A MACROECONOMIC EVALUATION OF THE SPANISH MONETARY POLICY TRANSMISSION MECHANISM

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Abstract

The monetary policy transmission mechanism is analyzed in this paper with the help of a relatively standard macroeconometric model of the Spanish economy. A temporary increase in policy-set interest rates under different exchange rate regimes is simulated, and a careful decomposition of the channels of transmission of the shock is performed. The exercise highlights the importance of both business investment and the exchange rate in the transmission process. The influence of the business cycle is also taken into consideration.

0. Introduction

The present document describes the impact of a monetary shock simulated with the MOISEES model, and summarises the conclusions that can be drawn from the exercise. The original definition of the shock, suggested by the BIS, envisaged a temporary and a permanent interest rate increase both with fully flexible and fixed exchange rates. The experiment had to be carried out with the macroeconomic models of a number of central banks, and an important aspect was to differentiate clearly between the responses attributable to the structure of the models and to the true underlying financial structures.

The two simulations outlined in the document exactly match the final agreed-upon definition of the shocks: a temporary increase in the (nominal) intervention rate in 1994-1995, and an immediate return to baseline; and the same exercise with a path of foreign interest rates compatible with a stable nominal exchange rate. Further evidence is gathered by decomposing the channels of transmission of the shock.

The note is structured as follows. A first section, following this one, will outline the general properties of the MOISEES model. The particularities of the model will be linked to its background: the specific needs it was to cover, and its usage. A brief explanation of some of its most important blocks will be given, with special emphasis on the financial block, and the most important planned improvements will be summarised. A second section will discuss the actual simulations performed, and the changes in the model that a proper handling of the exercise made necessary. Results of the chosen simulations will be discussed in this section, as will further evidence gathered through additional experimentation. A third section will describe an attempt at decomposing the most important channels of transmission of the monetary shock, and their relation to the true underlying channels, indicating the most troublesome points of the procedure. The last section will summarise the main conclusions of the exercise.

1. General structure of the model.

1. 1. General background to the model.

The MOISEES model was first estimated in the Spanish Ministry of Economy at the end of the eighties. Its main use there was to simulate alternative scenarios, always with a baseline constructed around a forecast not directly related to the model itself. The rationale behind its structure was that a small, highly aggregated general-equilibrium model was better suited to the calibration of fiscal policy than a huge macroeconomic model or a host of small partial-equilibrium models. The fiscal sector, or fiscal block, of the model was large relative to the rest of the model, as this was one of the characteristics that could help in introducing specific fiscal policy shocks into the model. The monetary block, on the other hand, was extremely poor due to the lack of financial structure, as this was not a major issue at the Ministry.

The model was lent to the Bank of Spain, where a major re-specification is being undertaken in order to turn it into a more manageable tool for monetary policy analysis. The Research Department of the Bank of Spain has other quantitative tools, and the model is not meant to replace all these but rather to complement them in those fields where it may have some advantages. In particular, the model is not used, nor will it be used in the near future, for regular monetary policy programming, for which partial-equilibrium, medium- to short-term models are preferred. The implication of this complementarity is that the model is not expected to depict the short-run impact of an alternative scenario as accurately as other tools at the Bank, while its long-run behaviour has to be carefully gauged as this is the field where the model can excel. The model is, as a consequence, increasingly becoming a long-run analysis tool. This is the justification of the widespread use of co-integration techniques in the re-estimation of the model.

The model is annual, with an historical database beginning in 1964, although some series go as far back as 1954. Most of the structure of the model closely follows the current National Accounts structure, the database being a homogenised version of the Spanish National Accounts based in 1986. As a consequence, the real economy (real output and demand) is better portrayed than the financial side of the economy. The MOISEES model is from this point of view a fairly standard macroeconomic model. We plan soon to introduce some Financial Accounts considerations as an important add-on to the structure of the model. These and other changes will be explained in a later section.

1. 2. Brief description of blocks in the model.

This section will give a rough description of the general structure of the model, and the different blocks incorporating it. Rather than going into detail, a comprehensive bibliographic reference will be given. All we need for this document is a general understanding of some key points of its structure that will help us in the comprehension of the transmission of the particular shock envisaged.

The model was built at the Ministry of Economy around a particular supply block that embraced the idea that the economy is bound to undergo all kinds of shortages. Three types of shortage were envisaged for individual firms: a shortage of demand, a shortage of labour supply and a shortage of capital stock. Aggregate supply was considered to undergo all three shortages to differing degrees, as the share of firms enduring a specific type of shortage is time-varying. The shortage of demand is considered to be a Keynesian regime, while a capital stock shortage is considered to be a potential-output regime and a shortage of labour supply a classical regime. The final outcome after aggregating firms is an economy where an equilibrium is never fully reached, as there will always be firms undergoing some kind of shortage. Within this framework, the interesting point is what kind of shortage is proportionately the most important. This is a key

consideration when judging if fiscal policy has to affect demand (a mostly Keynesian economy, or an economy under a strong Keynesian regime), the labour market (a mostly classical economy) or the capital markets (an economy nearing its potential output point). The underpinnings of this block are explained in full detail in other publications (see [1], [3] and [6]).

Another important block, both for understanding the model and for its great implications in the simulations that follow, is the wages-prices formation mechanism. Two equations concur in determining the price and nominal wage level, following the Layard-Jackman-Nickell framework. An explicit wage-bargaining process is modelled, and the relative strength of labour unions and firms is a key factor explaining the wage-price spiral. Other important factors are the tax wedge, productivity growth and the unemployment level. The short-run Phillips curve has explicitly some degree of slope. A problem with this type of framework is the indetermination of what sets the price level: at first glance it seems that the general price level is fully determined in the labour market; but this may be misleading, as in a general-equilibrium framework both equations may only be explaining the wage-price spiral, but not the specific level at which it is happening. This particular point was worth testing thoroughly, and after much experimentation the conclusion was reached that the price level was uniquely determined by the level of liquid assets. The model was found to have a neutral monetary policy in the long-run (see [10]).

The demand block is quite standard: a private consumption equation, a business and a residential investment equation, and equations for both imports and exports. A relevant fact in the consumption equation is the particular role played by wealth; wealth as included in the model embraces all forms of assets in private hands. In particular, it includes all liquid asset holdings, not netted out with credits, implying strongly non-rational agents. This is not the case, as the variable has been included in the equation to ensure that a long-run unit elasticity of consumption and disposable income is achieved. As will

be shown later, the long-run impact of wealth on consumption is not an outstanding feature in the simulations. This is not the case in the short-run, though. Accelerations in wealth greatly affect the short-run behaviour of consumption, and this is mainly felt in the second year after a monetary shock is given. This factor may be more related to the model than to the real economy, as alternative specifications of the equation, particularly when net financial wealth is included, change this behaviour significantly.

The business investment equation is much more straightforward, and its response seems to capture well the general behaviour of this aggregate. Residential investment, however, lacks a proper housing prices variable, although this may be a factor of secondary importance. Unfortunately, the model lacks endogenous mortgage rates.

