^2 = 70\%$
$s = 0,22\%$
$DW(0) = 1,71$
$1994q1 - 2000q4$

In the equation above, the long-term coefficient is constraint. We also estimated the equitation without this constraint on the coefficient of the capacity utilization rate and find that the hypothesis that the coefficient of the CUR is equal to $(1-\alpha)/\alpha = 0,66$ is not rejected :

$$\Delta p = \underset{(-3,75)}{-0,15}.(p-(w-gpf/a))_{-1} + \underset{(3,09)}{0,08}.cur_{-1} + \underset{(3,68)}{3,52} + \underset{(4,95)}{0,55}.\Delta w$$

$$p^{*} = w - gpf/a + 0,55.cur$$

$R^2 = 70\%$
$s = 0,23\%$
$DW(0) = 1,75$
$1994q1 - 2001q3$

3.2.4 Structural inflexions in activity

The participation rate t_a is assumed to depend negatively on the long-term unemployment rate:

$$t_a = ls - pop1564 = -c\ /(1-c).u$$

This can be written as the fact that the labour force is a geometric mean of employment and population of working age ($pop1564$):

$$ls = c.l + (1-c).pop1564$$

The dynamic equation of labour force reads:

$$\Delta ls = \underset{(-3,89)}{-0,32}.(ls-l)_{-1} + \underset{(3,72)}{0.22}.(pop1564-l)_{-1} + \underset{(3,73)}{0,08\%}.t - \underset{(-3,73)}{1,76}$$
$$+ \underset{(4,28)}{0,52}.\Delta ls_{-1} + \underset{(6,24)}{0,72}..\Delta l - \underset{(5,54)}{0,55}.\Delta l_{-1}$$
$$ls = 0,30.l + 0,70.pop1564$$

$R^2 = 78\%$
$s = 0,05\%$
$DW(0) = 2,42$
$1992q1 - 2000q4$

3.2.5 Potential output and NAIRU

NAIRU

Case 1 (Phillips): the NAIRU is derived directly from the wages equation and the price equation, taking first differences:

$$u^* = \frac{l - p\dot{g}f}{b} = \frac{l'}{b}$$

Case 2 (WS): the NAIRU is derived from the juxtaposition of the long-term equations for the factor price frontier and wages (after allowing for dynamic elements which can marginally distort the result) the existence of equilibrium unemployment rate:

$$u^* = \left[(pc - p) + wedge + \frac{1-a}{a}.(r - p) \right] / b$$

Potential output

The potential of the economy can easily be calculated on the basis of the CPO for labour:

$$y^* = ls - u^* + (w - p)$$

Using the dependence of the labour force on the unemployment rate,

$$ls = pop1564 - c\ /(1-c).u$$

and that of wages on the real cost of capital,

$$a.(w-p) + (1-a).(r-p) = pgf$$

$$y^* = pop1564 - 1/(1-c).u^* + pgf\ /a - \frac{1-a}{a}.(r-p)$$

This implies that possible impacts on the unemployment rate are intensified on production..

All in all, depending on the case chosen:

Case 1 (Phillips) :

$$y^* = pop1564 - 1/(1-c).l/b + pgf/a - \frac{1-a}{a}.(r-p)$$

The potential of the economy depends in this case on the population of working age, global factor productivity and the real cost of capital.

Case 2 (WS) :

$$y^* = pop1564 + pgf/a - \frac{1}{b.(1-c)}.(pc-p) - \frac{1}{b.(1-c)}.wedge - (\frac{1}{b.(1-c)}+1).\frac{1-a}{a}.(r-p)$$

Apart from the factors already mentioned for case 1, the potential of the economy in case 2 depends also on the terms of trade and taxation.

3.3 Demand Prices and the Equilibrium at Factor Costs

For the purpose of achieving balance in terms of value, there remain to be determined consumer prices, investment prices and prices of stocks. This is done in the traditional way.

The prices for consumption and investment are in the long term a geometric mean of domestic prices (value added) and external (import) prices. For lack of data on VAT by product, it has been assumed that taxes on products, denoted t , concern only consumption. As a result, for the consumer prices, this tax effect was added. Not having data of this kind further back than 1996, it was difficult to estimate their impact. This is why unit elasticities for consumer prices were imposed, in both the short and the long term. In practice, the introduction of taxes leads to obtaining a reasonable equation.

In terms of values, the model is balanced by adjusting the stock change item.

$$\Delta pc = \underset{(-4,68)}{-0,86}.(pc - (\ln(1+t)+p))_{-1} + \underset{(4,29)}{0,049}.(pm-p)_{-1} \underset{(-4,71)}{-0,09} + \underset{(c)}{1}.\Delta\ln(1+t) + \underset{(12,47)}{0,96}.\Delta p \underset{(-2,73)}{-0,21}.\Delta p_{-1} + \underset{(9,92)}{0,06}.\Delta pm$$

$$pc = \ln(1+t) + 0,94.p + 0,06.pm$$

$R^2 = 96\%$ $s = 0,07\%$ $DW(0) = 2,08$ $1996q2 - 2000q4$

$$\Delta pi = \underset{(-1,86)}{-0,061}.(pi-p) + \underset{(1,41)}{0,009}(pm-p)_{-1} \underset{(-0,55)}{-0,00} + \underset{(5,59)}{0,70}.\Delta p + \underset{(1,54)}{0,17}.\Delta p_{-1} + \underset{(3,67)}{0,06}.\Delta pm$$

$$pi = 0,85.p + 0,15.pm$$

$R^2 = 64\%$ $s = 2,15\%$ $DW(0) = 2,18$ $1992q1 - 2000q4$

Variables at current prices are calculated as the ratio of the volume of the variable by its price. The only exception is the equation of inventories change at current prices, which is the residual of the GDP accounting identity in nominal terms.

3.4 Fiscal Rule and Monetary Policy

Moving to financial variables, we assumed that short-term rates are derived from real interest rate, which are assumed to be constant. An alternative would be to introduce a Taylor rule into the model. We choose to model long run interest rate by taking into account future inflationary pressure (due to the evolution of public deficit) rather by a condition of absence of arbitrage opportunity, which would require including anticipations. In the equation presented below, the long run interest rate is determined for longer horizon by the spread between the short- and the long-term interest rate, the real short-term interest rate and a ratio of public deficit over GDP: a rise of public deficit feeds inflationary anticipation and push agents to ask a higher spread for long run interest rate; the term of real interest rate, with a negative coefficient, reflect the convexity of the interest rate curve. The short run dynamics is influenced by the evolution of short- and long run rate and by inflation.

$$\Delta r10a = \underset{(-3,65)}{-0,29}.(r10a - r3m)_{-1} \underset{(-4,36)}{-0,25}.(r3m - \Delta_4 pc)_{-1} \underset{(3,17)}{+0,13}.\frac{Deficit_{-1}}{GDP_{-1}} \underset{(4,07)}{+0,60}.\Delta r10a_{-1} \underset{(1,26)}{+0,19}.\Delta r3m \underset{(2,86)}{+0,40}.\Delta pc \underset{(3,24)}{+0,73}$$

$R^2 = 65\%$

$s = 0,30$

$DW(0) = 1,98$

$1992q3 - 2000q4$

$$r10a = 0,14.r3m + 0,86\Delta_4 pc + 0,45.\frac{Deficit}{GDP}$$

We also assume that the exchange rate is exogenous.

In the model as it stands now, there is no specific effect of public balance on activity (apart from the equation of long run interest rate). It is however possible to add a public sustainability constraint in the model. For example, once public deficit cross the threshold of 3% of GDP, national governments may be force to raises taxation to avoid a rise of public debt. Excess deficit may be financed either by raising income taxes, social contributions or business taxes.

4 Assessing the Forecasting Performance of the Model

4.1 A Benchmark Model: a Vector-Autoregression

The forecasting power of the model has been compared to those of a bivariate VAR-X, which takes into account the evolution of GDP and of the consumer price index (CPI, the deflator of the price of households' consumption). We also add some exogenous variable reflecting the monetary and external environment (foreign prices, short run interest rate, world demand, the price of raw materials). Besides, a trend and a constant are added to estimate the VAR-X over the period Q2 1992 to Q4 2000. Given the limited time span (only 44 points), the autoregressive structure of the VAR is limited: two lags for endogenous variables and only one lag for exogenous variables, which adds up to 28 coefficients.

In sample forecast are given from 1996 to 2000. Indeed, the consumer price deflator in the model is only estimated from 1996 onwards, as it incorporates the rate of production tax, available only from Q1 1996.

4.2 Comparing the Properties of the VAR and the Model

Simulations are made assuming either constant innovations or innovations equal to zero. The forecast horizon considered is one quarter, one year or two years. To study the properties of the model compared to those of the VAR, we present in the figures given below the deviation between actual and simulated data. Besides, a useful synthetic indicator to summarise those results is Theil's inequality coefficient; it measures the root mean square error in relative terms. For a perfect forecast, Theil's ratio is equal to zero. However, if the forecast does not give any information (e.g. if the simulated value is null), this ratio is equal to unity.

$$\text{Theil's inequality coefficient} = \frac{\sqrt{\frac{1}{T}\sum (\hat{x} - x)^2}}{\sqrt{\frac{1}{T}\sum x^2} + \sqrt{\frac{1}{T}\sum \hat{x}^2}}$$

Assuming constant innovation is the usual method for forecasting; in this case the contribution of innovations for the evolution of the variables is null. An alternative method consists of forcing the innovations to zero for the forecast period, which leads to a contribution of innovations either positive or negative. However, this forecast enables us to gauge what would be the results given by the VAR and the model if innovations where draw in a probability distribution with mean zero.

Simulation with constant innovations:

	One quarter forecast		One year forecast		Two year forecast	
	GDP	CPI	GDP	CPI	GDP	CPI
Model	0.20	**0.15**	0.53	**0.54**	**0.43**	1.73
VAR	**0.13**	0.18	**0.35**	0.74	1.63	**1.65**

Results are broadly similar for the CPI whatever the forecast horizon; the model gives slightly better forecasts, except for a two year ahead forecast. On the contrary, the forecast of GDP given by the VAR is less precise, except for two years. Two year forecast should however be taken with caution given the limited number of data.

Simulation with innovations equal to zero:

	One quarter forecast		One year forecast		Two year forecast	
	GDP	CPI	GDP	CPI	GDP	CPI
Model	0.22	0.14	0.39	0.51	**0.28**	1.13
VARX	**0.09**	**0.09**	**0.12**	**0.25**	0.47	**0.40**

5 Some Standard Simulations Using the Phillips specification

We examine analytical simulation to examine the model properties. They describe the response of the economy to a shock of one of the exogenous variable of the model, other exogenous variables being unchanged. One should therefore used those results with caution as they do reflect realistic macro-economic scenarii.

We provide below analytical simulations for three standard sets of simulations:

- Fiscal and budgetary shocks: increase in public expenditure, increase in the rate of income tax.
- External shocks: increase of the world demand, depreciation of the nominal exchange rate, increase of nominal interest rate, increase in the price of raw materials.
- Supply shocks: increase of wages, increase of labour efficiency and increase of labour force.

As a rule, simulations are made under the assumption of constant real interest rate and constant nominal exchange rate, save for the simulations on exchange rate and on interest rate. We also use the WS-PS specification for the equation of wages. Full results are reported at the end of the paper in Annex 2 for

5.1 Fiscal and Budgetary Shocks

5.1.1 Increase in public expenditure equivalent to 1% of baseline GDP

In the short to medium-run, a public expenditure shock push up prices and GDP growth, though prices remain relatively sluggishness in the short run. The impact of impact on GDP peaks after a year, at 0.9 point. The accelerator effect on investment, the dynamics of consumption, the rise of employment and limited gains in purchasing power concur to this rise of GDP. This effect is partly mitigated by the rise of imports.

In the medium-run, demand stabilizes because of the increase of domestic prices. The gradual adjustment of employment to activity and the wage increase resulting from a decline of unemployment lead to a rise of labour unit cost after two years. The inflationary spike is then fed by the indexation of prices. The deviation of prices reaches 2.5% after three years.

The long run impact on GDP is equal to half of the initial expenditure shock. The rate of unemployment is 0.3 point below its baseline level. This reflects partly an improvement of terms of trade: given constant foreign prices, consumption prices are slightly below the price of value added.

5.1.2 Increase in the rate of income tax of 1 point

The simulation consists in an increase of 1 point of the income tax rate, which amounts to an ex ante increase of fiscal receipts of 0.75 point of GDP.

In the short run, the rise of the average income tax dampens demand and produces inflationary pressures. Consumption is negatively affected by a deterioration of households' gross disposable income. The overall effect on GDP is supplemented by the decline of investment. GDP decline by 0.5 point after a year and by 1 point after two years.

Besides, the tax increase is slightly inflationary over the first two years, despite the slowdown of domestic demand. The increase of the wage leads to important wage claims. The inflationary spiral is gradually dampened by the decline of GDP and the rise of unemployment.

In the long run, unemployment rises due to the increase of the wedge: it rises by 0.7 point. Potential output decline by 1.2 point.

5.2 External Shocks

5.2.1 Increase of world demand by 1%

This simulation consists of a purely demand shock. In the short run, the increase of world demand leads to an increase of euro area exports. This triggers a rise in GDP, internal demand and employment. After two-three years, the shock leads to a rise of 1/4 point of GDP.

The decline of unemployment and pressures on capacity utilizations rapidly lead to a rise of wages and production prices. An inflationary spiral occurs and triggers a crowding out of demand. Competitiveness declines, which boosts imports and dampens exports.

In the long run, the expansionary effect remains positive: GDP is 0.3% above the baseline scenario, because of a rise in the terms of trade.

5.2.2 Depreciation of the nominal exchange rate by 10%

This simulation consists of a purely nominal shock, which has no effect whatsoever on real variables in the long run. Price deviation is equal to the initial long run depreciation of the exchange rate.

In the short run, nominal exchange rate depreciation enhanced competitiveness on the domestic market as on foreign markets. The current account balance follows the textbook J-curve: a deterioration of the terms of trade implies in the short run a widening of the CA balance; price-competitiveness however soon triggers a rise of the CA balance. Despite imported inflation, consumption reacts positively to the depreciation: the rise of real wages (deflated by consumption prices) is dampened by indexation behaviours, while gross disposable income receives a boost because of the increase of employment. On the whole, the effect of depreciation on GDP is in the range of 3/4 point of GDP after one year.

