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PORTUGAL

Selected Issues

Prepared by Yasemin Bal Gündüz, Mark Lutz, and Marta Ruiz-Arranz

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I. INTRODUCTION

1. The 2003 Article IV discussions with Portugal focused on policies to overcome structural and cyclical impediments to growth as well as on steps to secure fiscal consolidation, and the following three chapters provide background analysis on these issues. The recession in Portugal has been accompanied by a large fall in real investment (by almost 15 percent during 2002–03), and a sustained economic recovery depends importantly on an investment rebound. There are some doubts, however, if company balance sheets are sufficiently strong to support a rebound at this juncture, and the links between corporate balance sheet strength and investment are analyzed in a cross-country context in Chapter II. The main medium-term challenge of the Portuguese economy—securing real income convergence with the leading advanced economies—has to take place within an increasingly competitive environment. The latter may be affected by European Union (EU) accession of 10 countries in May 2004, and the potential external trade implications are reviewed in Chapter III. Sizable fiscal deficits and a public debt ratio around 60 percent of GDP underscore the need to move ahead with fiscal consolidation, but securing fiscal solvency will also depend on redressing aging-related spending trends. Accordingly, Chapter IV reviews pension prospects and the implications of various policy reform scenarios.

2. Portugal ranks high among European countries in terms of corporate indebtedness. Interest rate convergence after EU accession as well as expectations of large benefits from monetary union have played a key role in fueling domestic demand growth and thus indebtedness. Furthermore, corporate leverage ratios were also affected negatively by the collapse in equity prices after 2000. Chapter II explores to what extent the rise in corporate indebtedness or developments in other balance sheet indicators may undermine investment in Portugal—a critical issue as the economy emerges from the recession. Dynamic panel data techniques are used to investigate the empirical relationship between corporate indebtedness—and other corporate balance sheet indicators—and investment. Covering a group of seven EU countries, the econometric results suggest that there is, in general, only weak evidence of links between corporate investment and leverage or other corporate balance sheet indicators. However, investment is significantly affected by these indicators above certain threshold levels of leverage and over the downturn phases of the real business cycle. The estimates suggest that balance sheet factors contributed to some extent to the weakness of investment during the current recession in Portugal, and also add a note of caution concerning a near-term prospects for investment.

3. Enlargement of the European Union from 15 to 25 members on May 1, 2004, is expected to bring important economic benefits for old and new members, largely through an expansion of trade. Chapter III explores the potential trade implications of EU accession for Portugal. With currently very little trade between Portugal and the accession countries, model-based estimates suggest a potentially large trade expansion—perhaps by some two-thirds or more above current levels. However, the experience of earlier EU accession countries and of monetary union in Europe also indicates that the trade benefits do not accrue automatically and evenly across countries: further structural reforms (in labor and product

markets) as well as steps to strengthen competitiveness may be critical if Portugal is to secure the fruits of trade integration.

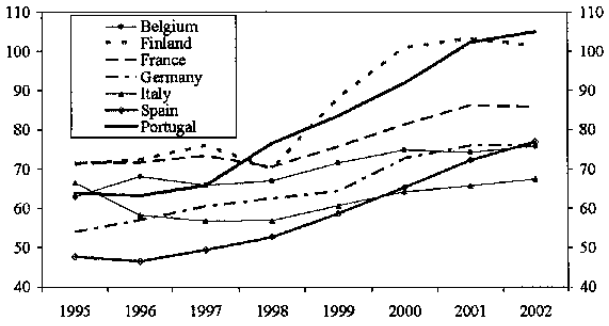
4. Chapter IV examines the Portuguese public pension system and its future financial sustainability. As in most other EU countries, Portugal will face adverse demographic trends in the coming decades, which will, absent further reforms, result in significant aging-related spending pressures. While the pension system has undergone a number of reforms, and current pension expenditures are slightly below the EU average, projections suggest that the system remains fundamentally unsustainable in its present form. The authorities' official projections predict that pension expenditures, equivalent to 9.8 percent of GDP in 2000, will increase by 2.3 percentage points of GDP by 2050. Moreover, these projections may be, for macroeconomic and demographic reasons, overly optimistic, with expenditures likely to rise to an even greater extent. With the general government debt burden already approaching 60 percent of GDP, and with social insurance contributions rates above the high EU average, there is little scope to finance the coming spending pressures. Thus, addressing these pressures most likely will have to involve some steps to reduce the scope and scale of pension benefits themselves. The chapter considers the quantitative effects of reforming several basic parameters determining pension benefits—including the retirement age, the accrual rate, the degree of indexation to inflation or real wage growth, and pension income taxation—and determines that each reform by itself would most likely not be sufficient to address fully spending pressures. This suggests that consideration be given to combining a number of different reform options.

II. Corporate Balance Sheets and Investment: Empirical Estimates For Portugal And Other EU Countries[1]

A. Introduction

5. Portugal ranks high among European countries in terms of corporate indebtedness. The debt level of nonfinancial corporations was around 105 percent of GDP in 2002, which compares with an average of 80 percent for a group of six other European countries, including Belgium, Finland, France, Germany, Italy, and Spain (Figure 1). Interest rate convergence after EU accession as well as expectations of large benefits from monetary union have played a key role in fueling domestic demand growth and thus indebtedness. The rise in corporate indebtedness has exceeded substantially the rise in corporate equity, and corporate leverage ratios were also affected negatively by the collapse in equity prices after 2000.

Figure 1: Corporate Indebtedness, 1995-2002 1/
(In percent of GDP)



Sources: European Central Bank (ECB), flow-of-funds data; and Fund staff estimates.
1/ Total debt includes loans and securities other than shares.

6. This chapter explores to what extent the rise in corporate indebtedness, or other balance sheet indicators, may undermine investment demand in Portugal—a critical issue as the economy emerges from the recession. Real investment is estimated to have declined by almost 15 percent during 2002–03, and this was an important factor behind the recession. While weak prospects for aggregate demand, including the collapse of a housing boom, clearly played a role, there are also concerns that high corporate indebtedness has undermined investment activity—or could do so in the future. Similar concerns about the implications of a possibly overleveraged corporate sector have also been raised for several other euro-area countries.

7. Dynamic panel data techniques are used to investigate the empirical relationship between corporate indebtedness—and other corporate financial health indicators—and investment. The cross-country analysis covers a group of seven European countries (with the country selection determined by data availability). The focus is not only on the general relationship between corporate balance sheet indicators and investment, but also (i) on the presence of asymmetric balance-sheet effects over the cycle (the so-called financial accelerator), and (ii) on the sensitivity of investment above certain threshold values.

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[1] Prepared by Marta Ruiz-Arranz.

8. The econometric results suggest:

- There is, in general, only weak evidence of links between corporate investment and leverage or other corporate balance sheet indicators.
- However, investment is significantly affected by these indicators above certain threshold levels of leverage and over the downturn phase of the real business cycle.
- Relatively weak balance sheets affect corporate investment negatively following real output downturns, but there is little evidence of an impact following an equity market bust.

Based on the empirical results, back of the envelope calculations suggest that balance sheet effects contributed significantly to the investment decline during the present economic downturn in Portugal. However, other factors (as already noted) clearly also played a role, and the observed decline in investment was considerably larger than can be attributed to the estimated balance sheet effects.

9. The remainder of the chapter is organized as follows. Section B reviews the literature on leverage effects and the financial accelerator. Section C describes the data used in the analysis, and the estimation methodology and hypothesis tests are presented in Section D. Following the identification of downturns in Section E, panel estimates of balance-sheet effects are discussed in Section F. Implications for Portugal are presented in Section G and the final section offers concluding remarks.

B. Literature

10. There is no strong theoretical reason in the traditional finance literature to expect the existence of investment-leverage sensitivities, nor to expect that these sensitivities increase monotonically with the level of financing constraints, more specifically with the level of corporate indebtedness, the cash position of the firm, or its liquidity constraints. Modigliani and Miller's (1958) theory of capital markets predicts that a firm's financial position or the composition of its liabilities has no effect on its investment decisions. In the Q model of investment under perfect capital markets, Tobin's Q (i.e., the cost of capital) is all the information needed to guide the firm's investment decisions. In particular, the magnitude of internal funds and the external financing structure of the firm do not matter and have no additional explanatory power.

11. Some economists and market analysts have challenged this neoclassical prediction and have presented empirical evidence of the sensitivity of investment to different measures of leverage, cash flow, and the "strength" of the balance sheet. These findings are motivated by models of capital market imperfections, including asymmetric information and agency problems (see Bernanke, Gertler, and Gilchrist, 1996). Capital market imperfections might limit the availability of external finance to firms with weak balance sheets. For example, if lenders cannot observe or control the risk involved in the investment project they finance, the

stake of a borrower in the project—measured by the share of investment financed by internal funds—might be a signal of the unobserved risk of lending. Consequently, the cost of external funds, and thus its investment spending, might vary with the borrower's financial health.

12. Fazzari, Hubbard, and Petersen (1988) provided empirical evidence of linkages between cash flow-capital ratios and investment, and they interpreted this as consistent with the presence of important financing constraints on the investment of some firms. To the extent that there is a large differential between internal and external finance and external funds might be scarce at times, investment spending might be sensitive to the availability of internal funds. A large list of empirical studies on the links between investment and liquidity and leverage measures followed Fazzari, Hubbard, and Peterson (1988). For example, Jaeger's (2003) analysis of time series data for Germany and the United States suggested that leverage effects on corporate investment can be substantial and persistent, particularly if leverage exceeds threshold values.

13. A related literature based on the financial accelerator theory (Bernanke, Gertler, and Gilchrist, 1999) pointed out that adverse shocks to the economy might be amplified by worsening credit-market conditions. An implication of this theory is that borrowers who face significant agency costs of borrowing—for example, small firms and firms with weak balance sheets—are likely to experience larger reductions in their economic activity following a negative shock relative to other borrowers. Vermeulen (2002) tests this theory using data for manufacturing industries in four European countries, and he finds evidence of a financial accelerator with different strength across size classes and asymmetric effects over the cycle in Europe.

14. This chapter builds on Vermeulen's (2002) work and provides further empirical evidence about investment-balance sheet sensitivities and asymmetric leverage effects over a larger group of countries and activity sectors—including the primary sector, manufacturing, and services—in Europe. Asymmetric effects are examined over real business cycles as well as over stock market price cycles. In addition, leverage threshold effects are analyzed and the cost of high indebtedness in terms of investment is estimated for Portugal.

C. Data

15. The data used in this chapter is drawn from the BACH[2] (Bank for the Accounts of Companies Harmonized) database. This database, managed by the European Commission. contains harmonized annual accounts statistics of nonfinancial enterprises for 11 European countries, Japan, and the United States from the early 1980s to 2001. It is constructed through the aggregation of a large number of individual firms' balance sheet and profit and loss accounts. BACH covers 23 activity sectors, 3 size classes, and 94 harmonized accounting items over different sample periods. These economic and financial data are collected at the

[2] For details see http://europa.eu.int/comm/economy_finance/indicators/bachdatabase_en.htm

national level through the completion of an annual questionnaire submitted by the companies. In the case of Portugal, the questionnaire is sent to 23,000 firms with a compliance rate of close to 70 percent.[3]

16. This chapter focuses on seven EU countries (Belgium, Finland, France, Germany, Italy, Portugal, and Spain) and 15 activity sectors (covering the primary sector, manufacturing, construction, trade, and service industries). The data availability varies across countries. For instance, for Italy data exist from 1982 to 2001, while, in the case of Portugal, the series used in this chapter start in 1995 (see the Appendix for further detail). The unbalanced panel employed in this chapter contains 102 country-sector pairs[4] observed over a different set of years, amounting to 1,392 observations. This means that the sample contains data for an average of 13 years for each county-industry class.

17. As with most empirical work at the level of aggregation used in this chapter, the results reported below need to be interpreted with caution in light of issues related to data quality and consistency. Concerns relate in part to the comparability of the data in the BACH dataset (for example, across different countries) and to potential biases related to the response rates of firms included in the dataset. In addition, data issues in some instances may also arise for some of the macroeconomic data (including those for industrial production) used in the analysis below.

D. Estimation Methodology and Hypothesis Tests

18. The chapter performs three hypothesis tests. First, the perfect capital market prediction is tested, that is, the hypothesis that investment is not affected by the composition of a firm's balance sheet (for example, its debt-equity ratio). The following indicators, which provide information about a firm's financial position, are analyzed: debt-to-asset ratio (*DA*), debt-to-equity ratio (*DE*), debt-to-internal funds ratio (*DIF*), short-term debt-to-assets ratio (*SDCA*), coverage ratio, that is, cash flow to interest payments ratio (*COV*), short-term debt as a fraction of total debt (*FS*), and cash flow-to-asset ratio (*CA*). These are typical measures of leverage, liquidity, and corporate financial health.

19. The following investment equation is estimated:

$$IK_{i,t} = \alpha_i + \delta_t + \beta_1 IK_{i,t-1} + \beta_2 IK_{i,t-2} + \beta_3 SK_{i,t-1} + \beta_4 B_{i,t-1} + \varepsilon_{i,t} \qquad (1)$$

---

[3] Although accounts are harmonized through a common layout for balance sheets, accountability differences across countries remain. This calls for caution in making comparisons on absolute levels. The focus on trends and growth rates in this chapter is likely to minimize the problem associated with different accounting practices.

[4] Fifteen sectors observed for 7 countries would amount to 105. However, there are no data for three of the sectors in Germany.

where: $IK_{i,t}$ is the investment–to-capital ratio of the country-industry pair i at time t, SK is the sales-to-capital ratio, B is a corporate balance sheet measure (i.e., *DA*, *DE*, *DIF*, *SDCA*, *COV*, *FS*, or *CA*), δ_t is a time fixed effect, and α_i is an unobserved individual fixed effect. The individual fixed effect is intended to capture all time-invariant factors, including unobservable characteristics, associated with a country-sector pair that have affected investment to capital ratios historically. The time effects capture common time developments across all country-industry pairs in the panel. Because of lack of data and other potential problems associated with measuring Tobin's Q (i.e., the cost of capital), a sales variable is introduced in the specification to control for underlying investment opportunities; and robustness checks reported later also include an interest-rate proxy for the cost of capital.

20. Given the presence of lagged dependent variable terms on the right-hand side of equation (1), the standard fixed effect estimator is inconsistent (Nickell, 1981), so the Arellano and Bond (1991) estimator is employed. First differencing equation (1) removes the α_i and produces an equation that is estimable by instrumental variables. Arellano and Bond derived a generalized method of moments estimator (GMM) using lagged levels of the dependent variable and the predetermined variables. This methodology assumes that there is no second-order autocorrelation in the first-differenced idiosyncratic errors. In order to minimize this potential problem, a second lag of the investment-capital ratio is included in the regression. Regressions with only one lagged dependent variable were also estimated and yielded similar results.

21. The key parameter of interest in equation (1) is β_4. The null hypothesis of the first test is that $\beta_4 = 0$. Failing to reject this hypothesis would suggest that investment decisions are not affected by the quality or strength of balance sheet indicators, as predicted by the perfect capital market theory.

22. The second exercise seeks to test the presence of asymmetric balance sheet effects over the cycle. Using the same dynamic panel data methodology, the following specification is estimated:

$$IK_{i,t} = \alpha_i + \delta_t + \beta_1 IK_{i,t-1} + \beta_2 IK_{i,t-2} + \beta_3 SK_{i,t-1} + (\beta_4 + \beta_5 R_{jt}) B_{i,t-1} + \varepsilon_{i,t} \qquad (2)$$

where R_{jt} is a dummy variable defined to be one if country j is in a downturn at time t and zero otherwise. The chapter examines two types of downturns, namely real sector downturns—characterized in terms of industrial production or the output gap—and stock market busts (as described in more detail in Section F). The objective of this analysis is twofold. First, the exercise attempts to determine the existence of a financial accelerator in Europe and the presence of binding external finance constraints during downturn phases of the cycle. The sign and statistical significance of β_5 will shed some light on this question. Second, if asymmetries over the cycle are relevant, the analysis attempts to identify what type of

cycles—real sector, equity price, or both—contribute to amplify the effects of weak balance sheets on corporate investment.

23. A third set of tests investigates threshold effects. Some market analysts as well as Jaeger (2003) have argued that an increase in leverage will have adverse effects on corporate investment only if debt or other balance sheet indicators exceed some threshold value. Similarly, firms with relatively low value of total assets are thought to be more vulnerable to high indebtedness. In order to examine these effects, equations (1) and (2) are estimated for two different samples. This includes a sample split for country-sector classes with high debt-asset ratios versus country-sector pairs with low debt-asset ratios. Likewise, the sample is divided according to the following financial constraints: high versus low debt-equity ratios and high versus low value of assets. Threshold levels are characterized by summary statistics of these indicators (average, median, and various percentiles).

E. Identifying Downturns

24. This section presents alternative definitions of downturns and how the dummy variable R_{jt} in equation (2) is constructed in each case. In the first definition, a downturn is identified in country j in year t if the country's industrial production growth at time t is negative. Table 1 contains data on industrial production for the seven countries in the study. The shaded areas on the table identify the downturn years. For instance, Portugal experienced industrial production slowdowns in 1985, from 1992 to 1994 and in 2000. Likewise, in France a downturn took place between 1991 and 1993.

