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ADJUSTING TO THE EURO AREA: SOME ISSUES INSPIRED BY THE PORTUGUESE EXPERIENCE

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"But this *long run* is a misleading guide to current affairs. *In the long run* we are all dead. Economists set themselves too easy, too useless task if in the tempestuous seasons they can only tell us that when the storm is long past the ocean is flat again."

John Maynard Keynes, *A Tract on Monetary Reform*, London: Macmillan, 1923, page 80.

Assessing the effects of participation in the euro area raises difficult methodological problems. First, some are related to the distinction between participation in the euro and other fundamental driving forces operating at the same time. Among these, a number have to do with the process of European integration, for example, the Single Market, leading to trade and financial integration. Moreover, in many areas, European integration has also been associated with overall progress toward liberalization. Methodological difficulties are compounded by the operation of other important driving forces such as globalization. A second methodological problem, relates to the fact that the effects from regime change derive from the interaction between:

- The rules, institutions and market opportunities characterizing the new regime.
- The behavior of private economic agents: households and firms.
- Policy choices by the authorities.

The latter two are, in turn, influenced by expectations, beliefs, customs and habits that developed slowly and gradually in a completely different environment. The experience of the Portuguese economy, in the 25 years before 1995, was dominated by high inflation, high nominal interest rates, credit restrictions, administrative controls and liquidity constraints. Credit was scarce and volatile. Participation in the euro area marked a transition to a regime of price stability, low and stable nominal interest rates and the country's participation in very deep and liquid financial markets.

According to Barbosa et al (1998) and Constâncio (2005) the main (quantifiable) effects from euro area participation, for the Portuguese economy, may be captured by a decline in the opportunity costs of external financing for the home economy. In other words, they are captured by a decline in interest rates and the cost of capital. The reduction in interest rates is associated with a decline in the various premia affecting it. Premia associated with inflation, credit risk, expropriation risk and macroeconomic instability. The magnitude of the effect could be expected to be non-negligible given the Portuguese history of high inflation, macroeconomic instability and weak protection of property rights. From the viewpoint of domestic economic agents, households and firms, the change is similar to financial liberalization or, more generally, to any disturbance leading to better access to finance.

Barbosa et al (1998) emphasized long run effects[2]. In their work the main long run effect identified was the increase in capital accumulation and potential output, associated with the lower user cost of capital. The other long run mechanism, often identified in the literature, is obtained in a static general equilibrium model, with two-

[2] The book did raise the possibility of wealth effects leading to quicker of adjustment of demand (relative to supply). However, after stressing the point they did not pursue the issue further.

sectors, producing traded and non-traded goods, with two factors of production, capital and labor. In such setting, a decline in the user cost of capital leads to an increase in the relative price of non-traded goods, if capital and labor can be freely transferred across sectors and the traded goods sector is capital-intensive.

Recent work on adjustment in the context of dynamic, open economy, general equilibrium models (in the tradition of, for example, Frenkel and Razin (1996) and Obstefeld and Rogoff (1996)) suggests the possibility of interesting dynamic adjustment patterns.

The interest is heightened by a question raised by Constâncio (2005). The question may be formulated as:

"Is it unavoidable for Portugal, in the process of adjusting to participating in the euro area, to experience a pattern of boom and bust?"

It is important to recall briefly what happened to interest rates during the process of adjustment to participation in the euro area. In the period 1991-1995 long-term interest rates and short-term interest rates averaged 12.3 and 13.6 per cent, respectively. Real long-term interest rates averaged 4.1 per cent during the same period. In the period 1996-2000, the corresponding numbers were 6.0, 5.0 and 2.5. And in 2004, they were 4.1, 2.1 and 2.0.

During the second half of the nineties the Portuguese economy grew fast. From 1995 to 2000 average real growth of GDP was one of the highest in the European Union at almost 4 per cent (more than 1 percentage point above the EU-15 average). Many saw fast growth as part of the catching-up process towards higher income and welfare prevailing in the most advanced economies in the EU. During this period gross fixed capital formation (GFCF) increased sharply, reflecting, in particular, the strong growth of investment in equipment goods. GFCF increased about 3 percentage points of GDP on average compared with the values registered in the first half of the nineties. In only five years, GDP per head (in PPS) increased more than 4 percentage points to more than 70 per cent of the EU average, in 2000. In the second half of the nineties domestic demand growth outpaced GDP growth. Private sector savings dropped sharply (by about 7 percentage points of GDP between 1995 and 2000) and the current account deficit soared to above 10 per cent of GDP. Inflation remained above the average in the countries participating in the euro area and the economy lost export market share. Starting in 2001 the economy decelerated sharply. In late 2002 and in 2003 it slipped into recession. GDP dropped 1.1 per cent in 2003. After 2001 Portuguese growth has been among the weakest in the EU. GFCF fell sharply in 2002 and 2003 and even private consumption fell slightly in 2003. There was a significant correction in the current account[3].

The link with participation in the euro area is clear. Constâncio (2005) writes: "(...) the drop in interest rates was significant after 1995 – and by then, membership of Monetary Union seemed more assured. As a consequence, we experienced a credit explosion. This is mostly a process of adjustment to a new steady state as rational

[3] The figures in this and the previous paragraph are taken from the Statistical Appendix to the European Commission's publication, European Economy, April 2005. The performance of the Portuguese economy since 1995 is critically surveyed in European Commission (2004).

agents implement consumption smoothing and investment jumps to take advantage of higher growth prospects and lower cost of capital. The surge in both consumption and investment was financed by the banking system, which was able to obtain funding abroad in euro and so could increase credit much more than deposits as the savings rate continued to decline. (...) Since 2000 private agents have started to reduce investment and increase savings, reaching a balanced position last year[4]. (...) The initial surge of expenditure was as unavoidable as the correction was spontaneous and equally rational."

Constâncio's question (quoted above) reminds us of a bankers' adage (quoted in Dornbush, Goldfajn and Valdes (1995)):

"It is not speed that kills, it is the sudden stop."[5]

Many countries, that have experienced sudden stops, have a history of scarce, expensive and extremely volatile credit[6]. In these countries, it is often the case that there are complex interactions between developments in the financial system (in particular in the banking system) and macroeconomic policies and cycles. In some cases, boom and bust is associated with sudden stops in international financing, followed by currency crises and banking crises. Whenever boom and recession cycles are accompanied by banking and financial crises there are major disruptions to economic activity and growth. The ability of the financial system to foster new ideas and projects and to offer payment services is severely diminished. Thus, opportunities for mutually beneficial trade and for profitable investment are left unexplored. The results are: low activity, low returns, low investment and low growth.

The rest of the paper is organized as follows. In section I, we will consider a simple dynamic general equilibrium model of a small open economy. The model is a simplified version of Fagan, Gaspar and Pereira (2004), from now on simply referred to as FGP. The model is rich enough to encompass both long run mechanisms referred to above: capital accumulation and the adjustment of relative goods prices and real wages to relative factor availability. FGP includes some frictions that make non-trivial adjustment dynamics and intertemporal effects possible. Specifically, it considers adjustment costs to investment (in both sectors) and monopolistic competition in the non-traded goods sector. The latter assumption makes it possible to assume price setting subject to adjustment costs, thereby introducing an element of price stickiness. In FGP, a lowering of interest rates – caused by a drop in the home country's idiosyncratic risk premium – leads to a jump in consumption (a drop in savings), an increase in investment and a widening of the current account deficit. At the same time, the initial disturbance also causes a real exchange rate appreciation through the increase in the relative price of non-traded goods. Moreover, there is a significant increase in real wages. Nevertheless, as time goes by, and expectations of higher output materialize the gap between domestic production and domestic absorption closes, the current account approaches balance and the foreign debt stabilizes (as a

[4] 2003.
[5] Page 219.
[6] IDB (2005) provides a fascinating report of the experience of Latin American and Caribbean countries.

ratio of GDP). Overall, it is a benign adjustment to a favorable disturbance. It is the case that lower interest rates lead to an expansion of the opportunity set available to the home economy. A very similar benign interpretation is offered in Blanchard and Giavazzi (2002).

In section II, we discuss informally further frictions that, in the literature, have been examined to generate patterns of boom and bust. In particular, we will look at the experience and modeling of Exchange Rate Based Stabilization Programs (ERBSP). In doing so we will be following Rebelo and Vegh (1995), Calvo and Vegh (1999) and Calvo, Izquierdo and Mejía (2004).

In section III, we will conclude and draw policy implications.

I. Adjustment to a fall in the risk premium in the FGP model.

In the simulations that follow we will consider one single driver of the adjustment process. Specifically, we will consider a decline in the idiosyncratic risk premium, associated with the domestic economy's borrowing, in world's financial markets. For illustrative purposes, we set the decline at 100 basis points.

As referred to above, Barbosa et al (1998) emphasized long run effects. In their work the main long run effect identified was the increase in capital accumulation and potential output, associated with the lower user cost of capital. The other long run mechanism, often identified in the literature, obtains in a static general equilibrium model, with two-sectors, producing traded and non-traded goods, using two production factors, capital and labor. In this set-up, a decline in the user cost of capital leads to an increase in the relative price of non-traded goods, if capital and labor can be freely transferred across sectors and the traded goods sector is capital-intensive.

It is possible to consider the two mechanisms above together and also some simple transition dynamics using a simple two-sector (tradables; non-tradables model) with the same basic structure as before. The main additional element is the consideration of intertemporal effects as in Frenkel and Razin (1996) and Obstfeld and Rogoff (1996).

