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SPAIN

Selected Issues

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Approved by the European Department

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- The first essay analyzes the effectiveness of fiscal policy in containing demand and the current account deficit. Using a structural vector autoregression analysis, the study finds that reductions in government spending are effective in containing demand, moderating cost differentials with trade partners, and improving the current account balance. The effect of tax changes, however, appears statistically less significant in affecting activity, the real exchange rate, and the external balance. The statistically modest tax multipliers appear to be caused by offsetting spending moves, which over the sample period have tended to follow tax changes. The study also finds that current account spillover effects of fiscal policy increased after EU membership, possibly as a result of a more open economic environment; accordingly the fiscal policy impact on activity declined.

- The second essay analyzes Spain's long-term growth and productivity performance compared to a sample of 23 industrialized economies. The accounting of growth sources points to the central role that increased labor utilization has played in Spain's per capita GDP catch-up. It also confirms a pronounced productivity slowdown in Spain since the 1990s, relative to both past performance and peer groups of economies. This is due to an exceptionally low growth in total factor productivity, rather than to a paucity of aggregate capital stock. This underscores the importance of productivity-enhancing reforms that foster human capital, entrepreneurship, competition, and market flexibility.

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I. Fiscal Policy and the External Balance in Spain[1]

A. Introduction

1. In recent years, the Spanish economy has experienced a widening current account deficit and an appreciation of the real effective exchange rate. The Spanish authorities have launched a broad reform agenda to improve competitiveness and productivity through the National Reform Program under the Lisbon Agenda (October 2005). However, it may take time for these structural changes to bear fruit. The question that we address in this paper is whether fiscal policies could help to contain the deterioration of Spain's current account and reduce the cost differential with trade partners in the short run, as reforms take hold.

2. We use econometric techniques—a structural vector autoregression (SVAR) approach—to disentangle the partial effects of exogenous fiscal policy shocks from those of other shocks that typically affect an economy's current account and real exchange rate—including shocks to productivity, output, the international interest rate, and the terms of trade.

3. On the basis of our quantitative analysis, we reach the following conclusions regarding the effectiveness of fiscal policies.

- **Reductions in government spending are effective in moderating demand pressures and containing the current account deterioration**. In particular, a negative *government spending shock* has a positive effect on the current account balance, causes a depreciation of the real exchange rate (through its effects on the inflation differential), and affects output negatively. These effects are appreciable, though admittedly not in relation to the present size of the current account deficit.

  Specifically, a 1 percent exogenous fall in real government spending in one-quarter—which exhibits significant endogenous persistence, declining to about 0.6 and 0.3 percent, respectively, after one and two years—improves the current account balance by about 0.16 percentage points of GDP over the first year, and the effect declines thereafter to vanish completely after two years. Thus, a reduction in real government spending of about 6.2 percent (1½ percentage points of GDP) would improve the current account balance by 1 percent of GDP.[2]
  Also, a 1 percent exogenous fall in real government spending in one-quarter prompts a 0.4 percent depreciation in the real exchange—presumably through its effect on

[1] Prepared by Mario Catalán and Ruy Lama.

[2] Government expenditure considered in this analysis includes consumption and investment and excludes transfers. Thus measured, government spending was 23 percent of GDP in 1994–2004.

Spain's unit labor costs and inflation differential with trade partners.[3] Thus, a reduction in real government spending of about 2.4 percent (0.6 percentage points of GDP) would narrow the relative price differential measured by the real effective exchange rate by 1 percentage point.

A 1 percent exogenous fall in real government spending in one-quarter lowers output by 0.32 percent over the first year. Thus, a reduction in real government spending of about 3 percent (¾ percentage points of GDP) would lower annual output growth by 1 percentage point.

- **Increases in tax revenue are typically followed by increased spending, and, for this reason, they do not appear to be effective in containing demand and affecting the current account.** We find that positive *tax revenue shocks* led to increases in government spending in the period 1986–2004. Through this channel, the tax shocks had only very modest effects on output, the current account, and had no significant effects on the real exchange rate. To some extent, these results could also reflect Ricardian equivalence effects, by which private agents offset tax changes by symmetric changes in their savings. Some evidence of the existence of these effects might be provided by the absence of twin external and fiscal deficits.

Regarding other shocks, our findings are the following:

- **Positive and temporary output shocks erode Spain's competitiveness**. A positive *output shock* causes an appreciation of the real exchange rate and a deterioration of the current account balance. Specifically, a one percent exogenous increase in real GDP—which exhibits significant persistence, declining to about 0.7, 0.5, and 0.4 percent, respectively, after 4, 8, and 12 quarters—worsens the current account balance by about 0.25–0.30 percentage points of GDP for over three years. This result provides some support to the view that the cyclical component of growth has partially accounted for the inflation differential and the current account deterioration observed in recent years.

- **Exogenous and positive shocks to the real interest rate improve the current account but have a negative effect on output**. Contrary to our prior expectations, however, these shocks are not followed by real exchange rate depreciations.

- **Our econometric results indicate that terms of trade shocks have no statistically significant effects on output, the real exchange rate or the current account in the sub-period 1986–2004**. These might be due to the small volatility of terms of trade,

[3] To be precise, the real exchange rate that we use in our econometric analysis (Section C) is based on unit labor costs.

which were remarkably stable during this period. In the period 1975–85, however, positive terms of trade shocks caused expansions in output, appreciations of the real exchange rate, and deteriorations in the current account, as expected a priori.

4. Structural vector autoregression (SVAR) analysis has been applied to study the role of fiscal policies in a number of countries. In the case of Spain, some studies evaluate the effects of fiscal policy shocks on domestic variables but do not account for their effects on the real exchange rate and the current account, which is the main purpose of this paper.[4] De Castro (2003), De Castro (2005), and De Castro and Hernandez de Cos (2006) study the effects of fiscal policy in Spain using structural VAR models. Their findings are broadly consistent with results for other countries. They find small government expenditure multipliers—the effect on output caused by a unit increase in nominal spending—that are close to one in the short run and negative in the medium term, and that the real interest rate increases in response to government spending and tax shocks. They also find that the price level responds positively to government spending shocks and negatively to tax shocks. One important finding in these papers is the existence of a strong correlation between fiscal revenue and expenditure: increases in fiscal revenues tend to be followed by higher government spending, and vice versa.

5. An issue that remains to be explored in the case of Spain is the effect of fiscal policy on the external sector. This topic has become more relevant in recent years due to the continuous loss of competitiveness—real exchange rate appreciation and deterioration of the current account balance. In the rest of this paper, we evaluate the effects of fiscal policies on the current account, the real exchange rate, and output, using a structural VAR approach.

6. In Section B, we describe the stylized facts of the Spanish economy, documenting the co-movements of relevant variables during the period 1975–2004. In Section C, we conduct the econometric analysis. Using quarterly data, we estimate structural vector autoregressions (SVAR) for the period 1975–2004. Considering the structural changes that occurred in the Spanish economy over the last three decades, we split the sample period in two sub-periods 1975–85 and 1986–2004. In the first sub-period (1975–85), the economy was more closed to international trade and capital flows than in the second one (1986–2004).[5] Spain's entry into the European Union in 1986 marks the beginning of a period characterized by increasing openness to international trade and capital flows. Regarding macroeconomic stability, the second period is also more stable, particularly the last decade—since the adoption of the

[4] The Bank of Spain has recently studied the effects of fiscal policies in Spain. See De Castro (2003), De Castro (2005), De Castro and Hernandez de Cos (2006), and *Boletín Económico* (March 2006).

[5] Notice that another structural break may have occurred when Spain adopted the euro in 1999. However, a lack of a sufficiently long data span prevents, so far, a reliable separation of this period.

euro. By splitting the sample period in this way, we explore whether the effects of fiscal policy have changed over time. In Section D we conclude.

B. Stylized Facts

7. Figures 1 shows the co-evolution, over the last three decades, of the cyclical components (deviations from trend) of the macroeconomic variables that we use in our econometric study (Section C below). In the last three decades, the economy went through significant structural and institutional changes. Specifically, the Spanish economy was less open—both its trade and capital accounts—and more volatile and unstable, particularly because of monetary instability, before joining the European Union in 1986.[6] Since then, barriers to trade and capital movements were gradually lifted, and after the recession of the mid-1990s, structural reforms and accession to the euro area reduced Spain's macroeconomic volatility. For these reasons, our descriptive and econometric analysis separates the periods 1975–85 and 1986–2004.

8. Figure 1-A shows that both measures of Spain's competitiveness—the current account and the real effective exchange rate—exhibit considerable fluctuations over the whole period, and that real exchange rate appreciations (depreciations) are typically associated with reductions (improvements) in the current account balance, particularly since 1983. Since then, sub-periods of real exchange rate depreciation and current account improvements—lasting three–four years—are typically shorter than the periods characterized by real exchange rate appreciation and current account deterioration—which last at least seven years.

9. Second, the co-evolution of the current account and the gross domestic product (Figure 1-B) reveals that cyclical output expansions (contractions) are typically associated with reductions (improvements) in the current account balances. Once again, this association is tighter since 1983, with the period 1979–83 being exceptional in that both the current account and detrended output declined. As tax revenues are tightly linked to output, increases in tax revenues are also associated with current account deterioration (Figure 1-E).

10. Over the whole period, there is a weak association between the real interest rate and the current account balance (Figure 1-C). However, in the period 1997–2005, persistent downward movements in the real interest rate—triggered by euro accession in 1997—coincide with a sharp deterioration in the current account balance.

11. Government expenditure is negatively associated with current account balances (Figure 1-D), but such correlation is weaker after 1997—government expenditure (log deviations from trend) remains fairly constant, whereas the current account balance declines

[6] See Fernandez de Cordoba and Kehoe (2000) for an analysis of the macroeconomic effects of Spain's capital account liberalization following accession to the European Union in 1986.

significantly. Finally, fluctuations in terms of trade are poorly correlated with changes in the current account (Figure 1-F).

12. Figure 2 shows the association between Spain's primary fiscal and current account balances. There is no evidence of a "twin" deficits phenomenon. This is particularly obvious in the last decade, when significant fiscal improvements were correlated with a significant deterioration of the current account—twin divergence.[7]

C. Econometric Analysis

13. The structural model considered in the analysis is the following:

$$Bx_t = \Gamma_0 + \Gamma_1 x_{t-1} + \varepsilon_t \quad (1)$$

B , Γ_0 , and Γ_1 are 6×6 coefficient matrices, and ε_t is a column vector of structural error terms. The structural vector autoregression model (SVAR) contains the vector of variables $x_t^{'} = (TOT_t, G_t, T_t, R_t, Y_t, CA_t, RER_t)$, where TOT is the terms of trade, G is government expenditure, T is net taxes, R is the real interest rate, CA is the current account balance, and RER is the real effective exchange rate. The real interest rate is expressed as an annual percentage rate, and the current account as percentage of GDP. The other variables are expressed in log-deviations from a linear trend. Thus, the impulse response functions of these variables can be interpreted as approximations to their percentage deviations from the trend. The data is expressed in quarterly frequency and details about the construction of the series can be found in appendix I[8].

14. The reduced form of the model to be estimated can be expressed as follows:

$$x_t = A_0 + A_1 x_{t-1} + e_t \quad (2)$$

[7] For more details on the relation between fiscal and current account balances, see paragraph 33.

[8] The data on net taxes (T) and government expenditure (G) is available at an annual frequency. Hence, we transformed it to a quarterly frequency using the proportional *Denton* technique. Reference to this procedure can be found in Appendix I.

where $A_0 = B^{-1}\Gamma_0$, $A_1 = B^{-1}\Gamma_1$, and $e_t = B^{-1}\varepsilon_t$. In order to identify the structural shocks of the model, we need to impose some restrictions in the matrix B. We adopt the following two identification strategies:

	Identification I							*Identification II*						
	TOT	**G**	**T**	**R**	**Y**	**CA**	**RER**	**TOT**	**G**	**T**	**R**	**Y**	**CA**	**RER**
Terms of Trade (TOT)	1	0	0	0	0	0	0	1	0	0	0	0	0	0
Government Expenditure (G)	0	1	0	0	0	0	0	0	1	0	0	0	0	0
Tax Revenue (T)	0	0	1	0	x	0	0	0	0	1	0	x	0	0
Real Interest Rate (R)	0	0	0	1	x	0	0	0	0	0	1	x	0	0
Gross Domestic Product (Y)	x	x	0	0	1	0	0	x	x	x	x	1	0	0
Current Account (CA)	x	x	x	x	x	1	0	x	x	x	x	x	1	0
Real Exchange Rate (RER)	x	x	x	x	x	x	1	x	x	x	x	x	x	1

15. These matrices incorporate assumptions that are broadly consistent with those of small open economy models—with two tradable (importable and exportable) and one nontradable sectors—as well as the typical decision lags that characterize fiscal policy. Specifically, the first row assumes that the terms of trade are exogenous from Spain's standpoint.[9] The second row assumes that government spending does not react contemporaneously to structural shocks affecting any of the other variables. This assumption is appropriate since there are lags in the implementation of expenditure policies—expenditure decisions can be changed only after past shocks have been observed—and our analysis is based on quarterly data.[10] The third row assumes that tax revenues respond contemporaneously to structural output shocks. Unlike Blanchard and Perotti (2002), who estimate the output elasticity of tax revenues separately, we estimate it within our VAR model. The fourth row assumes that output innovations affect the real interest rate contemporaneously. The rationale for this assumption is that the real interest rate can be decomposed in two parts: an exogenous international component and a risk premium. To the extent that output innovations are immediately reflected in the country risk premium, the real interest rate will also reflect such premium.[11]

[9] Strictly, it assumes that Spanish households and firms are price-takers in international markets, that is, their actions are unable to affect international import and export prices.