However, the effect of imported inflation on the wage-price nexus exerts a downward pressure on demand. Nominal convergence is almost fully reached after fifteen years and volumes converge to their baseline values.

5.2.3 Increase of nominal interest rate by 100 basis points

In this simulation, we increase nominal short- and long run interest rate by 100 basis points. This interest rate shock dampens consumption and investment. GDP declines by 3/4 point after three-years.

The decline of the rate of capacity utilization and the rise of unemployment triggers a decline of value added price and of wages. A deflationary spiral starts, leading to a decline of consumption prices of 0.45 after two years.

In the long run, potential output is reduced by a reduction of the capital-to-output ratio. The rise of the cost of capital leads via the factor price frontier to a decline of real wages. Structural unemployment rises by 0.4 point and potential output declines by 1.44 point.

5.2.4 Increase of the price of raw materials by 10%

In the short run, this shock leads to a rise of consumption prices and deteriorates households' consumption. This effect is supplemented by the rise in wages and the downward over-reaction of investment. After two years, the impact on GDP is of the range of 0.05 point.

In the middle- to long run, the rise of unemployment mitigates slightly the effect of the wage increase, which limit labour costs and counter the effect of the inflationary spiral. On the whole, unemployment rises by 0.7 due to the deterioration of the terms of trade and potential output declines by 0.1 point.

5.3 Supply Shocks

5.3.1 Ex-ante increase of wages by 1%

This wage shock consists in an increase of wage per capita of 1% above the baseline level, which results from the wage-setting equation and its traditional determinants. The wage increase feeds very quickly in value added prices and in consumer prices. The rise of labour costs affects negatively the level of employment. However, in the very short run, the depressive effect is mitigated because of the relative stability of consumption. The stability of gross disposable income remains constant, as the decline to the rise of unemployment is balance by a rise of per capita real wage. After one year, the decline of GDP is of only 0.1%.

However, the middle- to long-term response is more negative: the rise of unemployment and the decline of demand counter the inflationary impact of the initial wage shock. In the long run, as real labour cost is moving in line with the real cost of capital, structural unemployment rises by 0.1 point. Potential output decline by 0.2 point.

5.3.2 Increase of labour efficiency by 1%

In the short run, demand is not affected by the change in labour efficiency and the rise of labour productivity leads to a contraction of employment and a rise of the rate of unemployment. After one year, the effect of GDP is slightly positive. From then on, the decline of real unit labour cost leads to a decline of value added prices. After three to four years, the increase of efficiency is clearly expansionary: households' purchasing power, though negatively affected by the decline of employment in the short run, is boosted by the gradual rise of real wage.

In the long run, the labour efficiency shock does not change significantly the structural level of unemployment. The only effect comes from a decrease of the terms of trade. GDP rises by 0.45 point and employees are the ultimate beneficiaries of the productivity gains, which feed into a rise of real wage.

5.3.3 Increase of labour force by 1%

In the short run, the rise of the labour force triggers an almost equivalent rise of unemployment, which rises by 1 point. Unemployment exerts downward pressure on consumption. Besides, wages are also negatively affected and this decline quickly feeds into value added prices and consumption prices, which decline by 0.9-1% after a year. However, as real wages rise, employment recovers and triggers a rise of consumption and GDP. After two years, GDP is 1/4 point above its baseline level.

In the long run, the rise of labour force does not modify the rate of unemployment. However, a slightly deterioration of terms of trade leads to a rise of 0.4 of long run unemployment. Potential output rises by 1/2 point.

6 Conclusions and Extensions

The model thus provides a useful basis, for both forecasting and analysis, to study the economy of the euro area in a number of practical contexts:

- Relatively good performances in forecasting enable the model to be used for short-term forecasting, along with other tools already used for forecasting at the area-wide level.

- Besides, good analytical properties of the model enable to use it to study the impact of change of economic policy.

The model has already been used in this effect at INSEE in the quarterly outlook of March 2003 (Beffy et al, 2003).

Further research in needed in the following directions:

- As soon as reliable data on trade flows will be available, using separate data on goods and services should enhance the building block of the external sector.

- Financial variables should be given more importance in the model, especially the inclusion of a wealth effect in the consumption equation. This requires having reliable data on households' wealth.

- Rational expectations could be added to specify the evolution of the exchange rate or of wages.

- A further extension would be to model the main trade partners of the euro area, such as the United-States or the United Kingdom.

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8 Annexes

8.1 Annex 1 : Presentation of the Variables and their Sources

We generally use standard notations and conventions for the variables presented in this table. Lower-case letters are used for logarithm, unless otherwise indicated. Main aggregates and in particular the components of GDP are in volume.

Symbol	Name	Source
c	household consumption	Eurostat
cur	capacity utilisation rate (index)	Eurostat
d	depreciation rate	Constant calculated using Eurostat.
df	final demand	Calculated
dihs	internal demand, excluding inventories	Calculated
ΔS	inventory change (level)	Eurostat
e	exchange rate	Eurostat
G	government consumption (level)	Eurostat
gdi	household disposable income	Constructed, using data from Eurostat
gfp	growth factor productivity	Calculated
i	investment	Eurostat
k	capital	Constructed, using data from Eurostat
l	labour	Eurostat
ls	labour force	Eurostat
m	merchandise imports	Eurostat
p	value added price	Eurostat
p\$*	foreign export prices	Calculated.
pc	consumer price	Eurostat
pi	investment price	Eurostat
pm	import prices	Eurostat
pmhe	import prices, excluding energy	Calculated.
*pop*1564	population of working age	Eurostat
px	export prices	Eurostat
*r*10*a*	long run interest rate (point)	European Central Bank, *ECB Bulletin*
*r*3*m*	short term interest rate	European Central Bank, *ECB Bulletin*
t	time trend, equals to 1990 in Q1 1990	
t	value added tax	Calculated using public finance data from Eurostat
u	unemployment rate (%)	Eurostat
*u**	NAIRU	Calculated
uwc	unit wage cost (index)	Eurostat
w	wages	Eurostat
*wd**	world demand	Calculated.
wedge	tax wedge (index)	Calculated using Eurostat.
x	merchandise exports	Eurostat
y	value added	Eurostat

8.2 Annex 2: Results of analytical simulations (with a WS-PS specification)

8.2.1 Increase in public expenditure equivalent to 1% of baseline GDP

8.2.2 Increase in the rate of income tax of 1 point

8.2.3 Increase of world demand by 1%

8.2.4 Depreciation of the nominal exchange rate by 10%

8.2.5 Increase of nominal interest rate by 100 basis points

8.2.6 Increase of the price of raw materials by 10%

8.2.7 Ex-ante increase of wages by 1%

8.2.8 Increase of labour efficiency by 1%

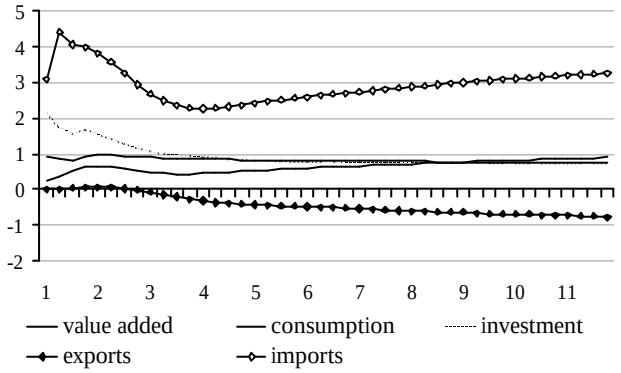
8.2.9 Increase of labour force by 1%

8.2.10 Increase of 1 point of product taxes

8.2.1 Increase in public expenditure equivalent to 1% of baseline GDP

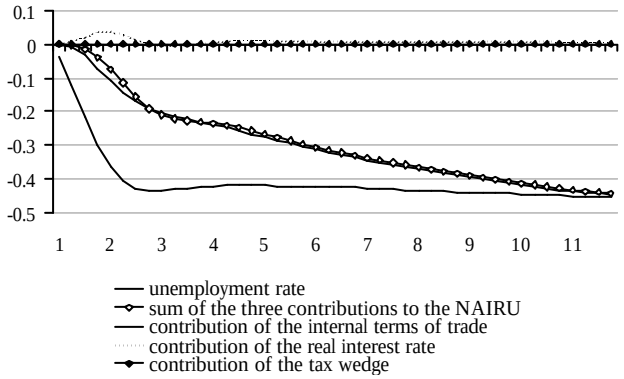
Quarter	1	2	3	4	8	12	20	Long-run
GDP	0.89	0.83	0.82	0.93	0.90	0.85	0.80	0.81
Consumption	0.26	0.36	0.51	0.61	0.53	0.44	0.58	1.14
Investment	2.11	1.74	1.55	1.67	1.17	0.92	0.77	0.81
Merchandise exports	0.00	0.00	0.03	0.04	-0.03	-0.28	-0.47	-0.87
Merchandise imports	3.08	4.39	4.05	3.97	2.94	2.28	2.55	3.54
Inventory change (GDP points)	0.00	0.23	0.09	0.09	0.01	0.00	0.01	0.00
Value added price	0.00	0.07	0.25	0.55	1.71	2.34	3.29	5.67
Consumption price	0.00	0.06	0.21	0.47	1.50	2.09	2.96	5.12
Export prices	0.00	-0.12	-0.19	-0.23	0.37	1.44	2.14	3.93
Import prices	0.00	0.00	0.01	0.02	0.23	0.46	0.73	1.42
Wages	0.00	0.07	0.24	0.55	1.79	2.49	3.40	5.67
Unit labour cost	-0.74	-0.45	-0.18	0.10	1.55	2.32	3.28	5.67
Unemployment rate (% points)	-0.04	-0.12	-0.22	-0.30	-0.44	-0.42	-0.42	-0.49
Internal terms of trade	0.00	0.01	0.04	0.08	0.20	0.25	0.33	0.52
Real interest rate (points)	0.00	0.01	0.02	0.04	-0.02	0.00	0.01	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	0.15	0.31	0.39	0.48	0.66	0.68	0.68	0.81
Labour force	0.11	0.17	0.16	0.15	0.18	0.21	0.22	0.00
Current account (GDP points)	-0.71	-1.02	-0.95	-0.94	-0.68	-0.40	-0.42	-0.54
Fiscal balance (GDP points)	-0.80	-0.79	-0.78	-0.74	-0.70	-0.70	-0.72	-0.70

Volume

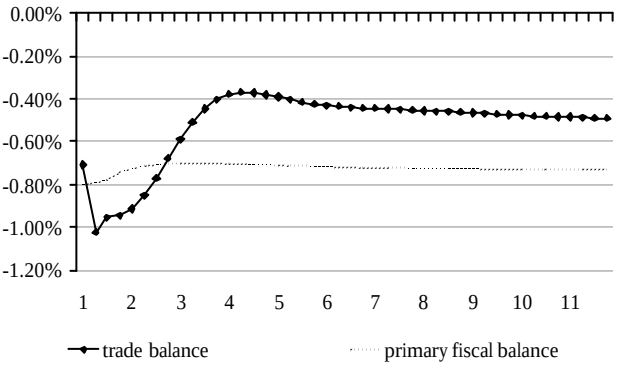


Prices

Unemployment rate



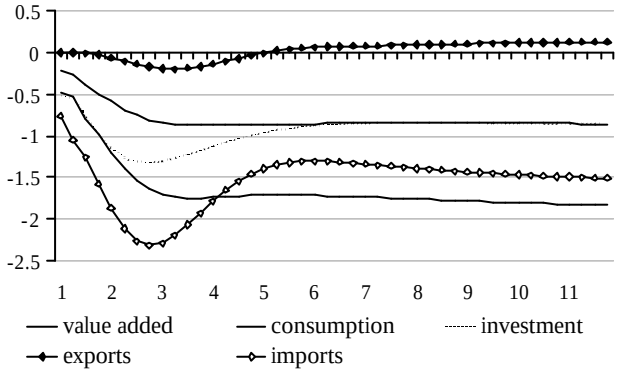
Trade and fiscal balances



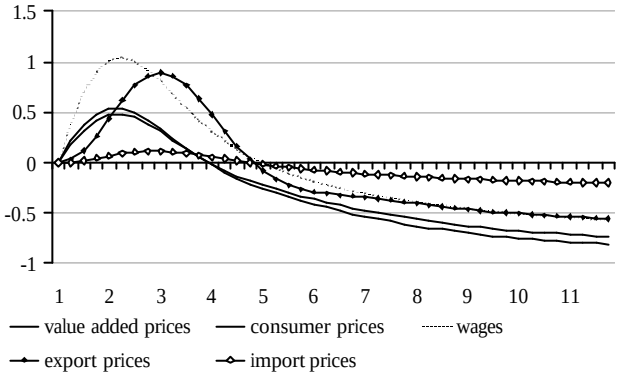
8.2.2 Increase in the rate of income tax of 1 point

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.22	-0.26	-0.37	-0.49	-0.81	-0.88	-0.86	-1.15
Consumption	-0.48	-0.54	-0.78	-0.98	-1.63	-1.75	-1.72	-1.88
Investment	-0.52	-0.55	-0.78	-0.99	-1.33	-1.17	-0.90	-1.15
Merchandise exports	0.00	0.00	-0.01	-0.03	-0.17	-0.17	0.05	-0.23
Merchandise imports	-0.76	-1.05	-1.26	-1.58	-2.31	-1.93	-1.31	-0.88
Inventory change (GDP points)	0.00	-0.06	-0.03	-0.05	-0.05	-0.02	0.00	0.00
Value added price	0.00	0.21	0.38	0.48	0.43	0.05	-0.38	1.48
Consumption price	0.00	0.18	0.32	0.42	0.39	0.06	-0.33	1.34
Export prices	0.00	0.03	0.12	0.26	0.86	0.63	-0.26	1.03
Import prices	0.00	0.00	0.02	0.04	0.11	0.07	-0.06	0.37
Wages	0.00	0.40	0.70	0.90	0.92	0.42	-0.15	1.48
Unit labour cost	0.19	0.55	0.88	1.09	0.98	0.31	-0.37	1.48
Unemployment rate (% points)	0.01	0.04	0.09	0.16	0.47	0.63	0.67	0.69
Internal terms of trade	0.00	0.03	0.05	0.06	0.04	-0.01	-0.04	0.14
Real interest rate (points)	0.00	0.03	0.02	0.01	-0.02	0.00	0.00	0.00
Tax wedge	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Employment	-0.04	-0.11	-0.20	-0.31	-0.74	-0.99	-1.08	-1.15
Labour force	-0.03	-0.07	-0.10	-0.14	-0.23	-0.29	-0.34	0.00
Current account (GDP points)	0.18	0.25	0.30	0.40	0.67	0.56	0.30	0.33
Fiscal balance (GDP points)	0.76	0.77	0.76	0.73	0.60	0.53	0.50	0.40

