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Recent exports matter: export discoveries, FDI and growth, an empirical assessment for MENA countries

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Les liens IDE, diversification des exportations et croissance: une estimation empirique dans le cas des pays méditerranéens

Résumé

La diversification des exportations est devenue un des objectifs prioritaires pour les stratégies de développement des pays MENA. Dans cet article, nous avons pour objectif de mesurer, dans le cas des pays MENA, les effets de la diversification des exportations sur la croissance. Nous tenterons également d'appréhender la manière dont les nouvelles exportations et les IDE interagissent dans le processus de croissance. Dans le cadre d'un modèle de croissance endogène, nous montrerons que les IDE peuvent agir comme un facteur complémentaire dans le processus de découverte. Les estimations empiriques sont qui sont réalisées en GGM système confirment que les IDE n'ont pas forcément le même effet sur la croissance selon le niveau de diversification des pays. Nous montrons aussi que lorsque les IDE ont un rôle positif et significatif sur la croissance, il est plus probablement lié à l'effet direct sur la valeur ajoutée et l'emploi qu' à l'effet de transfert technologique.

Mots-clés : Diversification des exportations, IDE croissance, pays du Bassin méditerranéen, Systèmes GGM

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Abstract

Export diversification has become a priority goal for the development strategies of the MENA countries. In this paper, we aim at measuring the effects of exports' diversification on growth in MENA countries. But we also try to assess the way new exports and FDI interact each others in the process of growth. Within the framework of an endogenous growth model, we claim that FDI can act as a complementary factor in the discovery process. The model is estimated by the system-GMM and we provide robust evidence that FDI do not necessarily have the same effect on growth according to the diversification level. We also show that while FDI have a positive and significant effect on the MENA countries' growth, it is most probably rather linked to the direct effect on value added and employment than to the spillover effects of technological transfer.

Keywords: Export diversification, FDI, Growth, MENA, GMM system

JEL : F1;O11

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After many years of a relative closing on foreign investments, most of the Mediterranean economies (Middle East and North Africa : MENA countries) moved towards more active strategies of attracting foreign direct investments (FDI) as early as the end of the eighties. These strategies were reaffirmed during the nineties while an increasing number of empirical analyses started to demonstrate that FDI could have beneficial effects on the growth of developing countries.

Although the theoretical literature tends to support the view that FDI can spur economic growth, the tempered results of empirical verifications underlie the idea that the FDI effect is not automatic and depends closely on the characteristics of each host country's and on the nature of each FDI[1]. Hence, the empirical relationship that exists between economic growth and foreign direct investment is not entirely devoid of ambiguity. Studies based on aggregate data show that FDI can have aggregate effects on growth for a developing economy, but their results remain weak and contradictory since they are very sensitive to the choice of the model. UNCTAD (1999) and Ram and Zhang (2002) thus detect a positive relationship between FDI and growth, but it disappears over some models[2] or for some measures of FDI inflows. Moreover, the recent literature shows that FDI spillovers depend on many factors like the technological gap with foreign firms, the degree of spatial concentration of the activities, the size and the export capacity of domestic firms, and the characteristics of FDI[3], and points that their effect is rather undetermined (Crespo and Fontoura 2006).

Nevertheless, cross-sectional analyses still help to identify the factors that can act as catalysts for the effects of technological and productive spillovers at a disaggregated sector level[4]. They show that higher absorption capacities in the host country increase the FDI effects on growth of GDP and global productivity of factors[5]. Crespo and Fontoura (2007)

[1] De Gregorio (1992) and Blomstrom et al (1992) thus show that FDI are three times more « efficient » than local investments, notably because of their ability to stimulate internal investments (crowding-in effect) and via the externalities that are related to a superior content in terms of organization and technologies (spillover effect).

[2] Among the variables frequently used in the baseline models, we find the GDP level per capita, the education level, the domestic investment ratio, the political instability, the terms of trade, the black market exchange rate premium and the level of financial development (UNCTAD, 1999).

[3] Sector-based analysis show for example that the effects of technological and productive efforts are conditioned by factors such as the density of the links between subsidiaries of foreign firms and local firms, be them partners or competitors, the degree of training and skill of the local labour, or the technological and organizational capacities of the local firms.For an more complete survey, see Crespo and Fontoura (2006).

[4] See Lee & Liu (2005) for a recent illustration.

[5] Absorption capacities of technology spillover are defined by the education level (Borensztein, De Gregorio and Lee 1998; Lipsey 2000) or by the technological gap with the country of origin the FDI (Lipsey 2000; Xu 2000; Görg and Greenaway 2004; Li and Liu 2004), higher level of financial development (Hermes and Lensink 2003;

points that the absorptive capacities of domestic firms and receiving economies are preconditions for incorporating the benefits of FDI externalities so that FDI impact can be non-significant, negative or positive according to the economic, institutional and technological circumstances of the host country. In this paper we argue that the degree of diversification of the host economy is a crucial dimension of the absorptive capacities. Yet, it has been neglected in the literature on FDI and growth, despite the emergence of a literature that address the question of the interaction between trade diversification and development (Imbs and Warcziag, 2003; Klinger and Lederman, 2004, 2006a, 2006b; Koren and Tenreyro, 2003, 2007). Moreover, the attraction of vertical or platform FDI and the integration into global value chains is at the very centre of the development policies of the Middle East and North African (MENA) countries. However, among the extensive literature quoted above, few works have been dedicated to the MENA countries. Lastly, the estimation of the effects of FDI on growth is often biased by the problem of endogeneity of explanatory variables, of which FDI can be considered as a major one. A small number of surveys have taken these difficulties into account and proposed to analyse these relations within the framework of a simultaneous equation model (Bende-Nabende, Ford and Slater, 2000; Li and Liu 2004) or through procedures of Bayesian averaging (Prüfer and Tondl, 2007). Yet, up to now, very few works on the effects of FDI on growth have used the general method of moments (GMM) (Arellano and Bond 1991; Arellano and Bover 1995; Blundell and Bond 1998), so far it is the estimation technique the best adapted to the dynamic models of growth that are generally estimated.

After a brief overview of the links between FDI, growth and diversification in MENA countries (section 2), we will precise the stakes of trade diversification in the process of development and the way it interacts with FDI (section 3). The model, the estimation methods as well as the data will be presented in section 4, and the results, comments and sensitivity analysis in section 5.