[10] Quarterly data rules out the possibility of a contemporaneous effect of output on government spending; spending decisions take more than one quarter to be implemented.

[11] Consistent with our small open economy assumptions, the international real interest rate is exogenous from the standpoint of Spanish households, firms, and the government. The country risk component, however, is endogenous and determined by output innovations. For a small open economy model where the country risk premium is determined by total factor productivity shocks, see Neumeyer and Perri (2005). In periods when Spain had an independent monetary policy, the short-term real interest rate was also influenced by the policy decisions of the Bank of Spain.

16. The fifth row embeds assumptions regarding the contemporaneous response of output to structural shocks to the other variables. We impose different assumptions in the first and second identification schemes. In the first identification scheme, output responds contemporaneously only to terms of trade and government spending innovations. In the second identification scheme, output also responds on impact to net taxes and real interest rate innovations. The results obtained under both identification schemes are similar. Finally we consider the current account and the real exchange rate the most endogenous variables, with their shocks depending on the innovations of the rest of the variables. The number of lags in the model is set to one according to the Schwarz criterion.

17. Given the structural changes that occurred in the Spanish economy over the last three decades—particularly regarding its macroeconomic stability and its openness to international trade and capital flows—we estimate separate regressions for the two sub-periods 1975–85 and 1986–2004, and compare the results.

Impulse Response Functions

Effects of Government Spending

18. Figure 3 shows the impulse response functions of the VAR to a 1 percent increase in government expenditure. Panel A shows that increase in spending is highly persistent and the standard error bands are above zero in the first quarters. Panel D shows that the VAR is consistent with key predictions of Keynesian models: increases in government spending induce output expansions. On impact, the effect is significant and generates an output expansion of 0.4 percent above the trend. This output expansion, in turn, leads to increases in tax revenues as shown in panel B.

19. The impact of government spending shocks on the real interest rate is not significant. Thus, expansions in government expenditure do not seem to crowd out private investment. Regarding the effects on the external sector, we observe a deterioration of the current account balance of 0.1 percent of GDP on impact, and an appreciation of the real exchange rate that peaks at 0.6 percent on the sixth quarter.

20. To summarize, we do find Keynesian effects on output of fiscal expenditure shocks. Also, government spending restraint is effective to correct external imbalances, and its quantitative effects are significant.

Effects of Net Taxes

21. Figure 4 shows the impulse response functions of the VAR to a 1 percent increase in net taxes. The increase in taxes leads to an increase in government expenditure. This behavior appears consistent with the notion that fiscal policy has resulted, at least ex post facto, in a "constant budget balance" rule, whereby variations in revenues are followed by variations in the same direction in expenditures. De Castro (2005) finds a similar result and

interprets it as revealing a government bias towards fiscal deficits. It is worth noting that in the VAR, the increases in government expenditure (Panel A) are much more persistent than the increase in taxes (Panel B). Since taxes and spending move together, we observe a limited impact of tax changes on output and the current account, and a delayed appreciation of the real exchange rate. The variation of the interest rate is significant but quantitatively small.

Effects of Output Shocks

22. It is important to notice the response of the external sector variables to output shocks. An increase of 1 percent of GDP above the trend generates a real exchange rate appreciation of 1 percent that peaks in the eighth quarter. The current account balance falls by 0.3 percentage points of GDP around the fourth quarter. These results indicate that the cyclical component of Spain's economic expansion in the last decade accounts, to some extent, for the current account deterioration and the appreciation of the real exchange rate.

Sub-sample Properties

23. Table 1 shows the impulse response function for the two sub-periods: 1975–85 and 1986–2004. The degree of (endogenous) persistence of the fiscal policy shocks are different in the first and second sub-periods: both expenditure and net tax shocks are more persistent after 1986. On the other hand, fiscal policy had a greater impact on the current account and the real exchange rate after 1986, possibly due to the fact that the economy was more open to international trade and capital flows. During the sub-period 1975–85, the economy was subject to restrictions on international transactions, so external sector variables were less sensitive to economic fluctuations.

24. In addition to considering shocks to fiscal policy, we analyzed the economy's response to real interest rate, output, and terms of trade shocks. Impulse response functions to terms of trade and real interest rate shocks show relatively small effects with respect to all the variables in both sub-periods.

Alternative Identifications

25. Table 2 shows the results of the impulse response function under an alternative identification scheme (Identification II). The results are of the same order of magnitude and of the same signs, reflecting the robustness of the result to different identification schemes consistent with small open economy assumptions.

Fiscal Multipliers

26. In order to measure the cumulative effect of fiscal shocks we estimate the government expenditure and net taxes multipliers according to the following formula:

$$M_j = \frac{\sum_{k=1}^{j} y_k}{\sum_{k=1}^{j} x_k} \tag{3}$$

The multiplier, Mj, is the ratio of the sum of the impulse response function of the variable y up to the period j, divided by the sum of the impulse response function of the fiscal shock x until period j.[12] This ratio gives a measure of intertemporal effects of fiscal shocks over a specific period of time.

Government Spending Multipliers

27. Table 3 shows the fiscal multipliers for the two sample periods. Regarding the fiscal expenditure multiplier, notice that the effectiveness of fiscal policy on output has decreased over time. For a time horizon of four years, the multiplier was greater than one before 1986 and closer to zero (although significant) in the most recent sub-period. Regarding the impact on the external sector, over the first four quarters a 1 percent increase in government expenditure deteriorates the current account by 0.16 percentage points of GDP. Considering that government spending is about 23 percent of GDP,[13] this multiplier implies that spending cuts of 1½ percent of GDP are necessary to improve the current account balance by 1 percent of GDP.

28. Regarding the effect on the real exchange rate, we find multipliers with opposite signs across sub-periods. In the first sub-period, an increase in government expenditure depreciates the real exchange rate—possibly through immediate nominal exchange rate depreciations—while in the second sub-period, such policy results in a real exchange rate appreciation. In the second sub-period, the exchange rate multiplier around the fourth quarter is 0.4—a 1 percent increase in spending generates a real appreciation of 0.4 percent. This multiplier implies that it is necessary an expenditure contraction of 0.6 percent of GDP to depreciate the real exchange rate in 1 percent. Given that Spain belongs to a monetary union, this depreciation is achieved through a reduction of the inflation differential with the euro area.

Net Taxes Multipliers

29. The multiplier associated to tax shocks shows different responses to output across sub-periods. In the sub-period 1975–85, there is a negative effect on output as expected in

[12] Even though we refer to Mj as a multiplier, strictly, it can be interpreted as an elasticity since variables y and x are log deviations from trend.

[13] We include only government consumption and investment.

Keynesian models. However in the sub-period1986–2004, the effect on output is positive due to the indirect effect of taxes on government expenditure: output expands because increases in tax revenue are followed by greater government expenditure. The effects on the real exchange rate are similar at four-year horizons. Finally, the effect of taxes on the current account is larger in the first sub-period.

Sub-sample Properties

30. A caveat is that the impulse response functions tend to be statistically nonsignificant for the first sub-period of the sample (1975–85). Tables 1 and 2 show that we cannot reject the null hypotheses of zero effect (at 5 percent confidence levels) for most impulse response functions in the sub-period 1975–85. Thus, multipliers in the second sub-period tend to be more reliable estimates of the effects of fiscal shocks.

Variance Decomposition

31. Table 4 shows the variance decompositions of the forecast errors of all endogenous variables in the VAR model. The variance decompositions of all the variables changes from one sub-period (1975–85) to the other (1986–2004). Specifically, fiscal policy has gained relevance in the determination of the volatility of external sector variables. Government expenditure and net taxes account for a larger share of the volatility of the current account and the real exchange rate in the sub-period 1986–2004—30 percent of the current account volatility and 37 percent of the real exchange rate volatility—than in the sub-period 1975–85.

32. This finding is consistent with open-economy macroeconomic theory, which predicts that as openness increases (as it did in Spain after EU membership), the spillovers of fiscal policy through the current account also rise commensurably. In the most recent sub-period, changes in fiscal policy are more easily reflected in international transactions and external balances.

Implications for the Relation Between Fiscal and Current Account Balances

33. Figure 2 shows the association between Spain's current account and primary fiscal balances. There is no evidence of "twin" deficits, and this is particularly obvious in the last decade when significant improvements in the primary fiscal balance were correlated with an equally significant deterioration of the current account balance—twin divergence. Our econometric results can be reconciled with Spain's twin divergence story of the last decade: although the partial effect of fiscal restraint contributed to improve the current account balance; the effect of the cyclical component of output more than offset this effect.

D. Conclusions

34. This paper quantifies the macroeconomic effects of fiscal policy in Spain, focusing on the external sector. It finds that government expenditure restraint can help to contain, in the

short term, the current account deficit in Spain. Reductions in government spending are effective in restraining demand, improving the current account balance, and reducing the cost differential with trade partners. On the other hand, higher tax revenues appear less effective in improving the external balance.

35. Clearly, while only structural policies can improve competitiveness and growth on a lasting basis within EMU, the paper finds that expenditure-based fiscal restraint can contribute, albeit modestly, to attenuating imbalances in the short term, as reforms take hold.

Table 1. Impulse Responses to Structural Shocks (Identification I)
(Deviations from trend, in percent) 1/

	1975-1985					1986-2004				
	Q	Q	Q	Q1	Q1	Q	Q	Q	Q1	Q1
					Government Expenditure Shock (1 percent increase)					
Government Expenditure	1.00*	0.59*	0.0	-0.20	-0.20	1.00*	0.64*	0.2	0.05	-0.07
Tax Revenues	0.13	0.64*	0.4	0.24	0.25	0.37*	0.1	-0.15	-0.34	-0.41
Real Interest Rate	-0.33	-	-0.42	-0.31	-0.20	-0.03	-	-0.08	-0.03	0.01
Gross Domestic Product	0.35*	0.38	0.4	0.36	0.31	0.36*	0.1	-0.02	-0.10	-0.12
Current Account	-0.22	-	0.0	0.03	-0.07	-0.14*	-0.12*	-0.05	0.01	0.05
Real Exchange Rate	0.07	-	-0.83	0.23	0.64	-0.06	0.61*	0.57*	0.26	0.01
					Tax Revenue Shock (1 percent increase)					
Government Expenditure	0.00	-	-0.20	-0.04	0.07	0.00	0.33*	0.64*	0.77*	0.77*
Tax Revenues	1.00*	0.62*	0.12	-0.09	-0.19	1.00*	1.13*	1.07*	0.88*	0.59
Real Interest Rate	0.00	0.33	0.36	0.32	0.25	0.00	0.17*	0.19*	0.19	0.19
Gross Domestic Product	0.00	-0.08	-0.23	-0.29	-0.29	0.00	0.11*	0.17*	0.14	0.06
Current Account	-0.19	-0.14	-0.10	-0.05	0.01	-0.03	-0.07*	-0.11*	-0.12*	-0.09
Real Exchange Rate	0.46	0.22	0.23	-0.01	-0.27	0.04	-0.09	0.15	0.40*	0.50*
					Real Interest Rate Shock (1 percentage point increase)					
Government Expenditure	0.00	-0.04	0.00	0.01	0.02	0.00	0.19	0.08	-0.06	-0.16
Tax Revenues	0.00	-0.01	0.00	-0.01	-0.03	0.00	-0.42	-0.63	-0.72	-0.71
Real Interest Rate	1.00*	0.09	0.05	0.04	0.03	1.00*	0.37*	0.15	0.09	0.07
Gross Domestic Product	0.00	-0.04	-0.04	-0.04	-0.04	0.00	-0.07	-0.15	-0.19	-0.19
Current Account	0.02	-0.02	-0.02	-0.01	0.01	0.06	0.05	0.07	0.10	0.11
Real Exchange Rate	0.25	0.15	0.03	-0.05	-0.07	0.32	0.37	0.21	-0.01	-0.18
					Gross Domestic Product Shock (1 percent increase)					
Government Expenditure	0.00*	-0.02	-0.21	-0.34	-0.38	0.00*	-0.17	-0.41	-0.52	-0.51
Tax Revenues	0.37*	0.35	0.70	0.85*	0.90*	1.05*	1.10*	0.93	0.82	0.81
Real Interest Rate	-0.92	-0.91*	-0.70	-0.49	-0.28	-0.08	-0.51*	-0.62*	-0.56*	-0.48
Gross Domestic Product	1.00*	0.84*	0.84*	0.74*	0.59	1.00*	0.73*	0.49*	0.37*	0.34
Current Account	0.02	-0.03	-0.13	-0.24	-0.31	-0.19	-0.32*	-0.29*	-0.23*	-0.19
Real Exchange Rate	-0.93	-0.06	0.53	0.86	0.87	-0.06	1.01*	1.02*	0.64	0.36
					Terms of Trade Shock (1 percent increase)					
Government Expenditure	0.00	-0.05	-0.05	-0.04	-0.03	0.00	0.06	0.16	0.18	0.17
Tax Revenues	0.02	0.10	0.09	0.09	0.08	-0.01	0.21	0.19	0.13	0.06
Real Interest Rate	-0.04	-0.03	-0.01	0.01	0.02	0.00	0.16*	0.10	0.07	0.05
Gross Domestic Product	0.05*	0.08*	0.05	0.03	0.01	0.00	0.03	0.03	0.02	-0.01
Current Account	0.02	-0.01	-0.04	-0.04	-0.04	0.01	0.00	-0.02	-0.02	-0.01
Real Exchange Rate	0.23	0.21	0.19	0.10	0.04	0.16*	0.00	0.06	0.11	0.12

1/ The impulse responses of the real interest rate and the current account indicate, respectively, deviations from baseline in percentage points and in percentage of GDP.
* Indicates that 0 is outside the +/- 2 standard error bands, which corresponds to a 5 percent significance level.

