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Morocco: Selected Issues

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MOROCCO

Selected Issues

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Approved by Middle East and Central Asia Department

April 21, 2004

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Overview

1. This selected issues paper aims to contribute to the analyses of recent developments in the Moroccan economy and its policy challenges over the medium term.

2. **Chapter I assesses the sustainability of public debt in Morocco.** At 68 percent of GDP, government debt is a source of vulnerability and could constrain growth by breeding expectations of higher taxes and interest rates. The paper uses the analytical framework for assessing debt sustainability in emerging market countries endorsed by the Executive Board and compares Morocco's vulnerabilities to those of the average emerging market country. The analysis is complemented by a review of the characteristics of government debt and the institutional framework for public debt management. The paper concludes that the characteristics of government debt compare favorably with those of an average emerging market country and that the current level of debt would appear sustainable judging by the average fiscal performance of the last 10 years. The fiscal position has however deteriorated in recent years and, unless improved, would put the debt-to-GDP ratio on an unsustainable path with no resilience to shocks. A front loaded fiscal adjustment aimed at reducing the debt-to-GDP ratio below 60 percent would enhance the countries' credibility vis-à-vis domestic and foreign investors and would be an important component of a high growth strategy.

3. **Chapter II studies the effects on Morocco's trade pattern of the ongoing integration with the European Union (EU) within the Barcelona process—a key component of Morocco's strategy to increase growth and reduce poverty over the medium term.** Morocco is one of the first Mediterranean countries to have signed and implemented a bilateral Association Agreement with the European Union (AAEU), calling for a gradual elimination of tariffs on non-agricultural goods. Using a gravity model of bilateral trade, this chapter addresses three main questions: (i) has the Barcelona process resulted in trade creation vis-à-vis the EU? (ii) is there any evidence of trade diversion? and (iii) is there any impact on intra-regional trade? The results indicate that Morocco has indeed benefited from trade creation with the EU, especially on the import side. Moreover, trade diversion does not appear to be a major concern, while the desired strengthening of intra-regional trade has yet to take hold. These results would encourage the Moroccan authorities to continue, or even accelerate, their integration efforts with the EU. While accompanying broader multilateral liberalization would be desirable, the apparent lack of trade diversion suggests that this is not a precondition to deepen integration with the EU.

4. **Chapter III examines empirically the long-run relation between workers' remittances and their various potential determinants.** Transfers from Moroccans living abroad play an important role in the current strength of Morocco's external position and have a significant impact on the conduct of monetary policy. Thus, any analysis of the long-term sustainability of Morocco's external position requires a good understanding of the behavior of workers' remittances and their long-run determinants. The findings of the empirical analysis suggest that altruism or solidarity, "attachment to homeland", and economic growth in the countries where remittances originate could indeed be the main long-run determinants of workers' remittances in Morocco. There is no evidence that portfolio diversification motives are significant among the long-run explanatory factors of providing workers' remittances to the home country. These findings suggest that the risks of a sudden end or reversal of transfers from Moroccans living abroad are limited in a foreseeable future. The evidence also indicates that Morocco could further take advantage of its potential as an investment destination in general and for its citizens living abroad in particular. The acceleration of the authorities' broad-based structural reform agenda would support the achievement of this goal.

I. ASSESSING THE SUSTAINABILITY OF PUBLIC DEBT IN MOROCCO[1]

A. Summary

5. **Morocco's public debt has considerably decreased as a percentage of GDP in recent years.** Although good fiscal performance contributed to the decline in total debt during most of the 1990s, privatization receipts accounted for most of the reduction as the fiscal position deteriorated starting in 2000.

6. **The level and characteristics of Morocco's public debt compare favorably with those of emerging market countries.** Active debt management through debt equity swaps and substitution of domestic debt for external debt reduced the share of external debt by half over the last ten years. The share of external debt in total debt is low, external debt is mostly at low fixed interest rates with long maturities, and external reserves cover the totality of external public and publicly guaranteed debt. Debt management has been modernized, and domestic debt is reasonably diversified across maturities and investor bases. In the current environment of low inflation and significant financial deepening, the government should not experience difficulties meeting its financing needs at reasonable interest costs in the foreseeable future.

7. **The recent developments in the fiscal position, if not reversed, would however put public debt on an unsustainable path** The authorities' baseline scenario assumes fiscal adjustment efforts in the medium term that would reduce the debt ratio to 64 percent of GDP by 2009. Stress tests along this adjustment path suggest that this target could be missed by a large margin should adverse shocks, such as severe droughts experienced in the past, reoccur.

8. **Although Morocco's debt profile is favorable, a front loaded fiscal adjustment would be desirable to further reduce the debt ratio.** Such an adjustment aimed at reducing the debt ratio below 60 percent of GDP would increase the countries' resiliency to shocks and further enhance its credibility vis-à-vis domestic and foreign investors. The resulting increase in confidence would be an essential component of a high growth strategy to reduce poverty and unemployment.

B. Introduction

9. **A sustainable public debt is a key component of good macroeconomic management.** A public debt that is too high negatively affects growth because it discourages private investment by breeding expectations of higher real interest rates and the associated debt service burden could lead to higher taxation and reduction of productive fiscal expenditures. Moreover, a high public debt reduces macroeconomic resiliency by limiting fiscal flexibility to respond to shocks. While it can be argued that high public debt incurred to finance expenditures that support private sector activity and growth is desirable, empirical

[1] Prepared by Abdourahmane Sarr

evidence from emerging market countries suggests a negative correlation between government debt and growth. Economic theory also offers little practical guidance on the optimality of a given debt level because conclusions drawn are in most cases model dependent (IMF 2003a). For these reasons, an analysis of the implications of fiscal policies for debt sustainability is important for macroeconomic management.

10. **To facilitate the comparability of public debt sustainability analyses and to emphasize their importance, the IMF Executive Board endorsed an analytical framework that standardized these exercises**.[2] The analytical framework allows to spell out assumptions on key macroeconomic variables that affect debt dynamics (interest rate, growth, exchange rate, and primary fiscal balance) in a baseline medium-term fiscal scenario. The relative contribution of these variables for debt dynamics is then highlighted. The analytical framework calculates the primary balances that stabilize public debt ratios under alternative scenarios and allows to conduct stress tests on the key macroeconomic variables. Stress tests are calibrated on the historical volatility of the macroeconomic variables to highlight vulnerabilities.[3]

11. **The framework should however be supplemented by an analysis of a country's specific characteristics that may have a bearing on the sustainability of its debt.** This is because the sustainability of a given debt ratio varies from one country to another, and may depend on factors not captured by the key macroeconomic variables. These factors include the country's debt management capacity, the characteristics of its debt stock and debt market, and other relevant macroeconomic strengths or vulnerabilities.

12. **Reviewing the characteristics of emerging market countries, the IMF concluded in a recent study that their public debt ratio, at an average of 70 percent of GDP, was unsustainable**.[4] In assessing the sustainability of that debt ratio, the study answered four basic questions: (i) Do primary fiscal balances under current fiscal policies allow to stabilize the countries' public debt ratios?; (ii) Is there a positive correlation between the countries' primary fiscal balances and public debt that suggests a track record of fiscal adjustment to keep public debt on a sustainable path?; (iii) Are the countries debt ratios excessive judging by the benchmark debt ratios implied by the real interest rates on public debt and by the primary fiscal balances and GDP growth rates the countries have been able to generate?; and (iv) Would the countries' debt ratios exceed their sustainable levels in the event of plausible shocks based on experienced volatilities? In answering these questions, the study recognized that its results could not be generalized to all emerging market countries since their individual characteristics can vary significantly and the analysis is mostly backward looking.

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[2] IMF (2002).

[3] Appendix I briefly explains the debt dynamics equation used in the framework.

[4] (IMF, 2003a).

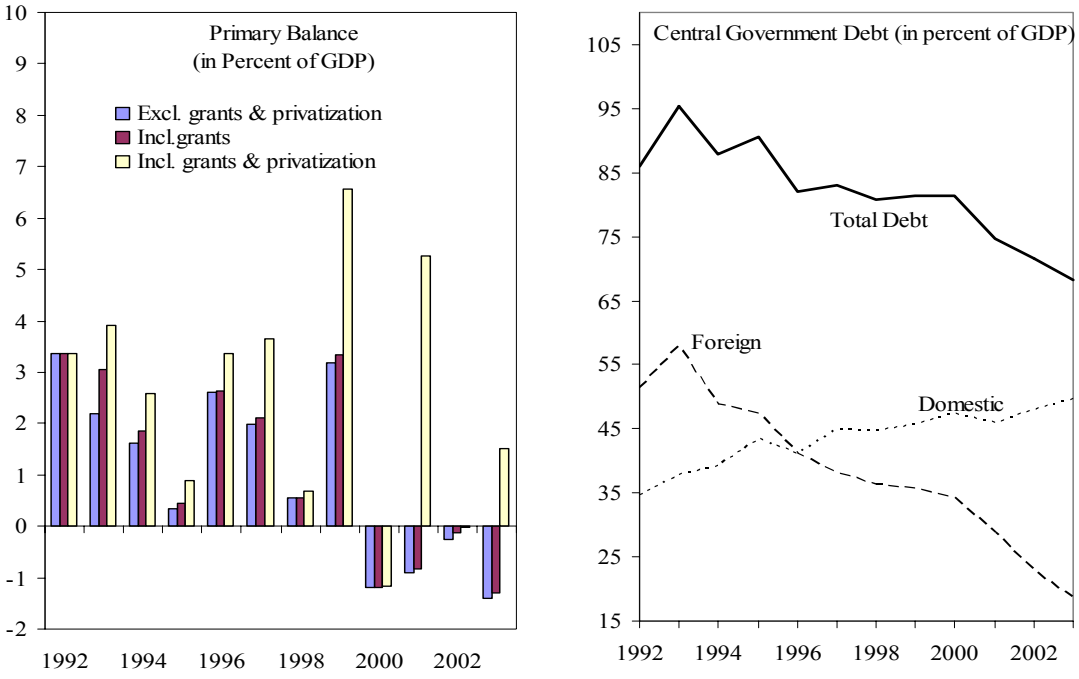
13. **The goal of this paper is to assess the sustainability of Morocco's public debt in light of its specific characteristics and the methodology used in the IMF (2003a) study.** Central government debt in Morocco represented 68 percent of GDP at end 2003 and is close to the average debt level of emerging market countries that the study assessed as unsustainable.

14. **The paper is organized as follows.** Section C describes the trends in Morocco's public debt and fiscal performance over the last ten years. Using the IMF's (2002) debt sustainability framework, the contributions of the key macroeconomic variables that affect debt dynamics are discussed. Section C also describes the main characteristics of Morocco's public debt and the institutional framework for public debt management. Answers to the first three of the four questions discussed above are analyzed to assess the sustainability of the country's debt. In this context, the characteristics of the Moroccan economy to those of the emerging market countries in the IMF (2003a) study are also compared. Section D discusses the implications for public debt of a baseline scenario that assumes fiscal consolidation efforts and those of an alternative scenario that assumes a continuation of the current fiscal policy stance. The implications for public debt of stress tests (the fourth question above) are used to draw final conclusions on the desirability to reduce Morocco's public debt ratio. Section E concludes the paper.

C. Public Debt in Morocco

15. **Public debt has declined significantly in recent years despite a worsening in the fiscal position.** Between 1994 and 2003, total central government debt fell from 88 percent of GDP to 68 percent (Figure 1 and Table 1). The debt ratio however remained high for most of the period despite significant primary surpluses. This is because low agricultural output in drought years resulted in significantly positive real interest rate/growth differentials that offset the debt reducing contributions of primary surpluses. Interest expenditures, although declining, averaged 5 percent of GDP over the period contributing to the fiscal deficit which averaged 3.7 percent of GDP between 1994–99. Since 2000, the primary balance has been in deficit because expenditures financed by privatization receipts, particularly the wage bill, increased while revenues declined because of ongoing trade liberalization and new tax exemptions. While the fiscal position deteriorated, the public debt ratio continued to decline because of privatization receipts. Privatization receipts amounted to only 3.5 percent of GDP during 1994–98 compared to over 12 percent of GDP during 1999–2003.

Figure 1. Primary Balances and Central Government Debt, 1992–2003



Source: Moroccan authorities and staff estimates.

16. **External debt vulnerability also declined considerably in recent years (Figure 2).** The share of external debt in total debt fell by more than half to only 27.1 percent between 1994 and 2003 reflecting the government's policy of substituting domestic debt for foreign debt to pay off expensive debt and debt equity swap operations.[5] Most of the outstanding debt is owed to bilateral creditors and international organizations at low fixed interest rates with an average maturity of 11 years and at a diversified currency composition. The weighted average nominal interest rate on outstanding external debt was only 3.7 percent at end 2003. In addition, external reserves covered the totally of public and publicly guaranteed external debt at end 2003.[6] This makes Morocco virtually immune to the impact of exchange rate movements on its net external debt position (including foreign reserves assets). Furthermore, judging by the 35 percent of GDP threshold above which the risk of a debt crisis has been empirically observed (Reinhart, Rogoff, and Savastano, 2003), and the fact that external debt is mostly owed to official creditors, Morocco appears significantly less vulnerable on the external side.

[5] The substitution of domestic debt for external debt partly explains the increase in gross financing needs observed in Table 1 in recent years.

[6] Contingent claims on reserves are also limited. Foreign currency deposits and nonresident deposits convertible into foreign currency represent less than 1 percent of GDP. Short term external debt is only 6 percent of external debt.

Table 1. Morocco: Public Sector Debt Sustainability Framework, 1994–2003

(In percent of GDP, unless otherwise indicated)

	Actual											
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
1 Public sector debt 1/	88.0	90.6	82.1	84.7	80.9	81.3	81.5	74.8	71.5	68.2		
o/w foreign-currency denominated	48.8	47.3	41.0	39.8	36.2	35.6	34.2	28.9	23.3	18.5		
2 Change in public sector debt	-7.5	2.7	-8.6	2.6	-3.8	0.4	0.2	-6.7	-3.3	-3.3		
3 Identified debt-creating flows (4+7+12)	-11.1	1.5	-6.9	6.5	-3.6	1.4	7.4	-4.5	-1.2	-4.9		
4 Primary deficit	-1.8	-0.4	-2.6	-2.1	-0.6	-3.3	1.2	0.8	0.2	1.3		
5 Revenue and grants	24.4	24.0	23.5	25.5	25.5	27.7	26.2	25.0	24.8	24.2		
6 Primary (noninterest) expenditure	22.6	23.5	20.9	23.4	25.0	24.3	27.4	25.8	25.0	25.5		
7 Automatic debt dynamics 2/	-8.5	2.4	-3.5	10.2	-3.0	8.0	6.2	0.8	-1.2	-3.3		
8 Contribution from interest rate/growth differential 3/	-4.6	5.2	-5.3	5.7	-1.1	4.7	3.3	-1.3	1.6	-0.6		
9 Of which contribution from real interest rate	4.2	-0.5	4.5	3.8	4.9	4.7	4.0	3.5	3.9	3.1		
10 Of which contribution from real GDP growth	-8.8	5.7	-9.8	1.8	-6.0	0.1	-0.8	-4.7	-2.3	-3.7		
11 Contribution from exchange rate depreciation 4/	-3.9	-2.8	1.7	4.5	-1.8	3.2	2.9	2.0	-2.9	-2.7		
12 Other identified debt-creating flows	-0.7	-0.4	-0.7	-1.6	-0.1	-3.2	0.0	-6.1	-0.2	-2.8		
13 Privatization receipts (negative)	-0.7	-0.4	-0.7	-1.6	-0.1	-3.2	0.0	-6.1	-0.2	-2.8		
14 Recognition of implicit or contingent liabilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
15 Other (specify, e.g. bank recapitalization)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
16 Residual, including asset changes (2-3)	3.6	1.1	-1.6	-3.9	-0.2	-1.0	-7.1	-2.2	-2.1	1.7		
Public sector debt-to-revenue ratio 1/	360.4	377.8	348.8	332.3	316.6	293.8	310.7	299.0	288.6	281.9		
Gross financing need 5/	9.8	11.6	8.3	3.3	10.1	18.3	23.2	21.3	20.6	21.9		
in billions of U.S. dollars	2.9	3.6	3.1	1.2	3.7	6.6	8.4	7.7	7.2	8.4		
Key Macroeconomic and Fiscal Variables											10-Year Historical Average	10-Year Standard Deviation
Real GDP growth (in percent)	10.4	-6.6	12.2	-2.2	7.7	-0.1	1.0	6.3	3.2	5.5	3.7	5.8
Average nominal interest rate on public debt (in percent) 6/	6.6	6.8	6.8	6.6	6.6	6.3	6.6	6.5	6.1	6.1	6.5	0.3
Average real interest rate (nominal rate minus change in GDP deflator,	5.1	-1.1	5.8	4.6	6.3	5.8	5.1	4.7	5.5	4.7	4.6	2.1
Nominal appreciation (increase in US dollar value of local currency, in	7.7	5.8	-3.8	-9.4	5.0	-7.9	-7.3	-5.8	10.9	13.7	0.9	8.6
Inflation rate (GDP deflator, in percent)	1.6	8.0	1.0	2.0	0.4	0.5	1.5	1.8	0.6	1.4	1.9	2.2
Growth of real primary spending (deflated by GDP deflator, in percent)	4.1	-2.6	-0.3	9.3	15.1	-2.7	13.7	0.2	-0.3	7.7	4.4	6.6
Primary deficit	-1.8	-0.4	-2.6	-2.1	-0.6	-3.3	1.2	0.8	0.2	1.3	-0.7	1.7
Overall Balance 7/	-4.0	-5.6	-2.8	-3.4	-4.6	-1.9	-6.4	-5.8	-4.6	-5.5	-4.5	
Interest expenditure	5.7	6.0	5.4	5.4	5.2	5.1	5.3	4.9	4.4	4.1	5.1	

Source: Moroccan Authorities and Fund Staff estimates

1/ Public sector refers to central government total gross debt

2/ Derived as $[(r - \pi(1+g) - g + \alpha\varepsilon(1+r)]/(1+g+\pi+g\pi))$ times previous period debt ratio, with r = interest rate; π = growth rate of GDP deflator; g = real GDP growth rate; α = share of foreign-currency denominated debt; and ε = nominal exchange rate depreciation (measured by increase in local currency value of U.S. dollar).

3/ The real interest rate contribution is derived from the numerator in footnote 2/ as $r - \pi (1+g)$ and the real growth contribution as -g.

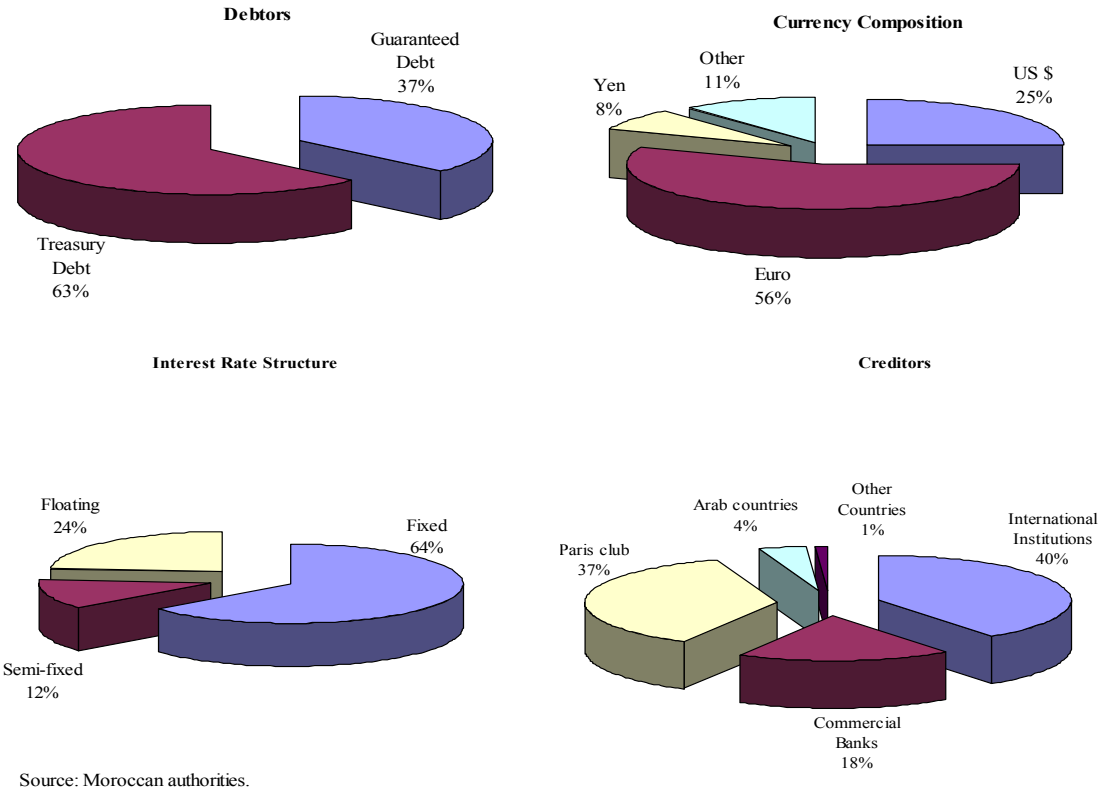
4/ The exchange rate contribution is derived from the numerator in footnote 2/ as $\alpha\varepsilon(1+r)$.

5/ Defined as public sector deficit, plus amortization of medium and long-term public sector debt, plus short-term debt at end of previous period.

6/ Derived as nominal interest expenditure divided by previous period debt stock.

