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## **An Anatomy of Moroccan Agricultural Trade\*\***

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### **Abstract**

Morocco is engaged in a number of economic reforms to better position the country's integration into world markets. Her agricultural sector is particularly important as its trade, GDP, and employment share are relatively large. We analyze Morocco's agricultural trade growth trends over the past 40 years (1962 - 2004) using SITC 4-digit bilateral agricultural trade data. The data are analyzed using the trend and cycles decomposition (TCD) approach and measurement of trade growth at the intensive and extensive margin. We find a high concentration of agriculture trade in both commodities and trading partners. Morocco has also lost export shares in EU to other EU countries in her top exporting commodities. Another finding suggests that agricultural export growth for Morocco was at the intensive rather than extensive margin. This posts a great challenge for Morocco if she is to expand trade at the extensive margin.

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# 1 Introduction

Morocco is engaged in a number of economic reforms to better position the country's integration into world markets. High on this agenda are negotiations with the EU to further liberalize agricultural trade. In the meantime, the country is at a critical turning point in addressing broader issues of social and economic development, especially in agricultural and rural development. For example, the government is in the process of drafting country's Vision 2020 documents. These documents will provide a strategic framework to the design and implementation of new development strategies. Special attention is given to the country's comparative advantage in agriculture in a more liberalized world environment. Given that the country is highly dependent on European markets for its agricultural exports, the removal of trade barriers and the lowering of transactions costs with EU member countries seems critical to the realization of the efficiency gains in those sub-sectors of agriculture for which the country has resource endowments in relative abundance to her major trade partners.

In order to better plan the future, it is necessary to better understand the country's historical agricultural trade performance. For this reason, we analyze Morocco's agricultural trade growth trends over the past 40 years (1962 - 2004) using SITC 4-digit agricultural trade data. Such data are analyzed using the trend and cycles decomposition (TCD) approach, smoothing techniques, and growth margin decomposition methods. These approaches are helpful for capturing the dynamics of growth in trade, and allow us to obtain insights that a more structural and model-based method is unlikely to provide.

We focus on the dynamic aspects of the country's total agricultural exports, and agricultural exports to its major trade partners (including trade with the rest of world that include all other countries not defined as the main partners). At the aggregate level, growth in Morocco trade (both exports and imports) has been highly variable over the past 40 years. The empirically smoothed growth rates remove the idiosyncratic shocks, and reveal a surprisingly cyclical pattern that spans several years. The pattern of fluctuations in agricultural exports and imports also correspond to the fluctuating pattern of agricultural value added (AgGDP). The aggregate data show that the country has lost world market share in the 1960s and 1970s. While some gains in market shares occurred in the late 1980s, the more recent trends in its share of the world market have been stagnant.

The data suggest that the main reason for this disappointing performance is that Morocco was unable to maintain or gain additional markets in the EU countries. Since 70% to 80% of Morocco's total agricultural exports are to the EU markets, trade barriers and transactions costs in these markets are likely key to the country's broader integration with world markets. Within the EU, France was the most important single market for Morocco, but growth of her agricultural exports to this market is the slowest of other major trading partners.

Commodity level analysis shows that Morocco's agricultural export growth is dominated by intensive margin (i.e., exports of the same product varieties over time). The commodities ranked at the top 5 in the 1960s are the same as

those ranked at the top 5 in the 2000s. These top 10 commodities accounted for more than 75% of Morocco's total agricultural exports in the 1960s, and they still accounted for more than 70% today.

That Morocco's agricultural exports are concentrated in a few commodities can also be seen by focusing on the number of commodities ranked in the top 20 in share of total agricultural exports. These top 20 commodities accounted for almost 95% of Morocco agricultural exports in the 1960s and 85% today. A majority of the commodities ranked in the top 20 have remained in this ranked order for more 40 years. There are very a few commodities that have replaced others in the top 20 recently. Given that expansion in world trade is driven mainly by growth at the extensive margin (new varieties of exports), part of Morocco's lack-luster growth of agricultural exports might be explained by her slow growth at the extensive margin.

The top 5 commodities in Morocco's total agricultural exports are given special attention because they are also the same top five commodities in terms of the country's trade share to the EU market. We find that Morocco has significantly lost its market share of these top 5 in the EU market, from 5% in early 1960s to 1.5% in recent years. What is the reason for this decline? Our market share analysis for EU's different trading patterns shows that increases in intra-EU trade is likely the most important reason the decline from 5% to 1.5% .