Table 1. Industrial Production 1/

	Levels with 1995 = 100							Growth Rates						
Year	Belgium	Finland	France	Germany	Italy	Portugal	Spain	Belgium	Finland	France	Germany	Italy	Portugal	Spain
1982	81.1	70.0	83.9	81.4	79.1	68.4	78.9							
1983	82.6	72.2	83.9	81.9	77.3	70.9	80.9	1.9	3.2	0.1	0.7	-2.4	3.5	2.5
1984	84.7	75.6	85.4	84.4	79.8	72.6	81.6	2.5	4.5	1.7	3.0	3.2	2.5	0.9
1985	86.8	78.1	86.6	88.5	79.9	71.7	83.1	2.4	3.3	1.4	4.7	0.2	-1.3	1.8
1986	87.5	79.3	87.1	90.1	83.2	76.9	85.8	0.8	1.5	0.6	1.8	4.0	7.0	3.2
1987	89.4	83.0	88.2	90.4	85.4	80.3	89.7	2.1	4.5	1.2	0.4	2.6	4.3	4.5
1988	94.6	86.5	92.2	93.7	91.3	83.3	92.5	5.7	4.2	4.5	3.5	6.7	3.7	3.1
1989	97.8	88.6	95.7	98.3	94.8	89.0	97.3	3.4	2.3	3.6	4.8	3.8	6.5	5.0
1990	99.3	87.1	98.7	103.4	93.2	97.0	96.9	1.5	-1.7	3.1	5.0	-1.8	8.6	-0.3
1991	97.4	79.6	98.4	107.0	92.3	97.0	96.3	-2.0	-9.1	-0.2	3.5	-1.0	0.0	-0.7
1992	97.0	80.2	97.5	104.4	91.4	94.7	92.9	-0.4	0.8	-1.0	-2.5	-0.9	-2.4	-3.6
1993	92.0	84.7	93.8	96.2	89.4	89.8	88.5	-5.1	5.4	-3.9	-8.2	-2.2	-5.4	-4.8
1994	93.9	94.2	97.7	99.2	94.6	89.6	95.4	2.1	10.7	4.1	3.1	5.7	-0.2	7.4
1995	100.0	100.0	100.0	100.0	100.0	100.0	100.0	6.3	6.0	2.3	0.8	5.5	11.0	4.8
1996	100.5	102.9	100.9	100.7	98.3	105.3	98.7	0.5	2.8	0.9	0.7	-1.7	5.1	-1.4
1997	105.2	111.8	104.8	104.4	102.1	108.0	105.5	4.6	8.3	3.8	3.6	3.8	2.5	6.7
1998	108.8	122.1	110.2	108.8	103.4	114.1	111.3	3.3	8.8	5.0	4.1	1.2	5.5	5.3
1999	109.7	129.0	112.3	110.4	103.3	117.6	114.1	0.9	5.5	1.9	1.5	-0.1	3.0	2.5
2000	115.6	144.3	116.3	117.2	107.5	115.3	119.2	5.2	11.2	3.5	6.0	3.9	-1.9	4.3
2001	113.2	144.4	117.6	117.8	106.3	118.9	117.4	-2.1	0.1	1.1	0.5	-1.2	3.0	-1.5

Source: IMF, World Economic Outlook database.

Note: Shaded area indicate downturns.

1/ Excludes construction.

25. The chapter also examines downturns characterized in terms of the output gap. Country *j* in year *t* is in a downturn if its output gap is widening.[5] Table 2 presents estimates of the output gap in percent of GDP, including indicators of widening output gap downturns. This represents a broader definition of downturns, with Portugal satisfying this condition for 7 years in the period 1982-2001 (compared to 5 years implied by the definition in Table 1).

Table 2. Output Gap

	Output Gap in Percent of Potential GDP							Widening Output Gap =1						
Year	Belgium	Finland	France	Germany	Italy	Portugal	Spain	Belgium	Finland	France	Germany	Italy	Portugal	Spain
1982	0.06	1.87	0.92	-1.83	-0.02	2.14	-3.68							
1983	-0.83	1.12	-0.26	-2.32	-1.50	-0.56	-3.77	1	1	1	1	1	1	1
1984	-0.31	1.09	-0.79	-1.73	-1.91	-4.86	-3.93	0	1	1	0	1	1	1
1985	-0.41	0.84	-0.87	-1.90	-1.50	-4.66	-3.75	1	1	1	1	0	0	0
1986	-0.93	0.00	-0.53	-2.01	-1.09	-3.58	-3.79	1	1	0	1	0	0	1
1987	-0.66	0.75	-0.77	-3.16	-0.02	-1.69	-1.36	0	0	1	1	0	0	0
1988	1.25	2.22	0.88	-2.26	1.44	0.42	0.72	0	0	0	0	0	0	0
1989	2.35	4.11	2.44	-1.22	2.14	2.58	2.61	0	0	0	0	0	0	0
1990	2.89	2.93	2.36	1.62	1.85	4.23	3.56	0	1	1	0	1	0	0
1991	2.32	-3.78	0.64	2.87	1.18	2.41	3.34	1	1	1	0	1	1	1
1992	1.29	-7.17	-0.53	3.02	0.18	1.45	1.56	1	1	1	0	1	1	1
1993	-1.40	-8.89	-3.81	0.04	-2.34	-2.74	-2.09	1	1	1	1	1	1	1
1994	-0.47	-6.80	-2.96	0.68	-1.73	-3.12	-2.30	0	0	0	0	0	1	1
1995	-0.36	-5.86	-2.75	0.71	-0.38	-3.03	-2.15	0	0	0	0	0	0	0
1996	-1.54	-5.27	-3.29	-0.22	-0.76	-2.41	-2.54	1	0	1	1	1	0	1
1997	0.01	-2.71	-3.10	-0.52	-0.30	-1.39	-1.76	0	0	0	1	0	0	0
1998	-0.08	-1.15	-1.73	-0.37	-0.09	0.25	-0.76	1	0	0	0	0	0	0
1999	0.84	1.79	-0.99	-0.12	0.03	1.23	0.02	0	0	0	0	0	0	0
2000	2.16	2.47	0.74	0.91	0.96	2.10	0.88	0	0	0	0	0	0	0
2001	0.78	-0.35	0.43	0.26	0.63	1.09	0.19	1	1	1	1	1	1	1

Source: IMF, World Economic Outlook database.

Note: Numbers 1 identify downturns.

26. In addition to identifying real sector downturns, this chapter also identifies equity price "busts" and tests the financial accelerator theory for periods where stock market valuations are falling. Recent papers (Jaeger, 2003; and IMF, 2003) suggest that leverage effects might be asymmetric over equity price cycles. Using data on European stock market indices—BEL 20 (Brussels), HEX 20 (Helsinki), CAC 40 (Paris), DAX (Frankfurt), MIB 30 (Milano), BVL 30 (Lisbon), and IBEX 35 (Madrid)—a dummy

Table 3. European Stock Market Indices

Year	BEL 20 Brussels	HEX 20 Helsinki	CAC Paris	DAX Frankfurt	MIB 30 Milano	BVL 30 Lisbon	IBEX 35 Madrid
1982				552.80			
1983				774.00			
1984				820.90			
1985				1,366.20			
1986				1,432.30			
1987			1,000.00	1,000.00			2,407.10
1988			1,573.94	1,327.87			2,727.50
1989			2,001.08	1,790.37			3,000.00
1990			1,505.10	1,398.23			2,248.80
1991	1,092.72	1,092.72	1,765.66	1,577.98			2,603.30
1992	1,127.02	1,127.02	1,857.78	1,545.05	10,000.00		2,344.57
1993	1,473.10	1,473.10	2,268.22	2,266.68	14,560.00	848.00	3,615.22
1994	1,389.64	1,389.64	1,881.15	2,106.58	14,748.00	919.95	3,087.68
1995	1,559.63	1,559.63	1,871.97	2,253.88	14,132.00	877.69	3,630.76
1996	1,895.49	1,895.49	2,315.73	2,888.69	15,697.00	1,163.54	5,154.77
1997	2,418.42	2,418.42	2,998.91	4,249.69	24,942.00	1,922.72	7,255.40
1998	3,514.51	3,514.51	3,942.66	5,002.39	35,152.00	2,427.33	9,836.60
1999	3,340.43	3,340.43	5,958.32	6,958.14	42,991.00	2,732.36	11,641.40
2000	3,024.49	3,024.49	5,926.42	6,433.61	43,719.00	2,507.89	9,109.80
2001	2,782.01	2,782.01	4,624.58	5,160.10	32,263.00	2,030.49	8,397.60

Source: Bloomberg.

[5] Alternatively, downturns could be defined as periods when the output gap was negative or when the output gap was negative and widening. Most empirical tests (not reported below) did not suggest significant asymmetric balance sheet effects using these definitions.

variable is defined to take on the value of "1" during stock price declines (periods of negative growth of the stock market index) and "0" otherwise. In those cases where index series do not extend back to the starting sample year, additional information is taken from IMF (2003), which describes a procedure to identify asset price booms and busts.

F. Empirical Results

Summary statistics and empirical trends

27. Table 4 presents summary statistics of the variables used in the econometric analysis over the seven countries and 15 activities sectors in the study. As already mentioned, time periods vary from country to country. Median values of the balance-sheet indicators by sectors of activity (Figure 2) indicate that the buildings and civil engineering sector and the trade sector rank at the top of the different leverage measures (debt-to-asset, debt-to-equity, and debt-to-internal funds). Firms in the transport and communication sector have the lowest liquidity position, in terms of short-term debt-to-asset ratio and short-term debt as a fraction of total debt, followed by the energy and water sector. With regards the coverage ratio, the best-positioned industries are chemicals and extraction of non-metallic minerals.

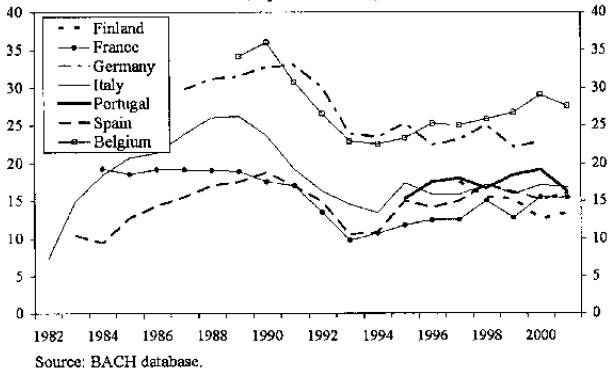
Table 4: Summary Statistics of the Variables Used

	Mean	Median	Std. Dev.	Maximum	Minimum
IK: Investment to capital ratio	18.80	17.89	8.56	-54.39	46.08
SK: Sales to capital ratio	5.56	4.85	3.98	0.28	25.64
DA: Total debt to total assets	56.82	58.22	11.30	21.32	87.84
SDCA: Short term debt to current assets	75.19	74.61	16.55	21.23	163.55
DE: Debt to equity	2.11	1.68	2.77	0.43	84.77
DIF: Debt to internal funds	9.13	5.21	87.99	-28.50	193.02
FS: Short term debt to total debt	70.29	74.66	16.34	15.80	94.22
COV: Cash flow to interest payments	3.58	3.16	2.07	-1.02	16.61
CA: Cash flow to total assets	10.68	10.87	3.55	-2.93	24.62

Source: BACH database.

28. Figure 3 displays investment capital ratios for the seven European countries in the study. These ratios are median values over the fifteen industries under consideration. Some downturn episodes are reflected extremely well in these investment trends. Most countries experienced downturns in the early 1990s and resumed growth after 1993, and the latter year typically coincides with a trough in the investment-to-capital ratio.

Figure 3: Investment-to-Capital Ratios, 1982-2000
(In percent of GDP)



Source: BACH database.

Investment-balance sheet sensitivities

29. This section discusses the estimation results of the dynamic investment model described in equation (1). Table 5 reports the robust one-step Arellano and Bond estimators for different balance sheet indicators.[6] The estimated coefficients suggest that there is only weak evidence that balance sheet positions affect investment decisions.

30. Higher leverage ratios—as measured by the debt-to-assets and the debt-to-equity ratios—tend to lead to lower investment rates, as suggested by some agency models, but the coefficients are not statistically significant (see columns (1) and (3)). Only the degree to which a firm is able to finance its investment using internal funds has a statistically significant, though small, impact on investment. A one standard deviation increase in the debt-to-internal funds ratio leads to a drop in the investment-capital ratio close to 0.2 percentage points.[7] This result suggests that the debt-to-internal funds ratio has a role in signaling the unobserved risk of investment projects to lenders. On the other hand, the impact of the firm's liquidity position is mixed. More specifically, short-term debt as a fraction of total debt is not statistically significant (column (5)) while a higher short-term debt-to-asset ratio tends to reduce investment, but only at the 10 percent significance level.

31. These estimation results provide some evidence of investment-cash flow sensitivities. To the extent that firms are constrained in their ability to raise funds externally or if internal finance has cost advantages over external finance, investment decisions may be sensitive to the availability of internal funds. In addition, cash flows may contain information about investment opportunities. In this sense, higher availability of internal funds may affect current investment. The regression results suggest that a one standard deviation increase in the cash flow-to-asset ratio leads to a rise in the investment-to-capital ratio by close to 1 percentage point.[8]

32. The tests of autocorrelations in the first-differenced residuals (see last rows in Table 5) indicate the presence of first-order autocorrelation but no second-order autocorrelation,

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[6] When the error term is heteroskedastic, inference based on asymptotic standard errors for the one-step estimators seems to be more reliable than inference based on two-step estimators. This is relevant because it might affect the statistical significance of the coefficients.

[7] The regression coefficient associated with the debt-to-internal funds ratio is -0.002 (column (4), Table 5). The standard deviation of the debt-to-internal funds variable is 87.99 (Table 4). Thus, the effect of a one standard deviation increase is -0.002×87.99=0.18.

[8] The regression coefficient associated to the cash flow-to-asset ratio is 3.55. The standard deviation of this variable is 2.07. Thus, the effect of a one standard deviation increase is 3.55×2.07=0.98.

implying that the coefficient estimates are consistent. Moreover, the Sargan test (not reported) accepts the null hypothesis that the over-identifying restrictions are valid.[9]

Asymmetric balance sheet effects

33. The results concerning asymmetric balance sheet effects—the estimation of equation (2) above—depend crucially on the variable used to identify the periods of economic or financial market weakness. First, the results suggest asymmetric balance sheet effects over the real business cycle. That is, firms with weak balance sheets are more likely to experience larger contractions in investment following a real downturn than financially healthy firms. Second, there is no evidence of a financial accelerator operating over the equity price cycles. After a stock market bust, financially more constrained firms are not more likely to experience investment reductions.

34. Tables 6 and 7 indicate that, in general, leverage and liquidity indicators have no impact on investment outside real sector downturns but they are important in determining investment spending during real sector slowdowns—defined as periods of negative industrial production growth or widening output gaps. Specifically, a one standard deviation increase of the debt-to-asset ratio (DA) leads to a drop in the investment-to-capital ratio of 0.3 percentage point following a widening-output-gap type of downturn.[10] Likewise, a liquidity shortfall, defined as a one standard deviation increase of short-term debt-to-total debt, leads to an investment contraction of 0.4 percentage point during economic downturns and has no effect outside the downturn periods. The exception is the debt-to-equity indicator, for which the coefficient estimates are negative but not statistically significant, even during periods of a real sector downturn.

35. Overall, the results are consistent with the financial accelerator theory: negative shocks reduce the borrower's net worth and increase the agency costs of lending, amplifying the investment effects of the initial shock. Furthermore, financing constraints might become binding in periods of high uncertainty or less availability of funds, such as recessions. There is indeed evidence that banks change their lending standards—from more laxity to tightness—systematically over the real business cycle (Asea and Blomberg, 1997).

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[9] This GMM estimator uses lagged values of the dependent variable and other right-hand side variables as instruments. With tests indicating the presence of heteroskedasticity, the two-step Sargan test of over-identifying restrictions is used.

[10] The estimated effect of 0.3 percentage point is the product of the coefficient on the debt-to-asset ratio during an economic downturn (0.024; see Table 7) and the standard deviation of the shock (11.3; see Table 4). Note that the calculation only uses the coefficient estimate for DA during an economic downturn, since the coefficient estimate for DA is otherwise not significant. Similar considerations underlie the estimates reported in the text below.

36. While some balance sheet effects on investment tend to be more pronounced during real sector downturns, this is not the case for the impact of cash flow indicators on investment. This is evidenced by the negative coefficient corresponding to the interaction term in the coverage ratio and cash-to-assets regressions (columns (6) and (7) in Tables 6 and 7). Theoretically, there are at least two effects working in opposite directions. On the one hand, higher relative costs of external finance during recession tend to favor the use of internal funds and hence increase the investment cash flow sensitivity. On the other hand, lower marginal profitability of capital leads firms to postpone investment projects and wait for higher returns, independently of the size of internal cash flows. This second effect dominates empirically, making investment less sensitive to cash flow during recession periods. In particular, while a one standard deviation increase in the cash flow-to-asset ratio leads to an increase of the investment-capital ratio by 0.9 percentage point outside downturns, the effect is 0.4 percentage point lower during slowdowns (although this still leaves, on net, an overall positive effect of cash flow on investment even during downturns).

37. This finding is similar to results in Kaplan and Zingales (1997). Their results suggest that the sensitivity of investment to cash flow is not necessarily increasing in the degree of financing constraints. Using a sample of manufacturing firms in the United States, they find that those firms classified as less financially constrained exhibit significantly greater investment cash flow sensitivity than those firms classified as more financially constrained. Vermeulen (2001) also finds this pattern and argues that it is consistent with the informational interpretation of cash flow. Cash flow is likely to provide less information about future investment opportunities during downturns.

38. Contrary to the findings for a real sector downturn reported in Tables 6 and 7, the results reported in Table 8 suggest that firms' investment is not sensitive to more leveraged or less liquid balance sheets during stock market busts. There is, therefore, no evidence of asymmetric balance sheet effects over equity price cycles. One possible interpretation relates to banks' lending cycles. While bank lending tightening takes place at the trough of output recessions, there is no clear correlation between financial market cycles and bank lending cycles.[11] Furthermore, there is a large body of evidence that suggests that cyclical changes in firm financing are dominated by changes in bank lending, especially at the peak and during the downward phase of the cycle.[12]

39. With banks changing their lending standards systematically over the real business cycle and with firms depending on banks for external financing, it is not surprising that leverage positions affect investment negatively during output slowdowns. However, since stock market busts do not correlate with credit tightening by banks, small changes in balance sheet indicators do not affect these firms' financial constraints substantially, and therefore their

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[11] See Asea and Blomberg (1997); and Weinberg (1995).

[12] See, for example, Zarnowitz (1985).

investment decisions are not substantially changed. In other words, even those firms with weaker balance sheet continue to have access to bank lending during equity price troughs and do not seem to change their investment behavior.