7/ Commitment basis, excluding privatization, including Fonds Hassan II expenditures

Figure 2. Characteristics of External Debt, 2003

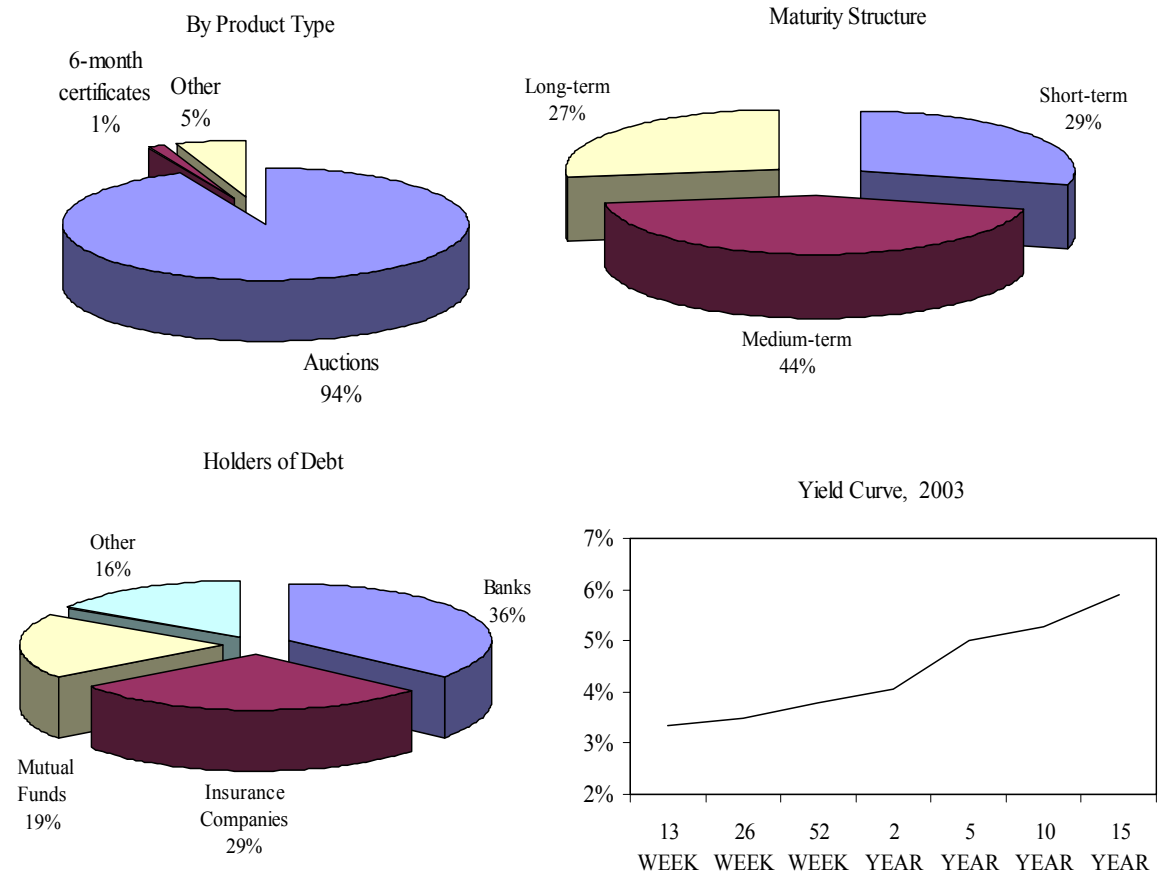


Source: Moroccan authorities.

17. **Characteristics of domestic public debt are favorable and reflect a modernized public debt management framework.** Almost all the domestic debt consists of auctioned treasury bills that are spread over diversified maturities and investor bases (Figure 3 and Box 1), issued in local currency, and at fixed interest rates. The share of short term debt (less than 1 year) has on average been kept at 25 percent to minimize liquidity risk and the average maturity of outstanding debt was 4 years at end 2003. A significant share of domestic debt is held by a healthy commercial banking sector that enjoys a comfortable resource base with broad money exceeding 80 percent of GDP and reserves at the central bank equivalent to 10 percent of GDP. In this context of abundant liquidity and low inflation (1.2 percent in 2003), interest rates on domestic debt have remained moderate over the yield curve.

18. **Notwithstanding its significant holdings of government paper, the banking system does not appear overly exposed to government debt** (Figure 4). Moroccan banks use 80 percent of their deposits to grant loans to the private sector and public debt instruments account for about 20 percent of their portfolios. Nevertheless, bank credit to the private sector is equivalent to about 60 percent of GDP, a level comparable to other emerging market countries, although below the levels attained in the most developed countries.

Figure 3. Characteristics of Domestic Debt



Source: Moroccan authorities.

Box 1. Morocco: Public Debt Management

Public debt management has been modernized. The institutional framework is clearly defined and debt management policies are transparent. Public debt management is the responsibility of the treasury and external finance department of the ministry of finance. Each year, the treasury announces its annual financing requirements and every month it announces the amounts to be raised on the auction market. Auction results are published and the treasury publishes annual reports on debt management.

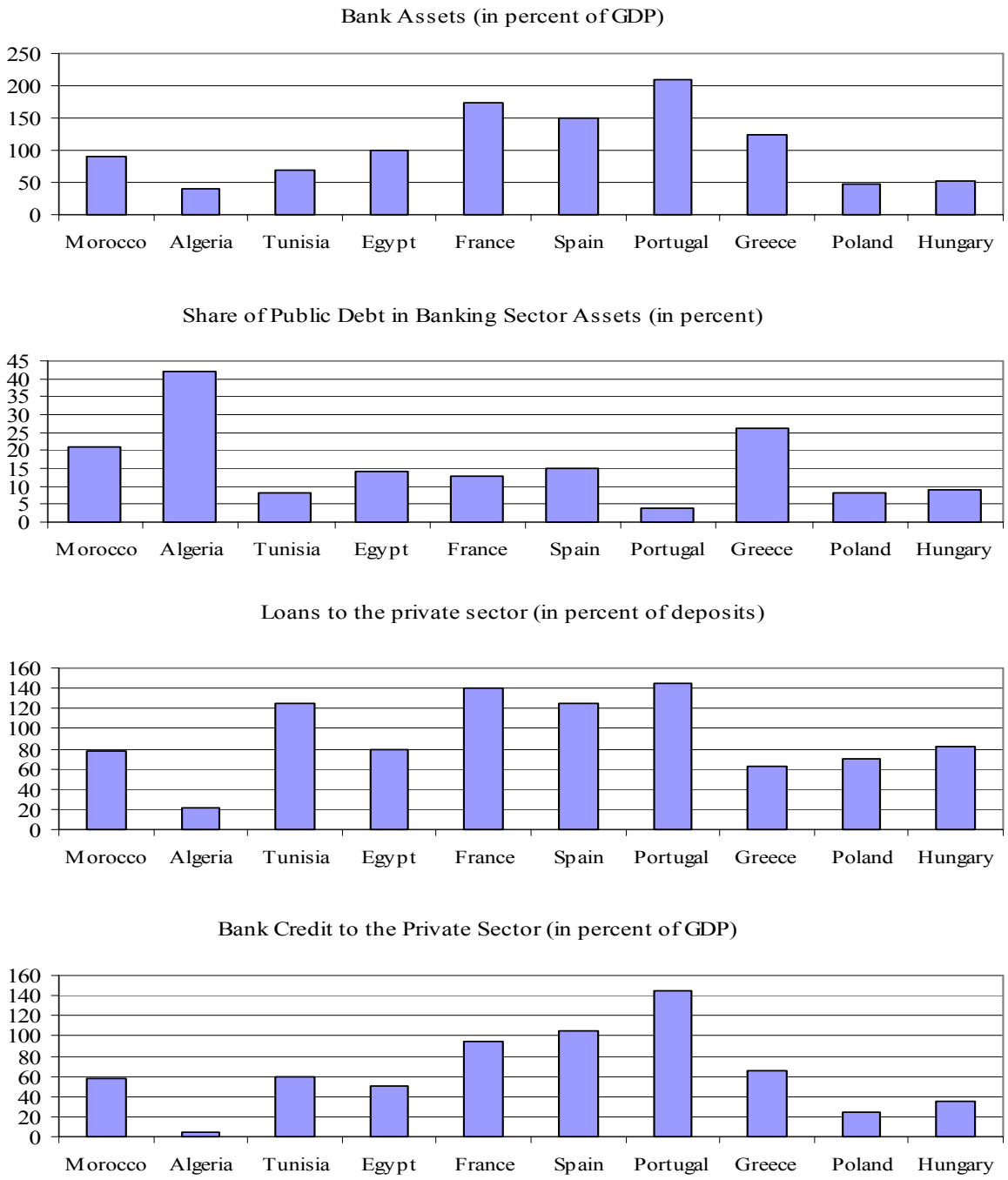
The treasury department holds regular auctions and maintains presence in the market. Government securities of less than 1 year are auctioned every week, maturities ranging from 2 to 15 years are auctioned every month, and longer maturities every quarter. Investors are informed of the issuance schedule and cancellations are announced in advance. To stimulate the auction market, a primary dealer system has been put in place. Primary dealers may submit noncompetitive bids at auctions and are required to provide quotations to support the secondary market.

The secondary market remains thin, but efforts are being deployed to stimulate it. The treasury department introduced the technique of issuance by assimilation whereby new issues characteristics are identical to existing issues in order to increase market liquidity.

A risk management framework has also been put in place and the treasury actively manages its debt portfolio to lower borrowing costs while minimizing risks. A benchmark portfolio has been established for external debt including a currency composition, interest rate, and maturity structures. Efforts are deployed to repay expensive external debt and reduce its level through debt equity swaps and debt conversions. To take advantage of abundant liquidity in the domestic market, the treasury has also been substituting domestic debt for external debt. On domestic debt, it aims to keep short term debt below 25 percent to minimize liquidity risk and extend the duration of the portfolio. The treasury also attempts to align expenditure execution with revenue collection to smooth its financing needs. Information sharing with the central bank also takes place to facilitate the latter's liquidity management.

Source: Guideline for Public Debt Management, Accompanying Document and Selected Case Studies. International Monetary Fund and World Bank 2003.

Figure 4. Banking System Balance Sheet and International Comparison



Source: Financial Sector Assessment Program (2002)

Developed countries, however, rely more on non-deposit funds.[7] These characteristics and the more than comfortable excess liquidity enjoyed by the banking system suggest that the government should not have difficulty meeting its financing needs in the foreseeable future at reasonable costs.

19. **Morocco's public debt appears more sustainable than that of the average emerging market country.** Among the vulnerability factors for public debt highlighted in the IMF (2003a) study for these countries, Morocco seems to share only a similar debt ratio (Figure 5). These countries on average have higher debt to revenue ratios, higher shares of external debt in total debt, lower financial deepening (M3/GDP), and significantly more volatile fiscal revenues. The low coefficient of variation of fiscal revenue in particular implies a stable revenue base to service debt[8], while the high financial deepening implies a larger domestic financing source.

20. **Judging by the first three criteria identified in the introduction of the paper, however, the verdict on the sustainability of Morocco's public debt is mixed.** Morocco's public debt ratio appears sustainable from the point of view of past fiscal performance, but not on the basis of current fiscal policies.

- **First,** the average primary surplus, real GDP growth rate, and implicit real interest rate on public debt over the last ten years (see Table 1) suggest a sustainable debt level of 78 percent of GDP. [9] Relative to the actual debt ratio of 68 percent of GDP, this benchmark debt level does not suggest overborrowing and is comparable to the benchmark debt found in industrial countries (Figure 6). The overborrowing ratio (actual over benchmark debt) is below one (0.87), suggesting underborrowing. An equivalent calculation for emerging market countries suggests a public debt ratio equivalent to 2.5 times their benchmark debt level.

- **Second,** econometric evidence shows a positive and significant relationship between the primary surplus and the public debt ratio suggesting that adjustment efforts have been made in the past to keep public debt on a sustainable path (Table 2). The coefficient for Morocco is significantly higher than that of the average emerging market country.

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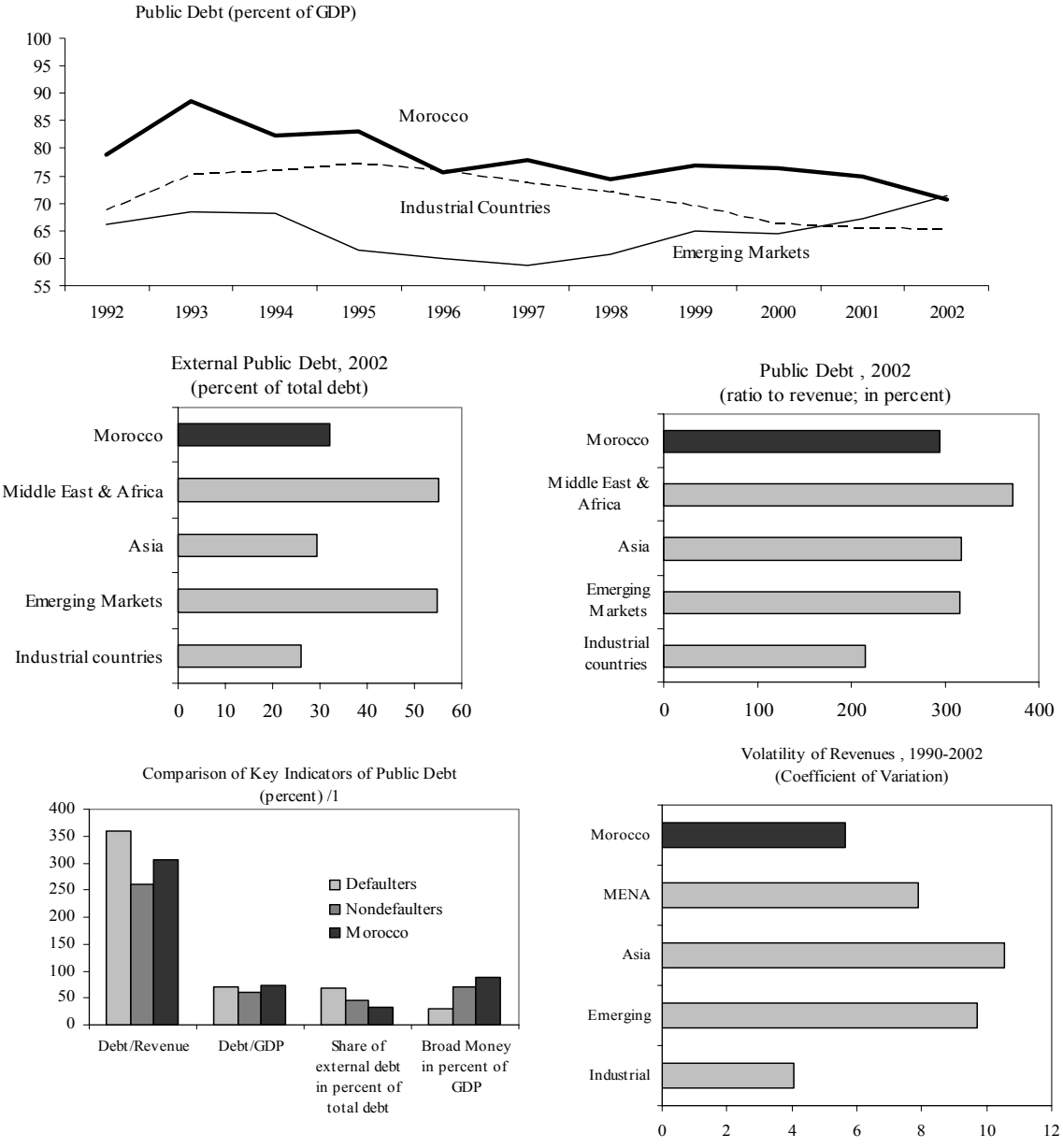
[7] This finding was highlighted by the background papers of the 2002 Financial Sector Assessment Program undertaken by the IMF and the World Bank.

[8] Tax revenues are less volatile than output in Morocco, because the agricultural sector which is the main source of output volatility is not taxed.

[9] With an average primary surplus at 0.7 percent, real GDP growth rate at 3.7 percent, and implicit real interest rate at 4.6 percent, and using $d = p / (r-g)$ to calculate the benchmark debt where p is primary balance as a percentage of GDP, r is the real implicit interest rate on public debt, g is the real GDP growth rate, and d is the debt to GDP ratio.

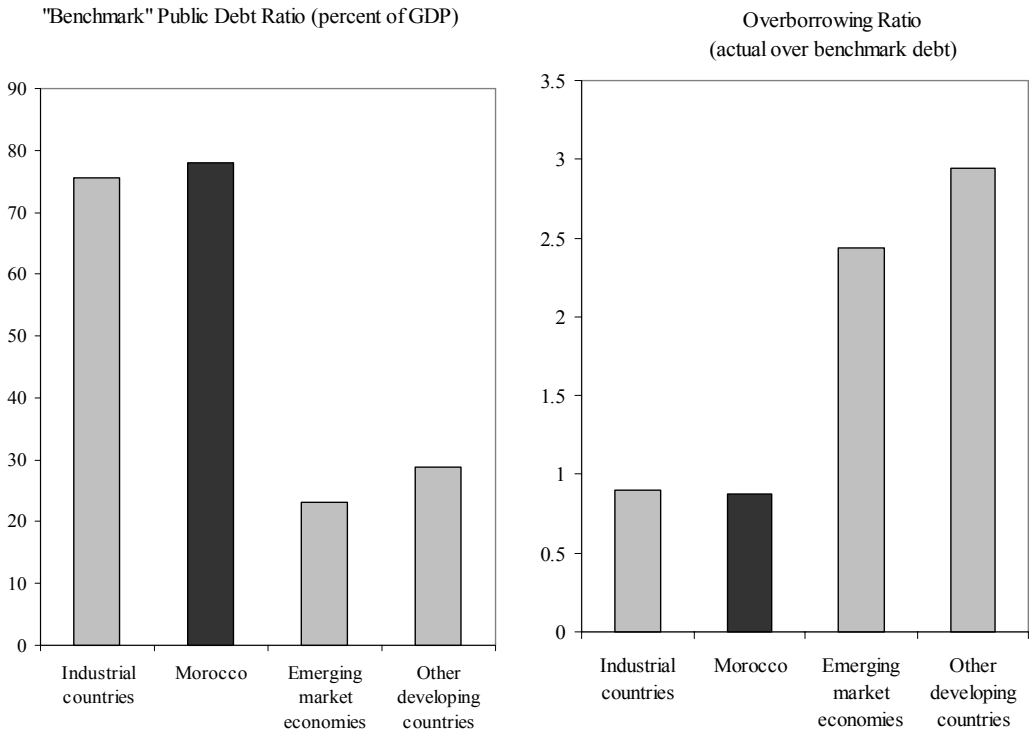
Figure 5. Debt Vulnerability Factors In Emerging Market Countries



Source: IMF (2003a) and staff estimates.

/1 Data are an average for 1998-2002. Defaulters refer to countries that have defaulted since 1998. For Morocco, data is for 2002 only.

Figure 6. Comparison of Overborrowing



Source: IMF (2003a) and staff estimates.

- **Third,** however, on the basis of the average GDP growth rate and implicit real interest rates of the last 10 years (Table 1), the primary surplus that would stabilize the current public debt ratio would be at 0.6 percent of GDP compared to a primary deficit of 1.3 percent of GDP in 2003. A medium term scenario that assumes the continuation of current fiscal policies would therefore put the public debt on an unsustainable path.

D. The Need for Fiscal Adjustment in the Medium Term

21. **The preceding analyses can be justifiably criticized on grounds that they are mostly backward looking.** Indeed, to the extent a country can credibly commit to fiscal consolidation looking forward, past debt dynamics may no longer be relevant. Moroccan authorities have indicated their commitment to fiscal consolidation and are taking steps in this direction with the aim of reducing the deficit to 3 percent of GDP by 2009. Their medium term fiscal consolidation scenario is underpinned by: (i) tax reform to stabilize the revenue ratio as trade liberalization proceeds, and (ii) civil service reform to lower the wage bill. Along with wide ranging structural reforms, fiscal consolidation is expected to increase growth to 5 percent over the medium term. The authorities do not have a debt reduction objective, but this scenario would reduce the debt ratio to 64 percent of GDP by 2009. The implicit interest rate on debt is assumed to increase to its historical average of 6.5 percent

over 2004–09, 0.5 percentage point higher than in 2002–03. Growth is projected at an average of 4.5 percent over 2004–09.

Table 2. Morocco: Fiscal Policy Reaction Function, 1990–2002 1/

(Dependent variable: primary surplus, percent of GDP)

Explanatory Variables			
Total Public debt (TD)--lagged 2/	0.0318***	0.0316***	0.0316***
Interaction with TD (Morocco Dummy)	...	0.649***	0.674***
Drought control (Morocco) 3/	...	...	-0.12
Adjusted R^2	0.63	0.65	0.65
Number of Observations	362	362	362

1/ Equations have been estimated with Generalized Least Squares allowing for fixed effects and correcting for heteroskedasticity.
*** indicates significance at the 1 percent level. The full emerging market countries sample in (IMF, 2003a) has been used.
2/ Emerging Market Economies in EMBI global index at beginning of 2002 plus Costa Rica, Indonedia, India, Israel, and Jordan.
3/ Drought control is defined as years in which the value added in agriculture and overall GDP growth were negative.

22. **Adopting this forward looking approach shows that shocks could still put public debt on an unsustainable path** (Table 3 and Figure 7)**.** This is mainly because of the volatility of output growth. Stress tests on real GDP growth suggest that adverse shocks such as two consecutive years of severe drought could put the debt ratio on an unsustainable path above 100 percent of GDP. Although the assumption of the most extreme stress test on output growth overstates the risk (2 standard deviations of negative shocks on growth two consecutive years, and because output was more volatile in the past), the results nevertheless reinforce the view that public debt ratio should be further reduced. [10] Under the second most extreme scenario (one standard deviation tests on growth and interest rates), the debt ratio could increase to about 80 percent of GDP. This debt ratio is the maximum ratio past fiscal and growth performances suggest is sustainable, as indicated above, but reaching it could undermine investor confidence. In addition, the analysis does not take into account contingent liabilities such as those related to the actuarially unbalanced pension funds and weak public banks.[11]

[10] The volatility of output growth is one of the main determinants of overborrowing in emerging market countries (IMF, 2003a).

[11] See SM/04/121 (4/14/04).

