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Regional Integration, Firms' Location and Convergence: An Application to the Euro-Mediterranean Area

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Executive summary

1. Stylized fact about regional integration, firms' location and convergence

a) Regional integration and trade patterns

- **The Barcelona agreement is often questioned about its effects on trade and convergence**. The factors which explain this modest performance can be found in the lack of deep integration, long transitional periods, the high propensity to agricultural protectionism in the EU as well as the modest levels of the funds provided by the EU to MENA countries.

- Although it is too early to assess the effects of the Union for the Mediterranean (UMed agreement), the **UMed main contribution relies in the new institutional setup** designed to govern this initiative. It includes a co-presidency, a joint permanent committee as well as a secretariat. On the other hand, **the main pitfall of the UMed is the dilution of the Barcelona process**, notably through the large number of countries involved compared with the Euromed agreement, but also through the addition of vagueness and complexity in the decisions.

- The analysis of trade patterns since the implementation of the Barcelona agreement reveals that **there has not been much change in the export and import structure of MENA countries**. In particular, trade diversification and the geographical orientation of trade have not changed a lot.

- Both **MENA countries and EU experience similar trends and levels of the contribution of manufacturing to their economies in terms of percentage of exports, employment, and GDP.** However, the indicators revealed that MENA countries differ significantly from EU countries in terms of the products and sectors in which both sets of countries are specialized in, with **MENA specialized in low technology products and EU specialized in high technology products.**

b) Industrial structure and location

- **MENA countries exhibit a significant share of industrial value added in GDP** (from 27% for Turkey up to 36% for Egypt). This is more than in EU countries. However, high technology industry only account for 1/3 of industrial production in MENA countries, against 50% in EU countries.

- The calculation of concentration indexes show that **MENA countries' industries are more concentred** (especially Tunisia, Morocco, Jordan and Egypt) **than in the EU** (except Ireland, Greece and Finland). Moreover, this concentration process has been reinforced in the past 2 decades in MENA countries, contrary to the EU. A breakdown by industry shows that **concentration is particularly significant in low-technology industries**, especially pottery, plastic, footwear, leather, textile and tobacco.

- The estimation of a model of economic geography shows that **firms' location in the euro-mediterranean area depends on**:

* **Labour costs**. Hence, the low labor costs observed in MENA countries explain to a large extend the concentration of labour-intensive industries in these countries.

* **Supply access**. The higher the supply access, which measures the proximity to inputs, the higher the concentration process.

* **Market access**. The better market access (due to a large country size), the more firms are incited to locate in these markets. In MENA countries, the small size of their markets reduces concentration. Firms tends to concentrates in the EU because a a more favourable market access

* **The quality of infrastructure and on business environment** is also a key variable for explaining firms' location in the euro-mediterranean area.

* **The level of technology** also matters. The lower the technology level, the higher the concentration process.

* Finally, **openness** as well as **regional integration** generally promotes concentration, as it makes easier market access.

To sum up, the high concentration level observed in MENA countries can be explained by their low labour costs, their low-technology industrial specialisation, their efforts in openness and regional integration, infrastructure and business environment as well as the proximity to inputs (supply access). However, their detrimental market access leads to a reduction in firm's concentration in Mediterranean countries.

c) Evolution of GDP par capita

- Looking at per capita GDP growth as a first insight about convergence, it is striking to observe that **over the period 1960-2007, the per capita GDP growth in MENA countries (MENA) is slightly above that recorded for the EU** (EU-6 and EU-15), whatever the GDP indicator used. However, this result masks significant differences across countries. As a matter of fact, countries like Tunisia, Morocco as well as Egypt show per capita GDP growth rates well above that of the EU. On the other hand, Algeria shows growth rates well below the EU average, whereas for Turkey and Syria, it is similar to that of the EU.

- **Considering changes over time**, it is worth mentioning that the EU per capita GDP rate of growth is declining over time whatever the indicator considered. Regarding MENA countries on the other hand, this rate of growth declines first before recovering in the last period. This means that **in the first period (from 1960 to 1994), the MENA rates of growth are generally lower than those recorded for the EU before becoming above that of the EU from 1995 onward.**

- Again, **there are some differences across countries**. Tunisia, Turkey and Jordan follow this general declining-recovering trend, whereas Morocco, Egypt and Syria show a declining trend over the whole period. As a result, these differentiated trends modify the ranking of the countries in terms of GDP growth over time. As a matter of fact, **taking the most recent period (1995-2007), the best performance is recorded for Tunisia and Turkey (increasing trend), still followed by Egypt despite its declining trend. These three**

countries are above the EU average. On the other hand, Morocco moves from above to EU-average (declining trend), Syria moves from above to below EU-average. Algeria and Jordan generally remain below the EU-average.