Table 2. Impulse Responses to Structural Shocks (Identification II)
(Deviations from trend, in percent) 1/

	1975-1985					1986-2004				
	Q	Q	Q	Q1	Q1	Q	Q	Q	Q1	Q1
					Government Expenditure Shock (1 percent increase)					
Government Expenditure	1.00*	0.57*	0.0	-0.19	-0.19	1.00*	0.67*	0.3	0.09	-0.04
Tax Revenues	0.17	0.66*	0.4	0.22	0.22	0.44*	0.1	-0.13	-0.35	-0.43
Real Interest Rate	0.03	-	-0.38	-0.27	-0.17	0.07	-	-0.06	-0.01	0.02
Gross Domestic Product	0.34*	0.35	0.3	0.33	0.28	0.36*	0.17*	-0.02	-0.11	-0.13
Current Account	-0.22	-	0.0	0.03	-0.07	-0.14*	-0.12*	-0.05	0.01	0.05
Real Exchange Rate	0.19	-	-0.81	0.20	0.59	-0.03	0.65*	0.61*	0.29	0.02
					Tax Revenue Shock (1 percent increase)					
Government Expenditure	0.00	-	-0.18	0.00	0.12	0.00	0.36*	0.71*	0.86*	0.86*
Tax Revenues	1.00*	0.60	0.04	-0.20	-0.31	1.00*	1.14*	1.10*	0.90*	0.59
Real Interest Rate	-0.01	0.46	0.46	0.39	0.29	-0.01	0.20*	0.24*	0.24	0.24
Gross Domestic Product	-0.13	-0.19	-0.35	-0.39	-0.37	-0.07	0.07	0.15	0.12	0.04
Current Account	-0.20	-0.14	-0.09	-0.02	0.05	-0.02	-0.06	-0.10	-0.11	-0.09
Real Exchange Rate	0.57	0.22	0.17	-0.11	-0.38	0.04	-0.17	0.09	0.39	0.52*
					Real Interest Rate Shock (1 percentage point increase)					
Government Expenditure	0.00	-0.04	0.00	0.02	0.03	0.00	0.20	0.12	-0.01	-0.10
Tax Revenues	-0.01	-0.02	-0.02	-0.03	-0.05	-0.18	-0.61*	-0.79	-0.85	-0.83
Real Interest Rate	1.00*	0.11	0.07	0.05	0.04	1.00*	0.43*	0.24	0.17	0.13
Gross Domestic Product	-0.03	-0.06	-0.06	-0.06	-0.05	-0.15	-0.18	-0.23	-0.25*	-0.24
Current Account	0.02	-0.02	-0.02	0.00	0.02	0.09	0.09	0.11	0.13	0.14
Real Exchange Rate	0.27	0.14	0.01	-0.08	-0.09	0.32	0.22	0.05	-0.12	-0.25
					Gross Domestic Product Shock (1 percent increase)					
Government Expenditure	0.00*	-0.09	-0.24	-0.33	-0.35	0.00	-0.07	-0.28	-0.41	-0.42
Tax Revenues	0.51	0.43	0.71	0.83*	0.85	1.23*	1.18*	0.96	0.79	0.73
Real Interest Rate	0.07	-0.77	-0.60	-0.40	-0.22	0.18	-0.39*	-0.55*	-0.51*	-0.43
Gross Domestic Product	1.00*	0.79*	0.77*	0.66*	0.51	1.00*	0.74*	0.48*	0.35	0.30
Current Account	0.01	-0.07	-0.16	-0.25	-0.30	-0.18	-0.32*	-0.30*	-0.23*	-0.18
Real Exchange Rate	-0.61	0.12	0.59	0.80	0.76	0.03	1.09*	1.10*	0.71	0.40
					Terms of Trade Shock (1 percent increase)					
Government Expenditure	0.00	-0.06	-0.06	-0.04	-0.03	0.00	0.06	0.16	0.18	0.17
Tax Revenues	0.03	0.10	0.10	0.10	0.08	-0.01	0.21	0.19	0.13	0.06
Real Interest Rate	0.00	-0.03	-0.01	0.01	0.02	0.00	0.16*	0.10	0.06	0.05
Gross Domestic Product	0.05*	0.08*	0.05	0.03	0.01	0.00	0.03	0.03	0.02	-0.01
Current Account	0.02	-0.01	-0.04	-0.05	-0.04	0.01	0.00	-0.02	-0.02	-0.01
Real Exchange Rate	0.24	0.22	0.19	0.10	0.03	0.16*	0.00	0.06	0.11	0.12

1/ The impulse responses of the real interest rate and the current account indicate, respectively, deviations from baseline in percentage points and in percentage of GDP. * indicates that 0 is outside the +/- 2 standard error bands, which corresponds to a 5 percent significance level.

Table 3. Fiscal Shocks' Multipliers (Identification I) 1/

	1975-1985					1986-2004				
	Q1	Q4	Q8	Q12	Q16	Q1	Q4	Q8	Q12	Q16
					Government Expenditure Shock (1 percent increase)					
Tax Revenues	0.13	0.50	0.97	1.47	2.27	0.37	0.31	0.17	-0.06	-0.36
Real Interest Rate	-0.33	-0.56	-0.89	-1.43	-2.23	-0.03	-0.10	-0.15	-0.17	-0.18
Gross Domestic Product	0.35	0.43	0.73	1.28	2.17	0.36	0.32	0.25	0.17	0.09
Current Account	-0.22	-0.21	-0.16	-0.12	-0.21	-0.14	-0.16	-0.18	-0.17	-0.14
Real Exchange Rate	0.07	-0.91	-1.84	-2.29	-2.20	-0.06	0.41	0.80	1.01	1.10
					Tax Revenue Shock (1 percent increase)					
Government Expenditure	0.00	-0.18	-0.37	-0.54	-0.65	0.00	0.20	0.58	1.08	1.70
Real Interest Rate	0.00	0.28	0.57	1.04	1.78	0.00	0.12	0.24	0.36	0.51
Gross Domestic Product	0.00	-0.03	-0.20	-0.54	-1.15	0.00	0.07	0.18	0.28	0.35
Current Account	-0.19	-0.20	-0.27	-0.39	-0.53	-0.03	-0.07	-0.13	-0.20	-0.29
Real Exchange Rate	0.46	0.36	0.52	0.71	0.67	0.04	-0.07	-0.01	0.23	0.60

1/ Multipliers are defined as the ratio of the cumulative response of the variable up to a given quarter over the corresponding cumulative response of the fiscal variable shocked.

Table 4. 16-Quarter Horizon Variance Decomposition (Identification I)

1975-1985

	TOT	G	T	R	Y	CA	RER
Government Expenditure (G)	11.9	55.8	4.8	3.4	8.0	15.1	1.0
Tax Revenue (T)	14.6	14.1	12.1	0.4	17.7	34.0	7.1
Real Interest Rate (R)	0.4	6.5	2.9	69.7	10.3	2.1	8.0
Gross Domestic Product (Y)	9.6	18.8	4.8	4.8	41.4	5.8	14.8
Current Account (CA)	6.8	2.6	2.2	1.4	4.2	72.0	10.8
Real Exchange Rate (RER)	8.2	8.8	0.5	3.9	2.8	33.6	42.2

1986-2004

	TOT	G	T	R	Y	CA	RER
Government Expenditure (G)	9.5	24.6	43.1	1.0	4.3	15.7	1.7
Tax Revenue (T)	5.4	4.2	52.7	11.8	11.4	11.2	3.4
Real Interest Rate (R)	16.6	2.1	12.7	33.1	26.5	8.4	0.7
Gross Domestic Product (Y)	1.5	16.3	10.8	9.3	55.4	1.0	5.8
Current Account (CA)	1.5	12.1	17.8	7.0	30.0	29.2	2.4
Real Exchange Rate (RER)	4.5	25.2	12.2	5.1	20.3	1.9	30.9

Figure 1. Evolution of Fiscal, External, and Other Macroeconomic Variables (1975–2005)

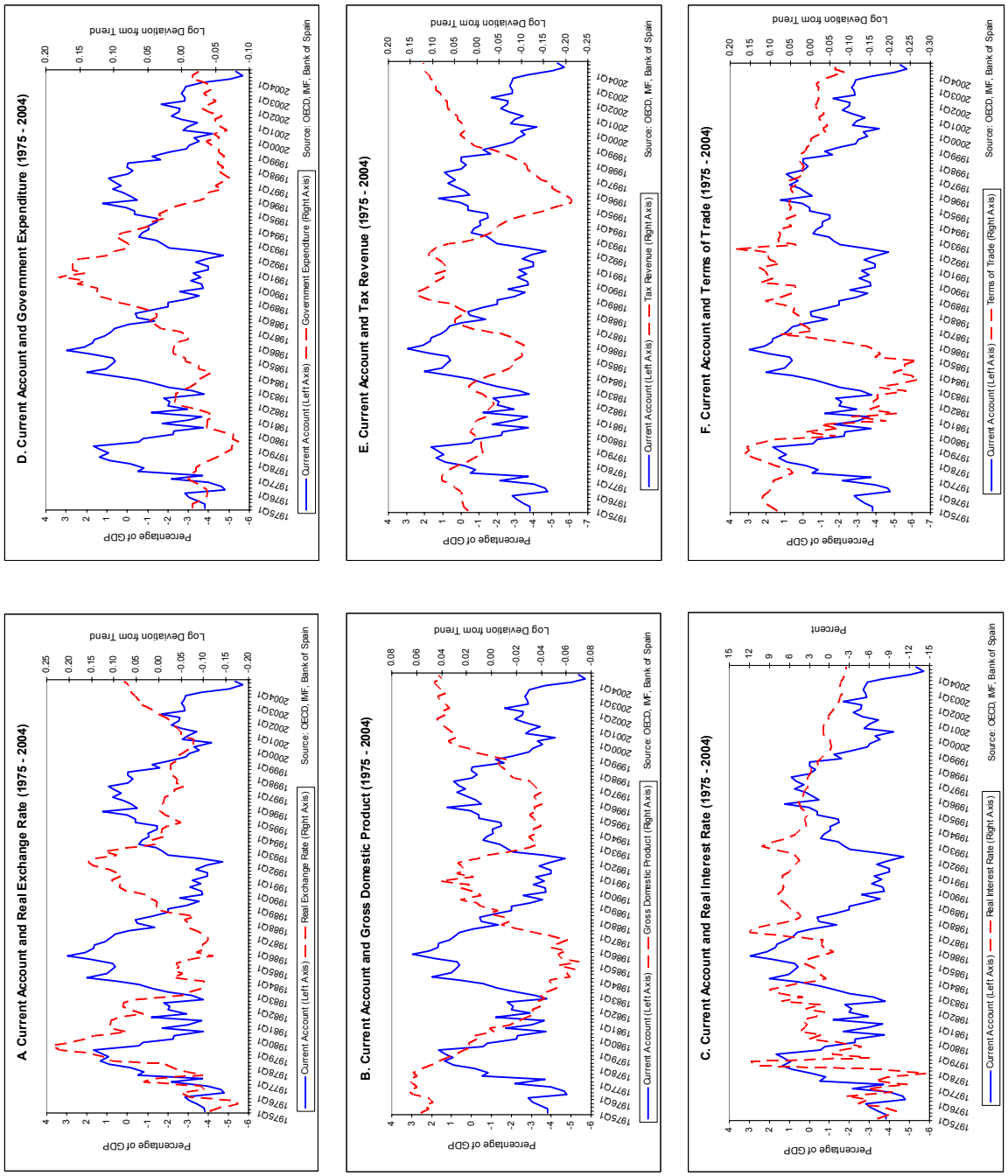


Figure 2: Government Primary and Current Account Balances (1975 - 2004)