I. FDI, trade diversification and growth in MENA countries

I.1. FDI, trade and growth: failed expectations

At the end of the nineties, the MENA region under-achievement in terms of FDI attraction started to be highlighted by different studies. Petri (1998) underlines the poor performances of the countries of the region in attracting FDI by comparing it with the higher performances of countries with similar « fundamentals ». During the nineties, FDI represented an average of 0,9% of the GDP in MENA countries, against 2,5% in African countries, 3,8% in Eastern Asia and 4,5% in Latin America (Sekkat 2004). A few years later, and despite a fast increase of the FDI inflows for Tunisia, Morocco and Egypt, such a weakness in attracting investment was still underlined by the studies of Iqbal and Nabli (2004), Chan and Gemayel (2004), Sekkat (2004) or Daniele and Marani (2006). In addition, Noland and Pack (2007) or Iqbal and Nabli (2004) also show that the degree of integration to the global production chains is very limited in spite of the closeness to the European market. Subsequently, Haddad and Harrison (1993) then Harrison (1996) find very few empirical evidence of the existence of

or Alfaro et al 2004), more open economy oriented towards exportations (Balasubramanyam, Salisu and Sapsford 1996; Bende-Nabende, Ford and Slater 2000; OECD 2002), better macro-economical stability (Prüfer and Tondl 2007) and local infrastructures and institutions of higher quality (Olofsdotter 1998; Bénassy-Quéré, Coupet and Mayer 2005; Busse and Groizard 2006; Prüfer and Tondl 2007)

spillover towards local firms, even though the joint-ventures in Morocco are on average more productive than the local firms[6].

Cross-sectional studies have not produced particularly consistent evidence about what explain both the poor performance of MENA countries in attracting FDI and the weakness of the spillover effect from FDI. The slowness and inefficiency of the structural reforms (privatizations, improvement of the regulations, openness and convertibility) and make them unable to create sufficiently propitious conditions for the local establishment of foreign firms. Some studies show that trade openness, infrastructure and regional integration have a significant positive influence on incoming FDI for MENA countries, while other factors that are traditionally significant in explaining FDI inflows, such as market size, macroeconomic stability and investments returns, productivity levels or labour costs, are less important in MENA countries than they are in other developing countries (Bouklia-Hassane and Zatla 2001; Onyeiwu 2003)[7]. But the weakness of the legal and administrative environment in the MENA countries has been underlined as a major hinderance to growth by the recent surveys of Alessandrini (2000), Daniele and Marani (2006), Chan and Gemayel (2004), Benassy-Quéré, Coupet and Mayer (2005), or Sekkat (2004) that all underline the necessity of furthering the reforms in that field.

Within the framework of growth accounting, Sadik and Bolbol (2001) point that FDI have more effects on growth via capital accumulation than via productivity gains[8]. FDI received by Egypt, Jordan and Tunisia had positive effect on productivity for specific sectors (energy and textile for Tunisia, energy and services for Jordan, and sectors that are highly protected against competition in Egypt) although with limited influence of technological transfers. Sadik and Bolbol (2001) emphasize that he efficiency progress that was recorded in Tunisia during the eighties is then rather linked to the intensification of competition due to the presence of foreign firms than to real transfers of an advanced technology.

A few empirical studies have tried to explain why FDI do not spur growth significantly in MENA countries. The limited capacities of absorption of MENA countries compared to other developing countries are put forward to explain the weak effects of FDI on growth by Sekkat (2004) or Elmawazini (2007). As regards openness to trade and to investment, it appears that the process of integration of the MENA countries into the World economy has not generated much effect on their growth. Trade openness is then positively associated with FDI inflows in MENA countries, but it does not contribute significantly to produce spillover effects towards productivity and growth (Haddad and Harrison 1993; Harrison 1996; Sadik and Bolbol 2001).

If FDI can spawn spillover effects for specific sectors only, developing such sectors is a necessary condition for a wider positive effect of FDI. The structure of output and trade matters and openness is not a convenient measurement of the way integration to the world

[6] Harrison (1996) even suggests that in Morocco, FDI effects on productivity might have been negative in the short term because of the consequences in terms of production scale of the loss of local market shares for domestic firms. More recently, Bouoiyour and Akhawayn (2005) show on a panel of Moroccan industries that FDI has significant spillover effects on the productivity of labour. Furthermore, they give evidence that these effects are proportional to the technological gap between foreign subsidiaries and local firms and increase together with the openness of the sector to exportations.

[7] Sekkat (2004) puts forward that the openness and exchange convertibility made by the countries of this area are not sufficiently backed-up by a furthering of the necessary complementary improvement of infrastructure and socio-institutional and political environment. But he implements an econometric analysis on a sample of developing countries and not only on MENA countries.

[8] FDI do not give a significant explanation to the growth in Morocco, Oman and Saudi Arabia. Sadik and Botbol (2001) explain this result by internal factors that are not controlled for in regressions (for Morocco, influence of climatic hazards on harvests, for Oman and Saudi Arabia, influence of the oil prices).

economy can trigger growth. Yet, the trade diversification of these countries has been too narrow during the last fifteen years.

