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## The Real Exchange Rate and External Competitiveness in Egypt, Morocco and Tunisia

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# The Real Exchange Rate and External Competitiveness in Egypt, Morocco and Tunisia

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## ABSTRACT

### The Real Exchange Rate and External Competitiveness in Egypt, Morocco and Tunisia<sup>1</sup>

Egypt, Morocco and Tunisia face challenges competing on the global markets, as shown by their relatively low and stagnant export shares. The limited export competitiveness has hampered external demand, growth and employment. Applying, for the first time to North Africa, the stock-flow approach to the real equilibrium exchange rate, this paper evaluates the countries' real exchange rate misalignments during the past three decades. While Egypt experienced periods of substantial misalignment, including in recent years, the exchange rates in Morocco and Tunisia have broadly reflected the underlying fundamentals. In all three countries structural factors are key to boosting exports, alongside of avoiding sizeable future misalignments. Intra-regional trade – both with North Africa and the rest of the continent – together with greater orientation to fast growing emerging markets could also raise countries' external competitiveness.

JEL Classification: F3, F41, F63, C5, O1

Keywords: real exchange rate misalignment, stock-flow model, competitiveness, trade, employment, North Africa

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## **I. Introduction**

A real exchange rate that is broadly aligned with its equilibrium value is an important part of a country's macroeconomic framework. Persistently misaligned real exchange rates can cause a misallocation of resources between tradable and non-tradable sectors and negatively impact labor market dynamics. Reduced external competitiveness due to over-valued exchange rate hampers exports, aggregate demand, growth and job creation.<sup>2</sup> Besides the longer-term implications, real exchange rate misalignment can lead to inflationary pressures and even trigger speculative attacks.<sup>3</sup> When setting their exchange rate policy, countries also need to balance their goals of reaching competitiveness and macroeconomic stability (Dornbusch, 1980; Yagci, 2001).

In Egypt, Morocco, and Tunisia concerns about real exchange rate misalignments have prevailed for some time given the countries' high unemployment, stagnating global export shares, and low export diversification. External competitiveness became even more relevant in the aftermath of the global financial crisis and after the 2011 upheaval, with inclusive growth and job creation once again topping the countries' economic policy agenda (Stampini and Verdier-Chouchane, 2011 and others). By providing accurate signals to producers, the real exchange rate can help generate competitive jobs via exports. It can also help reduce income inequalities by raising the workers' marginal revenue product (Ngandu, 2008). To be effective, the aligned real exchange rate needs to be complemented by other sound macroeconomic policies and enabling business environment.

This paper aims to find out whether the real exchange rate misalignment contributed to the weak external competitiveness (e.g., limited export value added and diversification) in the three North African countries.<sup>4</sup> To this goal, it estimates the real equilibrium exchange rate for the past three decades, using the stock-flow approach. The main findings are that Egypt experienced protracted periods of misalignment both in the past and in recent years underscoring the importance of exchange rate management. In contrast the real exchange rate in Morocco and Tunisia broadly reflected the underlying economic fundamentals, pointing to general structural problems (e.g., flexibility of product and labor markets, shortages in human capital) as bottlenecks to external competitiveness. The paper concludes with policy recommendations for structural reforms that could raise and diversify exports, including within the North Africa region.

The paper is organized as follows. Section II reviews the literature while Section III gives stylized facts. Section IV outlines the methodology on the real exchange rate misalignment, estimates the real equilibrium exchange rate and discusses the extent of misalignments in the three countries studied. Section V concludes.

## **II. Literature Review on Assessment of Equilibrium Exchange Rates**

In the vast literature on the determinants of the real equilibrium exchange rates, three methodologies are most common: (1) the 'macroeconomic balance' (MB) approach, as in Williamson (1994); (2) the

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<sup>2</sup> According to Rodrik (2003), and Bhala (2008), undervalued exchange rate can serve as an industrial policy tool by stimulating the tradable sector and hence growth.

<sup>3</sup> Real exchange rate misalignment can also hamper development of financial markets (Domec and Shabsigh, 1999).

<sup>4</sup> External competitiveness is typically measured using the behavior of the Real Exchange Rate (RER) in bilateral trade and Real Effective Exchange Rate (REER) in multilateral trade (UNCTAD, 2012 and others).

'behavioral equilibrium exchange rate' (BEER) approach (Edwards, 1994); and (3) the natural rate of exchange (NATREX) approach, as in Stein (1995).<sup>5</sup>

*The MB approach* defines the equilibrium exchange rate as the real exchange rate that meets simultaneously conditions of internal and external balances.<sup>6</sup> It particularly focuses on medium-term sustainability of the external current account and the impact of fundamental variables. In advanced and emerging market economies, the targeted current account gaps are often dependent on the level of potential output. The real equilibrium exchange rate is then estimated as a rate that would lead to the required adjustment in the current account to the potential (trend) output.

*The BEER approach* estimates directly the structural (long-run) relationship between economic fundamentals and the real equilibrium exchange rate and interprets it as the equilibrium relationship. It searches for a statistically significant relationship between the variables (e.g., productivity differentials, net foreign assets, terms of trade, etc.) and the real exchange rate without specifying the structure that the relationship should take. In contrast to the MB approach, which imposes normative assumptions, the BEER approach is less rigorous, but allows the analysis to be tailored to country-specific circumstances (Al Shehabi and Ding, 2008).<sup>7</sup>

*The NATREX approach* is also based on concepts of internal and external balances. In contrast to MB approach it also analyzes determinants of the long-run (steady state) real exchange rate equilibrium. In its reduced form it resembles the BEER approach.

This paper utilizes *the stock-flow approach* to the real equilibrium exchange rate, and applies it, for the first time, to North Africa. The approach was first used in Faruqee (1995), Aglietta et al. (1997) and Alberola et al. (2002) for advanced economies and in Alberola, 2003; and Égert et al. (2006) for transition economies. It has theoretical underpinning, where the real equilibrium exchange rate is determined by the stock and flow of net foreign assets between countries. First, a country's long-run target for the stock of net foreign assets is set. The real equilibrium exchange rate then corresponds to a current account balance consistent with the income flows from this stock. The approach also considers productivity as a channel through which changes in the price-based real exchange rate can occur. This is because higher productivity reflects non-price competitiveness and can cause appreciation of the real exchange rate (Égert et al., 2004).<sup>8</sup>

In sum, the stock-flow approach differentiates between (i) the medium-term undervaluation caused by the Balassa-Samuelson effect (productivity catch up) that is unlikely to cause abrupt adjustments and (ii) misalignment caused by other factors than productivity differentials. The stock-flow approach is particularly suitable to emerging market countries that often go through structural and productivity changes that may impact the medium-term path of the real exchange rate. To our knowledge, this is the first time the method is applied to the North African countries.

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<sup>5</sup> Bussière et al. (2010) review recent methodological advances in estimating the real equilibrium exchange rate.

<sup>6</sup> This approach is referred to as the fundamental equilibrium exchange rate (FEER). Internal balance means that the economy operates at the full-capacity output, while the external balance refers to the current account sustainability.

<sup>7</sup> Edwards (1994) defined the REER as the relative price of non-tradables to tradables that results in the attainment of internal and external equilibrium. Internal equilibrium is defined as the clearing of all non-tradable markets. External equilibrium is attained when the net present value of future current account balances is nonnegative, given the level of exogenous long-run capital inflows. These two equilibrium conditions identify a unique REER.

<sup>8</sup> The theoretical underpinnings of the stock-flow approach are discussed further below and in Annex I.

### **III. External Competitiveness in Egypt, Morocco and Tunisia: The Facts**

#### **1. Exchange Regimes**

The choice of an exchange rate regime is key for countries' macroeconomic frameworks. It impacts the monetary regime a country can adopt and the extent to which the exchange rate helps absorb shocks. Both fixed and flexible regimes have their pros and cons, with trade-offs ranging from reduced transaction cost in the case of fixed regimes to ability to adjust to shocks in the case of flexible ones. In developing countries, fixed exchange rate regimes often generate a greater risk of real exchange rate misalignment than flexible regimes, as their real exchange rates tend to appreciate due to inflationary pressures (Coudert and Couharde, 2005).