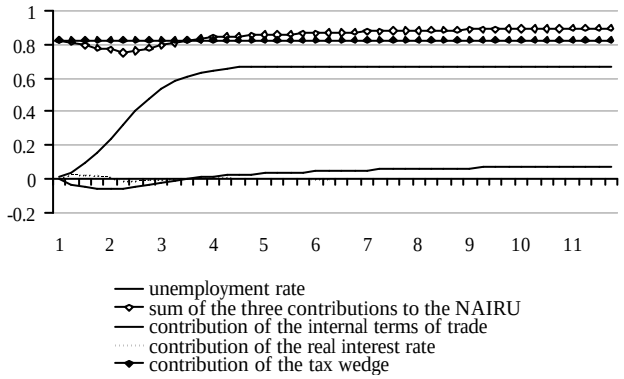
Volume



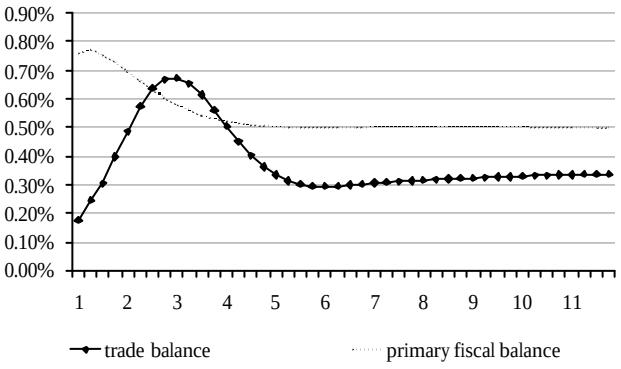
Prices



Unemployment rate



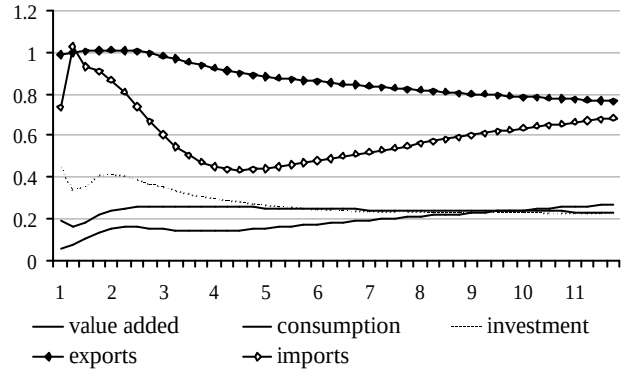
Trade and fiscal balances



8.2.3 Increase of world demand by 1%

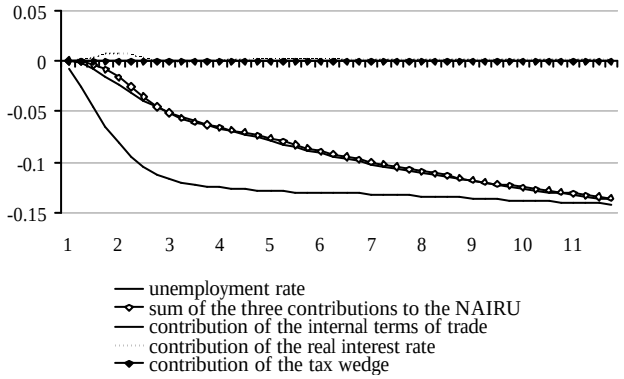
Quarter	1	2	3	4	8	12	20	Long-run
GDP	0.19	0.16	0.18	0.22	0.26	0.26	0.25	0.27
Consumption	0.06	0.07	0.11	0.14	0.15	0.14	0.17	0.38
Investment	0.45	0.34	0.35	0.41	0.37	0.31	0.25	0.27
Merchandise exports	0.99	1.00	1.01	1.01	1.00	0.94	0.87	0.71
Merchandise imports	0.74	1.03	0.93	0.91	0.67	0.47	0.47	0.83
Inventory change (GDP points)	0.00	0.04	0.02	0.02	0.01	0.00	0.00	0.00
Value added price	0.00	0.02	0.05	0.12	0.40	0.62	0.94	1.84
Consumption price	0.00	0.01	0.04	0.10	0.35	0.55	0.84	1.66
Export prices	0.00	-0.03	-0.04	-0.05	0.06	0.33	0.61	1.28
Import prices	0.00	0.00	0.00	0.00	0.05	0.11	0.21	0.47
Wages	0.00	0.01	0.05	0.12	0.42	0.66	0.97	1.84
Unit labour cost	-0.16	-0.09	-0.05	0.00	0.33	0.59	0.93	1.84
Unemployment rate (% points)	-0.01	-0.03	-0.05	-0.06	-0.11	-0.12	-0.13	-0.16
Internal terms of trade	0.00	0.00	0.01	0.02	0.05	0.07	0.09	0.17
Real interest rate (points)	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	0.03	0.06	0.08	0.11	0.17	0.20	0.21	0.27
Labour force	0.02	0.04	0.03	0.04	0.05	0.06	0.07	0.00
Current account (GDP points)	0.06	-0.01	0.01	0.02	0.08	0.16	0.18	0.16
Fiscal balance (GDP points)	0.05	0.04	0.05	0.06	0.09	0.09	0.09	0.10

Volume

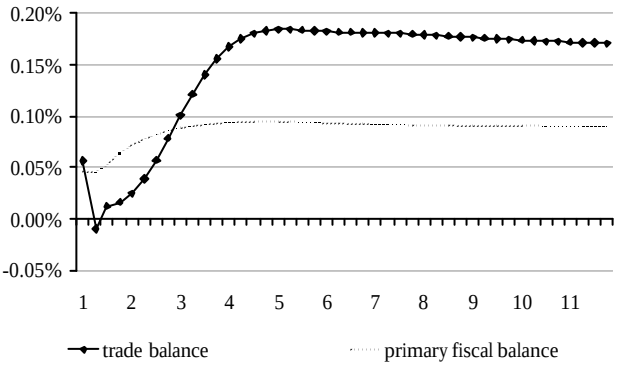


Prices

Unemployment rate



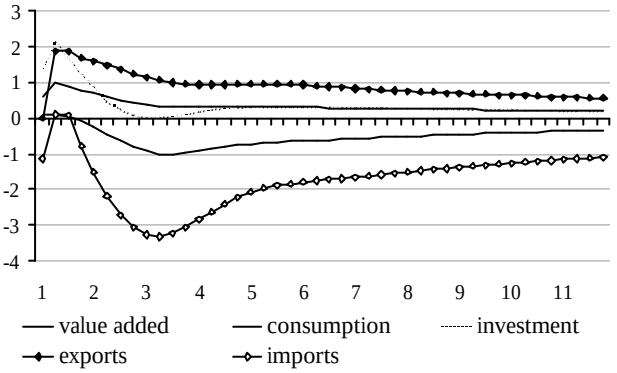
Trade and fiscal balances



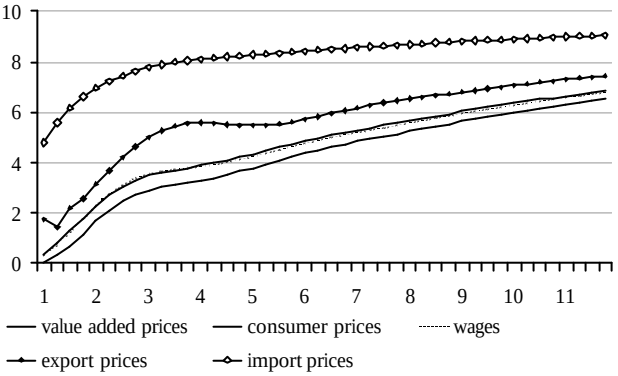
8.2.4 Depreciation of the nominal exchange rate by 10%

Quarter	1	2	3	4	8	12	20	Long-run
GDP	0.58	0.97	0.86	0.78	0.41	0.30	0.30	0.00
Consumption	0.07	0.12	0.05	-0.07	-0.82	-0.98	-0.66	0.00
Investment	1.38	2.14	1.62	1.21	0.07	0.10	0.30	0.00
Merchandise exports	0.00	1.87	1.86	1.68	1.24	0.96	0.95	0.00
Merchandise imports	-1.15	0.10	0.08	-0.79	-3.07	-3.07	-1.83	0.00
Inventory change (GDP points)	0.00	0.05	0.10	0.03	-0.05	-0.02	0.01	0.00
Value added price	0.05	0.36	0.72	1.18	2.74	3.20	4.23	10.00
Consumption price	0.32	0.82	1.28	1.77	3.31	3.79	4.73	10.00
Export prices	1.74	1.42	2.19	2.56	4.63	5.56	5.62	10.00
Import prices	4.79	5.59	6.17	6.60	7.62	8.05	8.38	10.00
Wages	0.30	0.80	1.25	1.77	3.39	3.79	4.63	10.00
Unit labour cost	-0.22	0.01	0.64	1.23	3.03	3.37	4.19	10.00
Unemployment rate (% points)	-0.02	-0.07	-0.13	-0.17	-0.07	0.08	0.07	0.00
Internal terms of trade	-0.26	-0.46	-0.55	-0.58	-0.55	-0.57	-0.48	0.00
Real interest rate (points)	0.02	0.24	0.32	0.37	-0.06	-0.08	-0.05	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	0.06	0.19	0.25	0.25	0.06	-0.11	-0.12	0.00
Labour force	0.05	0.11	0.11	0.06	-0.01	-0.01	-0.03	0.00
Current account (GDP points)	-0.42	-0.53	-0.47	-0.30	0.38	0.43	0.04	0.00
Fiscal balance (GDP points)	0.17	0.29	0.29	0.28	0.18	0.12	0.09	0.00

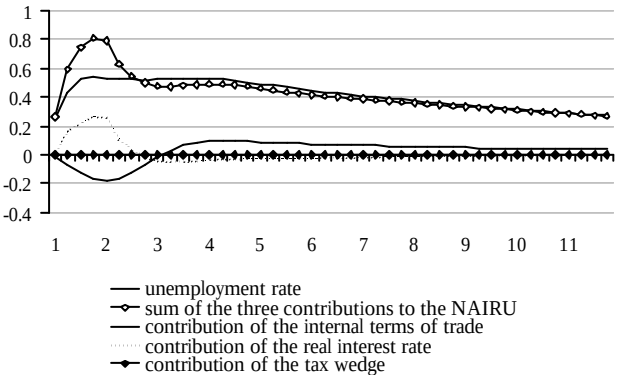
Volume



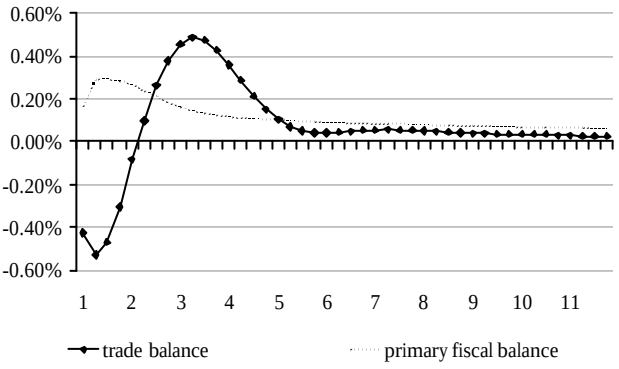
Prices



Unemployment rate



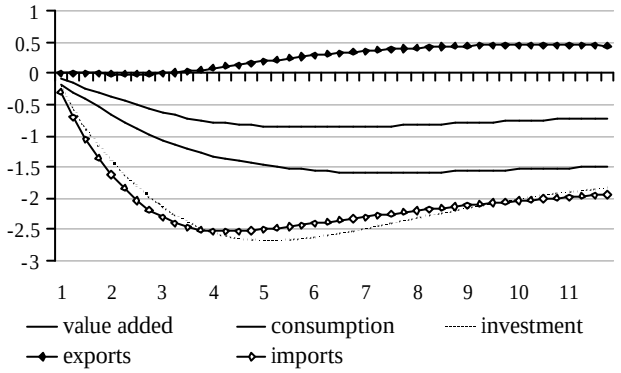
Trade and fiscal balances



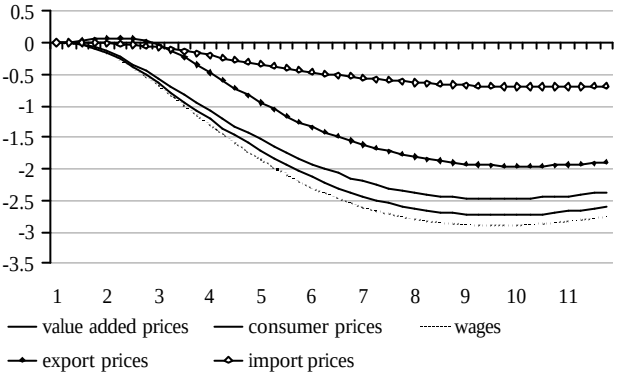
8.2.5 Increase of nominal interest rate by 100 basis points