- A final interesting set of statistics relates to the **comparison of per capita growth rates with the four cohesion EU members** (Greece, Spain, Portugal as well as Ireland). Over the whole period, **it is obvious that these four countries perform better that MENA**. In fact, **Tunisia only approaches these growth rate levels**. However, the evolution over time changes this picture to some extent. As a matter of fact, the growth gap between MENA and cohesion countries is very significant in the first period. **However, this gap is narrowing in the second and last periods.** In 1995-2007, the per capita GDP growth in MENA countries becomes greater than that of Portugal and approaches that of Spain (this is particularly true for Tunisia, Morocco, Egypt and Turkey). The gap is only increasing with Ireland, which takes advantage of the growth waves in the financial economy.

2. Analysis of convergence indicators

a) **The calculation of σ-convergence does not establish that the MENA countries have converged toward EU per capita income levels, except in recent years for specific countries, such as Tunisia, Turkey as well as Egypt and Morocco to a lesser extent**. These results contrast with cohesion countries, especially Ireland, Spain and Portugal which show a rapid convergence process to the EU-6 per capita GDP levels. There is also evidence for divergence within the Euro-Mediterranean as a whole, despite a stable value of σ in recent years. Finally, there is no evidence of convergence across MENA countries.

b) **However,** the absence of *σ-convergence* does not mean an absence of convergence process. This is why the *γ-convergence* indicator, based on the country ranking of per capita GDP, can be used together with the *σ-convergence* to infer about *β-convergence* (Boyle and McCarthy, 1999). In this respect, **the *γ-convergence* analysis is generally supporting convergence between MENA countries and the EU**. Another difference is that **the *γ-convergence* also supports a slight convergence across Mediterranean countries,** whereas σ was constant. In spite of these differences, the relative performance of the countries is unchanged whatever the convergence indicator used. As a matter of fact, the best performance in terms of convergence is that of Tunisia, followed by Turkey and Egypt. Morocco and Syria are in a intermediate position, whereas Algeria and Jordan are diverging whatever the convergence indicator used.

c) **The calculation of β-convergence supports the previous results, showing some evidence of convergence between MENA countries and EU per capita GDP levels**, whatever the way GDP is measured and whatever the estimator chosen. This result is also valid whatever the EU reference countries used (EU-6 or EU-15)

d) More detailed results a country level indicate that **β-the convergence hypothesis is clearly accepted** (at 1% level) **for Tunisia, Turkey, Egypt and Morocco. It is barely accepted for Syria** (10% level) **and clearly rejected for Algeria and Jordan**. These results correlates those previously found with the other convergence indicators. In addition, the hypothesis of convergence within the MENA region is also accepted in all cases. Finally, the convergence hypothesis is also supported for the whole euro-mediterranean area.

e) **The calculation of convergence for Human Development Index (HDI) levels complements the results previously found with GDP per capita only**. In this regard, it can be argued that i) **the convergence process between the Mediterranean countries and the EU is well established for the HDI**; ii) **Tunisia, Turkey and Egypt remain the countries which show the greatest convergence rates**; iii) **the euro-mediterranean area is also converging as well as HDI within the MENA area**.

3. The determinants of convergence

a) **The initial income level is a first determinant of growth and convergence in MENA countries**. In this regard, these countries are globally converging to the EU level over the whole period, conditionally to the other independent variables included in the model. This result correlate those found with the non conditional *β-convergence* calculated the previous section.

b**) Some other variables are also very significant**. **These are first education and R&D**, which both significantly contribute to growth in MENA countries. **Second, transport and communication also play a determinant role** for explaining convergence. As a matter of fact, roads, telephone lines and even internet show all a positive and significant sign whatever the estimator.

c) **Trade, specialization and economic geography also matter**. Indeed, **inter-industry specialisation tends to reduce growth in MENA countries**, essentially because MENA countries are specialized in low value added products. For the same reason, **the agglomeration of economic activities is detrimental to convergence**. In regard, it is also interesting to observe that the variable related to **the share of primary exports has a negative impact on convergence**. Openess and FDI are a necessary but not sufficient condition for convergence.