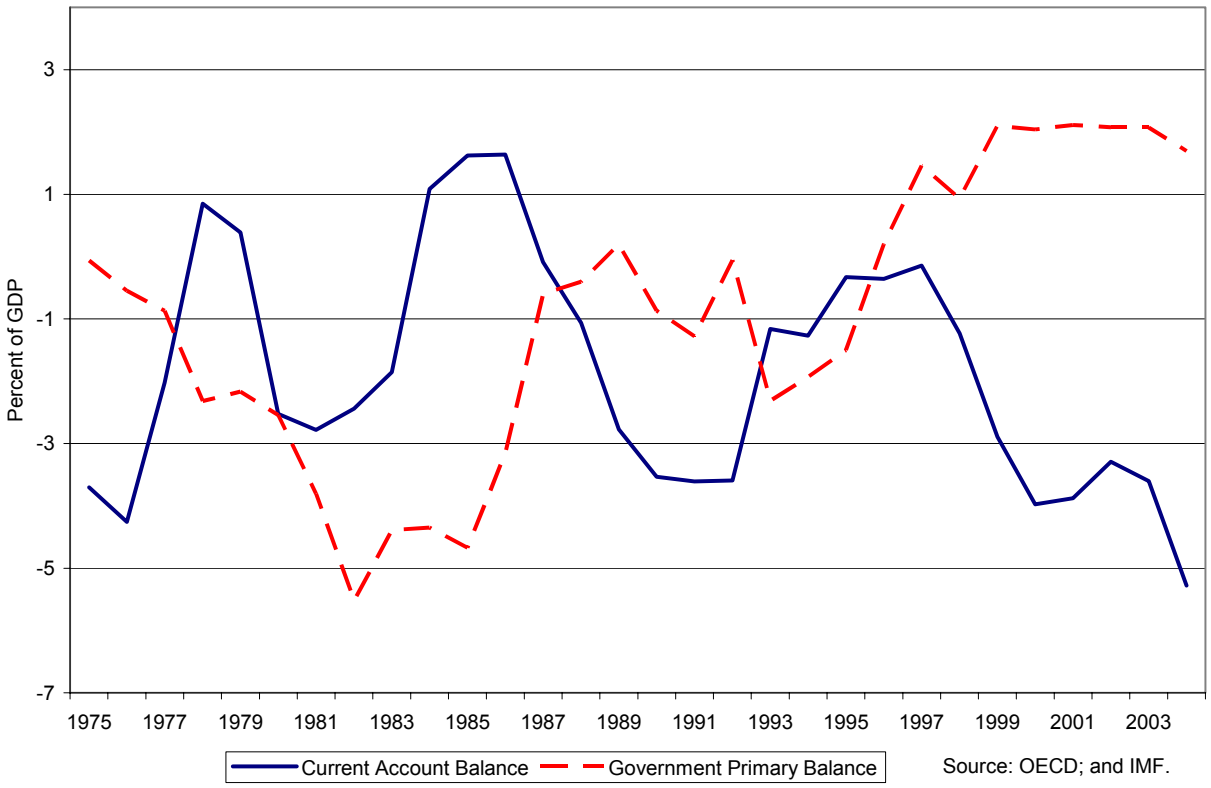
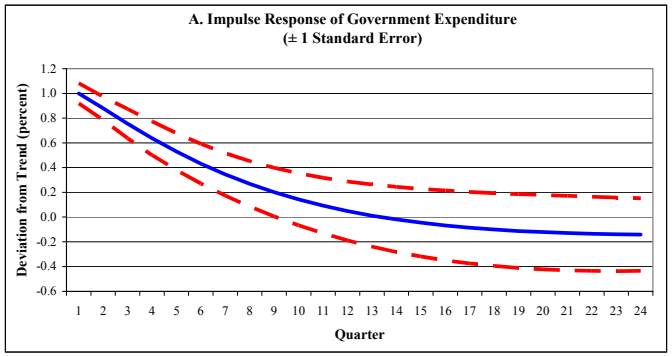
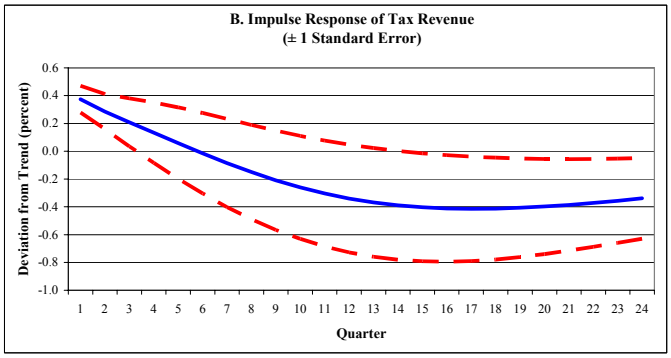
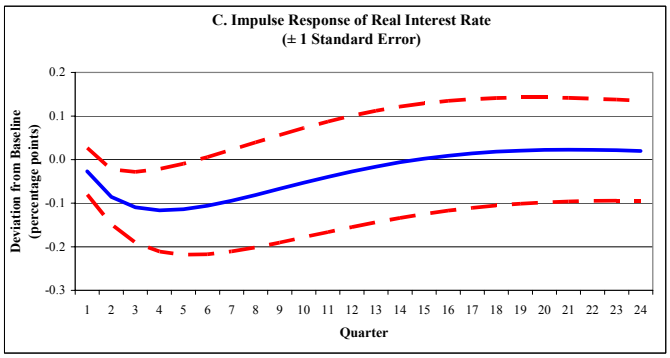
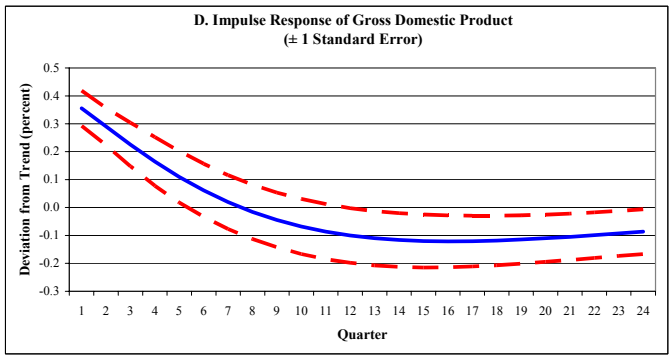


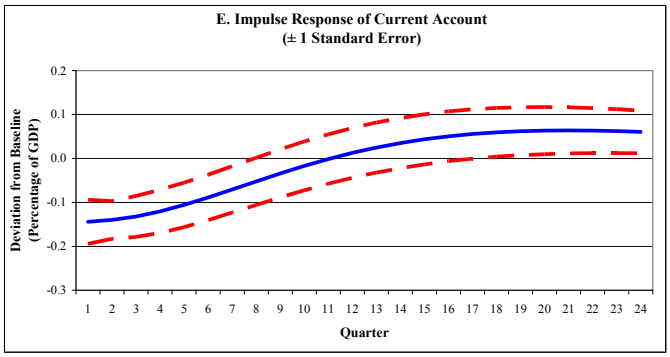
Figure 3. Impulse Responses to a 1 Percent Increase in Government Expenditure (1986–2004)











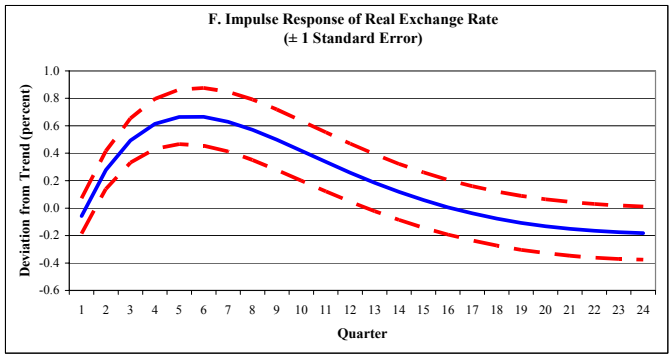
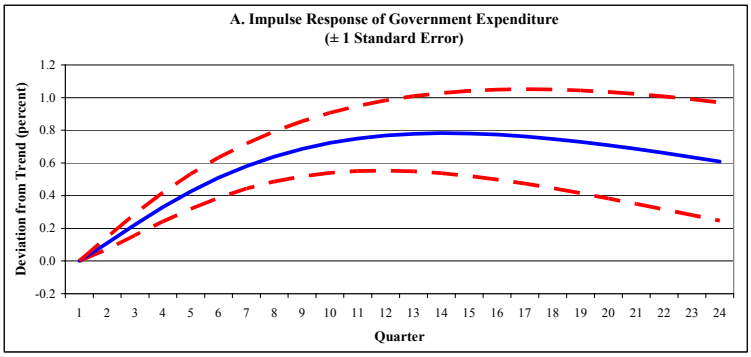
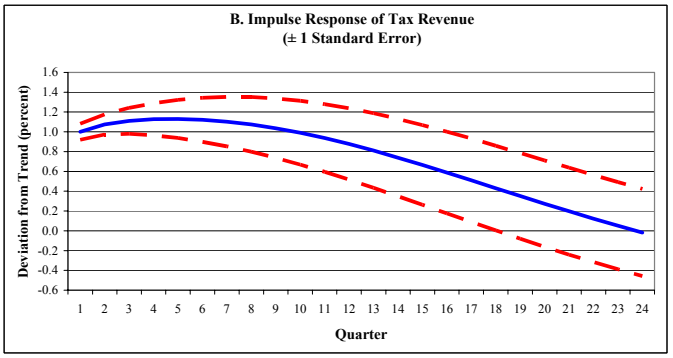
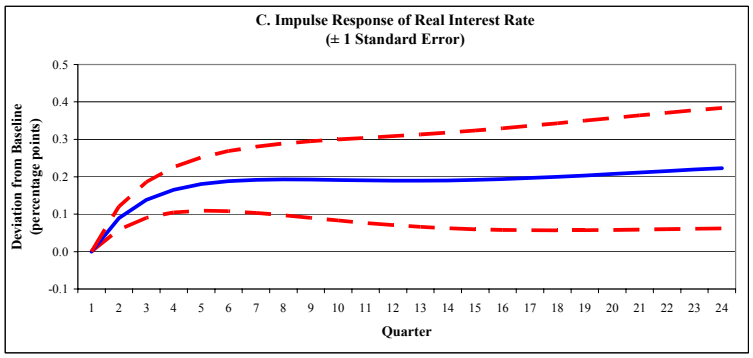
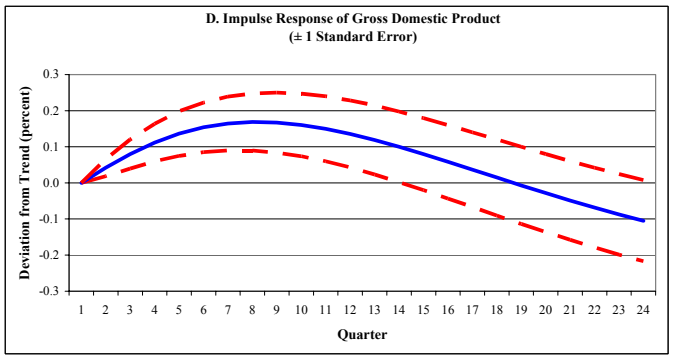


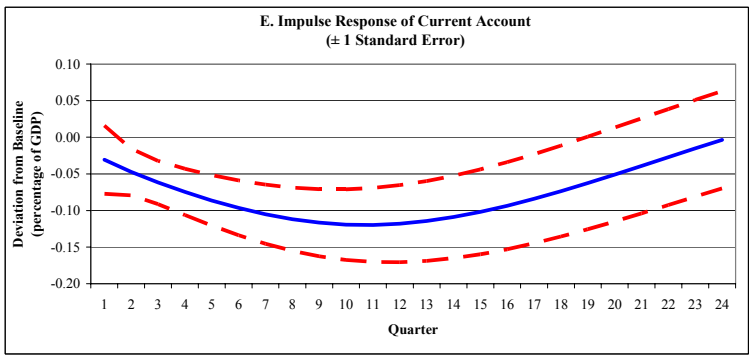
Figure 4. Impulse Responses to a 1 Percent Increase in Tax Revenue (1986–2004)

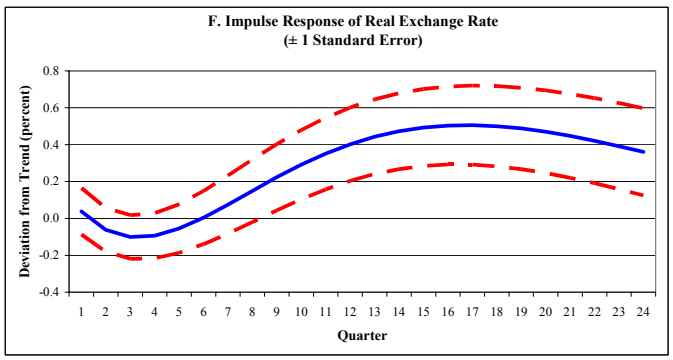












Appendix I. Data Sources

Government Expenditure: We follow Blanchard and Perotti (2002) and define it as the purchases of goods and services by the government. Specifically, we construct this variable adding government consumption and investment. The data of government consumption is obtained from the *Instituto Nacional de Estadistica*. Government investment is obtained from *OECD Analytical Database*. Since this series is only available at an annual frequency, we transform it to a quarterly frequency using the *proportional Denton technique*.[14]

Net Taxes: We define net taxes as total public revenue less Social Security Transfers and interest payments. The data is obtained from *OECD Economic Outlook*. This data is also available at an annual frequency, hence we use the *proportional Denton technique* to transform the series to quarterly data. We assume that net taxes has a similar behavior to real GDP at a quarterly frequency.

Terms of Trade: This is obtained from OECD *Analytical Database*.

Real Interest Rate: We use the nominal interest rate from the Money Market that is published in the OECD *Analytical Database*. We define a as proxy for expected inflation the average percentage change of the GDP deflator in period t and in the last three quarters. The real interest is computed the difference between nominal interest rate and expected GDP deflator inflation.

Real GDP: The series are obtained from the *Instituto Nacional de Estadisticas*. We spliced the dataset with base year 1995 with the more recent one with base year 2000.

Real Exchange Rate: We consider the real exchange rate based on unit labor costs indices published by the *International Financial Statistics*.

Current Account: It is obtained from the *OECD Analytical Database*. In the regression analysis we express this variable as a percentage of GDP.