One such model is presented in Fagan, Gaspar and Pereira (2004) – from now on FGP[7]. It is a two-sector dynamic general equilibrium model with price and wage stickiness. We consider an overlapping generation set-up on the household side (see, for example, Blanchard, 1985, and Yaari, 1965). In the literature on open economies, this set-up is usually preferred to the infinite horizon Ramsey approach, since it leads to a well-defined steady-state level of foreign debt. The production side of the economy consists of two final goods sectors: traded and non-traded goods. The traded goods sector is competitive and the price of traded goods is given exogenously by the "world" price. In contrast, the non-traded goods sector is characterised by monopolistic competition (see for example, Dixit and Stiglitz, 1977). The prices of the non-traded goods are subject to nominal adjustment costs (see, for example, Kim, 2000). Furthermore, the accumulation of capital is subject to real adjustment costs in both sectors. The version of the model, used in the simulations reported below, is a simplified version because it assumes exogenous labour supply and flexible wages. In the original FGP model, labour supply derived from the optimizing behavior of households and wage setting is subject to adjustment costs (in line with the

[7] The results reported, based on the model, should be regarded as merely illustrative. The model has been calibrated to reproduce facts inspired by the Irish and Portuguese experience (see FGP).The parameters used, reported in FGP and in Tables 1 and 2 at the end of the paper cannot be regarded as accurate representations of the Portuguese economy. In FGP, The purpose was to look at the macroeconomic adjustment process of an economy during a period of catching-up inside the European Union. Relevant dimensions for such analysis include productivity growth in the traded goods sector, trade integration, financial integration, net unilateral public transfers associated with European Union policies and much else. Moreover, the version used in what follows is simplified by taking labor supply to be exogenous and assuming that wages are perfectly flexible. Finally, as already stated in the main body of the text, in the short to the medium term, the Portuguese economy has been (and it is) affected by a multiplicity of shocks and disturbances, which are completely disregarded in what follows. Caution in interpretation is, therefore, warranted.

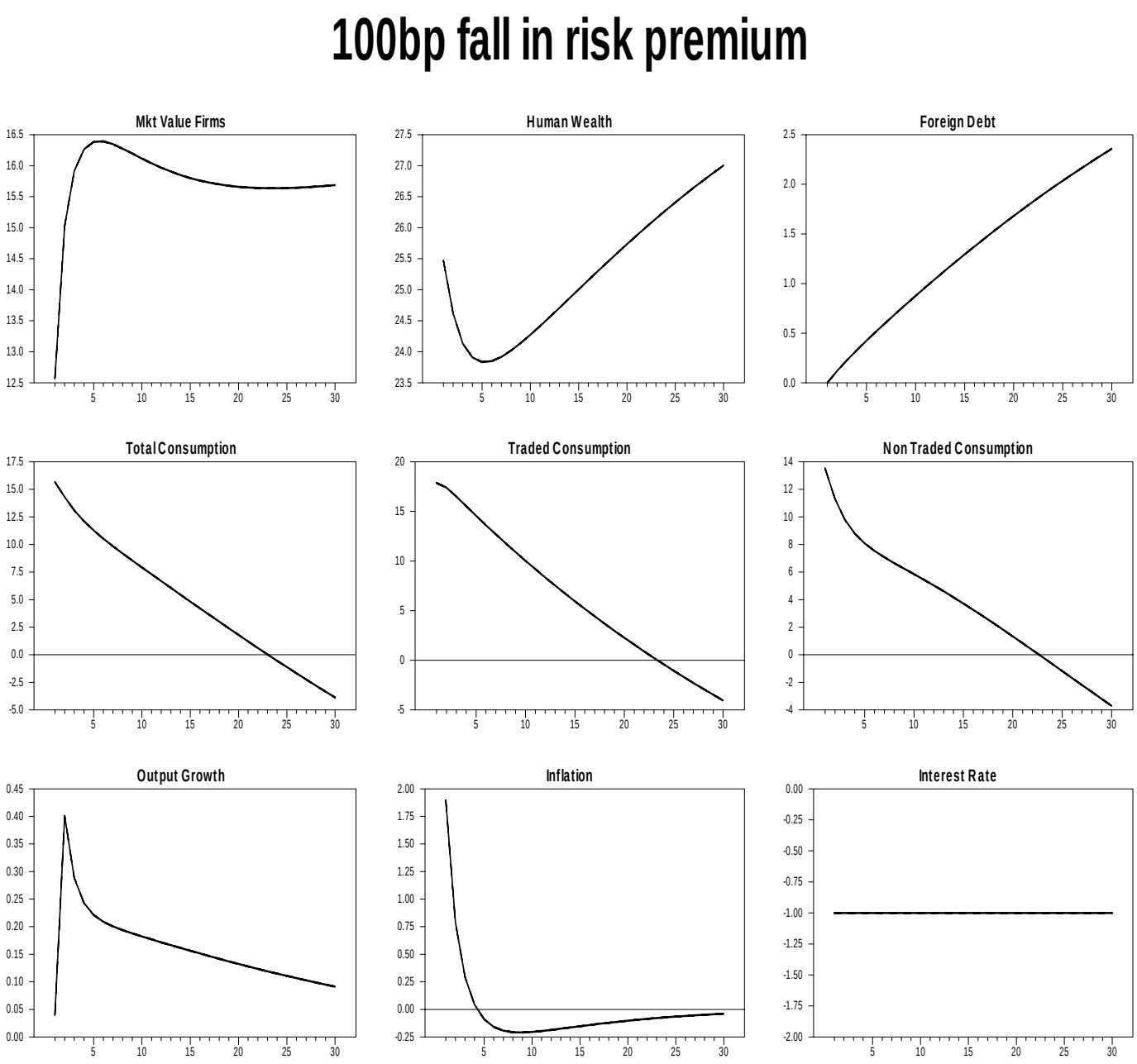
assumption made for non-traded goods). Moreover, in Appendix 2, we report the results with a version of the model including an endogenous risk premium term to reflect the country's foreign debt. In functional form we use is taken from Schmitt-Grohé and Uribe (2003).

There are three main sources of dynamics in the model: (i) adjustment costs to the capital stock; (ii) consumption and foreign debt accumulation and (iii) sticky prices. Adjustment costs give rise to interesting dynamics because they allow the supply effects to materialize only gradually. However, given perfect foresight, demand reacts immediately on impact to the reduction in the user cost of capital and increased wealth caused by the fall in the interest rate. Perfect foresight brings the effects of future prosperity to the present. Therefore, consumption and investment jump on impact leading to a sizeable expansion in domestic demand. In FGP, this effect is labeled "front-loading". Given that supply responds only gradually, the excess demand is closed through net imports from the rest of the world. External financing is used to make higher consumption and investment viable. By assumption non-traded goods cannot be obtained through the rest of the world. Since demand for non-traded goods increases, their relative price must increase and resources must be transferred to the non-traded goods sector. Thus, the traded goods sector must contract on impact, and labor transferred from the traded to the non-traded goods sector. To repeat, expectations (through the perfect foresight assumption) bring the effects of future prosperity forward to the present accelerating the adjustment process (including the necessary changes in relative prices and wages).

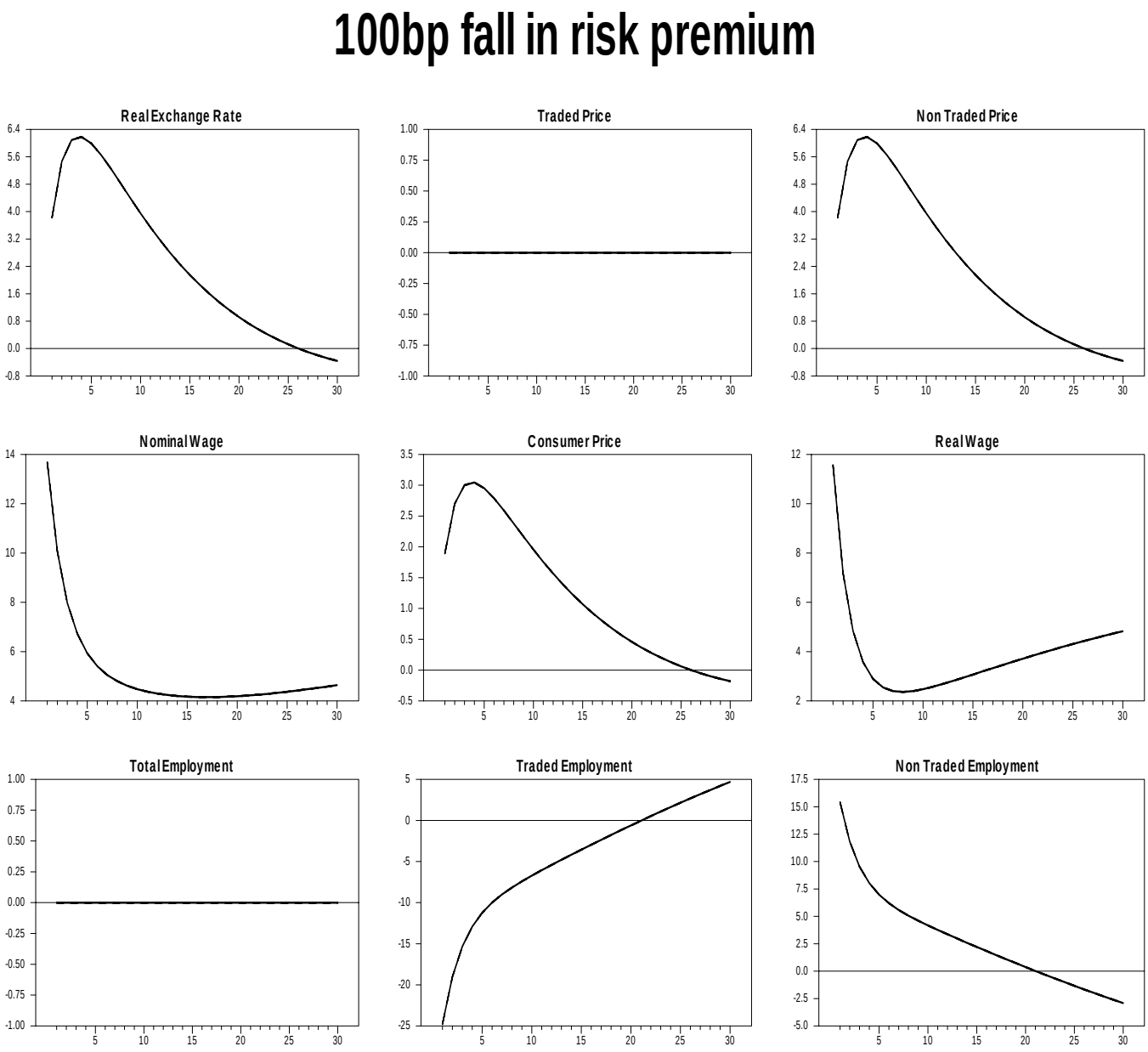
In this simple set-up the story is entirely benign. Supply increases gradually as the capital stock expands. Consumption declines from its initially elevated level due to the impact of household wealth of the accumulating foreign debt. As the path assumed under perfect foresight materializes, the increased domestic supply will come on stream just in time to ensure the sustainability in the net foreign asset position of the economy. The initial current account deficit shrinks gradually and foreign debt stabilizes (as a percentage of GDP).