d) **The Barcelona agreement has no direct impact on real convergence** of MENA countries toward EU income revels. **However, the EIB loans positively contribute to the convergence process** of MENA countries.

e) Amongst the remaining determinants, **the share of government consumption in GDP has an expected negative impact on convergence**. This can be explained by the fact that public consumption is financed by distortionary taxes which reduce the growth rate (Sala-i-Martin, 2004). **However, the share of public sector investment in GDP has a positive impact on convergence**. This result supports the role of public investment in MENA countries, especially concerning transport, infrastructure and technology.

4. policy implications

a) **Given the primary role of human capital and education for explaining convergence in MENA countries, these countries should pursue their efforts in this field**. In this regard, it is worth mentioning that some MENA countries have made significant efforts in the past decades. As a matter of fact, the secondary enrolment rate, which was below 50% in most MENA countries before 1990, has reached in 2005 more than 75 % in Turkey (76%), Tunisia

(83%), Egypt (86%), Jordan (88%) and Algeria (83%). Significant progress has also been made in Syria and Morocco, although this rate is still below 70% in these countries. This progress must be pursued in the coming years in order to reach the 100% rates of developed countries.

b) **Similarly, given the importance of R&D for explaining growth, MENA countries should go on investing in this field**. Some countries have already done significant progress in recent years, especially Tunisia, Turkey and Morocco. In these countries, the R&D expenditures approach 1% of GDP. This is close to the levels reached in Southern EU countries, but still far from those in France and Germany (greater than 2%) as well as Sweden and Finland (more than 3.5%). However, Algeria, Egypt, Jordan and Syria exhibit rates which are lower than 0.35%. These countries should make considerable efforts in the coming years to improve their research capacity as a means of catching up the GDP per capita gap with the EU.

c) **MENA countries should also continue to invest in transport and communication**. For instance, Turkey, Tunisia, Jordan and Morocco have significantly improved their roads and developed highways and other transport infrastructure. These countries (including also Egypt) have also considerably improved the telephone access, with more than 100 telephone lines per 1000 inhabitants. The internet access is also progressing. As a matter of fact, in 2005, Morocco enjoyed 24 internet users for 100 people, Jordan 23, Tunisia 17. However, these countries still remain far from EU levels (generally greater than 50 users per 100 people). As a result, investments in this area must be a priority. This remark applies particularly to Algeria, Egypt and Syria which generally show a wider gap with EU levels. In this regard, the econometric results showed that public investment play a significant role in the convergence process. This means that **governments must give priority to public investments in the areas above mentioned (R&D, education, transport and communication), even if public investment must be complemented by private investment**.

d) **MENA countries should also continue to open their economies even if openness and FDI are not sufficient conditions for growth**. In addition, **these countries must change their specialization process toward more high-tech (value-added) products** more similar to international demand. As a matter of fact, these countries still face a detrimental specialization process which is growth-reducing simply because of the nature of the goods involved. In addition, the geographical concentration and agglomeration process is also detrimental to growth for the same reasons. A move toward higher value added industries specialization and concentration process would change this detrimental relationship by promoting growth. **Again, the development of education and R&D and more generally human capital may be helpful for the change in this specialization process**.

e) Finally, we have seen that also the Barcelona agreement has not made it possible to directly stimulate convergence. However, the EIB loans have significantly contributed to convergence. As a result, **the EIB loans must be encouraged and developed**, especially for projects in line with human capital, transports and infrastructure. The contents of the Barcelona program should also be reconsidered in the light of the Union for the Mediterranean so as to include more growth-creating projects.

f) As a final point, **some countries still face detrimental demographic and migration indicators**. The case of Jordan is particularly significant. Indeed, the population in this country has increased much more than in the other MENA countries, i.e. from 3 to 6 million inhabitants since 1990. This is due to both higher natural increase and also the inflow of

foreign population after the two Gulf wars (especially from Iraq). As a consequence, this country must mechanically enjoy a much higher GDP growth rate for the same GDP per capita growth. Although economic theory does not directly relate population growth to standards of living, Jordan is likely to be negatively affected by population growth, partly due to the inflow of migrants. Syria and Egypt also face a high growth rates (more than 2% each year) though it is not due to migration. Still**, these countries should also accelerate their efforts to control the population growth**.

g) This research is a first step for understanding the growth and convergence process in MENA countries. Despite considerable efforts to build up a comprehensive database over almost 50 years, this research is still limited by the lack of data for some variables and by the use of sometimes rough proxies. It also failed to adequately show the precise impact of particular variables, such as corruption, colonization, cohesion funds… **Future research can be conducted to focus of the role of specific variables**.