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.09	-0.16	-0.24	-0.31	-0.57	-0.74	-0.87	-1.44
Consumption	-0.19	-0.29	-0.42	-0.54	-0.99	-1.28	-1.54	-1.46
Investment	-0.21	-0.58	-0.90	-1.17	-1.98	-2.48	-2.65	-2.60
Merchandise exports	0.00	0.00	0.00	-0.01	-0.01	0.05	0.27	-0.59
Merchandise imports	-0.31	-0.70	-1.06	-1.36	-2.19	-2.51	-2.43	-0.29
Inventory change (GDP points)	0.00	-0.02	-0.03	-0.04	-0.04	-0.03	-0.01	0.00
Value added price	0.00	-0.01	-0.03	-0.08	-0.51	-1.08	-2.04	3.79
Consumption price	0.00	-0.01	-0.03	-0.07	-0.45	-0.95	-1.83	3.43
Export prices	0.00	0.01	0.03	0.05	0.02	-0.35	-1.25	2.64
Import prices	0.00	0.00	0.00	0.00	-0.05	-0.17	-0.43	0.95
Wages	0.00	-0.01	-0.03	-0.08	-0.53	-1.15	-2.20	2.98
Unit labour cost	0.07	0.11	0.13	0.11	-0.28	-0.88	-1.98	3.79
Unemployment rate (% points)	0.00	0.02	0.04	0.06	0.19	0.30	0.41	0.40
Internal terms of trade	0.00	0.00	0.00	-0.01	-0.07	-0.13	-0.21	0.35
Real interest rate (points)	1.00	1.01	1.02	1.07	1.37	1.51	1.41	1.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.01	-0.04	-0.08	-0.12	-0.31	-0.48	-0.65	-0.67
Labour force	-0.01	-0.03	-0.04	-0.05	-0.10	-0.15	-0.21	0.00
Current account (GDP points)	0.07	0.16	0.25	0.32	0.53	0.59	0.49	0.32
Fiscal balance (GDP points)	-0.02	-0.04	-0.06	-0.09	-0.18	-0.25	-0.32	-0.52

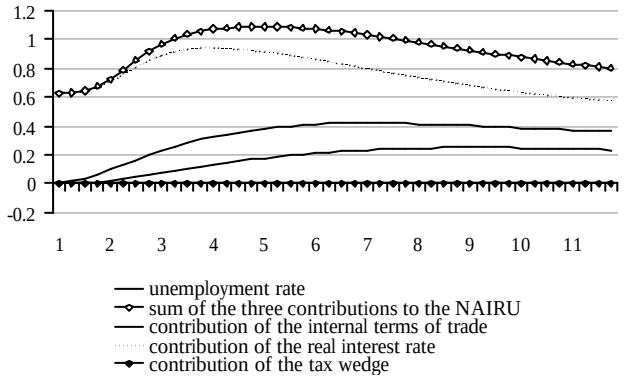
Volume



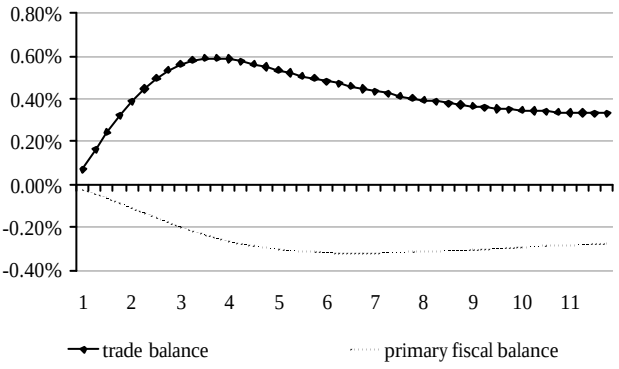
Prices



Unemployment rate



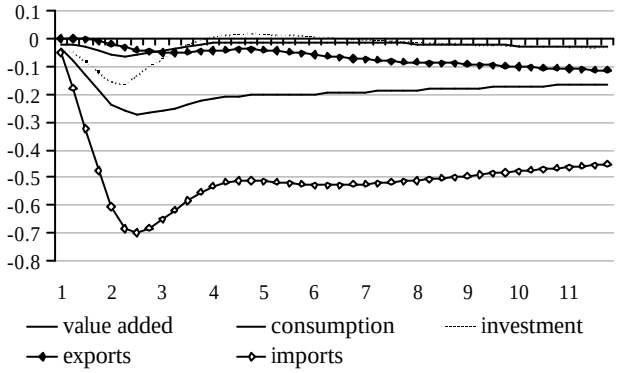
Trade and fiscal balances



8.2.6 Increase of the price of raw materials by 10%

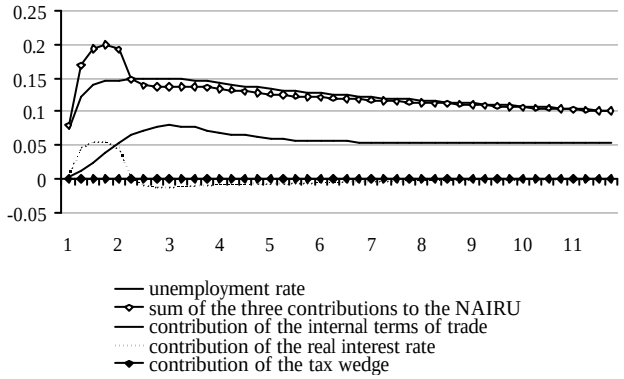
Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.02	-0.02	-0.03	-0.04	-0.05	-0.02	-0.01	-0.08
Consumption	-0.04	-0.08	-0.13	-0.19	-0.27	-0.23	-0.20	-0.11
Investment	-0.04	-0.05	-0.08	-0.12	-0.10	-0.01	0.01	-0.08
Merchandise exports	0.00	0.00	0.00	-0.01	-0.05	-0.05	-0.05	-0.22
Merchandise imports	-0.05	-0.18	-0.32	-0.48	-0.68	-0.55	-0.52	-0.25
Inventory change (GDP points)	0.00	0.00	-0.01	-0.01	-0.01	0.00	0.00	0.00
Value added price	0.02	0.09	0.14	0.17	0.21	0.26	0.43	1.37
Consumption price	0.10	0.22	0.29	0.32	0.37	0.41	0.57	1.42
Export prices	0.00	0.02	0.05	0.09	0.22	0.19	0.25	0.96
Import prices	1.44	1.44	1.45	1.46	1.48	1.49	1.53	1.79
Wages	0.09	0.21	0.27	0.30	0.32	0.33	0.50	1.37
Unit labour cost	0.10	0.20	0.25	0.28	0.25	0.24	0.42	1.37
Unemployment rate (% points)	0.00	0.01	0.02	0.04	0.08	0.07	0.06	0.05
Internal terms of trade	-0.08	-0.13	-0.15	-0.15	-0.16	-0.15	-0.14	-0.05
Real interest rate (points)	0.00	0.07	0.08	0.08	-0.02	-0.02	-0.01	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.01	-0.03	-0.05	-0.07	-0.12	-0.11	-0.09	-0.08
Labour force	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	0.00
Current account (GDP points)	-0.32	-0.28	-0.24	-0.20	-0.14	-0.18	-0.19	-0.20
Fiscal balance (GDP points)	0.00	0.01	0.00	0.00	-0.02	-0.01	-0.01	-0.03

Volume

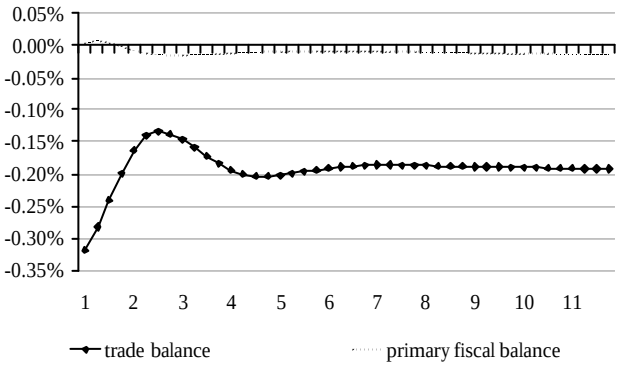


Prices

Unemployment rate



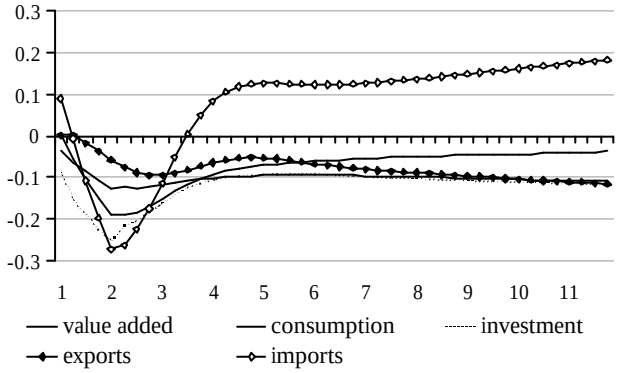
Trade and fiscal balances



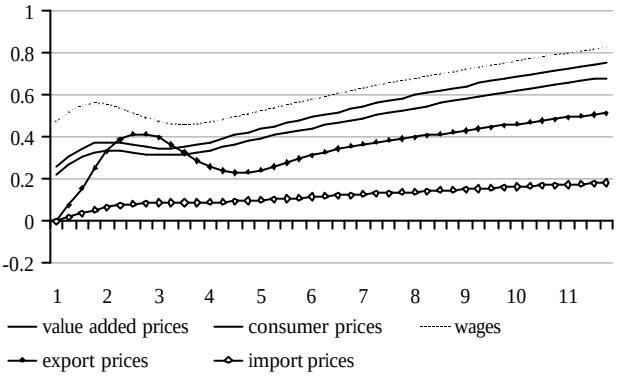
8.2.7 Ex-ante increase of wages by 1%

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.04	-0.07	-0.09	-0.11	-0.12	-0.10	-0.09	-0.19
Consumption	0.00	-0.06	-0.10	-0.15	-0.17	-0.10	-0.06	0.01
Investment	-0.09	-0.15	-0.19	-0.22	-0.18	-0.11	-0.09	-0.19
Merchandise exports	0.00	0.00	-0.02	-0.04	-0.09	-0.07	-0.06	-0.25
Merchandise imports	0.09	-0.01	-0.11	-0.20	-0.18	0.05	0.12	0.43
Inventory change (GDP points)	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00
Value added price	0.26	0.31	0.35	0.37	0.36	0.36	0.48	1.56
Consumption price	0.22	0.27	0.30	0.33	0.32	0.33	0.43	1.41
Export prices	0.00	0.08	0.16	0.25	0.42	0.29	0.30	1.09
Import prices	0.00	0.02	0.04	0.05	0.09	0.09	0.11	0.40
Wages	0.48	0.52	0.55	0.56	0.49	0.47	0.57	1.56
Unit labour cost	0.48	0.52	0.54	0.54	0.42	0.36	0.47	1.56
Unemployment rate (% points)	0.01	0.03	0.05	0.08	0.13	0.13	0.12	0.11
Internal terms of trade	0.04	0.04	0.04	0.04	0.03	0.04	0.05	0.15
Real interest rate (points)	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.03	-0.07	-0.10	-0.13	-0.20	-0.21	-0.19	-0.19
Labour force	-0.02	-0.04	-0.05	-0.05	-0.05	-0.06	-0.06	0.00
Current account (GDP points)	-0.02	0.01	0.04	0.08	0.09	0.02	0.00	-0.01
Fiscal balance (GDP points)	0.02	0.01	0.00	-0.01	-0.04	-0.04	-0.03	-0.06

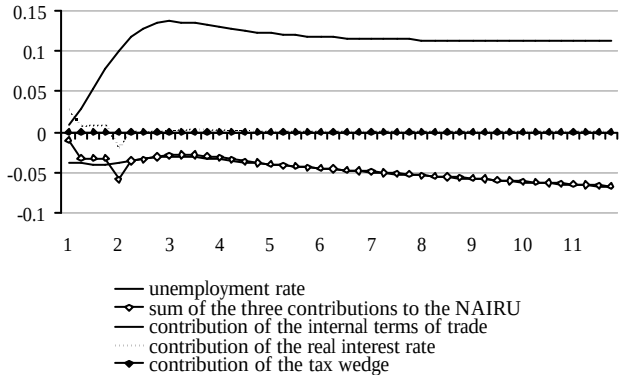
Volume



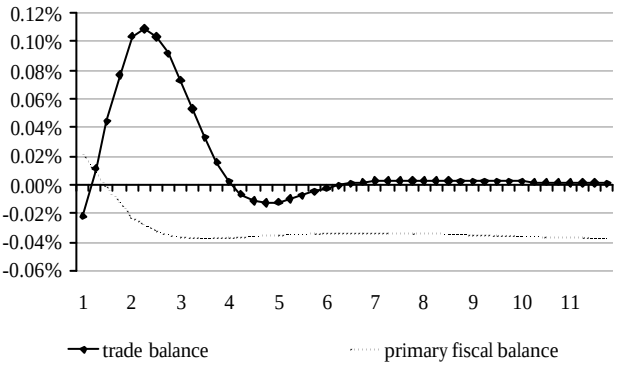
Prices



Unemployment rate



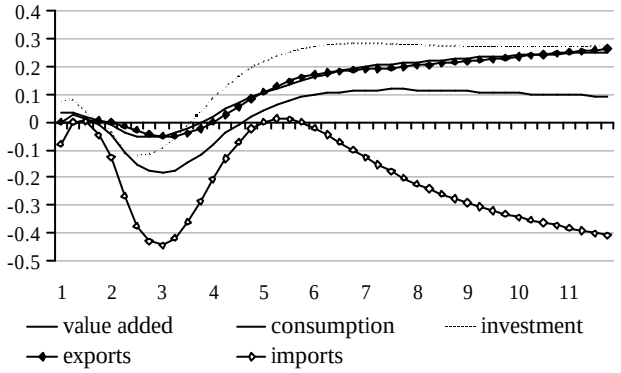
Trade and fiscal balances



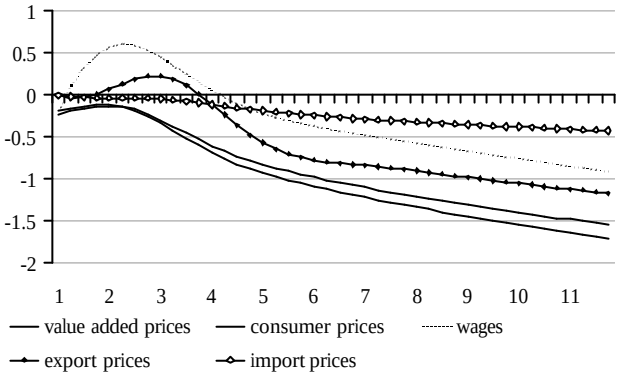
8.2.8 Increase of labour efficiency by 1%