Moving from expanding trade in existing goods to an extensive margin growth pattern through growth in the number of trade varieties is a huge challenge for Morocco. She may need to pursue a more open foreign direct investment strategy in order to attract multinational enterprises to compete in the EU's value added markets. However, in the short-run, Morocco still has potential to increase traditional exports through its negotiation with the EU to further open the EU market.

## 2 Overview of the Moroccan economy and trade

The annual growth rate in Morocco's real gross domestic product (GDP) averaged around 3% per annum from 1990 to 2005. The country's per capita GDP<sup>1</sup> was \$2,468 in 1975 and \$4,052 in 2005. While the importance of agriculture value added continued to decrease over the past 4 decades (figure 1), a large proportion of Moroccan labor force remains in the agriculture sector. The agricultural share of GDP decreased from 23.4% to 14.1% over the 1965 to 2005 period. The share of the work force engaged in agricultural employment remains high at 54% and 47% in 1965 and 2005 respectively. At the same time, the agricultural labor force is relatively dependent on foreign markets. Since 1990, the value of agricultural exports has comprised about 35% of agricultural GDP.

A surprising recent trend is growth in the share of the workforce employed in agriculture (figure 2). Bruce Johnston (1970), and many economists since,

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<sup>1</sup>Purchasing Power Parity adjusted in constant 2000 international dollars.

maintain that a fundamental feature of growth and development is the decline in the share of the workforce employed in agriculture. Morocco appears to have experienced a reversal in this trend, starting about 2003. The decline in the share of labor employed in industry has only been partially accommodated by an increase in the share of labor employed in services. This may suggest that the stagnation in per capita GDP growth tends to "lock" labor in agriculture.

In terms of the broader economy, agricultural exports are playing a smaller role. Since the 1970's, the share of agriculture in total merchandise exports has declined slowly, from a high of about 38% in the early 1970s to about 23% in recent years (figure 3). Manufacturing exports continue to grow and currently account for over 60% of total merchandise exports. Manufacturing also accounts for the largest and growing share of total imports, while agriculture's share has declined, reaching about 14% in recent years (figure 4).