Résumé

1. Intégration régionale, localisation et convergence: quelques faits stylisés

a) Intégation régionale et commerce international

- **Les accords de Barcelone sont parfois critiqués quant à leurs effets sur les échanges et la convergence**. Parmi les arguments évoqués, on peut citer l'absence d'intégration « profonde », les périodes de transition trop longues, le protectionnisme de l'UE concernant les produits agricoles ainsi que les niveaux insuffisants des prêts de la BEI procurés aux pays MENA.

- Bien qu'il soit trop tôt pour évaluer les premiers effets de l'Union pour la Méditerranée (UPM**), l'apport principal de l'UPM réside dans la création d'institutions**, qui incluent une co-présidence, un comité permanent joint ainsi qu'un secrétariat. **En revanche, l'UPM risque de générer un processus de dilution des accords de Barcelone**, parce qu'il inclut un plus grand nombre de partenaires, et ensuite parce qu'il reste encore caractérisé par un processus de décision et un contenu encore vague et complexe.

- L'analyse des principales caractéristiques des échanges des pays MENA après les accords de Barcelone indique qu'**il y a très peu de changement dans la structure des exportations et des importations des MENA**. En particulier, la concentration des échanges sur le plan sectoriel et géographique a assez peu évolué.

- **L'UE comme les MENA ont connu des évolutions assez semblables quant à la contribution du secteur manufacturier dans son ensemble, aux échanges, à l'emploi et à la production. Toutefois**, une analyse en termes de produits et de secteurs indique clairement que **les MENA restent spécialisés dans des produits à faible niveau technologique tandis que l'UE est spécialisée dans des produits à haut contenu technologique**.

b) Structure industrielle et localisation

- Les MENA sont caractérisés par une part significative de la valeur ajoutée industrielle dans le PIB (de 27% pour la Turquie à 36% pour l'Egypte). Ces chiffres sont supérieurs à ceux de l'UE. **Toutefois, les industries de haute technologie ne représentent qu'1/3 de la production industrielle dans les MENA contre 50% dans l'UE**.

- le calcul d'indices de concentration montre que **les MENA ont un tissu industriel plus concentré** (en particulier la Tunisie, le Maroc, la Jordanie et l'Egypte) **que l'UE** (sauf l'Irlande, la Grèce et la Finlande). En outre, ce processus de concentration a été renforcé depuis ces 15 dernières années dans le MENA, contrairement à l'UE. Une analyse sectorielle montre que **la concentration est particulièrement importante dans les industries faiblement technologiques**, essentiellement la céramique, les plastiques, le cuir, les textiles et le tabac.

- l'estimation d'un modèle d'économie géographique montre que **la localisation des firmes dans l'espace euro-méditerranéen dépend des variables suivantes** :

* **Les coûts du travail**. Ainsi, les faibles coûts observés dans les MENA expliquent pour une large part le niveau élevé de concentration des industries intensives en main d'œuvre dans ces pays.

* **L'accès de l'offre**. Plus cet accès est élevé (c'est-à-dire qu'il existe une forte proximité des inputs), plus les entreprises se concentrent.

* **L'accès au marché**. Plus cet accès est élevé (en raison d'une taille importante du pays), plus les firmes sont incitées à se localiser dans ces marchés. Concernant les MENA, leur petite taille constitue clairement un handicap.

* **La qualité des infrastructures et de l'environnement des affaires** est également une variable clé qui permet d'expliquer la localisation des firmes dans l'espace euro-méditerranéen.

* **Le niveau de technologie** est également une variable significative. Plus ce niveau est bas, plus la concentration des firmes est élevée.

* Enfin, **le niveau d'ouverture commerciale et d'intégration régional** favorise le processus de concentration, dans la mesure où il rend plus facile l'accès au marché.