Threshold effects

40. The presence of threshold effects is examined by estimating equations (1) and (2) in two different samples: high- and low-leverage country-sector classes. The estimation results in Table 9 indicate that additional increases in indebtedness have a negative impact on investment spending when the firm's debt-to-asset and debt-to-equity ratios are above median levels. More specifically, the debt-to-asset ratio does not affect the investment decisions of those firms in a low leverage regime. However, for highly indebted firms, an additional 10 percent increase in this ratio leads to a drop in investment by 2.5 percent. Likewise, a 10 percent increase in the debt-to-equity ratio reduces investment by 2 percent in the high-leverage firms and has no impact on the low-leverage firms. Furthermore, asymmetric effects over the real cycle are amplified in the high-leverage sample. Finally, (and not reported in Table 9) firms with relatively low value of total assets are also more vulnerable to high indebtedness.

Robustness check: controlling for the cost of capital

41. This section examines whether the implicit interest rate assumption in equations (1) and (2)—namely, that interest rates have evolved similarly across countries over time—has implications for the results reported above. The inclusion of time and country-industry dummies in the previous estimates controls for the omitted cost of capital variable when the time-series variability of the cost of capital is the same across countries. However, the level and volatility of interest rates was to some extent different across countries, in particular prior to monetary union period (Figure 4). In order to account for country-specific interest rates, all regressions were reestimated including the lending rate as an explanatory variable.

42. The sign of the potential omitted variable bias on the financial sector variables, such as leverage, is likely to be positive.[13] This implies, for example, that the true effect of leverage on

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[13] The omitted variables bias, that is, the difference between the estimated, $\tilde{\beta}_{LEV}$, and the true, β_{LEV}, coefficient of the leverage effect is given by

$$Bias = (\tilde{\beta}_{LEV} - \beta_{LEV}) = \beta_{RATE} \frac{C(LEV, RATE)}{V(LEV)}$$

where β_{RATE} is the true effect of the omitted variable (i.e., the cost of capital) on investment, $C(LEV, RATE)$ is the covariance between the leverage ratio and the lending rate, and $V(LEV)$ is the variance of the leverage variable. β_{RATE} is usually negative and the variance is

(continued...)

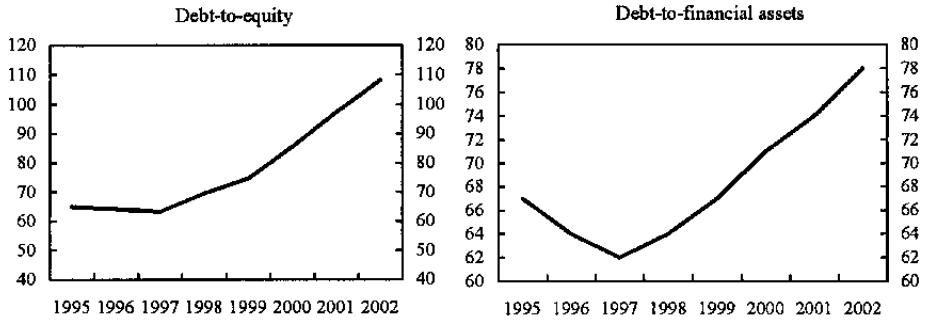
investment would become more negative, once the interest rate variables are included in the regression.

43. The estimation results including the cost of capital variable suggest, however, that the earlier estimation results are all robust to the inclusion of a cost of capital variable. Although the lending rate has a negative and statistically significant effect on investment—a 1 percent increase in lending rates leads to a drop of about 0.2 percent in the investment-to-capital ratio—the coefficients of all balance sheet indicators remain basically unchanged. Tables 10 through 12 replicate the results in Tables 5–7 and reconfirm the previous results. First, there is at best weak evidence of investment-leverage sensitivities in general. However, weak balance sheets affect investment negatively following real sector downturns and above certain threshold levels of leverage. In addition, there are not asymmetric effects working over equity price cycles. Overall, these results suggest that while country-specific interest rate effects are important to characterize investment, the omission of this variable is not central to the main questions addressed in this chapter—the effects of different corporate balance sheet indicators and investment.

G. Implications for Portugal

44. This section reports back of the envelope (i.e., comparative static) calculations of the impact of high leverage levels on corporate investment during the recent economic downturn in Portugal. Data from the Bank of Portugal for the entire nonfinancial corporate sector indicate that the debt-to-equity ratio increased by around 10 percent in 2002 (these data were not yet available for 2003). Likewise, the debt-to-financial asset ratio rose by 5 percent in the same year (Figure 5).

Figure 5. Portugal: Leverage Indicators, Nonfinancial Corporate Sector, 1995-2002
(In percent)



Source: Bank of Portugal.
1/ Data from nonconsolidated balance sheets of nonfinancial corporations.

always positive. If lower interest rates are accompanied by higher debt-to-equity and debt-to-assets ratios then the covariance term would be negative, and the bias term would be positive.

45. Using the regression coefficients from the main analysis (Tables 7 and 9) and the percentage increases for the debt-to-asset and debt-to-equity ratios for 2002, the decline of investment is estimated for two different regimes: a regime characterized by a real sector downturn and a second regime characterized by a real downturn as well as above-median levels of leverage (Table 13). Classifying (consistent with the criteria used in the empirical analysis of this chapter) the recent period in Portugal as a regime with relatively high levels of indebtedness and a real sector downturn, the observed rise in the debt-to-equity ratio is estimated to have reduced investment-to-capital ratio by around 2 percent in 2002.[14] Similarly, the observed increase in the debt-to-asset ratio would account for a contraction of the ratio by 1.3 percent. These effects are sizable, although other factors clearly also played a role as the actual investment-to-capital ratio is estimated to have declined by almost 9 percent in 2002.

Table 13. Portugal: Impact of Leverage on Investment

	Debt-to-Assets		Debt-to-Equity	
Regimes	Regression Coefficient	Impact on the Investment-to-Capital Ratio (In percent)	Regression Coefficient	Impact on the Investment-to-Capital Ratio (In percent)
Real sector downturn	-0.024	-0.13	non-sig	non-sig
High leverage and downturn	-0.253	-1.33	-0.187	-1.98

Sources: Bank of Portugal; and Fund staff estimates.

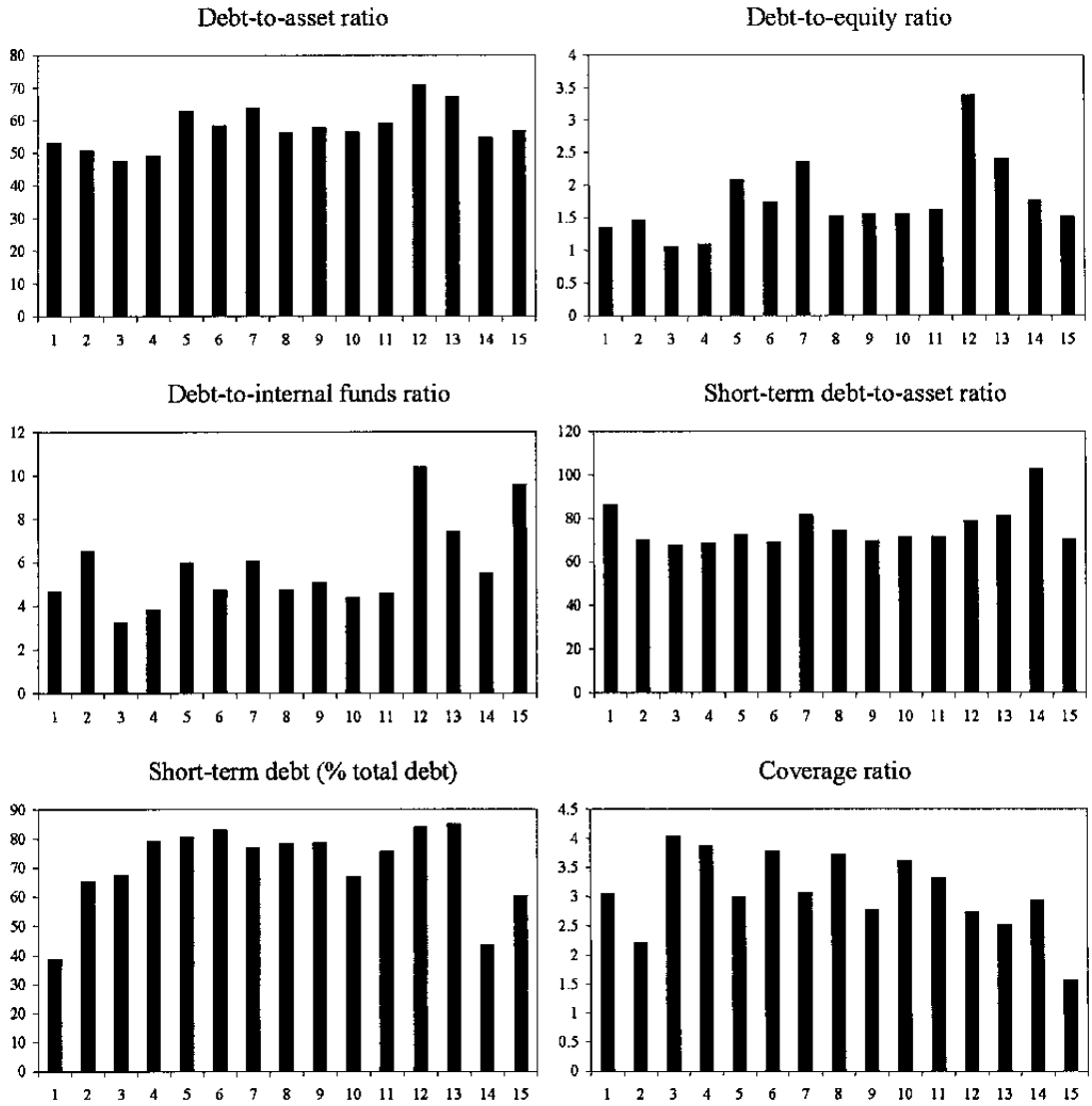
Notes: Regression coefficients are taken from Tables 7 and 9. The impact of a one percent in the financial variable is given by the sum of the regression coefficients β3 and β4 when both are significant. Otherwise, only the statistically significant coefficient is reported.
The effects on investment are computed by multiplying the regression coefficients associated with the debt-to-asset ratio and the debt-to-asset ratio by their corresponding growth rates in 2002 (i.e., 5.3% and 10.6% respectively).

H. Conclusions

46. The analysis in this chapter has sought to measure the impact of several financial health indicators on corporate investment. It also investigated potential threshold effects (i.e., that some indicators become particularly relevant if they exceed certain threshold values) and asymmetric effects over the cycle, covering both real sector downturns and financial market busts. The estimation results indicate that while there is no strong evidence that a firm's balance sheet composition has in general a significant impact on investment, there are significant effects working in exceptional circumstances—during real sector downturns and for corporations with relatively weak balance sheet positions. Both circumstances seem to apply to at least part of the corporate sector in Portugal at present and could impede investment to some extent in the period ahead.

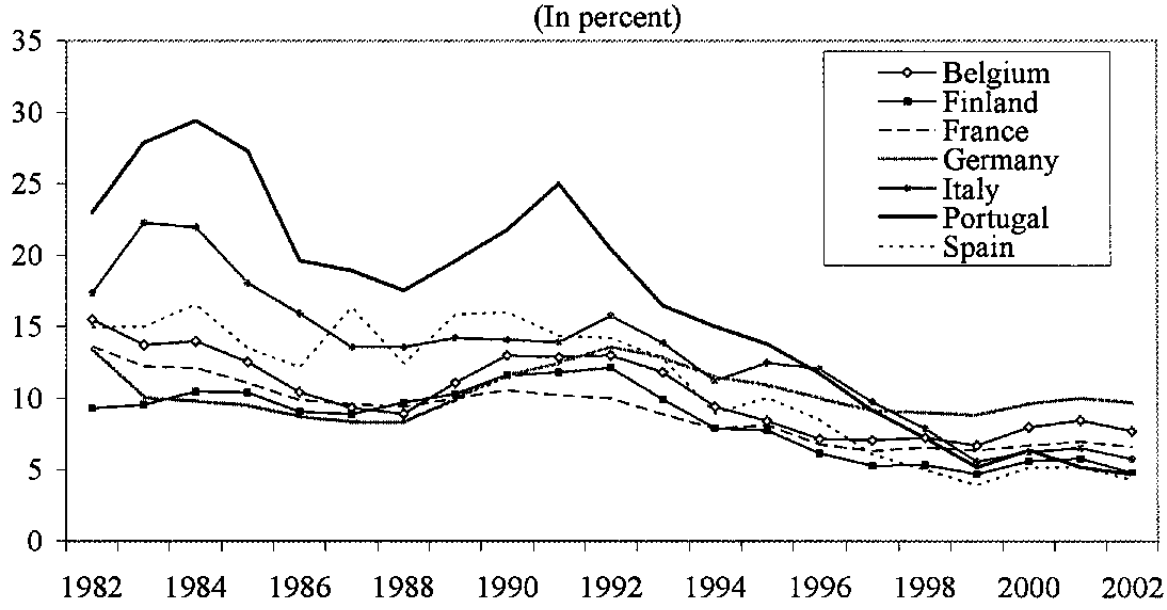
[14] The regression coefficient in this scenario is -0.18 and with the debt-to-equity increasing by 10.6 percentage points in 2002, the estimated reduction of investment is 1.98 percent.

Figure 2. Portugal: Median Values by Sectors 1/



1/ Sector 1 is energy and water; sectors 2-11, manufacturing industries; sector 12 is buildings and civil engineering; sector 13 is trade; sector 14 is transport communication; and sector is 15 other service.

Figure 4: Lending Rates, 1982-2002
(In percent)



Source: IMF, *International Financial Statistics*.

Table 5. Balance Sheet Indicators and the Investment-Capital Ratio
(Dependent variable is IK*t*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IK_{t-1}	0.355***	0.357***	0.356***	0.356***	0.357***	0.344***	0.335***
	(0.079)	(0.078)	(0.078)	(0.078)	(0.078)	(0.080)	(0.079)
IK_{t-2}	0.101***	0.102***	0.102***	0.102***	0.102***	0.098***	0.100***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.028)	(0.026)	(0.027)
SK_{t-1}	1.178***	1.277***	1.197***	1.229***	1.243***	1.262***	1.128**
	(0.453)	(0.483)	(0.463)	(0.472)	(0.481)	(0.489)	(0.445)
DA_{t-1}	-0.017						
	(0.040)						
$SDCA_{t-1}$		-0.036*					
		(0.019)					
DE_{t-1}			-0.140				
			(0.105)				
DIF_{t-1}				-0.002***			
				(0.000)			
FS_{t-1}					-0.016		
					(0.038)		
COV_{t-1}						0.327*	
						(0.198)	
CA_{t-1}							0.275**
							(0.111)
Constant	-1.092	0.192	0.219	-1.129	-1.093	-1.208	-1.228
	(0.984)	(0.234)	(0.234)	(0.983)	(1.017)	(0.955)	(0.921)
Obs	1087	1087	1087	1087	1087	1087	1087
Ind-Ctry	101	101	101	101	101	101	101
AR1	-3.36	-3.36	-3.35	-3.33	-3.35	-3.29	-3.21
p-value	0.0008	0.0008	0.0008	0.0009	0.0008	0.001	0.001
AR2	0.90	0.93	0.88	0.89	0.92	0.84	0.75
p-value	0.37	0.35	0.37	0.37	0.35	0.40	0.45

Source: BACH database.

Notes: Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Ind-Ctry is the number of industry-country pairs (i.e., cross-section dimension of the panel). All regressions include time dummies. AR1 and AR2 are first order and second order serial correlation tests. Lagged values of the variables used as intruments. All regressions pass the Sargan test of overidentifying restrictions.

Table 6. Asymmetric Effects over Real Sector Downturns I 1/
(Dependent variable is IK*t*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IK_{t-1}	0.359***	0.361***	0.356***	0.356***	0.364***	0.347***	0.339***
	(0.080)	(0.079)	(0.078)	(0.078)	(0.079)	(0.080)	(0.079)
IK_{t-2}	0.104***	0.104***	0.103***	0.102***	0.107***	0.099***	0.101***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.026)	(0.027)
SK_{t-1}	1.151***	1.256***	1.210***	1.230***	1.195**	1.209**	1.068**
	(0.444)	(0.479)	(0.464)	(0.474)	(0.468)	(0.480)	(0.430)
DA_{t-1}	-0.009						
	(0.040)						
R_t*DA_{t-1}	-0.020***						
	(0.007)						
$SDCA_{t-1}$		-0.031					
		(0.020)					
R_t*SDCA_{t-1}		-0.012**					
		(0.005)					
DE_{t-1}			-0.136				
			(0.101)				
R_t*DE_{t-1}			-0.064				
			(0.147)				
DIF_{t-1}				-0.002***			
				(0.000)			
R_t*DIF_{t-1}				0.001			
				(0.013)			
FS_{t-1}					-0.011		
					(0.037)		
R_t*FS_{t-1}					-0.019***		
					(0.005)		
COV_{t-1}						0.358*	
						(0.195)	
R_t*COV_{t-1}						-0.196**	
						(0.078)	
CA_{t-1}							0.321***
							(0.111)
R_t*CA_{t-1}							-0.125***
							(0.030)
Constant	-1.084	-0.230*	-1.078	0.209	-1.103	-1.179	-0.163
	(0.987)	(0.124)	(0.967)	(0.234)	(1.017)	(0.952)	(0.110)
Obs	1087	1087	1087	1087	1087	1087	1087
Ind-Ctry	101	101	101	101	101	101	101
AR1	-3.39	-3.38	-3.36	-3.33	-3.40	-3.30	-3.23
p-value	0.0007	0.0007	0.0008	0.0009	0.0007	0.001	0.001
AR2	0.57	0.70	0.86	0.89	0.52	0.69	0.37
p-value	0.57	0.48	0.39	0.37	0.60	0.49	0.71

Source: BACH database.

Notes: Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Ind-Ctry is the number of industry-country pairs (i.e., cross-section dimension of the panel). All regressions include time dummies. AR1 and AR2 are first order and second order serial correlation tests. Lagged values of the variables used as intruments. All regressions pass the Sargan test of overidentifying restrictions.
R=1 if industrial production growth is negative.

1/ Downturns are characterized by negative industrial production growth.