In our three North African countries studied, the exchange rate regimes have evolved over time from fixed to more flexible, as the ability to adjust to shocks gained in priority:

- *Egypt's exchange rate* was characterized by a substantial rigidity – de facto crawling band around US\$ during 1980 – 1990 and peg to the dollar – during 1991 – 2003 (Elbadawi and Kamar, 2006). In 2003, the floating regime was announced (Selim, 2012). However, Egypt's nominal exchange rate experienced only limited changes/gradual depreciation during 2003 – 2012, pointing to a de facto crawling peg regime. In 2012, IMF reclassified Egypt as having a stabilized exchange rate arrangement (IMF, 2012a).<sup>9</sup>
- *Morocco* has also maintained de facto fixed exchange rate regime throughout the years, with the dirham being pegged to the French franc until 1996 (but devalued in 1986), to a basket of currencies until 1999; and the basket of currencies included € £ and \$ since 1999. During the 1990s, Morocco was targeting real exchange rate. In 2012, the IMF classified Morocco as having a conventional fixed exchange rate regime (IMF, 2012a).
- *Tunisia* pegged its currency to a basket of currencies until 1994, and has a crawling peg since then according to the IMF, even though the country classifies its regime as a managed float. Between 1992 and 2000, Tunisia targeted the real exchange rate, but introduced more flexibility afterwards (Dropsy and Grand, 2004). In 2012, the Tunisian exchange rate regime was classified as crawling peg by the IMF (IMF, 2012a).

Inflation played a key difference in the evolutions of real exchange rates – Morocco and Tunisia avoided major inflationary pressures, but Egypt did not (Elbadawi and Kamar, 2006).

#### **2. External Price Competitiveness**

While a variety of alternative indicators of external price competitiveness exists, the most common one is the real effective exchange rate (RER), which measures the change in the relative price levels (domestic and foreign prices expressed in the same currency unit). Implications of movements in the RER for external price competitiveness need to be interpreted with caution though. In some countries

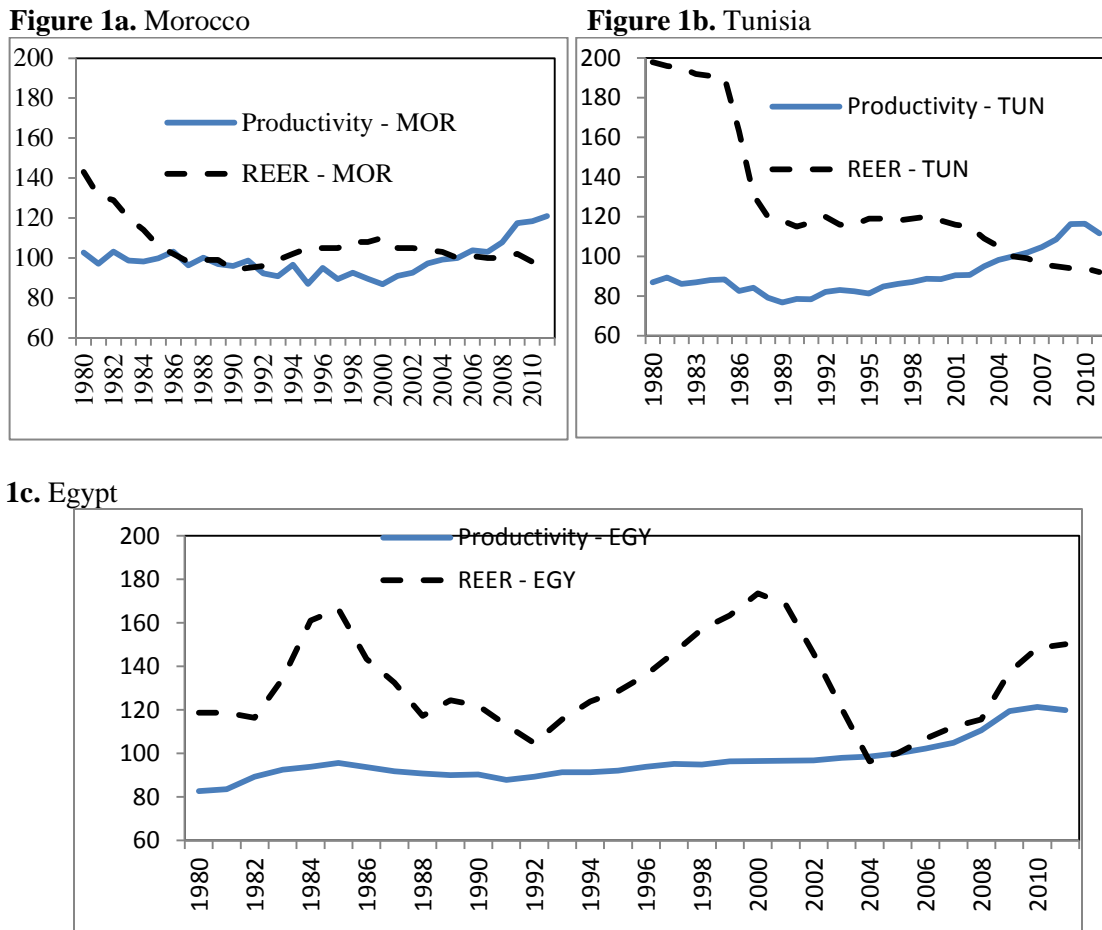
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<sup>9</sup> At the end of 2012, the Central Bank of Egypt introduced to a more flexible exchange system via daily foreign exchange auctions and tighter restrictions on foreign currency outflows (Abed and Idarian, 2013).

an appreciation of the RER indeed reflects a deterioration of competitiveness, but in others it may reflect changes in economic fundamentals, such as productivity gains that countries often experience during the catch up phase with more advanced economies resulting from the Balassa-Samuelson effect or a shift towards higher value added (higher quality) production. To gain meaningful insights into competitiveness trends, the RER indices need to be accompanied by other indicators and analysis.

Figure 1 shows (CPI-based) RER developments in the three countries. Having experienced several sizeable appreciation episodes of its bilateral RER since the early 1980s, Egypt is an interesting case to examine whether the appreciation led to an overvaluation of the real exchange rate and a deterioration of external price competitiveness. In contrast, Tunisian RER depreciated steadily for most of the period studied, with the exception of the 1990s, when a constant real exchange rate rule was applied (Fanizza et al, 2002). In Morocco, the RER exhibited mixed patterns – appreciation in the 1990s followed by depreciation during 2000s due to lower inflation than in trading partners (Sab, Sensenbrenner and Diouf, 2008). Over the longer term, both Morocco and Tunisia have experienced RER depreciation, reflecting declines in their real GDP per capita relative to trading partners. Relatedly, labor productivity was also lagging behind other emerging and frontier markets in Middle East and North Africa (MENA) and Asia (Figure 2).