The results are reported in a series of Charts (Figures 1 a), b), c) and d)). The Charts plot deviations from baseline taking place in the first thirty periods of simulation (each period should be interpreted as corresponding to one year).

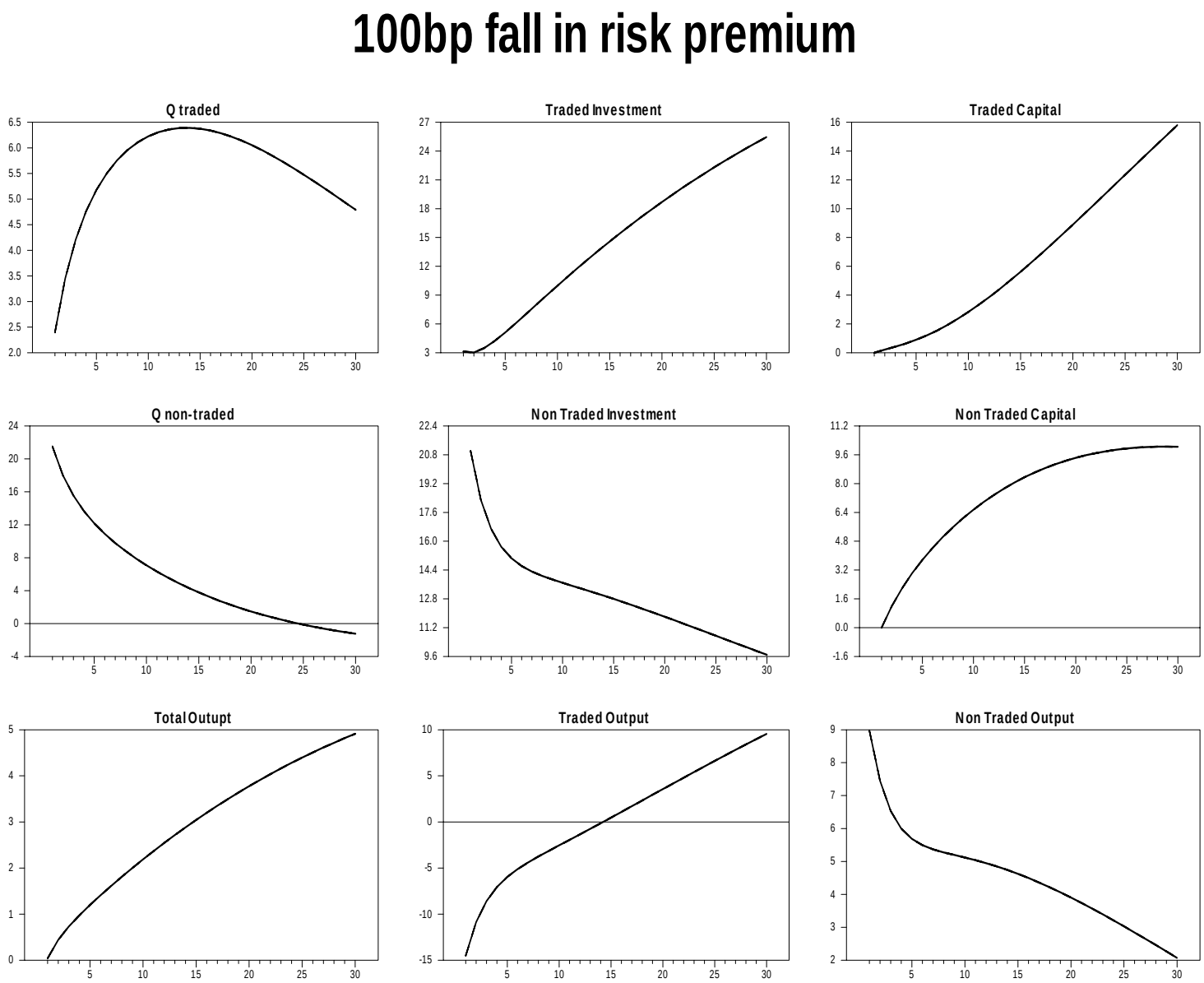
FIGURES 1 a): ADJUSTMENT TO A PERMANENT DECLINE (100 bp) IN THE (EXOGENOUS) IDIOSYNCRATIC RISK PREMIUM.



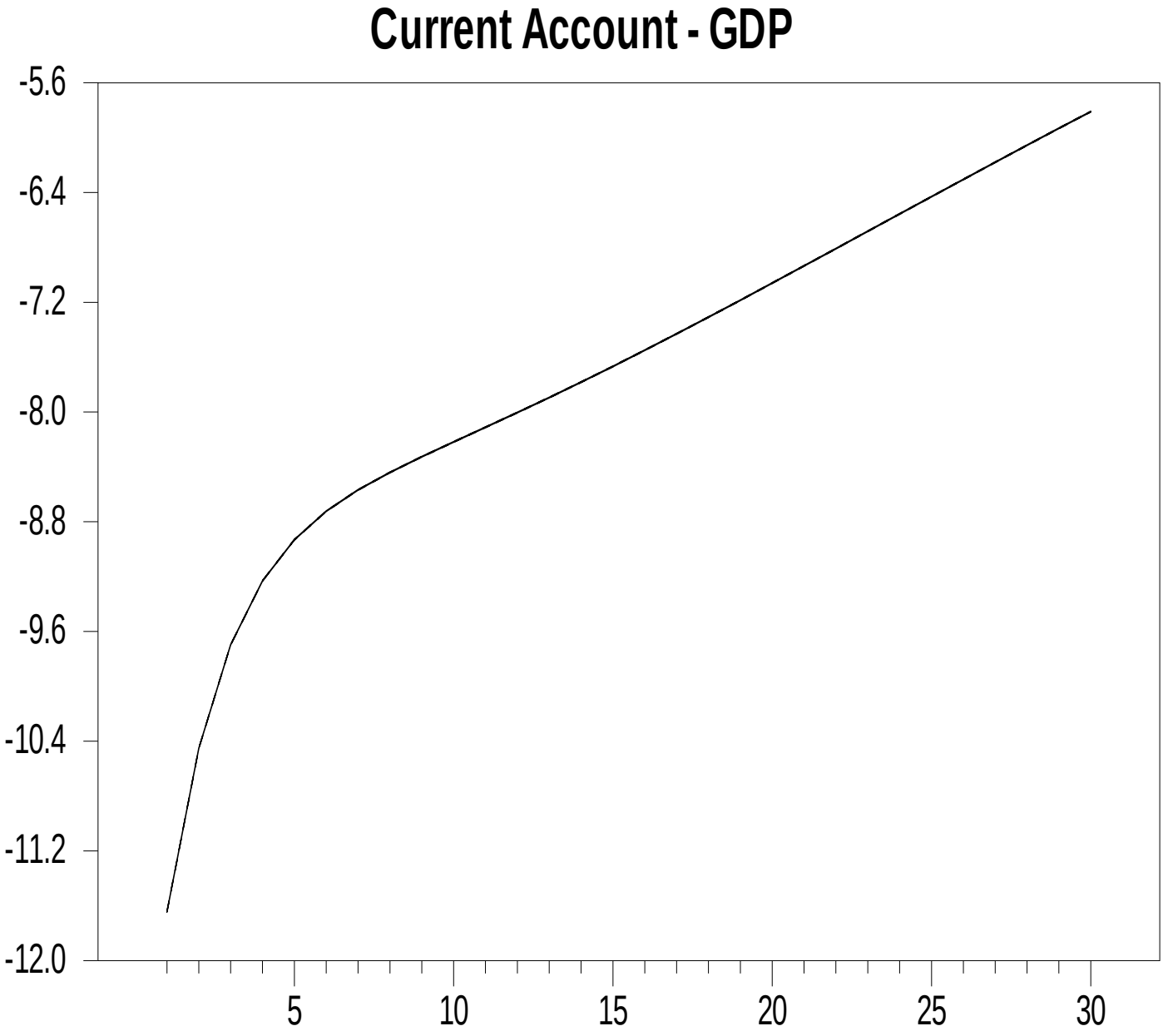
FIGURES 1 b): ADJUSTMENT TO A PERMANENT DECLINE (100 bp) IN THE (EXOGENOUS) IDIOSYNCRATIC RISK PREMIUM.



FIGURES 1 c): ADJUSTMENT TO A PERMANENT DECLINE (100 bp) IN THE (EXOGENOUS) IDIOSYNCRATIC RISK PREMIUM.



FIGURES 1 d): ADJUSTMENT TO A PERMANENT DECLINE (100 bp) IN THE (EXOGENOUS) IDIOSYNCRATIC RISK PREMIUM.