Quarter	1	2	3	4	8	12	20	Long-run
GDP	0.03	0.03	0.02	0.01	-0.06	0.00	0.15	0.45
Consumption	0.00	0.03	0.01	-0.01	-0.18	-0.12	0.09	-0.02
Investment	0.07	0.08	0.04	0.00	-0.12	0.04	0.26	0.45
Merchandise exports	0.00	0.00	0.01	0.01	-0.04	-0.03	0.16	0.60
Merchandise imports	-0.08	0.00	0.00	-0.05	-0.43	-0.29	0.00	-1.05
Inventory change (GDP points)	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.00
Value added price	-0.22	-0.18	-0.15	-0.13	-0.25	-0.60	-1.05	-3.69
Consumption price	-0.19	-0.16	-0.13	-0.12	-0.22	-0.53	-0.94	-3.35
Export prices	0.00	-0.03	-0.03	0.00	0.23	0.01	-0.74	-2.60
Import prices	0.00	-0.02	-0.03	-0.03	-0.04	-0.09	-0.23	-0.95
Wages	-0.18	0.11	0.33	0.48	0.54	0.15	-0.33	-2.72
Unit labour cost	-0.21	0.04	0.22	0.32	0.16	-0.43	-1.07	-3.69
Unemployment rate (% points)	0.00	0.01	0.03	0.07	0.28	0.38	0.37	0.33
Internal terms of trade	-0.03	-0.02	-0.02	-0.01	-0.03	-0.07	-0.11	-0.35
Real interest rate (points)	-0.03	0.01	0.01	0.00	-0.01	0.00	0.00	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	0.00	-0.03	-0.09	-0.15	-0.44	-0.58	-0.59	-0.55
Labour force	0.00	-0.02	-0.05	-0.08	-0.13	-0.17	-0.18	0.00
Current account (GDP points)	0.02	0.00	0.00	0.02	0.16	0.10	-0.07	0.03
Fiscal balance (GDP points)	0.01	0.05	0.06	0.07	0.04	0.02	0.05	0.15

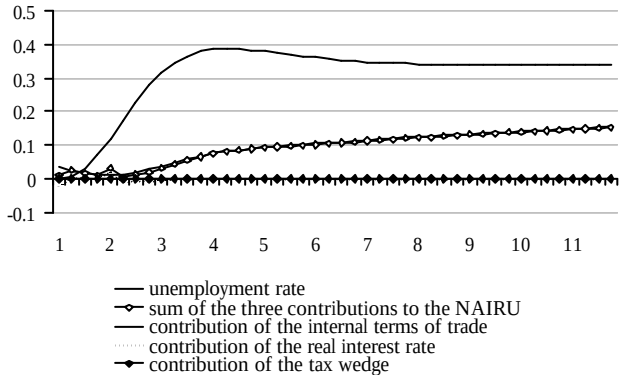
Volume



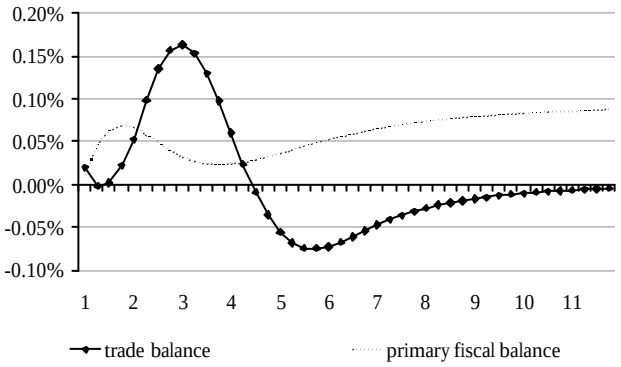
Prices



Unemployment rate



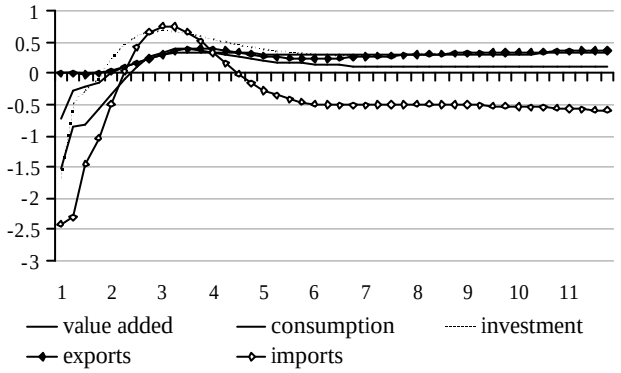
Trade and fiscal balances



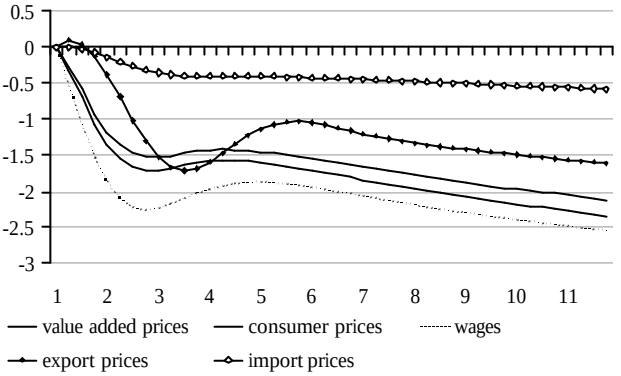
8.2.9 Increase of labour force by 1%

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.71	-0.28	-0.21	-0.14	0.25	0.34	0.29	0.54
Consumption	-1.54	-0.86	-0.83	-0.57	0.26	0.37	0.15	-0.02
Investment	-1.67	-0.48	-0.27	-0.09	0.67	0.59	0.32	0.54
Merchandise exports	0.00	0.00	-0.02	-0.01	0.24	0.39	0.24	0.72
Merchandise imports	-2.42	-2.31	-1.46	-1.04	0.66	0.51	-0.47	-1.26
Inventory change (GDP points)	0.00	-0.18	0.02	-0.02	0.05	0.02	-0.01	0.00
Value added price	0.00	-0.33	-0.69	-1.07	-1.70	-1.60	-1.68	-4.43
Consumption price	0.00	-0.28	-0.59	-0.92	-1.52	-1.45	-1.52	-4.02
Export prices	0.00	0.09	0.03	-0.12	-1.31	-1.68	-1.03	-3.12
Import prices	0.00	0.00	-0.03	-0.07	-0.31	-0.40	-0.41	-1.15
Wages	0.00	-0.55	-1.07	-1.54	-2.26	-2.03	-1.92	-4.43
Unit labour cost	0.60	-0.43	-0.96	-1.42	-2.17	-1.81	-1.64	-4.43
Unemployment rate (% points)	1.02	1.05	0.99	0.93	0.59	0.39	0.38	0.40
Internal terms of trade	0.00	-0.05	-0.10	-0.15	-0.19	-0.15	-0.16	-0.43
Real interest rate (points)	0.00	-0.05	-0.05	-0.04	0.04	-0.01	0.00	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.12	-0.15	-0.09	-0.03	0.34	0.56	0.58	0.54
Labour force	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Current account (GDP points)	0.56	0.56	0.35	0.24	-0.30	-0.32	0.04	0.03
Fiscal balance (GDP points)	-0.17	-0.12	-0.12	-0.11	0.02	0.09	0.11	0.18

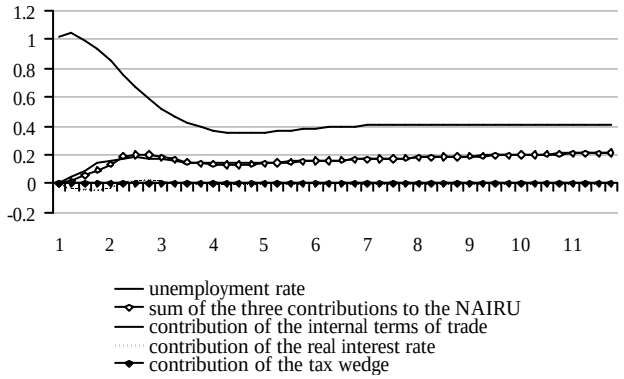
Volume



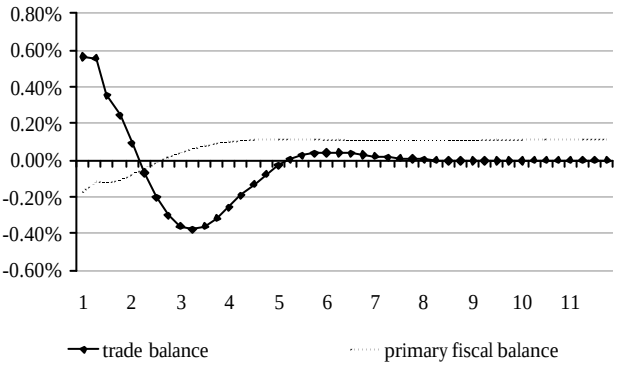
Prices



Unemployment rate



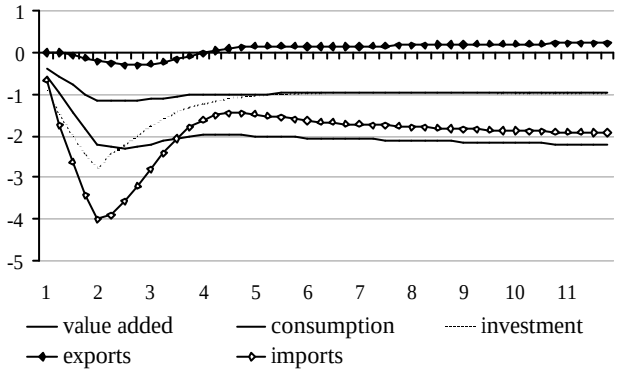
Trade and fiscal balances



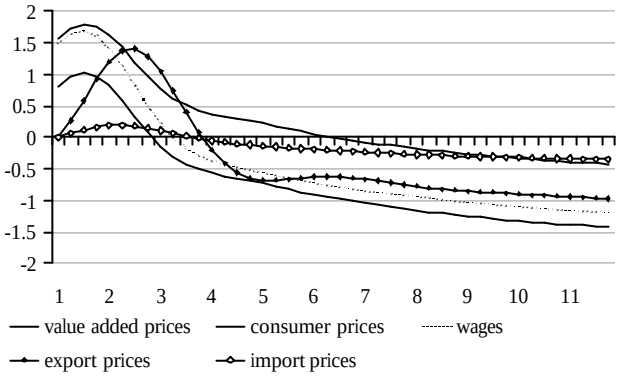
8.2.10 Increase of 1 point of production taxes

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.39	-0.58	-0.79	-1.00	-1.15	-1.04	-0.98	-1.25
Consumption	-0.59	-0.98	-1.44	-1.85	-2.27	-2.02	-2.04	-2.27
Investment	-0.91	-1.49	-2.02	-2.47	-2.00	-1.32	-0.99	-1.25
Merchandise exports	0.00	0.00	-0.06	-0.13	-0.32	-0.09	0.15	-0.10
Merchandise imports	-0.65	-1.74	-2.63	-3.43	-3.22	-1.80	-1.59	-1.38
Inventory change (GDP points)	0.00	-0.08	-0.08	-0.11	-0.05	0.01	0.00	0.00
Value added price	0.81	0.96	1.02	0.97	0.08	-0.51	-0.86	0.65
Consumption price	1.56	1.70	1.78	1.74	0.97	0.43	0.10	1.46
Export prices	0.00	0.27	0.58	0.92	1.28	0.08	-0.64	0.45
Import prices	0.00	0.06	0.12	0.16	0.15	-0.02	-0.18	0.16
Wages	1.49	1.63	1.68	1.60	0.49	-0.29	-0.68	0.65
Unit labour cost	1.73	1.89	1.97	1.92	0.50	-0.47	-0.88	0.65
Unemployment rate (% points)	0.04	0.13	0.25	0.39	0.76	0.77	0.73	0.75
Internal terms of trade	-0.74	-0.73	-0.74	-0.76	-0.89	-0.93	-0.95	-0.80
Real interest rate (points)	1.02	0.92	0.91	0.90	0.00	0.02	-0.01	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.15	-0.33	-0.51	-0.69	-1.15	-1.22	-1.17	-1.25
Labour force	-0.11	-0.19	-0.23	-0.26	-0.31	-0.37	-0.37	0.00
Current account (GDP points)	0.15	0.44	0.68	0.91	0.95	0.46	0.34	0.41
Fiscal balance (GDP points)	0.87	0.79	0.72	0.64	0.50	0.49	0.50	0.41