Table 3. Morocco: Public Sector Debt Sustainability Framework, 2002–09

(In percent of GDP, unless otherwise indicated)

	Actual				Projections						
	2002	2003			2004	2005	2006	2007	2008	2009	
					I. Adjustment Scenario						Debt-stabilizing primary balance 10/
1 Public sector debt 1/	71.5	68.2			67.6	67.8	67.5	66.9	65.8	64.1	-1.0
o/w foreign-currency denominated	23.3	18.5			16.3	14.0	12.3	10.6	9.1	7.7	
2 Change in public sector debt	-3.3	-3.3			-0.6	0.2	-0.3	-0.6	-1.1	-1.7	
3 Identified debt-creating flows (4+7+12)	-1.2	-4.9			-3.1	-1.2	-0.3	-0.6	-1.1	-1.7	
4 Primary deficit	0.2	1.3			1.1	0.9	0.4	0.1	-0.3	-0.7	
5 Revenue and grants	24.8	24.2			24.4	23.9	24.0	24.0	24.1	24.1	
6 Primary (noninterest) expenditure	25.0	25.5			25.5	24.8	24.4	24.2	23.8	23.4	
7 Automatic debt dynamics 2/	-1.2	-3.3			-1.5	-1.3	-0.1	-0.3	-0.5	-0.7	
8 Contribution from interest rate/growth differential 3/	1.6	-0.6			0.9	0.1	-0.1	-0.3	-0.5	-0.7	
9 Of which contribution from real interest rate	3.9	3.1			2.9	2.6	2.7	2.7	2.7	2.7	
10 Of which contribution from real GDP growth	-2.3	-3.7			-1.9	-2.5	-2.8	-3.0	-3.2	-3.4	
11 Contribution from exchange rate depreciation 4/	-2.9	-2.7			-2.5	-1.4	0.0	0.0	0.0	0.0	
12 Other identified debt-creating flows	-0.2	-2.8			-2.7	-0.8	-0.6	-0.4	-0.3	-0.3	
13 Privatization receipts (negative)	-0.2	-2.8			-2.7	-0.8	-0.6	-0.4	-0.3	-0.3	
14 Recognition of implicit or contingent liabilities	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	
15 Other (specify, e.g. bank recapitalization)	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	
16 Residual, including asset changes (2-3)	-2.1	1.7			2.5	1.4	0.0	0.0	0.0	0.0	
Public sector debt-to-revenue ratio 1/	288.6	281.9			277.6	283.5	281.5	278.6	273.3	265.5	
Gross financing need 5/	20.6	21.9			22.5	20.8	19.7	19.6	19.1	18.3	
in billions of U.S. dollars	7.2	8.4			10.5	11.3	11.4	12.1	12.7	13.0	
Key Macroeconomic and Fiscal Assumptions			10-Year Historical Average	10-Year Standard Deviation							Projected Average
Real GDP growth (in percent)	3.2	5.5	3.7	5.8	3.0	4.0	4.4	4.8	5.1	5.5	4.5
Average nominal interest rate on public debt (in percent) 6/	6.1	6.1	6.5	0.3	6.0	6.2	6.3	6.4	6.4	6.5	6.3
Average real interest rate (nominal rate minus change in GDP deflator,	5.5	4.7	4.6	2.1	4.5	4.2	4.3	4.4	4.4	4.5	4.4
Nominal appreciation (increase in US dollar value of local currency, in	10.9	13.7	0.9	8.6	15.5	9.5	0.2	0.1	0.0	0.0	4.2
Inflation rate (GDP deflator, in percent)	0.6	1.4	1.9	2.2	1.5	2.0	2.0	2.0	2.0	2.0	1.9
Growth of real primary spending (deflated by GDP deflator, in percent)	-0.3	7.7	4.4	6.6	3.0	1.3	2.5	3.8	3.5	3.8	3.0
Primary deficit	0.2	1.3	-0.7	1.7	1.1	0.9	0.4	0.1	-0.3	-0.7	0.3
					II. Stress Tests for Public Debt Ratio						Debt-stabilizing primary balance 10/
A. Alternative Scenarios											
A1. Key variables are at their historical averages in 2005-09 7/					67.6	66.6	65.7	65.1	64.5	64.0	0.2
A2. Primary balance under adjustment scenario in 2005-09					67.6	67.8	67.5	66.9	65.8	64.1	-1.0
A3. No policy change (relative to baseline) 8/					67.6	70.2	71.6	73.5	75.7	78.0	0.0
B. Bound Tests											
B1. Real interest rate is at historical average plus two standard deviations in 2005 and 2006					67.6	70.7	73.4	72.8	71.6	69.8	-1.1
B2. Real GDP growth is at historical average minus two standard deviations in 2005 and 2006					67.6	79.7	96.6	102.6	107.8	112.0	-1.6
B3. Primary balance is at historical average minus two standard deviations in 2005 and 2006					67.6	69.4	71.3	70.7	69.5	67.8	-1.0
B4. Combination of 1-3 using one standard deviation shocks					67.6	73.6	80.4	79.7	78.4	76.5	-1.2
B5. One time 30 percent real depreciation in 2005 9/					67.6	76.7	76.4	75.8	74.6	72.7	-1.1
B6. 10 percent of GDP increase in other debt-creating flows in 2005					67.6	77.8	77.5	76.9	75.7	73.8	-1.1

1/ Public sector refers to central government total gross debt

2/ Derived as $[(r - \pi(1+g) - g + \alpha\varepsilon(1+r)]/(1+g+\pi+g\pi))$ times previous period debt ratio, with r = interest rate; π = growth rate of GDP deflator; g = real GDP growth rate; a = share of foreign-currency denominated debt; and ε = nominal exchange rate depreciation (measured by increase in local currency value of U.S. dollar).

3/ The real interest rate contribution is derived from the numerator in footnote 2/ as $r - \pi(1+g)$ and the real growth contribution as -g.

4/ The exchange rate contribution is derived from the numerator in footnote 2/ as $\alpha\varepsilon(1+r)$.

5/ Defined as public sector deficit, plus amortization of medium and long-term public sector debt, plus short-term debt at end of previous period.

6/ Derived as nominal interest expenditure divided by previous period debt stock.

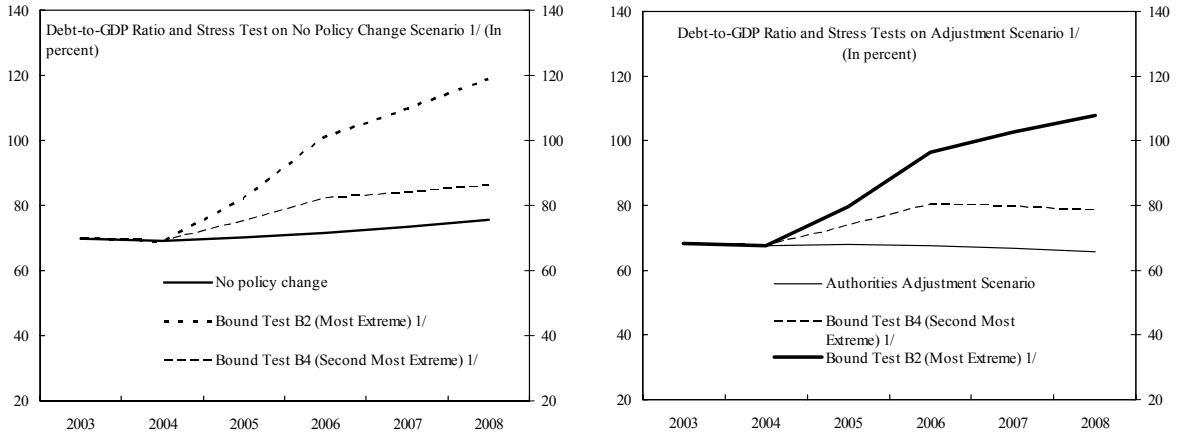
7/ The key variables include real GDP growth; real interest rate; and primary balance in percent of GDP.

8/ In particular, the revenue ratio declines as trade liberalization proceeds and civil service reform is not undertaken

9/ Real depreciation is defined as nominal depreciation (measured by percentage fall in dollar value of local currency) minus domestic inflation (based on GDP deflator).

10/ Assumes that key variables (real GDP growth, real interest rate, and primary balance) remain at the level in percent of GDP/growth rate of the last projection year.

Figure 7. Debt to GDP Ratio Under Alternative Fiscal Scenarios



Source: IMF staff estimates.
1/ See Table 3 on Publlic Sector Debt Sustainability Framework for the definition of bound tests.

E. Conclusion

23. **The paper suggests that a front loaded fiscal adjustment to reduce the debt below 60 percent in the medium term is desirable to provide Morocco with room to absorb shocks.** Past fiscal performance and the characteristics of the public debt stock suggest that Morocco may sustain a higher debt level than the average emerging market country. Other characteristics of the Moroccan economy also compare favorably with other emerging market countries, notably, favorable external vulnerability indicators, low inflation, and low fiscal revenue volatility. However, the volatility of output growth has been high. In view of this, a lower level of debt would increase Morocco's credibility vis-à-vis domestic and international investors in comparison to other emerging market countries.

Public Debt Dynamics Equation[12]

Debt dynamics are modeled by the following process:

$$d_{t+1} - d_t = \frac{1}{(1+g+\pi+g\pi)}(\hat{r} - \pi(1+g) - g + \varepsilon\alpha(1+\hat{r}))d_t - pb_{t+1}$$

where *d* is the debt-to-GDP ratio, *pb* is the primary balance, $\hat{r}$ is a weighted average of domestic and foreign interest rates, α is the share of foreign currency-denominated public debt, π is the change in the domestic GDP deflator, and g the real GDP growth rate. Changes in the exchange rate (local currency per U.S. dollar) are denoted by ε, with ε>0 indicating a depreciation of the local currency.

Based on the above equation, the framework separates between different channels that contribute to the evolution of the debt-to-GDP ratio (Tables 1 and 3 in the text)): the primary deficit (line 4) and the endogenous/automatic factors (line 7), which include the real interest rate, real GDP growth, and exchange rate movements. The contribution of the real interest rate to the evolution of the debt ratio is given by $\frac{\hat{r} - \pi(1+g)}{(1+g+\pi+g\pi)}d_t$ (line 9), the contribution of the real growth rate as $-\frac{g}{(1+g+\pi+g\pi)}d_t$ (line 10), and that of an exchange rate depreciation as $\frac{\varepsilon\alpha(1+\hat{r})}{(1+g+\pi+g\pi)}d_t$ (line 11). The separation of the different factors allows an assessment of their relative importance for the evolution of the debt ratio. It also serve as the basis for stress tests, which include a baseline check, in which the key variables (such as real GDP growth) are assumed to be at their historical averages, and a number of temporary shocks to these variables (isolated and combined) based on historical averages and standard deviations. The results of these stress tests are summarized along with the baseline assumptions and projections in Table 3.

[12] Based on " Debt Sustainability Template, Guidance Note" November 8, 2002. Policy Development and Review Department, International Monetary Fund.

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II. Impact of the Barcelona Process on Morocco's Trade[13]

A. Introduction

24. **A closer integration with the global economy is a key component of Morocco's growth strategy.** Increased openness to trade and capital flows can contribute to improve economic performance through a more efficient allocation of resources, technology transfers, scale effects, competitive pressure, and improved access to foreign savings. Morocco's main trade liberalization efforts have been undertaken with the European Union (EU), first under a cooperation agreement, and more recently—and more significantly—within the Barcelona process.[14] This process, initiated in Barcelona in 1995, aims at closer political, economic, and cultural cooperation between the EU and Southern and Eastern Mediterranean countries (henceforth referred to as Mediterranean countries). The main instruments used to build the economic partnership are the bilateral Association Agreements with the European Union (AAEU), supported by grants under the MEDA program, and complemented by loans by the European Investment Bank (EIB). The principal objectives are to create a Euro-Mediterranean free trade zone by 2010, alleviate the challenges from economic liberalization through capacity building and measures to enhance competitiveness, and increase foreign direct investment into Mediterranean countries. Morocco's AAEU entered into force on March 1, 2000, making the country the third participant after the Palestinian Authority (1997) and Tunisia (1998).[15]

25. **The Barcelona process presents both opportunities and risks.** While quantification of its impact on welfare is beyond the scope of this study, the effect of the process on Morocco's trade pattern will be analyzed, using a gravity model of bilateral trade. In particular, the following questions will be addressed:

- **Has the Barcelona process resulted in trade creation?** Several factors could potentially impede the generation of trade between the EU and its Mediterranean partners. Exports creation toward the EU could suffer if Morocco and other Mediterranean countries are not competitive enough to penetrate the European

[13] Prepared by Ludvig Söderling. Research assistance was contributed by Tea Trumbic.

[14] Morocco is also undertaking other trade liberalization efforts, but their impact will largely be felt in the future. A free trade agreement was recently signed with the United States, another with Tunisia, Egypt and Jordan, and yet another with Turkey. Morocco has also recently reduced and simplified the tariff protection vis-à-vis Most Favored Nation (MFN) countries.

[15] An AAEU came into force with Israel in 2000, and with Jordan in 2002. Egypt signed an agreement in 2001, and Lebanon and Algeria in 2002 (all await ratification). Negotiations were concluded with Syria in 2003. All aforementioned countries signed cooperation agreements in the mid-1970s. Cyprus, Malta (to become EU members in 2004) and Turkey (an EU customs union partner) concluded first generation association agreements with the European Community in the 1960s and early 1970s.

market. On the import side, Morocco's AAEU, like those of other countries, provide for a significantly more rapid reduction in tariffs on non-competing capital goods and intermediate inputs than on competing final goods. As a result, effective protection increases initially, to be reversed only over time.

- **Is there evidence of trade diversion?** Similar to all preferential trade liberalization efforts, the Barcelona process in general and the AAEUs in particular risk displacing trade from more competitive non-EU producers to less competitive producers (tariffs excluded) within the EU. As a result, a portion of the welfare gains from trade liberalization could potentially accrue to inefficient European producers, while the Mediterranean countries pay the price in terms of lost fiscal revenue from tariffs.

- **Has there been any impact on intraregional trade,** i.e., on trade among Mediterranean countries? One of the objectives of the Barcelona process is to increase foreign direct investment (FDI) in Mediterranean countries. However, as long as trade barriers are higher between Mediterranean countries than those vis-à-vis the EU, there is a risk of a "hub and spoke" effect, whereby FDI is directed toward the EU rather than toward Mediterranean countries. By contrast, increased intraregional integration could counter this effect by expanding the market size both for intermediate and final goods.

B. Developments in Trade Patterns Since 1990

Analytical Framework: The Gravity Model of Bilateral Trade

26. **The gravity model is a tool often used to analyze bilateral trade patterns. Its simplicity and high level of statistical explanatory power have contributed to promoting its wide use.** The basic gravity model relates some measure of bilateral trade (imports, exports, or both) to the economic size of two countries, and the geographical distance between them. Population (or GDP per capita), is often also included, along with other variables that could influence bilateral trade. The general specification used here is:

$$M_{ij} = Y_i^{\alpha} Y_j^{\beta} P_i^{\lambda} P_j^{\delta} D_{ij}^{\phi} X_{ij} e^{\varepsilon_{ij}}$$

where M_{ij} is imports to country i from country j. Only south-south and north-south trade is considered, given that the focus of the analysis is on Morocco and that hence intra-industrial country trade (in particular intra-EU trade) is unlikely to provide an appropriate reference for the trade flows studied here. Y_i and Y_j are GDP in country i and j respectively, P_i and P_j are population in country i and j, D_{ij} is the distance between country i and j, X_{ij} is a vector of variables describing either country i or j, or both. This vector includes the share of agriculture in GDP of the exporting country and dummy variables for trade between partners sharing the

same language, for partners bordering each other, for primary commodity exporters, and for landlocked countries.[16] ε_{ij} is a normally distributed error term, with zero mean.

27. **Bilateral trade can be expected to depend positively on the size of the two economies, and negatively on the distance between the countries.** A large population is generally considered to relate negatively to trade, since this would imply a larger domestic market and a higher degree of auto-sufficiency.[17] Trade is also likely to be higher between bordering countries and countries sharing a common language, and lower for landlocked countries. The share of agriculture in GDP can be expected to correlate negatively to exports, since trade protection tends to be particularly high against agricultural products. Trade in primary commodities should ideally be excluded from the gravity model, given that terms of trade swings can cause significant volatility in trade. However, IMF's Direction of Trade Statistics (DOTS) provides data for total trade only, and a dummy variable for commodity exporters is used instead.[18] There is no strong a priori reason for this dummy to be positive or negative.

Empirical Results

28. **The econometric analysis is based on a dataset covering bilateral trade for 90 countries.** Three-year averages are calculated for four separate regressions for the periods 1991–93, 1994–96, 1997–99, and 2000–02 (latest available). Dummy variables for trade between Mediterranean countries[19] and the EU, intra-Mediterranean trade, and Mediterranean trade with the rest of the world are included to analyze any changes in trade patterns over time. Any changes in Mediterranean trade patterns—as seen by changes in the coefficient for the relevant regional dummies—can reasonably be attributed mainly to the Barcelona process, since it is the principal trade liberalization initiative undertaken in that region during the studied period. Another set of regressions is carried out using regional trade dummies for the EU, the Middle East and North Africa (MENA), Asia, sub-Saharan Africa, European developing countries, Latin America, and non-EU industrial countries to control for

[16] The dummy for landlocked countries takes the value 1 if one of the countries is landlocked, 2 if both are, and zero otherwise. All other dummies take the value 1 or zero.

[17] Moreover, for a given level of GDP, a large population indicates a low level of economic development and hence generally a low export capacity. It has, however, occasionally been argued that that a large population allows for scale effects and a more efficient division of labor and would therefore affect trade positively.

[18] The UN's COMTRADE database does provide information on trade by major product group. Exploiting this could be useful for further research.

[19] Mediterranean countries are Algeria, Egypt, Jordan, Morocco, Syria, and Tunisia. Lebanon and the Palestinian Authority are excluded due to incomplete data.

wider regional trade developments.[20] This dummy also proxies for regional difference in overall progress in macroeconomic and structural reform. The results are presented in Tables 1 and 2 in Appendix II.

29. **The interpretation of the results is different for the regressions including and excluding regional dummies**. In the latter case, based on a country pair's respective GDP and population, distance etc., the model predicts the "normal" level of bilateral trade using all south-south and north-south trade as a reference indiscriminately. The signs for the various dummies for Mediterranean trade indicate whether this trade is below, at (in case the coefficient is insignificantly different from zero), or above the "normal" level. Changes in the level of the coefficients over time point to improvements or deteriorations of the trade performance. In the regression including regional dummies, different regions are considered to have different "normal" trade levels. Loosely speaking, without regional dummies, Mediterranean trade is compared to that of all developing countries, while with regional dummies it is compared to that of trade in the MENA region. The latter will always yield more favorable results, given that, according to the model, the MENA region's trade performance was the poorest among all regions in the studied period (see Table 2 and Figure 2 in Appendix II).

30. **The estimated gravity model displays reasonable properties and is robust with regard to variables included** (Tables 1 and 2 in Appendix II). The estimated coefficients for the basic variables—GDP, population, distance, common language, common border, and agricultural share of GDP—are nearly always highly significant, with the expected sign. Interestingly, the share of agriculture in GDP is only significant from the mid-1990s onward, plausibly an outcome of the increasing protection wedge between agricultural and industrial products. In addition to the core gravity model, a set of regressions is shown (for the latter two periods only, due to data availability), including institutional and trade policy variables.[21] These regressions show that the rule of law, control of corruption, and trade policies are all important for trade, although rule of law is not always significant simultaneously with the corruption and trade restrictiveness variables. Institutional weaknesses may explain part of the trade underperformance in the MENA region, since coefficients both for Mediterranean import dummies and the overall MENA dummy generally increase once these variables are included.

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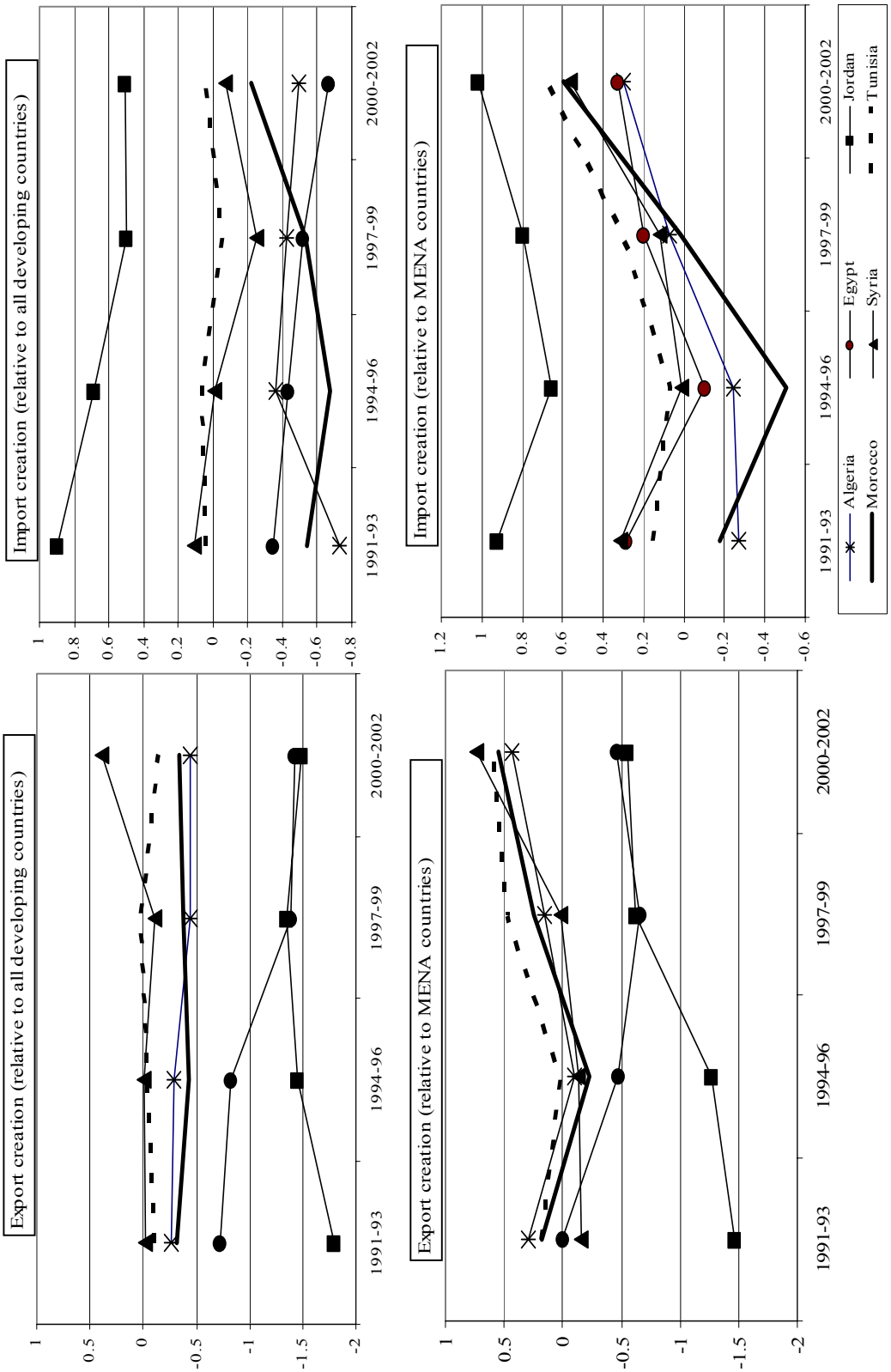
[20] For example trade liberalization under the auspices of the World Trade Organization (WTO) has had an uneven impact on developing and industrial countries, and on countries with different economic structure (see Subramanian, A. and S. Wei, 2003, "The WTO Promotes Trade, Strongly but Unevenly, IMF Working Paper," WP/03/185 (Washington: International Monetary Fund, 2003).