I.2. Discovering new exports as a "new challenge" for the MENA region

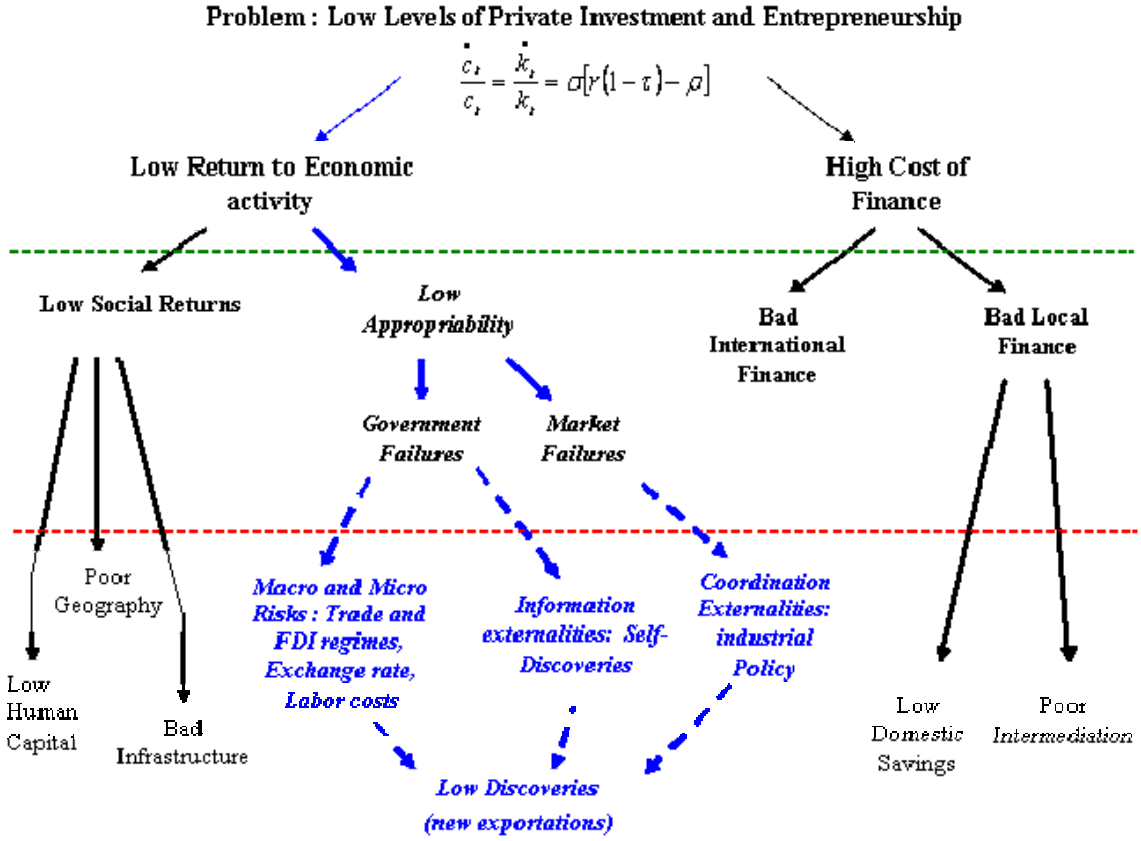
The ability to attract the FDI that may accelerate the growth of MENA economies has been recently linked to the nature of their productive structures. The concentration of their export structure is put forward in a recent unpublished survey of trade diversification for five MENA countries [Egypt, Lebanon, Jordan, Morocco and Tunisia] from the World Bank.

Statistical analyses show that these five countries – except Jordan – have had very little progress towards diversification of their productive and export structures during the last twenty years. Moreover, the exportations of these countries are generally characterized by a high sector-based integration since the four biggest export sectors represent 75% of the exports for Egypt, Tunisia, Jordan and Morocco, against 57% for South-East Asia and 49% for Eastern Europe countries. Furthermore, measurement of specialization shows that their export structure is very dependent on natural resources – agriculture and food (Morocco, Jordan), oil and gas (Tunisia, Morocco, Jordan), fertilizers (Jordan, Morocco) or low skilled works such as textile (Tunisia, Morocco, Jordan) – and that the part of their medium or high technology exports remains very modest – 21.2% on average in the five countries against 55% for the new European countries and South-East Asia.

The World Bank has also published an important survey that underline the limits to growth and international integration for Morocco (World Bank 2006) that had a considerable influence on the recent orientation of the Moroccan economic policy. The survey is entirely built from the assumption that the main constraint on Moroccan growth is low level of private investment. It points that a series of market and policy distortions reduce the incitement to innovate and self-discover for the firms and entrepreneurs of Morocco (figure 1). The statistical study shows that diversification and competitiveness of exports are too weak, and thus binding for growth. Their conclusion is that the growth acceleration must be drawn by exportations and their diversification, and that the whole economic policy of Morocco must be oriented towards the incitement to discover new tradable products.

The Country Economic Memorandum thus shows that the Morocco's discovery levels are below those related to the same level of income per capita, and also below the levels of his competitors (China, Romania, Turkey) (World Bank 2006: 26). The authors deduct from this that *"the weak competitiveness and productive diversification are at the source of the slowness in the structural transformation of the economy, and Morocco's main challenge in the forthcoming years will be to develop new products for export"* (World Bank 2006: 26). Moreover, this "slowness of structural transformation towards productive diversification" is explained by the combination of failures in both economic and market policies. The first ones refer to the stiffness of the work regulations and its high cost, a too heavy taxation that burdens the firms' profits and the income of skilled workers, and the non-adaptability of both the commercial system (anti-export bias joint to a very high level of protection against importations) and the exchange rate system (fixed rate and risk of over-valuation).

Figure 1. The growth diagnostic for Morocco (World Bank 2006)



Therefore, the Country Economic Memorandum highlights the necessity for Morocco to enter into a strategy of exports diversification beyond the traditional manufacture products (textiles and leather, agribusiness and automotive parts gather 86% of the manufacture exports and 43% of the total exports), towards services and new dynamic activities. The ability to go over from primary exportations to exportations with a higher value added, ability that was at the very heart of the strategies of export incentives applied by Asian economies, is presented as a key for economic growth (World Bank 2006: 63). Examples such as Taiwan, South Korea and Chile are even invoked to underline the strategic importance of « fundamentals »: a stable macroeconomic environment, some pro-market policies, an active industrial policy for the sector-based incitement of exportations and the mobilization of savings and investments towards these sectors.

Openness to trade is essential for reaping positive growth effects of FDI, but the structural composition of export is probably another essential condition for growth. What can be said about FDI and diversification interaction from the recent literature on diversification and growth?

II. How do diversification and FDI simultaneously affect growth?

II.1. Diversification as a key structural change in the development process

Chenery (1979) or Syrquin's (1989) pioneering works showed that the production's structural changes were at the root of the development process. Since the international integration is one of the requisite for the development to happen, such structural changes also concern the exchanges between developing countries. At an early stage, Prebish (1950) and Singer (1950) have thus underlined the risks of an excessive concentration of the primary products exports towards growth and stability. But the diversification issue cannot be restricted to the move from an agricultural production to an industrial production that helps to limit the effects of the deterioration of exchange terms on the trade-generated incomes. Today, it is perceived as a mean to stabilize the export revenues on the long term in front of high elasticity demands and very volatile market prices (Bertinelli, Salins and Strobl 2006; Levchenko and Di Giovanni 2008)[9]. Yet, since it enables to plan the investments, safeguard an import capacity and prompt to create new exportable activities, the stabilization of exports revenues contributes inevitably to growth in the long term.

But the new production techniques linked to exports diversification also help to generate some technological transfer effects that might lead to dynamics of endogenous growth. Indeed, the knowledge and an increasing number of export products are non-rival assets that can thus be spread without limitation in the productive system and feed the productivity gains (De Pineres aand Ferrantino 2000; Feenstra and Kee 2004). Exporting firms generally have higher productivity levels because they use technologies that are more advanced and they use their resources in a more efficient way. They also have lower costs because they take advantage of the economies of scale generated by the size of the global market. A larger number of export sectors can thus increase the productivity level of the whole production system because of the upstream and downstream connections through which the effects of technological transfer are transiting. But these backward and forward linkages also generate strong incentives to create new complementary activities that allow the diversification of the production system, and even lead to new exports in the long run.