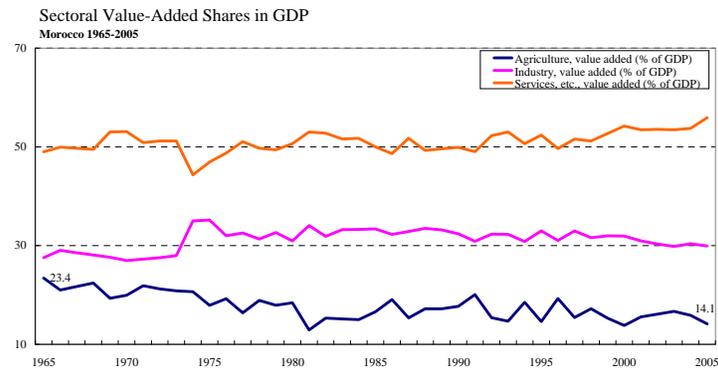


Figure 1

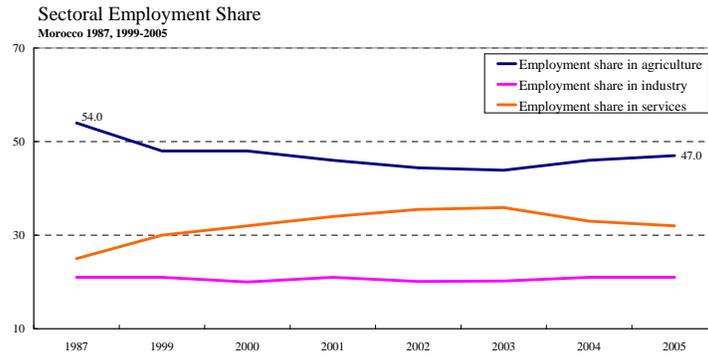


Figure 2

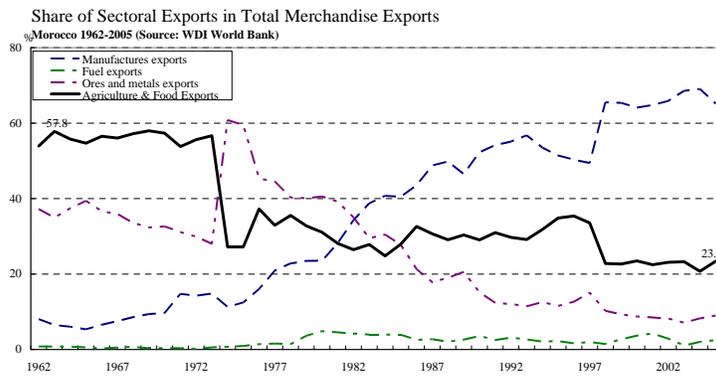


Figure 3

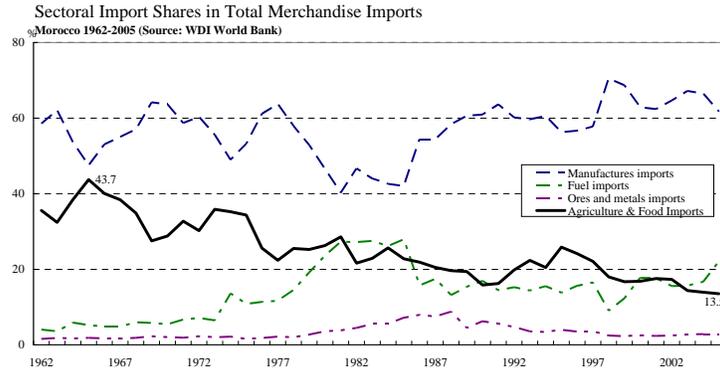


Figure 4

### 3 Data

The Moroccan agricultural trade data at 4-digit Standardized International Trade Classification (SITC) level are used for trade pattern analyses. The data source is the United Nations Commodity Trade Statistics Database (UNCOMTRADE) maintained by the Statistic Division of United Nations. The aggregate data covers Food and Live Animals (SITC 0), Beverage and Tobacco (SITC 1), Crude Materials, Inedible, except Fuels (SITC 2), Animal and Vegetable Oils, Fats and Waxes (SITC 4), Other Organic Chemicals (SITC 5129), Essential Oils and Retinoids (SITC 5511), Starches, Inulin, Gluten, Albumin, Substances, Glues (SITC 5995), Leather (SITC 6113, 6114, 6119), Veneers, plywood boards & other wood, worked, nes (SITC 6311, 6312, 6314, 6318) and Textile Yarn (SITC 6511-5, 6519). National income data from the IBRD's World Development Indicator (WDI) are also used to obtain the overall picture of Moroccan growth, trade, and economy. Although our trade data are in nominal terms, our analyses focus mainly on shares and growth rates of these values where real and nominal price make little difference.

### 4 Methods

The time series data of agricultural trade flows from and to Morocco are analyzed to better understand the changes and trend in Morocco trade and to inform policy decisions. The growth rates of aggregate trade and export and import flows in aggregate commodities are also calculated and analyzed. Special focuses were given to the bilateral agricultural trade between Morocco and

her major trading partners. Trend and cycles decomposition approaches and smoothing techniques are applied to capture the long-term trend in Moroccan trade. Growth in trade is also decomposed into intensive and extensive margins. This section provides a quick overview of the methods adopted in the analysis.

#### 4.1 Trend and Cycle Decomposition (TCD) and Smoothing

Avoiding probabilistic approaches, Hodrick and Prescott (1997) proposes a filter to decompose the long-run trend and short-run cycling fluctuations in analyzing aggregate macroeconomic time series data. They, and others studying economic growth, begin with the maintained hypothesis that the underlying and fundamental components of growth in an economic time series varies "smoothly" over time. The challenge is to identify the growth rates associate with these fundamentals and distinguish them in the data from other noisy idiosyncratic shocks. More specifically, Hodrick and Prescott (1997) maintain that any given time series  $y_t$  is consisted of a growth component  $g_t$  and idiosyncratic component  $c_t$ . That is  $y_t = g_t + c_t$  for  $t = 1, \dots, T$ . The component  $c_t$  is the deviations from the long-term growth trend  $g_t$  and should sum to zero over a sufficiently long period of time. The method is to minimize the sum of squares of the residual,  $c_t$ , and the (weighted) sum squares of the second difference of  $g_t$ . The solution series  $\{g_t\}_{t=-1}^{t=T}$  is determining by:

$$\min_{\{g_t\}_{t=-1}^T} \left\{ \sum_{t=1}^T c_t^2 + \lambda \sum_{t=1}^T [(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]^2 \right\} \quad (1)$$

The fact that component  $c_t$  should sum to zero over time if the decomposing is done correctly gives rise for the first term in 1. The second term in 1 is much more interesting given the role of the parameter  $\lambda$  and the use of second difference of the data series. For the penalty term in brackets, the larger the value assigned to  $\lambda$ , the  $g_t$  chosen to minimize (1) will be such as to produce a smaller value for the term  $[(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]$ . If  $\lambda$  takes the value of infinity, this will force the solution series to follow a linear time trend model where  $[(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]$  is zero. With assumptions on the probabilistic behavior of  $c_t$  and  $[(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]$  and the proportion of  $c_t/y_t$ , Hodrick and Prescott (1997) recommend the values of  $\lambda$  for data series with different time intervals.