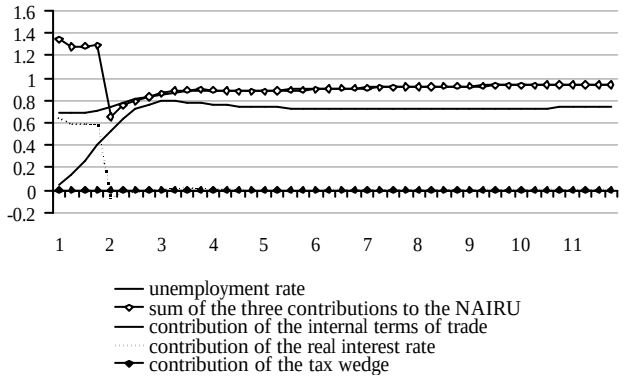
Volume



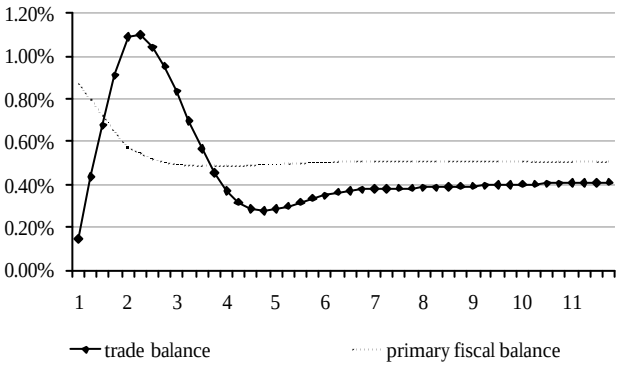
Prices



Unemployment rate



Trade and fiscal balances



8.3 Annex 3: Results of analytical simulations (with a Philips specification)

8.3.1 Increase in public expenditure equivalent to 1% of baseline GDP

8.3.2 Increase in the rate of income tax of 1 point

8.3.3 Increase of world demand by 1%

8.3.4 Depreciation of the nominal exchange rate by 10%

8.3.5 Increase of nominal interest rate by 100 basis points

8.3.6 Increase of the price of raw materials by 10%

8.3.7 Ex-ante increase of wages by 1%

8.3.8 Increase of labour efficiency by 1%

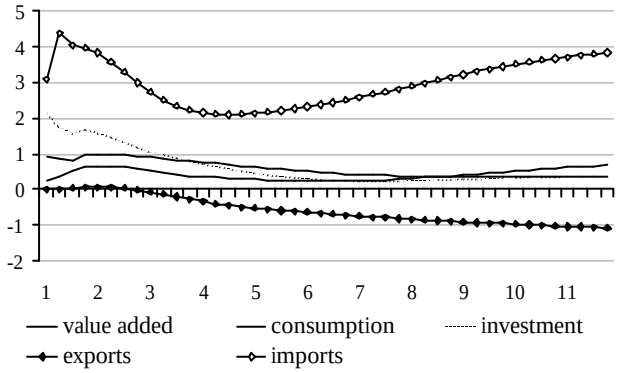
8.3.9 Increase of labour force by 1%

8.3.10 Increase of 1 point of production taxes

8.3.1 Increase in public expenditure equivalent to 1% of baseline GDP

Quarter	1	2	3	4	8	12	20	Long-run
GDP	0.89	0.83	0.82	0.93	0.91	0.79	0.53	0.00
Consumption	0.26	0.36	0.50	0.61	0.55	0.37	0.25	1.28
Investment	2.10	1.74	1.55	1.68	1.18	0.78	0.32	0.00
Merchandise exports	0.00	0.00	0.03	0.04	-0.02	-0.28	-0.62	-2.12
Merchandise imports	3.09	4.38	4.04	3.96	2.99	2.22	2.26	5.98
Inventory change (GDP points)	0.00	0.23	0.09	0.09	0.02	-0.01	-0.01	0.00
Value added price	0.00	0.07	0.23	0.51	1.70	2.59	4.21	14.44
Consumption price	0.00	0.06	0.20	0.43	1.49	2.30	3.77	12.99
Export prices	0.00	-0.11	-0.19	-0.24	0.32	1.52	2.89	9.90
Import prices	0.00	0.00	0.01	0.02	0.22	0.47	0.90	3.50
Wages	0.01	0.07	0.21	0.47	1.79	2.91	4.76	14.45
Unit labour cost	-0.73	-0.45	-0.21	0.02	1.55	2.74	4.50	14.44
Unemployment rate (% points)	-0.04	-0.12	-0.22	-0.30	-0.45	-0.40	-0.17	0.00
Internal terms of trade	0.00	0.01	0.03	0.07	0.20	0.28	0.42	1.28
Real interest rate (points)	0.00	0.01	0.02	0.04	-0.01	0.00	0.01	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	0.15	0.30	0.40	0.48	0.67	0.62	0.28	0.00
Labour force	0.10	0.17	0.16	0.15	0.18	0.18	0.04	0.00
Current account (GDP points)	-0.71	-1.02	-0.95	-0.94	-0.69	-0.39	-0.26	-0.60
Fiscal balance (GDP points)	-0.80	-0.79	-0.78	-0.75	-0.70	-0.70	-0.77	-0.98

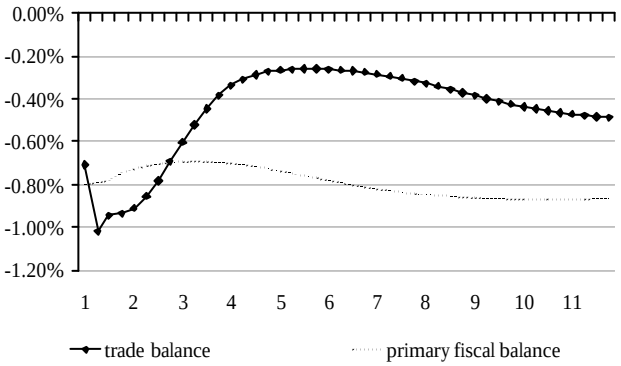
Volume



Prices

Unemployment rate

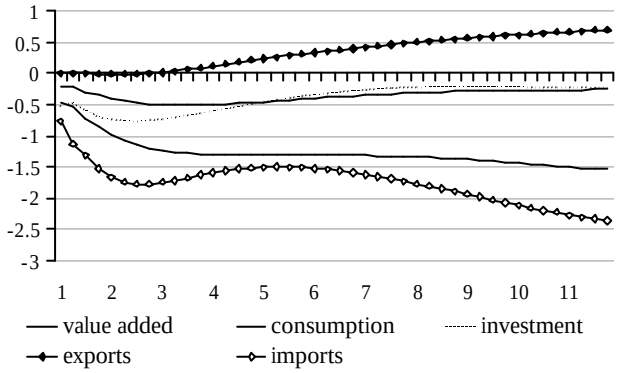
Trade and fiscal balances



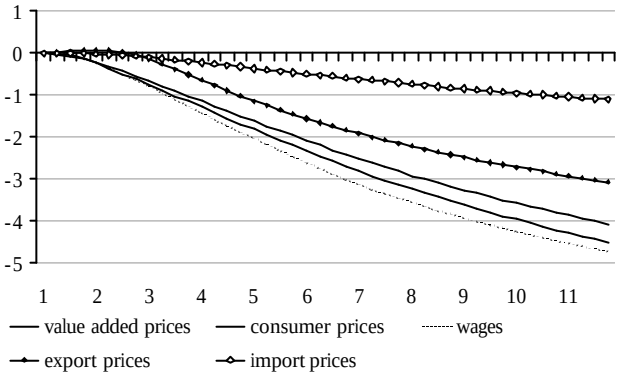
8.3.2 Increase in the rate of income tax of 1 point

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.22	-0.23	-0.29	-0.36	-0.49	-0.51	-0.42	0.00
Consumption	-0.48	-0.54	-0.73	-0.86	-1.19	-1.29	-1.32	-1.99
Investment	-0.52	-0.48	-0.59	-0.69	-0.75	-0.64	-0.37	0.00
Merchandise exports	0.00	0.00	-0.01	-0.01	-0.01	0.09	0.31	1.45
Merchandise imports	-0.76	-1.13	-1.31	-1.52	-1.78	-1.63	-1.51	-3.81
Inventory change (GDP points)	0.00	-0.06	-0.03	-0.04	-0.03	-0.01	0.00	0.00
Value added price	0.00	-0.02	-0.06	-0.14	-0.62	-1.15	-2.19	-8.66
Consumption price	0.00	-0.02	-0.05	-0.12	-0.54	-1.02	-1.96	-7.87
Export prices	0.00	0.03	0.05	0.07	-0.04	-0.51	-1.45	-6.14
Import prices	0.00	0.00	0.00	-0.01	-0.07	-0.19	-0.46	-2.28
Wages	0.00	-0.02	-0.06	-0.13	-0.63	-1.26	-2.46	-8.66
Unit labour cost	0.18	0.13	0.12	0.07	-0.45	-1.12	-2.31	-8.66
Unemployment rate (% points)	0.01	0.03	0.06	0.09	0.20	0.23	0.17	0.00
Internal terms of trade	0.00	0.00	-0.01	-0.02	-0.08	-0.13	-0.23	-0.85
Real interest rate (points)	0.00	0.00	-0.01	-0.01	0.00	0.00	-0.01	0.00
Tax wedge	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Employment	-0.04	-0.08	-0.12	-0.16	-0.31	-0.37	-0.27	0.00
Labour force	-0.03	-0.05	-0.05	-0.06	-0.09	-0.11	-0.06	0.00
Current account (GDP points)	0.18	0.27	0.31	0.36	0.43	0.36	0.23	0.43
Fiscal balance (GDP points)	0.76	0.75	0.73	0.71	0.66	0.63	0.63	0.78

Volume

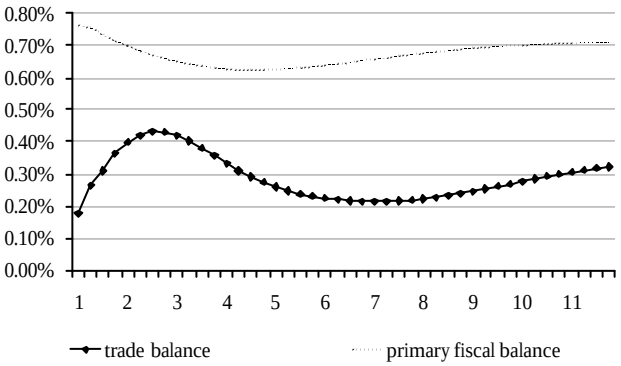


Prices



Unemployment rate

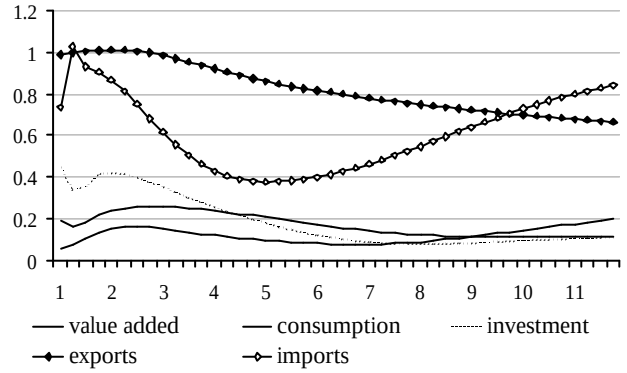
Trade and fiscal balances



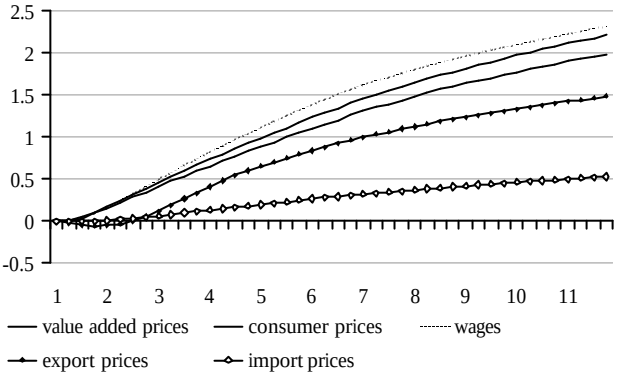
8.3.3 Increase of world demand by 1%

Quarter	1	2	3	4	8	12	20	Long-run
GDP	0.19	0.16	0.18	0.22	0.26	0.25	0.18	0.00
Consumption	0.06	0.07	0.11	0.14	0.16	0.13	0.09	0.41
Investment	0.45	0.34	0.36	0.42	0.38	0.28	0.13	0.00
Merchandise exports	0.99	1.00	1.01	1.01	1.00	0.94	0.83	0.30
Merchandise imports	0.74	1.03	0.93	0.91	0.68	0.46	0.39	1.57
Inventory change (GDP points)	0.00	0.04	0.02	0.02	0.01	0.00	0.00	0.00
Value added price	0.00	0.02	0.05	0.11	0.40	0.67	1.18	4.44
Consumption price	0.00	0.01	0.04	0.09	0.35	0.60	1.05	4.01
Export prices	0.00	-0.02	-0.04	-0.05	0.05	0.34	0.80	3.09
Import prices	0.00	0.00	0.00	0.00	0.05	0.12	0.25	1.11
Wages	0.00	0.01	0.04	0.10	0.41	0.74	1.33	4.44
Unit labour cost	-0.16	-0.09	-0.06	-0.02	0.33	0.68	1.25	4.44
Unemployment rate (% points)	-0.01	-0.03	-0.05	-0.06	-0.12	-0.12	-0.07	0.00
Internal terms of trade	0.00	0.00	0.01	0.02	0.05	0.08	0.12	0.41
Real interest rate (points)	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	0.03	0.06	0.08	0.11	0.18	0.19	0.11	0.00
Labour force	0.02	0.04	0.03	0.04	0.05	0.05	0.02	0.00
Current account (GDP points)	0.06	-0.01	0.01	0.02	0.07	0.16	0.23	0.16
Fiscal balance (GDP points)	0.05	0.04	0.05	0.06	0.09	0.09	0.08	0.01

Volume

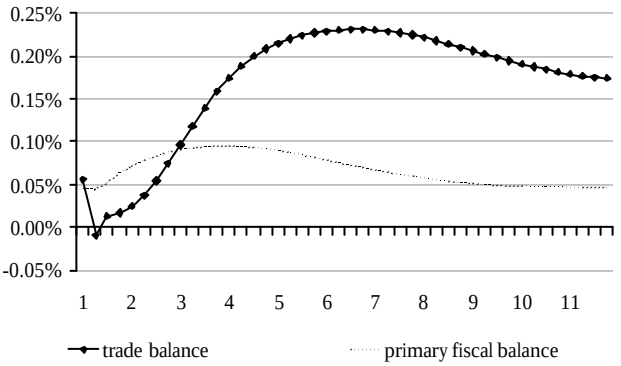


Prices



Unemployment rate

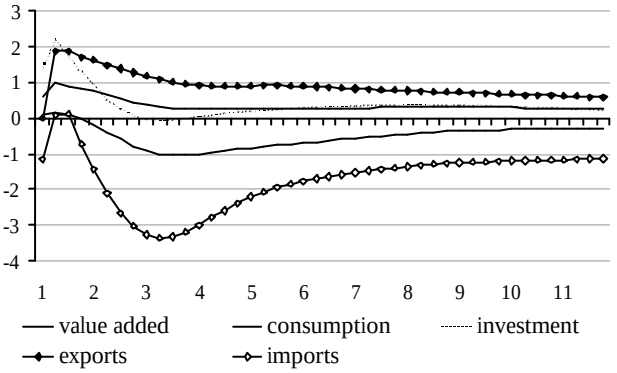
Trade and fiscal balances



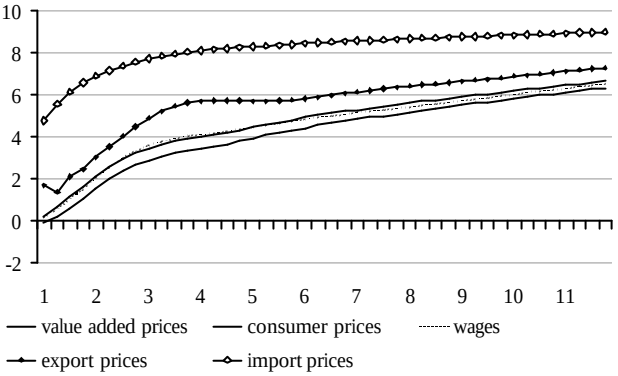
8.3.4 Depreciation of the nominal exchange rate by 10%