The trade balance is determined by one equation explaining imports, and another explaining exports of goods and services excluding tourism. This exclusion may be relevant once the exchange rate is allowed to move. Both equations show great sensitivity to changes in competitiveness, and imports show a significant short-run response to changes in business investment, a most relevant factor affecting the outcome of most of the simulations carried out with the model.

The fiscal block has no behavioural equations, but it has a lot of reaction functions that attempt to mirror some of the simplest rules followed by the fiscal authorities in setting spending. These rules vary with the particular component, but most of them are set as a proportion of lagged nominal GDP (implying a decision rule that sets spending the year before it is actually spent). Government revenues react to the economic situation in a quite automatic way, the only exception being direct taxes. Indirect taxes, social security revenues and other important components are directly linked to the variables they tax (consumption, employee compensation, etc). Direct taxes, on the other

hand, are linked to nominal GDP with an elasticity implying a positive and lasting effect of inflation. This relatively strong non-neutrality of direct taxes has far-reaching implications in the long-run behaviour of the model. This matter will be thoroughly addressed. The final picture is that of real spending and revenues with some degree of inertia in nominal terms. The implications are that the government is impacted in the short run by a fall in inflation.

Net government interest payments are fully modelled, including an implied interest rate that closely follows the long-term interest rate of the model, and an endogenous debt.

A good general account of the full model may be found in [3].

1. 3. The financial block.

The financial block merits special attention. Its structure is unrealistically simple, first because of the aim the model was designed to fulfil, but also because of the important changes the financial markets endured until the late eighties, precluding a detailed description of the financial markets (see [11]). Lack of data was the main factor behind the original specification of this block.

Two possible monetary policy settings were defined: an exogenous long-term interest rate, or an exogenous M2 supply. When interest rates were stable, a demand for real M2 was included in the model; when M2 was exogenous, an equation linking the long-term interest rate to M2 (and other variables) replaced the other equation. Both were roughly the inverse of the other equation. A further equation explained the demand for liquid assets other than M2 included in ALP, the broadest aggregate. M2 was perfectly controlled by the monetary authority -once exogenous-, but the full aggregate ALP was always determined within the model. A PPP equation was used for the exchange rate, although most simulations were carried out with fixed nominal exchange rates.

This particular financial block is being overhauled, with the inclusion of a demand for ALP compatible with the standard framework at the Bank of Spain, the inclusion of credit demand, and a full endogenisation of net financial wealth. Carrying out the current exercise with liquid assets modelled as two separate components, though, is not a major problem, as its goal is carefully to decompose the channels of transmission of monetary policy. Our purpose is to analyse the agents' decision-taking process, not to try to forecast the behaviour of a particular monetary aggregate.

Ongoing financial deregulation in Spain has had a strong impact on the conduct of monetary policy. The general framework used for the current exercise, for which the block has been revised, is that of a central bank that issues or withdraws money through the interbank lending market. The central bank controls the money it supplies adjusting an intervention rate (the 3-month interbank lending rate, one of the most directly affected by actual intervention rates, see [2]), the only short-term interest rate appearing in the model. The other two important interest rates that have a role in the model, the banking institution deposits rate and the medium- to long-term public debt implied rate -including only public debt in domestic private hands-, react to changes in the intervention rate and the short-term interest rate of the DM and Dollar in the Euromarket. The implied rate of the gross public debt moves closely in line with the long-term interest rate. This framework is only valid starting in the latter half of the eighties, so the new equations included in the model cover a short span of time, and their statistical strength is a matter for conjecture. It is, though, as good a representation of the current procedure for conducting monetary policy as can be obtained today.

There is some criticism as to the appropriateness of the financial block described. First, because data on monetary aggregates -starting in 1964- include a long period of strong government intervention and barely significant financial markets. Interest rates of all kinds, too,

were mainly set by the authorities. Second, because the extremely recent but deep-seated deregulation process is still affecting the elasticities in the equations involved in the block, and may strongly affect the size and timing of the simulated shock for the period for which the simulations have been carried out. In order to ease this issue, some experimentation was performed with other models used in the Research Department of the Bank of Spain, and a check was made that interest rate responses were very similar in all cases. As expected, there were some differences in the behaviour of the monetary aggregates (ALP) and in the impact of the simulated shock on real output and inflation, although the MOISEES model may be depicting these last two variables better.

1. 4. Planned improvements.

As mentioned, the model is undergoing a major revision. Its current version includes a totally new demand block, with equations not only re-estimated but re-specified: consumption is now split into durables and non-durables, although an equation for total consumption remains for certain specific simulations; residential investment includes a housing price variable linked to financial variables; imports are split into energy and non-energy imports, etc. The supply block is being totally rewritten in a more traditional framework, placing special emphasis on explicitly modelling a tradables and a non-tradables (protected) sector. The financial block will be re-estimated along the lines defined by the financial model used for monetary programming, and will explicitly model the behaviour of banking institutions, including both the monetary aggregates and their counterparts - banking sector credits-, and the inter-relatedness of interest rates. The current exercise may serve as a stepping-stone in this process.

An additional but important improvement ranking high on our agenda is the change of data frequency. Most of the new equations have been estimated in both annual and quarterly data. Unfortunately, the

Spanish Quarterly National Accounts are still incomplete.

2. Simulations.

Besides the changes and improvements currently being introduced into the model, the relative scantness of its current financial block prompted the idea that some sort of enrichment was needed for this exercise. First, it was necessary to link the exchange rate to the foreign interest rate differential. Next, the transmission mechanism linking the intervention rate and other domestic interest rates had to be greatly improved, in order to substantiate the overall behaviour of the financial block. Finally, the neutral fiscal policy envisaged in the first exposition of the exercise led us to experiment with different behaviours of direct taxes, as they are currently much too sensitive to the general (nominal) level of activity.

2. 1. Changes undertaken for the exercise.

The first step was to stretch the baseline until at least the year 2000. This was done by first tailoring the Bank of Spain forecast, closely in line with the government's convergence plan, to the requirements of the model; and further, to extend it to the year 2020, in order to be able to analyse the long-run behaviour of the model. We needed a reliable test of the long-run neutrality of a monetary shock, something we expect from our models, to increase our confidence in the outcome of the exercise. This check was made necessary by the changes implemented in the financial block that will be explained later.

Once this step had been covered, the exchange rate depreciation had to be related to changes in the foreign interest rate differential. The model originally included a PPP relationship, a not very helpful equation for this exercise but a tried and tested one. It was decided to use it to model agents' expectations about a future depreciation of the peseta, in order to avoid a future exchange rate irrevocably fixed by

monetary authorities. The changes included the modelling of expected currency depreciation with the help of the PPP equation, and the definition of an actual depreciation compatible with the expected future exchange rate and the interest rate differential. Agents in the economy perfectly forecast the exchange rate given the baseline monetary policy, and the current exchange rate is depreciated in order to ensure both that expectations are fulfilled and that actual depreciation coincides with the interest rate differential with the rest of the world. As agents never forecast the monetary policy (they always think it will return to baseline), the monetary authority is able to appreciate the peseta by a given amount, but at the cost of ever increasing domestic interest rates. It should be stressed that agents never revise their expected future monetary policy, but they adjust their exchange rate expectations should this policy actually change. This means that the credibility of the monetary authorities never changes but always coincides with the credibility level implied in the baseline.