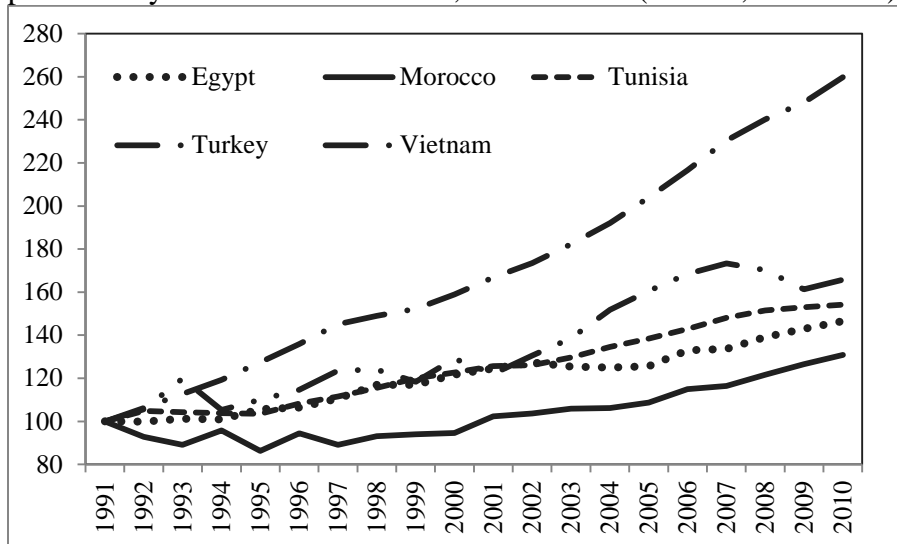
**Figure 1.** Real exchange rate and productivity (Indices, 1980 – 2011; 2005 = 100) 1/



**Source:** Authors' calculations based on the IMF IFS and IIF statistics. 1/ Increase (decrease) means appreciation (depreciation). Productivity is measured in terms of difference from the EU.



**Figure 2.** Labor productivity in selected economies, 1991 – 2010 (Indices; 1991=100)



Source: Authors' calculations based on the IMF and ILO databases.

### 3. Export Performance

#### *Growth, Market Share and Composition*

On a more positive note, Egypt's, Morocco's and Tunisia's volumes of exports grew by 186%, 182% and 165%, respectively, during 2000 and 2011 – close or slightly above the global average of 169%. However, these figures are less favorable when compared to other emerging market countries exporting heavily to the EU: Turkey's exports grew by 237% while those of Poland and Romania by 228% and 266%, respectively, during the same period.<sup>10</sup>

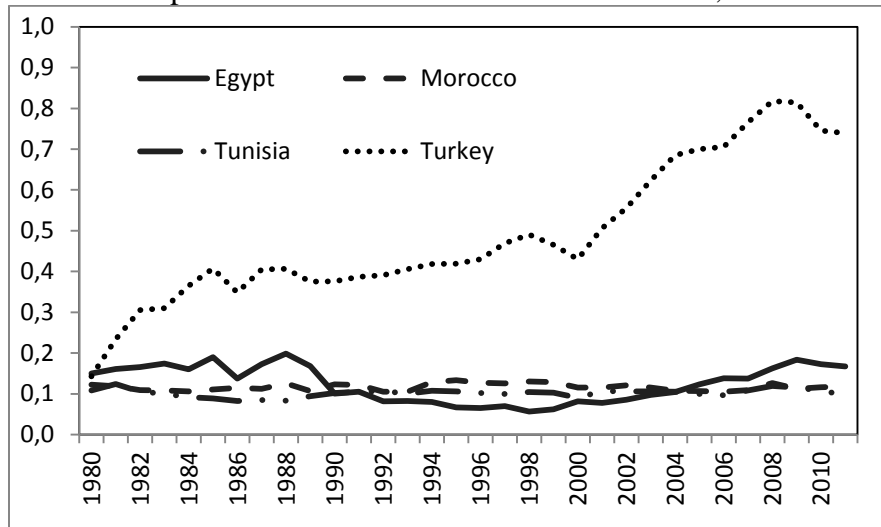
As shown by their low and stagnating shares in global exports, Egypt, Morocco and Tunisia have been facing external competitiveness challenges (Figure 3). Low and constant (or marginally rising, as was the case of Egypt) export shares help explain why the aggregate demand growth in these countries has remained subdued and not generated enough 'decent' jobs in export sectors.

#### *Diversification of Exports*

The three North African economies are less diversified than some other emerging market economies at comparable levels of development (e.g., Turkey). In particular, Europe has accounted for a disproportionate share as an export destination in all three countries, reflecting geographical closeness and long-established business ties (Table 1). Exports were also overly concentrated in primary products (fuel and agriculture). More broadly, consumption goods and primary products accounted for most of exports in the MENA region, while capital goods have a share of only about 7 percent in total exports (Ahmed et al., 2010).

<sup>10</sup> Calculations are based on the October 2012 IMF WEO database. The MENA region's subdued GDP growth goes hand in hand with its trade performance. Specifically, exports per capita of Morocco, Tunisia, and Egypt grew at slower rate than the average of emerging market economies since 1990 (Rasmussen, 2010).

**Figure 3.** Shares in World Export Markets -- Selected MENA Countries, 1980 – 2011 (%)



**Source:** Authors' calculations based on the IMF Database of Trade.

Low value-added products represent large shares of exports in all three countries. Specifically, according to the WTO database, the most important Egyptian exports during 2009-11 were fuels (36% of total exports) and agricultural products (17%); Egypt increased its share of the world markets in these sectors. Agricultural products (20% of total), chemicals (18%) and clothing (18%) were the largest parts of Morocco's exports during 2009 - 2011, but the country's share in world clothing markets as well as its revealed comparative advantage in this sector declined during the 2000s. In Tunisia, machinery equipment (including telecommunications) accounts for a large share (28%) of exports, followed by clothing (20%). As in Morocco, the country's share in the world market and its revealed comparative advantage in clothing have been declining.

**Table 1.** Merchandise Export by Sectors and Destinations in 2011 (% of total exports) 1/

	Egypt	Morocco	Tunisia	Turkey	Vietnam
Agriculture	17	16	8	11	23
Fuels	36	19	15	9	12
Manufacturing	42	62	75	77	64
Destination 1	31 (EU27)	60 (EU27)	76 (EU27)	47 (EU27)	19 (US)
Destination 2	7 (India)	6 (India)	4 (Libya)	6 (Iraq)	16 (EU27)
Destination 3	6 (Saudi Arabia)	4 (Brazil, US)	3 (Algeria)	4 (Russia)	11 (China)
Trade openness (% of GDP, 2005-11)	60	77	100	50	161

**Source:** WTO database. 1/ Country of export destination is in parentheses.

The lack of diversification of trading partners and high concentration in primary and consumption goods could pose a challenge for growth prospects in the North African countries. First, Europe's slow recovery from the global financial crisis creates uncertainties about their recovery as well. Second, medium term projections suggest that Europe will grow at slower rates than more dynamic regions such as developing Asia or Latin America. As Ahmed et al (2010) emphasized and the resilience of East Africa during the crisis illustrated, it would be important to broaden the export destinations to these more dynamic regions so as to provide a basis for high and inclusive growth. North African

countries could benefit from deeper integration with Sub-Saharan Africa, which continues to be among the world's fastest growing regions.

### *Intra-regional Trade*

**Table 2.** Shares of intra-regional and intra-African trade, by selected RECs (%)

	1981-1990	1991-2000	2001-2012	2008-2012
<b>EAC total exports</b> (US\$ mil.)	1,951	2,827	7,224	10,022
<i>Of which (% of total exports)</i>				
Intra-EAC exports	10.3%	16.5%	19.7%	19.8%
Exports to rest of Africa	6.2%	7.8%	13.1%	14.0%
Total exports to Africa	16.5%	24.3%	32.8%	33.8%
Export to advanced economies	67.9%	54.3%	39.0%	35.3%
Export to developing Asia	5.8%	10.7%	13.2%	14.1%
<b>UMA total exports</b> (US\$ mil.)	26,857	32,210	105,494	140,378
<i>Of which (% of total exports)</i>				
Intra-UMA exports	1.4%	3.1%	2.6%	3.1%
Exports to rest of Africa	0.3%	0.1%	0.2%	0.4%
Total exports to Africa	1.7%	3.2%	2.8%	3.5%
Export to advanced economies	86.0%	83.4%	82.2%	78.7%
Export to developing Asia	1.6%	2.2%	4.9%	7.9%

**Source:** Authors' calculations based on the IMF Direction of Trade database.

Heavy linkages with Europe, low intra-regional and intra-African trade as well as heavy dependence on Europe lower North Africa's competitiveness (Table 2). For example, UMA's intra-regional exports as a proxy points to its low share in overall UMA's exports even relative to intra-African exports.<sup>11</sup> In turn, intra-African exports are low relative to other regions – their average share in total exports during 2000 – 2012 was only 11 percent, relative to 25 percent in Latin America and 51 percent in Asia. More integrated Africa's sub-regions such as the EAC grow faster and are more resilient to aggregate shocks than regions trading mostly with advanced economies (Blanke et al., 2011).