As for the models of activities portfolio (Acemoglu and Zibilotti, 1997; Kalemli-Ozcan, Sorensen and Yosha 2003) the exports diversification is explained by an endogenous process whose driving force is the decision taken by producing agents to invest in diversified activities in order to stand on the optimal border. Diversification then looks like a strategy open to countries that have a capital to invest and enough opportunities to invest this capital (Koren and Tenreyro, 2007). On the opposite, the poorest countries should specialize in a small number of low-risk sectors in order to stand in the optimum. FDI should thus favour diversification by increasing at the same time the quantity of capital available for investments – as long as the diversion effects on domestic investments remain limited. But they may also increase the investment opportunities through the upstream and downstream links and via the imitation likely to come together with foreign establishments. Furthermore, Hausmann,

[9] This volatility in export prices and volumes has been aggravated by the attendance of China to the world markets, producing in the same time more competition in terms of prices and volumes on the textile markets, and huge price movements on the market of raw materials, creating instability for income from trade and for growth in several developing countries (Kaplinsky 2006).

Hwang and Rodrik (2007), Hausmann and Klinger (2006) or An and Iyigun (2004) show that the diversification towards much more complex assets can stimulate the growth. And this diversification can also facilitate the structural change, especially by increasing the density of the productive system. The thickening of the « production tree » (Hausmann and Klinger, 2006) increases the number of opportunities for discoveries or changes of specialization by moving from one branch to another one, i.e. by moving the production towards products that are new, but close to the ones that are already produced by the economy. Such increase of concentration also helps to reduce the cost of discoveries for exportation since the close assets need some similar combinations of private and public capital that are available in the economy (Hausmann and Klinger, 2006).

Based on these theoretical foundations, the relationship between development and diversification has recently been the subject of empirical analyses. Imbs and Warcziag (2003) show that the development level measured by the income per capita has a robust non-linear effect on the diversification measured by the structure of production and of labour by sectors. They give evidence that diversification increases together with the level of income per capita up to a development threshold (9.000 USD) from which the concentration starts to increase again. Klinger and Lederman (2005), Hausmann, Rodrik and Velasco (2006) and Carrère, Cadot and Strauss-Khan (2007) further show that similar results can also be observed for the diversification of the export structure. Diversification is traditionnally measured by a Gini or a Herfindhal index computed on the distribution of exports by sectors. But, Klinger and Lederman (2004) use the notion of "export discovery" coined by Hausmann and Rodrik (2003) to propose a new measurement of export diversification. They start from the assumption according to which the market failures such as insufficient protections for innovators can trigger imitation and free-rider behaviour and may inhibit discoveries of new products and exports. They argue that it can disrupt the positive relationship between export diversification and economic development. They thus demonstrate that economic development eases export discoveries[10] up to the low levels of average incomes (income per capita between 4.200 and 5.500 USD), before the relationship becomes adverse between discoveries and further development. The empirical findings of Carrère, Cadot and Strauss-Khan (2007) support this Hump-shaped pattern. Using both a standard Herfindhal diversification index and a "discovery" measurement of the changes in the export structure,, they show that Low and Middle income countries diversify mostly by adding new lines of exports whereas high income countries diversify by adding new export values among active product lines while re-concentrating their exports towards fewer product lines. Counting discoveries is then another way to measure export diversification except that diversification can be stable in the presence of discoveries if former exports disappear while discoveries happen[11].

Klinger and Lederman (2004) also points that diversification is not the consequence of modifications in factor provision, but that it depends mostly on the growth of exports and on the development level. Though Carrère, Cadot and Strauss-Khan (2007) argue that these results are in accordance with the standard analysis of international trade that explains diversification as a shifting through the diversification cones as the capital gets accumulated (Schott, 2004; Xiang, 2007). However, the standard trade theory does not give an endogenous explanation of the shifting process that result from an exogenous accumulation of capital comparable to development.

[10] They define « discoveries » as products whose export value progressed from less than 10.000 USD in 1993 to over 1 million USD between 2000 and 2002.

[11] For a discussion of that point and on the statistical accuracy of the notion of discoveries, see Carrère et al. (2007).

The effects of diversification on growth have nevertheless been analysed by a few recent works. De Pineres & Ferrantino (2000), Al-Marhubi (2000), De Ferranti et al. (2002), Lederman & Mahoney (2007) or Hesse (2007) provide some evidence that generally speaking, the diversification of exports has a robust positive effect on the increase of GDP per capita[12]. However, Hesse (2007) brings out a development threshold below which an increase in diversification accelerates growth and beyond which an increase in export concentration stimulates the growth. But their stories say nothing about the role of FDI in this relationship. While the factors contributing to the absorption capacity of technology spillover from FDI are now well documented, as mentioned above, other were left aside although they certainly condition the expected gains from received FDI. Thus, a superior degree of diversification in the production and exportations will ease the effects of technological and economic transfers between the sectors and between the firms engaged in the same activities.

II.2. How do diversification and FDI affect growth?

Hausmann and Rodrik (2003) show that the key for structural change in a developing economy is the creation of incentives to « disclose » the production costs of new activities so that this knowledge can give rise to additional private investments in these fields. An increase in the number of discoveries unveils the information about the production costs of a larger variety of products and prompts to make private investments that go in the direction of larger diversification of the production and exportations. As for human capital or the level of financial development[13], the diversification has an effect on growth via the term that expresses the technological level and its indirect effects on the returns of investments. But it also generates the direct investments needed to get information on « what the country is good at producing »[14]. Furthermore, the knowledge of private costs for a new activity generates externalities that are a potential source of increasing yields for other entrepreneurs, as long as the public incentives let the innovators seize a part of the social profit of their discovery. Lastly, rather than a formalized technology, FDI and intermediate goods involve above all a tacit technology that must be adapted by the receiving environment (Nelson, 2000; Evenson & Westphal, 1995). The discovery process can then be the unexpected result of the adaptation of the imported technologies associated with FDI to the local conditions. Simultaneously, Hausmann & Klinger (2006) recent analysis underlines the importance of the density of the productive networks in the ability to innovate, diversify and develop the production and exportations' structure. Once again, FDI probably play a role in these relations between diversification, growth and development because it provides new physical capital but also backward and forward linkages that strengthen the productive networks. On our side, we assume that a diversified economy offers a larger variety of complementary factors (Hausmann & Rodrik 2003a; Hausmann & Klinger 2007) that lowers the introduction costs of new technologies involved in the semi-finished goods linked to FDI as well as it increases the productivity of these semi-finished goods.