[21] The trade restrictiveness index is a composite index, calculated by the IMF and takes into account both tariff and nontariff barriers. The governance variables are described in detail at http://www.worldbank.org/wbi/governance/pubs/govmatters3.html.

Figure 1. Trade Creation Effects with the EU



Source: IMF staff calculations (see Tables 1 and 2 in Appendix II)

31. **While the Mediterranean countries' trade performance is mixed relative to developing countries in general, it is strong compared to other MENA countries** (Figure 1). Morocco and Tunisia, the only countries to have ratified their AAEUs before the end of the studied period are among the strongest performers. Both Tunisia's imports from and exports to the EU are at the level predicted for any developing country. The same applies to Syria, perhaps for less obvious reasons. Morocco is the only country to have improved (relative to all developing countries) both its imports and exports performance vis-à-vis the EU since the beginning of the Barcelona process in the mid-1990s. Only Jordan over-imported from the EU relative to the predicted value for developing countries, albeit to a declining degree. Egypt's limited trade creation, despite trade liberalization efforts in the mid-1990s, may be linked to a significant appreciation in that country's real effective exchange rate during the 1990s and tensions in the foreign exchange market toward the end of the reviewed period. Although Algeria seems to have under-traded (relative to all developing countries) with the EU, and increasingly so during the second half of the 1990s, the results are significant for imports only. Moreover, Algeria's broad liberalization efforts in the mid-1990s and its comprehensive tariff reform in 2001 do appear to have generated trade performance improvements relative to the MENA region, although the results remain statistically insignificant on the export side. The latter is consistent with a lack of diversification of Algeria's exports, which remain dominated by oil. Overall, there is clear evidence of trade creation between Mediterranean countries and the EU, once account is taken of regional effects. This evidence is substantially stronger on the import side than on the export side.

32. **Morocco saw significant trade creation effects with the EU on the import side, but imports appear to remain below their "normal" level.**[22] According to the gravity model, Morocco under-imported from the EU by about 50 percent in the mid 1990s compared to (a statistically insignificant) underperformance of about 20 percent at the end of the period.[23] Interestingly, the greatest improvement came after the entry into force of the AAEU. Hence, any potential adverse effects from increased effective protection appear to have been more than offset by the positive impact of the overall liberalization efforts.

33. **Morocco's exports also seem to have benefited from the integration efforts with the EU.** After having controlled for GDP and population growth, and changes in the share of agriculture in GDP, Morocco's exports to the EU are estimated to have increased by about 9 percent since the mid 1990s.[24] This indicates that there are Moroccan exporters competitive

[22] In what follows, the discussion will be based on the model excluding regional dummies.

[23] Underperformance is here defined as the difference between actual and "normal" imports as a percentage of the normal level, or $e^{-0.67}-1 = 0.5$.

[24] This corresponds to the change in the point estimate of the dummy variable for Moroccan exports to the EU. It deserves to be mentioned that while the estimated coefficients were significant at the 10 percent level, the

(continued…)

enough to penetrate the European market, despite a gradual appreciation of the real effective exchange rate, which started to be reversed in 2001. Limited EU concessions given to Moroccan agriculture products and fish may have contributed to the improved export performance.

34. **Trade diversion does not emerge as a major concern.** For the Mediterranean countries as a group, imports from third party countries increased from a 40 percent underperformance prior to the AAEU to a normal level in the last period.[25] Accordingly, the potential harm from the discriminatory aspect of the trade liberalization with the EU appears limited.[26] There are signs of export diversion, with exports to third party partners declining by some 9 percent relative to the predicted value in the latter half of the studied period, incidentally corresponding to Morocco's export creation with the EU. This indicates that at least part of the gross export creation with the EU is merely a dislocation of exports initially going elsewhere.

35. **The desired increase in intraregional trade has yet to take hold**, although the level is not statistically different from the "normal" level. This outcome is not surprising, given that the liberalization efforts so far have been primarily bilateral between the EU and Mediterranean countries. Different rules of origin, weaknesses and inefficiencies in customs administration (less of a concern in Morocco, which has made great progress in this area, and currently clears goods through customs in a matter of hours or less), and the closure of the Morocco-Algeria border have contributed to hamper intraregional trade creation.

C. Conclusions

36. This analysis produces three main conclusions:

- **There is evidence of EU-Moroccan trade creation from the Barcelona process, and this is likely to be reinforced in the medium term.** Both Morocco's exports and imports appear to have benefited from the integration with the EU, despite the increase in effective protection following the implementation of the AAEU. Given that the latter effect will be gradually eliminated, the remaining slack in the imports level can be expected to vanish.

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change itself is not statistically significant. Similar observations apply to most other estimated geographical dummy coefficients.

[25] To avoid multiplication of dummies, the trade diversion effect is examined only for the Mediterranean countries as a group.

[26] In the case of Morocco, the value of non-EU imports remained broadly stable between 1999 and 2002, while EU imports grew substantially. Although this, in itself, is not an indication of trade diversion, it merits monitoring.

- For the Mediterranean region, **the gravity model does not detect any evidence of import diversion from the Barcelona process.** This apparent lack of negative effects from the Barcelona process will have to be re-evaluated over time, as more data become available. Moreover, evidence of export diversion indicates that part of the observed gross EU export creation is simply a reorientation of exports originally directed to third party countries.

- **The Barcelona process has not yet resulted in increased intraregional trade,** thereby restricting the potential gains from the integration process.

37. In view of these conclusions, **Morocco's trade liberalization efforts in the context of the AAEU appear appropriate, and could even be accelerated.** Clearly, it is desirable to accompany these efforts by broader multilateral trade liberalization to avoid complicating customs administration and to promote trade creation with other regions. However, given the enhanced trade opportunities deriving from a deepened integration with the EU combined with the apparent absence of import diversion, multilateral trade liberalization should not, at this point, be considered a precondition.

38. **The absence of intraregional trade creation could raise concerns about potential "hub and spoke" effects.** In this regard, the ongoing efforts to harmonize rules of origin and allow for accumulation of origins among Mediterranean countries are important. In addition, the signing of a free trade agreement between Egypt, Jordan, Morocco, and Tunisia, and of another between Morocco and Turkey are steps in the right direction.

39. As an auxiliary point, the analysis also indicates the **importance of the quality of institutions for effective trade integration.** The rule of law and absence of corruption emerge as important determinants for successful trade promotion. Clearly, the benefits from trade reform will depend on the investment environment. In this regard, Morocco is encouraged to pursue its ongoing efforts to improve its institutions, especially through judicial reform and measures to improve governance and transparency.

Table 1. Morocco: Estimated Results from the Gravity Model, Excluding Regional Trade Dummies 1/

	1991–93	1994–96	1997–99	1999–2002	1997–99	2000–2002
GDP importing country	1.36 ***	1.31 ***	1.24 ***	1.17 ***	1.04 ***	0.88 ***
GDP exporting country	1.45 ***	1.36 ***	1.28 ***	1.28 ***	1.31 ***	1.30 ***
Population importing country	-0.21 ***	-0.21 ***	-0.19 ***	-0.09 ***	0.08 #	0.23 ***
Population exporting country	-0.24 ***	-0.13 ***	-0.04	-0.05 #	-0.07 *	-0.06 *
Distance	-1.44 ***	-1.46 ***	-1.35 ***	-1.33 ***	-1.35 ***	-1.35 ***
Common language	1.16 ***	1.23 ***	1.07 ***	1.00 ***	1.06 ***	0.99 ***
Common border	0.97 ***	1.02 ***	0.88 ***	1.03 ***	0.89 ***	1.11 ***
Landlocked 2/	-0.32 ***	-0.29 ***	-0.30 ***	-0.28 ***	-0.30 ***	-0.35 ***
Agricultural share of GDP 3/	-0.08	-0.16 ***	-0.17 ***	-0.16 ***	-0.17 ***	-0.17 ***
Commodity exporter	-0.52 ***	-0.12	-0.24 ***	-0.38 ***	-0.22 **	-0.37 ***
Rule of law 4/					0.01	0.07 **
Control of corruption 4/					0.35 ***	0.45 ***
Trade restrictiveness 4/					-0.08 ***	-0.06 ***
EU-Mediterranean trade						
Morocco imports	-0.54 ***	-0.67 ***	-0.53 ***	-0.22	-0.38 *	-0.24
Morocco exports	-0.32 *	-0.43 **	-0.38 *	-0.34 *	-0.42 ***	-0.55 *
Algeria imports	-0.73 ***	-0.36 *	-0.42 **	-0.49 ***	0.01	-0.17
Algeria export	-0.26	-0.29	-0.44	-0.45	-0.37	-0.72
Tunisia imports	0.04	0.06	-0.06	0.04	0.21	0.01
Tunisia exports	-0.12	-0.04	0.02	-0.15	-0.06	-0.44
Egypt imports	-0.34	-0.43 #	-0.51 **	-0.66 ***	-0.34	-0.48
Egypt exports	-0.72 *	-0.83 **	-1.39 *	-1.43 ***	-1.37 ***	-1.53 **
Syria imports	0.11	-0.01	-0.25 #	-0.07	0.27	0.26
Syria exports	-0.03	-0.01	-0.12	0.39	-0.23	0.12
Jordan imports	0.90 ***	0.69 ***	0.50 ***	0.50 ***	0.71 ***	0.57 ***
Jordan exports	-1.80 ***	-1.45 ***	-1.35 ***	-1.49 ***	-1.34 ***	-1.71 ***
Other Mediterranean trade						
Imports from other	-0.17	-0.30	-0.50 ***	0.03	-0.14	0.22 #
Exports to other	-1.13 ***	-1.15 ***	-1.16 ***	-1.24 ***	-1.28 ***	-1.27 ***
Intra-Mediterranean	0.28	-0.06	-0.22	-0.06	0.15	0.11
Constant	4.07 ***	4.59 ***	3.97 ***	3.91 ***	4.25 ***	4.40 ***
Number of observations	5,548	6,264	6,321	6,419	5,261	6,044
R-squared	0.64	0.69	0.67	0.66	0.69	0.67

Source: IMF staff estimates.

1/ Estimated using heteroscedasticity consistent standard errors, ***, **, *, # indicate statistical significance at the 1, 5, 10, and 15 percent level, respectively. All variables are in logs except indices for rule of law, control of corruption and trade restrictiveness.

2/ Dummies take the value one or zero, except the dummy for landlocked countries which takes the value one if one of the partner countries is landlocked, two if both are landlocked, and zero otherwise.

3/ Exporting country.

4/ Importing country.

Table 2. Morocco: Gravity Model Estimations with Regional Trade Dummies 1/

	1991–93	1994–96	1997–99	1999–2002	1997–99	2000–2002
GDP importing country	1.17 ***	1.27 ***	1.23 ***	1.11 ***	1.18 ***	0.97 ***
GDP exporting country	1.34 ***	1.39 ***	1.41 ***	1.34 ***	1.41 ***	1.38 ***
Population importing country	-0.26 ***	-0.29 ***	-0.31 ***	-0.20 ***	-0.16 ***	-0.02
Population exporting country	-0.29 ***	-0.27 ***	-0.27 ***	-0.23 ***	-0.25 ***	-0.25 ***
Distance	-1.61 ***	-1.42 ***	-1.25 ***	-1.18 ***	-1.23 ***	-1.17 ***
Common language	0.84 ***	0.83 ***	0.65 ***	0.66 ***	0.75 ***	0.69 ***
Common border	0.89 ***	1.04 ***	0.98 ***	1.19 ***	0.98 ***	1.25 ***
Landlocked 2/	-0.41 ***	-0.23 ***	-0.31 ***	-0.36 ***	-0.26 ***	-0.37 ***
Agricultural share of GDP 3/	-0.03	-0.06	0.02	-0.01	-0.02	-0.01
Commodity exporter	-0.01	0.03	0.03	-0.06	0.01	-0.08
Rule of law 4/					0.00	0.06
Control of corruption 4/					0.15 ***	0.24 ***
Trade restrictiveness 4/					-0.07 ***	-0.05 ***
EU-Mediterranean trade						
Morocco imports	-0.18	-0.51 ***	0.02 ***	0.59 ***	0.07	0.51 **
Morocco exports	0.18	-0.23	0.24	0.55 ***	0.07	0.23
Algeria imports	-0.27	-0.24	0.07	0.30 #	0.24	0.35 *
Algeria export	0.29	-0.10	0.15	0.43	0.11	0.06
Tunisia imports	0.15	0.06	0.30 #	0.68 ***	0.49 **	0.61 ***
Tunisia exports	0.18	0.02	0.47 *	0.59 *	0.31	0.22
Egypt imports	0.29	-0.11	0.20	0.33 *	0.18	0.31 #
Egypt exports	0.00	-0.47	-0.65 **	-0.46 #	-0.82 ***	-0.69 **
Syria imports	0.31 *	0.01	0.12	0.56 ***	0.49 **	0.69 ***
Syria exports	-0.16	-0.14	0.02	0.74	-0.13	0.42
Jordan imports	0.92 ***	0.66 ***	0.80 ***	1.02 ***	0.94 ***	0.98 ***
Jordan exports	-1.47 ***	-1.28 ***	-0.63 *	-0.55 **	-0.78 **	-0.85 ***
Other Mediterranean trade						
Imports from other	0.76 ***	0.30 #	0.36 **	1.12 ***	0.51 ***	1.08 ***
Exports to other	-0.13	-0.58 ***	-0.29 *	-0.13	-0.59 ***	-0.36 **
Intra-Mediterranean	1.11 ***	0.31	0.40 #	0.77 ***	0.58 **	0.66 ***
Regional trade dummies						
Middle east and North Africa	-1.23 ***	-1.05 ***	-1.48 ***	-1.76 ***	-1.22 ***	-1.57 ***
Sub-Saharan Africa	-0.84 ***	-0.65 ***	-0.77 ***	-0.94 ***	-0.70 ***	-0.99 ***
Asia	1.15 ***	0.28 *	0.25 *	0.33 **	0.16 **	0.24 #
EU	0.24 ***	0.50 ***	0.40 ***	0.44 ***	0.52 ***	0.46 ***
Latin America	-0.56 ***	-0.96 ***	-1.23 ***	-1.28 ***	-1.03 ***	-1.27 ***
European Developing	-0.65 ***	-1.11 ***	-1.06 ***	-0.86 ***	-0.90 ***	-0.86 ***
Industrial non-EU	0.51 ***	-0.55 ***	-0.68 ***	-0.59 ***	-0.75 ***	-0.76 ***
Constant	7.01 ***	5.72 ***	4.69 ***	4.55 ***	4.46 ***	4.64 ***
Number of observations	5,548	6,264	6,321	6,419	5,261	6,044
R-squared	0.68	0.71	0.70	0.69	0.70	0.69

Source: IMF staff estimates.

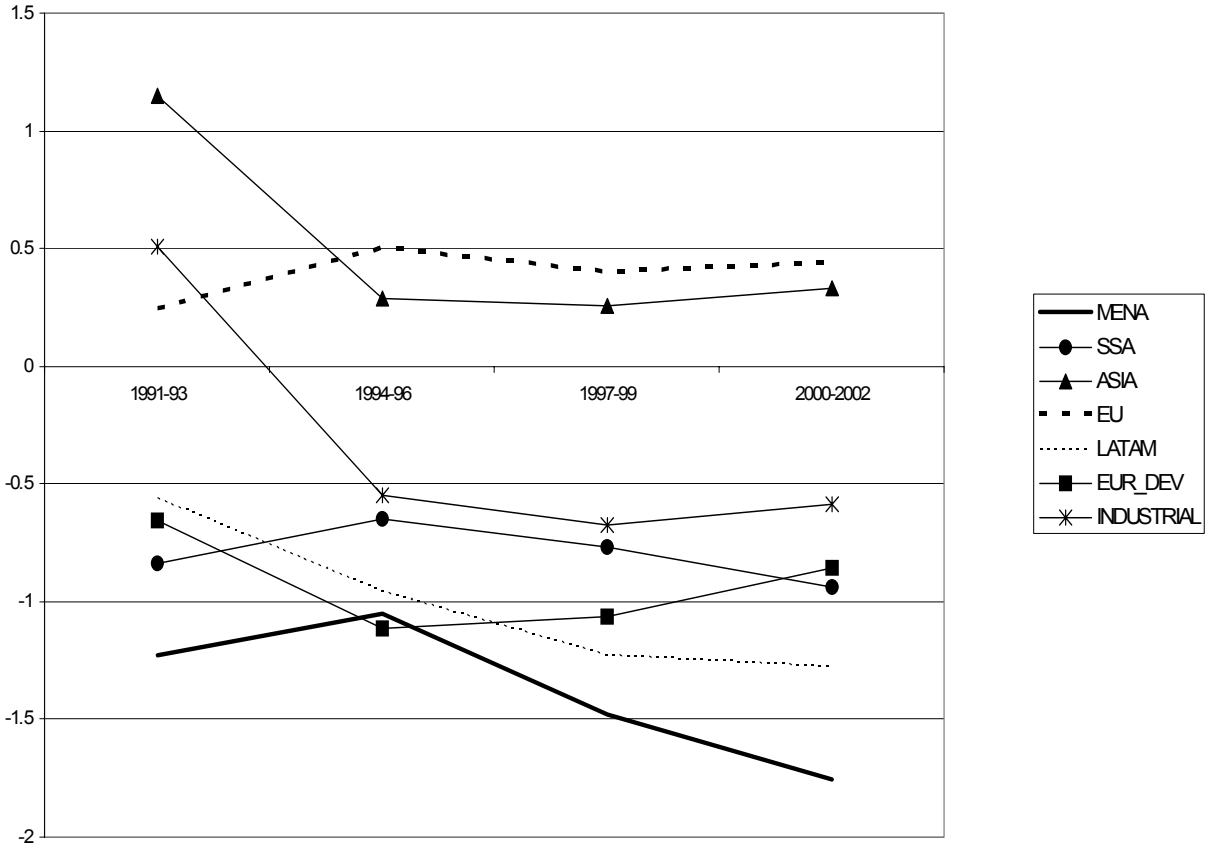
1/ Estimated using heteroscedasticity consistent standard errors, ***, **, *, # indicate statistical significance at the 1, 5, 10, and 15 percent level, respectively. All variables are in logs except indices for rule of law, control of corruption and trade restrictiveness.

2/ Dummies take the value one or zero, except the dummy for landlocked countries which takes the value one if one of the partner countries is landlocked, two if both are landlocked, and zero otherwise.

3/ Exporting country.

4/ Importing country.

Figure 2. Estimated Regional Trade Effects



Source: IMF staff estimates (see Table 2).

III. On The Long-Term Determinants Of Workers' Remittances In Morocco[27]

A. Introduction

40. **Transfers from Moroccans living abroad play an important role in the current strength of Morocco's external position and have a significant impact on the balance of payments and the conduct of monetary policy.** Workers' remittances in Morocco now stand at about 9 percent of GDP, up from an average of 5 percent per year before 2000 (Figure 1). They almost offset the trade deficit, and strongly contribute to the current account and overall balance of payments (BOP) surpluses (Table 1). The accumulation of these surpluses over the recent years have allowed Morocco to build external reserves, which now cover external public debt. The remittances also effect liquidity conditions in the banking system, and, therefore, affect the conduct of monetary policy.

41. **Any analysis of the long-term sustainability of Morocco's external position requires a good understanding of the behavior of workers' remittances and their long-run determinants**. This study tries to achieve this goal by developing a theoretical framework to guide the empirical analysis. Some potential explanatory factors, prompted by the discussions that the mission had with the authorities, are considered. They include "altruism", which could be captured by the relation of remittances to wages in Morocco, "attachment to homeland," as partly captured by the construction of real estate in Morocco by Moroccans living abroad, and economic growth in countries where remittances originate. The authorities also indicated that parts of these transfers are made by Moroccans willing to develop small and medium-size enterprises in their homeland. However, they recognize that transfers related to such motives remain very small. Nonetheless, in order to keep the study as comprehensive as possible, and not impose any restriction a priori on the model, interest rates in Morocco and abroad were also added in order to assess whether such transfers could partly reflect portfolio diversification, which could help capture transfers driven by investment motives. In addition to these determinants, there could be qualitative factors related to the authorities' policies toward Moroccans living abroad. Various policy measures essentially related to administrative procedures have been put in place to keep Moroccans living abroad attracted to their home country. These have not been taken into account in this study.

42. **The empirical evidence confirms that altruism or solidarity, "attachment to homeland" and economic growth in the countries of residence could indeed be the main long-run determinants of workers' remittances in Morocco.** The evidence suggests that in the long-run, the elasticity of remittances with respect to Moroccan real GDP, which is used as a proxy for real incomes, is negative, holding everything else constant. This suggests that there could be altruistic or solidarity motives behind workers' remittances in Morocco. The elasticity of remittances with respect to wages in the countries where they originate is positive. This finding is consistent with the hypothesis that altruistic motives could in fact be behind remittances, since these motives could be seen as a sign of a willingness to "share". The evidence also suggests that remittances are positively correlated with construction GDP. This result is in line with the great deal of construction of real estate in Morocco by

[27] This chapter was prepared by Jacques Bouhga-Hagbe.

Moroccans living abroad, which could be a sign of their "attachment to their homeland." There is no evidence that motives for portfolio diversification are significant among the long-run explanatory factors. This finding potentially reduces the risks of a sudden end or reversal of transfers from Moroccans living abroad. However, the evidence also suggests that Morocco could further attract remittance inflows through investment. To this end, a faster implementation of the authorities' structural reform agenda could be essential.

43. **The paper is organized as follows**. Section II below discusses the evolution of remittances in Morocco, including their main characteristics and their impact on the balance of payments and the conduct of monetary policy. Section III discusses the potential determinants of workers' remittances in general and presents the long-run relation suggested by the empirical evidence. Conclusions and policy implications are provided in Section IV. The appendices present the theoretical foundation behind the empirical analysis, as well as a brief summary of the econometric techniques used.