Table 7. Asymmetric Effects over Real Sector Downturns II 1/
(Dependent variable is IK$_t$)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IK_{t-1}	0.355***	0.358***	0.356***	0.357***	0.357***	0.341***	0.335***
	(0.078)	(0.077)	(0.079)	(0.079)	(0.077)	(0.080)	(0.078)
IK_{t-2}	0.107***	0.108***	0.103***	0.102***	0.111***	0.103***	0.105***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.026)	(0.027)
SK_{t-1}	1.202***	1.308***	1.210***	1.227***	1.333***	1.331***	1.239***
	(0.460)	(0.492)	(0.466)	(0.468)	(0.509)	(0.514)	(0.471)
DA_{t-1}	0.012						
	(0.038)						
R_t*DA_{t-1}	-0.024***						
	(0.009)						
$SDCA_{t-1}$		-0.020					
		(0.019)					
R_t*$SDCA_{t-1}$		-0.016**					
		(0.007)					
DE_{t-1}			-0.129				
			(0.107)				
R_t*DE_{t-1}			-0.103				
			(0.174)				
DIF_{t-1}				0.002			
				(0.011)			
R_t*DIF_{t-1}				-0.004			
				(0.011)			
FS_{t-1}					-0.013		
					(0.038)		
R_t*FS_{t-1}					-0.028***		
					(0.007)		
COV_{t-1}						0.343*	
						(0.199)	
R_t*COV_{t-1}						-0.272*	
						(0.150)	
CA_{t-1}							0.271**
							(0.110)
R_t*CA_{t-1}							-0.139***
							(0.040)
Constant	-2.686**	-2.409**	-1.325	-1.160	-3.150***	-1.658*	-2.680***
	(1.162)	(1.141)	(1.131)	(1.004)	(1.175)	(0.996)	(1.008)
Obs	1087	1087	1087	1087	1087	1087	1087
Ind-Ctry	101	101	101	101	101	101	101
AR1	-3.31	-3.32	-3.34	-3.33	-3.41	-3.32	-3.23
p-value	0.0009	0.0009	0.0008	0.0009	0.0006	0.0009	0.001
AR2	0.72	0.760	0.86	0.88	0.57	0.82	0.66
p-value	0.47	0.45	0.39	0.38	0.57	0.41	0.51

Source: BACH database.

Notes: Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Ind-Ctry is the number of industry-country pairs (i.e., cross-section dimension of the panel). All regressions include time dummies. AR1 and AR2 are first order and second order serial correlation tests. Lagged values of the variables used as intruments. All regressions pass the Sargan test of overidentifying restrictions.
R=1 if output gap is widening.

1/ Downturns are characterized by widening output gap.

Table 8. Asymmetric Effects over Equity Price Cycles
(Dependent variable is IK*t*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IK_{t-1}	0.356***	0.359***	0.358***	0.355***	0.358***	0.342***	0.334***
	(0.079)	(0.079)	(0.078)	(0.078)	(0.078)	(0.081)	(0.079)
IK_{t-2}	0.103***	0.104***	0.104***	0.100***	0.103***	0.098***	0.101***
	(0.028)	(0.027)	(0.028)	(0.028)	(0.028)	(0.026)	(0.027)
SK_{t-1}	1.200***	1.298***	1.203***	1.227***	1.245***	1.270***	1.152***
	(0.455)	(0.483)	(0.464)	(0.467)	(0.477)	(0.488)	(0.441)
DA_{t-1}	-0.021						
	(0.041)						
R_t*DA_{t-1}	-0.005						
	(0.005)						
$SDCA_{t-1}$		-0.034*					
		(0.019)					
R_t*SDCA_{t-1}		-0.004					
		(0.004)					
DE_{t-1}			-0.159				
			(0.111)				
R_t*DE_{t-1}			-0.122				
			(0.129)				
DIF_{t-1}				-0.011			
				(0.011)			
R_t*DIF_{t-1}				0.009			
				(0.011)			
FS_{t-1}					-0.016		
					(0.038)		
R_t*FS_{t-1}					-0.002		
					(0.004)		
COV_{t-1}						0.351*	
						(0.201)	
R_t*COV_{t-1}						-0.056	
						(0.084)	
CA_{t-1}							0.289**
							(0.113)
R_t*CA_{t-1}							-0.036
							(0.029)
Constant	-1.06	0.173	-0.272	-1.127	-1.075	-1.206	-1.202
	(0.976)	(0.158)	(0.422)	(0.981)	(1.013)	(0.951)	(0.905)
Obs	1087	1087	1087	1087	1087	1087	1087
Ind-Ctry	101	101	101	101	101	101	101
AR1	-3.36	-3.35	-3.34	-3.33	-3.34	-3.28	-3.20
p-value	0.0008	0.0008	0.0008	0.0009	0.0008	0.001	0.001
AR2	0.86	0.88	0.85	0.86	0.89	0.83	0.70
p-value	0.39	0.38	0.39	0.39	0.37	0.41	0.48

Source: BACH database.

Notes: Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Ind-Ctry is the number of industry-country pairs (i.e., cross-section dimension of the panel). All regressions include time dummies. AR1 and AR2 are first order and second order serial correlation tests. Lagged values of the variables used as intruments. All regressions pass the Sargan test of overidentifying restrictions.
R=1 if equity market bust (negative growth of the stock market index).

Table 9. Leverage Threshold Effects
(Dependent variable is IK*t*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IK_{t-1}	0.323**	0.158***	0.326**	0.158***	0.278*	0.192***	0.278*	0.197***
	(0.142)	(0.052)	(0.144)	(0.052)	(0.165)	(0.045)	(0.165)	(0.044)
IK_{t-2}	0.066**	0.088*	0.070**	0.086*	0.016	0.080*	0.017	0.081**
	(0.033)	(0.049)	(0.034)	(0.048)	(0.031)	(0.041)	(0.031)	(0.041)
SK_{t-1}	1.283**	1.920***	1.259**	1.882***	1.365***	1.684***	1.367***	1.646***
	(0.518)	(0.554)	(0.518)	(0.554)	(0.460)	(0.585)	(0.462)	(0.591)
DA_{t-1}	-0.246**	-0.025	-0.227**	-0.023				
	(0.119)	(0.066)	(0.115)	(0.065)				
R_t*DA_{t-1}			-0.026**	-0.017*				
			(0.012)	(0.009)				
DE_{t-1}					-0.195**	0.668	-0.187**	0.763
					(0.099)	(0.967)	(0.093)	(0.983)
R_t*DE_{t-1}							-0.057	-0.563
							(0.172)	(0.377)
Constant	-0.122	-0.177	-0.177	-0.152	-0.165	-0.875*	-0.159	-0.864*
	(0.152)	(0.613)	(0.239)	(0.607)	(0.103)	(0.530)	(0.108)	(0.513)
Obs	544	543	544	543	481	606	481	606
Ind-Ctry	55	77	55	77	55	79	55	79
AR1	-2.54	-4.60	-2.59	-4.65	-2.38	-5.28	-2.39	-5.28
p-value	0.01	0	0.009	0	0.01	0	0.01	0
AR2	1.23	0.93	1.03	0.59	1.58	0.54	1.58	0.25
p-value	0.22	0.35	0.3	0.55	0.11	0.59	0.11	0.80

Source: BACH database.

Notes: Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Ind-Ctry is the number of industry-country pairs (i.e., cross-section dimension of the panel). All regressions include time dummies. AR1 and AR2 are first order and second order serial correlation tests. Lagged values of the variables used as intruments. All regressions pass the Sargan test of overidentifying restrictions.
R=1 if industrial production growth is negative.
(1) and (3) DA_{t-1} larger than median value
(2) and (4) DA_{t-1} smaller than median value.
(5) and (7) DE_{t-1} larger than 60^{th} percentile.
(6) and (8) DE_{t-1} smaller than 60^{th} percentile.

Table 10. Investment-Balance Sheet Sensitivities Controlling for the Cost of Capital
(Dependent variable is IK*t*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IK_{t-1}	0.346***	0.349***	0.347***	0.348***	0.349***	0.341***	0.330***
	(0.079)	(0.079)	(0.079)	(0.079)	(0.079)	(0.081)	(0.080)
IK_{t-2}	0.097***	0.097***	0.097***	0.097***	0.097***	0.096***	0.096***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.026)	(0.026)
SK_{t-1}	1.402***	1.489***	1.422***	1.448***	1.458***	1.418***	1.322***
	(0.493)	(0.518)	(0.502)	(0.511)	(0.521)	(0.487)	(0.467)
I_{t-1}	-0.223**	-0.215**	-0.226**	-0.219**	-0.219**	-0.163	-0.183*
	(0.105)		(0.106)	(0.106)	(0.105)	(0.105)	(0.100)
DA_{t-1}	-0.031						
	(0.040)						
$SDCA_{t-1}$		-0.033*					
		(0.019)					
DE_{t-1}			-0.165				
			(0.113)				
DIF_{t-1}				-0.002***			
				(0.000)			
FS_{t-1}					-0.016		
					(0.039)		
COV_{t-1}						0.244	
						(0.207)	
CA_{t-1}							0.248**
							(0.113)
Constant	-1.471	-1.494	-1.487	-1.527	-1.489	-1.487	-1.550*
	(0.990)	(0.994)	(0.980)	(0.987)	(1.018)	(0.992)	(0.940)
Obs	1087	1087	1087	1087	1087	1087	1087
Ind-Ctry	101	101	101	101	101	101	101
AR1	-3.32	-3.32	-3.31	-3.29	-3.31	-3.27	-3.19
p-value	0.0009	0.0009	0.0009	0.001	0.0009	0.001	0.001
AR2	1.01	1.06	1.01	1.01	1.05	0.94	0.85
p-value	0.31	0.29	0.31	0.31	0.29	0.34	0.39

Source: BACH database.

Notes: Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Ind-Ctry is the number of industry-country pairs (i.e., cross-section dimension of the panel). All regressions include time dummies. AR1 and AR2 are first order and second order serial correlation tests. Lagged values of the variables used as instruments. All regressions pass the Sargan test of overidentifying restrictions.

Table 11. Asymmetric Effects over Real Sector Downturns Controlling for the Cost of Capital
(Dependent variable is IK*t*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IK_{t-1}	0.351***	0.352***	0.347***	0.348***	0.356***	0.344***	0.334***
	(0.080)	(0.080)	(0.079)	(0.079)	(0.079)	(0.081)	(0.080)
IK_{t-2}	0.100***	0.099***	0.098***	0.097***	0.102***	0.096***	0.097***
	(0.026)	(0.026)	(0.026)	(0.027)	(0.026)	(0.026)	(0.026)
SK_{t-1}	1.360***	1.452***	1.436***	1.452***	1.394***	1.372***	1.246***
	(0.484)	(0.513)	(0.503)	(0.513)	(0.508)	(0.479)	(0.449)
I_{t-1}	-0.211**	-0.200*	-0.229**	-0.220**	-0.203*	-0.207***	-0.170*
	(0.107)	(0.107)	(0.107)	(0.105)	(0.105)	(0.105)	(0.113)
DA_{t-1}	-0.023						
	(0.040)						
R_t*DA_{t-1}	-0.020***						
	(0.007)						
$SDCA_{t-1}$		-0.029					
		(0.020)					
R_t*SDCA_{t-1}		-0.011**					
		(0.005)					
DE_{t-1}			-0.160				
			(0.109)				
R_t*DE_{t-1}			-0.066				
			(0.145)				
DIF_{t-1}				-0.002***			
				(0.000)			
R_t*DIF_{t-1}				0.004			
				(0.015)			
FS_{t-1}					-0.010		
					(0.038)		
R_t*FS_{t-1}					-0.019***		
					(0.005)		
COV_{t-1}						0.272	
						(0.203)	
R_t*COV_{t-1}						-0.174*	
						(0.078)	
CA_{t-1}							0.296***
							(0.099)
R_t*CA_{t-1}							-0.123***
							(0.030)
Constant	-1.443	-1.454	-1.485	-1.529	-1.470	-1.475	-1.513
	(0.986)	(0.987)	(0.976)	(0.986)	(1.010)	(0.991)	(0.926)
Obs	1087	1087	1087	1087	1087	1087	1087
Ind-Ctry	101	101	101	101	101	101	101
AR1	-3.35	-3.34	-3.32	-3.29	-3.36	-3.29	-3.21
p-value	0.0008	0.0008	0.0009	0.001	0.0008	0.001	0.001
AR2	0.70	0.85	0.98	1.02	0.66	0.80	0.48
p-value	0.48	0.39	0.33	0.31	0.51	0.42	0.63

Source: BACH database.

Notes: Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Ind-Ctry is the number of industry-country pairs (i.e., cross-section dimension of the panel). All regressions include time dummies. AR1 and AR2 are first order and second order serial correlation tests. Lagged values of the variables used as instruments. All regressions pass the Sargan test of overidentifying restrictions.
R=1 if industrial production growth is negative.

Table 12. Asymmetric Effects over the Equity Price Cycle Controlling for the Cost of Capital
(Dependent variable is IK*t*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IK_{t-1}	0.347***	0.350***	0.348***	0.345***	0.349***	0.341***	0.330***
	(0.079)	(0.079)	(0.078)	(0.079)	(0.079)	(0.081)	(0.080)
IK_{t-2}	0.098***	0.098***	0.099***	0.095***	0.097***	0.095***	0.097***
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.026)	(0.026)
SK_{t-1}	1.402***	1.490***	1.420***	1.452***	1.457***	1.416***	1.327***
	(0.493)	(0.518)	(0.501)	(0.509)	(0.521)	(0.490)	(0.465)
I_{t-1}	-0.217**	-0.208*	-0.220**	-0.224**	-0.217**	-0.158	-0.171*
	(0.108)	(0.109)	(0.107)	(0.105)	(0.107)	(0.107)	(0.101)
DA_{t-1}	-0.033						
	(0.041)						
R_t*DA_{t-1}	-0.002						
	(0.006)						
$SDCA_{t-1}$		-0.032*					
		(0.019)					
R_t*SDCA_{t-1}		-0.002					
		(0.004)					
DE_{t-1}			-0.181				
			(0.119)				
R_t*DE_{t-1}			-0.086				
			(0.130)				
DIF_{t-1}				-0.015			
				(0.012)			
R_t*DIF_{t-1}				0.013			
				(0.012)			
FS_{t-1}					-0.016		
					(0.039)		
R_t*FS_{t-1}					-0.000		
					(0.004)		
COV_{t-1}						0.260	
						(0.210)	
R_t*COV_{t-1}						-0.032	
						(0.085)	
CA_{t-1}							0.261**
							(0.115)
R_t*CA_{t-1}							-0.028
							(0.029)
Constant	-1.446	-1.468	-1.454	-1.533	-1.482	-1.479	-1.513*
	(0.978)	(0.985)	(0.964)	(0.983)	(1.013)	(0.980)	(0.919)
Obs	1087	1087	1087	1087	1087	1087	1087
Ind-Ctry	101	101	101	101	101	101	101
AR1	-3.32	-3.31	-3.31	-3.28	-3.31	-3.27	-3.19
p-value	0.0009	0.0009	0.0009	0.001	0.0009	0.001	0.001
AR2	0.99	1.03	0.98	0.98	1.05	0.95	0.82
p-value	0.32	0.30	0.32	0.33	0.29	0.34	0.41

Source: BACH database.

Notes: Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Ind-Ctry is the number of industry-country pairs (i.e., cross-section dimension of the panel). All regressions include time dummies. AR1 and AR2 are first order and second order serial correlation tests. Lagged values of the variables used as instruments. All regressions pass the Sargan test of overidentifying restrictions.
R=1 if equity market bust (negative growth of the stock market index).

DATA DESCRIPTION

Countries and Time Periods

Belgium	1989-2001
Finland	1997-2001
France	1984-2001
Germany	1987-2000
Italy	1982-2001
Portugal	1995-2001
Spain	1983-2001

Sectors Used

Energy and water
Manufacturing industry
- Extraction of mettalliferous ores and preliminary processing of metal
- Extraction of nonmettalliferous ores and manufacturing of nonmetallic mineral products
- Chemicals and man-made fibers
- Manufacture of metal articles, mechanical and instrument engineering
- Electrical and electronic equipment including office and computing equipment
- Manufacture of transport equipment
- Food, drink, and tobacco
- Textiles, leather, and clothing
- Timber and paper manufacture, printing
- Other manufacturing industries not elsewhere specified

Building and civil engineering
Trade
Transport and communication
Other services not elsewhere specified

Construction of the variables

IK: Investment capital ratio. Investment is measured by BACH item Acquisition of tangible fixed assets minus sales and disposals. Capital is measured by Tangible fixed assets.
SK: Sales capital ratio. Sales is measured by the turnover variable in BACH

Leverage indicators:

DA: Debt asset ratio. Debt is measured by summing Creditors: amounts becoming due and payable after more than one year and Creditors: amounts becoming due and payable within one year. Assets are measured by Total Assets.
DE: Debt equity ratio. Equity is measured by BACH item Subscribed capital and reserves
DIF: Debt internal funds ratio. Internal funds is measured as gross operating profit.

Liquidity indicators:
SDCA: Short-term debt assets ratio. Short term debt is measured by Creditors: amounts becoming due and payable within one year. Short-term assets are measured by Current Assets.
FS: Short-term debt as a fraction of total debt.

Cash flow indicators:
COV: Coverage ratio: cash flow on interest payments. Interest payments are measured as interest and similar charges.
CA: Cash flow on total assets. Cash flow is measured as gross operating profit.

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III. The Impact of EU Enlargement on Portuguese Trade[15]

A. Introduction and Stylized Facts

47. Enlargement of the European Union (EU) from 15 to 25 members on May 1, 2004, is expected to bring important economic benefits for old and new members, largely through an expansion of trade. This chapter explores the potential trade implications of EU accession for Portugal. With currently very little trade between Portugal and the accession countries, model-based estimates suggest a potentially large trade expansion—perhaps by some two-thirds or more above current levels. However, the experience of earlier EU accession countries and of monetary union in Europe also indicated that the trade benefits do not accrue automatically: further structural reforms (in labor and product markets) as well as steps to strengthen competitiveness may be critical to secure the fruits of trade integration.