The appealing aspect of the filter is now more clear. Taking growth as consisting of a long-term trend and a short-term volatility, Hodrick and Prescott (HP) filter can serve as a way of smoothing data and filtering out the noisy short-term volatility which more likely has little to do with the fundamental forces of growth or structural change in the Moroccan economy. When the analyzed series already in growth rates,  $\lambda$  takes a small value of 6 through out our analyses to alleviate the concern of "over smoothing".

A moving average smoothing method is also employed to contrast results with that of the HP filter. The moving average process is one of the most

commonly applied smoothing techniques in dealing with time series data. In particular, the smoothed process is

$$x_t = \sum_{j=-k}^k a_j \cdot y_{t-j}, \quad a_j = a_{-j} \geq 0 \text{ and } \sum_{j=-k}^k a_j = 1 \quad (2)$$

where  $y_t$  is the data series and  $a_j$ 's are the weighting parameters. Lacking the justification to assign different weights,  $a_j$  takes the value of  $1/(2k+1)$  in all our analyses. The idea is that by accounting for the growth rates of three consecutive years, the resulting series is smoothed out of the random kinks and peaks that can hardly be explained by long term process of economic development. One obvious disadvantage of the moving average method is the loss of observations. If the data is smoothed using 3-year moving average, the first and last observation are lost due to the nature of the process.

In Figure 5 and 6, the 3-year moving average, and HP filtered growth rates in Moroccan agricultural exports and imports are plotted for comparison. It is clear that both smoothed series yield quite similar results. However, the HP filter seems to do a better job in smoothing without the problem of over-shooting and with the advantage of no unnecessary loss of observations.

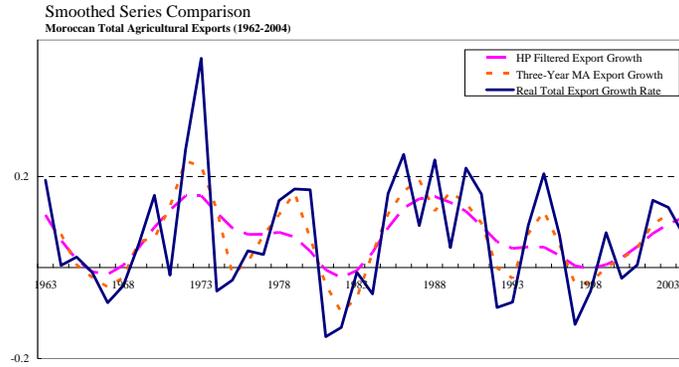


Figure 5

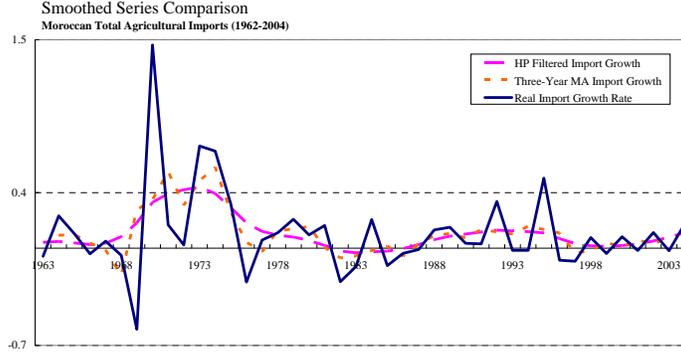


Figure 6

## 4.2 Methodology for determining the growth margin

To distinguish between the intensive and extensive margin of Moroccan agricultural exports, we employ the method originated by Feenstra (1994). Moroccan export growth is decomposed to intensive and extensive margin growth. The original idea of Feenstra's work is to include new product varieties into import price index. Borrowing Feenstra's idea, our analysis centers on whether the products of Morocco exports consist of existing or new varieties. The volume of trade,  $V_{it}$ , for the  $i^{th}$  product at time  $t$  is decomposed into the volume of existing varieties  $V_{it} \cdot D^e$ , disappearing varieties  $V_{it} \cdot D^d$ , and new varieties,  $V_{it} \cdot D^n$ , where  $D^e$ ,  $D^d$ , and  $D^n$  are dummy variables indicating whether the product exist in both period  $t$  and 0, only in period 0, or only in period  $t$  respectively. Thus,  $D^e = 1$  indicates an existing variety,  $D^d = 1$  a disappearing variety, and  $D^n = 1$  a new variety.