#### **IV. Estimating Real Equilibrium Exchange Rates**

In the following sections, we examine real exchange rate misalignments – a possible factor behind the low external competitiveness of the three North African economies. Towards this goal, we estimate the real equilibrium exchange rates of the three countries using the stock-flow approach. The equilibrium rates provide basis to gauge whether the movements of the actual real exchange rates reflect mostly changing fundamentals or deviations from equilibrium levels.

<sup>11</sup> The UMA consists of Algeria, Libya, Mauritania, Morocco, and Tunisia.

## 1. Modeling Framework

According to the stock-flow approach (Annex I), the real exchange rate based on the CPI (RER) can be linked to the dual productivity differential (PROD) and to net foreign assets (NFA). The reduced-form equation is the following:<sup>12</sup>

$$RER = f^{+/-}(PROD, NFA)^{+/-} \quad (1a)$$

This stock-flow approach differentiates between the long-term misalignment (undervaluation) caused by the Balassa-Samuelson effect and other forms of misalignments that cannot be explained by the difference in the productivity levels between developing and developed countries. In emerging market economies, the impact of the productivity increase on the real exchange rate is ambiguous. On the one hand, according to the traditional Balassa-Samuelson effect a faster productivity growth in the tradable than non-tradable sector leads to appreciation of domestic currency. This can be amplified by strengthened non-price competitiveness in the tradable sector. In a presence of home bias, higher productivity in the tradable sector can also lead to a depreciation of the real exchange rate through decrease in the price of domestically produced tradable goods relative to those abroad. The overall impact of productivity on the real effective exchange rate depends on the strength and direction of these effects.<sup>13</sup>

The sign on net foreign assets is also ambiguous during the emerging markets' adjustment to the long-run equilibrium. As these economies need capital inflows to fuel growth, their targeted net foreign assets position may be negative. In turn, these capital inflows would typically cause the real exchange rate to appreciate. Once the foreign liabilities are large enough though, the outflow of interest payments may cause the real exchange rate to depreciate (Babetskii and Égert, 2005).

For the robustness check, we include the following control variables in the empirical analysis:

- Consumption as a share of GDP (*GS*) is often used to account for the demand-side factors that can lead to real appreciation if larger part of the spending is on non-tradables. Typically the government consumption is biased toward the non-tradables, and hence its increase causes prices in the non-tradable sector to rise, resulting in a REER appreciation;
- Openness (*OPEN*), reflecting trade liberalization and defined as share of exports and imports in GDP, is often included in estimations of real equilibrium exchange rate. An increase in openness can lead to a deterioration of the current account and real depreciation;
- A positive shock to terms of trade (*TOT*) should generate additional export revenues and contribute to real appreciation;
- The impact of investment as share of GDP (*INV*) is ambiguous. It depends on whether the investment is used to release supply side constraints in the tradable or non-tradable sector.

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<sup>12</sup> The dual productivity differential is defined as  $(prod^T - prod^{NT}) - (prod^{T*} - prod^{NT*})$ .

<sup>13</sup> Benigno and Thoenissen (2003) show in a dynamic general equilibrium model the case where the drop in tradable prices is more important than the increase in non-tradable prices, leading to the real exchange rate depreciation.

Equations (1b) to (1e) show equation (1a) augmented with the above control variables:

$$RER = f(PROD^{+/-}, NFA^{+/-}, GS^+) \quad (1b)$$

$$RER = f(PROD^{+/-}, NFA^{+/-}, OPEN^-) \quad (1c)$$

$$RER = f(PROD^{+/-}, NFA^{+/-}, INV^{+/-}) \quad (1d)$$

$$RER = f(PROD^{+/-}, NFA^{+/-}, TOT^+) \quad (1e)$$

## 2. The Econometric Methodology

### Data and Methodology

The empirical analysis is based on annual data series from 1980 to 2009, obtained from various databases of the African Development Bank and IMF. Equation (1) is estimated using CPI-deflated real effective exchange rate (*RER*). *PROD* is the productivity differential between the home country and the euro area, measured as real GDP per capita (in constant 2000 \$), and *NFA* is the ratio of net foreign assets to GDP. These and other variables are defined in Annex II.

First, we examine the relationship between the real exchange rate and the two core variables, productivity and net foreign assets. We then add the following control variables one at a time to check the robustness of the results in equation (1): the public spending to GDP ratio (*GS*); the openness ratio (*OPEN*), measured as total trade to GDP; the investment to GDP ratio (*INV*); and the terms of trade (*TOT*), export over import prices.

Given that conventional unit root tests suggest that most of our variables are non-stationary in level,<sup>14</sup> we carry out cointegration analysis. The presence of cointegration is assessed using the error correction term.<sup>15</sup> The long-term coefficients are estimated using the dynamic ordinary least square (DOLS) estimator, developed by Stock and Watson (1993). Stock and Watson (1993) show that DOLS accounts for the endogeneity of the regressors and serial correlation in the residuals by incorporating lags and leads of the regressors in first differences:

$$Y_t = \beta_0 + \sum_{i=1}^n \beta_i X_{i,t} + \sum_{i=1}^n \sum_{j=-k_1}^{k_2} \gamma_{i,j} \Delta X_{i,t-j} + \varepsilon_t \quad (2)$$

<sup>14</sup> The Augmented Dickey Fuller (ADF), Philips-Perron (PP), Elliott-Lothenberg-Stock (ERS) point optimal unit root tests, and the Kwiatowski-Phillips-Schmidt-Shin (KPSS) stationarity test are used to check whether the series are stationary or integrated processes. The results are available from the authors upon request.

<sup>15</sup> Kremers, Ericsson and Dolado (1992) argue that it is more effective than the residual-based Dickey-Fuller test, proposed initially by Engle and Granger (1989). Unlike the Dickey-Fuller test, which requires all variables to be integrated of order one to test for the existence of a long-run relationship among them, the auto-regressive distributed lag (ARDL) method allows for testing the variables irrespective of whether they are either purely I(0), or purely I(1) or a mixture of both. While the VAR-based Johansen cointegration technique could be also used in principle, we do not employ it due to the small number of observations we have.

where  $k_1$  and  $k_2$  denote, respectively, leads and lags. Their length is determined on the basis of the Schwarz, Akaike and Hannan-Quinn information criteria.

There is however some uncertainty whether the real exchange rate series for Tunisia and Morocco are I(1) processes. Therefore, we employ a level auto-regressive distributed lag (ARDL) model for these countries with the long-term parameter  $\beta$  in equation (4) being derived as suggested by Wickens and Breusch (1988):

$$Y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^n \delta_i Y_{t-i} + \sum_{i=1}^n \sum_{j=-k_1}^m \phi_{i,j} Y_{t-j} + \varepsilon_t \quad (3)$$

where the long run elasticity can be obtained as  $\beta = \sum_{j=0}^l \delta_j / (1 - \sum_{j=1}^l \phi_j)$ .

### *Estimation Results*

The estimate results of the real exchange rate models, obtained using the DOLS and ARDL models), are reported in Table 3. For each country, the baseline model linking the real exchange rate to productivity and net foreign assets is estimated first. Subsequently, additional control variables including the government spending ratio, openness, the investment ration and terms of trade are added one by one to the baseline model.

