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Portugal: Selected Issues

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INTERNATIONAL MONETARY FUND

PORTUGAL

Selected Issues

Prepared by Paulo Drummond and Yuan Xiao (both EUR)

Approved by the European Department

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- The first chapter uses a range of indicators to assess the competitiveness gap versus other euro-area members and finds a gap of 10–20 percent. It then applies constant market share analysis to assess to what extent the export market loss since the mid-1990s has been associated with deteriorating competitiveness. An illustrative numerical exercise suggests that closing the competitiveness gap will likely require a long adjustment period, even with a jump in TFP growth and strong wage moderation. Reforms that boost productivity and promote wage moderation can play a critical role in restoring competitiveness.

- The second chapter investigates the determinants of Portugal's corporate investment, whose performance has been weak in recent years. It reviews the evidence supporting various hypotheses advanced to explain the boom and bust investment cycle surrounding the entrance to the monetary union. Using quarterly data covering 1987 to 2005, this essay estimates an aggregate investment function, and finds that investment reacts positively to output growth. However, it also finds evidence that a corporate debt overhang in the early 2000s contributed to the retrenchment of investment. The findings imply that, while structural reforms to improve the fiscal environment and raise productivity—thus enhancing potential growth—should have a positive effect on private investment in the future, its recovery will be attenuated by the impact of still high corporate debt.

Contents   Page

3

I. PORTUGAL: HOW LARGE IS THE EXTERNAL COMPETITIVENESS GAP?[1]

A. Overview

1.   Portugal's persistent loss of market share and weak export growth in recent years have raised concerns about its external competitiveness. To some extent, the weakening of Portugal's external position can be seen as a natural consequence of the dynamics that characterized the economy in recent years: the falling risk premium associated with Portugal's entry into the euro area, and the resulting increase in investment and wealth, the jump in consumption, and the demand boom that characterized the Portuguese economy until the end of the 1990s, was associated with an appreciation of the real exchange rate, some loss of competitiveness, and a widening of the current account deficit. But other mechanisms were also at play: the pro-cyclical fiscal policy of recent years and rapidly rising relative unit labor cost growth, much above the euro area average, contributed to the emergence of a competitiveness gap. To look into competitiveness more directly, this note reviews aggregate measures of competitiveness, and examines disaggregated trade data to assess recent changes in the competitiveness of the Portuguese economy.

2.   Assessing Portugal's relative competitiveness position is not straightforward, however, as different indicators suggest different interpretations. Aggregate broad-based measures of competitiveness—such as the World Economic Forum's (WEF) and the International Institute for Management (IMD)'s international competitiveness rankings—which attempt to look beyond economic performance to consider economies' official sectors, business efficiency, and infrastructure quality—provide somewhat divergent assessments of Portugal's degree of competitiveness. In the WEF's global competitiveness ranking for 2006, Portugal was placed thirty-fourth out of 125 countries, while under the IMD's methodology, the Portuguese economy ranked forty-fifth out of 60 countries in the 2005 listing. These measures encompass a number of subjective elements, however, and more importantly, take a broader view of competitiveness than that commonly used to measure external performance.

3.   While the various common methods of assessing competitiveness applied in this chapter are subject to known shortcomings, on balance they suggest a substantial competitiveness gap existed at the end of 2005. More traditional aggregate measures of competitiveness show a consistent and substantial decline in competitiveness (Section B): ULC-based real appreciation since the mid 1990s—benchmark years for Portugal—reached 10 percent in 2005, while Portuguese unit labor costs in the manufacturing sector rose some 20 percentage points faster than those of competitors in the euro area in the same period. The ratio of wage cost per employee to value added suggests that Portugal's cost advantage of the

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[1] Prepared by Paulo Drummond (EUR).

mid-1990s has disappeared in relation to Spain and Italy. In the meantime, the gap between export profit margins in Portugal and the average for the euro area widened some 15 percentage points in the last 10 years, in favor of the euro area. As a complement to these measures, this chapter reviews macro model-based and/or econometric estimates of the equilibrium exchange rate, all of which point to a significant loss of competitiveness in recent years, with a competitiveness gap in the range of 10–20 percent by the end of 2005.

4.   Export performance has reflected the loss in competitiveness. Applying constant market share (CMS) analysis to Portuguese exports over the period 1992–2004 suggests the bulk of export market loss in the 1990s was associated with deteriorating competitiveness (Section C). The CMS analysis, based on the value of exports, suggests market losses moderated since 1998, which may reflect a substantial compression of export margin, with a resulting negative impact on investment and employment in the tradables sector. Data on market share in volume terms, computed as the real growth of exports versus the weighted growth of import volumes in the main destination markets, however, suggests steady losses since the mid-1990s, particularly in the last two years.

B.   Aggregate Measures of Competitiveness

Real effective exchange rate measures

5.   Portugal has experienced significant CPI-based and ULC-based real appreciation since the mid 1990s. This was the case against both euro-area and non-euro-area competitors. This reflected a significant rise in unit labor costs and the impact of the euro's sharp appreciation in 2002 and 2003. Most of the appreciation took place between 2000 and 2005, when Portuguese unit labor costs in the manufacturing sector rose 6.7 percent faster than for euro-area competitors and almost 10 percent faster than for competitors in the rest of the world (Table 1 and Figure 1). In 2005, unit labor costs in Portugal were basically flat, caused by wage moderation and a cyclical recovery of labor productivity growth. This ended previous years of worsening cost competitiveness against its competitors (Table 2).

Table 1. Unit Labor Costs, Manufacturing, 1998–2005
(Annual changes in percent)

	1998	1999	2000	2001	2002	2003	2004	2005	Cumm.
Portugal									
Labor productivity	2.1	2.4	1.5	0.2	-0.1	-0.7	1.1	0.7	7.4
Unit labor costs	2.8	3.9	3.1	4.8	3.2	1.5	1.1	-0.1	22.1
Spain									
Labor productivity	0.2	0.1	0.0	0.3	0.3	0.4	0.5	0.5	2.4
Unit labor costs	1.8	1.3	2.4	4.0	2.8	0.9	0.6	0.8	15.6
Euro Zone									
Labor productivity	1.2	1.7	2.1	0.4	1.0	1.1	1.7	0.9	10.6
Unit labor costs	-0.6	-0.4	-1.9	3.0	0.8	0.6	-0.6	1.4	2.4
Non-Euro Zone									
Labor productivity	2.3	3.2	3.6	1.8	2.6	2.7	3.9	2.7	25.1
Unit labor costs	4.7	2.1	-2.5	3.3	0.2	-0.7	-2.1	1.0	6.0

Sources: Ameco database, OECD, and Fund staff calculations.

Table 2. Share of Portuguese Exports in the World Market at SITC 2-digit
(In percent)

	1992	1996	1998	2000	2002	2004
Food	0.6	0.4	0.4	0.4	0.4	0.5
Mineral fuels	0.4	0.2	0.2	0.1	0.1	0.2
Chemicals	0.4	0.2	0.2	0.2	0.2	0.2
Raw material	1.1	0.6	0.7	0.7	0.7	0.7
Textile & appeal	3.6	1.6	1.4	1.2	1.2	1.1
Metals	0.4	0.2	0.2	0.2	0.3	0.3
Manufactures	0.8	0.4	0.4	0.4	0.4	0.3
Transport equipments	0.5	0.5	0.5	0.4	0.4	0.5
Other manufactures	0.6	0.3	0.3	0.3	0.4	0.5
Total (sum)	0.9	0.5	0.5	0.4	0.4	0.4