B. Workers' Remittances In Morocco

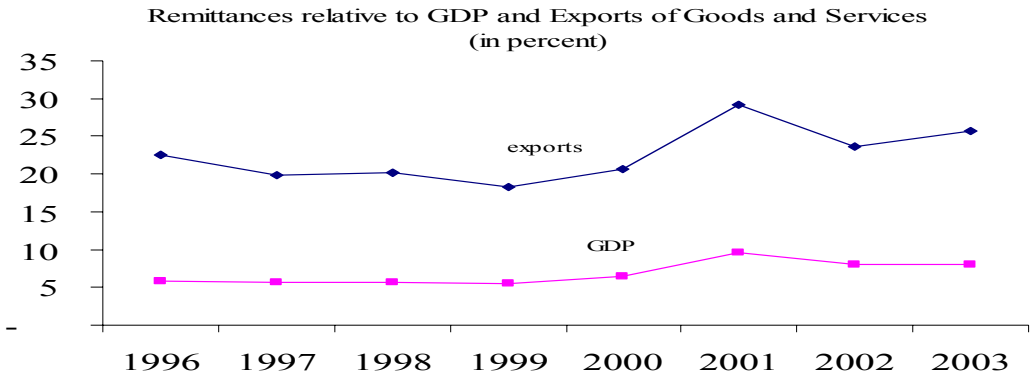
44. **The evolution of workers remittances in Morocco is mainly characterized by a sudden surge in 2000,[28] which is not yet fully explained** (Figure 1). Since then, their level has remained high compared to other countries, at about 9 percent of GDP and about 25 percent of exports of goods and services. For example, in percent of GDP, they are 3 percent in Egypt, 1 percent in Turkey, 5 percent in Tunisia and 18 percent in Jordan. In percent of exports of goods and services, they are 16 percent in Egypt, 3 percent in Turkey, 13 percent in Tunisia, 42 percent in Jordan. Remittances in Morocco mostly originate from Europe, especially France and to some extent Spain.

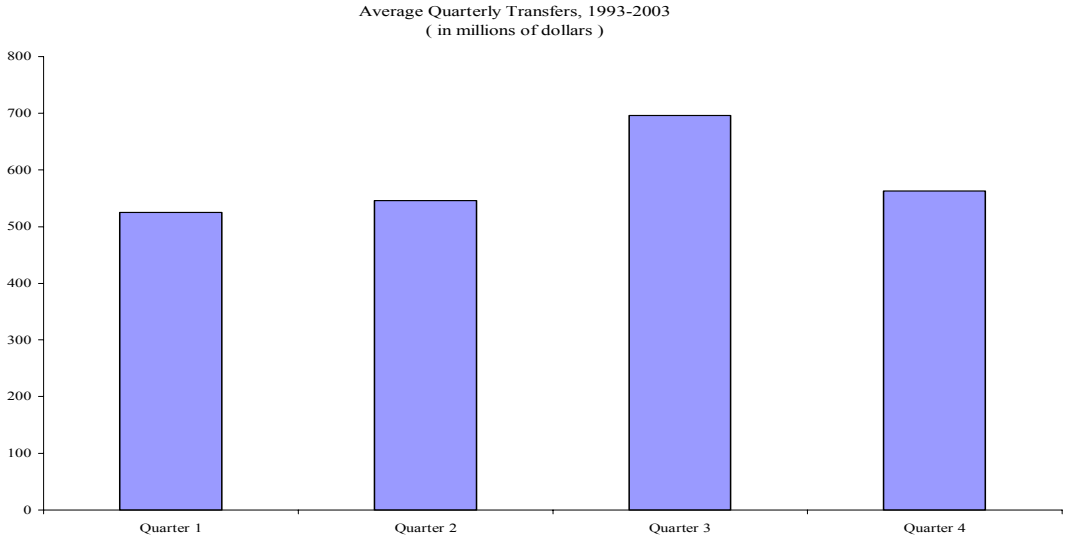
45. **Transfers are made partly through the banking system but also through postal and other money-transfer services** (Figure 1). The authorities indicated that a significant share of transfers is made in cash, especially when Moroccans living abroad travel to their home country. This share is estimated through foreign currency exchanges that are made at the central bank or at other foreign exchange providers, and is included in the estimate of total transfers.

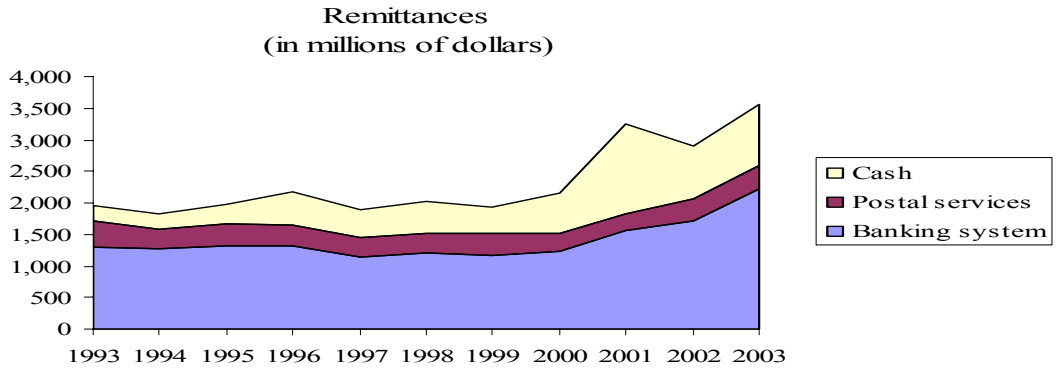
46. **The impact of workers' remittances on Morocco's external position and the conduct of monetary policy is significant.** The remittances almost cover the trade deficit and have contributed to the recent surpluses of the external current account, as well as the overall balance of payments (BOP) (Table 1). The BOP surpluses have contributed to the

[28] A similar phenomenon was observed in Pakistan at the same time, where remittances moved from about 2 percent of GDP before 2001 to more than 6 percent of GDP after 2002.

Figure 1. Workers' Remittances







Sources: Moroccan authorities; and IMF staff estimates.

Table 1. Morocco: Balance of Payments (1996–2003)

	1996	1997	1998	1999	2000	2001	2002	2003 Prel.
				(In percent of GDP)				
Current account	0.1	-0.3	-0.4	-0.5	-1.4	4.8	4.1	3.1
Trade balance	-6.0	-5.6	-6.5	-6.9	-9.7	-8.9	-8.5	-9.9
Exports	18.8	21.1	19.9	21.3	22.3	21.1	21.7	19.5
Imports	-24.8	-26.6	-26.4	-28.2	-32.0	-30.0	-30.2	-29.3
Services	2.6	2.2	2.4	3.2	3.4	5.6	5.4	5.4
of which tourism receipts	4.6	4.3	4.9	5.5	6.1	7.6	7.3	6.9
Income	-3.6	-3.5	-2.9	-2.8	-2.6	-2.5	-2.0	-1.6
Transfers	7.0	6.6	6.5	6.1	7.4	10.5	9.2	9.1
of which workers' remittances	5.9	5.7	5.6	5.5	6.5	9.6	8.0	8.0
Capital and finanical account	0.2	1.5	0.8	5.5	-0.1	5.8	-1.8	0.9
Reserve accumulation	-0.8	-1.7	-0.7	-4.6	1.2	-11.3	-1.8	-3.9
Errors and omissions	0.5	0.4	0.3	-0.4	0.3	0.8	-0.6	0.0

Sources: Moroccan authorities and IMF Staff estimates

strengthening of Morocco's external position through the accumulation of reserves, which now cover the external public debt. The transfers also contribute to the liquidity of the banking system and affect the conduct of monetary policy as evidenced by the recent policy measures taken by Bank Al Maghrib (BAM) to absorb that liquidity.[29] Therefore, understanding the long-run behavior of workers' remittances will be essential to both the long-term sustainability of Morocco's external position and the conduct of monetary policy.

C. Potential Long-Run Determinants Of Workers' Remittances

47. **In this section, first the existing literature on remittances is briefly presented. Then the potential long-run explanatory factors behind the evolution of workers' remittances in Morocco are discussed.** Subsequently, the long-run relation between the remittances and their potential determinants, as derived from a theoretical framework, is estimated. The relative importance of each of those determinants could have an implication on the long-run behavior of the level of remittances.

[29] In order to absorb liquidity in the Moroccan banking system, BAM has recently used reserve requirements and interest rates on its deposit facilities. In addition, an auction mechanism to further absorb bank liquidity has just been introduced.

Discussion

48. **The literature on remittances** can be divided in two segments, one focusing on the causes and uses of remittances, and the other on the macroeconomic impact of remittances.[30] The first segment emphasizes the role of altruism and family ties as a motivation for remittances.[31] However, some other theories have focused on the idea that there can be self-interested reasons for remitting as well, which nevertheless center on the family.[32] The family can also be thought of as playing the role of an insurance company that provides members with protection against income shocks by diversifying the sources of income.[33] The family can also function as a bank that finances migration for some members. The borrowers remit funds in order to repay the loans.[34] Nonetheless, Chami and Fisher (1996) argue that these arrangements may not be as self-interested as they may appear and show that altruism can lead to risk-sharing arrangements that are self-enforcing. Other authors have examined the possibility of portfolio-investment motives behind remittances.[35] Regarding the macroeconomic impact of remittances in the recipient countries, the literature tends to emphasize the point that remittances increase family consumption and are not invested in productive assets,[36] with the possible exception of real estate. In addition, others suggest that remittances, even when they are invested in productive assets, can have Keynesian multiplier effects on the economy, which nonetheless will remain of a short-term nature.[37] Finally, evidence suggests that remittances can be detrimental to long-run growth by lowering labor-force participation.[38] With the above in mind, the following section will discuss the potential causes of remittances in the specific case of Morocco and examine what they could imply for Morocco's long-term prospects.

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[30] See for example Taylor (1999) and Elbadawi and Rocha (1992), Russell (1986) and more recently Chami, Fullenkamp, and Jahjah (2003) for a review of the literature on remittances.

[31] See for example Johnson and Whitelaw (1974), Lucas and Stark (1985).

[32] Lucas and Stark (1985) find evidence for self-interested behavior in Botswana and suggest that one reason for remitting could be that migrants may have investments that need attention while they are away.

[33] See Stark(1991), Agarwal and Horowitz (2002), Gubert (2002), Abel and Kotlikoff (1988), Altonji et al. (1992), and Townsend (1994) among others.

[34] See Poirine (1997), Ilahi and Jafarey (1999).

[35] See for example Straubhar (1986) and Wahba (1991), and more recently Gordon and Gupta (2004).

[36] See Obeirai and Singh (1980), Durand et al. (1996), Gilani (1981), Glytsos (1993), Alderman (1996), Adams (1998, 1991), Brown (1997), Sofranko and Idris (1999), Lopez and Seligson (1991), Taylor (1992).

[37] See Stahl and Habib (1989), Nishat and Bilgrami (1991), Glytsos (1993), Adelman and Taylor (1990), Durand, Parrado and Massey (1996).

[38] See Kozel and Alderman (1990), Itzigsohn (1995), Gilani (1981), Amjad (1986), and Ahmed (1986).

49. **Altruism or solidarity motives** as a determinant of workers' remittances in Morocco could contribute to their stability in the long-run, mainly because it seems reasonable to expect such motives to remain stable.[39] However, the stability of such motives should also be seen in the context of changes in migration patterns. For instance, the migration of family members may reduce the scope for "altruistic" motives. Nonetheless, in the case of Morocco, this effect would be counterbalanced by the new waves of immigrants who are attracted by the increasing labor demand in industrialized countries. Moreover, altruistic motives for remittances may in fact partly reflect self-interested reasons for transfers from Moroccans who want their residential investments to be looked after when they are away. Therefore, "altruistic" flows could be thought of as being fairly stable. Evidence of altruism can be captured by a negative long-run correlation of remittances with wages in the home country.[40] In the specific case of Morocco, one would expect altruism to be evidenced by a negative correlation between transfers and real GDP in Morocco. An additional indicator that could be considered is income in the country of residence. A positive correlation between income in the country of residence and transfers, holding everything else constant, could also be seen as an indication of altruism or solidarity, since it would suggest a willingness to "share."

50. **"Attachment to homeland"** could also contribute to the stability of remittances in the long run, since one would expect such motives to remain stable. However, improved settlement opportunities for Moroccans in their countries of residence may in theory reduce their attachment to Morocco. Nonetheless these improvements in settlement opportunities could be expected to occur at a slow pace, therefore having in a foreseeable future, only a limited offsetting impact on Moroccans' attachment to their homeland. Attachment to the homeland could be assessed with the construction of real estate in Morocco by Moroccans living abroad or any other asset that could reflect their ties to Morocco. Therefore, the value added of the construction sector would then be a natural candidate for a proxy of Moroccans' attachment to their homeland. One would then expect remittances to be positively correlated with construction GDP. Construction of real estate could also be seen as an investment decision based on profitability considerations. However, the evidence on housing prices (Figure 2) would not support such an explanation in the case of Morocco.

51. **Remittances as portfolio investment flows** could be expected to add to a country's vulnerability since one would expect them to be sensitive to their rate of return. A small part of remittances are made by Moroccans who are willing to create small and medium-sized enterprises in Morocco. This is a direct investment flow that could also be interpreted as a sign of their attachment to their home country, and therefore one that is not expected to add to the country's vulnerability. However, the existence of such investments also implies that remittances, because of their potential investment nature, could be sensitive to their rate of return. If this were true, one would expect deposits held in Morocco by Moroccans living abroad to be positively correlated with interest rates in Morocco and negatively with interest rates abroad.

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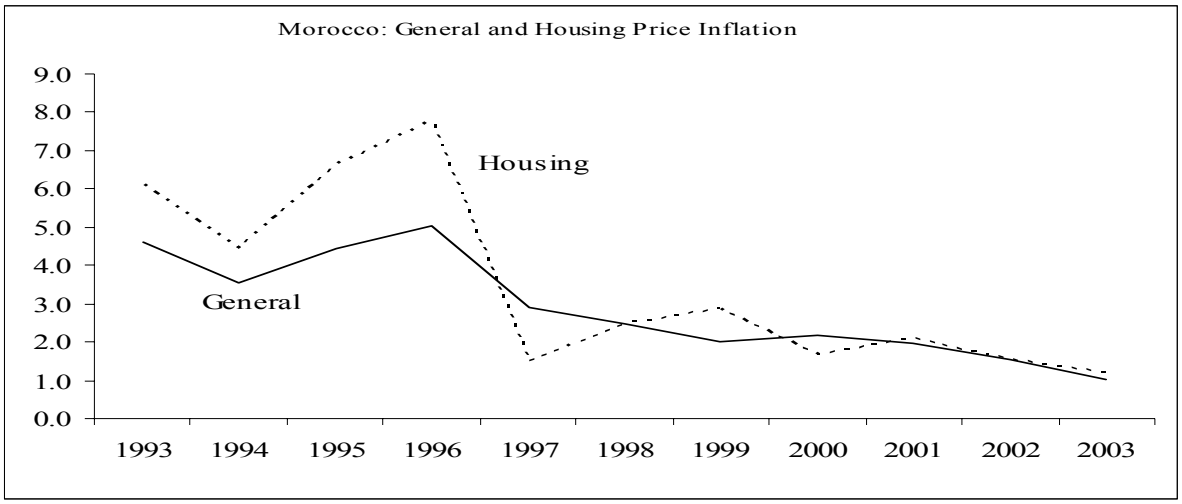
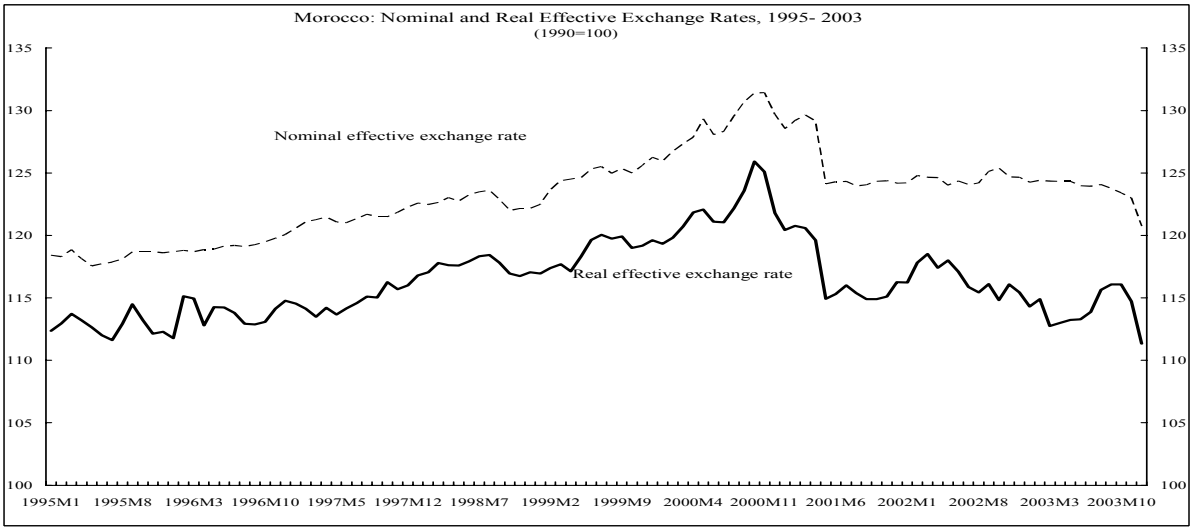
[39] According to the authorities, part of such solidarity motives could be explained by workers' strong family ties to Morocco, where they have left their parents, as well as children in some cases.

[40] See Chami et al. (2003) for a recent discussion and evidence for altruism as a motive for remittances.

Figure 2. Housing Prices and Effective Exchange Rates





Sources: Moroccan authorities; and IMF staff estimates.

52. **The exchange rate through the "substitution" and "wealth" effects** could also influence the level of remittances. The overall effect of exchange rates movements is not always clear a priori because it is the sum of both the "substitution" and "wealth" effects. The idea behind the substitution effect is that because goods in the home country are less expensive with the devaluation or depreciation of the currency, one does not need to transfer as much money as before to buy a given amount of goods, and may even substitute some goods in the home country for the more expensive ones in the country of residence. On the other hand, a devaluation or depreciation of the home country's exchange rate can also make its citizens living abroad "wealthier", and therefore give them incentives to transfer more money in order to buy even more goods, including building residential real estate, in the home country, which are now less expensive. This is the "wealth" effect. However, even if

the actual effect of exchange rate movements were known, interpreting their long-term impact on the sustainability of the external position would not be certain.[41]

53. **National policies toward workers living abroad** could be an important qualitative determinant for transfers in general. In Morocco, the authorities would like to keep Moroccans living abroad attracted to their home country. To this end, they have created a ministry in charge of Moroccans living abroad *(Ministère délégué auprès des affaires étrangères et de la cooperation chargé des Marocains Résidents à l'Etranger)*, which, among other things, helps streamline the administrative procedures related to their transactions with their home country. The model used in this paper will not take such qualitative items explicitly. However, it is shown in Appendix III how one can capture the effects of such policy measures in theory.

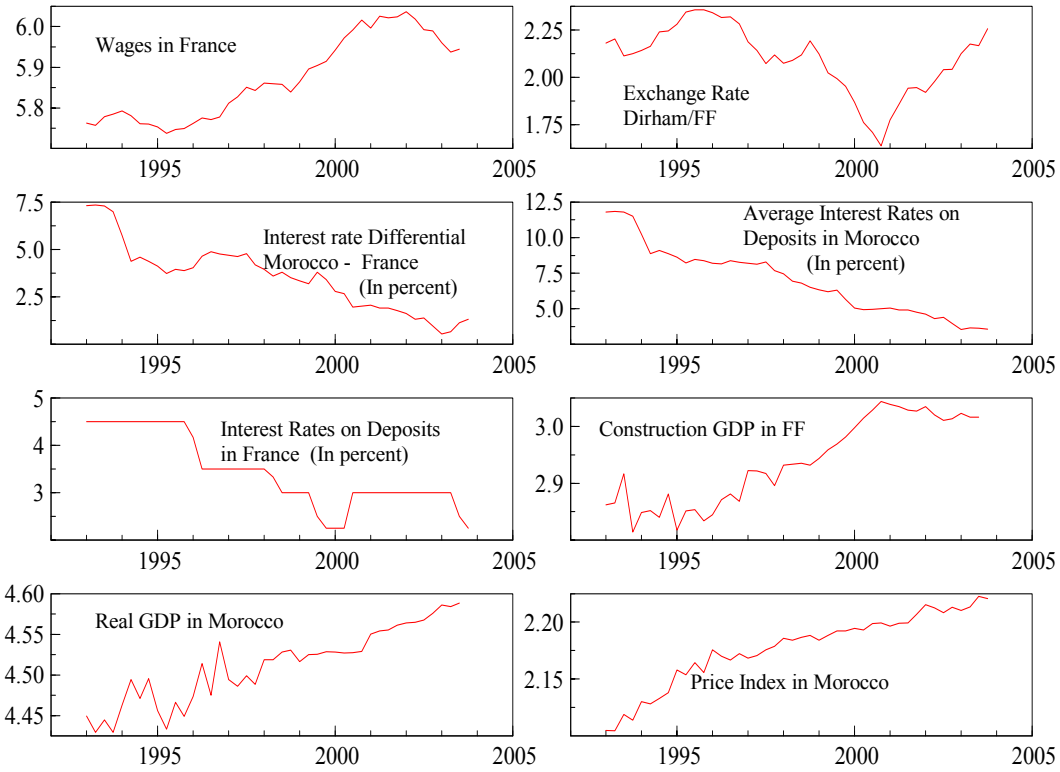
54. **The surge of remittances since 2000 could remain unexplained, even after considering the potential explanatory factors discussed above**. Since this study is mainly about the long-term determinants of remittances, no analysis of this specific phenomenon will be provided. However, Appendix III presents how in theory such a phenomenon can happen. In addition to the wealth effect of the devaluation discussed above, the model allows one to capture the surge in remittances through an increase in the "attachment" to the home country. Various events in the new post-September 11 environment could support an explanation based on the attachment to the home country.