We thus carry on with the empirical model of Borzenstein et al (1998) or Hermes & Lensink (2003), whereby the GDP growth per capita is explained by the stock of human capital, the initial level of income per capita, the direct foreign investment and all other

[12] Herzer et al. (2006) reach the same result for the Chile case.
[13] For justifications, see Borzenstein et al (1998) about human capital and Hermes & Lensink (2003) for financial development.
[14] Hausmann & Rodrik (2003: 606).

variables that usually influence growth[15]. Like Borzenstein et al (1998) and Hermes & Lensink (2003), we start from the Barro & Sala-I-Martin (1995: chap 6) formalization of the Romer (1990) model of endogenous growth in which the new types of semi-finished goods introduced in FDI increase the growth on condition that the human capital and the technological gap (Borzenstein et al., 1998) or the financial development (Hermes & Lensink ,2003) are important enough to reduce the introduction costs of new technologies and increase the yields of new semi-finished goods. In Borzenstein et al (1998) analysis, an interactive term between FDI and education helps to measure the way the impact of foreign investments on growth is influenced by the level of human capital in the economy. Using the same type of interactive variables, Hermes & Lensink (2003) and Alfaro et al (2004)[16] try to assess the effects of financial liberalization on the relation between FDI and growth. The problem is that they don't address the dynamic nature of the underlying theoretical model and the necessity to estimate it with the GMM estimators (Blundell & Bond, 1998).

We carry on with this last approach but we use a dynamic model of growth estimated by the GMM-system estimator (Arellano & Bover, 1995; Blundell & Bond, 1998). In this framework, we look at the joint roles of FDI and diversification towards economic growth. We start from a similar specification, but incorporate new variables that were up to now seldom used in the aggregate analysis, such as the degree of diversification of exports or the sector concentration of exports and the emergence of « discoveries » in new exports. These variables control for the way FDI affect growth according to the degree of diversification in the economy.

III. Model, data and estimators

Following Durlauf et al. (2004), we distinguish three sets of control variables that could explain growth. First, we have the set "*X"* of variables controlling for the countries initial conditions in the augmented standard model of growth (Mankiw et al., 1992): the accumulation of physical capital, the growth of the work force and education. The second set *"Z"* includes more specific variables drawn from the empiric models of growth such as infrastructures among which some are drawn from models of endogenous growth. The third set consists of one endogenous variable, the GDP per capita delayed by one period. The growth equation is in a logarithmic form (Mankiw et al., 1992; Durlauf et al., 2004):

$$(1) \qquad \text{Log}\,(Y_{it:}/Y_{it-1}) = \alpha\,\text{Log}(Y_{it-1}) + \Psi\,X_{it} + \Pi\,Z_{it} + f_i + \varepsilon_{it}$$

with Y_{it} the GDP per capita PPP of the country i at the t moment and X_{jt} and Z_{jt} the set of control variables at the period *t* for the country *i*. f_i represent the fixed effects specific to each country and ε_{it} the specification error.

For the *X* set of variables, the accumulation of physical capital is measured by the investment rate (*Investment*). As the data on the number of years at high school from Barro and Lee (2000) are not available on an annual basis and are incomplete for several countries of our sample, the high school registration rate (*School*) is used as an indicator of human capital. Labour is measured by the working aged population (*Labour*). The *Z* vector of control variables includes state and policy variables that can affect growth: public expenses, trade

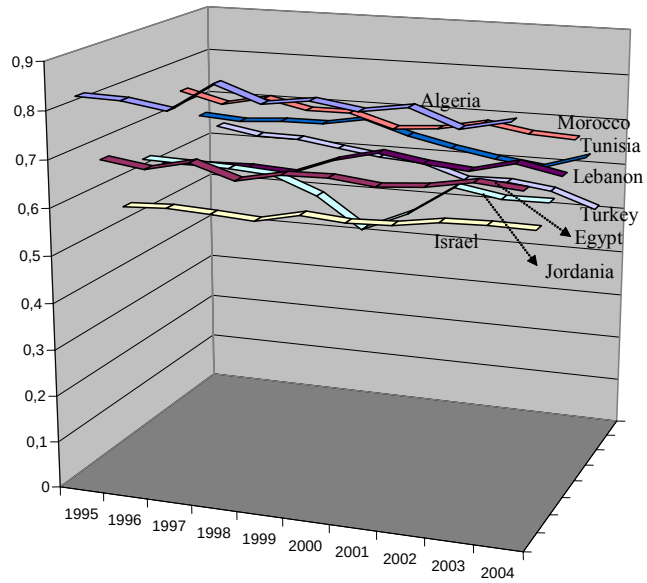
[15] Public expenses, black market premium, political instability, political rights, financial development, inflation rate, quality of the institutions. See Barro & Sala-I-Martin (1995 : Chap 12).

[16] Starting from two different models, Hermes & Lensink (2003) and Alfaro et al (2004) end up with an equivalent econometric specification.

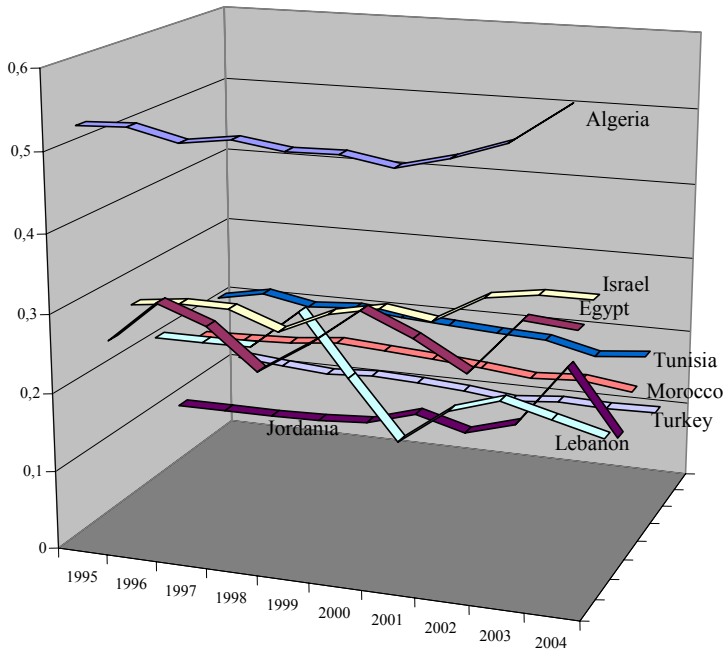
openness, infrastructures, financial development, trade diversification and attraction of FDI. The FDI variable (*FDI*) measures the net inflows of FDI in percentage of the GDP. In direct relation with our issues, we successively introduced three variables that represent the changes in the productive structures: the number of discoveries, the diversification index and the concentration index (UNCTAD database). The number of discoveries is measured by the absolute annual growth in the number of exported products (in absolute value) at the three digits level of the CTCI-3. However, only the products having a value higher that 100.000 USD or accounting for more than 0.3% of the country's total exports are included (*Discoveries*). The diversification index is a variant of Finger-Kreinin's indicator on the similarity of the trade structure (Appendix 1), whose value lies between 0 and 1. This index indicates the way a country's structure of exports differs from the worldwide one. The closer to 1 the index is, the stronger the divergence is. The concentration index is measured by the Herfindahl-Hirschmann's Index whose value is between 0 and 1 (see Appendix 1). It indicates the degree of concentration of a country's exports set. The closer to 1 the index is, the stronger the integration is. Figure 2 show the evolution of the diversification and concentration index, but also of discoveries for the countries of our sample.