Another absolutely necessary change was to streamline better the relationships among different domestic interest rates. The model originally had two possible monetary policy settings: either the central bank decided on the level of supply of M2, or the decisions were taken in terms of stabilising the long-term interest rate. The deposits rate was then linked to the long-term rate by a simple reaction function. The first step for improving this set-up was to include a short-term interest rate, for which the 3-month intervention rate was chosen, and to include statistically-sound equations linking all the different interest rates. The mechanism finally implemented is the following: the long-term interest rate is set according to the domestic short-term interest rate (long-run coefficient of around 0.65) and the foreign interest rate (long-run coefficient of 0.35); the deposit rate is explained by the short-term and long-term interest rates, the former with a greater weight.

Other changes considered but not finally adopted were a more

neutral fiscal policy and the definition of monetary policy targeting in terms of real as opposed to nominal interest rates. Direct taxes as modeled are not only affected by the level of activity; they are also very sensitive to changes in inflation. Their first re-specification embodied inflation-neutral direct taxes, but historical data did not support this as a good mechanism to isolate them from inflation; an ad-hoc gradual return to baseline deficit over GDP was then tried, but the response was slow and mainly felt beyond the year 2000. Finally, direct taxes were left untouched.

2. 2. Description of the simulated shocks.

The two exercises finally undertaken incorporated all the changes described. They are a temporary increase in the intervention rate of 100 basis points in 1994 and 1995, and an immediate return to baseline afterwards; and the same shock with a stable nominal exchange rate, thanks to a suitable path of foreign interest rates. Results are presented for the period 1994 to 2000, although simulations have spanned the full baseline length. It is worth noting that the way the exchange rate has been modeled precludes a simple exogenisation of the variable (as the PPP equation now plays the role of the expectations-formation mechanism); alternatively, it was preferred to endogenise[1] the foreign interest rate in order to neutralise the two factors affecting the exchange rate in the model: the interest rate differential in the short run, and the inflation differential in the long run. Obviously, this has consequences that affect the whole simulation.

2. 3. Summary of simulation results.

As the two simulations have many points in common, it is probably preferable to give a broader account of the first one, which we think is

[1] Rather, the exchange rate equation was inverted in order to have the foreign interest rate as the left-hand variable.

the most appropriate. The second simulation will be discussed only when significant departures arise. The last sub-section will address additional evidence obtained by repeating the simulations with small changes in the shock definition, the specification of the model or the time horizon.

2. 3. 1. Asymmetric simulation.

Results of the first simulation will be discussed adhering closely to the structure of tables II and III.

2. 3. 1. 1. Table II.

As previously stated, the 3-month interbank lending rate will play in these simulations the role of the policy-set intervention rate. As it is the only short-term interest rate included in the model, the first two lines of the table coincide. They directly show the simulated shock.

The long-term interest rate is the medium- to long-term public debt interest rate. It is linked to the domestic and foreign short-term interest rates, increasing some 65 basis points given a sustained shock such as the simulated one. The dynamics of the equation prevent a full impact from being reached, increasing only 48 basis points in 1995 before beginning a gentle return to baseline.

Deposit rates are somewhat less sensitive to the short-term interest rate, but short-run dynamics are stronger. This is the factor explaining the greater inertia of these rates as compared to the long-term rates. They, too, gently return to baseline once the shock is reversed.

Real interest rates are more sluggish than their nominal counterparts. This is something arguably legitimate, as nothing prevents real interest rates from having more inertia in the short run

than nominal interest rates. But it is worth pointing out that the return of real interest rates to baseline is faster if the real intervention rate is the variable targeted by the monetary authority. Real interest rates rebound after 1996, a move generated by the reversal of the shock in that year, but this rebound slowly subsides afterwards. The user cost of capital moves broadly in line with the long-term real interest rate.

The nominal exchange rate moves according to two factors: the increase in domestic interest rates and the fall in domestic inflation. The real exchange rate virtually mimics the short-term interest rate behaviour, as should be expected. The small differences arise because of the dynamics in the PPP equation, a full return to baseline being achieved after the year 2000.

The new path of the wealth variable is mainly explained by changes in households' liquid assets holdings.

Net interest and dividend payments in the household sector move in line with changes in deposit rates and money demand. Dividend payments in real terms react to changes in real economic activity, but are on the other hand not very sensitive to interest rates. They may be under-reacting in this simulation, but changes in their equation, although considered, have finally been dropped. Net interest and dividend payments abroad move in line with the exchange rate; their inclusion in the table is only for the sake of completeness.

Two measures of real monetary aggregates are shown: ALP (roughly equivalent to M4) and M2. ALP moves in line with M2, one of their components, but liquid assets other than M2 strongly affect them. M2 falls as the alternative interest rate increases (there is no M2 'own' interest rate in the model), and reverts to baseline when this movement is reversed. ALP bounces back, as a consequence, because of the implied movement in liquid assets other than M2. These other liquid assets jump -mainly in the second year- as their own interest rate

increases, make a gentle return to baseline afterwards, and finally shoot up again thanks to the fall in inflation. As inflation falls, part of the household assets' demand shifts to liquid assets.

2. 3. 1. 2. Table III.

GDP falls slightly for the whole period, a tendency towards a return to baseline appearing at the end of the simulation. The fluctuations it suffers, though, are odd-looking. Two factors explain this: the behaviour of consumption, and particularly its sensitivity to changes in wealth; and the behaviour of imports, itself mainly linked to changes in business investment. GDP falls the first year by 0.05%, almost returns to baseline the following year, has a stronger negative impact on the fourth year, and gently returns to baseline afterwards. Although many of these movements can be explained by the consumption path, they are misleadingly small thanks to the trade balance behaviour: the fall in domestic demand these years is much stronger. The trade balance is itself driven by imports, which are extremely responsive in the short run to changes in business investment. As can be seen, the fall in business investment almost parallels the fall in imports, both factors almost cancelling each other out.

The most troublesome GDP component is no doubt private consumption. It is negatively affected by the increase in interest rates, but positively affected by the increase in financial wealth and dividend and interest payments to households. The appreciation of domestic currency helps further to explain its behaviour. The final outcome is a wandering path for consumption, sometimes above baseline, sometimes under it. The two cases when consumption departs most from its original values, in 1995 and 1997, arise when the full impact of the increase in wealth (1995) or its fall (1997) is felt, wealth being directly affected by changes in the monetary policy. Other major determinants of the increase in consumption in the final years are the ever-falling direct taxes, the main factor explaining the increase in disposable

income these years.

Government expenditure (government consumption plus investment) first increases then decreases, very gently in both cases. The main factor behind this is the nominal rigidity affecting most of the expenditure components in the model. Expenditures such as welfare benefits, government investment, and others, are affected by unforeseen changes in inflation.

Total gross private investment falls, driven mainly by business investment, as residential investment increases slightly as a result of the increase in household disposable income. The fall in business investment arises because of the fall in GDP and the increase in the user cost of capital. Changes in inventories are related to the gap between supply and demand, as both aggregates are independently determined in the model. Although inventories always return to baseline, they may be sluggish in doing so.