The results are entirely in line with the intuition sketched above. The decline in interest rates leads to a sharp increase in non-human wealth and human wealth. The increase in non-human wealth reflects the increased in the market value of domestic firms, which, in turn, reflects the added investment opportunities opened by the reduction in the user cost of capital (see Figure 1 a) – top left panel). At the same time, human wealth increases as well, reflecting the increase in wages relative to baseline (see Figure 1 a) – top row, middle panel, and Figure 1 b) – middle row, right panel). The sharp increase in wealth translates into a substantial increase in consumption and a (very) large current account deficit (Figure 1 a) – middle row and Figure 1 d)). Correspondingly, there is a persistent accumulation of foreign debt – to finance both the increased investment in the traded and non-traded goods sector, but also the increase in consumption (Figure 1 a) – top row, right panel). The build up in foreign debt takes place relatively quickly in the model.

The wealth effects, described in the previous paragraph, are not associated with significant supply side effects in the short run, reflecting the assumption of exogenous labor supply. As a result, the increase output rises only gradually to its new – higher – steady state level. Thus the magnitude of the simulated immediate impact on supply is much smaller than on demand. Expectations of future prosperity justify wealth effects that bring forward the effects of future supply, causing domestic demand growth well in excess of current domestic supply. In order to close the gap, there is a sizable accumulation of foreign debt through a current account deficit.

The increase in demand puts pressure on the non-traded goods sector to expand. Such pressure pushes the relative price of non-traded goods higher (see Figure 1 b) – top row). Since the price of traded goods is given in world markets, and it is assumed constant, the real exchange rate corresponds exactly to the price of non-traded goods (the left and right panels, on the first row of Figure 1 b) are exactly the same). There is a fall in employment in the traded goods sector compensated by a corresponding expansion in employment in the non-traded sector (Figure 1 b), bottom panel). Total employment cannot change in the model so changes in employment in traded and non-traded goods sectors are just mirror images. The same pattern is visible in investment. Investment (and the stock of capital) expands in both sectors but the increase in investment (on impact) is much stronger in the non-traded sector. On impact, there is a contraction in the traded goods sector. There is a large, sharp fall in traded output. Domestic traded goods production stays below baseline for about ten years. Only very gradually does traded output pick-up and go above baseline (see Figure 1 c)).

Inflation is above baseline for about five-years (Figure 1 a), bottom row, middle panel). Afterwards there is under-shooting and a slow return to baseline. These developments reflect the path in the relative price of non-traded gods. As stressed before, expectations of future output growth brings forward the adjustment in the relative price of non-traded goods[8]. In the model, since wages are flexible, there is a sharp increase of nominal and real wages on impact as an equilibrium response to the increase in current demand (see Figure 1 b) – middle row – left and right panels).

[8] In Fagan, Gaspar and Pereira (2005) a similar mechanism is identified for the case of an anticipated acceleration of productivity in the traded goods sector. As in the example discussed in the text perfect foresight bring forward the adjustment and leads to a front-loading of the economy's response to the disturbance.

However, after some years, as foreign debt accumulates, demand eventually slows down and there is a gradual correction in the relative price of non-tradables. Specifically, the deviation of the relative price of non-traded goods, from baseline, peaks up after about four years (see Figure 1 b) – top row). A prolonged correction follows. It is interesting to point out that the real exchange rate is above baseline for about 25 years. Afterwards real exchange depreciation follows with the price of non-traded goods falling below baseline.

It is interesting to note that there are strong effects concerning the timing of consumption. As pointed out before, GDP growth is above baseline throughout the simulation period. The deviation of consumption from baseline declines gradually over time and turns negative after about 20 years. The intuition for the result is interesting and worth exploring. As we have seen before lower interest rates bring about positive wealth effects and an increase in current consumption. However, the decline in interest rates also causes a decline in the growth rate of consumption. Given a sufficiently long period of time, the growth effect eventually dominates (see Figure 1 a) – middle row). From another angle one may say that, on impact wealth rises, leading to higher consumption. However, as foreign debt accumulates, overall wealth declines and in fact falls below baseline, leading to lower consumption, even in steady state.

In any event, later, during the adjustment path, the combination of higher current potential output and declining demand brings about the correction in the current account and the eventual stabilization of the foreign debt to GDP ratio (see Figure 1 d)). It is important to note that the stabilization of the foreign debt ratio is not yet visible to the eye after 30 years (see Figure 1 a), top row, right panel).

Allowing for an endogenous risk premium component in determining the domestic interest rate does not change the results qualitatively (see Appendix 2). The decline in interest rates leads, as before, to a reduction in the user cost of capital and sizeable wealth effects leading to front-loading of demand. Naturally, adjustment costs imply that supply effects materialize gradually over time. Thus, there is excess demand. For traded goods the gap is closed through imports from the rest of the world. External financing is used to make higher consumption and investment viable. For non-traded goods demand and supply balance require a relative price increase and causing a transfer of resources towards the non-traded goods sector. Specifically, the traded goods sector must contract on impact, and labor transferred from the traded to the non-traded goods sector. As before, the main mechanism of adjustment remains. Expectations (through the perfect foresight assumption) bring the effects of future prosperity forward to the present accelerating the adjustment process (including the necessary changes in relative prices and wages).

Nevertheless, it is important to note that quantitatively the results are substantially different. The variant with endogenous risk premium implies substantial smaller effects on impact (and the first few years). It also implies faster correction thereafter. For example, comparing Figure 1 d) and Figure A.2. d) plotting the current account deficit, it is possible to see that the initial value is about 12 per cent of GDP, in the case with constant interest rates, against about 7.5 per cent, for the case with endogenous risk premium. After 30 years the difference is even more striking, about 6

per cent of GDP as compared with less than 2 per cent. Another important difference is that since, in the endogenous risk premium case, interest rates return the baseline, leading to lower steady state capital and foreign debt.

We will interpret the pattern of adjustment in the next section.

II. Is boom and bust part of adjustment to participation in the euro area?

II.1. Further comments on adjustment using the FGP model.

"Is boom and bust (an unavoidable part) adjustment to participation in the euro area?"

At a purely conceptual level, looking only at aggregate variables the answer is clearly: no. The basic interest rate effect and the propagation mechanisms presented above allow for adjustment, which is smooth and, on the whole, benign. The reduction in interest rates corresponds to an expansion in the opportunity set of a small open, capital-importing economy.

The fall in the risk premium leads to an increase in investment, and in human and non-human wealth, reflecting upward adjustments in wages and in the market value of firms. These adjustments justify wealth effects, which, through consumption smoothing lead to an immediate jump in consumption and a corresponding decline in savings. The increase, in investment and consumption, is met by higher imports, and the corresponding widening of the trade and current account deficits is initially financed through an increase in foreign debt. At the same time, the demand boom causes the relative price of non-traded goods to increase and a shift of employment from the traded to the non-traded goods sector. Investment increases above baseline in both sectors. Aggregate GDP is consistently above baseline reflecting the corresponding pattern in investment. As time goes by, the slowdown in demand (relative to supply) brings about gradual reduction in the current account deficit, which implies the stabilization of the foreign debt to GDP ratio ensuring sustainability. The interest payments to the rest of the world are ensured through a trade surplus. Overall, there is a successful adjustment to a favorable disturbance. The points made follow the line of argument in Rebelo and Vegh (1995), who stress that it is not easy to generate a boom-recession cycle within this class of models.

The main mechanism at play is intertemporal adjustment, following standard open macro-economy models (as in Frenkel and Razin (1996) or Obstfeld and Rogoff (1996)). The most important ingredients for the results are perfect foresight and adjustment costs to investment. As in Blanchard and Giavazzi (2002), financial integration, allowing easier and cheaper financing, justifies an increase in investment and a decline in savings, leading to a widening of the current account deficit. Under perfect foresight, the ensuing adjustment works out perfectly in the end with the slowdown in domestic demand and the expansion in domestic supply materializing at the exact right time.

However, even in our simple benign story there are a number of interesting additional elements:

- The self-correcting forces take very long to operate. The dynamics, brought into play by the initial disturbance, are very long lasting.
- After the initial jump, wealth (both human wealth and the market value of firms) deviations from baseline gradually narrow. Nevertheless, all these

variables stay significantly above baseline, during the thirty-year period reported in the Charts.

- Naturally, relative price adjustment occurs much faster. Inflation comes below baseline after only about five years and the real exchange rate reaches its peak and starts declining at the same time. Under wage flexibility the adjustment of wages is even faster. Real wages shoot-up on impact and then decline rapidly in the direction of baseline. There is even a slight overshooting, in the real wage deviation from baseline. Specifically, after about seven years real wages start to deviate increasingly from baseline after the period of sharp correction.
- The initial large deviations of consumption from baseline decline over time and eventually reverse themselves. After a long period, despite higher GDP, domestic consumption will be lower than baseline. Thus, there is something of a boom and bust pattern in private consumption. Indeed the steady state level of consumption is lower than before.
- After thirty years, the adjustment process has not yet been completed. At that point foreign debt (as a percentage of GDP is still growing). Steady-state with a stable foreign-debt to GDP ratio is still far off.

Recapitulating, for some important variables the model generates strong and immediate adjustment ("front-loading"), followed by subsequent slowdown and even correction in levels. For example, consumption jumps on impact followed by a decline in its growth rate, leading, eventually, to levels of consumption below baseline. Non-traded production follows an interesting pattern as well. The initial increase in production, investment and employment gradually wither. Naturally, such adjustments are reflected in the time profile of price variables. Non-traded prices deviations from baseline peak early in the process and gradually adjust back to baseline thereafter. Eventually, the relative price of non-traded goods goes below baseline. Again such a pattern is consistent with a boom-interpretation in the relative price of non-traded goods. As the case may be, the main point remains correct. Under the assumptions of the model the economy adjusts in a self-equilibrating way to an initial increase in the opportunity set open to the home economy.

It is justified to pause and consider some predictions from the model that seem to fit known facts about the adjustment of the Portuguese economy to participation in the euro area:

- Lowering of nominal and real interest rates.
- Initial strong increase in domestic economic activity and, especially strong, in domestic demand financed through the expansion of credit.
- Increasing relative prices for non-tradables goods. Positive (and significant) inflation differential relative to the average of the euro area. Increasing wages and unit labor costs.
- Appreciation of the real exchange rates, loss of competitiveness of the economy, widening trade and current account deficits.
- Subsequently, slowdown of demand and decline in the inflation differential.