Source: UN COMTRADE, and IMF staff calculation.
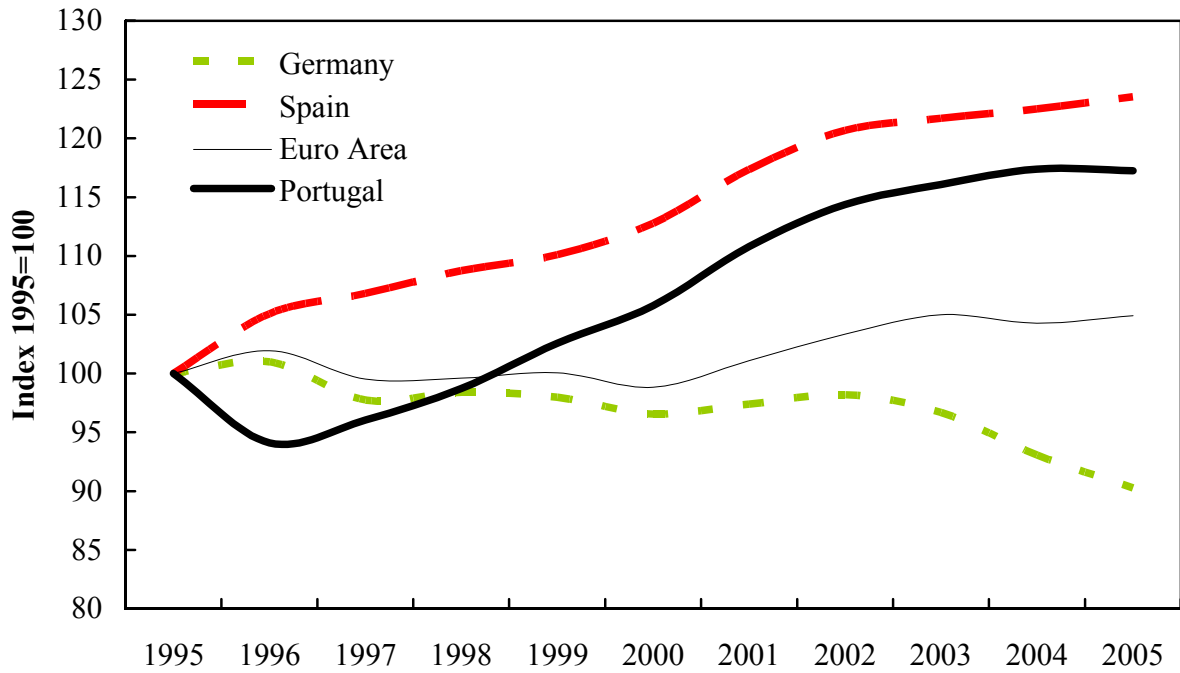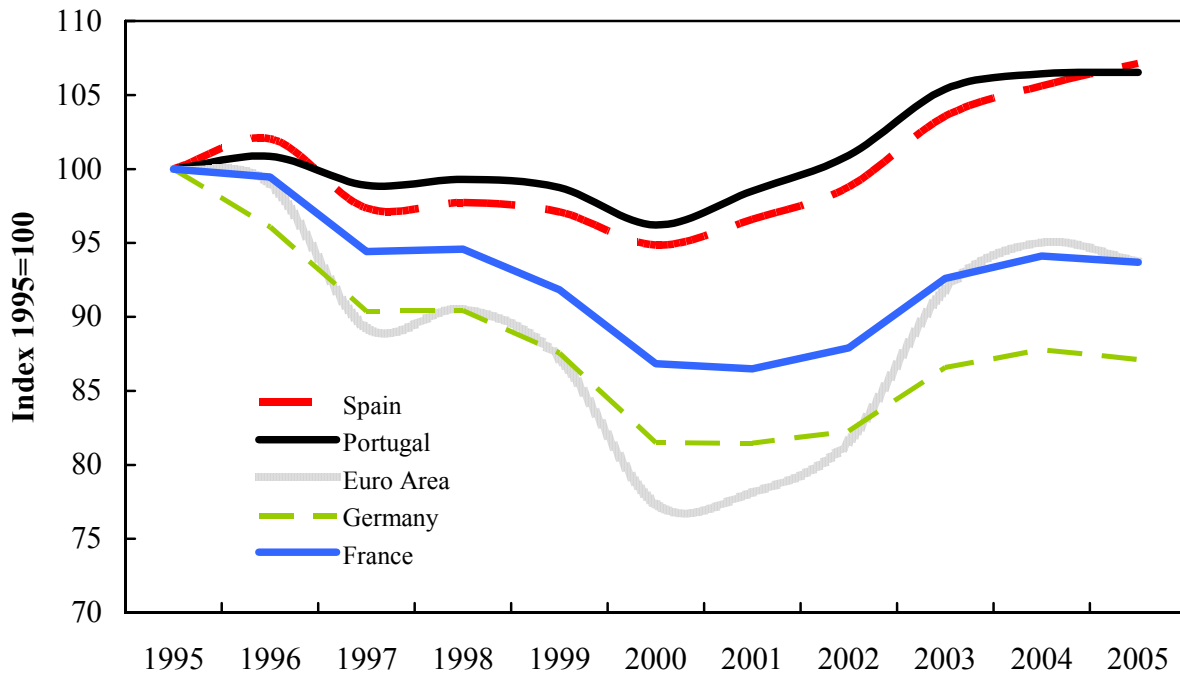
Figure 1. Manufacturing Unit Labor Cost (1995-2005)

Figure 2. Real Effective Exchange Rate - CPI based (1995-2005)

Source: OECD Analytical Database for ULC and International Financial Statistics (IMF) for REER.

6.   The RER analysis is useful to assess changes in competitiveness, but it provides limited insight on the level of competitiveness and only if an equilibrium base period can be identified. For Portugal, the mid-1990s can be associated as "benchmark" years—based on current account and export developments. However, with changes in the quality and composition of production, entry into the euro area, and a large margin of uncertainty about the extent of any disequilibrium, even in the mid-1990s, these developments do not allow us to make clear statements about Portugal's current competitiveness gap. Another caveat is that comparator countries are weighted by actual trade shares, with possibly too little weight on actual and potential third country competitors.[2]

Profit share indicators

7.   The ratio of wage costs per employee to value added (in current prices) per person in manufacturing provides a measure of relative profit shares in the tradables-intensive sector of the economy.[3] Alternatively, we also calculate the export margin by dividing the deflator of exports of goods by the unit labor cost in manufacturing. This measures improves on ULC-based REERs by taking into account variations across countries in the price of tradable output/exports (Lipschitz and McDonald, 1991). Nevertheless several caveats must be borne in mind. First, relative profit shares in manufacturing are not a good guide to differences in the rate of return on capital if there are significant differences in production technology. Comparisons of profit shares between countries at roughly similar stages of development should be more meaningful, although even here different product mixes can distort level comparisons. Analysis of changes in relative profit shares are meaningful because changes in production technology typically occur slowly. Second, the aggregate indicators could hide large differences in profit shares within the manufacturing industry.

8.   The export margin shows a steady and gradual decline in Portugal (Figure 3) while the ratio of wage cost per employee to value added suggests that Portugal's cost advantage of the mid-1990s has disappeared in relation to Spain and Italy (Figure 4). To the extent that comparisons of the levels of these measures are meaningful (that is, production technologies are similar), 2005 data suggest that since 1995 the gap between profit shares in Portugal and,

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[2] For a discussion of this point, see "Competitividade das Exportacões Portuguesas: Uma Avaliacão dos Pesos das Taxas de Cambio Efectiva," by Paulo Soares Esteves and Carolina Reis.

[3] This measure is close to wage shares used by Lipschitz and McDonald. Here, however, productivity is calculated per person employed (including self-employed), but wage costs are calculated per employee (excluding self-employed). This avoids a bias due to—sometimes tax system related—differences in the importance of self-employment across countries.

for example, Germany, widened some 10 percentage points, as the share of wage costs in value added increased.
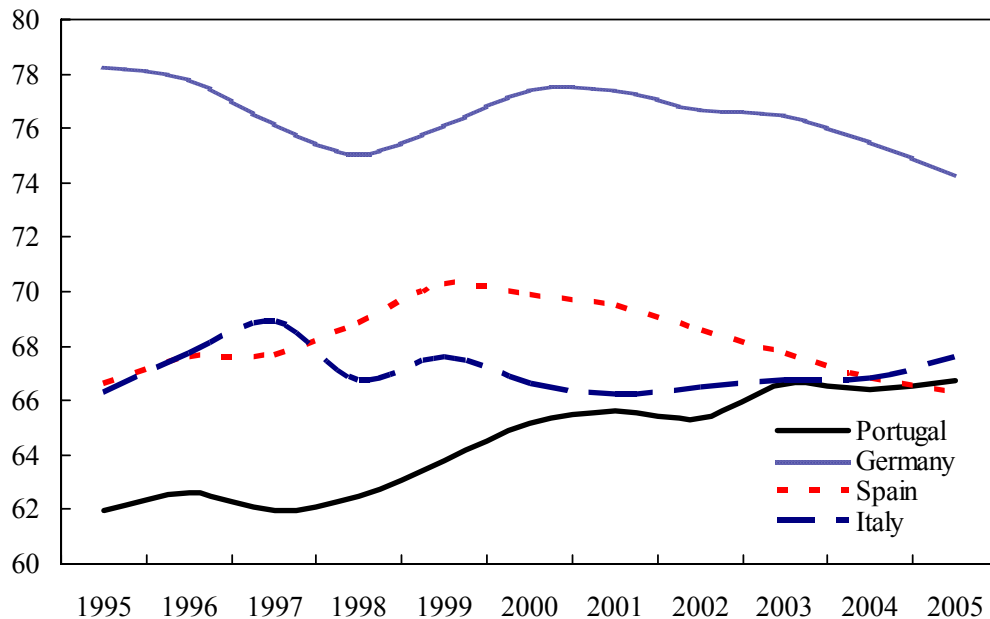
Figure 3. Export Margin 1/
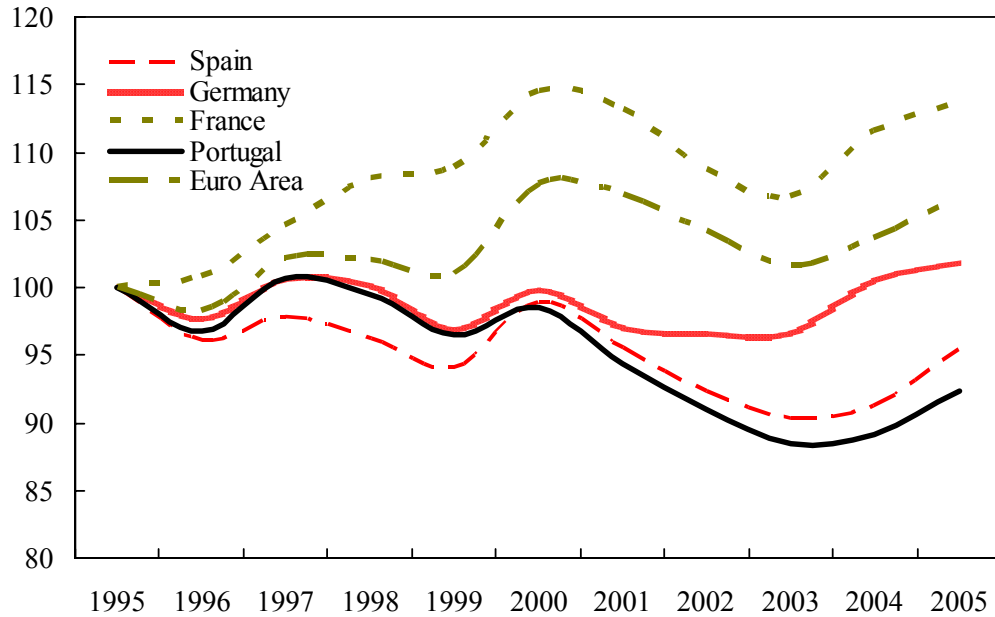
1/ The Exports Margin is calculated dividing the deflator of exports of goods by the unit labor cost in manufacturing.
Source: OECD Analytical Database, INE and European Commission.