Exports closely follow the changes in competitiveness, losing ground in 1994-1995, and recovering afterwards. Real exports eventually return to baseline, but not before the end of the simulation, as the real exchange rate has not yet returned to base in 2000. Imports are strongly affected by the fall in business investment.

Inflation is constantly below base, but a return to its original values is ultimately achieved around the year 2008, the biggest difference from the baseline arising in 1998. The final effect on prices is, as a consequence, a negative step of about 2.5% of their baseline value. This process is fairly understandable, as the temporary increase in the intervention rate amounts to a negative permanent shift in money supply. The biggest drop in inflation occurs five years after the shock, but it is significant after some two years. One key point explaining price movements is the increasing gap between domestic producer prices and consumer prices, as the share of imports in consumption is

relatively large. This factor strongly helps to reduce labour costs measured in producer prices without detriment to the labour market, as pay measured in terms of the consumption deflator is only marginally affected. The only thing preventing a stable real wage in CPI terms is the slightly higher unemployment rate. Most of the exchange rate appreciation effect unfolds in the long-run through this channel. Real consumption wages go back to baseline by 2002.

Import prices move in line with the exchange rate, as they are exogenous measured in foreign currency.

Government accounts are negatively and permanently affected, the fiscal deficit undergoing a lasting downward fall of around 0.3% of GDP. Government expenditures consist of government consumption and investment, welfare benefits of all kinds, and smaller items. Although the first component is mainly (but not only) driven by compensation to civil servants, the rest of the components are chosen in nominal terms the year before they are actually spent. If an unforeseen inflation surge occurs, they will marginally grow in real terms. Government revenues, on the other hand, include the public sector disposable income without welfare benefits and net interest payments, which is the third component of government accounts shown in the table. Both net interest payments and direct taxes are heavily affected by the increase in interest rates, the former directly and also through the increase in public debt, the latter due to its high inflation-dependence. The growth in interest payments is specially strong as compared to the GDP growth, although in absolute terms both revenues and expenditures fall by a larger amount.

Finally, the current account is mainly explained by the track followed by the trade balance: an improvement in the initial years, a deterioration afterwards. As exports wander around their baseline values, imports are the key factor justifying the trade balance path. As earlier mentioned, the fall and subsequent recovery of imports is caused

by the important changes in business investment. The foreign sector in the MOISEES model is a key growth-limiting factor when demand shocks occur. This seems to be a characteristic of the Spanish economy, rather than a troublesome attribute of the model; nevertheless, the model may be over-stating it.

In short, there are three points worth remembering in this simulation: the sluggish inflation-adjustment in the Spanish economy, though this adjustment is complete in the end; the great importance of business investment and of imports in the transmission of the monetary shock; and, finally, the strong short-run effect and significant medium-term effect of the exchange rate. These conclusions are, of course, only related to the Spanish economy inasmuch as the model is a good representation of the economy.

2. 3. 2. Symmetric simulation.

A second simulation was attempted disregarding the exchange rate effects. The first impression was that exogenising the nominal exchange rate would settle the matter and allow a repetition of the former simulation avoiding exchange rate effects. But this is not a correct solution for a model such as MOISEES, because its particular framework precludes a stable exchange rate and an independent monetary policy. As already stated, the original PPP equation is now the expectation-formation mechanism agents use to forecast future exchange rates, and it is understandably rational and desirable that agents should persist in forecasting. It is necessary, then, to devise ways to stabilise the exchange rate while retaining its equation. This can be achieved in the short run by imposing a shift in the foreign interest rate so that the interest rate differential remains unaffected. Unfortunately, agents will expect a future appreciation on the basis of an anticipated fall in future inflation. Two factors can stop this currency appreciation from actually happening: either domestic interest rates are allowed to fall -and this contradicts the simulated shock itself-, or foreign interest rates are

allowed to increase. The third alternative, having foreign prices decrease in line with domestic prices, was ruled out.

The decision finally adopted was to endogenise foreign interest rates so as to impose a constant nominal exchange rate. Agents' decision-making is not then directly affected, as would have happened with an exogenous exchange rate. The final path of the foreign interest rate was subject to two independent but simultaneous pressures: first, an increase of 100 basis points in 1994 and 1995, to balance the parallel increase in domestic interest rates; second, an increasing divergence from baseline to balance the fall in the inflation differential with the rest of the world. The final situation is that of an artificial appreciation of foreign currencies in relation to the peseta. As the increase in foreign interest rates tightens the monetary conditions, it helps reduce the domestic inflation level and widen the inflation differential. This is clearly a non-sustainable policy. We hope, nevertheless, that results for the first four or five years will remain meaningful, and that this procedure will be more attractive than simply exogenising the nominal exchange rate.

The simulation finally undertaken is a temporary increase of 100 basis points of the intervention rate, in 1994-1995, and an immediate return to baseline. This move is complemented by an increase in the foreign interest rate that stabilises the nominal exchange rate for the whole simulation, but otherwise allows agents freely to forecast future exchange rates.

Basically, the outcome differs from the former simulation in two respects: first, the sustained increase in long-term interest rates has a stronger negative impact on the economy, particularly on business investment and imports; second, the fall in inflation is stronger and long-lasting. The increase in the foreign interest rate pushes domestic long-term interest rates and the user cost of capital up, increasing their differential with short-term rates. Falling imports and the gains

in competitiveness help in creating a sustained current account-surplus.

Focusing on the first four years of the simulation, which are broadly similar in both exercises, the main differences lie in the behaviour of long-term interest rates and of the exchange rate. Long-term interest rates increase more than in the former simulation because of the concurrent increase in foreign and domestic short-term interest rates. The resulting user cost of capital is higher, too, and business investment is very negatively affected. As before, the induced fall in imports strongly smooths the fall in GDP. On the other hand, the stability of the exchange rate during these initial years of the simulation, as opposed to the strong appreciation in the other simulation, induces a better behaviour in exports. The trade balance improves sharply and lastingly, a distinct feature of this exercise.

Another point worth noting is the behaviour of unit labour costs. In the current simulation, import prices are not allowed to decrease in the early years, and the gap between producer prices and consumer prices remains almost at its baseline value. As unemployment has increased by a large amount, the fall in real labour costs measured in terms of consumption prices is now relatively sizable. This outlines the importance of the gap between production and consumption deflators in a medium-size economy such as Spain, and of the share of imports in consumption.

As in the other simulation, the trade balance has a significant dampening effect, the final impact on GDP being again misleadingly small.

2. 3. 3. Additional evidence.