To repeat the intertemporal adjustment, in the simple intertemporal model sketched above, is, on the whole, and with some interesting qualifications, smooth and benign. It goes without saying that the story presented above is a gross over-simplification. The effects of euro participation cannot be summarized by a one-off shift in the exogenous risk premium. Such disturbance did not occur all of a sudden. Agents were not oblivious of the possibility of Portugal becoming a participant in the euro area up to a given date and all-knowing about the full adjustment path going forward (perfect foresight) immediately after. Some assumptions about the functioning of the economy are patently unrealistic. Moreover, many other drivers have affected the Portuguese economy since 1995. Again just as an example, in the most recent period, the Portuguese traded goods sector has been subject to increased competition in the context of enlargement of the EU and the emergence of China as a major player in global trade. Furthermore, the model omits stochastic shocks, which would be fundamental for explaining economic fluctuations at business cycle frequencies (in the case of Portugal the most important factor would be the European business cycle).

More importantly, in the context of the model, the dynamics, which we have assumed to be correctly anticipated, are very long lasting. The foresight assumed is very demanding.

It may well be that the combination of the type of friction considered (adjustment cost associated with changes to the capital stock and price setting in non-traded goods) and the assumption made about the relation between expectations and outcomes (perfect foresight) drives the results. In any case, the equilibrium paths for consumption and the relative price of non-tradables (and wages) suggest the possibility of richer dynamics. Therefore, the question remains whether there are omitted frictions and imperfections that make a boom and bust pattern likely.

These questions will occupy the rest of the section.

II. 2. What are the lessons from the literature on "sudden stops" and ERBSP?

There is a literature on the effects of Exchange Rate Based Stabilization Programs (ERBSP). It is a literature that reflects a dismal experience, marked by many instances of failure and repeated trials. The best-documented experiences come from Latin America. The collapse of the Argentinean currency board provided a vivid example of the possibility of crises, even in very rigid versions of exchange rate pegs.

It is interesting that, reading through the contributions of Calvo and Vegh (1995), Rebelo and Vegh (1995) to list the stylized facts they identify:

- Initial increase in economic activity and consumption.
- Diminishing nominal (and real) interest rates at the start of the program.
- Absence of progress towards budgetary consolidation in many (unsuccessful) cases.
- Slow convergence of inflation rates.
- Real exchange rate appreciation and loss of competitiveness.
- Deterioration of the trade balance and the current account.
- Most ERBSP display a pattern of boom and bust.
- Most ERBSP end-up with an External Payments Crisis. It is important to note that the boom-recession pattern is present even in (the few) successful stabilization programs.

There is a paradox here. Policy-makers are obviously concerned that, in certain circumstances, it is difficult to avoid adjustment characterized by a pattern of boom and bust. They would like to know whether (and how) adequate policy responses could avoid such pattern. Academics, on the contrary, have to struggle in order to be able to generate boom bust patterns, in the context of dynamic general equilibrium models of the economy.

The literature has identified a number of channels, which seem to contribute to generate such patterns:

- Endogenous credibility of the economic regime (possibility of multiple equilibria and self-fulfilling crises).
- Departures from perfect foresight or rational expectations. In particular, inertia induced by the expectations formation mechanisms.
- Exogenous inflation inertia.
- Nominal stickiness of prices and wages.
- Endogeneity of public sector's policies (wrong judgments by policy-makers or inadequate institutions to deal, for example, with time-consistency problems).
- Limited participation (segmentation) in financial markets. Deviations from complete stage-contingent contracts (for example, lending against collateral).
- Strong intertemporal effects associated with the consumption of durable goods and investment in real estate.

At a very general level, there are two alternative stories competing:

First, the adjustment of the economy can be regarded as an equilibrium phenomenon. In a dynamic general equilibrium model, the behavior of economic variables over time (including, for example, the real exchange rate and the current account) will respond endogenously to a large number of parameters that reflect a process of structural change. These include productivity trends, trade barriers (including transport and trading costs), taxation, migration flows, financial flows, international transfers, institutional and behavioral characteristics of product and labor markets and much else. In the process of adapting to participating in the euro area, a country like Portugal will benefit from more favorable financial conditions. These include the ability to borrow in deep financial markets, in its own currency. Easier and cheaper financing will, in equilibrium, likely lead to an increase in investment and to a decline in savings, implying a widening current account deficit. Assuming perfect foresight everything will work out in the end (such interpretation, as reported above, is put forward in, for example, Blanchard and Giavazzi (2002)).

Second, the alternative regards the adjustment process as reflecting some distortion or friction, present in the economy. Relevant frictions include: microeconomic rigidities in labor and product markets (especially in services); financial market segmentation through limited participation or other distortions in asset markets; distortions in the behavior of the public sector through weak or otherwise ill-designed institutions (leading, for example, to excessive growth in wages in the government sector) and deviations from perfect foresight or rational expectations allowing for errors to be made and disappointment to set in.

Recently, Calvo, Izquierdo and Mejía (2004) studied sudden stops empirically. They have used a sample of 32 developed and developing countries (their sample includes 17 developed countries and 15 emerging market countries). They found that large real exchange rate fluctuations associated with reversals in capital account flows (sudden stops) were, basically, an emerging market phenomenon. For developed countries large real exchange rate fluctuations have been mostly compatible with orderly international financial flows. Importantly, sudden stops are strongly related to elements of vulnerability of the home economy. Among the determining factors the degree of openness (lowering the likelihood of a sudden stop) and domestic liability dollarization (increasing it). The relevance of the inability of most emerging market countries to develop domestic institutions enabling domestic currency denominated international borrowing is so relevant that Eichengreen and Hausmann (1999) labeled it “original sin”. It is clear that, inside the euro area, participants are sheltered from “original sin”. More explicitly, for strong conceptual and empirical reasons the literature on sudden stops cannot be applied to adjustment within the euro area. Furthermore, it is clear that there is nothing of a sudden stop in the Portuguese experience post-2000. In fact, there has been no sign of increased difficulties in access to financing by Portuguese residents. Nevertheless, the imperfections considered in this literature provide us with a workable starting point to think about qualifications and extensions to our basic story. We will approach these issues in the concluding section.

III. Concluding remarks and policy implications.

Is a pattern of boom and bust unavoidable in the process of adjustment to the euro? At a theoretical level the answer seems to be "no". We have seen that it is possible to write down complete, optimizing models of the economy, consistent with smooth and benign adjustment. As we have seen in the previous section, for strong conceptual and empirical reasons the literature on ERBSP and sudden stops cannot be applied to the case of adjustment within the euro area. Indeed, the most important source of vulnerability leading to sudden stops is balance sheet mismatch, associated with foreign currency borrowing. The situation is completely different in monetary union. The vulnerability associated with currency mismatch is simply not present for a country participating in the euro area. Nevertheless, when looking at frictions and imperfections in the economy that may affect the adjustment process the literature provides us with a very useful starting point.

The research summarized in Calvo and Vegh (1999) suggest that it may be possible to generate boom-bust cycles by taking into account the intertemporal effects associated with consumption durables and real estate. The friction comes from some indivisibility element in the expenditure pattern of households together with some non-negligible trading cost. The idea is that the disturbance associated with the regime change will lead to a concentration in time of households' expenditures. Given this lumping in time it is unavoidable that expenditure will go down going forward. Importantly, such a boom-bust cycle is entirely benign. It is an endogenous equilibrium response of the economy to changing circumstances. Thus, it does not follow that a policy response would be desirable (even if possible).

There are, however, some further mechanisms, which may be less benign:

- Departures from rational expectations (or perfect foresight) in the direction of bounded rationality models.
- Limited participation (i.e. segmentation) in domestic financial markets and other financial frictions.
- Rigidities in product and labor markets leading to price and wage stickiness.
- Weak institutions to deal with discipline in public finances.

I will make some comments on each of these mechanisms. It was pointed out above that in a dynamic general equilibrium model, the behavior of economic variables over time (including, for example, the real exchange rate and the current account) will respond endogenously to a large number of parameters that reflect a process of structural change. These include productivity trends, trade barriers (including transport and trading costs), taxation, migration flows, financial flows, international transfers, institutional and behavioral characteristics of product and labor markets and much else. Perfect foresight assumes that households and firms are able to figure out, correctly and instantaneously, the implications of any disturbances for the path of equilibrium prices and factors costs into the indefinite future. Such assumption is very strong.

Indeed, as Constâncio (2005), points out "the new realities of life in a monetary union are only with difficulty taken on board by economic agents, who have for decades been used to other regulation mechanisms." Two possibilities are particularly relevant in this context. Households may be tempted to assume that the initial increase in real wages corresponds (at least partly) to a new trend associated with the European integration process. In such case, they would overestimate the effect on human wealth, which would exacerbate the front-loading of demand. The challenge of formulating a complete, consistent story is not easy. However, it is intuitive that, given front-loading of demand associated with wealth effects, extrapolative expectations could constitute a powerful amplification mechanism. Secondly, for many years the short duration of loans, associated with high nominal interest rates, meant that rules of thumb equating long run solvency with capacity to ensure debt service in the immediate future, would turn out relatively conservative. The same would not, naturally, hold true for an environment of low nominal interest rates and very long maturities. More sophisticated economic planning, based on a much longer time-horizon, is crucial for successful adjustment, or even survival, in the new environment.

Segmentation in access to international financing is also potentially important. Specifically, bounded rationality could be considered jointly with limited participation, in which only the domestic financial institutions have direct access to the global financial markets. In such a case, a credit boom accompanies the increase in domestic demand. A further amplification mechanism could be associated with loan contracts using real estate as collateral. An increase in the value (quantity and price) of real estate available would allow for a rapid expansion in credit contributing widening access to credit in the economy. In such a context it is clear that particular emphasis on financial system stability is called for. It encompasses both prudential supervision of individual financial institutions (and strong attention to credit risk analysis on the part of financial institutions) and also a careful assessment of the interaction between macro-stability of the financial system and macroeconomic adjustment.