48. The recent declines in Portugal's cost and price competitiveness and structural weaknesses in some areas—relatively low productivity, low educational attainment, and high labor costs compared with the accession countries—raise some concern about increased competition from the accession countries (Table 1). Is Portugal well positioned to benefit from trade gains after the EU enlargement? Is the current trade structure of Portugal and the accession countries relevant to assess the trade effects of the expanded European Union? This chapter does not aim to give definite answers to these questions but to shed some light on the potential impact of EU enlargement on Portugal's trade flows by presenting stylized facts and empirical evidence from recent gravity model estimates.

Table 1. Productivity, Wages, and Schooling

	Productivity 1/ (EU=100)	Wage Level 2/ (EU=100)	Schooling (Years)
Portugal	45.7	35.8	5.9
Spain	76.8	62.6	7.3
European Union	100.0	100.0	9.0
Czech Republic	27.9	17.2	9.5
Hungary	33.1	16.9	9.1
Poland	26.1	19.7	9.8

Note: Productivity, wages, and schooling data are respectively for 2002, 2000, and 2000.

Sources: IMF, WEO; Eurostat; and Barro Lee (2002) dataset.

1/ GDP (at market prices) per employed.
2/ Data refer to manufacturing and services.

49. At present, most of Portugal's international trade takes place within the European Union, while trade shares with the 10 accession countries (AC-10) are low. Specifically, more than three-quarters of Portuguese exports and imports are with other EU countries. At the same time, Portugal's exports to the 10 accession countries are small, accounting for 1.5 percent of total exports in 2002, compared with 12.6 for the present EU member countries (EU-15; Table 2). Viewed from the perspective of

Table 2. Export Shares, 2002

	Portugal	Spain	EU-15	AC-10	Rest of the World
Portugal		20.3	79.0[1]	1.5	19.5
Spain	9.5		69.5[2]	3.4	27.1
EU-15	1.0	4.9	61.1	12.6	26.3
AC-10	0.5	1.8	66.9	13.2	19.9

Source: IMF, *Direction of Trade Statistics* (2003).

[1] It includes exports to Spain.
[2] It includes exports to Portugal.

[15] Prepared by Marta Ruiz-Arranz.

the accession countries, their exports to Portugal were, on average, only ½ percent of total AC-10 exports in 2002 (while exports to the EU accounted for about two thirds of total AC-10 exports). Notwithstanding some dispersion among the accession countries (Table 3), none of them had export shares to Portugal above 1 percent in 2002. The empirical results below suggest that this leaves considerable room for trade expansion after EU accession.

Table 3. Portugal, Spain and Accession Countries: Export Shares

	Portugal	Spain	EU-15	AC	Rest of the World
Portugal		20.3	79.0[1]	1.5	19.5
Spain	9.5		69.5[2]	3.4	27.1
Cyprus	0.1	1.2	49.3	9.7	41.1
Czeck Republic	0.4	2.0	68.6	16.3	15.1
Estonia	0.1	0.8	57.2	15.0	27.8
Hungary	0.6	2.4	75.0	6.7	18.3
Latvia	0.3	0.7	59.6	17.1	23.4
Lithuania	0.2	1.1	48.4	19.4	32.3
Malta	0.2	1.2	38.6	2.5	58.9
Poland	0.9	1.8	68.8	11.5	19.7
Slovak Republic	0.2	1.6	60.6	25.5	11.9
Slovenia	0.2	1.1	59.3	8.2	32.5

Source: IMF, *Direction of Trade Statistics* (2003).

[1] It includes exports to Spain.
[2] It includes exports to Portugal.

B. Gravity Model Estimates

50. A large body of literature has studied the trade creation effects of free trade arrangements, single markets, and currency unions.[16] Most of these studies find sizeable effects on trade flows. However, there is controversy over the exact size of the gains. For example, Rose (2000) finds that membership in a currency union triples trade with other currency union members, using a panel of cross-country data covering bilateral trade between 186 countries at five-year intervals between 1970 and 1990. Persson (2001) and Tenreyro (2001) correct Roses's estimate for selection bias and simultaneity bias, respectively, and find that currency union increases trade by some 60 percent. The positive effects on trade of the European Economic Community and the European Free Trade Agreement have been highlighted by Bayoumi and Eichengreen (1995) and Frankel and Wei (1993), among others. More recently, Micco and others (2003) and Faruqee (2004), using post-1999 data, have

[16] See, for example, Bayoumi and Eichengreen (1995), Frankel and Rose (1998, 2002), Rose (2000, 2002), Tenreyro (2001), Micco and others (2003), and Faruqee (2004).

examined the trade effects of European monetary union. They find that the euro's impact on trade ranges between 4 and 16 percent.

51. Most of these studies estimate so-called gravity regressions for international trade. Gravity models examine how trade between pairs of countries is affected by monetary union or a common market after controlling for size, geographical distance, and other variables (such as, colonial links, shared border and common language) that might affect trade flows between two countries. In its simple form, the gravity equation for trade—in analogy to Newton's law of universal gravitation—states that trade flows between two countries are proportional to the product of the two countries' economic sizes (GDPs) and inversely proportional to distance (broadly understood as including all factors that might create trade resistance)[17].

52. Using the methodology and database in Dabán, García-Escribano, and Hoffmaister (2004), the current trade flows between Portugal and the AC-10 are examined within a gravity model.[18] Tables 2 and 3 above indicate that Portuguese trade with the AC-10 is small compared with trade flows between the AC10 and the rest of the EU. In order to assess whether these trade patterns can be explained by economic size, distance, and other "cultural" factors the following gravity regression is estimated:

$$\ln(Trade_{ijt}) = \gamma_{ij} + \tau_t + \beta_1 \ln(Y_{it}Y_{jt}) + \beta_2 \ln(P_{it}P_{jt}) + \alpha X_{ij} + \delta D^{EUAC} + \lambda D^{EUAC} D^{PRT} + \ldots + \varepsilon_{ijt} \quad (1)$$

where $Trade_{ijt}$ is bilateral trade in goods between trading countries i and j at time t, γ_{ij} represents the fixed effect in trade between countries i and j, τ_t represents common time effects for a particular year, Y and P represent gross domestic product in level and population, X_{ij} is a matrix of variables including the geographical distance between i and j, and dummy variables for shared borders, common language and access to sea, and ε is the error term. D^{EUAC} is a dummy variable taking on the value "1" if one trading partner belongs to the EU-15 and the other to AC-10 (and is "0" otherwise). The coefficient δ is the key parameter to assess the degree of "undertrading" or "overtrading" between the EU-15 and AC-10, i.e., of trade not explained by other observable factors. D^{PRT} is a country dummy variable for Portugal. Thus, λ gives the deviation of Portugal with respect to the average EU-15 trade effect. To allow a comparison with other trading partners, some regressions also include country-specific effects for France, Germany, Italy, Spain, and the United Kingdom.

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[17] The theoretical foundations of the gravity equation can be found in Anderson (1979), Deardorff (1984), Helpman and Krugman (1985), and Helpman (1987).

[18] The dataset covers the EU-15 and AC-10 countries and spans the period 1978–2002.

53. The estimation results in Table 4 suggest that the degree of undertrade between the EU-15 and AC-10 is around 28 percent for total exports[19] and somewhat less (18 percent) for imports. Thus, the fact that countries in the EU trade more among themselves than with the AC-10 (as indicated in Table 2 above) can be largely explained by gravity and cultural factors. Nevertheless, there is also a significant amount of the trade differential that cannot be explained by these observable factors. This level of undertrade might be interpreted as the estimate of the potential trade gains after EU enlargement.

54. In order to examine whether the average effect is similar across the present EU-15 member states, country dummies are interacted with the dummy variable D^{EUAC}. Table 5 shows that undertrade varies widely across countries. While some countries like the France, Germany, and the United Kingdom are overtrading with the AC-10, the level of Portugal's undertrade—that is, trade shortfalls relative to the trade volume explained by distance and other cultural factors—is above 70 percent for exports[20] (and 66 percent for imports). This is substantially larger than the undertrade of neighboring Spain.

Table 5. Undertrade Between the EU-15 and AC-10 Countries

	Exports	Imports
EU-15	28	18
Germany	-3	-14
France	-4	-24
Italy	29	23
United Kingdom	-12	-35
Spain	47	35
Portugal	73	66

Note: Undertrade is computed from the regression coefficients using the following formula: -(exp(beta)-1)*100.
For EU-15 estimates in columns (1) and (3) are used.

55. The results above imply that the current level of trade between the EU-15 and the AC-10—and especially between Portugal and the AC-10—is significantly smaller than what distance and other fundamentals would justify. This indicates room for potentially large trade expansions.

56. Available evidence suggests, however, that the gains from trade integration are not always distributed equally and depend importantly on structural features of the integrating economies. Faruqee (2004) and other studies on optimal currency unions[21] suggest that the actual realization of these gains is influenced by the share of total trade that is accounted for by intra-industry trade—which is the component of external trade that has been found to be particularly sensitive to exchange rate movements—and by other characteristics of the product market that determine the ability to cope with asymmetric shocks. Similarly, the degree of price and wage flexibility as well as factor mobility appear to be key factors influencing the gains from trade integration, especially when the latter is accompanied by relinquishing an independent monetary policy.

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[19] The coefficient of the dummy variable D^{EUAC} on the log of export flows regression is -0.33 (column 1). Thus, the impact on trade is computed as $\left(\left(e^{-0.33} - 1\right) \times 100 = -28.1\right)$.

[20] $\left(e^{-0.31-1.02} - 1\right) \times 100 = -73.55$

[21] See IMF, SM/04/02 (1/8/04), for a review of the literature.

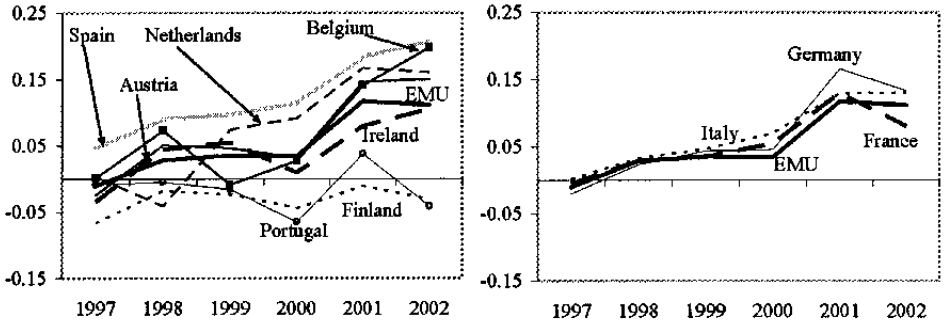
57. Portugal's past experience in the EU and in monetary union may provide some guidance about its ability to benefit from EU enlargement. To get a rough bearing in this regard, the analysis below draws on the results in Faruqee (2004), who examines the impact of membership in the EU or monetary union on trade integration within the euro area. He estimates the following gravity-equation model for a panel of 22 industrialized countries:

$$\ln(Trade_{ijt}) = \gamma_{ij} + \tau_t + \beta_1 \ln(Y_{it}Y_{jt}) + \beta_2 \ln(y_{it}y_{jt}) + \alpha FTA_{ijt} + \delta_t EU_{ijt} + \sum_i \lambda_{it} D^i EMU_{ijt} + \varepsilon_{ijt} \quad (2)$$

where the variables are as defined in equation (1) above, and y represent per capita GDP, *FTA* is a dummy variable for free trade agreements, *EU* and *EMU* are dummy variables equaling one if both partners belong to the EU or the euro area, respectively, and zero otherwise. To assess differences among the euro-area countries, the coefficient of interest is λ_{it}: it captures the specific trade effect for country i (for example, Portugal) following monetary union, an effect that is in addition to common effect for all other euro-area members (which is captured by the common coefficient λ_t).

58. The results in Faruqee (2004) suggest significant trade benefits from economic integration, here proxied by EMU, but also important differences across individual countries. Overall, he finds that euro-area membership boosted trade among member countries by an average 7–8 percent and that trade gains from EMU are rising over time.[22] His results also suggest that monetary union has not had trade diverting effects, since both intra- and extra-area trade increased under the single currency. Concerning differences across countries, Portugal (together with Finland) stands out as the country that harnessed least the trade benefits of monetary union. On average, Portugal's trade gains were some 11 percent below the euro-area average, and the estimated trade benefits were not statistically significant for Portugal (see Figure 1).

Figure 1. Dynamic Patterns of EMU Trade Effects, 1997-2002
(Logarithmic change in trade)



Source: Faruquee (2004).

[22] In another study for the countries in the European Union, Micco and others (2003) find that the euro's impact on trade ranged between 4 and 16 percent.

59. Some factors seem to boost the trade benefits from economic integration and monetary union, but considerable uncertainty remains as to the precise channels explaining the estimated cross-country differences. As noted in Faruqee (2004), there appears to be a significant correlation between trade gains from monetary union membership and the share of intra-industry trade (Table 6). Finland, Ireland, and Portugal are the countries with the smallest initial shares of intra-industry trade within the EU, and these are also the countries estimated to have benefited the least from monetary union. However, this relationship is not that close for those countries on the top end of the trade gains (see Spain and Netherlands, for instance). This suggests that other factors—such as firm entry and exit policies in the product market and labor market flexibility—might also be relevant for a country to take advantage of trade gains from monetary union. Moreover, some of the divergent trade gains could have reflected different developments in competitiveness. As indicated in Figure 2, Portugal is estimated to have recorded a relatively large appreciation of its real effective exchange rate during the period covered in the empirical estimates. These losses (not captured in the empirical analysis based on equation 2) are likely to have contributed to the relatively low estimated trade benefits from monetary union in Portugal.

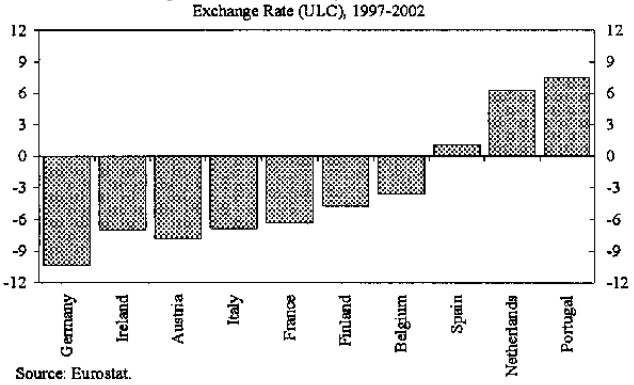
Table 6. Intra-Industry Trade Shares, 1997
(In percent) 1/

Finland	50
Ireland	53
Portugal	55
Italy	60
Netherlands	61
Spain	72
Austria	75
Germany	80
Belgium	81
France	87

Source: European Commission (2002).

1/ Grubel-Lloyd index, which measures the share of intra-industry trade in percent of total trade with EU trading partners.

Figure 2. Cumulated Change in Real Effective Exchange Rate (ULC), 1997-2002



Source: Eurostat.

C. Conclusions

14. EU accession by 10 countries in May 2004 could bring important trade benefits to both old and new EU member countries. The results reported in this chapter suggest potentially large effects for Portugal, which presently trades significantly less with the accession countries than suggested by standard gravity models of external trade. However, there is also some evidence—including from the experience of present euro-area members—that the economic gains from trade integration do not accrue automatically and evenly across countries. The chapter highlights several factors that may influence Portugal's potential gains from further economic integration in Europe (including those related to its trade structure and competitiveness), but investigating the precise channels that determine a country's gains from integration remains an area for further research.

Table 4. Trade Estimates for EU-15 and AC-10 Countries

	Total Exports		Total Imports	
	(1)	(2)	(3)	(4)
$Ln(Y_iY_j)$	0.68**	0.68**	0.62**	0.62**
	(0.10)	(0.10)	(0.10)	(0.10)
$Ln(D_{ij})$	-1.23**	-1.22**	-1.17**	-1.18**
	(0.03)	(0.03)	(0.03)	(0.03)
$Ln(P_iP_j)$	-2.25**	-2.25**	-2.84**	-2.84**
	(0.68)	(0.67)	(0.63)	(0.62)
$language_{ij}$	-0.01	0.06	0.05	0.10
	(0.07)	(0.07)	(0.07)	(0.07)
$border_{ij}$	0.65**	0.66**	0.61**	0.63**
	(0.07)	(0.08)	(0.07)	(0.07)
$landlocked_i$	-5.76**	-5.77**	-17.60**	-17.45**
	(1.18)	(1.17)	(3.37)	(3.32)
$landlocked_j$	-7.35**	-7.17**	-9.28**	-9.12**
	(1.97)	(1.95)	(1.81)	(1.78)
D^{EUAC10}	-0.33**	-0.31**	-0.20**	-0.21**
	(0.03)	(0.03)	(0.03)	(0.03)
$D^{Germany}*D^{EUAC10}$		0.34**		0.34**
		(0.06)		(0.06)
$D^{France}*D^{EUAC10}$		0.35**		0.42**
		(0.07)		(0.07)
$D^{Italy}*D^{EUAC10}$		-0.03		-0.06
		(0.05)		(0.05)
$D^{UK}*D^{EUAC10}$		0.43**		0.51**
		(0.07)		(0.08)
$D^{Spain}*D^{EUAC10}$		-0.32**		-0.22**
		(0.07)		(0.06)
$D^{Portugal}*D^{EUAC10}$		-1.02**		-0.87**
		(0.08)		(0.08)
Constant	21.29**	21.07**	34.56**	34.30**
	(3.86)	(3.81)	(5.84)	(5.75)
Observations	5756	5756	5758	5758
Adjusted R	0.90	0.90	0.90	0.91

Source: IMF, *Direction of Trade Statistics* (2003).

Note: The dependent variable is log exports (imports) from country *i* to county *j*. D^{EUAC10} is a dummy variable taking the value of one when trade is between an EU-15 country and one AC-10 country; and zero otherwise. Robust standard errors in parentheses. * indicates significant at 5%; ** significant at 1%.