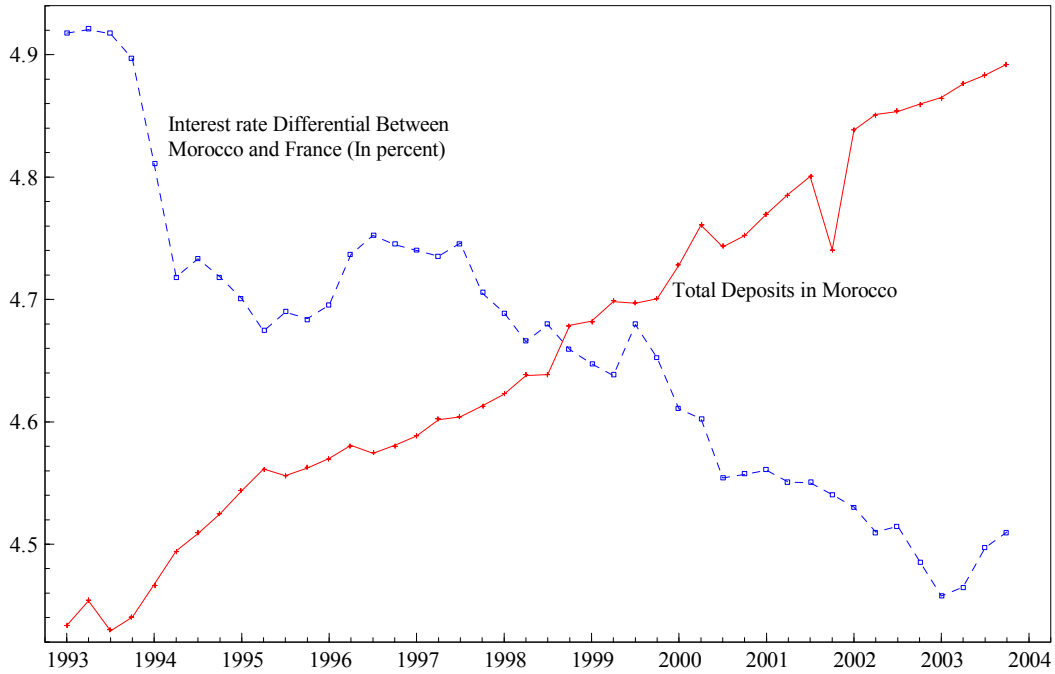
Empirical examination for Morocco

55. **The empirical investigation is based on a theoretical model that is presented in Appendix III, where the implied regression equations are equation 9 for the long-run solution and equation 10 for the short-run one.** In the model of workers' remittances, an altruistic worker, with some degree of "attachment" to her home country maximizes private welfare by allocating her revenue between consumption in the country of residence, family consumption in the home country, acquisition of financial assets in the country of residence, and acquisition of financial and nonfinancial assets, such as real estate, in the home country. The model has some implications that can be estimated. In particular, the model predicts that if workers have some degree of attachment to their home country, then the long-run elasticity between remittances and the acquisition of nonfinancial assets, such as real estate, must be positive. If they are altruistic, the elasticity between remittances and real wages or real GDP in Morocco must be negative, and the elasticity of remittances with respect to wages in their country of residence must be positive. It also predicts that if motives for portfolio diversification are behind workers' transactions with their home country, then there should be a positive semi-elasticity between workers' stock of financial assets in the home country and the interest rate differential between the home country and the country of residence, holding the long-run level of remittances constant. This is assets substitution.

[41] For example, even if a devaluation or a depreciation of the currency can temporarily attract flows from workers willing to buy goods in their home country because they have become less expensive, this factor can also undermine their confidence in the economy in the long run.

Figure 3. Potential Long-Run Determinants of Workers' Remittances
(In logarithm, unless otherwise indicated)





Sources: Moroccan authorities; International Financial Statistics; and IMF staff estimates

56. **An estimate of the co-integration or long-run relation between remittances and their determinants as implied by the model is presented in equation 1.** Since the relevant variables implied by the model are non stationary, estimating the model using a standard ordinary least square technique (OLS) could give a spurious regression equation, which could cause misleading inferences.[42] Therefore, a vector autoregression (VAR) is used to test for the existence of a stationary linear combination of the non stationary variables using Johansen(1991) method. Such a linear combination represents the long-run relationship among the variables. One can refer to Figure 6 to see how the VAR fits the data and Table 3 for the misspecification tests. Figure 4 presents deviations of remittances from their (long-run) value as predicted in equation 1.[43]

$$Remit = a_0 + 1.8 * (Wages\_Fce) - 4.2 * GDP + 10 * Cstr + 19.3 *(ERdh/FF\_EUR) - 0.1 * (IR\_Mor - IR\_Fce) - 4.5 * Dep \quad (1)$$

The variables are in logarithms. The coefficient on *(IR_Mor – IR_Fce)* is a semi-elasticity and other coefficients are (long-run) elasticities, except for the coefficients on (*Wages_Fce)* and *(ERdh/FF_EUR)*, which nonetheless have the same signs as the actual elasticities as explained below.

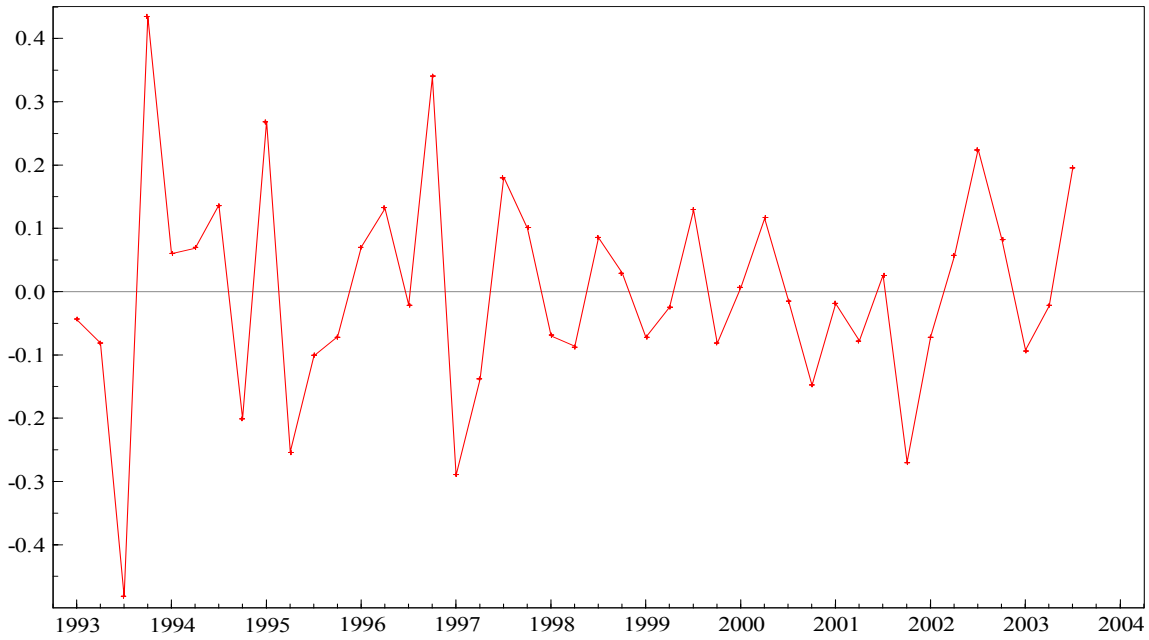
a_0 is an estimated constant term. A random error term is omitted for brevity (Figure 4).
Remit is the logarithm of remittances in French francs or Euro.
Wages_Fce is the logarithm of wages in France in French francs or in Euro.
GDP is the real GDP in Morocco in dirham.
Cstr is the logarithm of the real value added of the construction sector in Morocco in French francs or in Euro.
ERdh/FF_EUR is the logarithm of the exchange rate dirham per French franc or per Euro.
IR_Mor – IR_Fce is the difference between interest rates in Morocco and France in percent.
Dep is the logarithm of the dirham equivalent of the end-of-period stock of total deposits held in Moroccan bank accounts by Moroccans living abroad.

---

[42] See for example Yule(1926), Granger and Newbold (1974), Phillips(1986) for further discussion.

[43] We have conducted an alternative test to confirm whether the vector in equation 1 is indeed a co-integration vector. The framework for this test is provided by Banerjee, Hendry and Smith. (1986) and Kremers, Ericsson and Dolado (1992). The test essentially checks whether the coefficient on the term.
$ECM_{j-1} = (Remit - (1.8 * (Wages\_Fce) - 4.2 * GDP + 10 * Cstr + 19.3 *(ERdh/FF\_EUR) - 0.1 * (IR\_Mor - IR\_Fce) - 4.5 * Dep))_{j-1}$
in equation 10 is negative and significant. Estimation results and 't' statistics are presented in Table 6. Note that the 't' statistics do not have the standard 't' distribution

Figure 4. Deviation of Remittances from the Long-Run Value as Defined in Equation 1

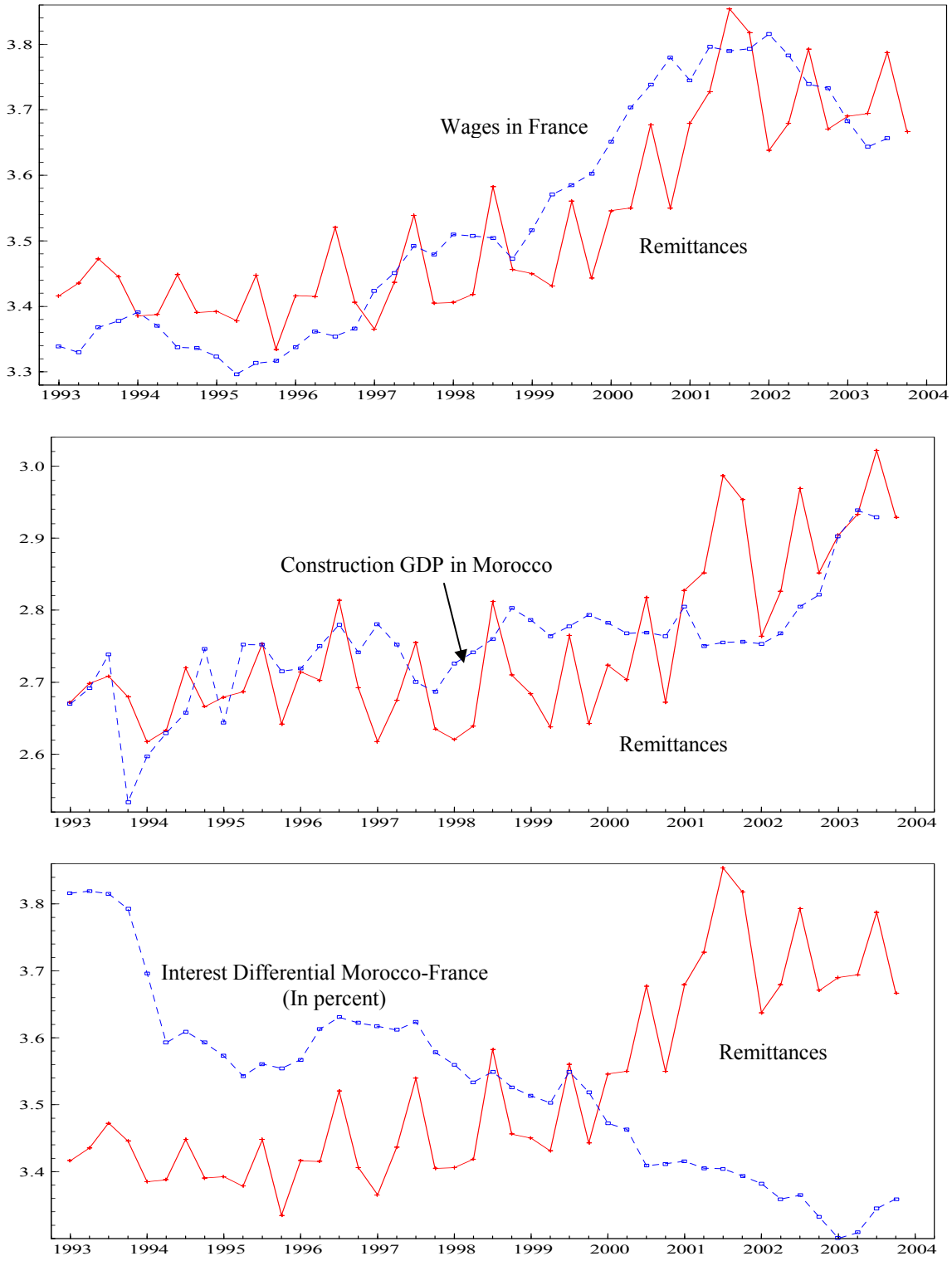


Sources: Morocco authorities; and IMF staff estimates.

Empirical results presented in equation 1, are in line with a priori expectations.

57. **Remittances may partly be driven by a willingness to share, which would support the argument for altruism as a strong determinant of remittances in Morocco.** *Wages_Fce* is used as a proxy for incomes of Moroccans living abroad, as well as the stock of financial assets they hold in their countries of residence. The logarithm allows one to abstract from the actual levels and focus only on growth and the elasticities. Therefore, taking the logarithm of wages in France assumes that its growth rate is positively correlated to the growth of income and financial assets held by Moroccans living abroad in their country of residence. This assumption seems reasonable since most of the remittances originate from Europe, especially France, Italy, and Spain. As explained in Appendix III with equation 9, the coefficient on *Wages_Fce* in equation 1 is not the value of the actual elasticity of remittances with respect to wages abroad. However, its positive sign implies that the latter is also positive. The reason why the coefficient is not the wage elasticity stems from the fact that wages in France are also used as a proxy for financial assets held by Moroccans living abroad in their countries of residence. However, the latter are expected to have a negative elasticity because an increase in assets abroad, everything else held constant (including wages and consumption in the country of residence), will tend to reduce remittances to the home country. Therefore, the positive coefficient on wages implies that the wage elasticity is positive, implying a willingness to share.

Figure 5. Evolution of Transfers and Some of Their Potential Long-Run Determinants
(In logarithm of variables in French Francs, unless otherwise indicated)



Sources: Moroccan authorities: and IMF staff estimates.

58. **The negative elasticity for *GDP* provides additional evidence that altruistic or solidarity motives could partly be behind remittances in Morocco.** *GDP* is a proxy for real incomes in Morocco. As implied in the theoretical framework, the negative correlation between remittances and real incomes in the home country, everything else being equal, is an indication that Moroccans living abroad could be taking into account the well-being of their Morocco-based families in their decision-making process.

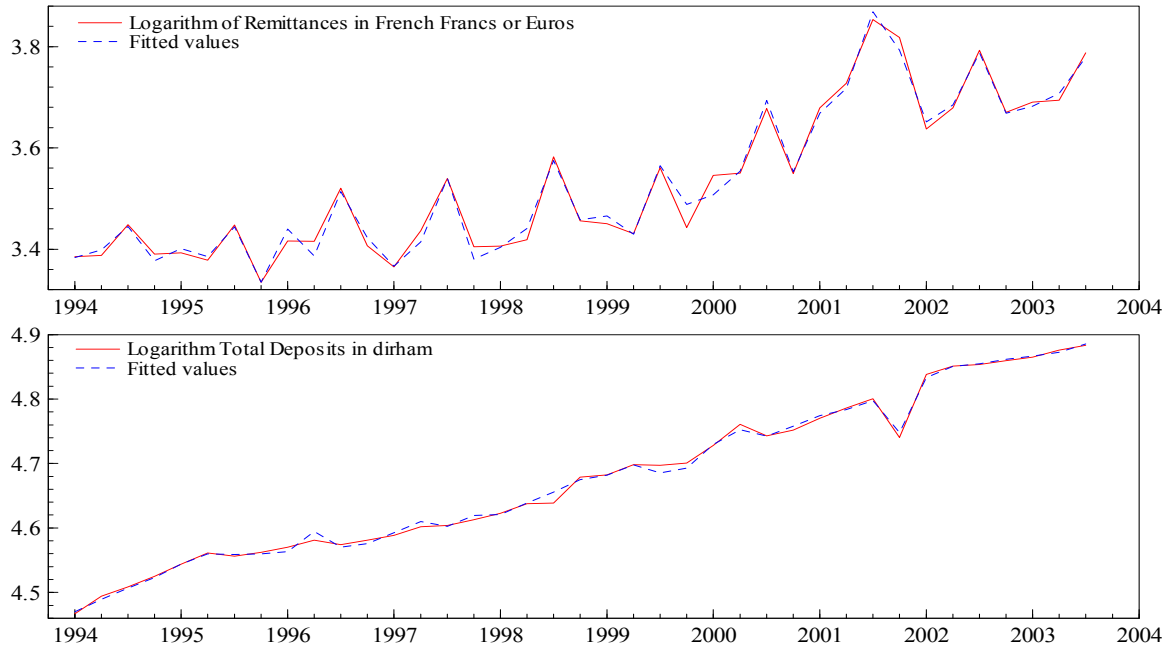
59. **The positive elasticity for *Cstr* suggests that attachment to one's homeland may be another strong motive behind the remittances in Morocco**. *Cstr* is a proxy for the volume of real estate construction in Morocco made by Moroccans living abroad. As shown with the theoretical framework in equation 8, such a phenomenon in the long run is only possible if Moroccans living abroad have some degree of attachment to their home country. As Figure 2 illustrates, the price index for housing, which grows at approximately the same rate as the whole price index, does not show any specific pattern that could significantly tie real estate construction by Moroccans living abroad to some form of investment.

60. **The wealth effect of the exchange rate depreciation should not be excluded from the long-run determinants of remittances in Morocco.** The coefficient on *ERdh/FF_EUR* is not the long-run value of the elasticity of remittances with respect to the exchange rate as argued in Appendix III with equation 9. However, the estimated short-run model suggests that this elasticity could be positive (Appendix IV and Table 6).

61. **There is no evidence that portfolio diversification motives could be behind the remittances in the long-run.** This claim is supported by the negative semi-elasticity of remittances with respect to interest rates differentials *IR_Mor – IR_Fce* and the negative coefficient on *Dep*. The negative signs of these two coefficients imply that holding everything else constant, including the long-run level of remittances and financial assets abroad, an increase in the interest differential in favor of Morocco will not increase the long-run amount of deposits held in Morocco by Moroccans living abroad (Figure 3). Therefore, this finding implies that those deposits may not be accumulated as part of a portfolio diversification strategy. Furthermore, the negative elasticity for *Dep* also suggests that increases in remittances are associated with a draw down of those deposits. This supports the argument that those deposits could merely be transitory accounts that are used to complement spending in the home country when necessary.

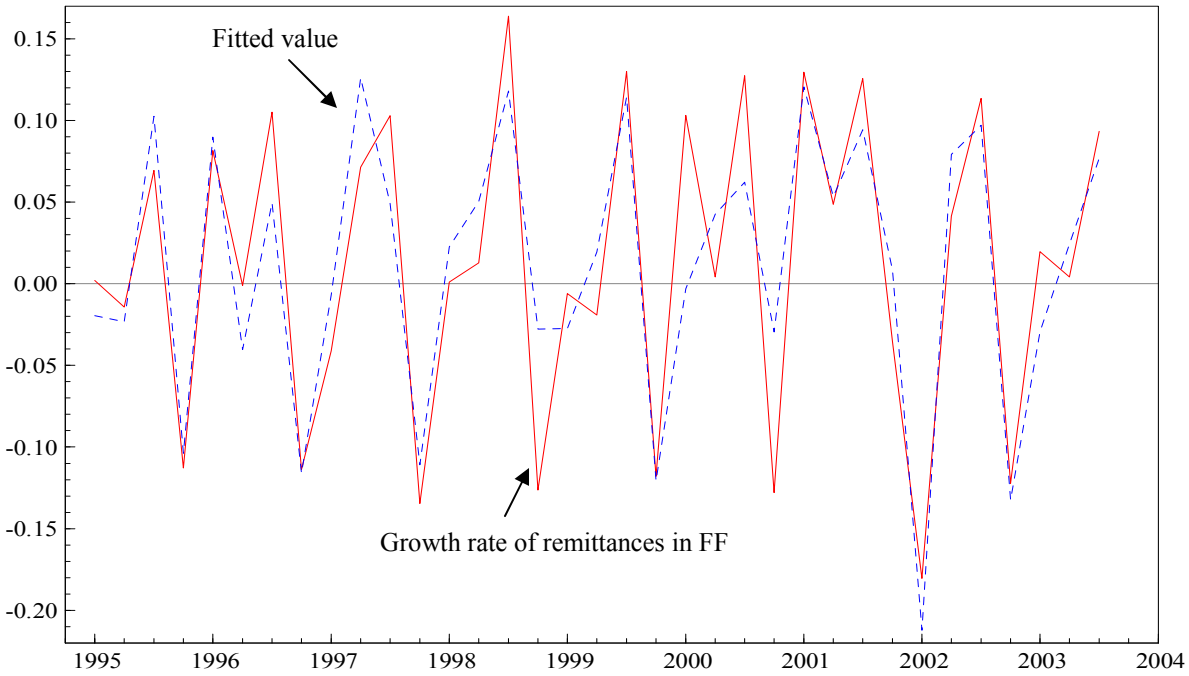
62. **Even though the analysis could be made richer by adding other variables that have been left aside, one should note that the model satisfactorily fits the data, including during the period after 2000, when the surge in remittances is observed (Figures 6 and 7).** However, the model cannot irrevocably attribute the surge in remittances to a specific factor or group of factors. The wealth effect of the devaluation of the dirham, which occurred at that time, could be a potential explanatory factor. However, one cannot reach such a conclusion with certainty without a much deeper analysis, which should also include countries such as Pakistan, where a similar surge in remittances was observed during the same period.

Figure 6. Transfers and Total Deposits and Their Fitted Values (VAR)



Sources: Moroccan authorities; and IMF staff estimates

Figure 7. Remittances Growth Rates and Their Fitted Values (Error-correction or Short-run model)



Sources: Moroccan authorities; and IMF staff estimates

D. Conclusion and Policy Implications

63. **There is no evidence that could suggest that there are significant risks for a sharp slowdown or reversal of workers' remittances to Morocco in the foreseeable future**. The analysis suggests that altruism or solidarity, attachment to homeland and economic growth in the countries of residence could be the main long-run determinants of workers' remittances in Morocco. Moreover, there is no strong evidence that motives for portfolio diversification are significant among the long-run explanatory factors. This finding potentially lowers the above mentioned risks. Thus, remittances are likely to continue to be an important source of foreign exchange inflows to Morocco.