Rigidities in labor and product markets make structural change more difficult and may hinder the downward adjustment in the real exchange rate and wages, which is necessary later in the adjustment process. Such dynamic process is considered, for example, in Blanchard and Muet (1993). Since the authors were considering the French-German exchange rate they did not emphasize the time-varying nature of the real exchange rate. Nevertheless, the pattern of adjustment necessary, for real exchange rate depreciation (with constant nominal exchange rate), clearly applies. The orthodox prescription is to reinforce flexibility in labor and product markets. Such flexibility is necessary to allow the relocation of resources, which accompanies structural change, to take place smooth and easy.

Last but not least, let us focus on public finances. The two examples above about imperfect knowledge and bounded rationality of private sector agents apply to the public sector as well. The literature on ERBSP emphasizes that it is easy for a government to interpret the initial economic boom as structural, thereby revising its

estimation of tax revenues going forward[9]. Moreover, the lowering of nominal interest rates and easier access to long-term financing, imply that some constraints on public sector behavior have been removed. Thus, the need to conduct budgetary policy in the context of rational long term planning becomes imperative.

Another way of emphasizing the same point is to point out that lower interest rates and easier access to finance makes it easier to the Government to finance current transfer programs and public investment (e.g. in infrastructures). The incentives for front-loading are present in the public sector as well. Government, however, should take intertemporal effects and, in particular, intergenerational distribution effects explicitly into account. It is clear that the current reduction in interest rates benefits current generations. However, for people born sufficiently far in the future the effect is negative as their level of lifetime consumption is below baseline (given the accumulation of foreign debt). If the intergenerational distributional effect is deemed undesirable the public sector could compensate for it by diminishing the level of explicit and implicit public debt. Detken, Gaspar and Winkler (2004) called this type of problem a "prosperity vs. posterity" trade-off. They argue that the euro area by creating an integrated sovereign bond market, with little ability to discriminate smoothly on the basis of credit risk (see, for example, Lamfalussy (1989) and Restoy (1996)), weakens the incentives for budgetary discipline. Thus, it would seem, that a proper response of the public sector to adjustment to euro area participation would justify added emphasis on budgetary discipline and public finance management in a long run framework.

In case public finance trends prove unsustainable the necessary correction may entail, by itself, a boom-bust pattern of adjustment. Another mechanism could be the deterioration of financial market expectations, associated with the prospects for future budgetary policy. As in the literature about the collapse of exchange rate regimes such role for expectations has the ability to generate multiple equilibria. The policy prescription is simply to follow policies that ensure the intertemporal sustainability of public finances – taking into account demographic trends and its implications for Education, Health and Pensions – and that insure the economy against the trap of "bad equilibria".

A further prudential argument in favor of conservative management of public finances relates to the need to have room to manoeuvre in case of difficulties in the process of adjustment. Prudent policy-makers have to take into account the possibility of less favorable developments and build-up a margin of flexibility to deal with them.

Many authors (for example Constâncio (2005)) stress the importance of avoiding pro-cyclical budgetary policies. This is certainly correct. However, in the context of the FGP model there is a further aspect associated with current macroeconomic management. Budgetary expansion, given the predominance of public expenditure in non-tradables, exacerbates the front-loading, and the adjustment in relative prices and

[9] Examining fiscal behavior in the context of boom and bust phases in asset prices Jaeger and Schuknecht (2004) conclude that first, in such a context, it is more difficult to forecast turning points and to estimate output gaps. Second, standard estimates of revenue elasticities are not good guides when assessing the stance of policy. Third, boom and bust phases exacerbate both spending and pro-cyclical biases in policy-making. Their empirical analysis is base on a cross-country sample including 16 industrial countries from 1971-2002.

wages, thereby increasing the pressure on the traded goods sector and the risks associated with over-optimism.

In summarizing our policy conclusions, it is clear that the impact of interest rate convergence, resulting from the entry of a country into monetary union, poses formidable problems for economic analysis and domestic economic policy. On the one hand, conditions in the domestic economy, which would normally be associated with overheating and the emergence of unsustainable imbalances – booming consumption and investment expenditure, deteriorating current account and loss of external competitiveness – could, in the event, represent the equilibrium adjustment of the economy to the changed circumstances. If this were indeed the case, there would be little cause for concern. On the other hand, such a process could, as a result of inaccurate expectations, real and financial frictions and weak institutions, develop beyond what is justified by fundamentals, leading to unsustainable developments which, if not counteracted, would ultimately result in a severe crisis or in prolonged under-performance. Facing uncertainties of this magnitude, it is essential to pursue the prudent course. In particular, we would stress the importance of realistic assessment of future prospects (in the context of longer-term economic planning), extra attention to micro and macro financial stability, the importance of labor and product market flexibility and, last but not least, prudent public finance management with a strong emphasis on posterity. If it sounds like a mantra it is. The original, literal meaning of mantra is “instrument of thought helping concentration and meditation”.

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Appendix 1 – The Dynamic General Equilibrium Model (from FGP)

Traded goods sector: Output, factor demands and pricing

$$YT_t = AT(LT_t)^{\theta_{LT}} KT_t^{1-\theta_{LT}} \tag{T.1}$$

$$KT_{t+1} = (1-\delta_{KT})KT_t + IT_t - \mu_{IT}\frac{IT_t^2}{KT_t} \tag{T.2}$$

$$NCFT_t = pt_t YT_t - w_t LT_t - pit_t IT_t \tag{T.3}$$

$$\theta_{LT} pt_t YT_t = w_t LT_t \tag{T.4}$$

$$\frac{q_{t+1}^{KT}}{1+r_{t+1}}(1-2\mu_{IT}\frac{IT_t}{KT_t}) = pit_t \tag{T.5}$$

$$q_t^{KT} = (1-\theta_{LT})pt_t\frac{YT_t}{KT_t} + \frac{q_{t+1}^{KT}}{1+r_{t+1}}\left[1-\delta_{KT}+\mu_{IT}\left(\frac{IT_t}{KT_t}\right)^2\right] \tag{T.6}$$

$$IT_t = stITT_t^{it} ITN_t^{(1-it)} \tag{T.7}$$

$$pit_t = \left(\frac{1}{st}\right)\left(\frac{pt_t}{it}\right)^{it}\left(\frac{pn_t}{(1-it)}\right)^{(1-it)} \tag{T.8}$$

Non-traded goods sector: Output, factor demands and pricing

$$YN_t = AN(LN_t)^{\theta_{LN}} KN_t^{1-\theta_{LN}} \tag{T.9}$$

$$KN_{t+1} = (1-\delta_{KN})KN_t + IN_t - \mu_{IN}\frac{IT_t^2}{KT_t} \tag{T.10}$$

$$NCFN_t = (pn_t - \mu_p\left(\frac{pn_t}{pn_{t-1}}-1\right)^2)YN_t - w_t LN_t - pin_t IN_t \tag{T.11}$$

$$\Psi_t = (pn_t - \mu_p\left(\frac{pn_t}{pn_{t-1}}-1\right)^2)YN_t + (pn_{t+1} - \mu_p\left(\frac{pn_{t+1}}{pn_t}-1\right)^2)\frac{YN_{t+1}}{1+r_{t+1}} \tag{T.12}$$

$$w_t = \frac{\partial \Psi_t}{\partial LN_t} \tag{T.13}$$

$$\frac{\partial \Psi_t}{\partial LN_t} = \left\{ -\frac{1}{\varepsilon_{pn}} \frac{pn_t}{pn_{t-1}} \left[1 - 2\mu_p \left(\frac{pn_t}{pn_{t-1}} - 1 \right) \right] + \left[pn_t - \mu_p \left(\frac{pn_t}{pn_{t-1}} - 1 \right)^2 \right] \right. \tag{T.14}$$

$$\left. - \frac{2}{\varepsilon_{pn}} \frac{1}{1+r_{t+1}} \frac{YN_{t+1}}{YN_t} \frac{pn_{t+1}}{pn_t} \mu_p \left(\frac{pn_{t+1}}{pn_t} - 1 \right) \right\} \theta_{LN} \frac{YN_1}{LN_t}$$

$$\frac{\partial \Psi_t}{\partial KN_t} = \left\{ -\frac{1}{\varepsilon_{pn}} \frac{pn_t}{pn_{t-1}} \left[1 - 2\mu_p \left(\frac{pn_t}{pn_{t-1}} - 1 \right) \right] + \left[pn_t - \mu_p \left(\frac{pn_t}{pn_{t-1}} - 1 \right)^2 \right] \right. \tag{T.15}$$

$$\left. - \frac{2}{\varepsilon_{pn}} \frac{1}{1+r_{t+1}} \frac{YN_{t+1}}{YN_t} \frac{pn_{t+1}}{pn_t} \mu_p \left(\frac{pn_{t+1}}{pn_t} - 1 \right) \right\} (1 - \theta_{LN}) \frac{YN_1}{KN_t}$$

$$\frac{q_{t+1}^{KN}}{1+r_{t+1}} (1 - 2\mu_{IN} \frac{IN_t}{KN_t}) = pin_t \tag{T.16}$$

$$q_t^{KN} = \frac{\partial \Psi_t}{\partial KN_t} + \frac{q_{t+1}^{KN}}{1+r_{t+1}} \left[1 - \delta_{KN} + \mu_{IN} \left(\frac{IN_t}{KN_t} \right)^2 \right] \tag{T.17}$$

$$IN_t = snINT_t^{in} INN_t^{(1-in)} \tag{T.18}$$

$$pin_t = \left(\frac{1}{sn} \right) \left(\frac{pt_t}{in} \right)^{in} \left(\frac{pn_t}{(1-in)} \right)^{(1-in)} \tag{T.19}$$