En bref, la forte concentration industrielle observée dans les MENA peut s'expliquer principalement par les faibles coûts du travail, le faible niveau de technologie, les efforts de ces pays en matière d'infrastructure, la proximité des inputs ainsi que la proximité géographique de l'Europe. En revanche, l'accès au marché est défavorable à l'attraction des firmes en raison de la trop petite taille des ces pays.

c) Evolution du PIB par habitant

- Une première approche de la convergence réelle peut se faire en comparant l'évolution du PIB par habitant dans les MENA et dans l'UE. **Sur la période 1960-2007, ce taux de croissance est légèrement supérieur dans les MENA à celui de l'UE** (UE-6 et UE-15), quel que soit l'indicateur de PIB utilisé. Toutefois, ce résultat masque des différences importantes entre pays. Ainsi, la Tunisie, le Maroc et l'Egypte présentent une croissance du PIB par habitant bien supérieure à celle de l'UE, tandis que l'Algérie et la Jordanie connaissent une croissance beaucoup plus faible que celle de l'UE. La Syrie et la Turquie connaissent des taux de croissance similaires à ceux de l'UE.

- Considérant les évolutions dans le temps, on observe que le taux de croissance du PIB par habitant européen a constamment décliné depuis 1960, tandis que pour les pays MENA, il a eu d'abord tendance à décliner avant une reprise depuis 1995. Ceci se traduit par le fait que **de 1960 à 1995, la croissance du PIB par tête des MENA était généralement inférieure à celle de l'UE, avant de devenir supérieure à celle de l'UE depuis 1995.**

- Il existe cependant des différences entre les pays. La Tunisie, la Turquie et la Jordanie ont suivi ce trend baissier puis haussier, tandis que le Maroc, l'Egypte et la Syrie ont connu un trend baissier continu sur toute la période. Ces différents trends ont pour conséquence un changement dans le classement des MENA en termes de croissance du PIB par habitant. Ainsi, **dans la période la plus récente (1995-2007), la meilleure performance est atteinte pour la Tunisie et la Turquie, encore suivie par l'Egypte (malgré un trend défavorable).**

Ces trois pays sont au-dessus de la moyenne européenne. En revanche, le Maroc passe d'une situation au-dessus de la moyenne européenne à une situation égale à cette moyenne. La Syrie, qui était initialement au-dessus, passe au-dessous la moyenne européenne, tandis que la Jordanie et l'Algérie restent au dessous de cette moyenne.

- **Une comparaison avec les pays du Pacte de Cohésion** (Grèce, Espagne, Portugal et Irlande) **montre que sur l'ensemble de la période, ces pays font mieux que les MENA en termes de croissance du PIB par habitant**. En fait, seule la Tunisie se rapproche des performances de ces pays. **Toutefois, l'écart de croissance du PIB par tête se resserre nettement depuis 15 ans**. Par exemple, sur la période 1995-2007, la croissance du PIB par habitant dans les MENA est devenue supérieure à celle du Portugal et se rapproche de celle de l'Espagne (en particulier concernant la Tunisie, le Maroc, l'Egypte et la Turquie). L'écart se creuse uniquement avec l'Irlande qui a profité de la vague porteuse de l'économie financière.

2. L'analyse des indicateurs de convergence

a) **Le calcul de la σ-convergence ne permet pas d'établir que les MENA ont convergé vers les niveaux européens de PIB par habitant, à l'exception des années récentes et pour des pays spécifiques, comme la Tunisie, la Turquie ainsi que, dans une moindre mesure, l'Egypte et le Maroc.** Ces résultats contrastent avec ceux correspondant aux pays du Pacte de Cohésion, en particulier l'Irlande, l'Espagne et le Portugal qui ont connu un processus de convergence rapide vers les niveaux de PIB par habitant de l'UE-6. En revanche, il existe une certaine évidence de divergence à l'intérieur de la zone euro-méditerranéenne dans son ensemble, en dépit d'une stabilisation de l'indicateur de σ -convergence dans les années récentes. Enfin, il n'y a pas d'évidence de convergence des pays MENA entre eux.