Figure 4. Ratios of Wage Costs to Value Added, 1995–2005 1/

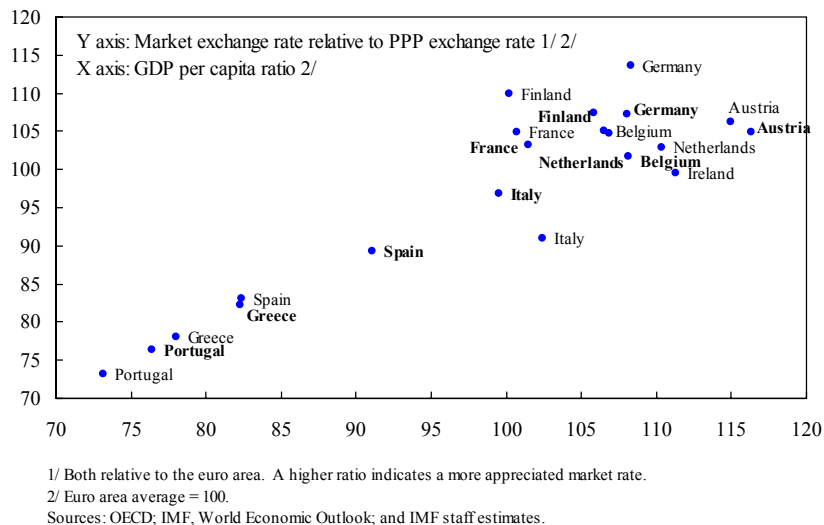1/ Wage bill per employee in manufacturing, as ratio of value added per person employed.
Sources: OECD, STAN Database; OECD, Analytical Database; and IMF staff estimates.

PPP exchange rates

9.   In contrast to REERs, the ratio between the actual exchange rate and the PPP exchange rate aims to assess levels of current exchange rates against their long-term equilibria. The PPP exchange rate compares the cost (in national currency) of a similar basket of goods (typically that of GDP) in two countries. For countries at close to the same level of development, ratios of the market rate to the PPP rate above one indicate overvaluation and below one undervaluation. For such countries, this is a particularly powerful tool because it measures over or undervaluation directly, rather than indirectly via the presumption that any change in the real value of a currency is a movement toward or away from a static equilibrium.

10.   Using the PPP exchange rate ratio to analyze exchange rates of countries at different stages of development is more complicated. Countries with lower GDP per capita have lower wages in the service (or nontradable) sector and therefore lower prices in this sector expressed in a common currency—the ratio of the market rate to the PPP rate should be below one and rising (De Broeck and Sløck (2001)).[4] In Portugal, the PPP exchange rate ratio rose as convergence proceeded. At end-2005, the actual PPP exchange ratio was 76 percent of that of the euro area. Using the PPP exchange rate ratio consistent with Portugal's GDP per capita as a norm, the actual Portuguese PPP exchange rate ratio was relatively high in light of its GDP per capita. Also, Portugal's relative position with respect to Germany or France deteriorated as the ratio of the market rate to the PPP rate in these countries declined.

Figure 5. PPP Exchange Rate Ratio and GDP per Capita, 1998; 2005 in bold

1/ Both relative to the euro area. A higher ratio indicates a more appreciated market rate.
2/ Euro area average = 100.
Sources: OECD; IMF, World Economic Outlook; and IMF staff estimates.

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[4] For a sample of developing countries, they estimate the log of the PPP exchange rate ratio as a linear function of the log of PPP GDP per capita in dollars and find that an increase in PPP per capita GDP of one percent increases the exchange rate ratio by 0.41 percent.

Macro model-based and/or econometric estimates of equilibrium exchange rate

11. The **macroeconomic balance approach** and related calculations of the fundamental equilibrium exchange rate (FEER) are based on a structural model of the economy, focusing on trade equations.[5] Using the methodology in IMF (2006),[6] the macro approach compares the underlying external current account with a norm or target. The underlying current account is derived by adjusting the actual current account for "transitory" elements, including the cyclical position and the impact of (all) past real exchange rate changes. The norm is derived from medium-term savings and investment balances or from current account positions needed to achieve a certain net foreign asset position. The gap between the underlying current account and the norm is then mapped into a gap between the actual and equilibrium exchange rate.[7] In the case of Portugal, the misalignment implied by the C/A norm (a deficit of 3 percent) yields a misalignment of 7 to 10 percent. The key caveat is that this approach assumes that excess current account deficits are due solely to misalignment of relative prices. In Portugal, however, factors including consumption smoothing, volatile and bulky capital flows, and structural changes in savings behavior can produce temporary large current account deficits not due to a misaligned exchange rate.

12. Recent studies have calculated some concept of equilibrium exchange rate for Portugal:

- Smidkova and Bulir (2004) use a model of fundamental real exchange rates (for a discussion, see Smidkova, Barrell and Holland, 2002) based on empirically estimated trade equations that relate exports and imports to the real exchange rate, the terms of trade, and domestic and foreign economic activity, with a view to measuring how far real exchange rates are from values corresponding to their economic fundamentals. They define the external balance in terms or stocks rather than flows. For Portugal, they find for the period 1992–2003—covering seven years of preparing for euro adoption as well as a brief post-adoption period—that the escudo remained in line with economic fundamentals until 1999 albeit close to overvaluation. However, they

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[5] This approach is discussed by Isard and Faruqee (1998) and Isard and others (2001).

[6] "Methodology for CGER Exchange Assessments" (forthcoming).

[7] A related approach is the estimation of the natural real exchange rate (NATREX). Based on more rigorous modeling of stock-flow interaction in a macroeconomic growth model, it makes a distinction between medium-term equilibrium (with external and internal balance) and long-run equilibrium (with net foreign debt constant and the capital stock at a steady state level).

also find that by the end of 2003, the euro was some 10–20 percent too strong in real terms for Portugal.

- Using the methodology in IMF (2006),[8] the equilibrium exchange rate can be derived from reduced-form panel cointegration regressions, relating the real effective exchange rate to a set of underlying fundamentals.[9] The dataset used includes 48 industrial countries and emerging markets, and covers the period 1980–2004. The real exchange rate misalignment for Portugal as of March 2006 is estimated to range from 8 percent to 11.3 percent, for the 2005 and 2011 fundamentals, respectively. The main shortcomings of such studies are the large estimation errors and the fact that results are contingent on the assumptions of particular models.

13.   Given the theoretical and practical difficulties associated with estimating equilibrium real exchange rates, we calculated, alternatively, the improvement in competitiveness (as measured by the real effective exchange rate) required to achieve a trade deficit that would stabilize net external liabilities close to their current level. The misalignment estimated is based on the gap between the projected current account deficit and the current account deficit that stabilizes NFA at 2005 levels:

$$ca^S = \frac{g_t + \pi_t}{(1+g_t)(1+\pi_t)} b^S$$

where ca^s is the NFA-stabilizing current account/GDP; g is real GDP growth rate; π is the GDP inflation rate; and, b^s is the target NFA/GDP. The estimate assumes a current account deficit consistent with a stable NFA position. The midpoint REER misalignment estimated is 14.5 percent (within a range of 12.4 to 20.6 percent) assuming trade elasticities of 0.7 for exports and 0.92 for imports. [10]

C. Constant Market Share Analysis

14.   In recent years, Portuguese export performance, in volume terms, has reflected the loss in competitiveness. Real export growth (goods) averaged 2.6 percent in 2001–04, at a time when the growth in the Portuguese export market was averaging above 4.4 percent annually according to WEO data. Real export growth (goods) in 2005 was about 1.6 percent, compared to 6.6 percent market growth.

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[8] "Methodology for CGER Exchange Assessments" (forthcoming).

[9] Lagged net foreign assets to trade, productivity of tradables versus nontradables relative to trading partners, commodity terms of trade, government consumption to GDP ratio, and an index of trade restriction.

[10] Isard and Faruqee (1998).

15.   Based on the UN's COMTRADE trade database, the Portuguese share of the world export market was halved since the early 1990s (Table 2). Most of the decline occurred during the 1990s, with only a slight decline since 1998. However, the world market shares reflect the pattern of specialization in terms of either the country of destination or in the particular commodity bundle exported. To shed light on the relative contributions of these factors, in what follows we disaggregate the trade flows by applying constant market share analysis.

Constant market share analysis (CMS)

16.   This approach can be expressed by the following equation:

$$X^1 - X^0 = r\sum_i X_i^0 + \sum_i (r_i - r)X_i^0 + \sum_i \sum_j (r_{ij} - r_i)X_{ij}^0 + \sum_i \sum_j (X_{ij}^1 - X_{ij}^0 - r_{ij}X_{ij}^0)$$

where

$$X^t = \sum_i \sum_j X_{ij}^t = \sum_i X_i^t, \quad t = 1,0$$

and

X$_{ij}{}^t$ = the value of Portuguese export of commodity i to market j at time t,
r = the rate of growth of world exports,
r$_i$ = the rate of growth of world exports of commodity i,
r$_{ij}$ = the rate of growth of world exports of commodity i in market j.

17.   This approach entails decomposing the change in Portuguese exports between any two periods into four effects:

- *The global market growth effect (first term).* This indicates the part of the export growth that is due to the expansion of the overall world trade. The magnitude of this effect shows the potential growth of the Portuguese exports when its share of world export market is kept constant.

- *The commodity composition effect (second term).* This is the weighted sum of values of exports of different commodities. The weights are the deviations of the growth rates of individual commodity exports from the growth rate of the aggregate world exports. For instance, the commodity composition effect would be negative if Portugal had concentrated its exports on commodities with relatively slow global growth.

- *The market distribution effect (third term).* This measures the change in exports due to market distribution and depends on trade policy and income growth of the countries where the Portuguese exports are destined. In general, this effect would be positive if Portuguese exports had gone to countries where demand growth was faster than the global average.

- *The competitiveness effect (fourth term).* This residual term can be used as a measure of export competitiveness, the gain or loss in export growth that cannot be attributed to global growth, growth or trade partners or growth in demand for the products in which Portugal specializes.

18.   The decomposition highlights that a stable share of world export markets does not imply stable competitiveness. Instead, a constant share in exports—after adjusting for the commodity and market effects—is equivalent to unchanged competitiveness. However, changes in trade policy can also be at play. Moreover, it would be preferable to do the analysis in volume terms, but data are not available. These caveats suggest caution in interpreting the results.