Our results indicate that in the long run, net foreign assets have a robust negative relationship to the real exchange rate in all three countries (only estimates based on DOLS are statistically significant for the latter). The negative sign, implies that in all three economies, decreases in net foreign assets, equivalent to capital inflows, result in an appreciation of the real exchange rate.<sup>16</sup>

Regarding the impact of productivity, the coefficient estimates are generally positive in Egypt, indicating that increases in productivity lead to real exchange rate depreciation. Even though results are in general not statistically significant (except when terms of trade are included), the coefficients preserve their positive sign in all estimated equations. In Morocco the impact of productivity on the real equilibrium exchange rate is statistically significant (under the DOLS method), but negative, indicating that the increase in productivity has the traditional Balassa-Samuelson effect. Finally, in Tunisia the signs of the estimated coefficients vary and magnitudes are relatively small, pointing to an ambiguous impact of productivity on the real exchange rate. This results is in contrast with findings for other emerging markets (including new EU members of Central Europe), where the productivity is a key driver of real exchange rate movements.

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<sup>16</sup> In emerging market economies, the sign on NFA could be positive over the medium term. When the emerging market economy has low initial stock of foreign assets and low domestic savings, foreign capital inflows are needed to close the investment – savings gap. Hence an increase in foreign liabilities might lead to domestic currency appreciation (Égert, Lahrèche-Révil, and Lommatzsch, 2004).

**Table 3. Real exchange rate models: Egypt, Morocco, and Tunisia**

<b>EGYPT - DOLS</b>					
ECT	-0.345***	-0.383**	-0.331**	-0.468**	-0.524***
CONST	1.211	1.056	2.113	3.021***	0.821
PROD	0.780	1.443	0.460	0.212	1.716
NFA	-2.841***	-3.787***	-3.721***	-3.364***	-2.767***
GS		0.415			
INV			-0.469		
OPEN				-0.778***	
TOT					-0.233
$R^2$ adj.	0.394	0.368	0.407	0.420	0.469
HQ	-2.267	-2.183	-2.246	-2.268	-2.356
<b>EGYPT - ARDL</b>					
CONST	-0.329	-0.558	-0.289	1.435	0.061
RER(-1)	0.594***	0.642***	0.59***	0.178	0.459***
PROD	1.196	1.156	1.193	1.326*	1.966***
NFA	-1.319**	-0.936	-1.369*	-2.279***	-1.106***
GS		0.162			
INV			-0.024		
OPEN				-0.647**	
TOT					-0.413***
<b>MOROCCO - DOLS</b>					
ECT	-0.528***	-0.665***	-0.515***	-0.567***	-0.643***
CONST	2.709***	0.962	2.466***	3.454***	3.454***
PROD	-0.962**	0.092	-1.083**	-0.834**	-0.834**
NFA	-1.259***	-1.259***	-1.498***	-0.971***	-0.971***
GS		0.646			
INV			0.231		
OPEN				-0.471**	
TOT					-0.471**
$R^2$ adj.	0.444	0.406	0.429	0.449	0.421
HQ	-3.715	-3.606	-3.645	-3.681	-3.649
<b>MOROCCO - ARDL</b>					
CONST	1.236**	0.711	1.113**	2.192***	1.112**
RER(-1)	0.387**	0.39**	0.415**	0.233	0.351*
PROD	-0.103	0.072	-0.221	-0.168	-0.038
NFA	-0.646***	-0.748***	-0.722***	-0.5**	-0.633***
GS		0.283			
INV			0.118		
OPEN				-0.324*	
TOT					0.07

TUNISIA - DOLS					
ECT	-0.456***	-0.289	-0.614***	-0.464***	-0.434**
CONST	2.033***	-0.65	0.548	2.244***	2.244***
PROD	-0.05	0.562	-0.034	0.079	0.079
NFA	-0.35**	-0.726***	-0.646***	-0.372**	-0.372**
GS		1.639**			
INV			1.002***		
OPEN				-0.178	
TOT					-0.178
$R^2$ adj.	0.214	0.048	0.313	0.321	0.273
HQ	-3.636	-3.401	-3.728	-3.739	-3.670
TUNISIA - ARDL					
CONST	1.021**	0.995	0.707	1.381***	1.269**
RER(-1)	0.532***	0.531***	0.522***	0.474***	0.514***
PROD	-0.086	-0.077	-0.139	0.099	0.016
NFA	-0.147	-0.148	-0.299*	-0.219	-0.214
GS		0.016			
INV			0.255		
OPEN				-0.231	
TOT					-0.166

**Source:** Authors' estimations. Note: Results are robust to other specifications (available upon request).

The estimated coefficient for openness shows that a greater openness would lead to a depreciation of the real exchange rate in all three countries. The relationship is statistically significant only for Egypt and Morocco, but has the negative sign also for Tunisia. It is also consistent with the actual developments in Morocco and Tunisia since mid-2000s. Another useful finding is that terms of trade impact the real exchange rate. Specifically, improvements in terms of trade would lead to real exchange rate appreciation in Egypt and Morocco, most likely via inflation differentials.

### 3. Real Exchange Rate Misalignment

The misalignment between the actual real exchange rate (RER) and the long run real equilibrium exchange rate (REER) can be calculated from the following formula:

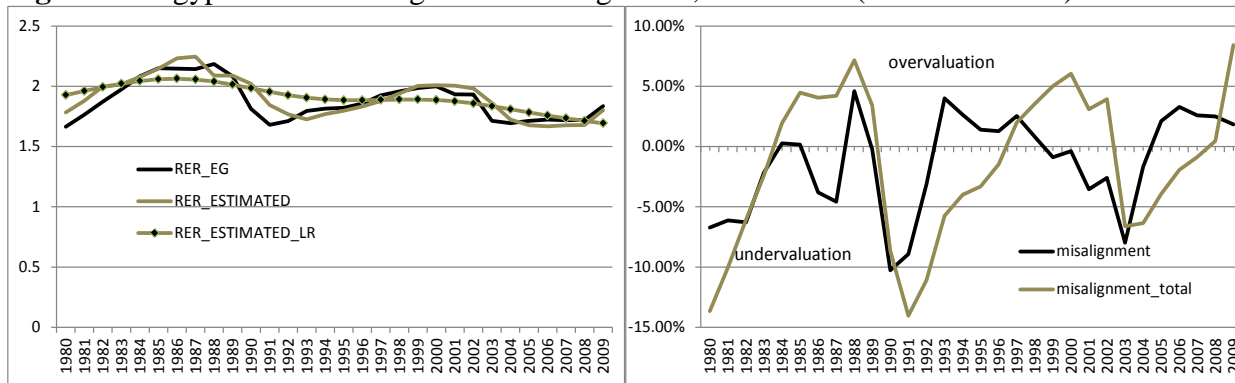
$$\text{Misalignment} = (\text{RER} - \text{REER}) \quad (4)$$

The results are illustrated in Figures 4a – 4c. It is interesting to note that the RER of *Egypt* was overvalued from the mid-1990s until mid-2000s, following the increasing inflation rate and current account deficits. To mitigate the appreciation pressures and decline in reserves, extensive foreign exchange controls were put in place at the end of 1990s. This has led to low growth, a decline in central bank reserves, and import compression. In 2006 and 2007, the real exchange rate was again relatively closely to its equilibrium value, consistently with Almekinders (2007).<sup>17</sup>