64. **The evidence on Moroccans' attachment to their home country supports the view that Morocco should maintain its economic and political reform efforts, which could further help diversify the investment allocation of remittance inflows, limit the negative impact that remittances could have on labor force participation, and therefore help create a sustained and broad-based economic growth**. The evidence suggests that Moroccans living abroad already show some attachment to their home country, as confirmed by the positive long-run correlation between remittances to Morocco and the value added of the construction sector. However, because this spending in Morocco is concentrated in the construction sector and because only a small portion of remittances goes to the creation of small and medium-size enterprises, Morocco does not fully take advantage of the skills of the new generations who, according to the authorities' own analysis, are not only highly qualified but are also more likely to be entrepreneurs. Therefore, Morocco could further utilize the entrepreneurial skills of its citizens living abroad, which along with the attachment to the home country, could potentially increase remittances through investment and boost Morocco's economic growth.

THE MICROECONOMICS OF WORKERS' REMITTANCES

This section briefly describes the theoretical framework that has guided the empirical investigation related to workers remittances in Morocco.

A. Summary of the Model

Throughout the model, subscripts *t* and *j* will denote the period. The additional notations presented below will be used:

MRA will stand for *"Moroccan Residing Abroad."*

U_t will denote the utility function of the MRA.

β its time discount rate.

H_j will denote size of the nonfinancial asset (real estate) in Morocco (construction costs/unit price of construction goods).

C^*_j will denote the MRA's real consumption abroad.

C_j will denote the MRA's parents' real consumption in Morocco.

α_j will be degree of the "attachment" of the MRA to Morocco.

γ_j will be MRA's degree of altruism toward parents left in Morocco.

P^*_j will denote consumption goods prices abroad.

M^*_j will denote the total MRA's transfers to Morocco in foreign currency (this is what enters in the BOP).

B^*_j will be the MRA's end-of-period net assets held abroad in foreign currency.

W^*_j will be the MRA's earnings in foreign currency.

i^*_j is the level of interest rates abroad.

A_j is the MRA' net financial assets in Morocco (balance of bank accounts held by MRAs in Morocco). The asset value is denominated in dirham.

i_j is the level of interest rates in Morocco.

P_j is price index in Morocco.

e_j is the exchange rate. It is the amount of dirham per unit of foreign currency.

T^*_j will denote the MRA's transfers to parents left in Morocco.

w_j will denote the nominal level of wages in Morocco.

$\Delta_j LogX$ will denote is the first difference in logarithm of *X* from its previous-period value (i.e. $\Delta_j X \equiv Log(X_j) - Log(X_{j-1})$).

$D_j LogX$ will denote is the first difference in logarithm of X from its long-run or steady state value $\overline{X}$ (i.e. $D_j LogX \equiv LogX_j - Log\overline{X}_j$).

Each period *j*, the MRA faces the following constraints:

$$P^*_j C^*_j + M^*_j + B^*_j - B^*_{j-1} = W^*_j + i^*_j B^*_{j-1} \quad (2)$$

$$A_j = A_{j-1}(1+i_j) + e_j M^*_j - P_j (H_j - H_{j-1}) - e_j T^*_j \quad (3)$$

$$H_j > 0 \quad (4)$$

Equation(2) is the budget constraint faced by the MRA each period. It says the amount of spending in consumption abroad, transfers to the home country and asset accumulation must be equal to total income in the period, including interest income. Given the fact that M^*_j can be positive or negative in equation(2), the model allows for portfolio diversification.

Equation(3) gives the law of motion of the interest-earning account. It increases with the interest rate and the amount of transfers. However, it declines as money is withdrawn to finance construction and maintenance of real estate or to support relatives or friends in the home country. Equation(4) just says that the nonfinancial asset must remain positive.

The MRA faces the following additional constraint:

$$C_j = (P_j w_j + e_j T^*_j)/P_j \quad (5)$$

Equation(5) assumes that the MRA's family in Morocco consumes all her revenue, including the transfers from the MRA. This assumption is used solely to simplify the model. One could assume that only a fraction of the revenue is consumed each period without altering the results. One could also make the level of family's consumption an outcome of an optimization problem where the MRA's family solves an intertemporal problem and could acquire her own assets to smooth consumption. However, such an approach would not only add complications to the model, but it will not be very realistic. The reason is that families receiving transfers from parents' living abroad are less likely to build sizable stocks of financial assets because of their modest living conditions.

The MRA then solves the following problem:

$$\text{Max } U_t = \sum_{j=t}^{\infty} \beta^{j-t} \left(\alpha_j Ln(H_j) + Ln(C_j^*) + \gamma_j Ln(C_j) \right) \quad (6)$$

Subject each period j to (2), (3), (4) and (5)

Note that such a representation of an MRA's welfare takes into account future generations utility, but discount it at a rate β. Note also that H_j, the size of the nonfinancial asset (real estate) enters directly in the utility function. This formulation implicitly assumes that the services, and the flow of "happiness" provided by a nonfinancial asset in the nature of a real estate increases with the size of the asset. Finally, note that the terms α_j and γ_j , which respectively capture attachment to the home country and the degree of altruism, can also vary over time. An increase in the degree of attachment to the home country will increase the desired size of the nonfinancial asset, and therefore increase transfers destined to accumulating such an asset. Similarly, an increase in the degree of altruism will also increase the amount of consumption C_j one would like her relatives to enjoy. The implications of the model will now be examined.

At the optimum, among other things, we have the following:

$$P_j C_j = \gamma_j e_j P_j^* C_j^* \quad (7)$$

Equation(7) links the level of consumption the MRA wants her family to have to her own level of consumption in the country of residence. Note the important role of the degree of altruism γ_j. The greater the degree of altruism, the greater the level of consumption enjoyed by the MRA's family. Using equation(5), one can easily see how the model will imply that a greater degree of altruism will lead to larger transfers to the home country. The steady state will give another important implication of the model.

The steady state or long-run in this framework is defined as an equilibrium where the exchange rate, the degree of altruism and attachment to homeland, interest rates, the inflation rates in the home country and abroad, the rates of growth of transfers, financial and nonfinancial assets are all constant. One can show that such a steady state exists and that in particular, it implies that

$$\frac{P_j H_j}{e_j} = \frac{P_j (H_j - H_{j-1})}{g\, e_j} \equiv \frac{P_j}{g} Cstr_j = \alpha_j a_h P_j^* C_j^* \quad (8)$$

where g is the long-run growth rate of transfers as well as financial and nonfinancial assets, and a_h a constant term that depends on the long-run interest and inflation rates. Note that *Cstr*

is the amount of construction of real estate or the acquisition of other nonfinancial assets by the MRA.

Equation(8) says that in the long-run, the acquisition of nonfinancial assets by the MRA in her home country will strongly depend on α_j, her degree of attachment to her home country as well as on her level of consumption in her country of residence. Note the important role played by the degree of attachment to the home country in equation(8). The higher the degree of attachment to the home country, the larger the desired level of nonfinancial asset. Using equation(3), one can intuitively see why the model would imply larger transfers to the home country if the MRA's degree of attachment to the home country increases. One can now turn to the empirical implications of the model.

The implied short- and long-run regression equations

The model presented in the previous section implies that the long-run relation between remittances and their determinants is as given in equation (9) and the short-run relation as in equation (10). The existence of a long-run relation as presented in equation (9) is tested[44] and estimated using Johansen (1991) approach (Tables 4 and 5). The short-run relation in equation (10) is estimated by OLS in Table 6. Note that using the Granger representation theorem,[45] a negative coefficient on the term ECM_{j-1} in equation (10) will confirm the existence of a long-run relation between remittances and their determinants as implied by the model.[46]

---

[44] The main idea behind the test is to check whether the term ECM_j, which is a linear combination of non stationary variables, is stationary. An additional (ADF) test for the stationarity of ECM_j is presented in Table 2. A graph of the estimated ECM is provided in Figure 6.

[45] See Engle and Granger(1987), Banerjee, Hendry and Smith. (1986) and Kremers, Ericsson and Dolado (1992).

[46] As one can easily show from the model, other variables will not depend on the term *ECM*, and therefore could be thought of as weakly exogenous.

$$
\begin{aligned}
\mathrm{Log}\ \mathrm{M}_{\mathrm{j}}^{*} &= \frac{1}{\sigma_m}\Big(\sigma_w^{*}\,\mathrm{Log}\,\mathrm{W}_{\mathrm{j}}^{*} + (\sigma_{\mathrm{A}} + \sigma_{\mathrm{A}}^{(-1)})\,LogA_{j} \\
&\quad + (\sigma_{\mathrm{B}} + \sigma_{\mathrm{B}}^{(-1)})\,LogB_{j}^{*} + \sigma_h \mathrm{LogCstr}_{\mathrm{j}} + \sigma_{\mathrm{w}} \mathrm{Log}\ \mathrm{w}_{\mathrm{j}} \\
&\quad + \Big(\sigma_{\mathrm{e}} - \frac{1}{1-\lambda_1}\big(\sigma_{\mathrm{i}} + \sigma_i^{*}\big)\lambda_2\Big)\mathrm{Loge}_{\mathrm{j}} + \frac{1}{1-\lambda_1}(\sigma_{\mathrm{i}} + \lambda_1\sigma_i^{*})(i_j - i_j^{*})\Big) + ECM_{j} \\
&= \frac{1}{\sigma_m}\Big((\sigma_w^{*} + \phi(\sigma_{\mathrm{B}} + \sigma_{\mathrm{B}}^{(-1)}))\,\mathrm{Log}\,\mathrm{W}_{\mathrm{j}}^{*} + (\sigma_{\mathrm{A}} + \sigma_{\mathrm{A}}^{(-1)})\,LogA_{j} \\
&\quad + \sigma_h \mathrm{LogCstr}_{\mathrm{j}} + \sigma_{\mathrm{w}} \mathrm{Log}\ \mathrm{w}_{\mathrm{j}} + \Big(\sigma_{\mathrm{e}} - \frac{1}{1-\lambda_1}\big(\sigma_{\mathrm{i}} + \sigma_i^{*}\big)\lambda_2\Big)\mathrm{Loge}_{\mathrm{j}} \\
&\quad + \frac{1}{1-\lambda_1}(\sigma_{\mathrm{i}} + \lambda_1\sigma_i^{*})(i_j - i_j^{*})\Big) + ECM_{j}
\end{aligned}
\qquad (9)
$$

$$
\begin{aligned}
\mathrm{D_j Log\,M^{*}} &= q_w^{*}\,\mathrm{D_j Log W_j^{*}} + \mathrm{q_A}\,\mathrm{D_j}LogA_j + \mathrm{q_A^{(-1)}}\,\mathrm{D_j}LogA_{j-1} \\
&\quad + \mathrm{q_B}\,\mathrm{D_j}LogB_j^{*} + \mathrm{q_B^{(-1)}}\,\mathrm{D_j}LogB_{j-1}^{*} + q_h\mathrm{D_j LogCstr_j} + \mathrm{q_w D_j Log\,w_j} \\
&\quad + \mathrm{q_p D_j LogP_j} + \mathrm{q_e D_j Loge_j} + \mathrm{q_i D_j}\,i_j + q_i^{*}\,\mathrm{D_j}i_j^{*} \\
&\quad + (\eta - 1)\sigma_m ECM_{j-1} + q_o + \nu_j \qquad (10) \\
&= (q_w^{*} + \phi\cdot(\mathrm{q_B} + \mathrm{q_B^{(-1)}}))\,\mathrm{D_j Log W_j^{*}} + \mathrm{q_A}\,\mathrm{D_j}LogA_j + \mathrm{q_A^{(-1)}}\,\mathrm{D_j}LogA_{j-1} \\
&\quad + q_h\mathrm{D_j LogCstr_j} + \mathrm{q_w D_j Log\,w_j} + \mathrm{q_p D_j LogP_j} + \mathrm{q_e D_j Loge_j} \\
&\quad + \mathrm{q_i D_j}\,i_j + q_i^{*}\,\mathrm{D_j}i_j^{*} + (\eta - 1)\sigma_m ECM_{j-1} + q_0^{'} + \nu_j^{'}
\end{aligned}
$$

assuming that

$$
LogB_j = \frac{1}{\phi}\mathrm{Log W_j^{*}} + \mu_j \qquad (11)
$$

and that

$$i_j^* = \lambda_1 \cdot i_j - \lambda_2 Log\, e_j + \kappa_j, \quad 0 < \lambda_1 < 1, \quad \lambda_2 > 0 \qquad (12)$$

Equation(11) states that financial assets held by MRAs abroad increase with their wages, up to a term μ_j that is stationary. This assumption is made because there is no data on MRAs financial asset holdings in their countries of residence.

Equation(12) is suggested by the evidence on deposit rates in France, which are used as a proxy for i_j^*. This equationis a deviation from the exchange rate parity. This could be the product of some form of capital controls.[47] Holding the exchange rate constant, an increase of interest rates abroad of one percent must be matched with a more than one percent increase in interest rates in the home country.

The elasticities in equation(9) are defined as follows:

$$\sigma_m = 1 + \left(\frac{\overline{P \cdot e \cdot Cstr}}{\overline{eM}} + \frac{\overline{eT}}{\overline{eM}} \left(\frac{\overline{P \cdot C}}{\overline{eT}} - \frac{\overline{W}}{\overline{eT}} \right) \right) \frac{\overline{eM}}{\overline{P^* C^*}} > 0$$

$$\sigma_w^* = \left(\frac{\overline{P \cdot e \cdot Cstr}}{\overline{eM}} + \frac{\overline{eT}}{\overline{eM}} \left(\frac{\overline{P \cdot C}}{\overline{eT}} - \frac{\overline{W}}{\overline{eT}} \right) \right) \frac{\overline{W^*}}{\overline{P^* C^*}} > 0$$

$$\sigma_{\mathrm{w}} = -\frac{\overline{eT}}{\overline{eM}} \frac{\overline{P \cdot w}}{\overline{eT}} < 0 \qquad (13)$$

$$\sigma_h = \frac{\overline{eT}}{\overline{eM}} \frac{\overline{P \cdot w}}{\overline{eT}} > 0$$

$$\sigma_{\mathrm{e}} = \frac{\overline{P \cdot e \cdot Cstr}}{\overline{eM}} - 1$$

and

[47] In Morocco, there are no restrictions on the transfers of proceeds from the liquidation of assets if the assets are purchased with an inflow of foreign exchange. Otherwise, the proceeds must be deposited in a dirham convertible account and may be transferred over a period of five years.

$$
\begin{aligned}
\sigma_A &= \frac{\overline{A}}{\overline{\overline{eM}}} > 0 \\
\sigma_A^{(-1)} &= -\frac{\overline{A}}{\overline{\overline{eM}}}\frac{1}{1+g} < 0 \\
\sigma_B &= -\frac{\overline{B^*}}{\overline{\overline{P^*C^*}}}\left(\frac{\overline{P\cdot e\cdot Cstr}}{\overline{eM}} + \frac{\overline{eT}}{\overline{\overline{eM}}}\left(\frac{\overline{P\cdot C}}{\overline{eT}} - \frac{\overline{W}}{\overline{\overline{eT}}}\right)\right) < 0 \\
\sigma_B^{(-1)} &= \frac{1}{1+g}\frac{\overline{B^*}}{\overline{\overline{P^*C^*}}}\left(\frac{\overline{P\cdot e\cdot Cstr}}{\overline{eM}} + \frac{\overline{eT}}{\overline{\overline{eM}}}\left(\frac{\overline{P\cdot C}}{\overline{eT}} - \frac{\overline{W}}{\overline{\overline{eT}}}\right)\right) > 0 \\
\sigma_i &= \sigma_A^{(-1)} = -\frac{\overline{A}}{\overline{\overline{eM}}}\frac{1}{1+g} < 0 \\
\sigma_{i^*} &= \sigma_B^{(-1)} = \frac{1}{1+g}\frac{\overline{B^*}}{\overline{\overline{P^*C^*}}}\left(\frac{\overline{P\cdot e\cdot Cstr}}{\overline{eM}} + \frac{\overline{eT}}{\overline{\overline{eM}}}\left(\frac{\overline{P\cdot C}}{\overline{eT}} - \frac{\overline{W}}{\overline{\overline{eT}}}\right)\right) > 0
\end{aligned}
\qquad (14)
$$

ν_j and $\nu_j^{'}$ are stationary random terms and q_o and $q_0^{'}$ and η are constant terms.
The elasticities in equation(10) are as follows

$$
\begin{aligned}
q_w^* &= \frac{\overline{W^*}}{\overline{\overline{eT}}}\cdot\frac{\overline{eT}}{\overline{\overline{eM}}} = \frac{\overline{W^*}}{\overline{\overline{eM}}} > 0 \\
\mathrm{q_w} &= -\frac{\overline{P\cdot w}}{\overline{\overline{eM}}} < 0 \\
q_h &= \frac{\overline{P\cdot Cstr}}{\overline{\overline{eM}}} > 0
\end{aligned}
\qquad (15)
$$

$$
\begin{aligned}
q_e &= \frac{\overline{P\cdot Cstr}}{\overline{\overline{eM}}} - 1 \\
q_p &= \frac{\overline{P\cdot Cstr}}{\overline{\overline{eM}}} - \frac{\overline{P\cdot w}}{\overline{\overline{eM}}}
\end{aligned}
\qquad (16)
$$

and,

$$
\mathrm{q_A} > 0,\ \mathrm{q_A^{-1}} < 0,\quad \mathrm{q_B} < 0,\quad \mathrm{q_B^{-1}} > 0,\quad \mathrm{q_i} < 0,\quad q_i^* > 0 \qquad (17)
$$

Note that equation(9) implies clear altruistic motives for the remittances, i.e. that remittances will increase with bad economic performances in the home country ($\sigma_{\mathrm{w}} < 0$), and with good ones in the country of residence(σ_w^*>0). It is important to note that in equation(9), the elasticity of remittances with respect to wages in the country of residence is positive only because the family in the home country is receiving positive

transfers at the optimum (i.e. $\frac{\overline{P \cdot C}}{\overline{eT}} - \frac{\overline{W}}{\overline{eT}} > 0$, which implies that $\sigma_m > 0$). Equation(9) also implies that "attachment to homeland", as captured by the construction of real estate in Morocco by the MRAs should imply a positive elasticity between remittances are the construction GDP (σ_h>0.)

The model also implies that remittances increase with the depreciation of the home country currency in the short-run ($q_e > 0$) if and only if the long-run elasticity of remittances to construction spending is greater than unity, i.e. if the wealth effect of the exchange rate depreciation dominates the substitution effect. Formally in equation(16), we have q_e>0 if and only if $(e \cdot P \cdot Cstr)/(e \cdot M^*)$>1. The intuition is that if the home country's currency depreciates by one percent, holding everything else constant, including the foreign-currency equivalent of construction spending, then construction spending in the local currency will increase by one percent, and therefore remittances in local currency must increase by more than one percent because of the elasticity. The only way this can happen is if there is additional inflow of foreign currency. The effect of the exchange rate depreciation will only increase remittances by one percent.

One can also see from equation(16) that q_p>0 if the long-run elasticity of remittances to construction spending is greater than the elasticity of transfers to nominal wages in the home country. The intuition is that holding everything else constant, including real wages, an increase in prices in the home country raises the unit cost of construction goods as well as nominal wages. The first effect will be to increase remittances, and the second to reduce them. The outcome will depend on the difference in the two elasticities.

It is now shown how the two relations in equations (9) and (10) are derived.

Assuming that the variables remain in the "neighborhood" of their steady state values, one can log-linearize the model's equilibrium outcome around the steady state. Rearranging the standard log-linearized equationwill imply the following equation

$$\begin{aligned} \text{Log } M_j^* = {} & q_w^* \, Log W_j^* + q_A \, LogA_j + q_A^{(-1)} \, LogA_{j-1} + q_B \, LogB_j^* + q_B^{(-1)} \, LogB_{j-1}^* \\ & + q_h \, \text{LogCstr}_j + q_w \, \text{Log } w_j + q_p \, \text{LogP}_j + q_e \, \text{Loge}_j + q_i \, i_j + q_i^* \, i_j^* + LR_0 \qquad (18) \\ & + \varepsilon_j \end{aligned}$$

where we have

$$\mathrm{LR}_0 = \mathrm{Log}\,\overline{\mathrm{M_j}^*} - (q_w^*\,Log\overline{\mathrm{W_j}^*} + \mathrm{q_A}\,Log\overline{A_j} + \mathrm{q_A^{(-1)}}\,Log\overline{A_{j-1}} + \mathrm{q_B}\,Log\overline{B_j^*} + \mathrm{q_B^{(-1)}}\,Log\overline{B_{j-1}^*}$$

$$+ q_h\mathrm{Log}\overline{\mathrm{Cstr_j}} + \mathrm{q_w}\mathrm{Log}\,\overline{\mathrm{w_j}} + \mathrm{q_p}\mathrm{Log}\overline{\mathrm{P_j}} + \mathrm{q_e}\mathrm{Log}\overline{\mathrm{e_j}} + \mathrm{q_i}\,\overline{i_j} + q_i^*\overline{i_j^*}) \qquad (19)$$

ε_j in equation(18) captures the magnitude of the short-run "disequilibrium," that is the deviation of the level of remittances from their level as predicted by the long-run relation. Since it is assumed that variables deviates from their long-run relation only by stationary random term, one can use the log-linearized version of equation(8) to rewrite ε_j so as to eliminate domestic prices using equation(2).[48] The resulting equationis then

$$\begin{aligned}
\varepsilon_j &= (\Delta_j \mathrm{Log}\,\mathrm{M}^* - (\; q_w^*\Delta_j\,Log\mathrm{W}^* + \mathrm{q_A}\,\Delta_j LogA + \mathrm{q_A^{(-1)}}\,\Delta_{j-1}LogA + \mathrm{q_B}\Delta_j\,LogB^* \\
&\quad + \mathrm{q_B^{(-1)}}\,\Delta_j LogB^* + q_h\Delta_j\mathrm{LogCstr} + \mathrm{q_w}\Delta_j\mathrm{Log\ w} + \mathrm{q_p}\Delta_j\mathrm{LogP} + \mathrm{q_e}\Delta_j\mathrm{Loge} \\
&\quad + \mathrm{q_i}\,\Delta_j i + q_i^*\Delta_j i^*)) \\
&= \sigma_m\mathrm{Log}\,\mathrm{M_j}^* - (\; \sigma_w^*\,Log\mathrm{W_j}^* + (\sigma_\mathrm{A} + \sigma_\mathrm{A}^{(-1)})\,LogA_j \\
&\quad + (\sigma_\mathrm{B} + \sigma_\mathrm{B}^{(-1)})\,LogB_j^* + \sigma_h\mathrm{LogCstr_j} + \sigma_\mathrm{w}\mathrm{Log\ w_j} \\
&\quad + (\sigma_\mathrm{e} - \frac{1}{1-\lambda_1}(\sigma_\mathrm{i} + \sigma_i^*)\lambda_2)\mathrm{Loge_j} + \frac{1}{1-\lambda_1}(\sigma_\mathrm{i} + \lambda_1\sigma_i^*)(i_j - i_j^*))) - LR_0^{'} \\
&= \sigma_m ECM_j - LR_0^{'} + \sigma_\mathrm{A}^{(-1)} g_j^A + \sigma_\mathrm{B}^{(-1)} g_j^B + \delta_j
\end{aligned} \qquad (20)$$

where we have

[48] The only purpose of this operation is to reduce the number variables that will be used in the VAR and to increase the degrees of freedom in order to have more reliable estimates of the long-run relation. This is not necessary when the sample size is large enough. Prices are chosen because they are the most likely to meet the assumption of small stationary deviations from the long-run values.