19.   In applying the CMS approach to the Portuguese exports over the period 1992–2004, exports at two digits were regrouped into nine major commodities and various export markets. The nine commodities are: food (0–24), mineral fuels (25–27), chemicals (28–38), raw material (39–49), textile and appeal (50–71), metals (72–83), manufacturing goods (84–85), transportation equipments (86–89), and other manufacturing goods (90–97). The analysis looks at the following key Portuguese export markets: 1) Spain; 2) Germany; 3) France; 4) Italy; 5) United Kingdom; 6) United States; 7) euro area, excluding Germany, France, Spain, and Italy; and 8) the rest of world.

20.   The results, suggest the bulk of export market loss was associated with deteriorating competitiveness. The total export loss associated with weak competitiveness was some 14 percent of Portuguese exports in the period 1992–2004. Since adoption of the euro, the loss of market share continued, albeit at a more moderate pace (Table 3). Such moderation

Table 3. Portugal: CMS Analysis of Exports Changes
(Value in billion US dollars; unless otherwise indicated)

	1992–2004	1992–1998	1998–2004 1/
Change in exports			
in billion U.S. dollars	17.1	5.7	11.4
Average annual growth rate (in percent)	5.6	4.5	6.7
Due to:			
World trade effect	55	28	14
Commodity composition effect	-4	0	-2
Market distribution effect	9	3	3
Competitiveness	-42	-25	-3

1/ Based on the commodity composition of exports as of 1998.
Source: IMF Staff estimates.

of 1 percent annually for the euro area (as in the April 2006 WEO projections), even if Portuguese ULCs were to fall at a rate of 2 percent annually it would still take three to seven years to close the competitiveness gap with the euro area. Moreover, if capital deepening were to contribute 1 percent annually to labor productivity growth over that period (slightly above the rate experienced in 2001–04), even an increase in annual TFP growth to 1 percent (the euro-area average for those years) would leave no room for nominal wage growth in Portugal under this scenario. While these calculations are simply illustrative and are subject to considerable uncertainty, they demonstrate the scale of the problem Portugal faces, and the critical role that reforms to boost productivity and promote wage moderation must play in restoring competitiveness.

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II. EXPLAINING CORPORATE INVESTMENT IN PORTUGAL[12]

A. Introduction

1.   After rapid expansion in the 1990s, private fixed investment growth turned negative in 2001, and investment collapsed in 2003. Even in 2005, when the economy started on a moderate recovery path, private fixed investment declined by 4 percent. As investment is a significant—and the most volatile —component of the national accounts, understanding its behavior is crucial to forecasting the pace of the ongoing recovery of the Portuguese economy.

2.   Two main theories have been put forward to explain the behavior of investment in the recent cycle: the "expectations" hypothesis and the "debt" hypothesis. In the 1990s, investment boomed in anticipation of fast growth under monetary union. This expectation was reversed later as the private sector adjusted to a new steady state with lower growth prospects. In addition, the sharp rise in enterprise indebtedness associated with this prior investment could have limited investment growth in recent years, independent of future growth prospects. In this chapter, we examine the data in search of evidence to evaluate the validity of these hypotheses in Portugal.

3.   Using quarterly data covering 1987–2005, we also attempt to estimate a relationship between corporate investment and its determinants. The estimates yield support for both hypotheses mentioned above. Investment reacts positively to output growth, but the corporate debt overhang in the early 2000s may have contributed to the retrenchment of investment spending. As growth prospects are found to be the driving force of investment, it is crucial that the government maintain the momentum and the credibility of fiscal consolidation and structural reform to sustain business confidence. However, high debt levels in the aftermath of the investment boom of the late 1990s may still act as a drag on investment going forward.

4.   The rest of this chapter is organized as follows. Section B presents some stylized facts on investment behavior in the recent business cycle, which are to be explained in the following sections. In Section C, we summarize the leading explanations of investment behavior in Portugal and examine informally some evidence. In Section D, we conduct econometric estimation of the determinants of investment. Section E concludes.

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[12] Prepared by Yuan Xiao (EUR).

B. Investment in the Recent Cycle: Some Facts

5.   The story of Portugal's recent business cycle is by now familiar. Portugal enjoyed a rapid economic upturn in the 1990s, but growth slowed in the new millennium. Following a recession, a gradual recovery appears to be underway. The economy was also hurt by a significant loss of external competitiveness, mostly because of poor productivity growth but also due to the rise of Asian economies with lower labor costs. During the cycle, there was significant comovement among all components of the national accounts, but, not surprisingly, investment exhibited the largest volatility (Figure 1). Investment has probably contributed to the cycle in two ways, both as a source of shock and as a magnifying channel.

Figure 1. Year-Over-Year Growth of Components of GDP
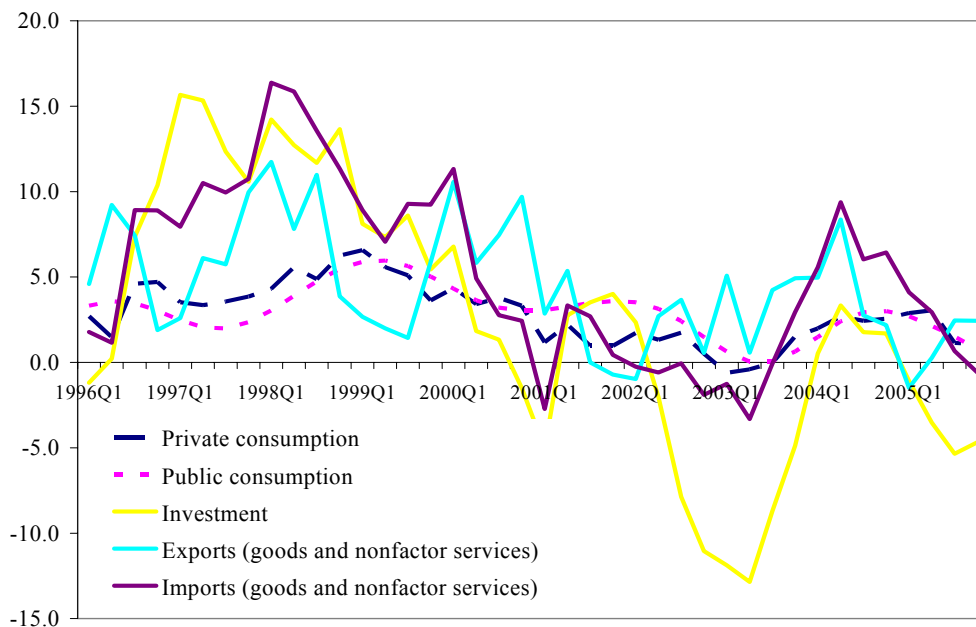
6.   As Figure 2 shows, the behaviors of investment in construction and machinery and equipment were similar. Of corporate investment, the sectoral breakdown in Figure 3 suggests that most sectors experienced the same boom and bust cycle, except for the utility sector. Construction and real estate suffered the most severe downturns. The task we set out to accomplish in this chapter is to explain this boom and bust behavior of corporate investment, focusing on identifying the factors driving corporate investment in this cycle.
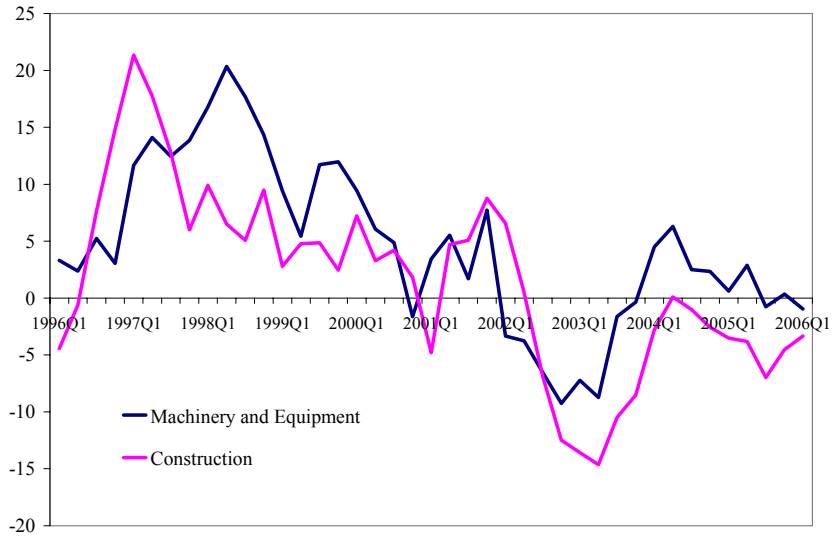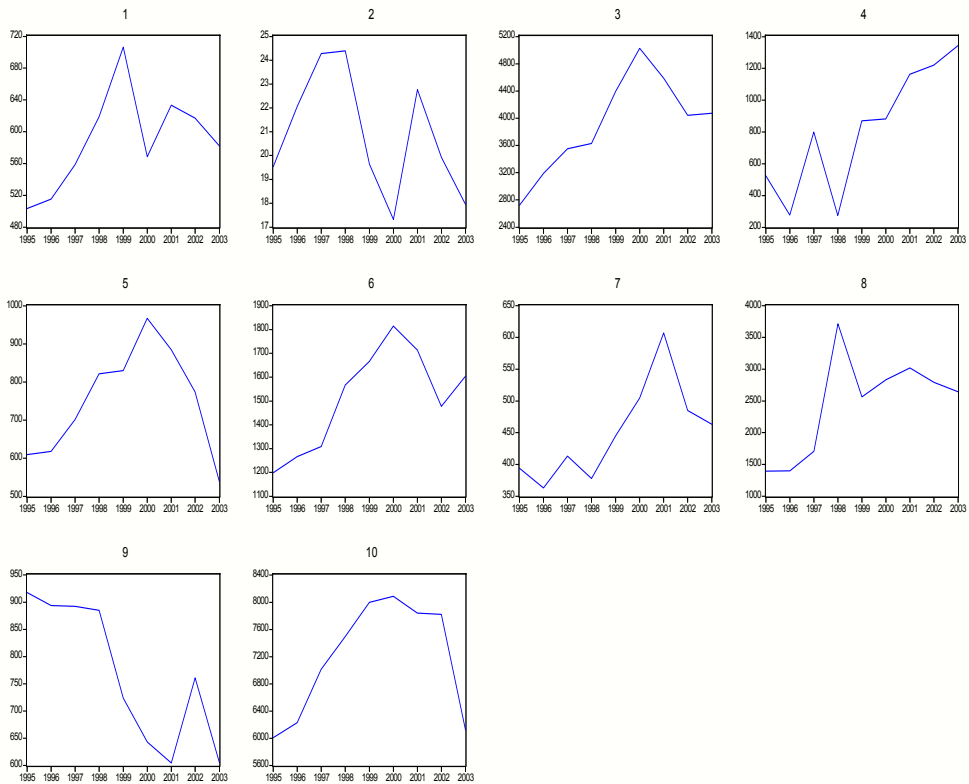
Figure 2. Investment Components

Figure 3. Sectoral Investment

1. Agriculture, hunting, and forest; 2. fishing; 3. total manufacturing; 4.electricity, gas, and water supply; 5.construction; 6.wholesale and retail trade; 7. hotels and restaurants; 8. transport and storage and communication; 9. financial intermediation; and 10. real estate, renting, and business activities.