b) **Toutefois**, l'absence de σ-convergence ne signifie pas une absence de processus de convergence. C'est pourquoi l'indicateur de γ-convergence est également calculé en lien avec celui de la β-convergence (Boyle et McCarthy, 1999). **Sur ce point, l'analyse de la γ-convergence permet d'accepter l'hypothèse de convergence entre les MENA et l'UE. Une autre différence est que la γ-convergence permet également d'accepter l'hypothèse de convergence entre les MENA**, en dépit d'un σ constant. Malgré ces différences, la performance relative des pays reste inchangée quel que soit l'indicateur retenu. En effet, la meilleure performance en termes de convergence revient à la Tunisie, suivie par la Turquie et l'Egypte. Le Maroc et la Syrie sont dans une situation intermédiaire, tandis que l'Algérie et la Jordanie divergent quel que soit l'indicateur utilisé.

c) **Le calcul de la β-convergence confirme les résultats précédents, en montrant l'existence d'un processus de convergence entre les MENA et l'UE**, quel que soit la mesure du PIB et quel que soit l'estimateur utilisé. Ce résultat est également robuste quel que soit le groupe de pays de référence retenu (UE-6 ou UE-15)

d) Des résultats plus détaillés indiquent que **l'hypothèse de β-convergence est clairement acceptée (au seuil de 1%) pour la Tunisie, la Turquie, l'Egypte et le Maroc**. **Elle est moins clairement acceptée pour la Syrie (seuil de 10%), et clairement rejetée pour l'Algérie et la Jordanie.** Ces résultats confirment ceux obtenus avec les autres indicateurs de convergence. De plus, l'hypothèse de convergence entre les MENA est également acceptée, de même que la convergence de l'espace euro-méditerranéen dans son ensemble.

e) **Le calcul de la convergence appliqué à l'indicateur de développement humain (IDH) complète les résultats précédents, en montrant que i) le processus de convergence entre les MENA et l'UE est bien établi pour l'IDH ; ii) La Tunisie, la Turquie et l'Egypte restent les pays qui montrent les taux de convergence les plus élevés ; iii) la zone euro-méditerranéenne converge également en termes d'IDH de même que les MENA entre eux.**

3. Les determinants de la convergence

a) **Le niveau initial du PIB par tête est le premier déterminant de la croissance et de la convergence des MENA**. A cet effet, ces pays tendent à converger vers les niveaux européens sur l'ensemble de la période, conditionnellement aux autres variables inclues dans le modèle. Ce résultat corrobore ceux obtenus avec l'analyse de la convergence non conditionnelle.

b) **D'autres variables ont également un impact très significatif. Il s'agit premièrement de l'éducation et de la R&D**, qui contribuent toutes deux de façon significative à la croissance des MENA. **Deuxièmement, le transport et la communication jouent également un rôle déterminant** pour expliquer la convergence. Ainsi, le nombre de lignes téléphoniques, l'état des routes et les équipements internet sont des variables qui sont soutes significatives quel que soit l'estimateur retenu.

c) **Les échanges, la spécialisation et les variables d'économie géographique jouent également un rôle important**. Ainsi, **la spécialisation inter-branches tend à réduire la croissance des MENA**, essentiellement parce que ces pays sont spécialisés dans des produits à faible valeur ajoutée. Pour des raisons similaires, **l'agglomération (concentration) des firmes est défavorable à la convergence**. Sur ce point, il est également intéressant de constater que la variable relative à **la part des exportations de produits primaires dans les exportations totales a un impact négatif sur la convergence**. Enfin, **l'ouverture économique et les IDE sont des conditions nécessaires mais non suffisantes pour la convergence**.

d) **Les accords de Barcelone n'ont pas d'impact direct sur la convergence réelle des MENA** vers les niveaux de l'UE. **Cependant, les prêts de la BEI ont un impact positif sur la convergence des MENA**.

e) Parmi les déterminants restants, **la part de la consommation de l'Etat dans le PIB joue un effet négatif sur la convergence**. Ce résultat s'explique par le fait que la consommation publique est financée par des impôts qui créent des distorsions dans l'économie (Sala-i-Marin, 2004). **Cependant, la part de l'investissement public dans le PIB a un impact positif sur la convergence**. Ce résultat souligne l'importance de l'investissement public dans les MENA, particulièrement concernant les transports, l'infrastructure et la technologie.