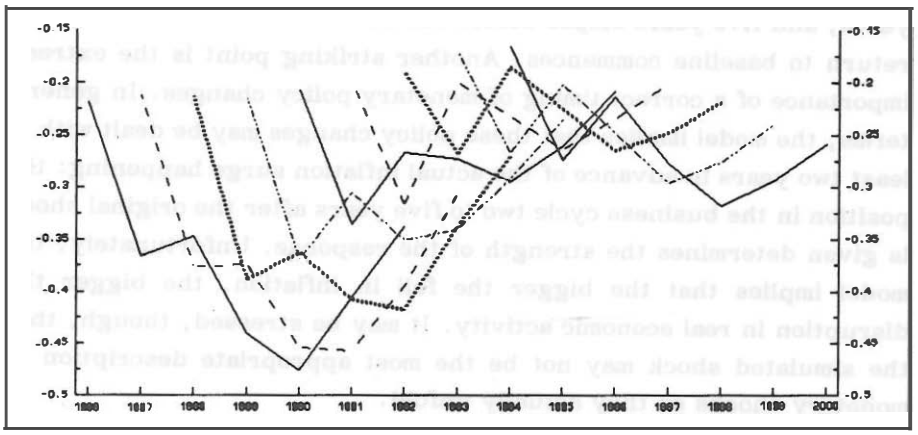
Results have been reported until the year 2000, but the actual simulations were carried out for the full baseline time span (1994-2020).

This has allowed long-run analyses of policy impacts to be performed, and some aspects of the general design of both exercises that were potentially troublesome have been outlined. The first one is the large long-run impact of the non-neutral fiscal policy; the second one is the inconsistent monetary policy implied in the simulations, as the central bank decides its moves in terms of nominal rates in situations of evolving inflations. Both factors worked in the same direction, inducing significant oscillations around the baseline from the year 2008-2010, and delaying a return to baseline. A monetary policy set in terms of real intervention rates combined with a more neutral fiscal policy radically changed the final part of the simulation, producing a smoother transition to equilibrium. This monetary policy was incompatible with the exercise, and was merely adopted for the gathering of additional evidence.

Some simulations were performed with different direct tax rules, in order to ease the non-neutrality of fiscal policy. After much testing, the most satisfactory of them was a derivation of the original reaction function that ensured a gradual return to the baseline ratio of direct taxes over GDP. Unfortunately, the time taken for this outline to work out, forcing a return to the aforementioned baseline ratio, was such that no relevant differences in results were found by the year 2000. The outline was finally dropped, but we have been very careful in stressing the importance of the non-neutrality of fiscal policy wherever it was felt necessary.

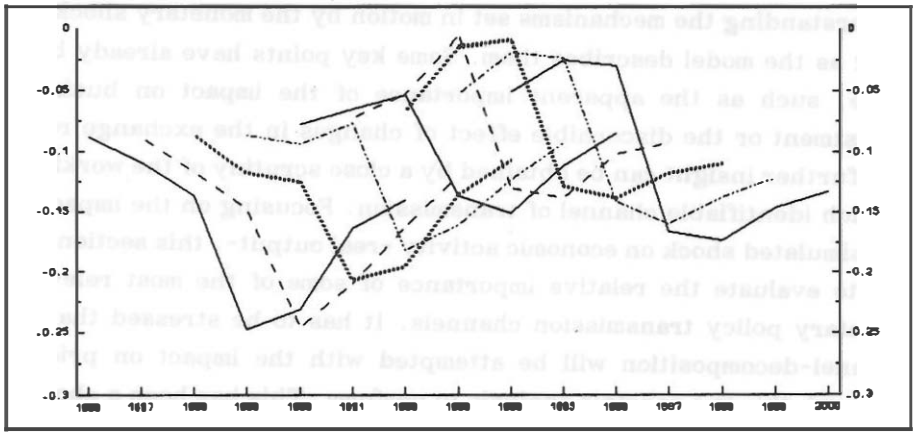
Another more fruitful experiment involved repeating the asymmetric simulation -the first one- starting in different years, in order to measure the importance of the business cycle in the model and, hopefully, in the economy. The simulation was repeated starting every year from 1986 to 1994, each time with a seven-year horizon to match the original shock definition. Figure 1 shows the consecutive paths for the GDP deflator inflation rate for each simulation; figure 2 shows the percentage deviations of real GDP itself. In general terms, 1989 may be

considered as the peak and 1993 as the trough in the Spanish business cycle, with 1987 and 1990-1991 as turning points.



GDP deflator inflation rate over different horizons
Absolute deviations over baseline

Figure 1



GDP over different horizons
Percentage deviations over baseline

Figure 2

The general conclusion that can be drawn from the experiment is the relatively long lags needed by a monetary shock to be fully felt, either in inflation or activity. Almost nothing happens the first two years, and five years elapse before the shock is reversed and a gentle return to baseline commences. Another striking point is the extreme importance of a correct timing of monetary policy changes. In general terms, the model implies that these policy changes may be dealt with at least two years in advance of the actual inflation surge happening: the position in the business cycle two to five years after the original shock is given determines the strength of the response. Unfortunately, the model implies that the bigger the fall in inflation, the bigger the disruption in real economic activity. It may be stressed, though, that the simulated shock may not be the most appropriate description of monetary shocks as they actually unfold.

3. Decomposition of the channels of transmission.

The discussion in the previous section is meant to be of use for understanding the mechanisms set in motion by the monetary shock, at least as the model describes them. Some key points have already been made, such as the apparent importance of the impact on business investment or the discernible effect of changes in the exchange rate. But further insight can be obtained by a close scrutiny of the workings of each identifiable channel of transmission. Focusing on the impact of the simulated shock on economic activity -real output-, this section will try to evaluate the relative importance of some of the most relevant monetary policy transmission channels. It has to be stressed that no channel-decomposition will be attempted with the impact on prices, although this is a sensible analysis to perform. This has been a choice, rather than an imposition, as the techniques that will be described in the next few pages can be employed for all kinds of decomposition.

In a highly aggregated and non-linear model such as MOISEES, it is impossible to decompose solely the final impact into a number of

complementary channels of transmission. First of all, non-linearity precludes independent channels that add up exactly to the full impact; furthermore, the chosen channels may not be the only ones. It is necessary, then, to decide what channels are worth describing, and in a second step precisely to define them and the way they are to be isolated. In short, we need to implement a particular mechanism to identify the agreed-upon channels, even though there may be no consensus on the relevant channels nor the appropriateness of the method. The decomposition adopted for this exercise, whose results will be discussed, has been implemented by means of repeating the asymmetric simulation -the first one-, shutting down each time all the channels except the one under scrutiny (see [9]). Results are then compared to the baseline. An alternative was to simulate with all the channels at work except one, and compare results with the full impact case. Both methods numerically coincide in a linear model.

After a careful study of the model, the following channels were found to be decomposable:

- a substitution effect in consumption;
- an income effect in consumption and residential investment;
- a wealth effect, again in consumption;
- a user-cost-of-capital effect in business investment;
- an exchange-rate effect;
- and a public-debt effect, independent from the wealth effect.

As the last one did not greatly affect results, its decomposition was finally abandoned. Consideration was given, but finally dropped, to including the substitution effect and the user-cost-of-capital effect under a single heading. Each channel was decomposed exogenising the right variables in the right equations: the direct impact of interest rates on consumption as substitution effect; dividend and net interest payments as income effect; wealth and the inflation tax in consumption as wealth effect; and so on. Each time, the variable exogenised was the

intervention rate or a closely related interest rate. For instance, the exchange-rate effect was decomposed exogenising the domestic short-term interest rate in the exchange rate behavioural equation, but allowing it to adjust to PPP factors. As a check on the soundness of the outline, we verified that GDP was not affected by this particular change in monetary policy when all the channels were shut down.