C. Alternative Explanations of Corporate Investment

7.   Several hypotheses could be advanced to explain the boom and bust behavior of Portugal's corporate investment. These relate to changes in firms' perceptions of business prospects, possible overinvestment by firms, a corporate debt overhang, and shocks to Portugal's labor productivity.

Expectation hypothesis

8.   Recent investment behavior should be understood in the context of the business cycle in which several major economic variables moved in the same boom and bust pattern. Economists tend to agree that the boom and bust behavior relates primarily to the large swing of expectations created by the prospect of joining monetary union. In the mid-1990s, interest rates fell significantly as the risk premium dropped. Investment rose sharply in anticipation of fast growth in monetary union and was financed by the rapid expansion of bank credit. The bust part of the cycle represents adjustments toward a new steady state with lower growth prospects. The prospects were further damaged by several adverse shocks to the path of growth, such as a significant loss of competitiveness and a productivity slowdown. The expectation hypothesis illustrates the role of growth prospects in determining business investment, as well as that of credit expansion.

Overinvestment

9.   While firms' behavior in the late 1990s could have been an equilibrium behavior and entirely rational, with hindsight there could have been overinvestment in the second half of the 1990s, relative to a new reduced growth path compared to agents' earlier expectations. Is there any evidence for overinvestment in the late 1990s? Overinvestment implies excessively high level of capital stock. Figure 4 plots the ratio of nonhousing private capital stock to potential GDP since 1980. There appears to be a break of trend since 1997, and the capital to GDP ratio rose sharply afterwards. The ratio flattened in the early 2000s when the trend of investment reversed. While undoubtedly a new steady state with a higher level of capital stock was expected owing to the entry into monetary union, the fact that investment was reversed later suggests that this expectation could have been too optimistic. In this sense the break of trend in the late 1990s could be interpreted as evidence for overinvestment.

10.   Another piece of evidence to look for is declining profitability. Excessively high levels of capital imply lower returns on capital, and the gross operating surplus will shrink. Figure 5 plots gross operating surplus along with business investment. As can be seen in the figure, the gap between profits and investment narrowed in the second half of the 1990s,

suggesting lower returns on capital.[13] In the regressional analysis in Section D, we shall investigate formally how business investment responds to the level of the capital stock and profitability.

Figure 4. Ratio of Nonhousing Private Capital Stock to Potential GDP

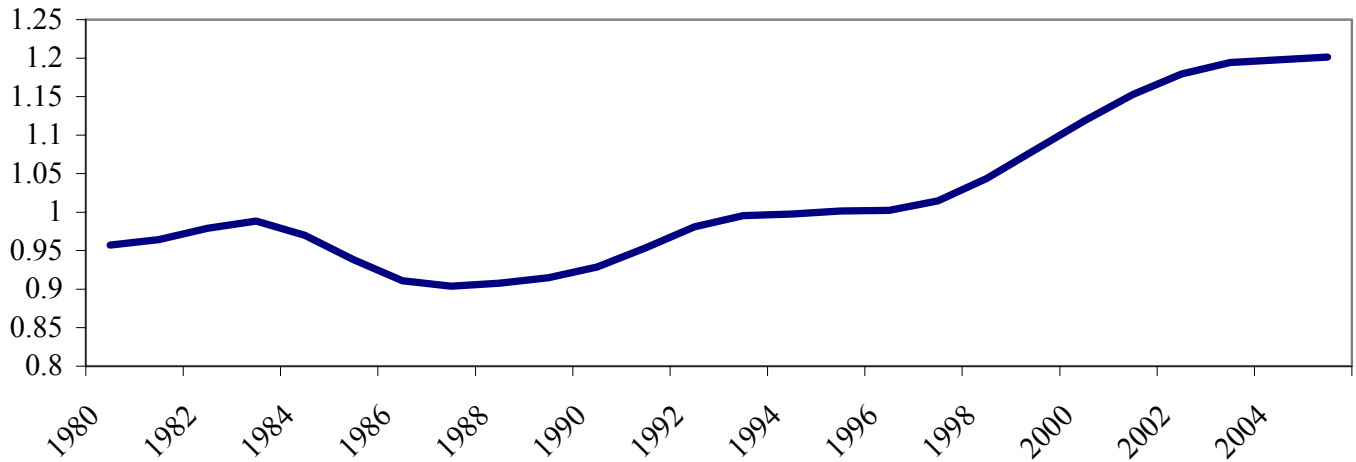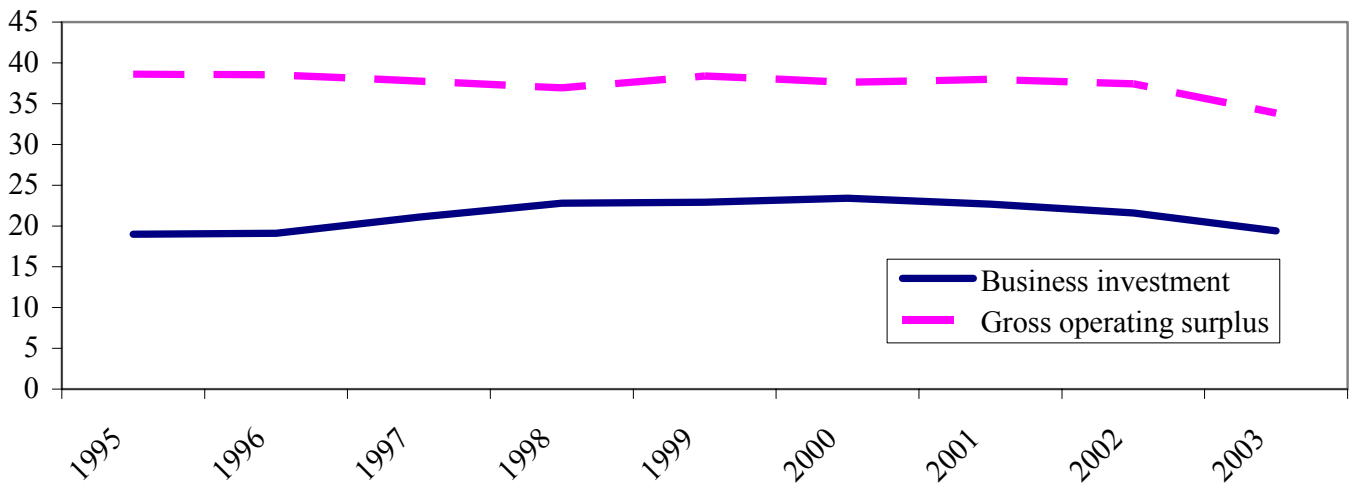Figure 5. Corporate Profitability and Investment

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[13] The argument should be qualified by the possibility of labor market rigidity. Declining profitability could also be interpreted as evidence for the lack of wage moderation during the period.

Debt hypothesis

11.   Corporate sector indebtedness in Portugal was close to the European average in 1995. However, in the next five years, as firms borrowed heavily in the low interest rate environment and in anticipation of better growth prospects as a member of the monetary union, the debt-to-GDP ratio shot up. It stabilized somewhat after the economy went into recession. By 2005, standing close to 100 percent of GDP, it was still among the highest in Europe (Figure 6).

12.   Could high corporate indebtedness explain corporate investment behavior during the recession? Although there has been a close comovement between corporate debt and investment, the causal relationship is not clear. On one hand, the creation of debt provides resource for investment. On the other hand, when corporate debt reaches a level that engenders balance sheet concerns, it tends to deter investment. Could it be the case that in early 2000s, corporate indebtedness reached such a critical level that helped trigger the collapse of business investment? International Monetary Fund (2004) applies dynamic panel data estimation to a sample of European countries, including Portugal, to investigate how corporate indebtedness and other balance sheet variables affect investment. It finds, in general, only weak links between corporate investment and corporate balance sheet variables. However, investment is significantly affected by these variables when they reach certain thresholds and during business downturns.

13.   It is not an easy task to determine at what point in the recent cycle, if at all, corporate indebtedness might have reached the critical threshold. However, the fact that Portugal started with an average debt-to-GDP ratio in 1995 but emerged as having one of the most highly indebted corporate sectors in early 2000s suggests that the debt ratio was indeed above normal in early 2000s. On the other hand, the new steady states in the monetary union could be consistent with a higher debt level and the drop in interest rates in the 1990s triggered rapid debt growth. In this essay, we attempt to measure the degree of debt overhang by estimating an equilibrium debt-to-output ratio, which is obtained by apply the Hodrick-Prescott filter to the data series. In theory, when the actual debt level is above the equilibrium level, firms should cut spending to reduce debt to the desired level, and when the actual debt level is below the desired level, business indebtedness tends to increase. This is precisely what we will attempt in Section D, when we will investigate the link between debt overhang and corporate investment.