Quarter	1	2	3	4	8	12	20	Long-run
GDP	0.59	0.99	0.89	0.82	0.42	0.26	0.25	0.00
Consumption	0.07	0.13	0.08	-0.02	-0.78	-1.04	-0.73	0.00
Investment	1.40	2.20	1.69	1.28	0.07	-0.02	0.25	0.00
Merchandise exports	0.00	1.87	1.87	1.69	1.27	0.96	0.90	0.00
Merchandise imports	-1.18	0.08	0.11	-0.73	-3.04	-3.20	-1.86	0.00
Inventory change (GDP points)	0.00	0.05	0.10	0.03	-0.05	-0.03	0.01	0.00
Value added price	-0.01	0.24	0.60	1.05	2.70	3.34	4.34	10.00
Consumption price	0.26	0.72	1.17	1.66	3.27	3.91	4.84	10.00
Export prices	1.74	1.40	2.13	2.48	4.50	5.63	5.78	10.00
Import prices	4.79	5.59	6.16	6.58	7.60	8.06	8.42	10.00
Wages	0.18	0.59	1.07	1.57	3.36	4.04	4.78	10.00
Unit labour cost	-0.34	-0.19	0.46	1.05	3.04	3.63	4.28	10.00
Unemployment rate (% points)	-0.02	-0.07	-0.15	-0.20	-0.10	0.10	0.14	0.00
Internal terms of trade	-0.27	-0.48	-0.57	-0.59	-0.55	-0.55	-0.47	0.00
Real interest rate (points)	0.01	0.23	0.33	0.37	-0.05	-0.08	-0.05	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	0.07	0.21	0.28	0.29	0.11	-0.13	-0.22	0.00
Labour force	0.05	0.13	0.12	0.08	0.00	-0.03	-0.05	0.00
Current account (GDP points)	-0.42	-0.53	-0.48	-0.32	0.36	0.48	0.06	0.00
Fiscal balance (GDP points)	0.16	0.29	0.29	0.29	0.20	0.13	0.07	0.00

Volume

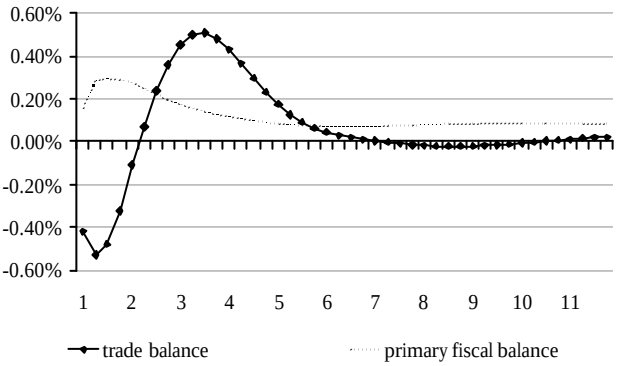


Prices



Unemployment rate

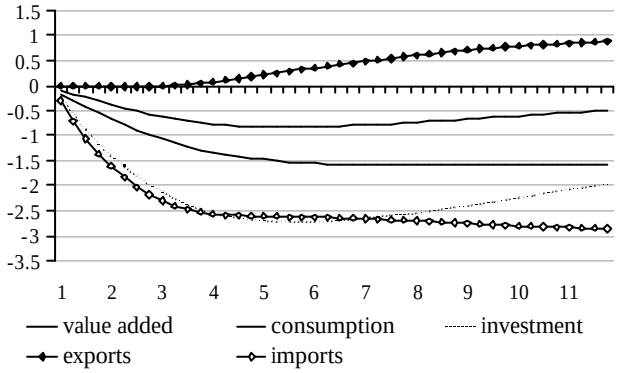
Trade and fiscal balances



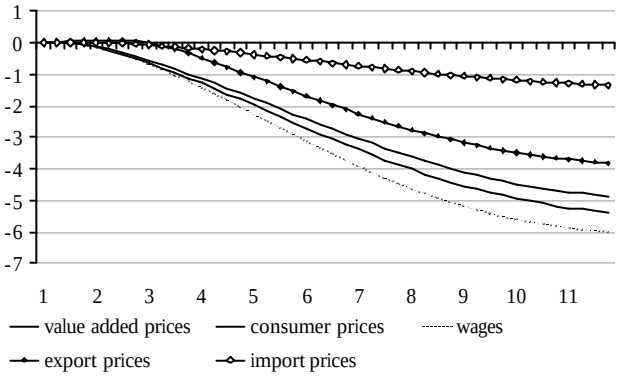
8.3.5 Increase of nominal interest rate by 100 basis points

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.09	-0.16	-0.24	-0.31	-0.57	-0.74	-0.83	-0.78
Consumption	-0.19	-0.29	-0.42	-0.54	-0.98	-1.28	-1.54	-1.50
Investment	-0.21	-0.58	-0.90	-1.17	-1.98	-2.47	-2.73	-1.95
Merchandise exports	0.00	0.00	0.00	-0.01	-0.01	0.05	0.32	0.34
Merchandise imports	-0.31	-0.70	-1.05	-1.36	-2.18	-2.53	-2.63	-1.93
Inventory change (GDP points)	0.00	-0.02	-0.03	-0.04	-0.04	-0.03	-0.01	0.00
Value added price	0.00	-0.01	-0.03	-0.08	-0.50	-1.11	-2.52	-2.09
Consumption price	0.00	-0.01	-0.03	-0.07	-0.43	-0.98	-2.25	-1.89
Export prices	0.00	0.01	0.03	0.05	0.03	-0.34	-1.55	-1.47
Import prices	0.00	0.00	0.00	0.00	-0.05	-0.17	-0.50	-0.54
Wages	0.00	-0.01	-0.03	-0.07	-0.51	-1.22	-2.90	-2.86
Unit labour cost	0.07	0.11	0.13	0.12	-0.25	-0.95	-2.60	-2.09
Unemployment rate (% points)	0.00	0.02	0.04	0.06	0.20	0.30	0.33	0.00
Internal terms of trade	0.00	0.00	0.00	-0.01	-0.06	-0.13	-0.27	-0.20
Real interest rate (points)	1.00	1.01	1.02	1.06	1.36	1.55	1.65	1.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.01	-0.04	-0.08	-0.12	-0.32	-0.47	-0.53	0.00
Labour force	-0.01	-0.03	-0.04	-0.05	-0.10	-0.14	-0.14	0.00
Current account (GDP points)	0.07	0.16	0.25	0.32	0.53	0.60	0.51	0.39
Fiscal balance (GDP points)	-0.02	-0.04	-0.06	-0.09	-0.18	-0.25	-0.33	-0.30

Volume

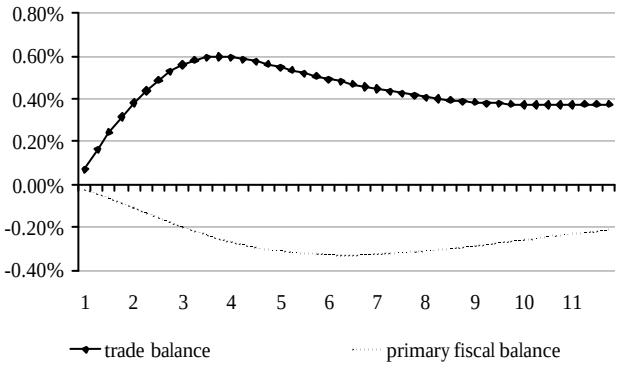


Prices



Unemployment rate

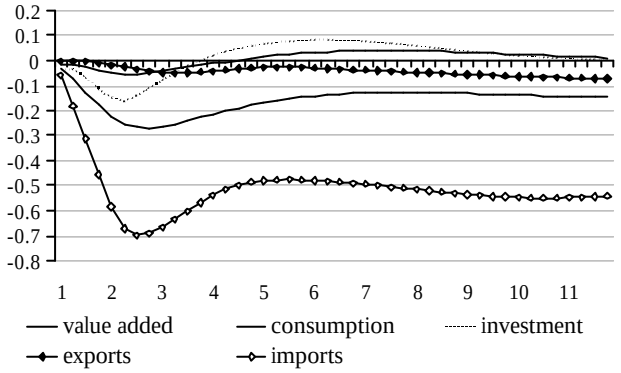
Trade and fiscal balances



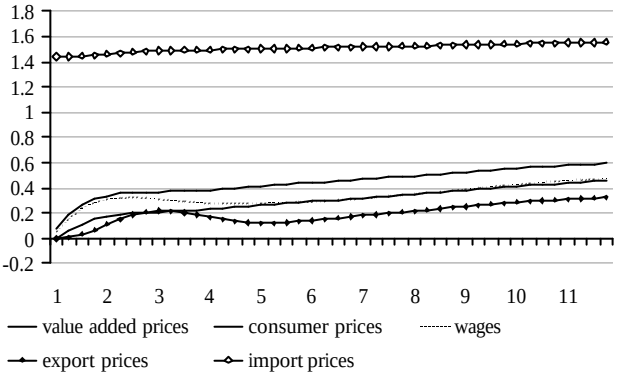
8.3.6 Increase of the price of raw materials by 10%

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.02	-0.01	-0.02	-0.04	-0.05	-0.02	0.03	0.00
Consumption	-0.04	-0.07	-0.12	-0.17	-0.27	-0.23	-0.15	-0.13
Investment	-0.04	-0.03	-0.07	-0.11	-0.11	0.00	0.08	0.00
Merchandise exports	0.00	0.00	0.00	-0.01	-0.04	-0.05	-0.03	-0.09
Merchandise imports	-0.06	-0.18	-0.31	-0.46	-0.69	-0.57	-0.48	-0.48
Inventory change (GDP points)	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00
Value added price	-0.01	0.06	0.11	0.15	0.21	0.22	0.28	0.57
Consumption price	0.08	0.19	0.26	0.31	0.37	0.38	0.44	0.70
Export prices	0.00	0.01	0.03	0.07	0.21	0.19	0.13	0.40
Import prices	1.44	1.44	1.44	1.45	1.48	1.49	1.51	1.59
Wages	0.05	0.15	0.24	0.28	0.32	0.28	0.28	0.57
Unit labour cost	0.06	0.14	0.22	0.26	0.25	0.19	0.22	0.57
Unemployment rate (% points)	0.00	0.01	0.02	0.03	0.07	0.07	0.02	0.00
Internal terms of trade	-0.08	-0.14	-0.15	-0.16	-0.16	-0.16	-0.15	-0.13
Real interest rate (points)	0.00	0.07	0.08	0.08	-0.02	-0.02	-0.01	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.01	-0.02	-0.04	-0.06	-0.11	-0.11	-0.03	0.00
Labour force	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03	0.00	0.00
Current account (GDP points)	-0.32	-0.28	-0.25	-0.21	-0.13	-0.18	-0.22	-0.21
Fiscal balance (GDP points)	0.00	0.01	0.01	0.00	-0.01	-0.01	0.00	0.00

Volume

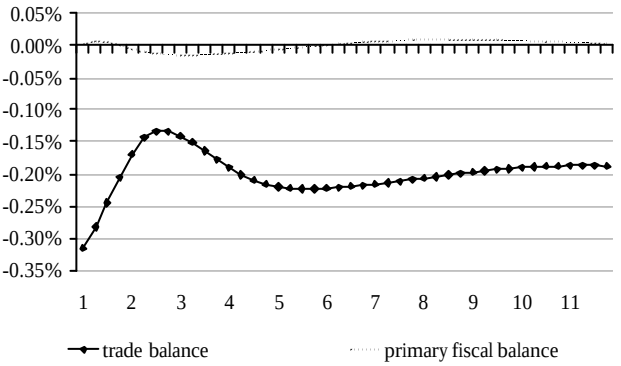


Prices



Unemployment rate

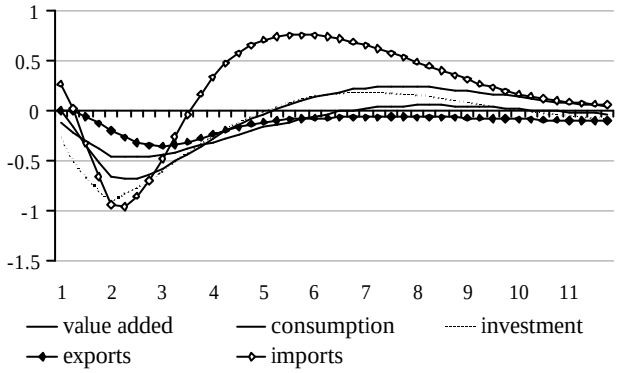
Trade and fiscal balances



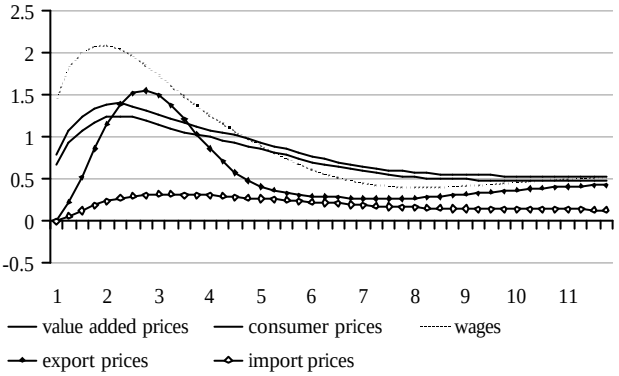
8.3.7 Ex-ante increase of wages by 1%

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.11	-0.22	-0.30	-0.38	-0.46	-0.34	-0.08	0.00
Consumption	0.00	-0.17	-0.34	-0.51	-0.65	-0.35	0.10	0.00
Investment	-0.27	-0.51	-0.66	-0.80	-0.70	-0.33	0.12	0.00
Merchandise exports	0.00	0.00	-0.05	-0.12	-0.34	-0.27	-0.08	0.00
Merchandise imports	0.27	0.02	-0.33	-0.66	-0.69	0.16	0.76	0.00
Inventory change (GDP points)	0.00	-0.01	-0.03	-0.03	-0.02	0.01	0.02	0.00
Value added price	0.80	1.08	1.25	1.35	1.33	1.13	0.81	0.00
Consumption price	0.67	0.93	1.09	1.19	1.20	1.03	0.74	0.00
Export prices	0.00	0.23	0.53	0.86	1.56	1.04	0.32	0.00
Import prices	0.00	0.06	0.13	0.19	0.31	0.31	0.24	0.00
Wages	1.46	1.84	2.00	2.08	1.86	1.37	0.68	0.00
Unit labour cost	1.47	1.83	1.95	2.00	1.58	0.99	0.46	0.00
Unemployment rate (% points)	0.03	0.09	0.17	0.27	0.49	0.46	0.19	0.00
Internal terms of trade	0.12	0.15	0.16	0.16	0.13	0.10	0.07	0.00
Real interest rate (points)	0.12	0.03	0.01	0.01	0.00	0.01	0.00	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.10	-0.23	-0.35	-0.46	-0.74	-0.72	-0.30	0.00
Labour force	-0.07	-0.13	-0.16	-0.17	-0.20	-0.21	-0.03	0.00
Current account (GDP points)	-0.07	0.02	0.14	0.25	0.34	0.06	-0.19	0.00
Fiscal balance (GDP points)	0.06	0.04	0.00	-0.04	-0.13	-0.14	-0.08	0.00