$$ECM_j = \frac{1}{\sigma_m}(\sigma_m \text{Log M}_\text{j}^{\ *} - (\ \sigma_w^* \ Log\text{W}_\text{j}^{\ *} + (\sigma_\text{A} + \sigma_\text{A}^{(-1)})\ LogA_j$$

$$+ (\sigma_\text{B} + \sigma_\text{B}^{(-1)})\ LogB_j^* + \sigma_h \text{LogCstr}_\text{j} + \sigma_\text{w} \text{Log w}_\text{j}$$

$$+ (\sigma_\text{e} - \frac{1}{1-\lambda_1}(\sigma_\text{i} + \sigma_i^*)\lambda_2)\text{Loge}_\text{j} + \frac{1}{1-\lambda_1}(\sigma_\text{i} + \lambda_1\sigma_i^*)(i_j - i_j^*))) \qquad (21)$$

$$= \frac{1}{\sigma_m}(\sigma_m \text{Log M}_\text{j}^{\ *} - (\ (\sigma_w^* + \phi(\sigma_\text{B} + \sigma_\text{B}^{(-1)}))\ Log\text{W}_\text{j}^{\ *} + (\sigma_\text{A} + \sigma_\text{A}^{(-1)})\ LogA_j$$

$$+ \sigma_h \text{LogCstr}_\text{j} + \sigma_\text{w} \text{Log w}_\text{j}\ + (\sigma_\text{e} - \frac{1}{1-\lambda_1}(\sigma_\text{i} + \sigma_i^*)\lambda_2)\text{Loge}_\text{j}$$

$$+ \frac{1}{1-\lambda_1}(\sigma_\text{i} + \lambda_1\sigma_i^*)(i_j - i_j^*)))$$

and

$$LR_0^{'} = LR_0 = \sigma_m \text{Log}\ \overline{\text{M}_\text{j}^{\ *}} - (\ \sigma_w^*\ Log\overline{\text{W}_\text{j}^{\ *}} + \sigma_\text{A}\ Log\overline{A_j} + \sigma_\text{A}^{(-1)}\ Log\overline{A_{j-1}} + \sigma_\text{B}\ Log\overline{B_j^*} \qquad (22)$$

$$+ \sigma_\text{B}^{(-1)}\ Log\overline{B_{j-1}^*} + \sigma_h \text{Log}\overline{\text{Cstr}_\text{j}} + \sigma_\text{w} \text{Log}\ \overline{\text{w}_\text{j}}\ + \sigma_\text{e}\text{Log}\overline{\text{e}_\text{j}} + \sigma_\text{i}\ \overline{i_j} + \sigma_i^*\ \overline{i_j^*}))$$

after assuming that equations(11) and (12) hold. δ_j is a stationary term. g_j^A and g_j^B are respectively the growth rate of assets held by MRAs in Morocco and abroad.

Note that equation(21) is equivalent to equation(9), which is the long-run relation between remittances and their determinants as predicted by the model.

Assuming that in equation(20), the growth rate of financial assets is stationary implies that the term *ECM_j* is stationary and will represent the co-integration or long-run relations between the non-stationary variables included in the model. The empirical investigation will confirm the stationarity of the growth rate of deposits in Morocco. However, since there is no data on MRA's financial assets in their country of residence, there is no way to verify the validity the assumption on the stationarity of the growth rate of those assets.

One way to present the model in an error-correction form as done in equation(10) is to assume that workers' remittances are such that they tend to gradually move back toward their long-run value, so that one can assume that

$$\varepsilon_j = \eta \varepsilon_{j-1} + \zeta_j \qquad (23)$$

where ζ_j is stationary.

Using equations(23)and (18), one will have the (error-correction) form for the model as presented in equation(10).

The two relations in equations(9)and (10) will now be tested. Real GDP in Morocco will be used as a proxy for real wages.

A SUMMARY OF THE ECONOMETRIC DETAILS

The dataset considered on remittances shows a sign of seasonality, especially during the third quarter (Figure 1). The authorities are pursuing their efforts of isolating the part of transfers that could reflect tourism motives and include it the services post of the BOP as a credit item. Nonetheless, seasonality should not necessarily be interpreted as inflows related to tourism from Moroccans living abroad. Seasonality can also come from altruism if one allows for the possibility that transfers could be made in order to help the family spend an enjoyable vacation time. This would probably be the case if the worker herself is spending vacation time with her family. Notwithstanding those remarks, the estimation procedure has included seasonality dummies.

All the potential explanatory factors discussed in section II, including interest rates cannot be ruled out a priori in the long-run relation determining workers' remittances. As Table 2 shows, the logarithm of remittances is integrated of order one, or difference-stationary. Therefore, for an explanatory factor to be considered as a potential determinant in the long-run relation, it must have the same time-series properties as the level of remittances, that is, be integrated of order one. The Augmented Dickey-Fuller (ADF) tests for such properties could not reject the hypothesis of an order of integration of one for all the potential determinants considered as the table clearly shows. Note however that both GDP shows a trend.

The long-run relation presented in equation(9) is first estimated using the Johansen (1991) method. An (unrestricted) vector autoregression (VAR) will be used because the variables considered are non stationary. A constant enters the VAR in an "unrestricted" manner to allow for a trend in the variables. Presented in Table 3 are various misspecification tests to assess whether the model could suffer from omitted variables. The tests do not seem to reveal any serious problem, except for the correlations of residuals on the equation determining the exchange rate. Furthermore, because of the sample size constraint, a fourth-order VAR is used. It could not be checked whether such a model minimized the various information criteria. Therefore, additional procedures will be used to confirm the choice of the long-run relation.

The determination of the co-integration vector will be based on the interpretability of the vector in line with the model and the evidence, the co-integration graphs, as well as the result of formal testing, including testing using the error correction model given in equation(10). Whether the co-integration vector's stationarity can be confirmed with ADF tests will also be checked.

The Johansen maximal and trace eigenvalue statistics confirm the existence of a long-run relation between remittances and their potential long-run determinants presented in equation(9). Table 4 presents the (λ_{trace} and λ_{max}), corrected for the degrees of freedom, and their probability values. Both tests suggest that there is one co-integration vectors that

can be derived from the unrestricted VAR. To identify the vectors from the seven presented, an approach similar to Johansen and Juselius (1992) will be used and a direct interpretability of the co-integration vectors[49] using the theory's predictions and the evidence is examined. Only vector 4 seems to match both the theory and the evidence.[50] This will be confirmed by additional tests.

In light of the theoretical framework and the evidence, only vector 4 in Table 4 can be interpreted as the long-run relation between remittances and their determinants. The co-integration graph (Figure 6), the ADF tests (Table 2) and the error correction form of the model (Table 6) could not reject the vector as describing that long-run relation. Note that in the model in an error correction form given in equation(10), the misspecification tests in Table 6 do not reveal any problem, neither for residual autocorrelation (AR), skewness and excess kurtosis (normality), autoregressive conditional heteroskedasticity (ARCH), nor heteroskedasticity (RESET test). The coefficient on the term ECM is negative and significant, even using the conservative Dickey-Fuller five percent critical value of -1.95. These findings support the choice of the vector as describing the long-run relation determining the level of remittances. The model also satisfactorily describes the short-run as illustrated in Figures 7 and 8, where the 1-step Chow tests could not reject the hypothesis of the model's stability.

The co-integration vector has been normalized on the remittances and is presented in equation(1). Note that except for the elasticity on deposits in Morocco, equation(1) confirms all predictions of the model. The estimated positive elasticity on wages can still be interpreted as is because even though wages are used as a proxy for assets held abroad, the elasticity on those assets is predicted to be negative in the model $\sigma_{\mathrm{B}} + \sigma_{\mathrm{B}}^{(-1)} < 0$. Therefore, a positive coefficient on wages will imply that $\sigma_{w}^{*} > 0$, as predicted in the model. Note that the estimated positive coefficient for the exchange rate cannot be interpreted from the long-run equation. The term $\sigma_{\mathrm{e}} - \frac{1}{1-\lambda_1}\left(\sigma_{\mathrm{i}} + \sigma_{i}^{*}\right)\lambda_2$ in equation(9) can still be positive even if the term

[49] Generic identification techniques could also be used when identifying restrictions are available and intuitive. See for example Dickey and Rossana (1994), Johansen and Juselius(1994), Hendry and Mizon(1993), Nachega (2001a, 2001b).

[50] Vector 1, 2 and 3 in Table 4 would suggest that the long-run elasticity of remittances with construction GDP, which is a proxy for MRAs spending on construction is negative. This would contradict both the theory and the evidence (Figure 4). Vector 5, which is normalized on the interest rate differential has an adjustment coefficient that is positive and therefore does not lead to an equilibrium correcting path for the interest rate differential. The same argument on construction GDP can be used for vector 6. Vector 7 would contradict the theoretical predictions on GDP in Morocco, and the evidence showing a positive correlation between wages abroad and transfers (Figure 4).

σ_e is negative. The estimated short-run model in Table 6 suggests that the elasticity of remittances with respect to construction spending is greater than unity, thus implying that $\sigma_e = q_h - 1 > 0$. This implies that the wealth effect of the exchange rate depreciation cannot be excluded as an explanatory factor for remittances. The negative coefficient on the interest differential $\frac{1}{1-\lambda_1}(\sigma_i + \lambda_1 \sigma_i^*) < 0$ is in line with the evidence (Figure 4) and implies that $\sigma_i < 0$, which is consistent with the model, given it's prediction that $\sigma_i^* > 0$. However, one cannot rigorously check if we have $\sigma_i^* > 0$. However, the evidence on the wage elasticity suggest that one can reasonably expect remittances to increase with interest income from financial assets held by MRAs in their country of residence. The model's predictions on both remittances and construction GDP as well as real GDP in Morocco are supported by the evidence.

There is no evidence that portfolio diversification motives are among the long-run determinants of transfers in Morocco. Another way to read the model as presented in equation(9) is to say that if portfolio diversification motives were strong as long-run determinants of remittances, i.e. if $\frac{1}{1-\lambda_1}(\sigma_i + \lambda_1 \sigma_i^*) < 0$, then holding everything else constant, including remittances, an increase in the interest rate differential will lead to financial assets substitution in favor of the country whose interest rates have increased the most. This would then imply that the coefficients on deposits and interest differentials in equation(9) are of different signs in the long-run. This has not been confirmed by the evidence.

This concludes the econometric analysis of workers' remittances in Morocco. The economic interpretation of these results is given above.

Table 2. Morroco: ADF(4) Statistics for Unit Root tests

Variables	t-ADF	Lag (AIC)	Lag (alt. model)
In (Log) levels			
Remit	-2.688	0	
Wages_Fce (FF or Euro)	-2.320	3	
ERdh/FF_EUR	-0.9331	1	
IR_Mor - IR_Fce	-1.804	0	
Dep	-2.418	1	
Cstr	-2.791	0	
GDP	-7.276**	3	
IR_Mor	-1.784	0	
IR_Fce	-2.172	1	
Price	-2.954	1	
ECM	-6.769**	0	
In first differnces			
Remit	-7.832**	0	
Wages_Fce (FF or Euro)	-4.340**		0
ERdh/FF_EUR	-3.663*	0	
IR_Mor - IR_Fce	-4.716**	0	
Dep	-9.564**	1	
Cstr	-7.557**	0	
GDP	-6.825**	4	
IR_Mor	-5.981**	0	
IR_Fce	-4.371**	0	
Price	-9.318**	0	

Notes: The estimation period is 1993:Q1-2003:Q4. The dataset is taken from the Moroccan authorities and the International Financial Staistics. The variables are defined in section III.B. Foor each variable, values in the second column denotes the t-values of the augmented Dickey-Fuller (ADF) statistics. The third column denotes the lag order that minimizes the Akaike information criteria (AIC) and the fourth, the lag order of an alternative model. The ADF statistics is testing a null hypothesis of a unit root in that variable expressed in (Log) levels and first (Log) difference against an alternative of a stationary root. Each regression contains a constant, a trend and seasonal dummies. * and ** denote rejection at the 5 and 1 percent significance levels. The ADF tests were augmented with 4 lags, except for the ECM equation where it was augmented with 6 lags. The null hypothesis was rejected for Dep_dh in levels at 5 percent level of significance when there was no lag added.

Table 3. Morocco: Residual Misspecification Test Statistics: First Order (unrestricted) VAR

	Serial correlation (AR1-5)	Normality
	F(5,2)	Chi ^2 (2)
Remit	1.9895 [0.3675]	4.7665 [0.0923]
Wages_Fce	4.8750 [0.1789]	2.4347 [0.2960]
ERdh/FF_EUR	94.263 [0.0105]*	0.47203 [0.7898]
Dep	0.63581 [0.7048]	5.1025 [0.0780]
IR_Mor - IR_Fce	3.3969 [0.2429]	1.1497 [0.5628]
Cstr	2.6360 [0.2976]	1.4349 [0.4880]
GDP	1.6517 [0.4185]	3.2080 [0.2011]

Notes: The estimation period is 1993:Q1-2003:Q4. The dataset is taken from the Moroccan authorities and the International Financial Staistics. The variables are defined in section III.B. The vector auto regression is estimated with 4 lags and contains an unrestricted constant and seasonal dummies. The null hypothesis are that of no serial correlation, and of normality. * and ** denote rejection of the null hypothesis at the 5 and 1 percent significance levels.

Table 4. Morocco: Test Statistics for Cointegrating Rank

Null	Alt.	Trace statistic	Null	Alt.	λmax statistic
r = 0	r ? 1	258.62 [0.000]**	r = 0	r = 1	178.61 [0.000]**
r ? 1	r ? 2	80.01 [0.366]	r = 1	r = 2	32.66 [0.278]
r ? 2	r ? 3	47.35 [0.747]	r = 2	r = 3	24.55 [0.429]
r ? 3	r ? 4	22.80 [0.960]	r = 3	r = 4	11.71 [0.933]
r ? 4	r ? 5	11.09 [0.954]	r = 4	r = 5	6.66 [0.957]
r ? 5	r ? 6	4.43 [0.861]	r = 5	r = 6	3.37 [0.910]
r ? 6	r ? 7	1.06 [0.302]	r = 6	r = 7	1.06 [0.302]

Notes: r denotes the rank of the long-run matrix. The sample period is 1994:Q1-2003:Q4. The unrestricted VAR is estimated with four lags. The small sample size did not allow for a longer lag tength. Given this constraint, the system with four lags minimized the information criteria (Akaike, Schwarz, Hannan-Quinn). Probability values are square brackets. * and ** denote rejection of the null hypothesis at the 5 and 1 percent significance levels.

Table 5. Morocco: Unrestricted Estimates of the Cointegrating Vectors and Adjustment Coefficients

	Estimated eigenvalues						
	1	***2***	***3***	***4***	***5***	***6***	***7***
	1.00	0.95	0.89	0.66	0.45	0.26	0.09
	Estimated eigenvectors *(in columns)*						
	1	***2***	***3***	***4***	***5***	***6***	*7*
Remit	**1.00**	-0.15	0.54	0.22	6.10	-0.49	-0.27
Wages_Fce	-2.24	**1.00**	-0.88	-0.41	12.69	1.70	-0.50
ERdh/FF_EUR	14.74	1.14	**1.00**	-4.25	5.45	5.82	0.22
Dep_dh	-7.68	-0.54	0.47	**1.00**	30.01	-0.78	-0.32
IR_Mor - IR_Fce	-0.32	-0.01	0.07	0.03	**1.00**	-0.01	-0.01
Cstr	7.54	-0.32	2.05	-2.22	-61.12	**1.00**	1.23
GDP	7.20	0.21	-1.89	0.92	8.23	-0.59	**1.00**
	Estimated adjustment coefficients *(in cloumns)*						
	1	***2***	***3***	***4***	***5***	***6***	*7*
Remit	**-0.20**	0.29	-0.41	-0.58	0.00	-0.88	0.11
Wages_Fce	-0.02	**-1.88**	0.09	0.33	0.00	0.03	0.08
ERdh/FF_EUR	0.00	0.55	**-0.03**	-0.04	0.00	-0.06	-0.04
Dep_dh	0.04	0.50	0.02	**-0.49**	-0.01	0.25	0.00
IR_Mor - IR_Fce	0.95	-15.44	-6.36	-8.89	**0.11**	-2.58	-0.43
Cstr	-0.04	-0.95	-0.14	0.50	0.00	**0.03**	0.10
GDP	-0.11	-0.42	-0.04	-0.85	0.01	-0.10	**-0.11**

Notes: The estimation period is 1993:Q1-2003:Q4.

Table 6. Morroco: Error Correction or Short Run Model

	Δ Remit	t-values
ECM_1	-0.40	-2.01
ΔWages_Fce (FF or Euro)	-1.72	-0.89
ΔCstr	4.03	2.74
ΔGDP	-1.84	-1.63
ΔIR_Mor	0.08	1.03
ΔIR_Fce	-0.12	-1.79
ΔDep_	-0.82	-0.88
ΔDep_1	2.65	2.92
ΔDep_2	0.75	0.78
ΔDep_3	-0.84	0.94
ΔDep_4	-0.25	-0.28
ΔER dh/FF	6.11	1.15
ΔER dh/FF_1	-3.78	-1.21
ΔER dh/FF_2	-0.18	-0.06
ΔER dh/FF_3	-3.02	-0.92
ΔER dh/FF_4	-3.28	-1.07
ΔPrice	6.45	1.92
Δprice_1	-3.90	-1.24
Δprice_2	-2.04	-0.66
Δprice_3	3.02	0.85
Δprice_4	-0.22	-0.07
Constant	-0.21	-1.96

Goodness of fit and mispecification tests

Nb. Obs. = 35

R^2 = 0.78

Std Err = 0.07

AR 1-5: F(5,8) = 2.4656 [0.1232]

ARCH 1-5 test: F(5,3) = 0.10448 [0.9837]

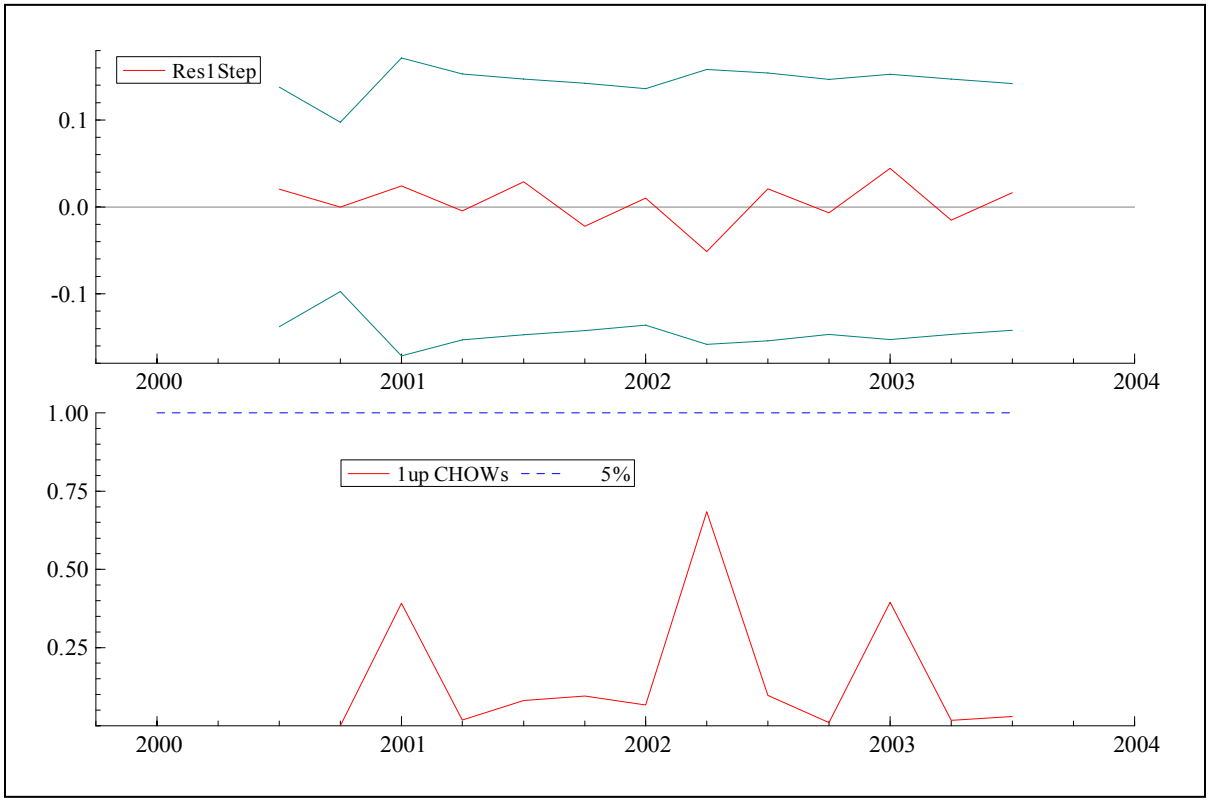
ARCH 1-2 test: F(2,9) = 0.016137 [0.9840]

Normality test: Chi^2(2) = 1.4282 [0.4896]

RESET test: F(1,12) = 0.66294 [0.4314]

Notes: The estimation period is 1995:Q1-2003:Q3. The dataset is taken from the Moroccan authorities and the International Financial Staistics. The variables are defined in section III.B. The error correction model includes 4 lags for deposits, prices and the exchange rate to reduce the serial correlation in the error terms. Note that the 't' statistic for ECM does not follow the standard 't' distribution, but rather another distribution $t_{ecm.}$ See further discusion in the appendix. For the mispecification tests, probability values are in square brackects.

Figure 8. Morocco. Error Correction Model Residuals and One-up Chow Test



Sources: Moroccan authorities; and IMF staff estimates.

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