Figure 6. Debt-to-GDP Ratio in Corporate Sector, 1994–2005
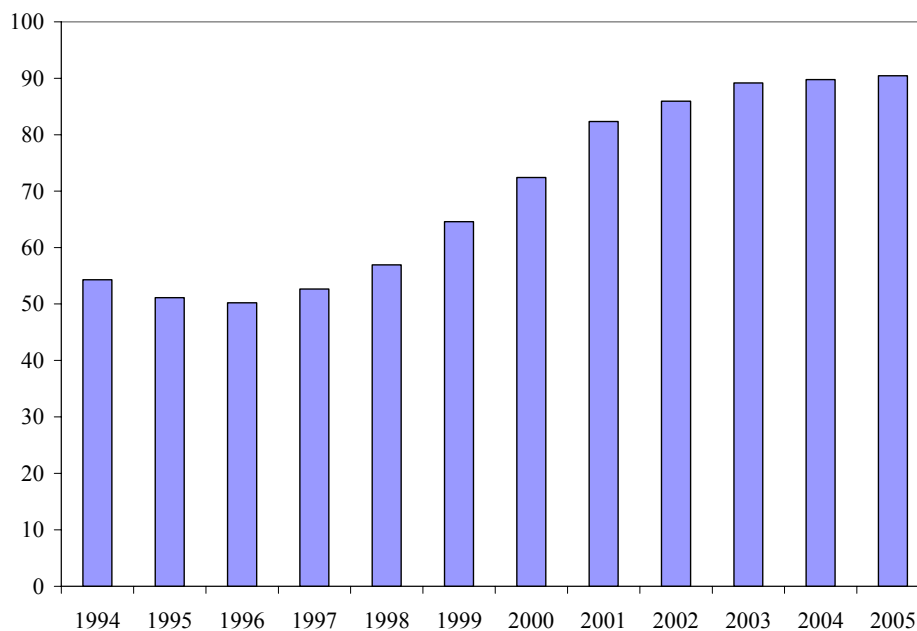
Other potential factors

14.   Other potential factors that could affect the movement of corporate investment are real interest rates, which determine the cost of capital, labor productivity, and the competitiveness of the firms.

15.   While the real interest rate represents the opportunity costs of investment, its movement is unlikely to explain the recent boom and bust cycle, as interest rates generally declined and were low throughout the period, with only a small increase in early 2000 (Figure 7).

16.   The shift in labor productivity could potentially affect investment decisions. As labor productivity has been declining, this could have raised doubts about future productivity, and tits effect on future returns to investment. Portugal enjoyed one of the higher productivity growth rates in Europe in the 1990s, but as Figure 8 shows, it lagged the European average for the period 1998–2004. Figure 9 plots the real effective exchange rates, which have been on the rise. The loss of competitiveness resulted from high unit labor costs could have contributed to lower investment as profits were squeezed.
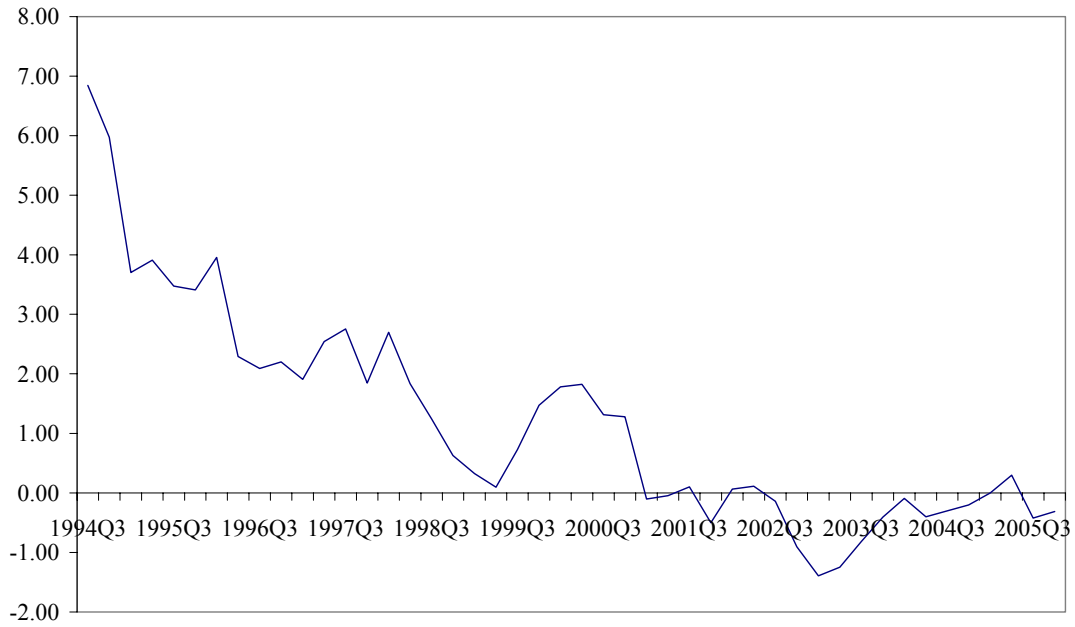
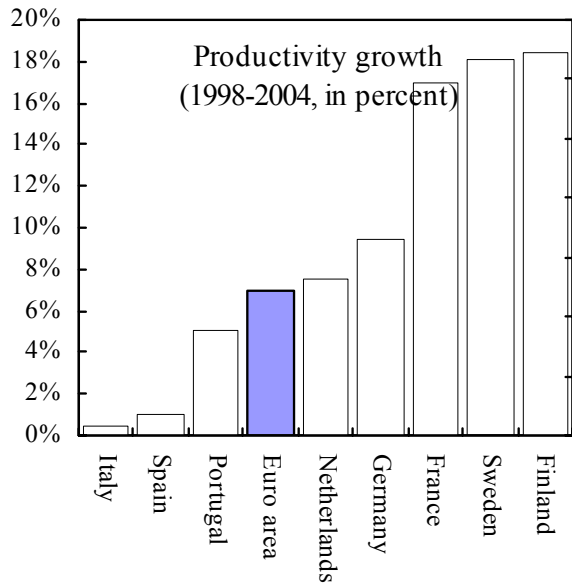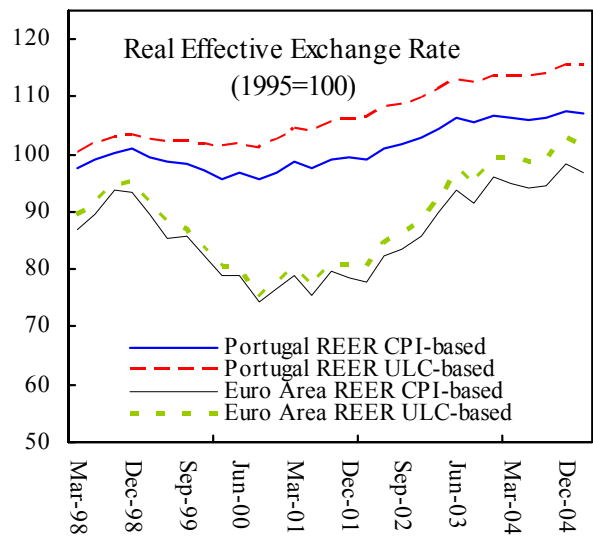Figure 7. Short Term Real Interest Rate

Figure 8. Productivity Growth

Figure 9. Real Effective Exchange Rates

D. Econometric Estimation

17.   To shed light on the factors affecting corporate investment, we estimate a relationship between aggregate investment and its determinants. Firm-level data on investment are not available. Economic theory suggests a number of potential factors that affect corporate investment. These can be grouped into three main categories: variables related to the future return of investment projects, to the balance sheets of the firms, and to the costs of undertaking investment projects. The functional form of the aggregate investment function is controversial, therefore in this chapter we take an eclectic approach in selecting explanatory variables and estimate a reduced form relationship, which captures both the demand for investment and the costs of investment.

18.   Specifically, we estimate a quarterly investment function in the following form by the method of Ordinary Least Squares (OLS):

$$I_t/Y_{t-1} = f(\Delta YNI_t, K_{t-1}/Y_{t-1}, D_{t-1}/Y_{t-1}, D^*_{t-1}, \Delta C_t, \Delta \pi_{t-1}, \Delta RER_{t-1}, \Delta rpc_{t-1}, \Delta r_{t-1}). \tag{1}$$

The independent variable is the ratio of real corporate investment to lagged real output (*I/Y*). The list of explanatory variables includes the following, with the appropriate lags (Figure 10).

- *Output growth (ΔYNI)*. As mentioned before, investment is driven by business prospects, of which current quarter output growth serves as a proxy. To avoid the simultaneity problem, we exclude business investment from total output.

- *Capital-to-output ratio (K/Y)*. *K* is the real nonhousing private capital stock. This term captures the negative effect on investment of the capital stock overhang.

- *Debt-to-output ratio (D/Y)*. The relationship of debt and investment is complicated. On one hand, the creation of debt provides resource for investment. On the other hand, when the corporate debt reaches a level that engenders balance sheet concerns, it tends to deter investment.

- *A measure of the gap between the actual debt-to-output ratio and its equilibrium value (D*)*. Although balance sheet variables have been found to influence investment decisions in economic downturns,[14] it is difficult to estimate the level of the debt at which firms start to cut back spending. We estimate the equilibrium debt-to-output ratio by applying the Hodrick-Prescott filter to the data series. This statistical detrending approach has the advantage of avoiding the theoretical controversy

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[14] See International Monetary Fund (2004).

involved in modeling corporate debt.[15] The debt-to-output ratio and its trend are displayed in Figure 11. The actual ratio fell below the trend around the mid-1900s, which could be the result of an increase in the desired debt ratio associated with the prospect of entering the Monetary Union. However, as firms downgraded their expectations about future projects, the optimal debt level may have fallen to a point where, by 1999, actual debt exceeded the desired level. In theory, when the actual debt level is above the desired level, firms should cut spending to reduce debt to the desired level, and when the actual debt level is below the desired level, business spending is increasing.

- *Credit growth (ΔC).* The monetary environment provides the liquidity for firms' spending.

- *Change in profitability (Δπ).* We measure profitability by the share of gross operating profits, which is in turn defined as output minus labor costs, in total output. For a given cost of capital, higher profitability leads to higher investment. In addition, large profits may signal higher future profits and attract new investment.