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IV. Pension Reform Issues in Portugal[23]

A. Introduction

60. As in most other European Union economies, Portugal will face adverse demographic trends in the coming decades, which will, absent further reforms, result in significant aging-related spending pressures. While the Portuguese public pension system has undergone a number of reforms, including most recently in 2000 and 2002, and pension expenditures are slightly below the European Union (EU) average, the system remains fundamentally unsustainable in its present form. Moreover, with the general government debt burden already approaching 60 percent of GDP, and with social insurance contribution rates above the high EU average, there is little scope to finance these coming spending pressures. Thus, addressing them most likely will involve reducing the scope and scale of pension benefits themselves.

61. This paper provides a brief overview of the public pension system in Portugal, and of prospective pension-related spending pressures in an international context, and considers some policy options. Section B reviews the structure of the Portuguese pension system, and compares some of its basic parameters (e.g., retirement ages, replacement and accrual rates, indexation, taxation), as well as demographic projections, with those in other EU economies. Section C discusses Portuguese pension expenditure projections, and examines their sensitivity to various macroeconomic and other assumptions. Section D considers some policy reform options, and Section E provides conclusions.

B. Background, Previous Reforms, and Demographic Outlook

62. Portugal's pension system comprises a mandatory publicly run, pay-as-you-go "first pillar," complemented by a small, but growing, voluntary tax-advantaged third pillar. The first pillar comprises separate schemes for private sector employees and for civil servants. The private sector scheme, *Segurança Social* (SS), was founded in 1935 for wage earners in industry and the service sectors, and is managed by the *Instituto de Gestão Financeira da Segurança Social*. Coverage was extended over time to other sectors of the economy, with benefits made universal following the 1974 revolution. The SS scheme subsequently incorporated other occupation-specific schemes (e.g., for agricultural workers).[24]

63. The civil servants' scheme, the *Caixa Geral de Aposentações* (CGA), was founded in 1929. While the system covers a much smaller number of participants, civil servants' pension benefits are much higher, reflecting a more generous benefit formula and a greater maturity of the system where, unlike the private sector, earnings are not underreported. This is clear,

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[23] Prepared by Mark Lutz.

[24] Bank employees, numbering some 46,000 (about 1 percent of total employment), remain an important exception to the general private sector scheme.

64. as Gouveia and Sarmento (2002) and Rodrigues (2002) discuss, by considering the following magnitudes. In 2000, the SS had 4.4 million active contributors compared to only 747,000 in the CGA (17 percent of the SS total). There were 2.5 million SS old age, survivor, and disability pensioners, compared to 428,000 CGA pensioners (also 17 percent of the SS total). However, SS pension expenditures equaled 6.1 percent of GDP in 2000, while CGA pensions equaled 3.6 percent of GDP (about 60 percent of the SS total). Thus, the average CGA pension was almost 3½ times as large as the average SS pension. It should be noted that the SS scheme includes many small pension payments either to individuals that had short or nonexistent contributory periods, or had very low wages. Almost one half of all SS pensioners received minimum pensions in 2000, and agricultural pensioners, accounting for an additional 18 percent of total SS pensioners, received similarly low transfers.

65. The Portuguese pension system has undergone a number of substantial reforms in recent times, most notably in 1993 and again in 2000 and 2002.[25] In 1993 reforms affecting the SS included: lowering the accrual rate (the annual incremental increase in the ratio that is multiplied against the reference wage in determining an initial pension) from 2.2 percent to 2 percent; increasing from 10 to 15 the number of required contribution years to obtain a pension; increasing, from the best 5 out of the last 10 years to the best 10 out of the last 15 years, the base period for determining the reference wage, while indexing for inflation the historical wages for this calculation; increasing gradually from 62 to 65 the female retirement age (phased in by 1999); and allowing pensioners to earn labor income. The minimum and maximum replacement rates were set at 30 and 80 percent of the reference wage (after 15 and 40 years), respectively.

66. Some further reforms to the SS system were introduced in 2000 and 2002—addressing important equity concerns, but not the fundamental financial unsustainability of the system. The number of years used to calculate the reference salary was to be gradually extended from the best 10 of the last 15 years to the entire contribution history (to be phased in from 2017 to 2035), thereby reducing incentives to evade contributions early on, and improve the system's finances. However, the fixed 2 percent accrual rate was replaced with a progressive schedule of 2–2.3 percent (for those with more than 20 years of contributions) to help those with minimum and relatively low pensions.[26] In addition, contributory minimum pensions with more than 30 years of contributions were to be increased so as to converge with

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[25] These reforms are discussed more fully in Pereira and Rodrigues (2001), Gouveia and Sarmento (2002), and Rodrigues (2002).

[26] In addition to these reforms directly affecting pensions, reforms to the financing side were also adopted, including defining government financial obligations for nonpension social expenditures administered by the SS (e.g., sickpay, maternity benefits, unemployment compensation), and establishing a reserve fund for the pension system equivalent to two years of pension payments.

the statutory minimum wage (net of pension contributions) over the 2003–07 period, with lower targets for shorter contribution periods.[27] It has been estimated that the net result of the first two changes did not improve the system's long-run financial position, and may in fact have worsened it (Rodrigues, 2002). Clearly, increasing minimum pensions, while socially important, will also impose an additional fiscal burden.

67. The civil service pension system also underwent a fundamental reform in 1993, with a splitting of the system into two groups: those employed in the civil service prior to and after September 1993. The system did not change for those employed prior to this date, with a minimum of only 5 years required to become vested for a civil service pension (compared to 15 years in the SS system). The monthly pension was equivalent to 100 percent of the wage earned in the last month of employment (gross of tax and social contributions, plus the average of the last two months of other forms of compensation) for those with 36 years of contributions (and at least 60 years old, unless the employer did not object).[28] Thus the annual accrual rate was implicitly 2.8 percent (equivalent to 1/36 per year), and a proportional reduction in pensions applied for those who retired at age 65 with less than 36 years service. From 2004 onwards, the monthly wage taken into account in calculating initial pensions for all pre-1993 civil servants that hereafter retire was reduced to wages (and nonwage benefits) net of CGA employee pension contributions, thereby reducing these pensions effectively by about 10 percent. However, the practice discussed in the footnote below of not adjusting pensions in line with civil servants wage increases until they fell to 90 percent of their initial value would not apply to these new pensioners. Additionally, employees with at least 36 years of civil service may still retire earlier than the statutory retirement age, but now with a proportional reduction in their pensions for each year of the difference with the statutory age. In contrast to these still relatively generous pension benefits, civil servants employed after September 1993, are subject to the much less munificent SS rules.

68. From an international perspective, Portugal's SS pension system is not an outlier, although considered by the European Commission to provide medium to high relative benefit levels (Table 1). Its statutory standard retirement age, 65 years, is most frequently used in EU economies, although its early retirement age is somewhat lower. However, the actual average retirement age in Portugal is not unusually low. Life expectancy in Portugal is the lowest

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[27] Noncontributory minimum pensions are to be increased to 50–60 percent of the minimum wage less the employees' social insurance contribution (of 11 percent).

[28] Thus, given that pensioners no longer made social security contributions, and little of their pensions were subject to income taxation, after-tax pensions were generally in excess of 100 percent of civil servants' take home pay. However, the system encompasses an erosion of these pensions until they reach 90 percent of the reference wage (equivalent to the wage net of the 10 percent pension contribution) before indexation applies (see Gouveia and Sarmento, 2002).

among EU countries, although the projected increase by 2050 is the highest. The statutory replacement rate is, at 80 percent, among the highest, and the average replacement rate is also near the top.[29] This reflects in part Portugal having the second highest accrual rate in the EU. It also reflects the Portuguese "indexation" system. While formally the scheme is ad hoc, SS pensions have traditionally been adjusted at about 1 percentage point higher than consumer price inflation, while many other EU systems have shifted to formal price indexation.[30] CGA pension increases have been linked to the increases in the civil servants wage scale.[31] Finally, Portuguese public pensions have very favorable personal income tax treatment, as contributions are deductible in determining taxable income, while pensions face much lower rates of effective taxation than do wages.[32] This also is in contrast to the general trend in the EU to subject pension income more generally to taxation.

69. Social security contribution rates are already relatively high in Portugal (Table 2).[33] While these include charges for other social security programs in addition to pensions (including sickness, maternity, family, unemployment and death benefits, occupational hazards and unemployment compensation, and subsidies for the handicapped), prospects for financing higher pension expenditures with higher contributions appear to be quite limited.

70. Demographic projections suggest that population aging in Portugal would be broadly comparable to developments in the EU on average (Figure 1). The old-age dependency ratio was 23 percent in 2000, almost equal to the 24 percent EU average, well below the 27 percent rate in Italy and Sweden, while sizably above the 17 percent rate in Ireland. Based on Eurostat's central population projection variant, the Portuguese dependency ratio is expected to increase in 2050 to 46 percent, compared to 49 percent on average in the EU.[34] With the

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[29] See European Commission (2002) for a detailed discussion of the estimation of average replacement ratios.

[30] As a rule, minimum pensions are often increased in line with minimum wages.

[31] Although recall that the system allowed for some initial erosion in real terms to 90 percent of the initial pension before indexation applies (see Gouveia and Sarmento, 2002).

[32] In 2002, the first €7,805.60 of pension income was tax exempt, unless the taxpayer's income exceeded a certain limit (€72,433 in 2002, equivalent to the prime minister's salary), in which case, the exemption was reduced by amount the income exceeded the limit. See PriceWaterhouseCoopers (2002). Pereira and Rodrigues (2001) estimate that only about 7.5 percent of all pension income was taxed in 1997.

[33] The civil servants' contribution rate is 10 percent, with the government providing additional financing for CGA pension payments, as needed.

[34] It is useful to note that the "central" population variant concerns the size of the overall population, but contains the most dramatic increases in the old-age dependency ratios.

fertility rate now below the replacement rate, as in all EU countries, the Portuguese population is projected to peak at slightly above 10.9 million in 2040, thereafter declining to 10.8 million in 2050.

C. Pension Expenditure Projections

71. Pension expenditures in Portugal were equivalent to 9.8 percent of GDP in 2000, somewhat below the EU average (Table 3). The authorities project that pension expenditures will steadily increase, peaking at 12.8 percent of GDP in 2035, before declining to 12.1 percent in 2050, with one-third of the increase accounted for by much smaller CGA pension system.[35] The projected increase is also somewhat below the EU average. Nevertheless, this, along with projected aging-related increases in healthcare expenditures, would without offsetting actions result in a clearly unsustainable fiscal outlook (Figure 2).[36]

72. The pension projections are sensitive to demographic and macroeconomic assumptions. Notably, the Portuguese authorities' projections assume a relatively rapid convergence in real living standards, such that per capita incomes would reach 90 percent of the EU average level by 2040 (versus 71 percent on a purchasing power parity standard in 2003), with complete convergence by 2050.[37] Given the demographic and labor market assumptions, this has implications for the growth in average labor productivity (see text table).[38] Clearly, the implicit increases in labor productivity are quite ambitious, especially

Portugal: Authorities' Official Pension Scenario
(Annual Average Growth)

	Actual 1998-2003	2005-2010	2010-2020	2020-2030	2030-2040	2040-2050
GDP	1.6	2.4	2.6	2.7	2.8	2.8
employment	0.8	0.5	0.1	0.0	-0.3	-0.4
productivity	0.8	1.9	2.5	2.7	3.1	3.2

Source: Portuguese authorities.

[35] These projections are contained in the most recent Stability Program (Government of Portugal, 2003), and are discussed more fully in Rodrigues (2002), incorporating the CGA projections in Gouveia and Sarmento (2002). These projections were made using PROST (Pension Reform Option Simulation Toolkit), a brief description of which is contained in World Bank (2000).

[36] These fiscal projections are based on pension expenditure and economic growth projections contained in the Stability Program, and Rodrigues (2002), and healthcare expenditure projections in Caldas and Rodrigues (2003). The general government nonaging related primary structural (i.e., cyclically-adjusted) balance is assumed to remain at its 2003 level, and the real interest rate is set at 3 percent.

[37] PPP adjusted per capita data are from Eurostat (2004).

[38] These data are consistent with Rodrigues (2002). The macroeconomic assumptions for the CGA system projections differ slightly but are broadly comparable.

when compared with developments in Portugal and the EU on average in the last decade (Table 4). And pension projections are sensitive to this assumption. As an illustration, Figure 3 compares the authorities' baseline projections with one in which average labor productivity were to grow by ½ percentage point less annually (averaging 2.1 percent compared to 2.6 percent in the SS system projection), with pension expenditures increasing by an additional 2 percentage points of GDP. Thus, the health of the pension system is likely to be sensitive to the economy's performance, with a possibility that the baseline projection may be too optimistic.

73. Additionally, the authorities' baseline projection assumes that female labor participation rates will increase significantly by 2010, converging to male participation rates (Table 5). Portuguese labor force participation rates, male, female and overall, are already above the EU average rates. In particular, female participation rates for those aged 25–54, and aged 55–64 are already more than 4 and 10 percentage points above their EU average counterparts, respectively (Figure 4). The projected increase would still leave the 25–54 cohort participation rate below those presently in Sweden, Finland, and Denmark, while the increase for the 55–64 cohort would leave it trailing only Sweden. Alternatively, were the increased female participation rates to be only one-half as large, projected pension expenditures would increase only marginally (at most by ¼ percentage point of GDP). Combining both the lower projected increase in female labor force participation rates and lower productivity growth would increase projected pension expenditures by 2 percentage points.

74. There are a number of additional aspects that suggest that the authorities' baseline projections may be quite optimistic. First, because indexation of CGA pensions to civil servants' wage increases is ad hoc, rather than a legal entitlement, the baseline CGA projection assumes annual updates in line with inflation. If full wage growth indexation were assumed, however, CGA pension expenditures would be about 2½ percentage points of GDP higher in 2040, and some 1¾ percentage points of GDP higher in 2050. A second reason why the baseline projections may be too optimistic is because they do not include the implications of the CGA system's recent incorporation of the postal system's pension scheme, although estimates of this transaction are not presently available.[39] The effects of the optimistic bias of the official figures for the civil servants pension system are partially offset by the recent changes in the rules followed by the calculation of initial pensions, which are not included in the projections (see paragraph 66 above). Finally, for the private sector pension system, the baseline projections do not model the impact of raising contributory minimum pensions to align them with targeted fractions of the minimum wage (net of pension contributions). While

[39] The postal pension system was partially funded and its assets were also transferred to the CGA along with its future expenditure obligations. While this will worsen the general government's position, it will not affect the net worth of the broader public sector (including government owned entities).

it is difficult to estimate precisely this effect, the fact that more than one half of all SS pensioners effectively received minimum pensions, and that minimum pensions are only about 50 percent of the minimum wage, it could be sizable, at least initially until contributors establish on average longer contributory histories, and the share of those receiving minimum pensions declines.

75. The increase in the authorities' baseline pension expenditure projections are somewhat below that in the EU on average. While projections over such a long time period are subject to considerable uncertainty, there appear to be a number of considerations, reflecting macroeconomic and demographic aspects, suggesting that the baseline projections may be somewhat optimistic. Thus, the need for expenditure reforms may be even greater than suggested by the official projections.

D. Policy Reform Possibilities

76. It is clear from the discussion above that Portugal will face significant aging-related pension expenditure pressures, and possibly to a greater degree than suggested by the authorities' projections. This section examines changes in various parameters, and in combinations of parameters, affecting pension benefits in order to gauge the magnitudes of the improvements that would result. [40] Clearly, other comprehensive reforms could also be considered, including shifting to a defined contribution (or notional defined contribution) pillar, but are not examined here.

77. One possible reform to be considered is a phased increase in the retirement age. Figure 5 displays the revised pension expenditure path that would result from a steady increase in the retirement age to 69 years by 2040.[41] This is broadly equal to the projected 5½ year increase in life expectancies over this period. It would reduce projected pension expenditures by almost 1 percentage point of GDP by 2050 under the authorities' baseline macroeconomic scenario, and by similar amount under the low-growth macroeconomic scenario (with both lower productivity growth and lower increases in female participation, as shown in the bottom panel of Figure 5). Thus, it would appear that this reform alone would not be sufficient to make the system fundamentally sustainable.

78. A second possible reform is a reduction in the annual accrual rate. As an example, Figure 5 shows the effects of reducing the rate to 1.85 percent for both the SS and CGA systems beginning in 2010. This would also reduce the increase in the combined projected

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[40] We thank the Portuguese authorities for providing the data necessary to run the various reform scenarios.

[41] The retirement age was increased linearly to 66 in 2010, to 67 in 2020, 68 in 2030, and to 69 years in 2040.

pension expenditure by roughly 1 percentage point of GDP under both sets of macroeconomic/demographic assumptions by 2050.

79. A third option is to reduce the rate of indexation. As noted, the CGA projections already assume that indexation covers only inflation, while the SS pensions increase each year by about 1 percent in real terms. Reducing the latter to cover only inflation beginning in 2005 (except for minimum pensions, which continue to get a 1 percentage point real increase per year) would also reduce expenditures by about 1 percentage point of GDP under the baseline macro/demographic assumptions, as well as under the less optimistic case by 2050 (Figure 5).