The total growth in exports then is separated into growth in existing and disappearing varieties, intensive margin, and growth in new varieties, extensive margin.

$$\frac{\sum_{i=1}^I V_{it} - \sum_{i=1}^I V_{i0}}{\sum_{i=1}^I V_{i0}} = \frac{(\sum_{i=1}^I V_{it} D^e - \sum_{i=1}^I V_{i0} D^e) - \sum_{i=1}^I V_{i0} D^d + \sum_{i=1}^I V_{it} D^n}{\sum_{i=1}^I V_{i0}} \quad (3)$$

The results of this accounting exercise are reported in the result section.

## 5 Results

In spite of the decline in the value of agricultural exports in the value of total exports, the country's agricultural exports have grown over 960% since 1962, and since 1985, they have tripled in nominal value. As seen in Figure 7, while growth in the value of agricultural exports has been positive overall, annual growth has been highly cyclical. The clear cyclical trend in export growth appears to peak around mid 70's and late 80's and "trough" in years around the late 60s, mid 80s and late 90s. Each cycle takes about 15 years to complete. The underlying explanation for these cycles is beyond the scope of the present paper. Possible explanations may entail climate, global trends, and macroeconomic policies including the value of the Dirham which was tightly controlled until recent years. Similar trend is observed for agricultural imports, although growth in imports in the 70's is much larger in magnitude than export growth. This is the period of relatively high world prices of primary resource, and the country experienced relatively high foreign exchange earnings from mineral exports.

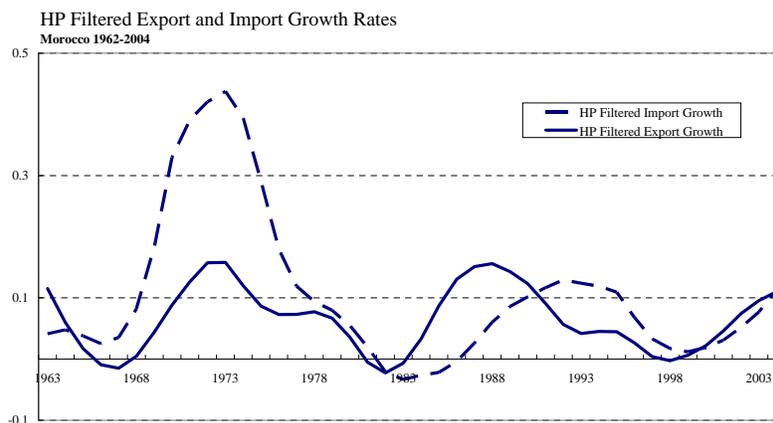


Figure 7

The market for Moroccan agricultural exports depends heavily upon European market. This pattern is almost surely linked to the country's close tie to France and its close geographical location to Europe. The share of Morocco's agricultural exports to the EU in her total agricultural exports was about 80% in 1962, which decreased and came back up to 76% in 2004. About 11% of Moroccan exports went to other African countries in 1962, but that number has fallen to 8% in 2004. While the importance of EU and other African countries has decreased slightly, the importance of Asian and the U.S. market has increased. Moroccan agricultural exports to Asia and U.S. have increased to

account for about 8% of her agricultural exports in 2004 from a low 3% in 1962.

Figure 8 reports the average export shares in total agricultural exports for selected trading partner in the 1970s and the past decade. These changes in relative importance of Morocco’s trading partners are evident, where a large 10% share decrease were observed for EU and 14% share increase for Asia & U.S. Together, EU, African, Asian countries, and U.S. account for 93% of Moroccan total agricultural exports in 2004.

The picture for imports is relatively different. Although EU countries are still the most important source for the country’s agricultural imports, the EU only accounted for an average of about 40% of total value of agricultural imports over the past decade. That number is 9% and 16% for Africa and Asia & U.S. All these important exporting partners together only account for less than 60% of the value of the country’s total imports. It is clear that Morocco’s importing partners are more diverse than her exporting partners.