- *Change in the unit-labor-cost-based real effective exchange rate (ΔRER).* This term measures the competitiveness of enterprises. Higher unit labor cost and the exchange rate reduce competitiveness and thus investment. A higher RER reduces demand for exports and increases demand for imports, discouraging investment.

- *Change in the relative price of capital (Δrpc).* The relative price of capital is measured by the ratio of the investment deflator to the GDP deflator. Higher prices of capital goods tend to reduce investment.

- *Change of the real interest rate (Δr).* The real interest rate is taken as the three-month nominal interest rates minus the twelve-month CPI inflation rate. It measures the opportunity costs of investment.

19.   The sample runs from 1987:Q1 to 2005:Q4.[16] All variables are in logarithm except the interest rate. We also include a constant and seasonal dummies in the estimation. As Figure 10 suggests, some of the variables are likely to be nonstationary, and the validity of the results requires the existence of a cointegrating relationship among the nonstationary variables. It turns out that this set of variables meets the requirement. Therefore, the

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[15] We have also attempted to estimate the equilibrium debt by modeling the relationship between debt and its two main determinants, output and the nominal interest rate. The implications for Equation (1) are similar to the Hodrick-Prescott filter approach. For details, see the Appendix.

[16] All data are obtained from the Bank of Portugal.

estimated coefficients are consistent. We first conduct stationarity tests on all the variables used in the investment function, and the results are shown in Table 1. As can be seen, the investment-output ratio, capital-to-output ratio, debt-to-output ratio, and the rate of credit growth are all nonstationary, and further tests suggest that they are all I(1). The other variables are all stationary.

Figure 10. Data Used in Regression
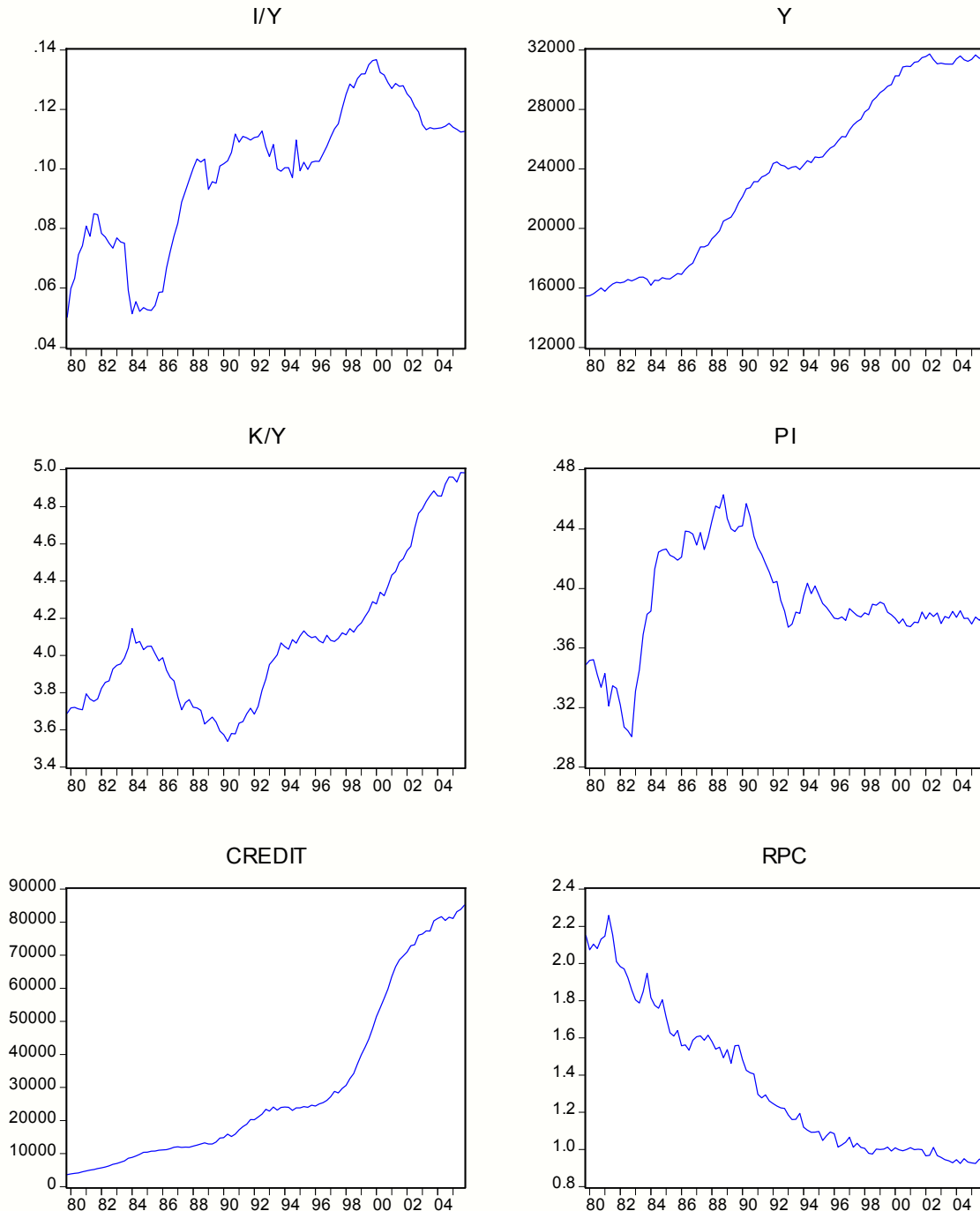
Figure 11. Actual and Equilibrium Debt-to-GDP Ratios
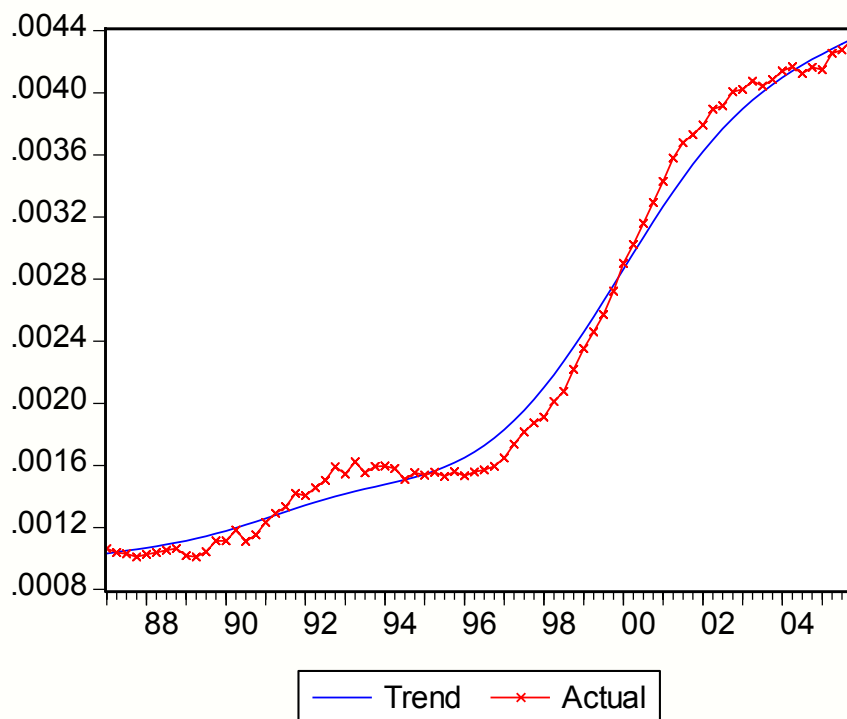
Table 1. Stationarity Tests

Variable	p-value
I/Y(-1)	0.7465
ΔYNI	0.0230
K/Y	0.1271
D/Y	0.6422
D/D*	0.0000
ΔC	0.1907
$\Delta\pi$	0.0000
ΔRER	0.0000
Δrpc	0.0000
Δr	0.0000

Null hypothesis: the variable considered has a unit root.
p-values are for the augmented Dicky-Fuller tests.

20.   We then estimate Equation (1) by OLS, and conduct the Engle-Granger cointegration test. It turns out the residual series resulted from the OLS is stationary, therefore the estimates in the OLS are consistent. Table 2 presents the estimation results. As can be seen, most explanatory variables have the expected signs. Investment reacts positively to output growth but negatively to the lagged capital stock. The lagged debt-to-GDP ratio, as well as credit growth, have positive signs, suggesting that higher debt creation and credit growth provide more resource for investment. These coefficients are statistically significant. Of particular interest is the measure of the gap between the actual debt-to-output ratio and its trend. It enters the equation with a negative and significant coefficient. This confirms the predictions that business spending adjusts such that the debt level reverses to the desired level. In the early 2000s, investment responded negatively to the accumulated high corporate debt in the late 1990s. A higher real effective exchange rate has a negative impact on investment, showing the impact of firms' competitiveness. The profitability term has the expected sign but is statistically insignificant. The changes in the relative price of capital and the real interest rate carry the wrong signs, however, they are insignificant, suggesting that there is not a discernable correlation between investment and these indicators, after controlling for other factors. This could be due to the lack of variations in these indicators in the sample period.

Table 2. OLS Estimates of Corporate Investment
(Depending variable is the ratio of corporate investment to real output)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	3.0599	0.6685	4.5772	0.0000
ΔY	1.4726	0.7397	1.9908	0.0515
K/Y(-1)	-1.6767	0.2468	-6.7933	0.0000
D/Y(-1)	0.4656	0.0511	9.1152	0.0000
D*(-1)	-0.5400	0.1279	-4.2236	0.0001
ΔC	1.1318	0.2589	4.3714	0.0001
$\Delta\pi(-1)$	0.1963	0.3946	0.4973	0.6209
ΔRER	-1.2263	0.5643	-2.1730	0.0341
Δrpc	0.3482	0.2550	1.3653	0.1777
Δr(-1)	0.0000	0.0065	0.0066	0.9948

R-squared	0.8562	Mean dependent var	-2.1756
Adjusted R-squared	0.8248	S.D. dependent var	0.1043
S.E. of regression	0.0437	Akaike info criterion	-3.2549
Sum squared resid	0.1048	Schwarz criterion	-2.8305
Log likelihood	123.6654	F-statistic	27.2936
Durbin-Watson stat	1.1566	Prob(F-statistic)	0.0000

21.   Overall the estimation results support the expectations theory and the debt hypothesis. As Figure 12 shows, the estimated investment function fits the historical data well. However, in the second half of the 1990s, it consistently underpredicts the actual investment, suggesting overinvestment in this period, which could be explained by the exuberance of firms about future growth under monetary union.