Figure 2. Diversification (2.a), concentration (2.b) of exports, and discoveries (2.c) for eight MENA countries: 1994-2005

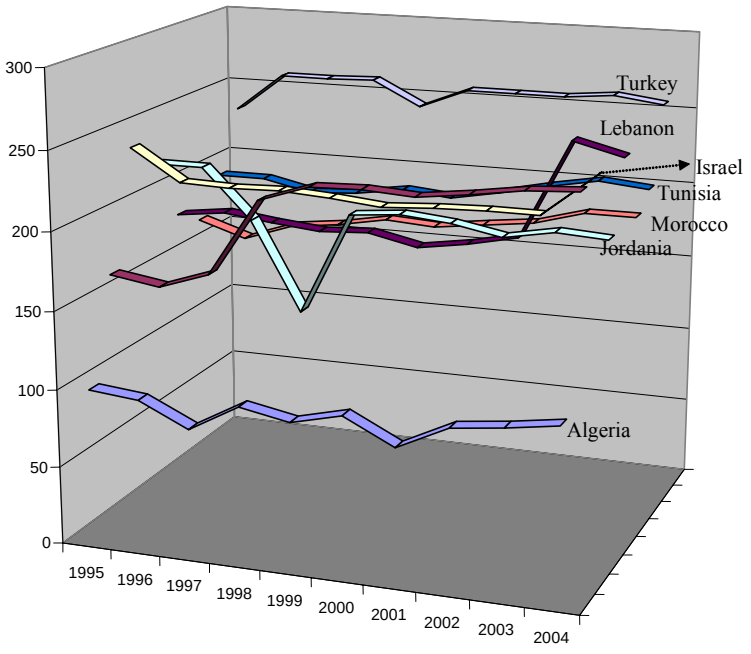
2.a. Herfindhal index of diversification (1995-2004)



2.b. Finger-Kreining index of concentration (1995-2004)



2.c. Export discoveries (1995-2004)



Interactive variables are introduced in the models, defined by the amount of FDI inflows times either the discovery variable (*Disco*FDI*), the integration variable (*Con*FDI*) or the diversification variable (*Diver*FDI*).

As in Romer (1986, 1990) and Lucas (1987), endogenous growth models show that firms can benefit from technological externalities produced by the diffusion of knowledge between firms and activities. From this perspective, anything allowing a better circulation of the information (infrastructure, financial development) and easing technological transfers (trade openness, FDI) can be considered as deciding factors for growth and for discoveries and diversification as well. Consequently, we introduce in this model a series of variables that may improve both the incentives to invest and the spreading of innovations and discoveries: the state of transport infrastructure (*Infrastructure*), the degree of development of communication networks (*Communication*)[17], the degree of development of the banking system approximated by the ratio of the domestic credit supplied by the bank sector on GDP (*Credit*), and trade openness as measured by imports and exports of assets and services (*Export* and *Import*). We also used the imports of intermediate goods (*Intermediate*) as a vector of technological transfer (Coe et al., 1997) and as a measure of the integration to the global value chains. We also introduced three variables that control for the effect of the macroeconomic management on growth: the annual inflation rate (*Inflation*), the weight of public expenditures (in % of GDP) (*Government Spending*) and the growth of M2/GDP (*M2*). The flow of public international aid (Aid) is also included in Y as a proxy for the expenses in investment promotion.

The equation (1) can be re-written under the form of an AR(1) as follows :

$$\text{Log}\,(Y_{it}) = \theta\,\text{Log}(Y_{it-1}) + \Psi\,X_{it} + \Pi\,Z_{it} + f_i + \varepsilon_{it} \qquad (1')$$

But testing the equation (1') for a panel with the presence of specific individual effects cause problems of correlation between the lagged endogenous term and the specification error term (Hanssen, 1982; Holtz et al., 1988; Arellano & Bond, 1991). The first solution is to use the General Method of Moments to control for endogeneity and to get some convergent estimators. According to Arellano and Bond (1991), it first consists in getting a first-order difference equation (3') in order to remove the fixed effect:

$$\Delta\text{Log}\,(Y_{it}) = \theta\Delta\text{Log}(Y_{it-1}) + \Psi\,\Delta X_{it} + \Pi\,\Delta Z_{it} + \Delta\varepsilon_{it} \qquad (1'')$$

By construction, the difference in error term ($\varepsilon_{it} - \varepsilon_{it-1}$) is correlated with ($Y_{it-1} - Y_{it-2}$). The second step consists in using instruments (for $T \geq 2$). In generalizing the GMM, Arellano and Bond (1991) suggest to instrument ($Y_{it-1} - Y_{it-2}$) by all available lags on the delayed endogenous variable in level, and to instrument ($X_{it-1} - X_{it-2}$) and ($Z_{it-1} - Z_{it-2}$) by their value in level delayed by one lag or more. The Sargan test is subsequently used to assess the validity of the instruments. However, according to Blundell & Bond (1998), when the dependent variable and the explanatory variable are continuous, the lagged levels of the variables are not reliable instruments for the first-order difference equation (3''). The GMM-system method consists in piling up the model in difference with the model in level. From then on, we add up

[17] The infrastructure indicator is measured by the size of the roads network (measured by the number of tarred roads in percentage of the total) and the quality of the electricity network (given by the losses on the electrical network). The more the indicator's value is close to 1, the more the infrastructures are developed. The communication indicator is measured by the number of telephones per 1.000 inhabitants, the number of personal computers per 1.000 inhabitants and the number of persons equipped with Internet. Data is from the World Bank.

the instruments for regressions in level that are the lagged differences of the related variables. We thus use the exogenous variables of the (y_{it-2}, $y_{it-3},\ldots,y_{it-n}$), (x_{it-1}, $x_{it-2},\ldots,_{it-n}$) and ($_{it-1}$, $Z_{it-2},\ldots$, Z_{it-n}) types as the instruments for equations in first-order difference while the variables in difference Δy_{it-1} , Δx_{it-1} and ΔZ_{it-2} are the instruments of the equations in level [18].