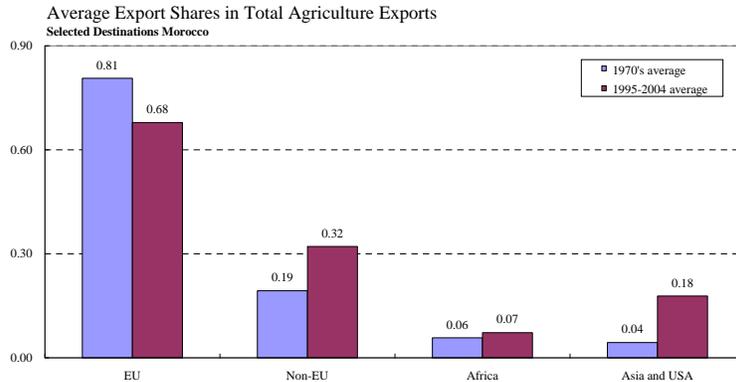


Figure 8

## 5.1 High specialization in Exports

Morocco’s exports are highly specialized. Table 1 reports the top ranking exporting products in 1962 and 2004. In spite of over 4 decades of dramatic global development, the top exporting products in 1962 remain important in 2004. Some products, such as Oranges and Fish, ranked in the top 5 for the entire 43 years covered in our analysis. Morocco’s exports are concentrated in fish (in airtight containers), oranges, tangerines, clematines, and fresh tomatoes. Together, these 3 single commodities account for 35% of total agricultural exports in 2004. This suggests a comparative advantage in producing these products. However, it also shows the strong dependence of on a narrow commodity base.

This narrow base also implies that remuneration to resources will likely remain dependent on a small number of trade partners.

Moroccan Top Agriculture Exporting Products		
Rank	1962	2004
1	Oranges, tangerines and clementines	Fish, in airtight containers
2	Fish, in airtight containers	Crustacea & molluscs, fresh, chilled, salted, dried
3	Tomatoes, fresh	Oranges, tangerines and clementines
4	Wine of fresh grapes including grape must	Other fresh vegetables
5	Beans, peas, lentils & leguminous vegetab., dried	Tomatoes, fresh
6	Potatoes, fresh, not including sweet potatoes	Fish, fresh, chilled or frozen
7	Materials of vegetable origin, nes	Vegetables preserved or prepared, nes
8	Wheat and meslin, unmilled	Fresh fruit, nes
9	Other fresh vegetables	Olive oil
10	Cereals, unmilled, nes	Fruit, temporarily preserved

Table 1

The dominance of oranges in Moroccan agricultural exports has diminished since the 1980s. Averaging from 1995 to 2004, oranges, though still ranked first, accounted only for 15% of total agricultural exports. Fish (in airtight containers) has gained importance over the past 20 years and accounted for 15% of total agricultural exports in 2004.

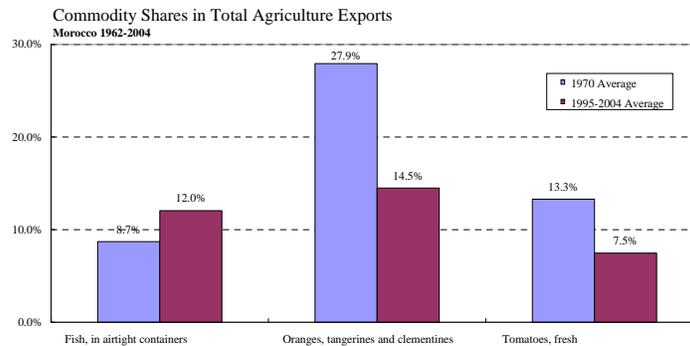


Figure 9

Figure 9 displays the share of aggregate fish and fruit shares in the value of total agricultural exports. In aggregate, fish and fruit are the two most important exporting categories for Morocco. Together they account for more than half of Moroccan agricultural exports, 36% and 21% respectively, in 2004. The trend of increasing significance in fish and decreasing share in fruit are again apparent. More recently, the share of fish in total value of agricultural exports have over taken the share of fruit in these exports.

All the evidence indicates that Moroccan agricultural exports are highly concentrated in a few commodities. This suggests strong comparative advantage for Morocco in producing these products in the global market. However, it also shows considerable dependence of Moroccan agricultural exports on these commodities. Given the high dependence of agriculture sector on trade, this concentration also makes the economy relatively sensitive to global market changes in these commodities.

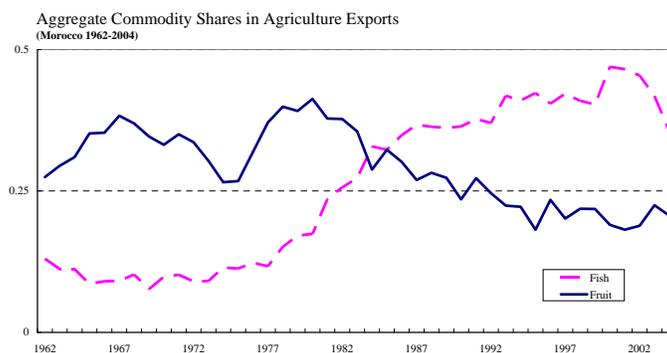


Figure 10

## 5.2 The Loss of Market Share in the EU

Our analysis suggests that the country's decline in the value of export shares is directly linked to the EU market. Figure 11 shows the share of Moroccan exports in fish and fruit in the value of total world trade over the past 4 decades. The country's value of total fruit exports to the value of total world trade in fruit has declined substantially over the past 2 decades. Although the country's value share of world fish exports grew in earlier years, this share has been stagnant for since the 1990s.