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[14] This method is described extensively in Quarterly National Accounts Manual—Concepts, Data Sources, and Compilation by Bloem, Dippelsman, and Maehle (2001). The document is available at http://www.imf.org/external/pubs/ft/qna/2000/textbook/. This method transforms the government investment to a quarterly frequency, approximating its statistical properties to the ones of total investment. The quarterly investment series is obtained from National Accounts and is published by the *Instituto Nacional de Estadistica*.

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II. SPAIN'S PRODUCTIVITY: A CROSS-COUNTRY PERSPECTIVE[15]

1. **The Spanish authorities have adopted a multi-pronged strategy of reforms to improve the productivity performance of the economy—with a view to enhance employment and incomes.** This strategy was initially announced in the Dynamization Plan (March 2004) and was more recently articulated and expanded in the National Reform Program[16] (NRP, October 2005) under the Lisbon Agenda. Key to this strategy is the assessment that the remarkable growth performance of the economy over the last 10–12 years owes much to the mobilization of labor resources, but that this growth engine will eventually reach its limits. Indeed, while in 1985 the Spanish GDP per capita (at current prices and purchasing parity standard, PPS[17]) was 72 percent of the EU-15 average, it had reached 90 percent in 2004. Simultaneously, the employment ratio increased from 47 percent of the working-age population in 1985 to 62 percent in 2004.[18] As the employment ratio stabilizes, further gains in income per capita will increasingly need to rely on productivity growth.

2. **Against this background, recent improvements in national accounts and other statistics have spurred, and benefited from, academic and private sector analyses of the economy's productivity performance.** Although still in its initial stages, this strain of analysis indicates that the Spanish economy has experienced a productivity growth slowdown, at least since the mid-1990s.[19] While some disaggregated analyses by industry group seem to point to an incipient recovery in the last few years concentrated in the relatively small information and communication technology (ICT) sector, economy-wide data fail to show a recovery so far.[20] Comparatively less attention, however, has been paid to

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[15] Prepared by Julio Escolano.

[16] Presidencia del Gobierno Español (2005).

[17] PPS exchange rates convert the GDP of different countries into a notional currency (the PPS) at exchange rates that take into account average price differentials in GDP aggregates. Aggregates expressed in PPS are derived by dividing aggregates in current prices and national currency by the respective purchasing power parity (PPP). That is, PPS exchange rates allow the measurement of GDPs at PPP prices. PPS (or PPP) exchange rates are estimated by Eurostat and the OECD (see the "Purchasing Power Parities (PPP)" page of the OECD Statistics Directorate in http://www.oecd.org). PPS is used throughout this chapter to measure GDP and all other nominal magnitudes. Henceforth, unless otherwise indicated, GDP per capita refers to GDP at current prices converted at current PPS exchange rates.

[18] For the EU-15, the corresponding employment ratios were 61 and 67 percent.

[19] See for example, Pérez (2006).

[20] Mas and Quesada (2005).

quantifying the Spanish productivity performance in a cross-country context—an angle we take up here.

3. **In this chapter, we examine Spain's growth and productivity performance in relation to a broad sample of peer economies over the last 30–40 years, with an emphasis on recent trends and growth implications.**[21] The accounting of growth sources confirms the central role that increased labor utilization has played in Spain's per capita GDP catch-up. It also reveals a less known secondary factor underpinning the catch-up in GDP per capita in recent years: relative price and GDP component shifts, which are not fully eliminated by conventional PPP conversions, account for up to 3–4 percentage points of the catch-up in nominal income since 1999. Over long periods, however, these two factors—the employment ratio and GDP price-composition effects—have had little impact on GDP per capita growth for most countries in the sample. Instead, productivity[22] growth has played the dominant role in determining their income levels in the long run. Regarding productivity, the picture that emerges confirms a pronounced productivity slowdown in Spain since the 1990s, relative to both past performance and peer groups of economies. This does not appear to be rooted on a paucity of aggregate capital per worker but rather on weak total factor productivity (TFP, the output obtained from one unit each of labor and capital). This supports analyses—including in the NPR—emphasizing the key role of factors of production omitted in standard growth accounting (e.g., human capital, incorporation of new technologies) and of institutional features of the economic environment that foster the effective use of productive factors (e.g., public goods, competition, market flexibility).[23]

4. **The layout of this chapter is as follows.** The following section studies the evolution of GDP per capita, breaking it down into its components. Nominal PPS GDP per capita is arguably the economic aggregate that comes closer to a measure of living standards and it is

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[21] The data are primarily based on the Annual Macroeconomic Database (AMECO) of the European Commission. Hours worked were obtained from the OECD and the Total Economy Database of the *Groningen Growth and Development Centre and The Conference Board.* The sample comprises a total of 23 industrialized economies: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States. Aggregate measures for a group of countries (e.g., EU-25, euro area, sample total) are computed through consolidation of the pertinent economies, rather than by simple averages. Data are available for 1960–2004, but the declining-balance method used to estimate capital stocks produces unreliable capital stock estimates for about the first ten years (the 1960s), which therefore are not used here.

[22] Throughout this chapter, the term productivity, when unqualified, refers to labor productivity, computed as output volume per hour worked. Output volume, in turn, is measured at constant 1995 prices.

[23] Identifying the factors that underlie the TFP performance of economies (and policies to address weaknesses in this area) is still a challenge for economic theory. The title of Prescott (1997), "Needed: A Theory of Total Factor Productivity," which explores the issue, starkly epitomizes this.

widely used as a tangible indicator of relative economic welfare across countries. Given the finding that closing the productivity gap has become key to achieving convergence in GDP per capita with peer economies, Section B analyzes the determinants of Spain's comparative productivity performance. It employs growth accounting and discusses whether there is evidence that lack of capital is a major cause of Spain's productivity lag. Finally, Section C draws some conclusions.

A. Sources of Income Growth

5. **Spain's convergence in GDP per capita suffered a setback after the oil shock of the early 1970s and did not resume until EU entry in the mid-1980s, accelerating in recent years (Figures 1 and 2).**[24] Like other European economies, Spain experienced significant catch-up growth during the 1960s and early 1970s—although it set out from a lower income level and the period of strong growth started later and ended somewhat earlier than in other European countries. During 1975–85, the gap with other industrialized economies widened, partially as a result of oil shocks and the subsequent protracted adjustment process.[25] Since then, the catch-up process gathered pace again, and it has maintained momentum until now. These relative gains were the combined result of the slowdown experienced by most European economies since the mid-1980s and of a growth acceleration in Spain following EU membership and associated liberalizing reforms.

6. **In order to quantify the contribution of different factors to growth and to the evolution of Spain's differential with respect to other economies in the sample, we decompose GDP per capita for each country in its components as follows:** (Summary results are presented in Tables 1 and 2.)

$$\text{Per capita GDP} = \frac{PY}{Pop} = P\left(\frac{N}{Pop}\right)\left(\frac{E}{N}\right)\left(\frac{L}{E}\right)\left(\frac{Y}{L}\right) \qquad (1)$$

Where

P = current prices GDP deflator expressed in PPS
Pop = population
Y = GDP at constant 1995 prices
$\frac{N}{Pop}$ = demographic trends, i.e., ratio of working-age population to total population

[24] For a comprehensive perspective of the Spanish economy, see *Servicio de Estudios del Banco de España* (2005) and Malo de Molina (2005).

[25] See Malo de Molina (2003) and *Servicio de Estudios del Banco de España* (2005).

Figure 1. GDP per Capita
(Current prices, logarithms)

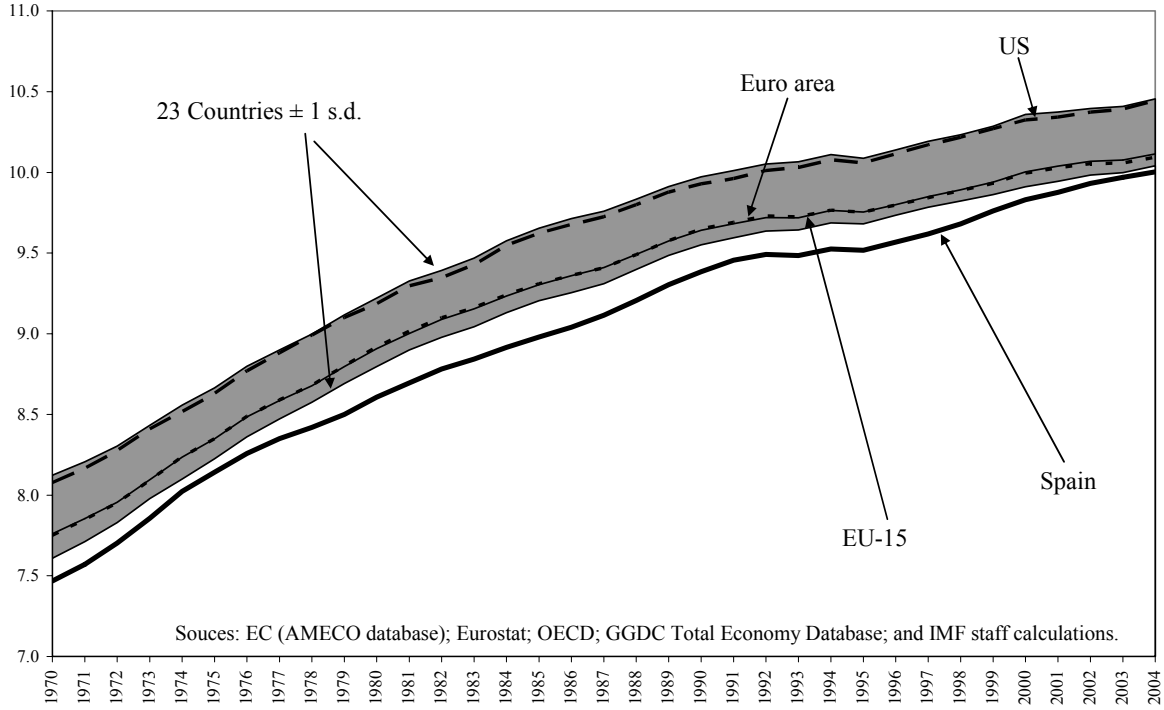
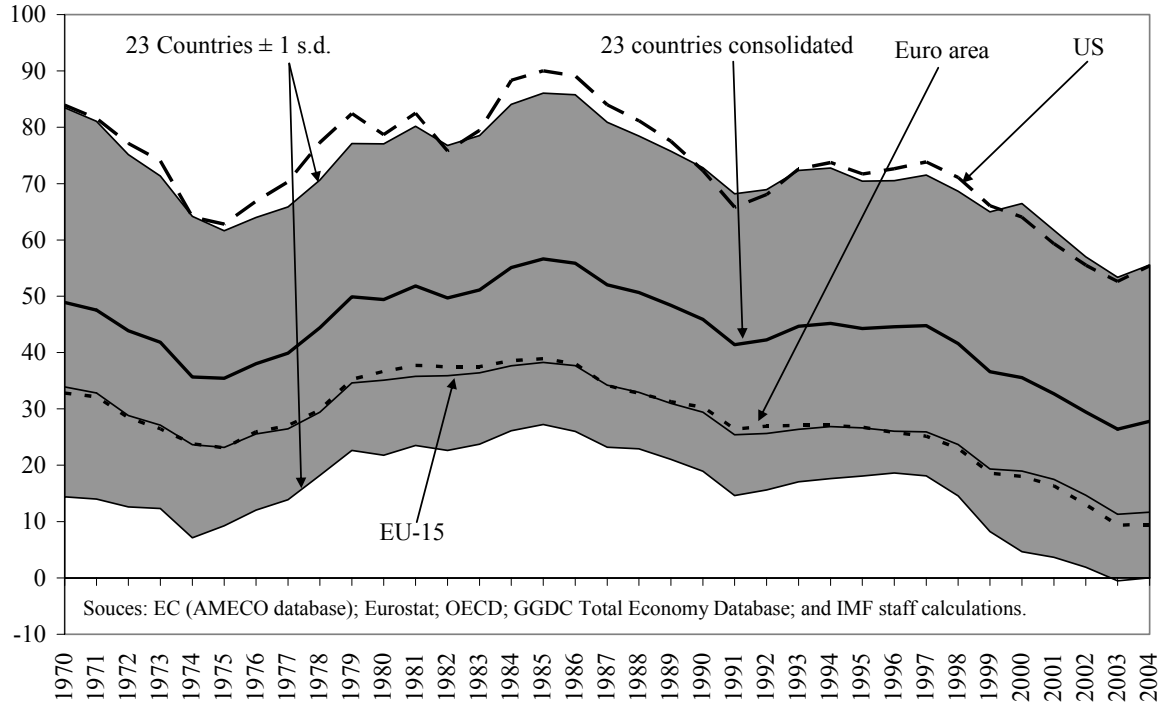


Figure 2. Gap in GDP per Capita
(Current prices, difference with Spain as percent of Spain)



$\frac{E}{N}$ = employment rate, i.e., the ratio of employees to working-age population

$\frac{L}{E}$ = average hours worked per employee, i.e., ratio between total labor input in hours and the number of employees

$\frac{Y}{L}$ = labor productivity, i.e., output per hour worked.

Notice that $\left(\frac{E}{N}\right)\left(\frac{L}{E}\right) = \frac{L}{N}$ is the labor utilization factor (average hours worked per working-age person) shown in Tables 1 and 2.