The household sector

$$U_{a,t} = \sum_{v=0}^{\infty} \gamma^v \beta^v \log(C_{a,t+v}) \quad \text{(T.21)}$$

$$\sum_{v=0}^{\infty} \gamma^v \left[1 + r_{t+v}\right]^{-v} pc_t c_{a+v,t+v} \leq TW_{a,t} \quad \text{(T.22)}$$

$$TW_{a,t} \equiv HW_{a,t} + FW_{a,t} + PVF_{a,t} \quad \text{(T.23)}$$

$$HW_{a,t} = \sum_{m=0}^{\infty} \left(\frac{\gamma}{1+r_{t+m}}\right) \cdot \left[W_{t+m}(\bar{L} - \ell_{a+m,t+m}) - LST_t\right] \quad \text{(T.24)}$$

$$FW_{a,t} = (1 + r_{t-1}) FW_{t-1} + NCFT_{t-1} + NCFN_{t-1} + \left[W_{t-1} \cdot (LNa,_{t-1} + LT_{a,t-1})\right] + TR_{t-1}$$

$$- pc_t C_{a-1,t-1} \quad \text{(T.25)}$$

$$PVF_{a,t} = \sum_{m=0}^{\infty} \left(\frac{1}{1+r_{t+m}}\right) (NCFT_{a,t} + NCFN_{a,t}) \quad \text{(T.26)}$$

$$pc_t C_t = \left(1 - \left[1 + r\right]^{\sigma-1} \gamma \beta^{\sigma}\right) \left[HW_t + FW_t + PVF_t\right] \quad \text{(T.27)}$$

$$C_t = scCT_t^c CN_t^{(1-c)} \quad \text{(T.28)}$$

$$pc_t = \left(\frac{1}{sc}\right) \left(\frac{pt_t}{c}\right)^c \left(\frac{pn_t}{(1-c)}\right)^{(1-c)} \quad \text{(T.29)}$$

The public sector

$$pt_t CGT_t + pn_t CGN_t + rPD_t + TR_t = TX_t \quad \text{(T.30)}$$

Conditions for market equilibrium and price determination

$$FD_{t+1} = (1 + r_t) FD_t + pt_t (CT_t + CGT_t + ITT_t + INT_t - YT_t) \quad \text{(T.31)}$$

$$YN_t = CN_t + CGN_t + ITN_t + INN_{tt} \quad \text{(T.32)}$$

$$LT_t + LN_t = L_t \quad \text{(T.33)}$$

$$FW_t = PD_t - FD_t \quad \text{(T.34)}$$

$$RER_t = \frac{pn_t}{pt_t} \quad \text{(T.35)}$$

$$r_t = rf_t + rp_t \tag{T.36}$$

$$pt_t = 1 \tag{T.37}$$

Table 1 – List of Variables (from FGP)

Householdss	
C	Consumption
CT	Consumption of traded goods
CN	Consumption of non-traded goods
FW	Financial Wealth
HW	Human Wealth
FD	Foreign Debt
PC	Consumer prices
PVF	Present value of firms (stock prices)
TW	Total wealth
U	Utility
W	Wage rate
Traded goods sector	
AT	TFP
IT	Investment
ITT	Investment (traded goods)
ITN	Investment (non traded goods)
KT	Capital Stock
LT	Employment
q^T	q-ratio
NCFT	Cash Flow
PIT	Price of investment goods
PT	Output price
Non-traded goods sector	
AN	TFP
IT	Investment
INT	Investment (traded goods)
INN	Investment (non traded goods)
KN	Capital Stock
LN	Employment
q^N	q-ratio
NCFN	Cash Flow
PIN	Price of investment goods
PN	Output price
Other	
CGN	Government consumption of non-tradeables
CGT	Government consumption of tradeables
PD	Government debt
R	Domestic interest rate
Rf	Foreign interest rate
RP	Exogenous risk premium
TR	Government transfers
TX	Taxes

Table 2 – Parameter set (from FGP)

PARAMETERS	VALUE	TYPE
Household parameters		
Discount factor	0.03581	calibrated
Probability of survival	0.97500	data
Savings rate out of total wealth	0.94129	calibrated
Production scalars in traded goods sector		
Scale parameter	8.77966	scale
Labour share	0.55000	data
Capital share	0.45000	data
Depreciation rate	0.09596	calibrated
Adjustment cost as a percentage of investment	0.20000	assumed
Adjustment cost parameter	1.66733	calibrated
Production scalars in non-traded goods sector		
Scale parameter	12.12338	scale
Labour share	0.60000	data
Capital share	0.40000	data
Depreciation rate	0.08150	calibrated
Adjustment cost as % of investment	0.20000	assumed
Adjustment cost parameter	1.96320	calibrated
Expenditure shares of traded goods		
In private consumption	0.50000	data
Scale parameter for private consumption	2.00000	scale
In investment in traded goods sector	0.40000	data
Scale parameter for investment in the traded goods sector	1.96013	scale
In investment in the non-traded goods sector	0.35000	data
Scale parameter for investment in the non-traded goods sector	1.91066	scale
In public consumption	0.05000	data
Monopolistic competition and nominal adjustment costs		
Mark-up in non-traded goods sector	0.10000	assumed
Nominal adjustment costs for the price of the non-traded good	50.00	data
Mark-up in the labour market	0.10000	assumed
Nominal adjustment costs for the nominal wage rate	50.00	data
Interest rate parameters		
Responsiveness of the endogenous risk premium to foreign debt	0.4000	data

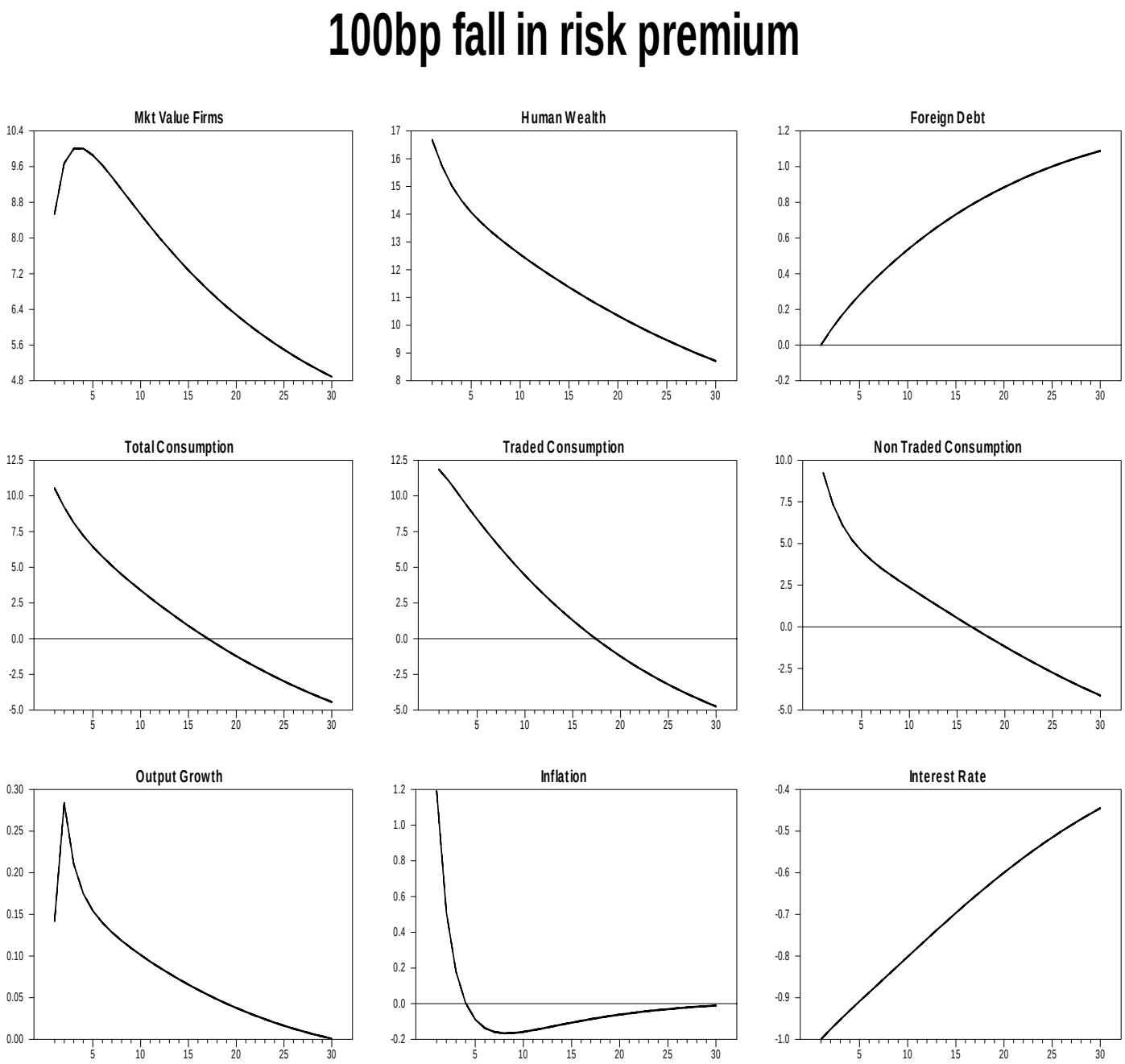
Table 3 – Data set (fromFGP)

DATA	VALUE	TYPE
Domestic spending data		
GDP growth rate	0.00000	normalised
GDP	1.00000	normalised
GDP – traded sector	0.38000	data
GDP – non-traded sector	0.62000	data
Private consumption	0.57500	data
Private investment in the traded goods sector	0.10125	data
Private investment in the non-traded goods sector	0.12375	data
Public consumption	0.20000	data
Foreign account data		
Trade deficit	0.00000	normalised
Interest payments	0.00000	normalised
Unilateral public transfers	0.00000	normalised
Current account deficit (+)	0.00000	normalised
Public account data		
Public consumption	0.20000	data
Government transfers	0.15000	data
Interest payments on public debt	0.02500	data
Lump sum tax revenues	0.37500	data
Public deficit (+)	0.00000	normalised
Population		
Population / labour force	1.00000	normalised
Population growth rate	0.00000	normalised
Labour force in the traded goods sector	0.38327	calibrated
Labour force in the non-traded goods sector	0.61673	calibrated
Leisure	0.20000	assumed
Leisure scale parameter	-0.17320	scale
Stock variables		
Private capital in the traded goods sector	0.84409	calibrated
Private capital in the non-traded goods sector	1.21473	calibrated
Foreign debt	0.00000	normalised
Public debt	0.50000	data
Human wealth	4.51063	calibrated
Value of the firms	4.78406	calibrated