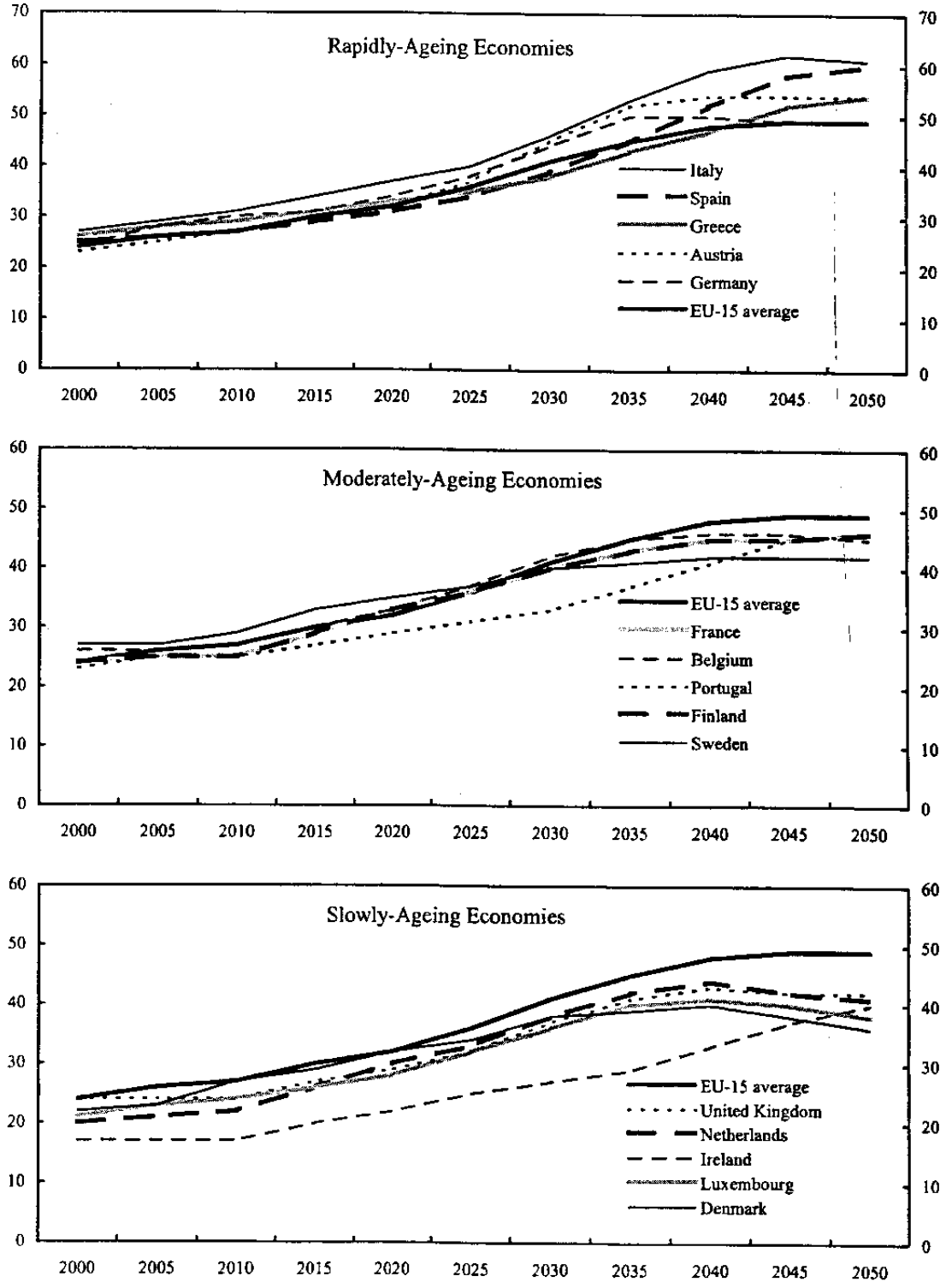
80. A fourth option considered is to increase the effective rate of taxation of pension incomes. For illustrative purposes, Figure 5 includes the case where standard (i.e., nonminimum) SS pensions and CGA pensions are subject to a flat 10 percent income tax rate. This increase is quite sizable, and, of all of the options considered has the largest impact, reducing net pension expenditures by 1½ percentage points of GDP under both macroeconomic scenarios, which offsets more than half of the increase under the baseline macro/demographic scenario. Given the high share of minimum pensions in the present system, introducing a more complex taxation scheme (e.g., subjecting pensions to progressive taxation) may yield different, possibly smaller, net improvements to the system.

81. A fifth possibility considered here is to combine a number of these reform options. Introducing both a higher retirement age and lower indexation would reduce the projected increase in pension expenditures by about 1¾ percentage points of GDP under the baseline scenario, and by 1½ percentage points of GDP under the more pessimistic case in 2050. Combining these two reforms with a 10 percent income tax would reduce net expenditures by 2¾ percentage points under the baseline scenario, and by 2½ percentage points under the other case. This final combination would be sufficient to contain net expenditures at its current level under the authorities' baseline scenario, while it would offset almost 60 percent of the increase in the more pessimistic scenario.

E. Conclusions

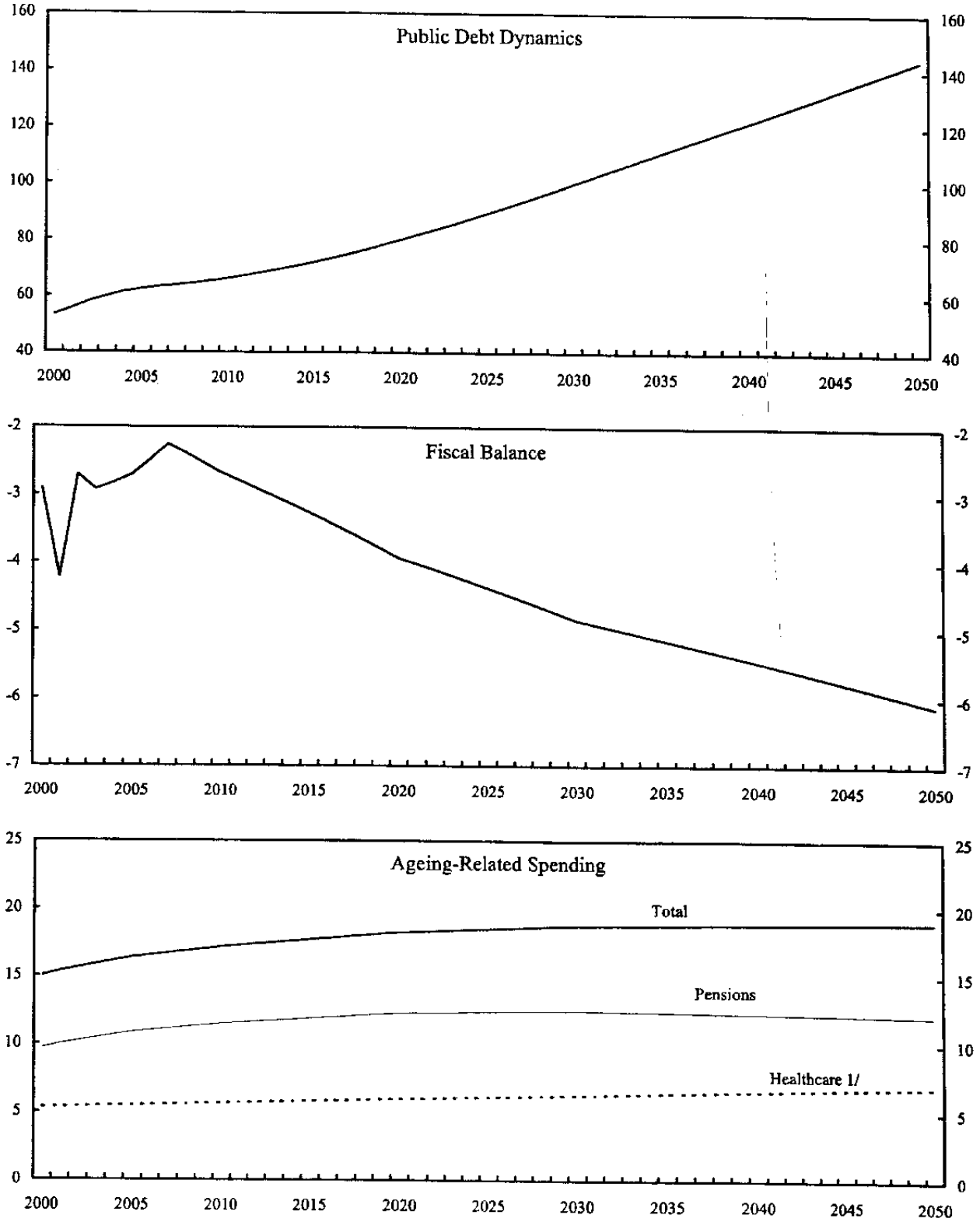
82. Despite earlier reforms, the Portuguese pension system remains fundamentally financially unsustainable. The increase in the authorities' projected pension expenditures are broadly in line with those in other EU countries, but may, for macroeconomic and demographic reasons, be somewhat understated. Given already high employee and employer contribution rates and a sizable public debt, pension benefits themselves would most likely need to be reduced (in relation to GDP) to stabilize the system. A number of parametric reforms were considered in this chapter. However, each alone would most likely not be sufficient to address fully the anticipated spending pressures. This suggests that consideration be given to combine a number of different reform options.

Figure 1. Portugal: Trends in Old-Age Dependency Ratios, 2000-50



Sources: Eurostat, as cited in Economic Policy Committee, European Commission (2001).

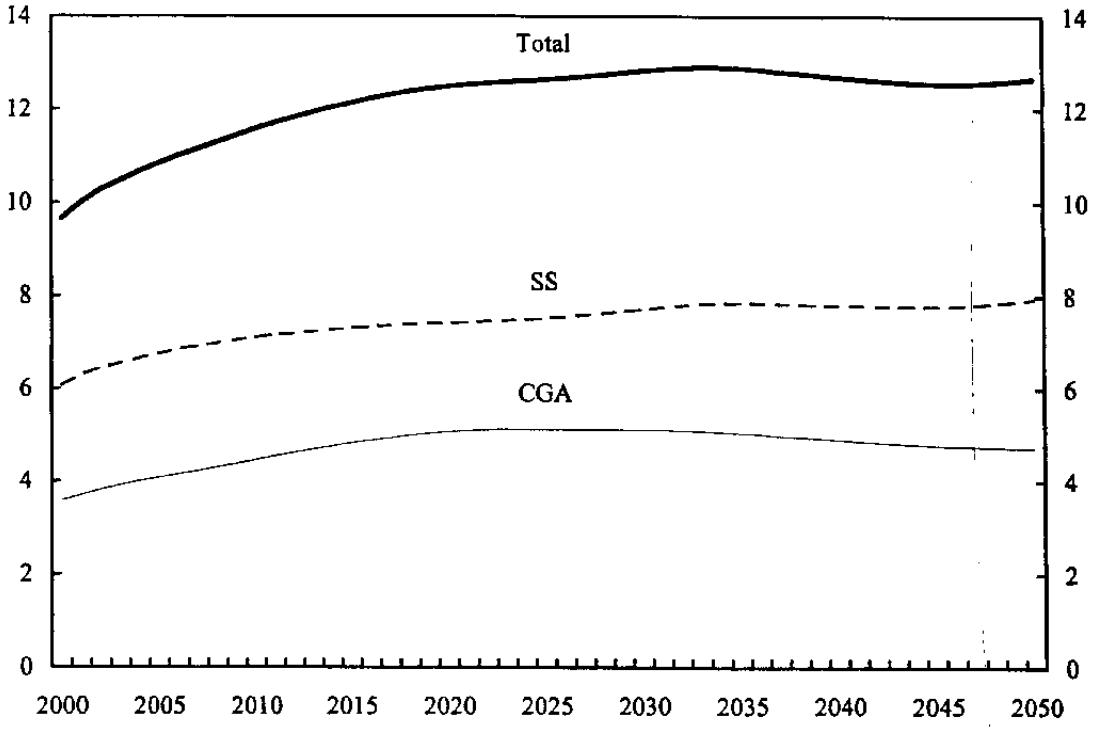
Figure 2. Portugal: Long-Term Aging-Related Fiscal Projections, 2000-50
(In percent of GDP)

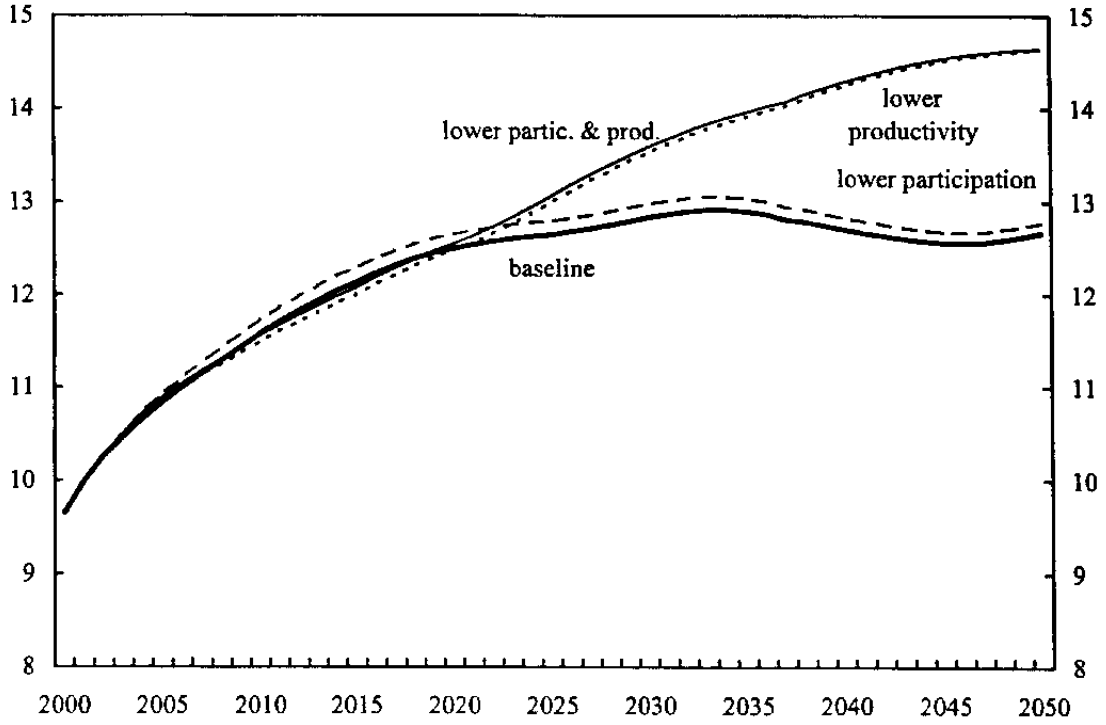


Sources: Portuguese authorities; and Fund staff calculations.

1/ Excludes long-term care.

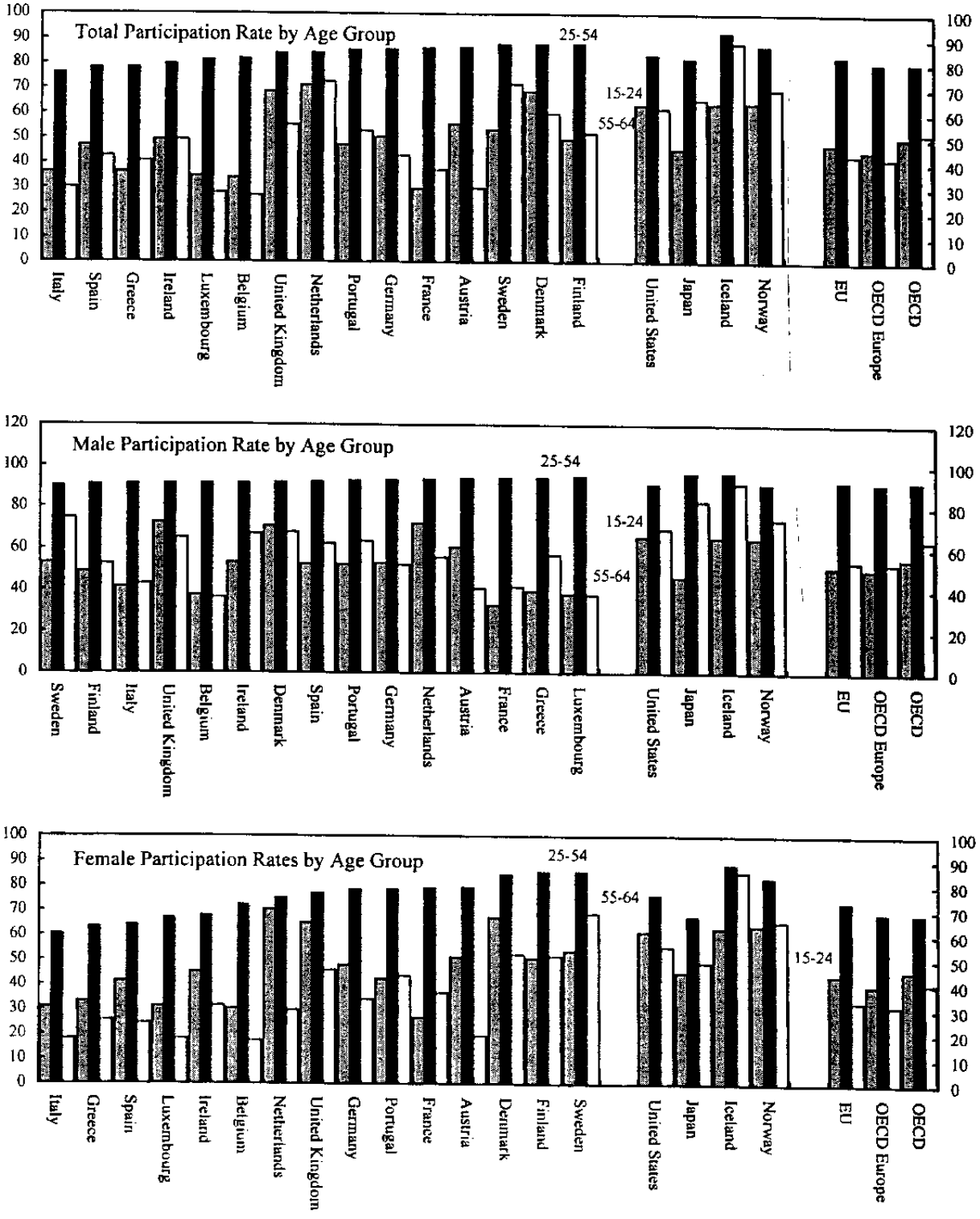
Figure 3. Portugal: Public Pension Expenditures, 2000-50
(In percent of GDP)