Table IV shows the resulting decomposition in terms of the contribution of each variable to the change in GDP. It is easy to verify that all the channels do not add up to the full effect, and sometimes the discrepancy is rather large. The exercise, though, remains meaningful in general terms, and the hints offered by a close analysis of the table are worth the trouble. As additional evidence was gathered by repeating the exercise with different decomposition strategies, the following lines will confine the discussion to the features common to all of the decompositions addressed.

First and foremost, the user-cost-of-capital channel is the most striking feature of the table. Its full impact in the short run is relatively small, but only because of the sharp decrease in imports that almost compensates for the fall in investment. As the short-run movement in imports is driven by business investment itself, the user-cost-of-capital effect is clearly the most powerful channel of transmission. As imports return to their new long-run equilibrium level, the user-cost-of-capital effect emerges as the one most affecting GDP.

The second most important channel is very probably the exchange-rate channel. The exchange rate works through the model in two different directions: it immediately alters the trade balance through changes in competitiveness, and it sets labour costs in motion as the gap between consumption prices and output prices changes. The share of imports in consumption turns out to be an important factor in the model in explaining the rather deep and long-lasting effect of this

channel, a most understandable feature for a medium-size open economy such as Spain's.

The wealth channel mostly affects the economy through sharp but short-lived changes in consumption. These changes are a direct consequence of the high short-run elasticity of wealth accelerations in the consumption function, mostly felt in 1995 and in 1997, the years following the shock itself and its reversal. The importance of this channel is probably related to the specification of the consumption equation, and may accordingly be over-stated. The rest of the channels are of lesser importance, the only point worth noting being the changes in the income effect when the decomposition strategy is changed. This channel does not appear as significant in the table shown, but this is not the case for other decompositions -where it has a meagre positive impact in the initial years-, although it always remains a small-size channel.

Two likely misleading factors in the exercise that are worthy of mention are the very small size of the shocks we are trying to decompose, and the sensitivity of some of them to small changes in the decomposition strategy or in the specification of the model. Both characteristics may imply that some of the decomposed channels are dependent on the model, and only faintly related to the economy. The whole table, indeed, may be totally misleading or inaccurate. There is, though, a robust fact that withstands these considerations: the importance of the user-cost-of-capital channel and the exchange-rate channel. Both channels have constantly remained the most significant channels in all the derivations of the original exercise that have been undertaken. The general feeling is, then, that this exercise reveals some important factors of the Spanish economy.

4. Main conclusions.

One of the main drawbacks of macroeconomic models is their

inability to give a detailed picture of the impact of a specific shock. One of their main strengths, however, is their ability to take into account all the possible channels of transmission at the same time, even though some channels may be better modelled than others. The main aim of the current exercise is to describe these channels when a monetary policy shock is faced, and the way they work in the model, relating these points to the real behaviour of the economy. The MOISEES model describes an economy with a slow inflation-adjusting process when a monetary shock occurs, but eventually leading to a full return of output to its baseline value. The shock affects demand in the short run mainly through business investment, although the extremely sensitive imports help reduce the initial impact. The exchange rate is an important factor both in the short run, where it affects the trade balance, and the medium term, as the gap between real labour costs and real take-home pay varies. Different decompositions of the channels of transmission have coherently shown that the user-cost-of-capital channel -related to business investment- and the exchange-rate channel are the most important ones. This is probably the outstanding feature of the exercise.

Other important evidence is the extreme sensitivity of the impact to the business cycle. Neither inflation nor output are noticeably affected until at least two years have elapsed from the actual shock occurring, but afterwards the size of the impact is strongly and directly related to the cycle. The implication of this sensitivity is that monetary policy has to be set around two years in advance of the inflation surge. Unfortunately, we have not been able to analyse the impact of a change in the credibility of the central bank, which is probably a most relevant factor.

The exercise is not problem-free, and this is a point that must not be concealed. The impact on GDP is too small to be considered as totally accurate, or unaffected by the specific implementation of the shock. The financial block, though fine-tuned for this exercise, is still too

sketchy, and lacks some important refinements. Further, the financial deregulation process still taking place in Spain may be affecting the size and timing of the impact. On the other hand, a number of different studies, not directly related to this one, show evidence that do not contradict our main results. We feel, therefore, that these results outline facts that pertain to the Spanish economy, and that the exercise is in general meaningful.

TABLE II: INTEREST RATES, EXCHANGE RATES AND ASSET PRICES

Policy experiment:[1] Asymmetric temporary interest rate increase.							
Deviations from baseline[2]	1994	1995	1996	1997	1998	1999	2000
1. Policy-controlled interest rate(%)	1.00	1.00	0.00	0.00	0.00	0.00	0.00
2. Market-determined interest rates(%):							
Representative (3-month)short-term interest rate	1.00	1.00	0.00	0.00	0.00	0.00	0.00
Representative long-term interest rate	0.37	0.48	0.18	0.10	0.06	0.03	0.02
3. Other interest rates(%):							
Mortgage rate							
Bank lending rate							
Deposit rate	0.17	0.36	0.24	0.08	0.03	0.02	0.01
4. Real short-term interest rate(%)	1.28	1.28	0.13	0.30	0.34	0.31	0.28
Real long-term interest rate(%)	0.65	0.77	0.30	0.40	0.40	0.35	0.29
User cost of capital(%)	0.62	0.64	0.16	0.31	0.31	0.28	0.24
5. Exchange rates:							
Nominal effective exchange rate	1.16	1.41	0.60	0.86	1.16	1.44	1.70
Real effective exchange rate	0.99	0.98	-0.04	-0.05	-0.06	-0.06	-0.06
Important bilateral exchange rates (domestic currency per unit of foreign currency)							
6. Asset prices and wealth:							
Stock prices							
House prices							
Wealth variables in the consumption function	-0.10	-0.01	0.14	-0.08	-0.20	-0.10	-0.00
7. Net interest and dividend payments:							
Household sector	0.30	0.58	0.51	0.61	0.95	1.25	1.48
Non-financial enterprises							
Abroad	-0.73	-0.57	0.37	0.43	0.54	0.70	0.87
8. Money and credit:							
Monetary aggregates (ALP)	-0.22	0.20	0.80	0.30	-0.03	0.22	0.44
Monetary aggregates (M2)	-0.63	-1.26	-1.16	-0.86	-0.36	-0.09	-0.08
Total domestic credit (public and private)							
Domestic bank credit							
- private							
- public							

Note: For 1. to 8. please specify the exact definitions of the reported variables, if necessary.

[1] Please specify which policy experiment is simulated.
[2] Percentage deviations if the baseline is in levels or an index; absolute differences if the base line is in percentages(%).