7. **The decomposition exercise shows that, since 1986, the main force behind Spain's catch-up in GDP per capita has been increased labor utilization, which still presents additional growth potential going forward.** Secondarily, demographic and (more recently) price factors have also played a role. In contrast, labor productivity growth has lagged behind the sample of industrialized economies as well as the EU-15 and the euro area—thus, negatively contributing to closing the remaining income gap. Table 1 shows that during 1986–2004 labor utilization grew at significantly higher rates in Spain than in the sample as a whole, the EU, or the euro area. The main factor behind increased labor utilization has been a rising employment rate. Also, hours worked per employee have declined less than in the whole sample, euro zone, and EU-15—but more than in the US. Regarding the level of labor utilization, however, the Spanish economy is still below many industrialized economies (Table 2, Figure 3). In 2004, labor utilization in Spain was about 10 and 7 percent above the euro area and EU-15 respectively despite a lower employment rate—mainly due to higher hours worked per employee. But it was still 6 percent below the total sample and 15 percent below the US, mainly on account of a comparatively low employment rate, while hours worked per employee were similar to the U.S. and slightly above the total sample. In particular, in 2004, the overall sample employment rate was 14 percent higher than in Spain, providing significant scope for raising GDP per capita through higher employment—as envisaged in the NRP.

8. **Demographics has helped to lift Spain's GDP per capita in recent years.** Other things equal, a country with a larger proportion of the population in the working-age bracket will have a higher GDP per capita. The demographic factor was unfavorable to Spain during the 1974–85 period, contributing with 3–4 percentage points to the GDP per capita gap with respect to other European countries and the total sample; and was broadly neutral during the 1986–98 period. In contrast, during the 2001–04 period, immigration and lags in the Spanish baby boom relative to other industrialized countries have resulted in a positive demographic contribution to closing the GDP per capita gap—by about 2–3 percentage points.

Table 1. Sources of Growth 1/
(Average annual percentage change)

	Spain	Euro Zone	EU-15	US	All countries in the Sample
			1999-2004		
GDP per capita (current prices, PPS)	5.54	3.51	3.76	3.86	3.75
PPS GDP deflator	3.00	1.86	1.96	1.93	1.95
GDP per capita (1995 prices)	2.46	1.61	1.76	1.89	1.76
Demographics	0.10	-0.11	-0.05	0.24	-0.01
Labor utilization	1.75	0.43	0.22	-0.42	-0.21
Employment rate	2.09	0.90	0.79	-0.22	0.27
Hours worked per employed person	-0.33	-0.46	-0.56	-0.20	-0.47
Labor productivity	0.60	1.29	1.59	2.08	1.98
Of which:					
Decomposition I $Y/L = A(K/L)^{\alpha}$					
Total factor productivity (TFP) component	0.20	0.84	1.09	1.36	1.35
Capital-labor ratio component	0.39	0.45	0.50	0.71	0.62
Decomposition II $Y/L = A^{1/(1-\alpha)}(K/Y)^{\alpha/(1-\alpha)}$					
Total factor productivity (TFP) component	0.29	1.20	1.55	1.95	1.93
Capital-output ratio component	0.31	0.09	0.03	0.13	0.05
			1986-1998		
GDP per capita (current prices, PPS)	5.53	4.54	4.63	4.68	4.71
PPS GDP deflator	2.57	2.58	2.61	2.63	2.62
GDP per capita (1995 prices)	2.88	1.92	1.97	2.00	2.04
Demographics	0.42	0.03	0.01	-0.06	-0.01
Labor utilization	1.23	-0.02	0.03	0.61	0.12
Employment rate	1.32	0.48	0.43	0.57	0.46
Hours worked per employee	-0.09	-0.50	-0.40	0.05	-0.34
Labor productivity	1.21	1.91	1.93	1.44	1.93
Of which:					
Decomposition I $Y/L = A(K/L)^{\alpha}$					
Total factor productivity (TFP) component	0.73	1.36	1.40	1.16	1.37
Capital-labor ratio component	0.48	0.54	0.52	0.28	0.55
Decomposition II $Y/L = A^{1/(1-\alpha)}(K/Y)^{\alpha/(1-\alpha)}$					
Total factor productivity (TFP) component	1.04	1.95	2.01	1.67	1.97
Capital-output ratio component	0.17	-0.04	-0.08	-0.22	-0.04
			1974-1985		
GDP per capita (current prices, PPS)	9.82	10.69	10.59	10.63	10.74
PPS GDP deflator	8.71	8.71	8.71	8.71	8.71
GDP per capita (1995 prices)	1.02	1.82	1.73	1.77	1.87
Demographics	0.32	0.51	0.48	0.40	0.39
Labor utilization	-3.53	-1.72	-1.60	0.13	-0.79
Employment rate	-2.43	-0.85	-0.75	0.42	-0.23
Hours worked per employee	-1.12	-0.89	-0.86	-0.28	-0.56
Labor productivity	4.38	3.08	2.90	1.22	2.28
Of which:					
Decomposition I $Y/L = A(K/L)^{\alpha}$					
Total factor productivity (TFP) component	2.50	1.91	1.81	0.86	1.39
Capital-labor ratio component	1.83	1.15	1.07	0.36	0.88
Decomposition II $Y/L = A^{1/(1-\alpha)}(K/Y)^{\alpha/(1-\alpha)}$					
Total factor productivity (TFP) component	3.59	2.73	2.59	1.24	1.99
Capital-output ratio component	0.76	0.34	0.30	-0.01	0.28

Souces: EC (AMECO database); Eurostat; OECD; GGDC Total Economy Database; and IMF staff calculations.

1/ Indicators for the euro zone, EU-15, and sample totals are for the consolidated group (rather than simple averages for the member countries). "Demographics" is the working-age population to total population ratio; "labor utilization" is hours worked per working-age person; "employment rate" is the ratio of persons employed to working-age population; "labor productivity" is output per hour worked. GDP and capital stock are valued at 1995 prices and converted to a common purchasing parity standard (PPS) unit of account.

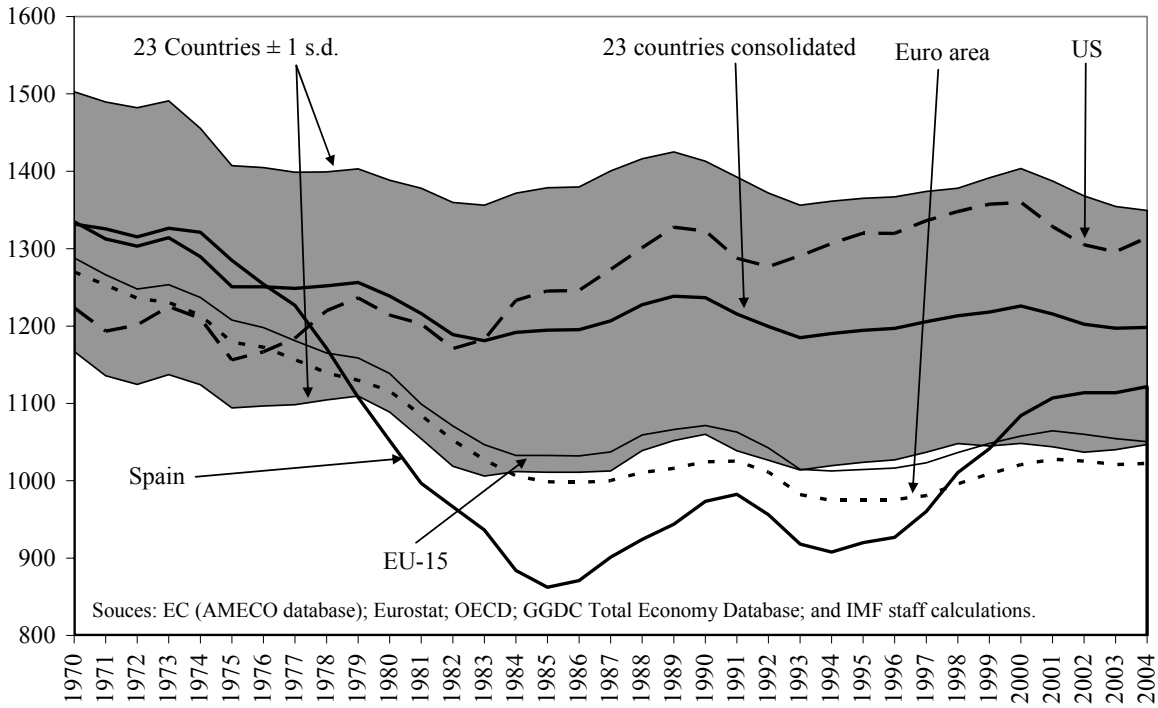
Table 2. Spain's Gap: An Overview 1/
(Differences in percentage points of the corresponding value for Spain 2/)

	Euro Zone	EU-15	US	All countries in the Sample
		1999-2004		
GDP per capita (current prices)	14.1	15.6	58.8	31.4
Changes since 1995 in relative prices and weights of GDP components	-3.6	-2.9	-3.0	-2.9
GDP per capita (1995 prices)	18.4	19.0	63.6	35.3
Demographics	-2.1	-2.5	-3.0	-2.4
Labor utilization	-6.9	-3.7	21.1	10.4
Employment rate	7.9	10.1	20.8	16.9
Hours worked per employed person	-13.7	-12.6	0.3	-5.6
Labor productivity	29.8	26.8	39.5	25.8
Of which:				
Decomposition I $Y/L = A(K/L)^{\alpha}$				
Total factor productivity (TFP) component	18.0	16.8	32.5	17.9
Capital-labor ratio component	10.0	8.6	5.2	6.6
Decomposition II $Y/L = A^{1/(1-\alpha)}(K/Y)^{\alpha/(1-\alpha)}$				
Total factor productivity (TFP) component	26.7	24.9	49.5	26.6
Capital-output ratio component	2.5	1.6	-6.7	-0.6
		1986-1998		
GDP per capita (current prices)	28.8	28.6	74.9	46.3
Changes since 1995 in relative prices and weights of GDP components	0.2	0.3	0.2	0.2
GDP per capita (1995 prices)	28.5	28.3	74.6	46.0
Demographics	0.8	0.0	-1.7	0.0
Labor utilization	6.5	10.7	39.2	28.9
Employment rate	18.9	22.5	38.8	32.7
Hours worked per employed person	-10.5	-9.6	0.3	-2.8
Labor productivity	19.9	15.8	27.7	13.3
Of which:				
Decomposition I $Y/L = A(K/L)^{\alpha}$				
Total factor productivity (TFP) component	10.1	7.8	22.0	8.0
Capital-labor ratio component	8.9	7.5	4.7	4.9
Decomposition II $Y/L = A^{1/(1-\alpha)}(K/Y)^{\alpha/(1-\alpha)}$				
Total factor productivity (TFP) component	14.7	11.3	32.9	11.7
Capital-output ratio component	4.6	4.1	-3.8	1.5
		1974-1985		
GDP per capita (current prices)	32.6	31.8	76.5	46.4
Changes since 1995 in relative prices and weights of GDP components	0.3	0.3	0.0	0.1
GDP per capita (1995 prices)	32.2	31.5	76.5	46.2
Demographics	2.8	2.6	4.3	4.0
Labor utilization	2.8	5.1	12.9	14.9
Employment rate	15.2	18.3	23.0	23.7
Hours worked per employed person	-10.8	-11.3	-8.7	-7.3
Labor productivity	25.5	22.4	52.6	23.4
Of which:				
Decomposition I $Y/L = A(K/L)^{\alpha}$				
Total factor productivity (TFP) component	11.3	9.2	32.1	11.9
Capital-labor ratio component	12.6	12.0	15.2	10.2
Decomposition II $Y/L = A^{1/(1-\alpha)}(K/Y)^{\alpha/(1-\alpha)}$				
Total factor productivity (TFP) component	16.6	13.5	49.0	17.4
Capital-output ratio component	7.6	7.8	2.2	5.0

Souces: EC (AMECO database); Eurostat; OECD; GGDC Total Economy Database; and IMF staff calculations.

1/ Indicators for the euro zone, EU-15, and sample totals are for the consolidated group (rather than simple averages for the member countries). "Demographics" is the working-age population to total population ratio; "labor utilization" is hours worked per working-age person; "employment rate" is the ratio of persons employed to working-age population; "labor productivity" is output per hour worked. GDP and capital stock are valued at 1995 prices and converted to a common purchasing parity standard (PPS) unit of account.
2/ Positive numbers indicate a lag of the Spanish economy (Spain = 0) with respect to the reference economy. Conversely, negative numbers indicate that the indicator's value for the Spanish economy is higher than for the reference economy. Components may not add up to totals because (i) they aggregate multiplicatively; and (ii) time averages are computed as the average of the ratios for each period and thus, the everage of the products will not generally agree with the product of the averages.

Figure 3. Labor Utilization: Hours Worked per Working-Age Person
(Thousands of hours)



9. **Shifts in relative prices and weights of GDP components have also contributed somewhat to closing the gap in GDP per capita, particularly since 2000, although only a small part is attributable to terms of trade gains.** In 1999–2004, the gap in GDP per capita between Spain and the whole sample was about 31 percent (of Spain's level), with the GDP measured in current prices expressed in PPS (Table 2). However, it was 35 percent with GDP expressed in constant 1995 prices. The difference is, by definition, accounted for by increases since 1995 in the relative price of GDP components that have a higher weight in Spain's GDP than in the comparator GDP (in this case the whole sample).[26] The contribution of this effects to the evolution of Spain's gap was generally negligible until the 1999–2004 period, when it became more significant (about 3 percentage points). This may be due to improvements in national accounts statistics introduced in many of the sample economies

[26] In order to have an impact after the PPS conversion, these relative price changes must occur in the reference basket used to compute the purchasing parity prices, in this case the aggregate EU GDP. For example, an increase since 1995 in the relative deflator of construction sector output in the EU would result in an increase of the relative purchasing parity price of that output. Since construction sector value added has a higher weight in Spain's GDP than in many other countries in the sample, the change in relative price would result, by itself, in an increase of Spain's (current prices in PPS) GDP relative to the sample, even in no change in volumes (i.e., measured in constant 1995 prices) had occurred.