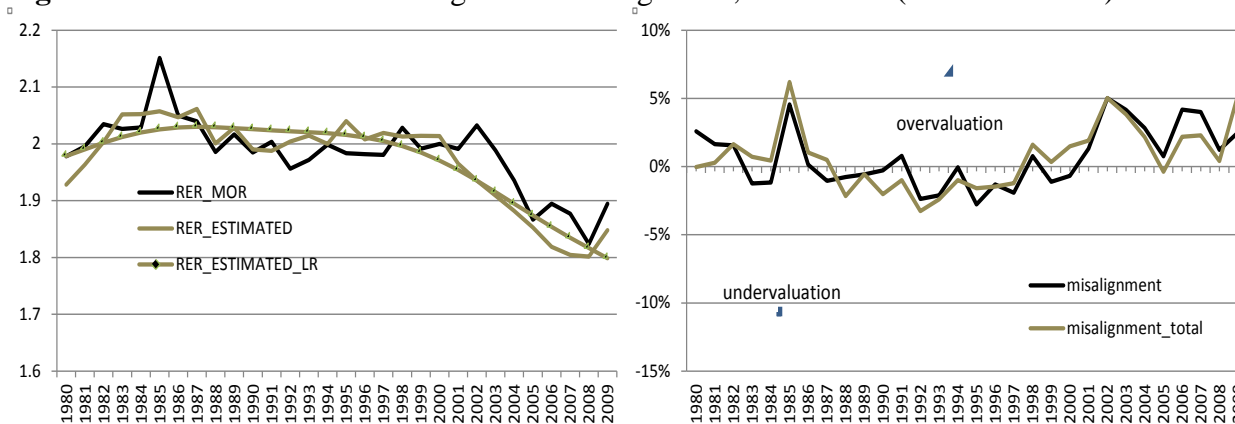
<sup>17</sup> The resulting strengthening of the balance of payments allowed a gradual abolition of the exchange controls and a strong recovery of import growth.



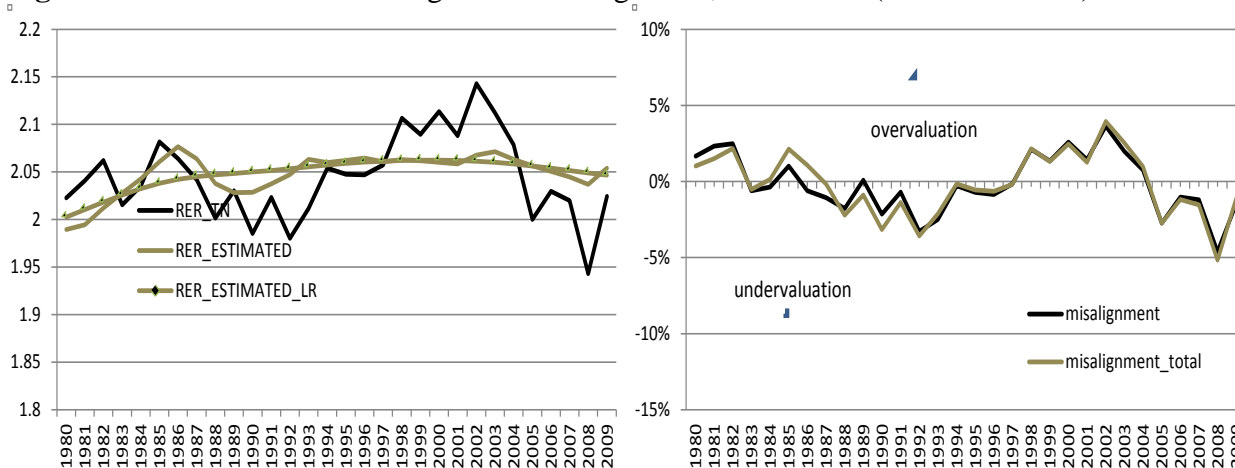
**Figure 4a. Egypt: Real Exchange Rate Misalignment, 1980-2009 (% of the REER)**



**Figure 4b. Morocco: Real Exchange Rate Misalignment, 1980-2009 (% of the REER)**



**Figure 4c. Tunisia: Real Exchange Rate Misalignment, 1980-2009 (% of the REER)**



**Source:** Authors' calculations. Note: DOLS is used to present misalignment in these graphs.

However, with the *de facto* crawling peg regime and rapidly rising inflation, real exchange rate appreciated and was once again notably overvalued in the late 2000s. At the end of 2012, the CBE introduced daily foreign exchange auctions and tightened restrictions on foreign currency outflows, with a view to raise exchange rate flexibility and reduce misalignment.

For *Tunisia*, the low misalignment in recent years can be explained by the abandonment of the real exchange rate targeting and gradual introduction of the exchange rate flexibility, with a view to have a floating system and complete capital mobility over the medium term. This goal had initially been set for 2010 but was postponed to 2014 because of the global crisis. The relative flexibility of the exchange-rate system resulted in a depreciating trend for the REER, fed by negative terms of trade shocks and by increased openness of the economy. Depreciation reinforced the price competitiveness of exports, but structural bottlenecks remained. Tunisia's policy of opening to the global economy weathered the impact of the global economic and financial crisis. The authorities continued lowering custom duties to comply with international commitments such as World Trade Organization, Agadir Agreement, and Arab Maghreb Union free-trade agreements, etc. and to stimulate trade across borders. Since January 2008, Tunisia has established a free-trade zone for industrial products with the EU.<sup>18</sup>

In *Morocco*, misalignment has been low in recent years. The country experienced a short overvaluation in mid- 80s entailed by the current account deficit, followed by the devaluation in the late 1980s. It's important to note that Morocco's equilibrium exchange rate's was not affected by the latest global economic crises, in part due to prudent monetary policy (Figure 4b).

Overall, periods of major exchange rate misalignments in Egypt are associated with country's changes in inflation.<sup>19</sup> Specifically, episodes of overvaluation are associated with Egypt's episodes of high inflation. For example, during the period 1984-1990 (overvaluation period), the average inflation was almost 20 percent (above the sample's average inflation of 12 percent). Similarly, episodes of undervaluation correspond to periods of decreasing inflation – during 1998-2002, the inflation rate reached its lowest level (average rate was 3.3 percent). Moreover, until recently Egypt's exchange rate was *de facto* fixed (various changes to the official regimes notwithstanding) which has contributed to the real exchange rate misalignment (Figure 4a).<sup>20</sup>

In contrast, relatively low misalignments in Morocco and Tunisia owe in part to maintaining inflation at moderate levels since mid-1990s, as pointed in Elbadawi and Kamar (2006). As, inflation has been decreasing since the early 1980s, it is not clear how to associate a specific overvaluation to an episode of high inflation.<sup>21</sup>

#### **4. Comparison of Results with the Empirical Literature**

Findings of earlier studies on the real exchange rate misalignment in North Africa, utilizing mostly the behavioral equilibrium exchange rate but also other approaches, are summarized in Table 4. The results of our paper, which uses the stock-flow approach to estimating the real equilibrium exchange rate, are broadly consistent with most of the empirical literature.<sup>22</sup>

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<sup>18</sup> Daly (2006) found real exchange rate fluctuations in Tunisia to be driven mostly by real shocks.

<sup>19</sup> This is despite the *de facto* fixed exchange rate regime, which in MENA countries is usually associated with low inflation (Ghanem, 2012).

<sup>20</sup> By targeting the real exchange rate in the 1990s, Morocco and Tunisia introduced some flexibility to the rate. Nabli and Végonzònès-Varoudakis (2004) attribute the periods of high real exchange rate misalignments in MENA countries to rigid exchange rates and the lack of reforms.

<sup>21</sup> Still, for the case of Morocco, the overvaluation observed in 1984 and 1985 coincides with an episode of higher inflation (Morocco's economy reached one of its highest inflation rate – 12.5 percent – during this period).

<sup>22</sup> Robustness checks conducted with HP filter are in Annex III.