This decline largely is linked to the decline in export share in the EU market. Figure 12 and 13 show the steady decline of Moroccan export importance for her top exporting commodities. In aggregate, the country's top 20 exporting commodities started with a 5% share in EU market in early 1960s and ended with a less than 2% share after 2000. Separately, oranges is the single commodity with the largest decline in its EU export share. Although Moroccan EU export share in fish (in airtight containers) has increased over the 1990s, this increase is much less in magnitude compared to the reduction in the shares of oranges.

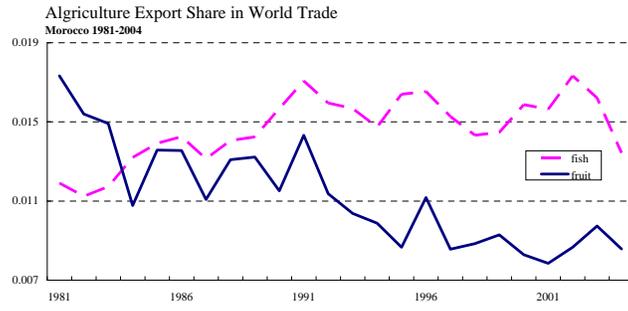


Figure 11

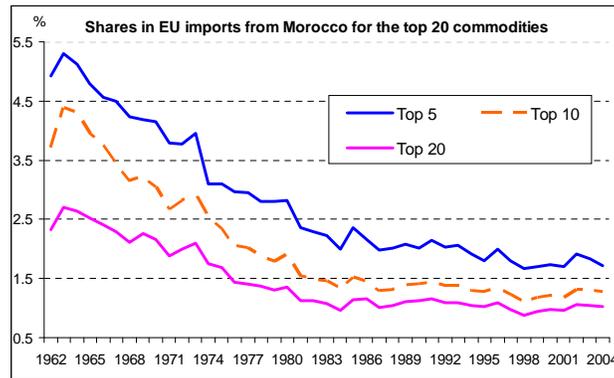


Figure 12

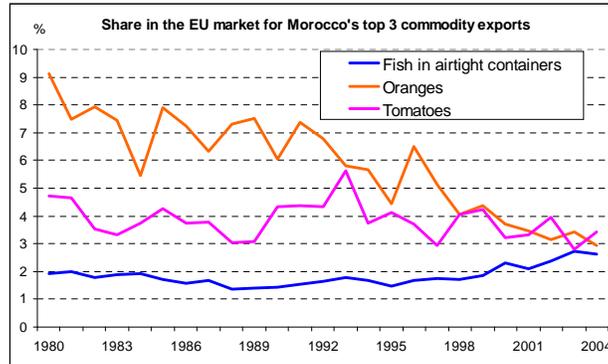


Figure 13

Morocco's fruit export market share in the EU market, mainly oranges, seems to be replaced by exports from other EU countries. Figure 14 shows the intra-EU trade for Morocco's top 3 exporting commodities over the past 25 years. The increasing importance of intra-EU orange trade is obvious. The same downward Moroccan share and upward intra-EU share trend is also observed for France, the single largest trading country for Moroccan agricultural exports. This disappointing performance shows that Morocco was unable to maintain or gain additional markets in the EU countries for her major exporting commodities, particularly oranges. This is especially of concern given that oranges account for almost one-fourth of total Moroccan agricultural exports. Whether the cause of this decline is due to trade diversion from the EU expansion requires more research.