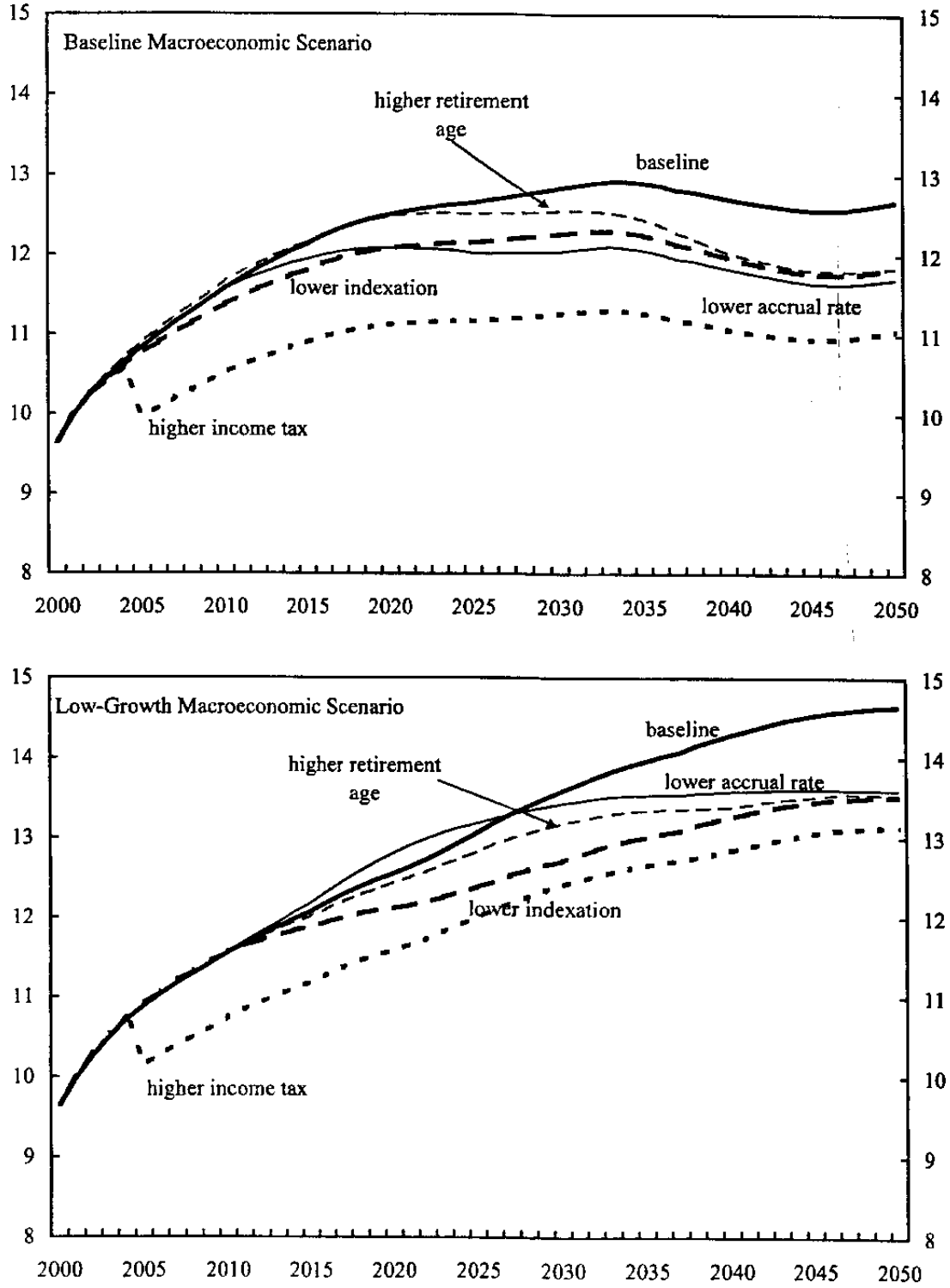
Sources: Fund staff simulations.

Figure 4. Portugal: Labor Force Participation Rates in Selected OECD Countries, 2002



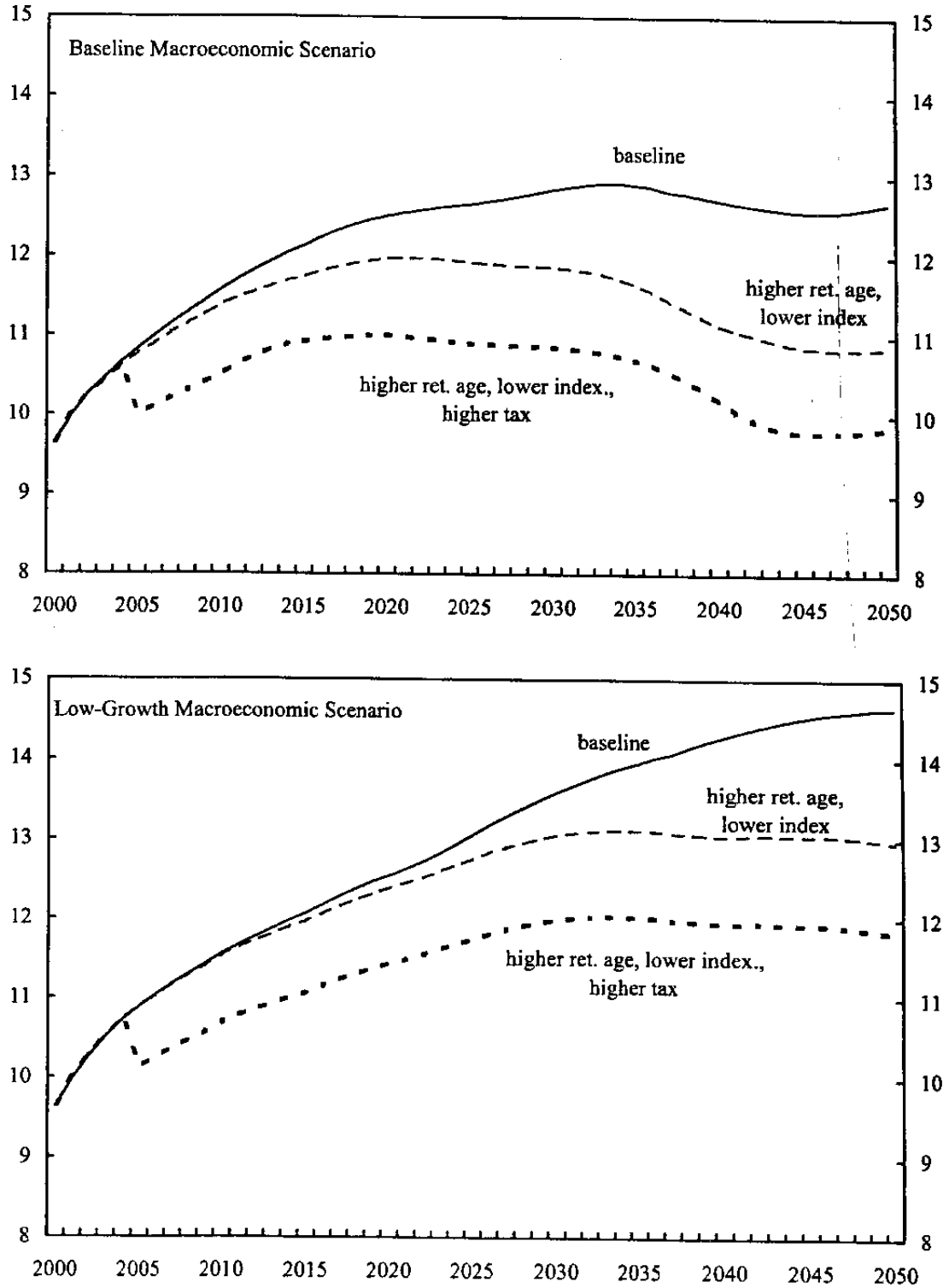
Source: OECD, *Employment Outlook*, 2003.

Figure 5. Portugal: Single Parametric Reform Scenarios, 2000-50
(In percent of GDP)



Source: Fund staff estimates.

Figure 6. Portugal: Combined Parametric Reforms Scenarios, 2000-50
(In percent of GDP)



Source: Fund staff estimates.

Table 1. Portugal: Summary of Public Pension System Parameters

	Life Expectancy 1/			Standard	Early	Average Retirement Age 1/ 2/			Statutory	Statutory	Average	Indexation 5/		
	2000	2050	Change	Pension Age 1/	Pension Age 1/	Old Age	Early Retirement	Disability	Replacement Ratio	Accrual Rate	Replacement Ratio 3/ 4/	Private Sector	Civil Servants	Taxation 6/
Belgium	75.3/81.4	80.5/85.5	5.2/4.0	65	60	62.6	55	...	60.0	1.50	40.7	P	W	F
Denmark	75.2/79.6	79.4/83.1	4.2/3.5	67	...	67	61	49	flat rate	...	32.0	W	W	F
Germany	74.7/80.8	80.0/85.0	5.3/4.2	65	63	62.2/62.3	...	52.2/50.3	48.9	1.08	48.9	W	W	P
Greece	75.9/81.0	81.0/85.0	5.1/4.0	65	57	60.5	...	50.4	80 (60)	...	71.2/53.4	A	W	F
Spain	74.9/82.1	79.0/85.0	4.1/2.9	65	60	65.3	61	49.6	95.0	2.50	76.3	P	P	F
France	74.8/82.8	80.0/87.0	5.2/4.2	60	56	61.8	...	...	50.0	1.78	58.0	P	W	F
Ireland	74.0/79.4	79.0/84.0	5.0/4.6	66	65	62	...	...	flat rate	...	28.0	A	A	F
Italy	75.5/82.0	81.0/86.0	5.5/4.1	65	57	61.6	56.3	50.5	80.0	1.88	69.1	P	P	P
Luxembourg	74.4/80.8	80.0/85.0	5.6/4.2	65	...	65	59.5	50.6	n.a.	1.78	56.0	P	P	F
Netherlands	75.5/80.9	80.0/85.0	4.5/4.1	65	60	65	60	...	flat rate	1.75	31.0	M	M	F
Austria	75.0/81.2	81.0/86.0	6.0/4.8	65/60	61.5/56.5	62.6	57.9	49.6	80.0	1.78	66.8	A	A	F
Portugal	72.0/79.2	78.0/84.0	6.0/4.8	65	55	65.7	61.9	56.4	80.0	2+	69.3/56.2	A	A	P
Finland	73.9/81.1	80.0/85.0	6.1/3.9	65	60	63.6	60.5	50.7	60.0	1.55	50.0	M	M	F
Sweden	77.3/82.0	82.0/86.0	4.7/4.0	65	61	64.5	62	50	60.0	1.41	48.2	W	W	F
United Kingdom	75.2/81.3	80.0/85.0	4.8/5.0	65	...	62.6/60.4	...	...	flat rate	0.51	20.5	P	P	P

Sources: OECD (2003); European Commission (2000, 2001, 2002).

1/ The first figures before the slash is for males, the second is for females.
2/ Data for Denmark, Germany, Spain, Greece, Austria, Netherlands, Portugal, Finland, and Sweden is for 2000; for Italy, Luxembourg, and the United Kingdom from 1999; for Belgium, France, and Ireland is from 1998.
3/ For the first pillar system, before tax, in percent of average wage.
4/ Figures after the slash indicate the outcome at the end of the transitional period.
5/ W: indexed to wages; P: indexed to prices; M: mixed wages and prices; A: indexation is ad hoc.
6/ F: fully taxed; P:preferentially taxed.

Table 2. Portugal: Total Social Security Contribution Rates, 2002

	All Social Security Programs 1/		
	Insured Person	Employer	Total
Belgium	13.07	24.87	37.94
Denmark 2/	3/	3/	3/ 4/
Germany 2/	19.80	21.11	40.91
Greece 2/	11.95	23.90	35.85
Spain 2/	6.25	31.58	37.83
France 2/	15.45	33.86	49.31
Ireland	6.00 5/	11.00 5/	17.00 4/ 5/
Italy 2/	8.89	32.22	41.11
Luxembourg 2/	15.40	13.57	28.97 4/
Netherlands 2/	36.05	18.75	54.80 4/
Austria 2/	17.20	25.10	42.30
Portugal	11.00	26.75	37.75
Finland 2/	6.30	20.40	26.70 4/ 6/
Sweden 2/	7.00	19.09	26.09 4/
United Kingdom 2/	10.00	11.90	21.90 4/

Source: U.S. Government "Social Security Programs Throughout the World: Europe" (2002).

1/ Includes old age, disability, and survivors; sickness and maternity; work injury; unemployment; and family allowances. In some countries, the rate may not cover all of these programs. In some cases, only certain groups, such as wage earners, are represented. When contribution rates vary, either the average of the lowest rate in the range is used.
2/ Contributions are subject to a ceiling for some benefits.
3/ Portion of set amount for old age, disability, and survivors. Central and local
4/ The government pays the total cost of family allowances.
5/ Range according to earnings bracket. Higher rate is shown, which applies to highest earnings class.
6/ Government pays the total cost of basic unemployment benefits.

Table 3. Portugal: Pension Expenditure Projections, 2000-2050
(In percent of GDP)

	2000	2010	2020	2030	2040	2050	Change 2000-50
Belgium	10.0	9.9	11.4	13.3	13.7	13.3	3.3
Denmark 1/	10.8	11.1	12.1	13.8	n.a.	14.9	4.1
Germany	11.8	11.2	12.6	15.5	16.6	16.9	5.0
Greece	12.6	12.6	15.4	19.6	23.8	24.8	12.2
Spain 1/	8.4	8.0	8.5	9.9	n.a.	13.0	4.6
France 1/ 2/	12.3	13.1	14.3	15.0	n.a.	n.a.	2.4
Ireland 3/	4.6	5.0	6.7	7.6	8.3	9.0	4.4
Itlay	13.8	13.9	14.8	15.7	15.7	14.1	0.3
Luxembourg	7.4	7.5	8.2	9.2	9.5	9.3	1.9
Netherlands	7.9	9.1	11.1	13.1	14.1	13.6	5.7
Austria 1/ 2/	14.7	14.9	15.8	17.2	n.a.	16.5	1.8
Portugal 4/	9.8	11.5	12.3	12.5	12.3	12.1	2.3
Finland	11.3	11.6	12.9	14.9	16.0	15.9	4.7
Sweden	9.0	9.6	10.7	11.4	11.4	10.7	1.7
United Kingdom	5.5	5.1	4.9	5.2	5.0	4.4	-1.1
EU 5/	10.4	10.4	11.5	13.0	13.6	13.3	3.2

Sources: European Commission, Economic Policy Committee (2001, 2003); and Portuguese authorities.

1/ Updated projection included in European Commission (2003).
2/ Data in 2000 column refer to 2005.
3/ Expressed as a share of GNP.
4/ As shown in the latest Portuguese Stability Program.
5/ Based on projections contained in European Commission (2001).

Table 4. Portugal: Average Labor Productivity Growth

	1960-65	1966-70	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2001
Austria	...	5.9	3.1	2.8	2.0	2.4	1.9	2.1
Belgium	4.0	4.4	3.3	3.1	1.8	2.1	1.8	1.4
Denmark	3.6	3.2	2.0	1.6	1.6	0.5	2.4	2.0
Euro Area	...	...	2.8	2.7	1.6	1.9	1.1	1.1
Finland	4.3	5.0	3.2	1.9	2.0	2.8	2.9	2.4
France	...	4.6	2.9	2.5	1.8	2.3	1.1	1.4
Germany	4.3	4.3	2.6	2.4	1.1	1.5	-0.3	1.1
Greece	8.8	8.8	4.7	3.3	-1.2	0.5	0.7	3.7
Ireland	3.5	5.0	4.5	3.0	3.4	3.8	2.6	4.4
Italy	6.1	6.4	2.5	3.3	1.8	2.5	2.4	0.9
Japan	7.8	9.5	4.0	3.2	2.4	3.3	0.8	1.6
Luxembourg	...	...	0.9	2.1	2.4	6.1	3.3	4.4
Netherlands	...	...	3.4	1.8	1.8	1.0	0.7	0.8
Portugal	6.6	6.1	1.9	4.0	0.0	3.6	1.5	2.2
Spain	7.0	5.3	4.7	3.2	3.0	1.1	2.2	-0.6
Sweden	4.6	3.3	1.6	0.4	1.8	1.4	3.1	2.2
United Kingdom	2.9	2.9	1.8	1.7	2.6	1.3	2.6	2.0
United States	3.4	1.3	0.9	0.7	1.6	1.1	1.4	2.2
Memorandum items:								
EU12 1/	5.3	5.3	3.0	2.7	1.7	2.2	2.0	2.1
EU15 1/	5.1	5.0	2.9	2.5	1.7	2.2	1.9	2.0
Portugal/Spain/Greece 1/	7.5	6.8	3.8	3.5	0.6	1.8	1.5	1.8

Sources: OECD, *Economic Outlook* database (No. 73 - June 2003); and Fund staff calculations.

1/ Unweighted average.

Table 5. Portugal: Labor Force Participation Rates
(Percent of Population)

	2000	2010	2020	2030	2040	2050
Baseline						
Total	67.1	70.9	70.3	69.9	69.9	70.2
15-24	42.5	41.3	40.9	42.9	42.4	41.7
25-54	79.3	82.0	81.9	81.8	82.2	82.0
55-64	52.5	57.8	59.7	59.9	58.7	59.5
Male	69.4	70.7	69.7	69.3	69.3	69.6
15-24	43.4	41.2	40.4	42.2	41.7	41.1
25-54	81.0	81.1	80.9	80.7	81.0	80.9
55-64	59.9	60.2	60.2	60.4	59.2	60.0
Female	64.8	71.1	70.9	70.4	70.5	70.9
15-24	41.6	41.5	41.3	43.5	43.0	42.4
25-54	77.6	82.8	83.0	83.0	83.3	83.2
55-64	46.0	55.7	59.2	59.4	58.2	59.0
Lower increase in female participation						
Total	67.1	69.5	68.9	68.5	68.5	68.9
15-24	42.5	40.8	40.0	42.1	41.6	41.0
25-54	79.3	80.7	80.5	80.4	80.9	80.8
55-64	52.5	55.4	57.5	58.0	56.6	57.5
Male	69.4	70.7	69.7	69.3	69.3	69.6
15-24	43.4	41.2	40.4	42.2	41.7	41.1
25-54	81.0	81.1	80.9	80.7	81.0	80.9
55-64	59.9	60.2	60.2	60.4	59.2	60.0
Female	64.8	68.3	68.0	67.6	67.8	68.2
15-24	41.6	40.3	39.6	42.0	41.5	40.9
25-54	77.6	80.2	80.2	80.1	80.8	80.6
55-64	46.0	51.1	55.1	55.7	54.0	55.1

Sources: Portuguese authorities; and Fund staff estimates.

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