IV. Results, comments and sensitivity analysis

Our sample consists in eight MENA countries over the period 1995-2004 (Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Tunisia, Turkey). Results are reported in table 1. A first estimation (column 1) in level includes individual fixed effects that control for the heterogeneity of the sample and for the omission of explaining variables. A Fisher statistics tests the significance of the fixed effects. The model is estimated in level with selected random effects (column 2) and a Hausman test is computed in order to choose between fixed or random effects specification. The Fisher test (F(6, 38) = 12.39) indicates that the specific individual effects are significant, while the Hausman test indicates that the fixed effects model could be preferred to the random effects model (chi2(9) =37.38). But FE and RE models do not correct neither the endogeneity bias nor the potential correlation between the regressors and the specific individual effects. From then on, a GMM in difference estimation (column 3) will control the endogeneity and the correlation bias, and a system-GMM estimation (column 4) will reintroduce the fixed effects. The variables that are systematically instrumented are the GDP per capita (delayed endogenous) as well as the FDI, FBCF and country's exports[19]. Both the GMM models give satisfying results from an econometric point of view. The instruments validity is confirmed in both cases by the Sargan/Hansen test[20]. Ultimately, the Arellano and Bond (1992) test indicates[21] the absence of autocorrelation of the residuals ε_{it} for the models in GMM since the *z* statistic calculated is inferior to the 1.64 threshold.

[18] These instruments are valid only under the assumption of a non correlation between exogenous variables and non observed individual effects $E(x_{it},f_i) = 0$.

Instruments for differenced equation : L(2/.).gdp L(2/.).fbcf L(2/.).fdi L(2/.).export___
Standard: D.human_capital_ D.infrastructure D.product_number D.decofdi D.export___ D.communication D.fdi D.fbcf D.high_technology-export D.import___ D.aid D.cpi D.credit D.gouv D.labor D.m2
Instruments for level equation: LD.gdp LD.fbcf LD.fdi LD.export___Standard: _cons

[19] The variables were chosen through endogenous tests. That way, each variable (FDI, FBCF then exportation) is regressed against all the other explanatory variables. You then retrieve the residues of the 3 regressions and regress the growth equation by adding the estimated residues variables. If the residues are significant, then the variables are considered as endogenous.

[20] The $\chi^2(40)=19.35$ and $\chi^2(70)=43.67$ statistics are in both models inferior to the fractile of the $\chi 2$ law at respectively 40 and 70 degrees of freedom

[21] The z statistic follows in an asymptotical way a normal reduced centred law. If this statistic is superior to 1,64 in absolute value, we then refuse H0. Otherwise, we accept the hypothesis of a rate-2 non self-correlation.

Table 1. Dependent variable: annual GDP growth for 1995-2004. Fixed Effects, Random effects, Difference-GMM and system-GMM estimations

	(1)	(2)	(3)	(4)[22]
Observations : 80	F(16, 46) = 129.99	Wald chi2(17) = 857.31	Wald chi2(17) = 1587.3	Wald chi2(17) = 37324.
Groups : 7	Prob>F=0.0000	Prob > chi2 = 0.000	Prob > chi2 = 0.000	Prob > chi2 = 0.000
GDP_{it-1}	**.1320487**	.5346475***	**.1070672**	**.5190*** **
	(1.57)	(8.91)	**(1.26)**	**(11.12)**
Constant	**-3.56e+09**	-3.89e+10*	**4.76e+08**	**-2.91e+10***
	(-0.71)	(-4.51)	**(1.01)**	**(-4.64)**
School	**-383.5828**	**-978.1201**	**-574.6974**	-473.03
	(-0,98)	**(-0.95)**	**(-1.55)**	(-1.15)
Investment	1.241852***	1.059899***	1.117066***	**1.220*** **
	(4.99)	(3.36)	(3.16)	**(4.80)**
Labour	2.72e+02***	2.86e+03***	1.82e+03**	**7..35.e+04****
	(5.5)	(4.33)	(2.41)	**(2.28)**
FDI	8.7798*	10.3186*	7.444187***	**14.61***
	(2.85)	(2.92)	(2.27)	**(4.81)**
Discoveries	5.94e+07**	1.23e+08***	5.84e+07 **	**8.93e+10*** **
	(2.49)	(3.58)	(2.52)	**(4.63)**
Disco*FDI	-.0471***	-.0551879***	-.0412431***	**-0.07594*** **
	(-3.26)	(-3.21)	(-2.72)	**(-5.34)**
Export	.8625617***	2.298182***	1.041728 ***	**1.1063*** **
	(4.46)	(5.85)	(4.74)	**(4.97)**
Import	**-.1249791**	**.2866888**	**-.1560689**	-0.15195
	(-0.70)	**(0.92)**	**(0.64)**	(-0.93)
Intermediate Goods	**-1.47e+08**	**-2.82e+08**	**-1.80e+08**	-8.60^{e}+07
	(-1.32)	**(-0.95)**	**(-1.42)**	(-0.63)
Inflation	**4.64e+07**	-1.89e+08*	**2.38e+07**	60344
	(1.18)	(-3.29)	**(0.65)**	(0.21)
M2	**-6.97e+07**	-6.57e+07 *	-1.30e+08 *	**-1.01^{e}+08****
	(-1.14)	(-1.70)	(-1.70)	**(-2.09)**
Gouv. Spending	**3.30e+07**	**-1.19e+08**	**1.63e+08**	-3.16e+08
	(0.10)	**(-0.27)**	**(-0.47)**	(-1.27)
Infrastructure	**-1.95e+09**	1.15e+10*	**4.97e+09**	**1.06^{e}+10***
	(-0.38)	(1.98)	**(0.66)**	**(1.95)**
Credit	1.75e+08***	1.40e+08**	1.25e+08**	**1.82^{e}+08*** **
	(3.39)	(2.14)	(2.29)	**(3.46)**
Aid	**-6628925**	4.23e+07***	**-1.10e+07**	**1.60^{e}+07****
	(-1.15)	(.2.79)	**(-1.32)**	**(2.01)**
Communication	**4.27e+09**	**-1.29e+10**	**-5.83e+09**	-5.45^{e}+10
	(0,93)	**(-1.10)**	**(-0.79)**	(-0.86)
Fisher	**F(6, 38) = 12.39**			
	Prob > F = 0.0000			
Hausman		**chi2(9) =37.38**		
		Prob>chi2 = 0.0000		
Sargan			**chi2(38) = 19.35**	**chi2(70) =43.67**
AR(2)			Z=0.43	Z=0.85545

Note: (***) significant at the 1% level; (**) significant at the 5% level; (*) significant at the 8% level

In the four models, the coefficient for the core variables of the Solow augmented model are generally of the expected sign and highly significant (*Initial GDP*, *Investment*, *Labour*), except for the *School* variable[23].