Volume

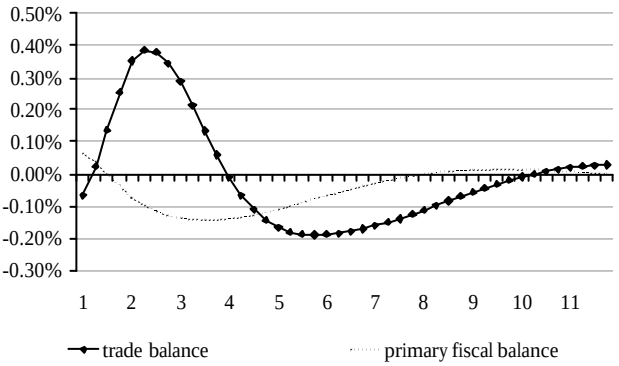


Prices



Unemployment rate

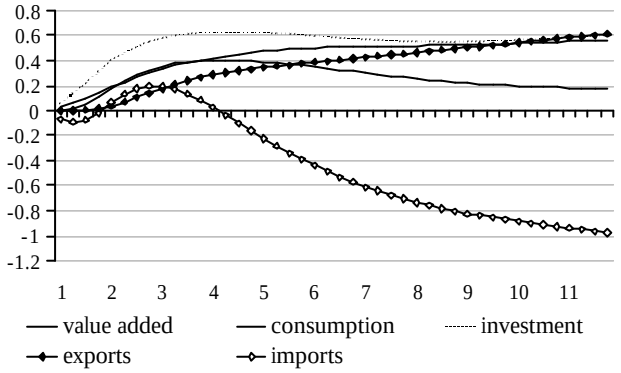
Trade and fiscal balances



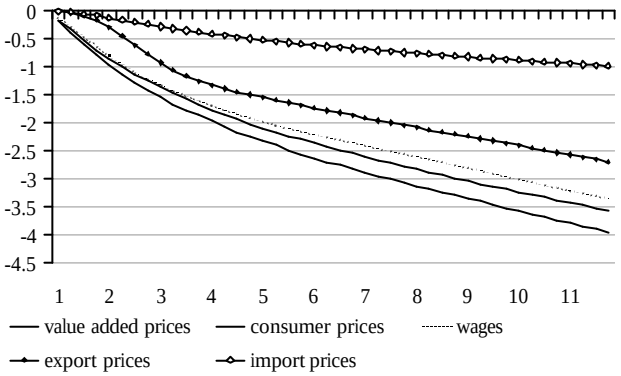
8.3.8 Increase of labour efficiency by 1%

Quarter	1	2	3	4	8	12	20	Long-run
GDP	0.03	0.06	0.10	0.14	0.30	0.41	0.50	1.00
Consumption	0.00	0.02	0.05	0.11	0.32	0.40	0.36	-0.12
Investment	0.06	0.14	0.23	0.31	0.55	0.62	0.60	1.00
Merchandise exports	0.00	0.00	0.01	0.02	0.14	0.27	0.38	1.49
Merchandise imports	-0.07	-0.09	-0.07	-0.02	0.20	0.09	-0.39	-2.63
Inventory change (GDP points)	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00
Value added price	-0.18	-0.39	-0.60	-0.79	-1.41	-1.86	-2.55	-8.87
Consumption price	-0.15	-0.33	-0.51	-0.69	-1.25	-1.67	-2.30	-8.07
Export prices	0.00	-0.02	-0.08	-0.17	-0.76	-1.25	-1.68	-6.30
Import prices	0.00	-0.01	-0.04	-0.08	-0.24	-0.38	-0.59	-2.34
Wages	-0.11	-0.28	-0.46	-0.63	-1.21	-1.60	-2.14	-7.96
Unit labour cost	-0.14	-0.35	-0.56	-0.78	-1.46	-1.90	-2.51	-8.87
Unemployment rate (% points)	0.00	0.00	0.01	0.00	-0.03	-0.06	-0.07	0.00
Internal terms of trade	-0.03	-0.06	-0.08	-0.10	-0.16	-0.20	-0.26	-0.87
Real interest rate (points)	-0.03	-0.03	-0.02	-0.02	0.00	0.00	0.00	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.01	-0.01	-0.01	0.00	0.05	0.10	0.12	0.00
Labour force	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.00
Current account (GDP points)	0.02	0.02	0.02	0.00	-0.11	-0.14	-0.06	0.06
Fiscal balance (GDP points)	0.01	0.03	0.04	0.05	0.10	0.14	0.18	0.33

Volume

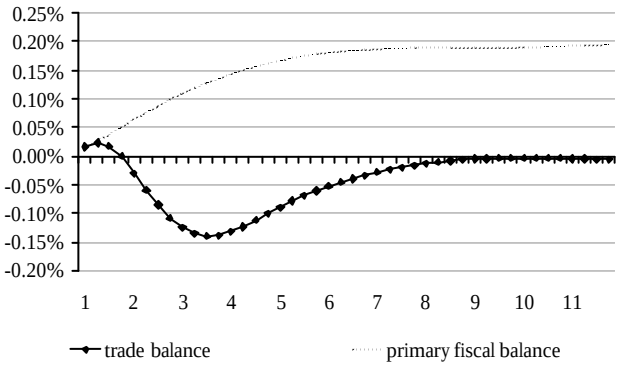


Prices



Unemployment rate

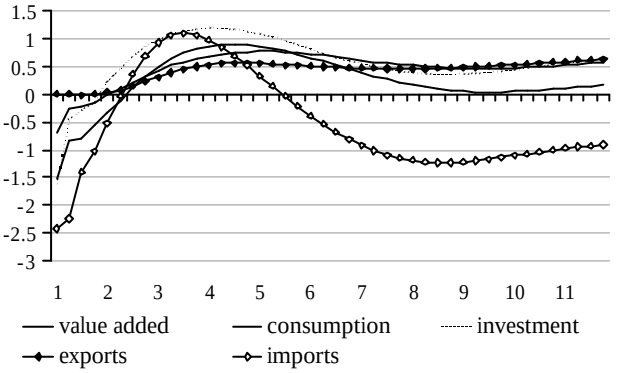
Trade and fiscal balances



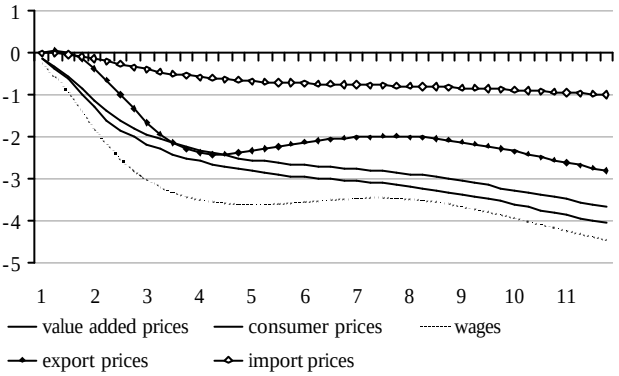
8.3.9 Increase of labour force by 1%

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.69	-0.27	-0.22	-0.16	0.33	0.64	0.75	1.00
Consumption	-1.52	-0.83	-0.82	-0.57	0.33	0.81	0.72	-0.12
Investment	-1.61	-0.45	-0.29	-0.13	0.86	1.18	0.89	1.00
Merchandise exports	0.00	0.00	-0.01	0.00	0.23	0.49	0.51	1.48
Merchandise imports	-2.43	-2.25	-1.40	-1.03	0.69	1.06	-0.22	-2.62
Inventory change (GDP points)	0.00	-0.18	0.02	-0.02	0.05	0.04	0.00	0.00
Value added price	-0.13	-0.35	-0.63	-0.98	-2.01	-2.49	-2.92	-8.83
Consumption price	-0.11	-0.30	-0.54	-0.85	-1.78	-2.23	-2.64	-8.03
Export prices	0.00	0.06	-0.01	-0.14	-1.33	-2.28	-2.17	-6.27
Import prices	0.00	-0.01	-0.03	-0.07	-0.32	-0.53	-0.71	-2.33
Wages	-0.23	-0.56	-0.94	-1.38	-2.79	-3.41	-3.57	-8.84
Unit labour cost	0.36	-0.43	-0.82	-1.25	-2.71	-3.15	-2.98	-8.83
Unemployment rate (% points)	1.00	1.03	0.99	0.94	0.54	0.08	-0.32	0.00
Internal terms of trade	-0.02	-0.05	-0.09	-0.13	-0.23	-0.26	-0.29	-0.87
Real interest rate (points)	-0.02	-0.03	-0.04	-0.04	0.02	0.00	0.00	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.10	-0.13	-0.09	-0.03	0.40	0.91	1.36	1.00
Labour force	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Current account (GDP points)	0.57	0.53	0.33	0.24	-0.30	-0.52	-0.16	0.06
Fiscal balance (GDP points)	-0.18	-0.11	-0.11	-0.10	0.00	0.12	0.25	0.33

Volume

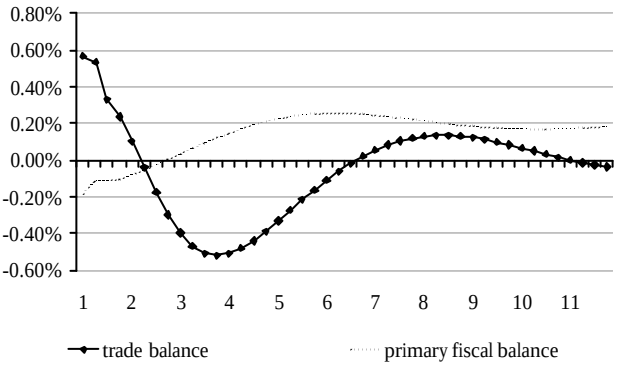


Prices



Unemployment rate

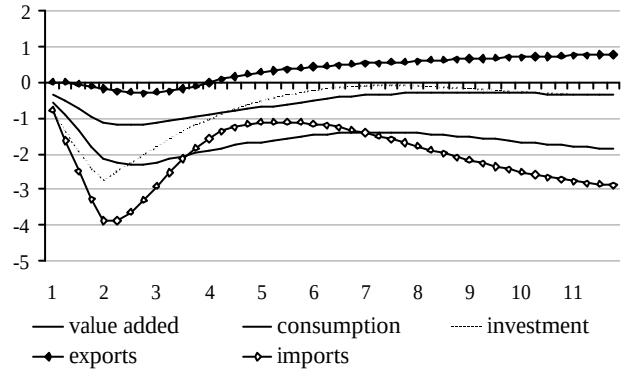
Trade and fiscal balances



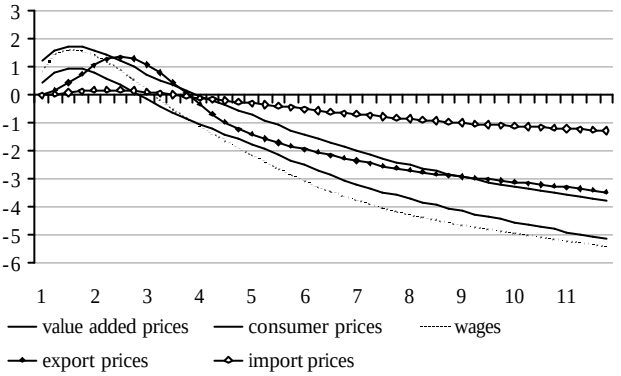
8.3.10 Increase of 1 point of product taxes

Quarter	1	2	3	4	8	12	20	Long-run
GDP	-0.34	-0.54	-0.76	-0.96	-1.16	-0.98	-0.56	0.00
Consumption	-0.59	-0.90	-1.37	-1.78	-2.30	-1.98	-1.53	-2.41
Investment	-0.80	-1.39	-1.95	-2.42	-2.05	-1.19	-0.29	0.00
Merchandise exports	0.00	0.00	-0.04	-0.10	-0.31	-0.10	0.39	1.76
Merchandise imports	-0.77	-1.64	-2.49	-3.28	-3.31	-1.84	-1.13	-4.59
Inventory change (GDP points)	0.00	-0.07	-0.08	-0.10	-0.05	0.01	0.02	0.00
Value added price	0.47	0.83	0.95	0.94	0.11	-0.82	-2.32	-10.39
Consumption price	1.27	1.59	1.71	1.71	1.00	0.15	-1.22	-8.67
Export prices	0.00	0.17	0.45	0.78	1.30	0.05	-1.82	-7.39
Import prices	0.00	0.04	0.09	0.14	0.15	-0.04	-0.44	-2.76
Wages	0.86	1.47	1.61	1.59	0.55	-0.80	-2.83	-10.39
Unit labour cost	1.09	1.73	1.92	1.92	0.57	-0.97	-2.83	-10.39
Unemployment rate (% points)	0.03	0.10	0.22	0.35	0.76	0.74	0.35	0.00
Internal terms of trade	-0.79	-0.75	-0.74	-0.76	-0.88	-0.98	-1.12	-1.88
Real interest rate (points)	0.97	0.96	0.92	0.91	-0.01	0.01	-0.01	0.00
Tax wedge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment	-0.11	-0.28	-0.46	-0.64	-1.14	-1.16	-0.56	0.00
Labour force	-0.08	-0.17	-0.22	-0.26	-0.31	-0.33	-0.08	0.00
Current account (GDP points)	0.18	0.40	0.62	0.85	0.97	0.47	0.06	0.52
Fiscal balance (GDP points)	0.84	0.81	0.74	0.66	0.51	0.48	0.58	0.83

Volume



Prices



Unemployment rate

Trade and fiscal balances