TABLE III: REAL ECONOMIC ACTIVITY, PRICE DEVELOPMENTS, FISCAL DEVELOPMENTS AND FOREIGN SECTOR

Policy experiment:[1] Asymmetric temporary interest rate increase							
Deviations from baseline[2]	1994	1995	1996	1997	1998	1999	2000
1. Real GDP and its components:							
Real GDP	-0.05	-0.02	-0.03	-0.17	-0.17	-0.15	-0.13
Private consumption	-0.04	0.19	0.16	-0.14	0.05	0.16	0.10
Government expenditure	0.09	0.09	0.05	0.05	-0.00	-0.03	-0.05
Private investment	-0.43	-0.88	-1.01	-0.92	-0.49	-0.15	-0.03
- Residential	0.09	0.27	0.31	0.21	0.11	0.07	0.12
- Non-residential	-0.62	-1.27	-1.41	-1.24	-0.64	-0.20	-0.06
- Inventories							
Exports	-0.26	-0.52	-0.30	0.03	0.17	0.23	0.22
Imports	-0.43	-0.69	-0.63	-0.42	0.27	0.57	0.45
2. Unemployment rate(%)	0.02	0.03	0.05	0.09	0.09	0.05	0.02
3. Real disposable income	0.13	0.16	0.06	0.01	0.00	0.05	0.09
4. Inflation and wages:							
GDP deflator	-0.16	-0.42	-0.63	-0.90	-1.20	-1.48	-1.73
Consumer prices	-0.26	-0.54	-0.66	-0.95	-1.28	-1.58	-1.85
Wages/earnings	-0.26	-0.57	-0.78	-1.15	-1.53	-1.85	-2.10
Unit labour cost	-0.25	-0.54	-0.73	-1.08	-1.44	-1.73	-1.97
Import prices	-1.14	-1.39	-0.59	-0.85	-1.15	-1.42	-1.67
5. Government accounts (% of nominal GDP):							
a) Primary expenditures	0.05	0.06	0.06	0.13	0.11	0.09	0.09
b) Interest payments	-0.23	-0.35	-0.21	-0.19	-0.20	-0.22	-0.23
c) Revenues	-0.02	-0.01	-0.00	-0.02	-0.01	-0.01	-0.01
d) Financial deficit	-0.30	-0.43	-0.27	-0.34	-0.32	-0.32	-0.34
e) Public sector debt	0.43	0.99	1.36	1.91	2.38	2.81	3.25
6. Current account (% of nominal GDP)	0.17	0.20	0.10	0.11	-0.07	-0.15	-0.12
Trade balance (% of nominal GDP)	0.16	0.19	0.10	0.10	-0.07	-0.15	-0.12
Net interest payments abroad (% of GDP)	0.01	0.01	-0.00	-0.01	-0.01	-0.01	-0.01

Note: For 1. to 6. please specify the exact definition of the reported variables, if necessary.

[1] See footnote 1 in Table II.

[2] See footnote 2 in Table II.

TABLE IV: CONTRIBUTIONS TO GDP CHANGES BY CHANNEL OF TRANSMISSION AND BY VARIABLE

Policy experiment: [1] Asymmetric temporary interest rate increase

1. First year after shock

	Total	Substitution effect	Wealth	Income/cash flow	Cost of capital	Exchange rate
GDP[2]	-0.05%	-0.02%	-0.01%	0.00%	0.01%	-0.03%
of which:						
Private consumption	-0.03%	-0.04%	-0.02%	0.00%	0.00%	0.04%
Government expenditure	0.02%	0.00%	0.00%	0.00%	0.00%	0.02%
Private investment:						
- residential	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
- non-residential	-0.08%	-0.01%	0.00%	0.00%	-0.05%	0.02%
- inventories	-0.02%	0.00%	0.00%	0.00%	-0.02%	0.00%
Exports	-0.07%	0.00%	0.00%	0.00%	0.00%	-0.07%
Imports	0.13%	0.02%	0.01%	0.00%	0.07%	-0.03%

2. Second year after shock

	Total	Substitution effect	Wealth	Income/cash flow	Cost of capital	Exchange rate
GDP[2]	-0.02%	-0.02%	0.02%	0.00%	0.00%	-0.06%
of which:						
Private consumption	0.12%	-0.03%	0.05%	0.00%	0.00%	0.05%
Government expenditure	0.02%	0.00%	0.00%	0.00%	0.00%	0.02%
Private investment:						
- residential	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%
- non-residential	-0.18%	-0.01%	0.01%	0.00%	-0.03%	0.02%
- inventories	-0.07%	0.00%	-0.01%	0.00%	-0.01%	0.02%
Exports	-0.15%	0.00%	0.00%	0.00%	0.00%	-0.14%
Imports	0.22%	0.01%	-0.02%	0.00%	0.04%	-0.05%

TABLE IV: CONTRIBUTIONS TO GDP CHANGES BY CHANNEL OF TRANSMISSION AND BY VARIABLE (contd.)

3. Third year after shock

	Total	Substitution effect	Wealth	Income/cash flow	Cost of capital	Exchange rate
GDP[2]	-0.03%	-0.01%	0.02%	0.00%	-0.02%	-0.05%
of which:						
Private consumption	0.10%	0.03%	0.04%	0.00%	0.00%	0.02%
Government expenditure	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Private investment:						
- residential	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%
- non-residential	-0.23%	0.01%	0.01%	0.00%	-0.06%	0.00%
- inventories	-0.06%	-0.01%	0.00%	0.00%	-0.01%	0.02%
Exports	-0.09%	0.00%	-0.01%	0.00%	0.00%	-0.07%
Imports	0.22%	-0.02%	-0.02%	0.00%	0.05%	-0.02%

4. Fourth year after shock

	Total	Substitution effect	Wealth	Income/cash flow	Cost of capital	Exchange rate
GDP[2]	-0.17%	0.01%	-0.04%	0.00%	-0.04%	0.00%
of which:						
Private consumption	-0.09%	0.02%	-0.10%	0.00%	-0.01%	0.02%
Government expenditure	0.01%	0.00%	0.00%	0.00%	0.01%	-0.01%
Private investment:						
- residential	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%
- non-residential	-0.22%	0.02%	-0.02%	0.00%	-0.23%	0.04%
- inventories	-0.05%	0.00%	0.02%	0.00%	-0.08%	-0.01%
Exports	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Imports	0.16%	-0.02%	0.05%	0.00%	0.26%	-0.05%

TABLE IV: CONTRIBUTIONS TO GDP CHANGES BY CHANNEL OF TRANSMISSION AND BY VARIABLE (contd.)