(including Spain) after 2000—notably in the EU, with the adoption of new chain-linked 2000-based national accounts. It is debatable whether these price effects reflect genuine increases in living standards when the price gains occur in nontradable sectors: the higher GDP per capita broadly compensates for the higher costs of consuming the same basket.[27] But relative price changes may have a tangible effect in living standards when they take the form of terms of trade gains: the volume of goods and services available through imports to economic agents in the country increases, even if the volume of goods and services exported does not.[28] Following Kehoe et al. (2005), we gauge the importance of terms of trade gains by the ratio of command-basis real GDP to real (1995 constant prices) GDP.[29] This measure indicates that correcting for terms of trade gains would result in a 0.9 percent higher real GDP in 1999–2004. In summary, while relative price effects have moved moderately in Spain's favor during 1999–2004, the gains that can be ascribed to terms of trade shifts are small, with the remainder possibly having little relevance for assessing long-term growth trends in living standards.

10. **In contrast with the factors discussed above, comparatively low productivity growth in Spain has slowed down convergence (Figure 4).** The average productivity gap with the whole sample was about 23 percent during 1974–85 period and, after narrowing somewhat in 1986–98, widened again to about 26 percent by 1999–2004 (Table 2). In terms of productivity growth, the Spanish economy experienced significantly higher-than-average productivity growth during 1974–85, which decelerated to slightly below the sample (and EU and euro area) average in 1986–98, and fell further to a 0.6 percent annually in 1999–2004—clearly below the comparator groups (Table 1).

11. **Therefore, at present, Spain's productivity gap explains most of the remaining gap in GDP per capita.** As the gap in labor utilization has been progressively reduced, productivity has become the main obstacle in the way to a fuller convergence in GDP per capita with the bulk of other industrialized economies. While in 1974–85 productivity differentials accounted for about half of Spain's gap in GDP per capita with respect to the whole sample, in 2004, the productivity gap (30 percent) more than accounted for the gap in

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[27] Even though this same basket may now be more "valued" by economic agents as reflected in a higher relative price.

[28] For a recent discussion of the impact of relative price changes in assessing economic performance (in the case of Switzerland) see Kehoe et al. (2005) and Abrahamsen et a. (2005). For a methodological discussion, see Kholi (2004).

[29] Command-basis real GDP measures real GDP in the conventional manner, except that exports are deflated by the deflator of imports, rather than by their own intrinsic deflator. Therefore command-basis GDP is a measure of the volume of goods and services that a country can command with the goods and services it produces. The US Bureau of Economic Analysis, for example, regularly computes command-basis GDP estimates as part of the standard National Income and Product Accounts (NIPA table 1.8.3).

GDP per capita (28 percent). Indeed, over the long term, GDP per capita growth has been closely associated with productivity growth in the sample countries (Figure 5). Specifically, should Spain close the 1999–2004 average productivity gap with the EU-15 (27 percent), its GDP per capita would exceed the EU-15 average by more than 10 percent—given Spain's superior rate of labor utilization. Overall, the sheer size of the gains that could be obtained by increasing Spain's productivity to that of peer economies lends strong support to the NPR focus on this objective.

B. Productivity Growth Accounting

12. **In order to discuss in more detail Spain's productivity performance we resort to growth accounting methodology based on growth theory.**[30] We postulate a standard Cobb-Douglas production function for each country in the sample.

$$Y_t = A_t K_t^{\alpha} L_t^{(1-\alpha)} \tag{2}$$

Here, Y_t and K_t represent GDP and the stock of capital in year t measured at constant 1995 PPS prices; L_t, as before, represents labor input measured as total hours worked in year t. The factor A_t represents total factor productivity (TFP), a measure of the efficiency in combining any given amount of capital and labor to produce output. Finally, the parameter α represents the output elasticity with respect to capital and is set to 0.3.[31] Given data for output, capital, and labor for all countries and periods in the sample, we compute TFP (A_t) for each country as a residual. Thus, TFP encompasses implicitly a variety of factors such as technological progress, human capital, quality of institutions, etc. that are not captured by the explicitly modeled factors of production—capital and labor. In this context, productivity is expressed by Y_t / L_t, output per unit of labor.

[30] See Kehoe and Prescott (2002).

[31] This is the value generally used in the growth accounting literature and is adopted here to facilitate international comparisons. Although α is a technology parameter, under standard equilibrium assumptions it equals the remuneration of capital as a share of total income, which is typically used to calibrate its value. Golling (2002) presents evidence that, when self-employed income is apportioned according to the reported shares for corporate income, 0.3 is a focal value for most countries.

Figure 4. Labor Productivity: GDP per Hour Worked
(GDP at 1995 PPS prices)

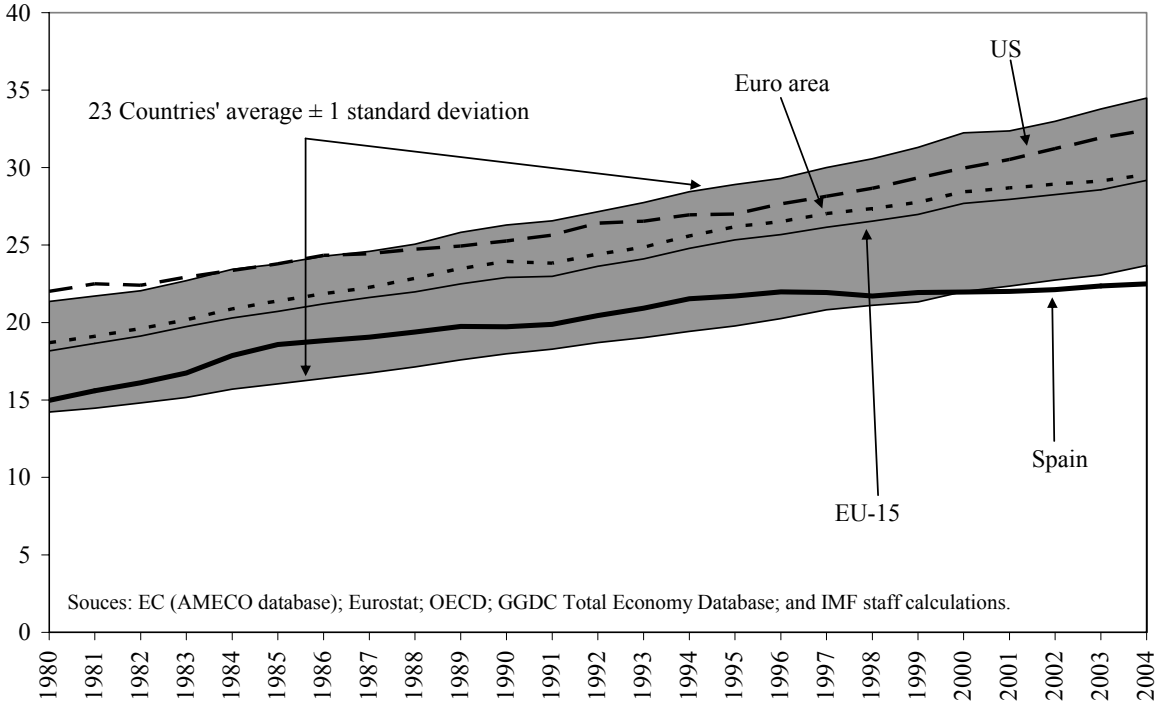
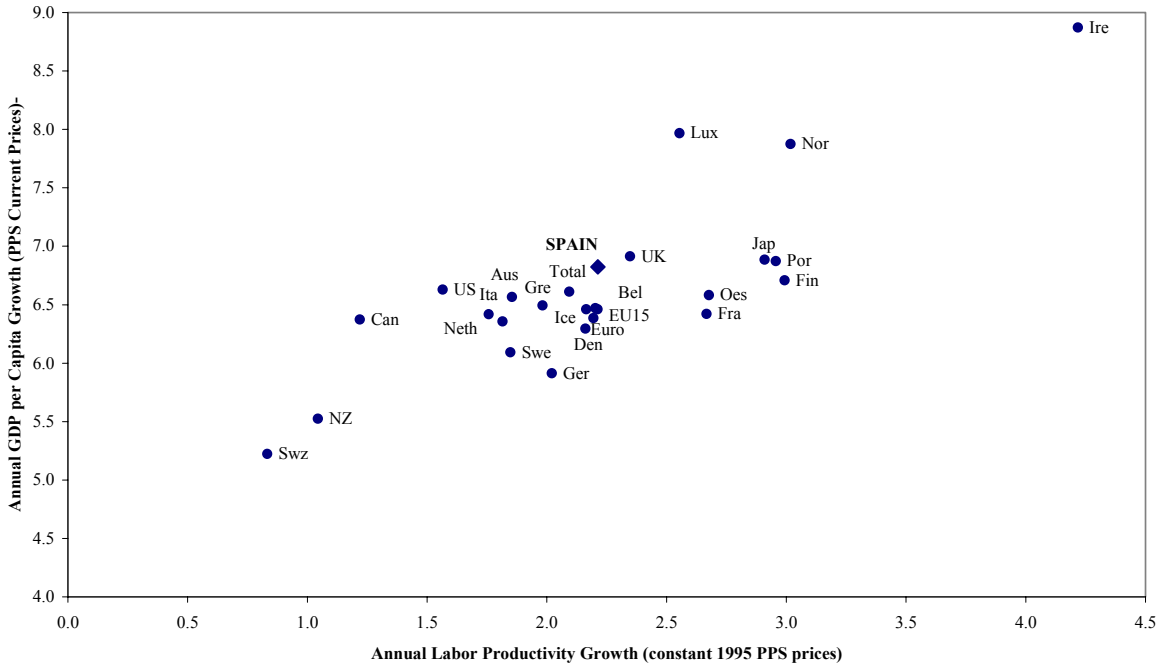


Figure 5. Growth of GDP per Capita and Labor Productivity (1975-2004)



Souces: EC (AMECO database); Eurostat; OECD; GGDC Total Economy Database; and IMF staff calculations.

13. **Under these assumptions, productivity can be seen as the result of the level of TFP and the stock of capital per unit of labor, or capital-labor intensity.** We refer to this decomposition as Decomposition I.

Decomposition I:

$$\frac{Y_t}{L_t} = A_t \left(\frac{K_t}{L_t} \right)^{\alpha} \tag{3}$$

When comparing productivity levels across countries, Decomposition I allows splitting the productivity differential into a part that is due to more efficient use of given resources (i.e., TFP) and another part that is due to availability of more resources in the form of higher capital-labor intensity. For example, the TFP gap under Decomposition I between Spain and other countries indicates the increase in productivity that would take place should this TFP gap be closed *while holding constant the capital-labor ratio.* This quantification provides useful insights from an accounting standpoint. Interpretation of the results, however, must avoid the presumption that TFP differentials evolve independently from capital-labor intensity differentials—a presumption not supported by either growth theory or empirical evidence. This is because, in principle, an increase in TFP would result in higher output, which in turn, would raise investment (for example, if investment represents a stable proportion of output); hence, over time, the capital-labor ratio would rise as a consequence of the initial TFP shock. In fact, capital-labor ratios have increased gradually over the sample period for all economies, as have TFP levels.

14. **The results from Decomposition I show a significant gap of Spain in TFP, which has paralleled the gap in labor productivity over time (Table 2, Figure 6).** In 2004, Spain had a 22 percent TFP gap with respect to the whole sample. Only Japan, Greece, and Portugal showed lower TFP levels. Also, TFP growth (Table 1) slowed down to 0.2 percent in 1999–2004 (1.35 percent for the whole sample), which resulted in a widening of the gap. Other European countries (including Germany and Italy, but not France and the United Kingdom) also experienced a slowdown in TFP growth in 1999–2004, although less pronounced than in the case of Spain. Regarding capital-labor ratios, Spain's level in 2004 was also relatively low, but similar to Australia and Canada, and substantially above Portugal. Other countries whose capital intensity was also below the whole sample in 2004 (although higher than Spain's) were Luxembourg, United Kingdom, New Zealand, Finland, Iceland, United States, and Denmark. Some of these countries, on the other hand, have productivity levels among the highest in the sample owing to high TFP levels.

15. **An alternative decomposition of the productivity gap allows a better focus on the role of TFP versus that of capital.** This decomposition, referred here as Decomposition II, splits labor productivity into a TFP component and a capital-output ratio component as follows:

Decomposition II:
$$\frac{Y_t}{L_t} = A_t^{1/(1-\alpha)} \left(\frac{K_t}{Y_t} \right)^{\alpha/(1-\alpha)} \quad (4)$$

Under Decomposition II, the fraction of the labor productivity gap allocated to the TFP factor represents the increase in labor productivity that would follow from closing the TFP gap, *if the capital-output ratio remained constant.* This hypothetical scenario is more tenable than that of Decomposition I.[32] It allows for the capital-labor ratio to adjust accordingly to the TFP shock to maintain the capital-output unchanged, with these induced effects accounted as part of the TFP component. Indeed, growth theory predicts that capital-output (but not capital-labor) ratios should remain constant along the dynamic steady-state path even in the face of TFP increases. Also, empirically, capital output-ratios do not show a trend over time (Figure 7) despite the upward trend in TFP (Figure 6).