**Table 4.** Real exchange rate misalignment in North Africa -- Summary of literature

<b>Study and authors</b>	<b>Methodology</b>	<b>Findings</b>
Mongardini (1998)	Equilibrium real exchange rate (ERER)	Real exchange rate was substantially overvalued before 1993, in late 1990s it was close to its equilibrium value.
Domaç& Shabsigh (1999)	BEER	Currency overvaluation between 1970 - 1995
Fanizza et al. (2002)	Analysis based on fundamentals and competitiveness indicators	No major misalignment of the Tunisian Dinar.
Bouoiyour&Rey (2005)	NATREX	Moroccan diner was overvalued in the late 1990s/early 2000s.
Almekinders (2007)	Utilizes three approaches: macroeconomic balance, PPP, external sustainability	Significant undervaluation from mid1980s to 1990s; overvaluation in 2000, RER broadly in equilibrium in 2006.
Charfi (2008)	BEER	The Tunisian dinar converged to its equilibrium level over the 1990s' (after 1986's devaluation).
IMF (2012b)	Utilizes three methods: macroeconomic balance, ERER, external sustainability	Tunisian dinar slightly overvalued but broadly in line with medium term fundamentals.
Abed&Iradian (2013)	Macroeconomic balance approach	Depreciation of about 10 percent in real effective exchange rate is needed to bring the RER of the Egyptian pound to its equilibrium value.
Lebdaoui (2013)	BEER and HP filter	Minor misalignment (less than 3%) of Moroccan dinar in various periods.

## V. Conclusions

Utilizing – for the first time for North Africa – the stock-flow approach to estimating the real equilibrium exchange rate, this paper estimated misalignments of real exchange rates from the equilibrium values in Egypt, Morocco, and Tunisia during the past three decades. While Egypt experienced protracted misalignment in the past and recent years, real exchange rates in Morocco and Tunisia stayed closer to their equilibrium values. These results need to be put in the context of the relatively weak export performance, where export growth has been lagging behind the average of emerging market economies. Non-price structural factors such as labor market flexibility, skills, and investment climate are among key factors for unlocking the export and productive potential of the three North African countries. Intra-regional trade – both with North Africa and the rest of the continent – together with greater orientation to fast growing emerging markets could also raise countries' external competitiveness.

According to various indicators (e.g., GCI, Doing Business), the most severe structural bottlenecks hampering Egypt, Morocco and Tunisia are inflexible labor market institutions, still relatively overregulated business climate, and skill shortages. They contribute to underdeveloped private sector,

slow growth and high and persistent unemployment.<sup>23</sup> To address these constraints, further progress needs to be made with reducing skill mismatch (e.g., revamping educational systems to reflect labor market demand); improving the business environment; and increasing labor market flexibility. Regarding the job creation part, measures could shift from establishing enabling environment (e.g. limiting rigidities) to more pro-active ones such as support to entrepreneurship in high-value added sectors and activities. This would be particularly important in the aftermath of the global economic crisis and in the context of ongoing domestic transitions, which put inclusive growth and job creation high on the countries' policy agenda.

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<sup>23</sup> Blanke et al. (2011) elaborate. As Rasmussen (2010) states, the MENA region's subdued GDP growth goes hand in hand with its weak trade performance. Specifically, exports per capita of Morocco, Tunisia, and Egypt grew at slower rate than the average of emerging market economies since 1990.

## ANNEX I. THEORETICAL UNDERPINNINGS OF THE STOCK-FLOW APPROACH<sup>24</sup>

The stock-flow model of the real equilibrium exchange rate builds on the asset model of the current account (e.g., Mussa, 1985; Faraque, 1995 and others), where the long run the current account is driven by adjustment in the net foreign assets towards their targeted position. Because of this adjustment, the real equilibrium exchange rate of the tradable sector can deviate from a value given by Purchasing Power Parity (PPP). The long-run real equilibrium exchange rate is consistent with the level of trade balance that equals the net income flows to the country.

The basis for the stock-flow approach to the real equilibrium exchange rate is decomposing real exchange rate into: (1) real exchange rate for the tradable sector (comprising the nominal exchange rate and the ratio of foreign and domestic tradable prices) and (2) the ratio of domestic to foreign relative price of non-tradable goods:

$$q = e + (p^{*T} - p^T) - \left( (1 - \alpha)(p^{NT} - p^T) - (1 - \alpha^*)(p^{*NT} - p^{*T}) \right) \quad (1)$$

where  $q$  denotes the real exchange rate,  $e$  is the nominal exchange rate,  $\alpha$  ( $\alpha^*$ ) is the share of tradable goods in the domestic (foreign) CPI;  $p^T$  ( $p^{*T}$ ) is the domestic (foreign) price of tradable goods, and  $p^{NT}$  ( $p^{*NT}$ ) is the domestic (foreign) relative price of non-tradable goods. The second – bracketed – term in (1) shows how changes in the real exchange rate due to different developments in prices of non-tradable goods relative to prices of tradable goods.

Focusing on the long-run external equilibrium (i.e. abstracting from short-term capital flows and business cycles) we define the change in net foreign assets as:

$$\Delta NFA = CAB = \varphi(NPC - q - (\Delta y - \Delta y^*)) + r^* NFA \quad (2)$$

where  $NFA$  stands for net foreign assets,  $NPC$  is non-price competitiveness,  $y$  ( $y^*$ ) is domestic (foreign) growth rate,  $r^*$  is the real interest rate at the world markets,  $CAB$  stands for the current account balance, and  $\varphi > 0$ . The first component of (2) represents the trade account and the second component is the interest income from NFA. In (2), real exchange rate depreciation and improved non-price competitiveness strengthen current account balance and increase NFA.

Under the uncovered real interest rate parity condition (where the difference between domestic and foreign real interest rates equals the expected change in the real exchange rate), the path of NFA towards their targeted level,  $NFA^D$ , can be described by:

$$\Delta NFA^D = \mu(NFA^D - NFA) + \lambda(r - r^*) = \mu(NFA^D - NFA) + \lambda E(\Delta q) \quad (3)$$

where  $\Delta NFA^D$  can be interpreted as capital account,  $r$  is the real interest at domestic markets and  $\lambda, \mu > 0$ . Since over the medium term  $\Delta NFA^D = \Delta NFA$ , combining (2) and (3) yields:

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<sup>24</sup> This section is adapted from Égert et al. (2004).

$$\varphi(NPC - q - (\Delta y - \Delta y^*)) + r^* NFA - \mu(NFA^D - NFA) = \lambda E(\Delta q) \quad (4)$$

According to (4), during the transition towards the long-run equilibrium the real exchange rate is driven by trade balance, income flow from NFA, and the difference between the targeted and the actual stock of NFA. Finally, since  $\Delta NFA = 0$  in the long-run equilibrium (steady state), the long-run real equilibrium exchange rate ( $q^l$ ) can be described as:

$$q^l = NPC^l - (\Delta y - \Delta y^*)^l + \frac{r^* NFA}{\varphi} \quad (5)$$

From (5), the real exchange rate based on the CPI ( $RER$ ) can be linked to the dual productivity differential ( $PROD$ ) and to net foreign assets ( $NFA$ ):