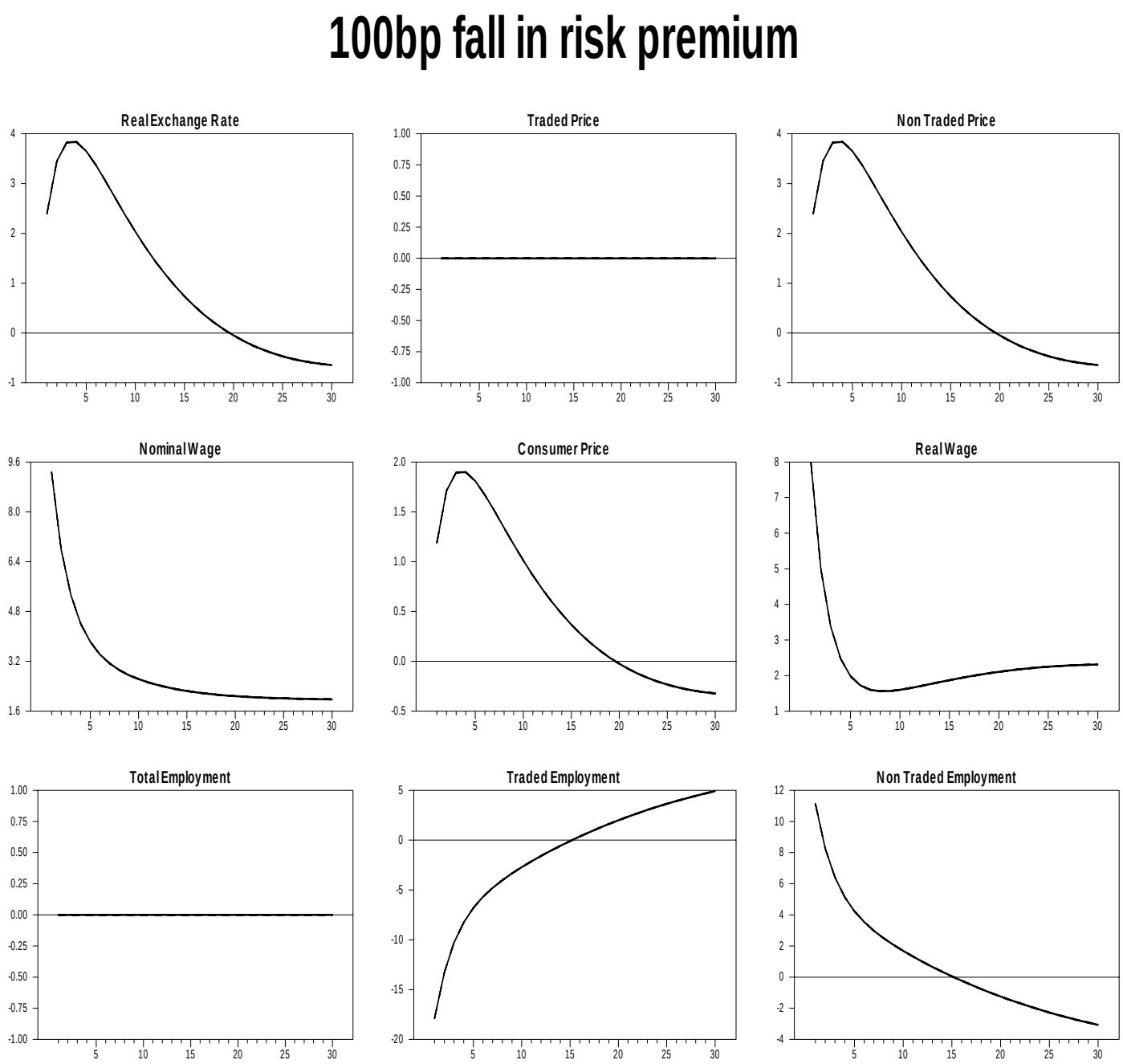
Prices		
Nominal exchange rate	1.00000	normalised
International price of traded goods	1.00000	normalised
Domestic price of traded goods	1.00000	normalised
Price of non-traded goods	1.00000	normalised
Price of private consumption	1.00000	normalised
Price of investment in the traded goods sector	1.00000	normalised
Price of investment in the non-traded goods sector	1.00000	normalised
Wage rate	0.54719	calibrated
Risk free interest rate	0.03500	data
Interest rate – exogenous risk premium	0.01500	data
Interest rate – endogenous risk premium	0.00000	normalised
Shadow price of capital in the traded goods sector	1.75000	calibrated
Shadow price of capital in the non-traded goods sector	1.75000	calibrated

APPENDIX 2- VERSION WITH ENDOGENOUS RISK PREMIUM (following Schmitt-Grohé and Uribe (2003)).

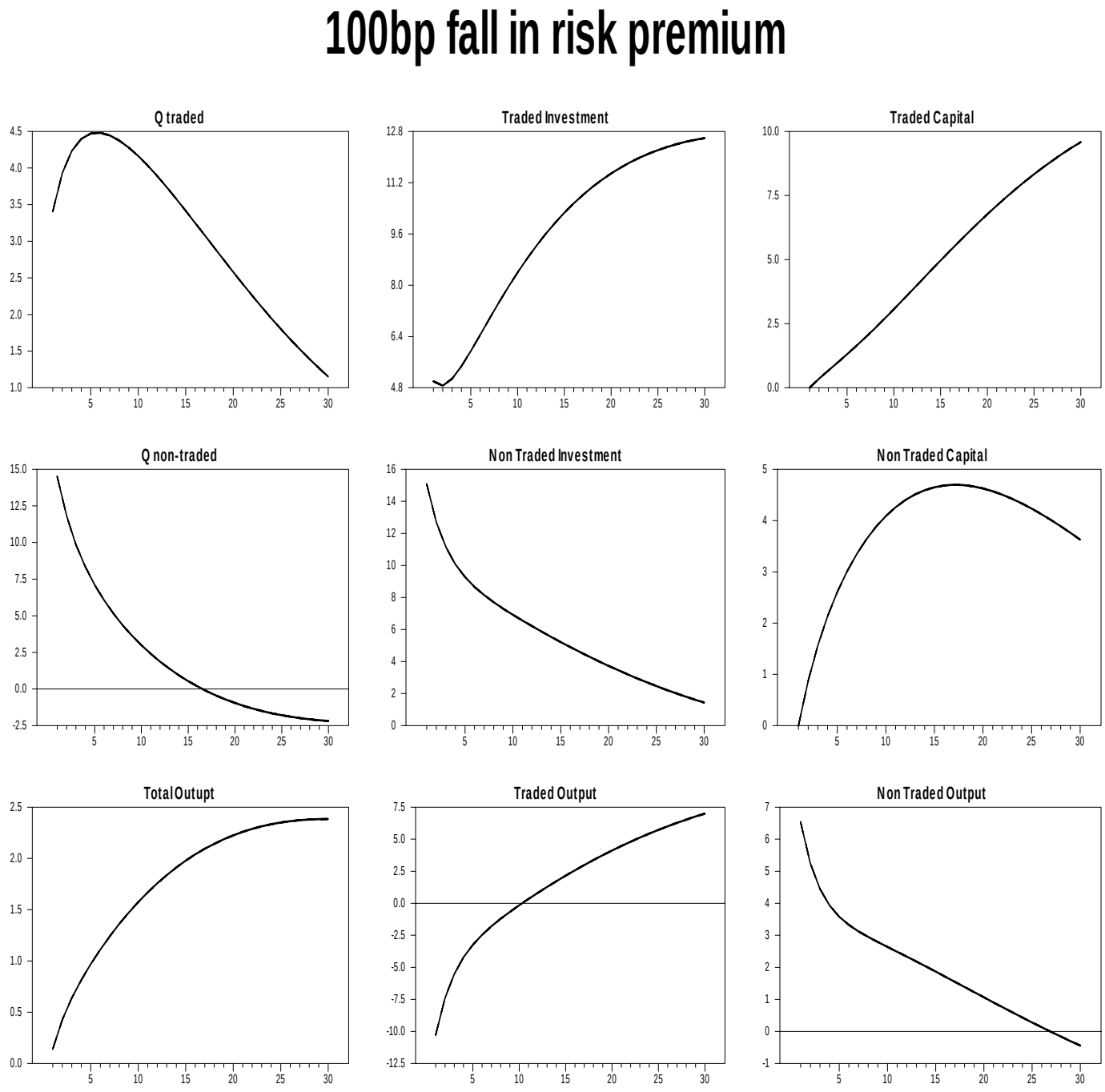
FIGURES A2 a): ADJUSTMENT TO A PERMANENT DECLINE (100 bp) IN THE (EXOGENOUS) IDIOSYNCRATIC RISK PREMIUM.



FIGURES A2b): ADJUSTMENT TO A PERMANENT DECLINE (100 bp) IN THE (EXOGENOUS) IDIOSYNCRATIC RISK



FIGURES A2 c): ADJUSTMENT TO A PERMANENT DECLINE (100 bp) IN THE (EXOGENOUS) IDIOSYNCRATIC RISK PREMIUM.



FIGURES A2 d): ADJUSTMENT TO A PERMANENT DECLINE (100 bp) IN THE (EXOGENOUS) IDIOSYNCRATIC RISK PREMIUM.