16. **The empirical results of Decomposition II indicate that, at present, Spain's TFP gap—rather than a paucity of capital—accounts for most of the gap in labor productivity (Table 2).** This was not the case during the 1974–85 period, when a significant gap in capital-output intensity existed, which continued to some extent into the 1986–98 period. During 1974–95, the capital output ratio of Spain rose steadily in absolute and relative terms and, in 1995, it eventually exceeded the whole sample level—rising further thereafter. In 2004, the sample countries with a capital-output ratio higher than Spain were Austria, Germany, Greece, Iceland, Italy, Japan, Netherlands, Sweden, and Switzerland. Thus, many of the sample economies, including most productivity leaders, had a lower capital-output intensity than Spain by 2004. In fact, it can be argued that some European countries (Greece, Italy, Germany) and Japan have an excess of capital relative to an efficient inter-temporal allocation of resources. This might be due to higher capital shares, associated with labor market rigidities and other distortions.[33] This point can be illustrated by placing economies in relation to a calibrated line representing Decomposition II. Consider the following equation, where $\overline{K}/\overline{Y}$ is the whole sample capital-output ratio.

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[32] See Hall and Jones (1999). For the opposite view, that is, advocating the use of Decomposition I, see O'Mahony and de Boer (2002). Decomposition II is widely used in the growth literature (see, for example, Mankiw et al. (1992), Hall and Jones (1999), and Kehoe and Prescott (2002)).

[33] Blanchard (1997) conjectures that labor market distortions led in some European economies to an inefficiently high capital intensity, which would explain their higher capital share in national income. It argues that as real wages failed to adjust to the productivity slowdown and supply shocks of the 1970's, firms reacted by moving away from labor. This eventually led to increases in unemployment and adoption of capital intensive technologies. Caballero and Hammour (1998) also finds evidence in this direction—for example, a strong positive correlation between the increase in dismissal restrictions and the increase in the capital-labor ratio. The large weight of manufacturing output in Germany's GDP, on the other hand, could explain part of the relatively high capital-output intensity in that country.

Figure 6: Total Factor Productivity Levels

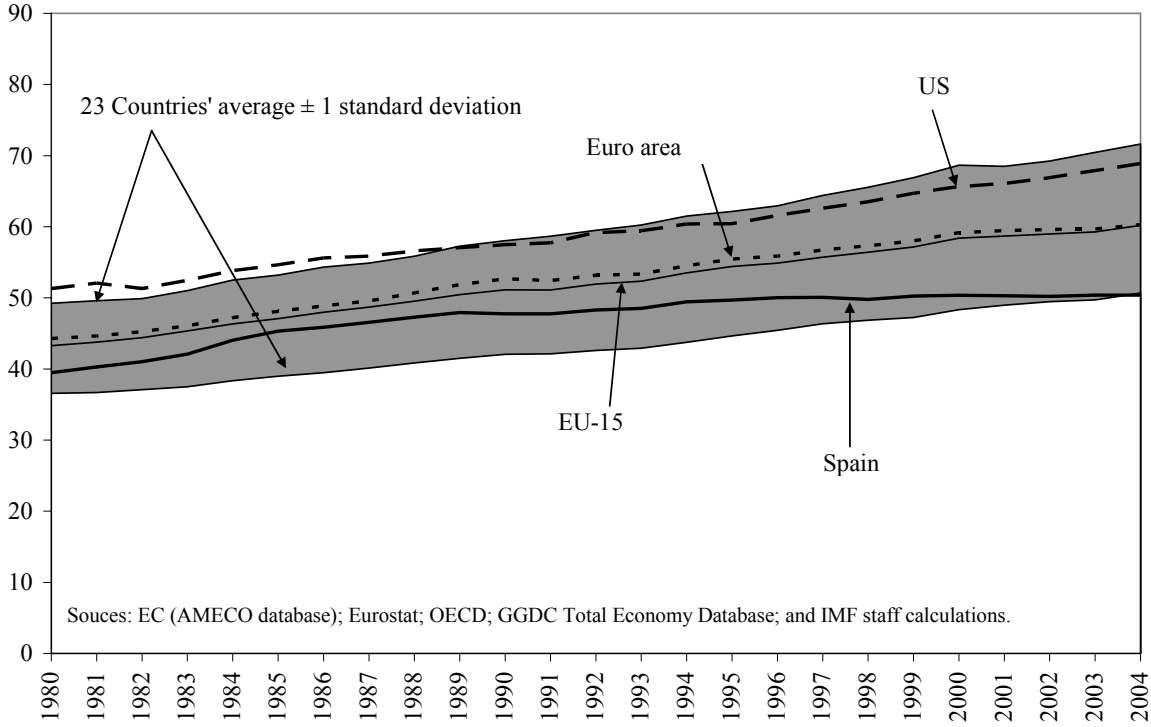
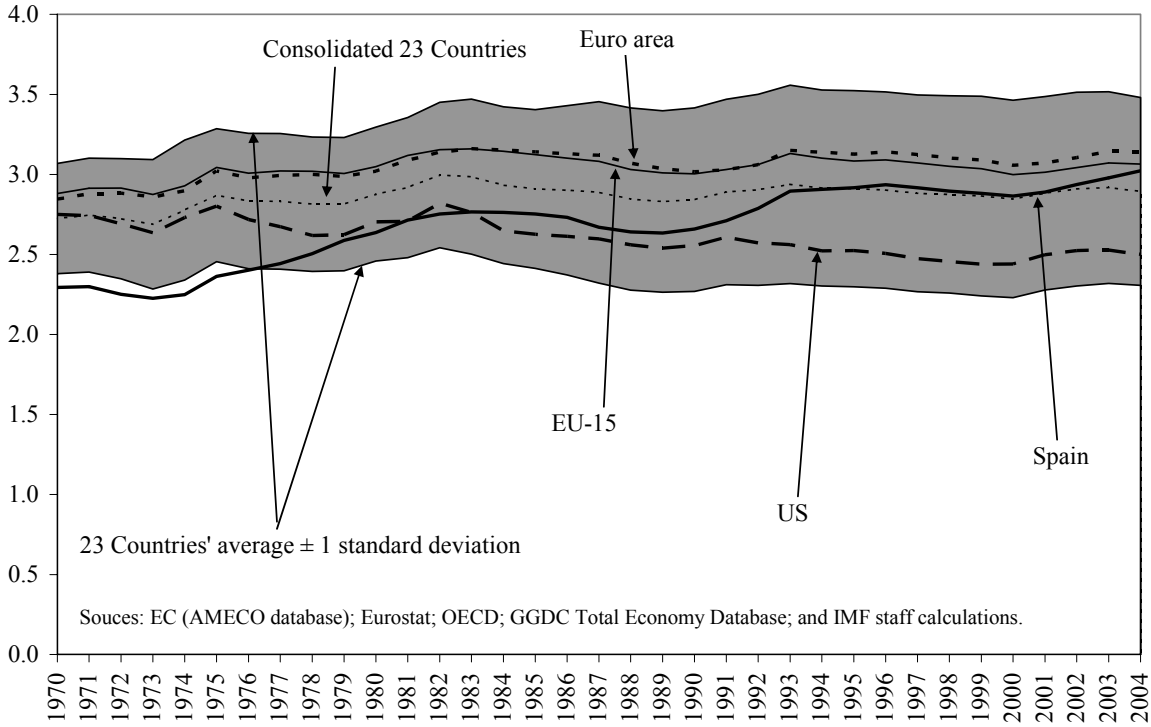


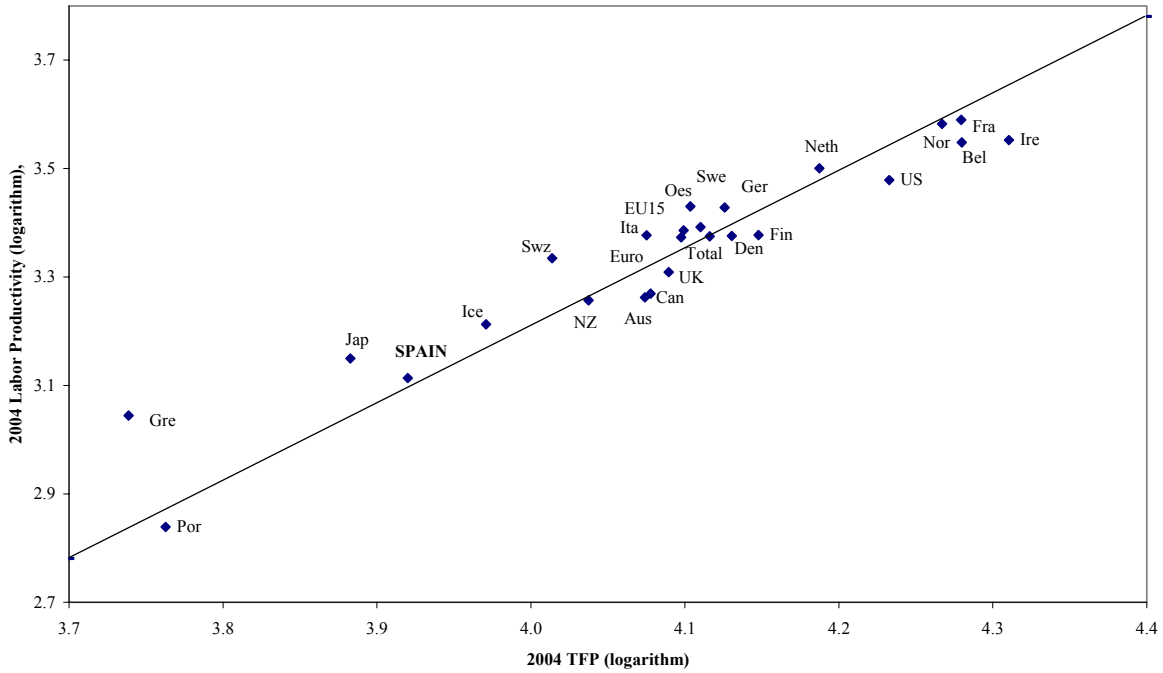
Figure 7: Capital-Output Ratios



$$\ln\left(\frac{Y_i}{L_i}\right) = \frac{1}{(1-\alpha)}\ln(A_i) + \frac{\alpha}{(1-\alpha)}\ln\left(\frac{\overline{K}}{\overline{Y}}\right) + \varepsilon_i \qquad (5)$$

Then, ε_i approximately represents the relative deviation of each country with respect to the whole sample capital-output ratio. The results, for 2004, are represented in Figure 8. It can be seen that Spain lies close to the line indicating a capita-output ratio similar to the sample aggregate, even though with lower TFP. It can also be seen in Figure 8 that high-TFP economies (on the right of the graph) tend to be below the aggregate sample capital-output ratio.

Figure 8. TFP, Labor Productivity, and Capital-Output ratio Deviations from Sample (2004) 1/



1/ Deviations from the line represent capital-output ratios' deviations from sample total.

17. **It must be emphasized, however, that the lack of evidence of a paucity of capital in Spain applies only to the aggregate level of capital and not to its composition.** In particular, there is empirical support for the positive effect that ICT capital has on general productivity.[34] Even if the primary objective were to increase TFP and not capital intensity, certain types of capital investment would still be necessary to take advantage of complementarities between human capital and new technologies, increase R&D, and

[34] See Colecchia and Schreyer (2002). Mas and Quesada (2005) analyzes the Spanish case.

improve firms' management and planning. Also, provision of public or publicly-sponsored capital may have positive production externalities that increase economy-wide production efficiency. Thus, the emphasis of the NRP on increasing investment in R&D and other TFP-enhancing capital, including infrastructures is not inconsistent with the view that most of the productivity gap has its root in low levels of TFP.

C. Conclusions

18. **Advances in labor utilization have underpinned the positive performance of the Spanish economy over the past 30 years.** We have analyzed the evolution over a 30–40 year period through 2004 of Spain's GDP per capita—a measure generally seen as broadly reflecting living standards—in comparison with a sample of 23 industrialized economies. On this measure, Spain has experienced a remarkable convergence with its regional neighbors and other peer groups of economies. Most of this convergence stemmed from closing the gap in labor utilization: specifically from increasing employment rates from low initial levels. But a significant employment rate gap still exists with respect to the overall sample and, although less, with other European economies. This underscores the substantial growth potential of closing the employment rate gap further, as envisaged in the NRP, and as could be helped by further labor market reforms.

19. **The productivity gap, however, has been resilient and it has widened in recent times—becoming the single most important reason of Spain's lag in GDP per capita.** Long-term growth in GDP per capita within the sample economies has been closely associated with productivity growth. As the gap in labor utilization is being gradually closed, the thrust behind Spain's GDP per capita growth will need to shift to productivity gains. Even from a shorter horizon viewpoint, a continuation of the lackluster productivity growth experienced since the end-1990s could prevent further convergence in living standards.

20. **In turn, the reason of the productivity gap lies in stagnating TFP growth rather than in a low aggregate capital endowment.** Thus, the authorities' focus on fostering human capital, R&D investment, provision of public goods with positive production externalities, and more efficient and flexible markets is well placed. Nevertheless, identifying specific factors underpinning TFP growth has proven to be an elusive goal of economic analysis. Thus, effective targeting and re-evaluation of policy initiatives on an ongoing basis will be essential.

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