$$RER = f^{+/-}(PROD, NFA)^{+/-} \quad (6)$$

**ANNEX II. DESCRIPTION OF VARIABLES**

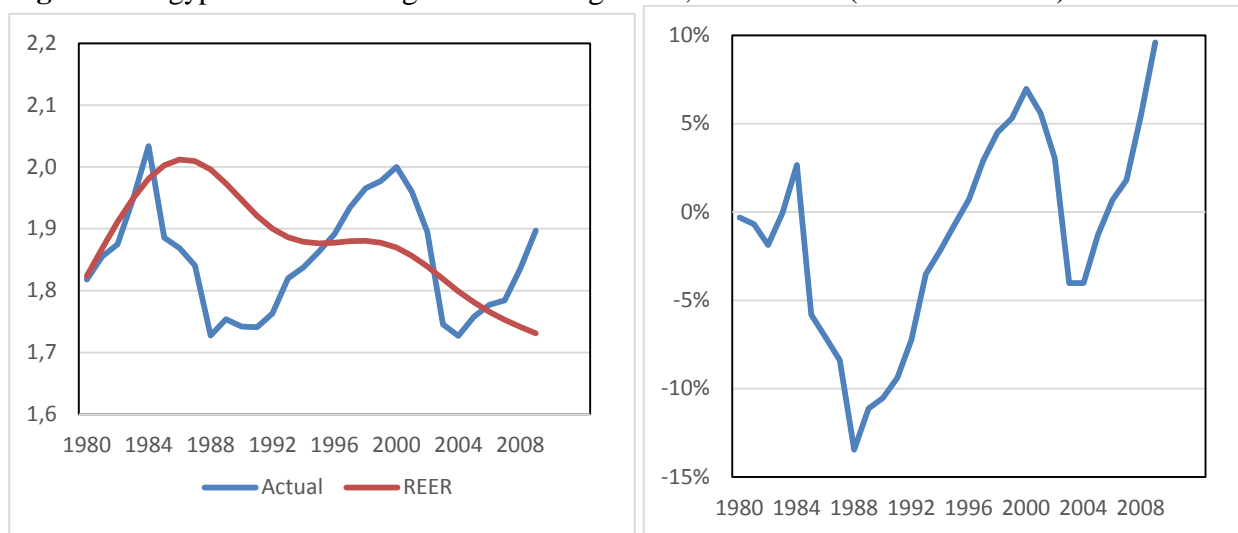
	<b>Definition</b>	<b>Sources</b>
GS (% GDP)	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees).	International Financial Statistics, IMF
INV (%GDP)	Expressed as a ratio of total investment in current local currency and GDP in current local currency. Investment or gross capital formation is measured by the total value of the gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables for a unit or sector.	World economic outlook, IMF
TOT	Net barter terms of trade index is calculated as the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000.	World Development Indicators, World Bank
NFA (%GDP)	Calculated as cumulative current account balances (% of GDP), that is all transactions other than those in financial and capital items. The major classifications are goods and services, income and current transfers.	World economic outlook, IMF
RER	Real exchange rate is the nominal exchange rate (a measure of the value of a currency against Euro) divided by a price deflator or index of costs.	International Financial Statistics, IMF
PROD	Differences in GDP per capita, in constant 2000 U.S. dollars.	World Development Indicators , World Bank
OPEN (% of GDP)	This indicator is calculated for each country as the simple average (i.e. the mean) of total trade (i.e. the sum of exports and imports of goods and services) relative to GDP.	International Financial Statistics, IMF

### ANNEX III. REAL EXCHANGE RATE MISALIGNMENT – ROBUSTNESS CHECK

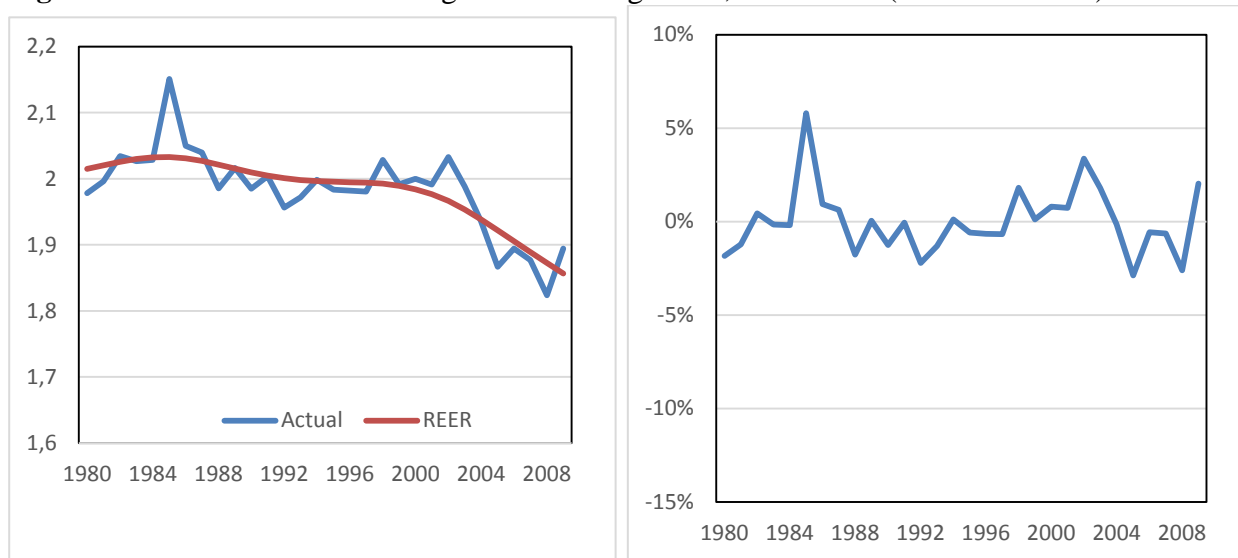
In this Annex, we conduct robustness check of our empirical results utilizing a purely statistical method of estimating the real equilibrium exchange rate by de-trending the actual series with HP filter. The assumption behind this approach, utilized in Csajbok (2003), Frait et al. (2006), Lebdaoui (2013) and others, is that over the longer term, the real exchange rate is on average in equilibrium.

Results utilizing this method confirm those derived with the stock-flow approach. Egypt has experienced periods of sizeable real exchange rate misalignments, including overvaluation of the real exchange rate in recent years. In contrast, real exchange rates of Morocco and Tunisia have been broadly aligned with their equilibrium values (Figure 1, Annex II).

**Figure 1a.** Egypt: Real Exchange Rate Misalignment, 1980-2009 (% of the REER)

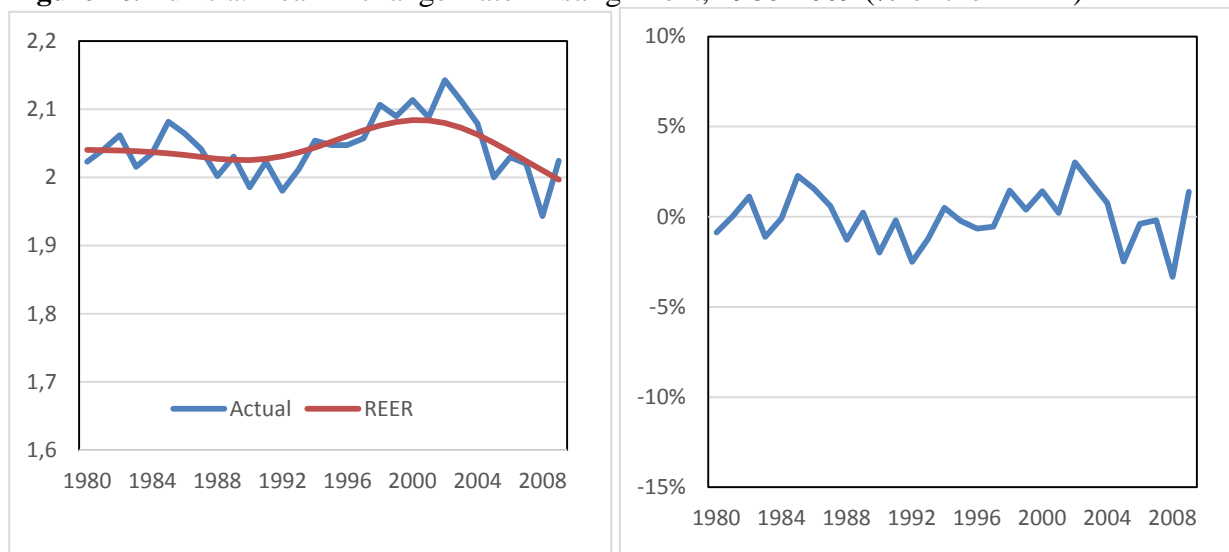


**Figure 1b.** Morocco: Real Exchange Rate Misalignment, 1980-2009 (% of the REER)





**Figure 1c.** Tunisia: Real Exchange Rate Misalignment, 1980-2009 (% of the REER)



**Source:** Authors' calculations. REER is computed with HP filter.

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