22.   These results have implications for the future path of corporate investment. For example, while structural reforms to improve the fiscal environment and raise productivity—thus enhancing potential growth—should have a positive effect on private investment in the future, its recovery will be attenuated by the impact of still high corporate debt. In this sense, the relatively inefficient corporate investment in the late 1990s could serve as a drag on growth prospects in the future.

Figure 12. Fitted Investment Function
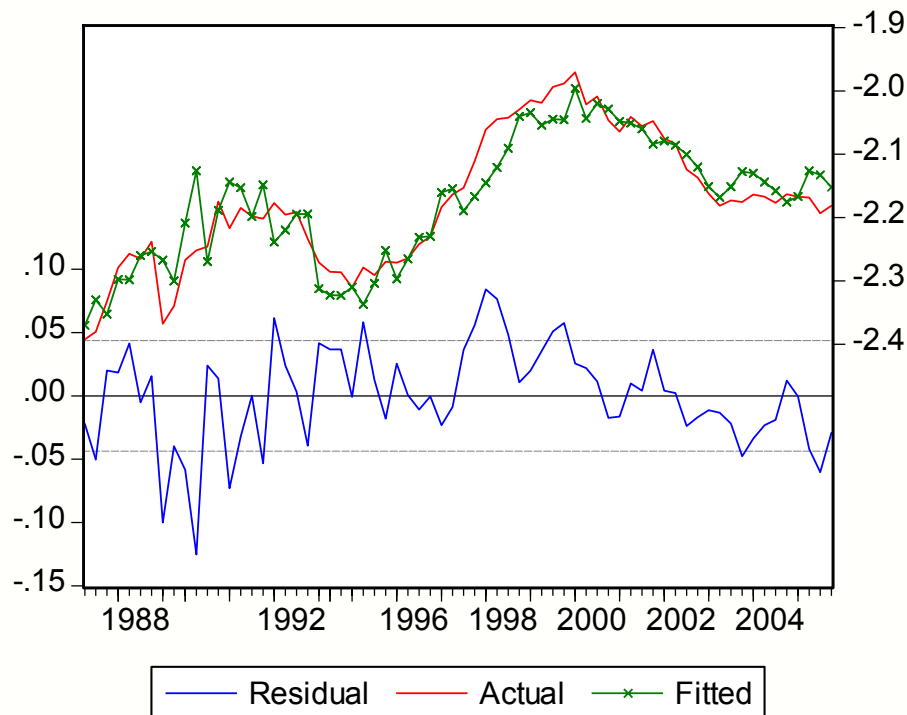
E. Concluding Remarks

23.   In this chapter we have reviewed several factors that could help explain the boom and bust behavior of corporate investment. We have examined evidence for overinvestment and conducted regression analysis of the determinants of corporate investment. We find that investment responds positively to output growth, credit growth, and the creation of debt, but the excessive debt overhang created in the late 1990s may have had a negative impact on investment. Some lessons could be drawn for the future. While investor sentiment will recover along with the overall activities and the deepening of structural reforms, the still-high corporate debt level is likely to act as a drag on the pace of investment growth in the near future. Thus, the recovery of investment as the cyclical upswing gathers steam may prove to be only gradual.

24.   For further studies on the investment behavior in Portugal, it would be interesting to conduct further econometric analysis to identify the role of investment shocks in the boom-bust cycle. As firm-level data become available, they should be examined to validate the aggregate results obtained in this chapter.

Appendix I. Alternative Estimates of the Equilibrium Debt

1.   In this Appendix, we present alternative estimates of the equilibrium levels of debt, by modeling the relationship between the level of debt and its two main determinants, the output level and the nominal interest rate. Firms incur debts to finance their operation, therefore the output level captures the demand for debt. The nominal interest rate reflects the cost of holding debt.

2.   The upward trend in the debt figures is apparently driven by the development of the economy and the steady decline of the interest rates throughout the sample period (Figure A1). As can be seen, a break of the trend occurred possibly in the late 1990s. In the late 1990s, the interest rate continued its declining trend, but there was not a sharp drop. It is conceivable that, as the adoption of the euro approached, a number of financing options became open to Portugal, and firms' expectations on future growth were revised, which caused a revision of the desired debt level. The jump of corporate debt in the period 1998–2000 is also due to a number of public investment projects that were carried out by private companies in the context of the public-private partnerships (for instance, in this period the building of a number of motorways without tolls, SCUTs, were launched) together with the domestic financing of FDI projects of Portuguese companies abroad and a number of mergers and acquisitions operations. Therefore, we present estimates based on specifications both including and excluding a dummy variable for the period after 1998.

3.   We have included the resulting deviations of the actual debt path from its equilibrium path in estimating the investment function (Equation (1)), and the results are similar to those obtained from using the Hodrick-Prescott detrending approach.

Debt equation assuming no trend break

4.   We obtain the following relationship for debt (D), output (Y) and the nominal interest rate (i) by OLS:

$$log(D) = -29.96 + 3.35 log(Y) - 0.02\ i + \text{error.} \tag{A1}$$
$$\quad\quad (0.00)\quad (0.00)\quad\quad (0.03)$$

p-values are in parenthesis. Unit root tests suggest that all three variables are I(1). Therefore we conduct the Engle-Granger cointegration test on the residual and find that the three series are cointegrated. Figure A1 plots the debt series and the estimated equilibrium debt series. The results suggest that the actual path of corporate debt was below its equilibrium path in the mid to late 1990s and above the equilibrium path in the early 2000s.

Debt equation assuming trend break in 1998

5.   As discussed above, there could be a possible trend break in the debt series around 1998. Next we re-estimate Equation (A1) by including a dummy variable for the period after 1998 (*D1998*), and the following relationship is obtained:

$$log(D) = -24.10 + 2.75log(Y) - 0.01\ i + 0.34\ D1998 + \text{error.} \qquad\qquad (A2)$$
$$\quad\ \ (0.00)\quad (0.00)\qquad\quad (0.19)\quad (0.00)$$

6.   Since a trend break in the debt series is assumed, we need to modify the Dicky-Fuller tests to test the presence of a unit root in this series. Here we apply the methodology of testing unit roots with structural breaks as developed in Perron (1990). Again the hypothesis that the debt series is I(1) can not be rejected. The Engle-Granger cointegration test shows that the three series in Equation (A2) are cointegrated. Figure A2 plots the debt series and the estimated equilibrium debt series. The results are similar to those obtained in the case without the trend break, suggesting that the debt path was below its equilibrium path in the late 1990s and above the equilibrium path in the early 2000s.
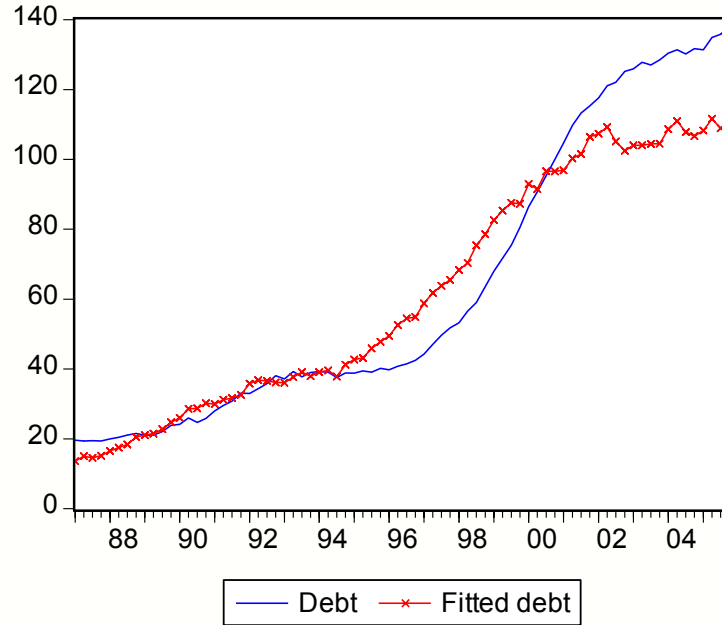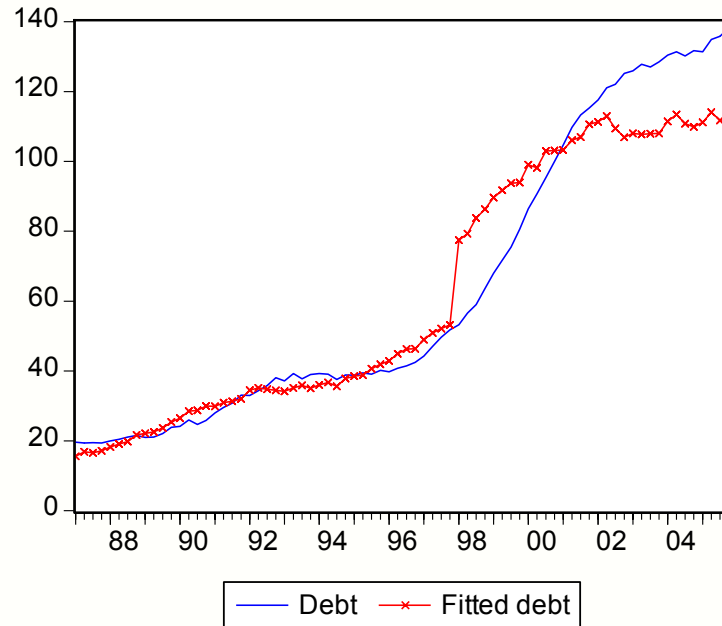
Figure A1. Fitted Debt Based On Equation (A1)

Figure A2. Fitted Debt Based On Equation (A2)

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