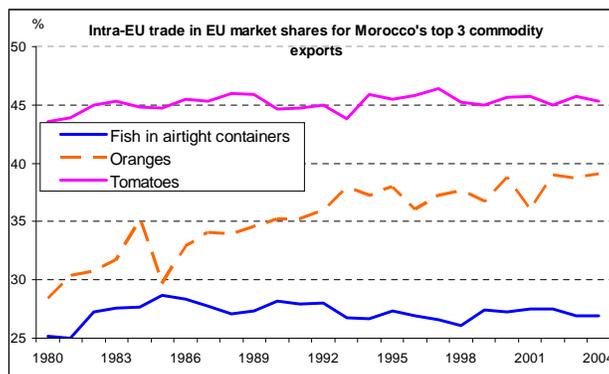


Figure 14

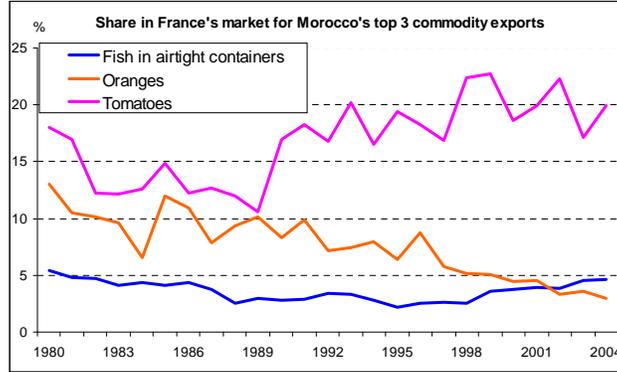


Figure 15

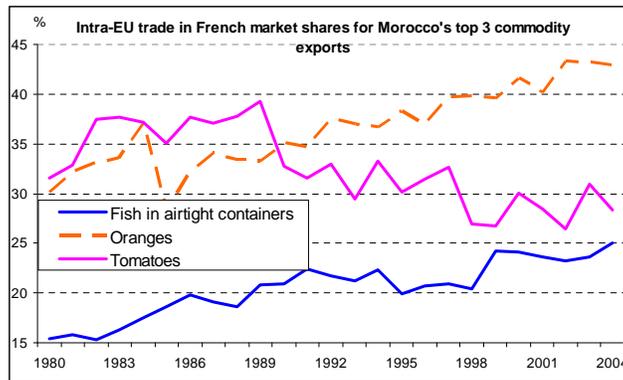


Figure 16

### 5.3 Intensive Margin Growth

These findings also indicate an intensive margin growth story for Moroccan exports. The margin decomposing formula given in (3) is applied to Moroccan total agricultural exports to confirm this impression. Using Moroccan agricultural export data from 1962 to 2004, and 107 product varieties of exports, we find that 56% of the total 191, are existing product varieties. Twenty-eight (15%) and thirty-one (16%) are disappearing and new product varieties, respectively. The total export growth from 1962 to 2004 was 957% and almost all of that growth, 920%, was intensive margin growth and only a trivial amount of that growth was extensive margin growth from new product varieties. Thus, less than 5% of the total export growth is extensive margin growth. It is evident

that over the past 4 decades Morocco has repeatedly exported the same product varieties and created very few new product varieties in her agricultural exports.

While comparative analysis of other countries is beyond our scope here, it is well known that US agricultural exports are also concentrated with over 60% of total U.S. agricultural exports destined for only six countries (Shane et al, 2007). However, the highest growth component of those exports is in high value added commodities, where product differentiation, variety and quality can be identified compared to trade in food and feed grains. This is not to suggest that Morocco should necessarily attempt to move in the direction of developing higher value agricultural exports using domestic resources alone. Instead, a market environment that can attract multi-national enterprises would seem a more attractive option.

## 6 Concluding Remarks

Our analysis has found an exceptional concentration of Moroccan agricultural trade not only in commodities but also in trading partners over the past 40 years. The country's agricultural exports are highly dependent on a few trading commodities, such as fish, oranges and tomatoes, a concentration that has persisted since the 1960s. Moreover, Moroccan agricultural exports are also extremely concentrated in their destinations. Exports to EU countries account for more than 70% of agricultural exports throughout the 40 years of our study. This strong concentration in both exporting commodities and partners has made the economy more exposed to the changes in trade dynamics within the EU. Findings suggested a loss export shares in EU to other EU countries especially in orange exports. It is therefore important in the short-run for Morocco to increase traditional exports through its negotiation with the EU to further open the EU market. We have seen the increasing importance of Asian and the US market to Morocco since the 1980s. It is strategically worthy for Morocco to continue to seek new and emerging trading markets and partners. Of course to increasing competitiveness and regaining comparative advantages are also good ways to maintain and develop current and new trading markets.

The margin growth analysis has shown almost all Moroccan agricultural export growth was at the intensive margin with existing varieties of exports. Less than 5% of Morocco's agricultural export growth for the past 40 years was with new varieties of exports or at the extensive margin. This partially explains the country's unsatisfactory export growth experience. This posts a great challenge for Morocco to move from expanding trade in existing goods to expand trade by creating new trade varieties. Successful export expansion through growth in new varieties should advance and sustain Morocco's export and economic growth in the long-run, but this may require a more open environment for foreign direct investments.

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