5. Fifth year after shock

	Total	Substitution effect	Wealth	Income/cash flow	Cost of capital	Exchange rate
GDP[2]	-0.17%	0.01%	-0.02%	0.00%	-0.09%	0.03%
of which:						
Private consumption	0.03%	0.01%	-0.02%	0.00%	-0.02%	0.04%
Government expenditure	0.00%	0.00%	0.00%	0.00%	0.01%	-0.01%
Private investment:						
- residential	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%
- non-residential	-0.12%	0.01%	-0.02%	0.00%	-0.24%	0.06%
- inventories	-0.03%	0.00%	0.00%	0.00%	-0.13%	-0.01%
Exports	0.06%	0.00%	0.01%	0.00%	0.01%	0.00%
Imports	-0.11%	-0.01%	0.02%	0.00%	0.28%	-0.06%

6. Sixth year of simulation

	Total	Substitution effect	Wealth	Income/cash flow	Cost of capital	Exchange rate
GDP[2]	-0.15%	0.01%	0.02%	0.00%	-0.15%	0.05%
of which:						
Private consumption	0.10%	0.01%	0.05%	0.00%	-0.02%	0.04%
Government expenditure	-0.01%	0.00%	0.00%	0.00%	0.01%	0.00%
Private investment:						
- residential	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%
- non-residential	-0.04%	0.00%	0.01%	0.00%	-0.14%	0.03%
- inventories	-0.04%	-0.01%	-0.03%	0.00%	-0.07%	-0.01%
Exports	0.08%	0.00%	0.00%	0.00%	0.03%	0.00%
Imports	-0.24%	0.01%	-0.02%	0.00%	0.05%	-0.01%

TABLE IV: CONTRIBUTIONS TO GDP CHANGES BY CHANNEL OF TRANSMISSION AND BY VARIABLE (contd.)

7. Final year of simulation

	Total	Substitution effect	Wealth	Income/cash flow	Cost of capital	Exchange rate
GDP[2]	-0.13%	0.01%	0.00%	0.00%	-0.16%	0.05%
of which:						
Private consumption	0.06%	0.00%	0.01%	0.00%	-0.01%	0.04%
Government expenditure	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Private investment:						
- residential	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%
- non-residential	-0.01%	-0.01%	0.02%	0.00%	-0.04%	-0.01%
- inventories	-0.06%	-0.01%	0.00%	0.00%	0.00%	-0.04%
Exports	0.08%	0.00%	0.00%	0.00%	0.06%	-0.01%
Imports	-0.20%	0.02%	-0.03%	0.00%	-0.17%	0.07%

[1] See footnote 1 in Table II.

[2] In percentage deviation from baseline.

TABLE II: INTEREST RATES, EXCHANGE RATES AND ASSET PRICES

Policy experiment:[1] Symmetric temporary interest rate increase with endogenous foreign interest rate.							
Deviations from baseline[2]	1994	1995	1996	1997	1998	1999	2000
1. Policy-controlled interest rate(%)	1.00	1.00	0.00	0.00	0.00	0.00	0.00
2. Market-determined interest rates(%):							
Representative (3-month)short-term interest rate	1.00	1.00	0.00	0.00	0.00	0.00	0.00
Representative long-term interest rate	0.70	0.86	0.28	0.27	0.33	0.40	0.48
3. Other interest rates(%):							
Mortgage rate							
Bank lending rate							
Deposit rate	0.17	0.42	0.32	0.11	0.07	0.07	0.08
4. Real short-term interest rate(%)	1.05	1.07	0.11	0.27	0.33	0.31	0.27
Real long-term interest rate(%)	0.75	0.93	0.39	0.55	0.66	0.71	0.76
User cost of capital(%)	0.67	0.82	0.33	0.44	0.53	0.58	0.64
5. Exchange rates:							
Nominal effective exchange rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Real effective exchange rate	-0.05	-0.12	-0.22	-0.49	-0.82	-1.12	-1.38
Important bilateral exchange rates (domestic currency per unit of foreign currency)							
6. Asset prices and wealth:							
Stock prices							
House prices							
Wealth variables in the consumption function	-0.17	-0.22	-0.09	-0.38	-0.67	-0.64	-0.62
7. Net interest and dividend payments:							
Household sector	0.10	0.25	0.17	0.19	0.51	0.82	1.04
Non-financial enterprises							
Abroad	0.05	0.12	0.22	0.49	0.81	1.11	1.38
8. Money and credit:							
Monetary aggregates (ALP)	-0.38	-0.29	0.34	-0.28	-0.94	-0.75	-0.60
Monetary aggregates (M2)	-0.80	-1.75	-1.57	-1.25	-0.94	-0.81	-1.02
Total domestic credit (public and private)							
Domestic bank credit							
- private							
- public							

Note: For 1. to 8. please specify the exact definitions of the reported variables, if necessary.

[1] Please specify which policy experiment is simulated.

[2] Percentage deviations if the baseline is in levels or an index; absolute differences if the base line is in percentages(%).

TABLE III: REAL ECONOMIC ACTIVITY, PRICE DEVELOPMENTS, FISCAL DEVELOPMENTS AND FOREIGN SECTOR

Policy experiment:[1] Symmetric temporary interest rate increase with endogenous foreign interest rate.							
Deviations from baseline[2]	1994	1995	1996	1997	1998	1999	2000
1. Real GDP and its components:							
Real GDP	-0.05	-0.01	0.03	-0.18	-0.25	-0.25	-0.27
Private consumption	-0.20	-0.04	0.16	-0.21	-0.17	-0.06	-0.20
Government expenditure	0.01	-0.01	0.02	0.08	-0.00	-0.07	-0.11
Private investment	-0.68	-1.37	-1.41	-1.51	-1.37	-1.14	-1.16
- Residential	-0.01	-0.01	0.02	-0.01	-0.17	-0.34	-0.44
- Non-residential	-0.94	-1.86	-1.87	-1.94	-1.70	-1.35	-1.35
- Inventories							
Exports	0.02	0.04	0.03	0.17	0.50	0.75	0.91
Imports	-0.67	-1.14	-0.93	-0.85	-0.26	0.07	-0.12
2. Unemployment rate(%)	0.03	0.04	0.05	0.13	0.16	0.15	0.13
3. Real disposable income	-0.01	0.01	0.03	-0.06	-0.16	-0.18	-0.19
4. Inflation and wages:							
GDP deflator	-0.05	-0.12	-0.22	-0.49	-0.82	-1.12	-1.38
Consumer prices	-0.05	-0.12	-0.22	-0.48	-0.81	-1.10	-1.36
Wages/earnings	-0.06	-0.18	-0.37	-0.76	-1.19	-1.55	-1.86
Unit labour cost	-0.06	-0.16	-0.34	-0.71	-1.11	-1.45	-1.74
Import prices	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Government accounts (% of nominal GDP):							
a) Primary expenditures	0.03	0.01	0.01	0.13	0.13	0.10	0.11
b) Interest payments	-0.42	-0.59	-0.28	-0.32	-0.42	-0.54	-0.68
c) Revenues	-0.01	-0.01	-0.01	-0.02	-0.02	-0.01	-0.02
d) Financial deficit	-0.47	-0.61	-0.30	-0.48	-0.57	-0.66	-0.81
e) Public sector debt	0.53	1.12	1.40	2.14	2.91	3.67	4.58
6. Current account (% of nominal GDP)	0.15	0.27	0.22	0.19	0.03	-0.06	-0.01
Trade balance (% of nominal GDP)	0.15	0.27	0.22	0.19	0.03	-0.06	-0.00
Net interest payments abroad (% of GDP)	-0.00	-0.00	-0.00	-0.01	-0.01	-0.02	-0.03

Note: For 1. to 6. please specify the exact definition of the reported variables, if necessary.

[1] See footnote 1 in Table II.

[2] See footnote 2 in Table II.

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