High levels of FDI, exportations and discoveries are generally associated with fast growth of GDP per capita. Nevertheless, neither the concentration nor the diversification indexes are

[23] As a general rule, the econometric surveys conclude that this variable is not significant when it is measured by the high school enrolment rate. It is however difficult to obtain better data on a yearly basis. As in the standard growth literature, the global convergence is computed as (θ-1) that gives the value -0.4809 for the system-GMM model.

significant whereas the number of discoveries affects significantly growth[24]. Since the coefficient is significant and positive, these results suggest that the diversification of trade enhances growth for MENA countries. The effect of export discoveries on growth can occur through the stabilization of the growth paths or from export resources as highlighted by the export portfolio models (Bertinelli et al. 2006; Levchenko & Di Giovanni 2008). But it can also stem from an increase of the productivity levels or from the effects of technological spillovers the new export sectors. The positive sign of FDI can be seen as the measurement of the net effect on growth, beyond the crowding-in effects on domestic investments.

We must also note that the interactive variable « *Deco*FDI* » always has a significant and negative sign[25]. This means that the higher the number of discoveries is, the less the growth is responsive to FDI or alternatively that more FDI inflows tend to disconnect growth from the number of discoveries. There are two explanations in the case of MENA countries. First, the FDI received by these countries do not generate much spillover effects because they are either isolated from the domestic productive network, as it is the case for investments in raw materials, or oriented towards the domestic market with a weak integration to the global value chains, as it is the case for the mergers and acquisition operations due to privatizations (sadik & Bolbol 2001). Another explanation is that the most diversified economies are also the ones whose growth is the less sensitive to the direct effects of FDI growth because they benefit from a larger domestic market and a more diversified domestic demand.

Results reported in table 1 show that macroeconomic stability (Government Spending, Inflation) is not significant in explaining growth for MENA countries, except for the monetary policy that have a negative influence on growth as it hampers the foreign competitiveness and then reduces the growth rates of these countries. On the contrary, the development of the banking system has a positive influence in so far as it enables a larger financing of the investment projects. This way, we meet up with the results of the surveys indicating that and the development of the banking and financing system plays a significant role in the way FDI affects growth (Hermes & Lensink 2003, Alfaro et al. 2004).

The countries of our sample do not seem to have problems of trade deficits since the import coefficient is never significant. The same happens for the importations of semi-finished goods that do not play any role in growth for MENA countries. This latter result confirms the weak integration of MENA countries in the global value chains (World Bank 2007; Noland & Pack 2007; Iqbal & Nabli 2004).

Lastly, the public aid to development as well as the development of transport infrastructures stimulate growth significantly in the system-GMM model. As done by Harding and Javorcik (2007), the bilateral or multilateral public aid can be interpreted like a proxy of the setting up of agencies for the promotion of exportations and investments. Indeed, developing countries generally benefit from some aid flows aiming at co-funding the setting up of promotion agencies and supporting their actions. These results thus confirm both the importance of transport infrastructures and of public and private investments for the supply of information about the conditions of foreign investment to attract the investments and make them more efficient (Charlton 2003; Morrisset & Andres-Johnson 2004).

[24] We only report results for discoveries in the Table 1.

[25] When the model is only estimated with the FDI and discovery variables, the FDI coefficient happen to be significant but negative, indicating a negative role of FDI in the growth process. As soon as the FDI variable is combined with the interactive variable (decofdi), the FDI coefficient becomes positive again while the coefficient of the interactive variables is negative.

The results of robustness checks have not been reported in the paper. Table 1 gives the results for the estimation of the most complete models. The change from one estimator to another one does not create any significant instability in the value of the estimated coefficients. Moreover, control variables (aid, communication, importation, M2) have been included step by step without either modifying significantly the estimations. Testing for outlier (Algeria) does not significantly change the results neither.

Conclusion

Export diversification has become a priority goal for the development strategies of the MENA countries that want to go beyond some excessively strong specializations on raw materials and finished goods for which prices and demand are rather unstable. Diversification must favour at the same time the domestic and foreign investment and induce some endogenous structural changes creating development. In this paper, we aimed at measuring the effects of exports' diversification on growth in MENA countries. The issue was also to test the hypothesis along which FDI do not necessarily have the same effect on growth according to the diversification level. Within the framework of an endogenous growth model estimated by the GMM system method, we showed that while FDI and diversification favour the MENA countries' growth, some higher levels of the latter decrease the effects of FDI on growth. We also demonstrated that while FDI have a positive and significant effect on the MENA countries' growth, it is most probably rather linked to the direct effect on value added and employment than to the effects of technological transfer. However, this is still a mere hypothesis that will need to be further confirmed.

Appendix

Definition of the Diversification Index

The values of the diversification index lie between 0 and 1.It gives information about the degree to which the export structure of a given country divert from the worlds' export structure. A value close to 1 means that the export structure of the country strongly divert from the world's trade one. The index S for a country *i* is a variant of a Finger-Kreinin index (Finger and Kreinin, 1979) and is a given by :

$$S_j = \frac{\sum_{i=1}^{n} | hij - hi |}{2}$$

where h_{ij} = share of the product *i* in the total of exports of the country *j*, and h_i = share of the product *i* in the total of the world's exports

Definition of the Concentration Index

The values of the concentration index lie between 0 and 1. It gives information about the degree of exports concentration of a given country. A value close to 1 means that the export structure is concentrated. The index H for a country *i* is a variant of the Herfindahl-Hirschmann normalized and is a given for country *j* by :

$$Hj = \frac{\sqrt{\sum_{i=1} (xi/X)^2} - \sqrt{(1/n)}}{1 - \sqrt{(1/n)}}$$

where x_i is the export value for the product *I*, and X is the sum of the x_i .

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