4. Implications en termes de politique économique

a) **Dans la mesure où le capital humain et l'éducation jouent un rôle majeur dans le processus de convergence des MENA, ces pays doivent continuer leurs efforts déjà engagés** concernant ces priorités. Par exemple, le taux de scolarisation (enseignement

secondaire), qui était inférieur à 50% dans la plupart des pays MENA avant 1990, a atteint en 2005 plus de 75% en Turquie, et jusqu'à 83% en Tunisie, 86% en Egypte, 88% en Jordanie et même 83% en Algérie. Des progrès significatifs ont également été réalisés par la Syrie et le Maroc, même si les taux de scolarisation restent inférieurs à 70% dans ces deux pays. Ces progrès doivent être accélérés dans les années à venir afin d'atteindre le niveau de 100% observés dans les pays développés.

b) **De la même manière, compte tenu de l'importance de la R&D pour expliquer la croissance, les pays MENA doivent continuer à investir dans ce domaine**. Quelques pays ont déjà réalisé des progrès significatifs, en particulier la Tunisie, la Turquie et le Maroc. Dans ces trois pays, la part des dépenses de R&D se rapproche de 1% du PIB. Ce chiffre est proche de celui atteint dans les pays d'Europe du Sud, mais encore loin des pourcentages atteints en France et en Allemagne (2%), et a fortiori de ceux en Suède et en Finlande (3,5%). En revanche, l'Algérie, l'Egypte, la Jordanie et la Syrie affichent des ratios de R&D inférieurs à 0,35% du PIB. Ces pays doivent désormais fournir des efforts considérables dans les années à venir afin d'améliorer leur capacité de recherche pour espérer rattraper une partie de leur retard en matière de convergence.

c) **Les pays MENA doivent également continuer à investir dans les transports et les communications**. Par exemple, la Turquie, la Jordanie et le Maroc ont déjà amélioré de manière significative leurs réseaux routiers, ferroviaires, voire maritimes. Ces pays (y compris l'Egypte) ont aussi considérablement amélioré l'accès au téléphone, avec plus de 100 lignes téléphoniques pour 1000 habitants. L'accès à internet progresse également très rapidement. Par exemple, en 2005, le Maroc disposait de 24% utilisateurs internet, 23% pour la Jordanie et 17% pour la Tunisie. Toutefois, ces pays restent encore en retrait des niveaux européens, qui dépassaient 50% d'utilisateurs internet. En conséquence, les investissements dans ce domaine doivent être prioritaires, en particulier pour l'Algérie, l'Egypte et la Syrie, pour lesquels le retard par rapport à l'UE est encore plus important. Sur ce point, les résultats économétriques montrent que l'investissement public joue un rôle non négligeable dans le processus de convergence. Cela signifie que **les gouvernements doivent donner la priorité aux investissements publics dans les domaines mentionnés ci-dessus (R&D éducation, transport et infrastructure), même si ces investissements publics doivent être complétés par les investissements privés.**

d) **Les pays MENA doivent également poursuivre leurs efforts d'ouverture de leurs économies même si l'ouverture commerciale et les IDE ne forment pas une condition suffisante pour la croissance**. En outre, **ces pays doivent modifier leur processus de spécialisation vers des produits plus technologiques** et plus en phase avec la demande mondiale. Ainsi, les MENA font face à un processus de spécialisation défavorable à la croissance, en raison de la nature des produits concernés. De plus, le processus de concentration géographique et d'agglomération est également défavorable à la croissance pour les mêmes raisons. Des changements vers une production et une spécialisation plus riche en produits technologiques permettraient d'inverser cette relation défavorable en promouvant la croissance. **Une fois de plus, c'est de l'éducation, de la R&D et plus généralement du capital humain que pourra venir ce changement dans le processus de spécialisation**.

e) Enfin, nous avons vu que les accords de Barcelone n'ont pas directement permis de favoriser la croissance et la convergence. Cependant, les prêts de la BEI se sont révélés être un instrument utile pour stimuler la convergence. En conséquence, **les prêts de la BEI doivent être encouragés et développés**, particulièrement à destination de projets liés au capital humain, aux transports et aux infrastructures. En outre, le contenu des accords de

Barcelone devrait être reconsidéré en lien avec l'UPM afin d'inclure des projets davantage créateurs de croissance.

f) Comme remarque finale, soulignons que **certains pays font face à des situations migratoires et démographiques défavorables**. Le cas de la Jordanie et particulièrement significatif. En effet, la population de ce pays a augmenté beaucoup plus que dans les autres pays MENA, soit de 3 à 6 millions d'habitants depuis 1990. Ceci s'explique à la fois par un taux de croissance naturel plus élevé, mais aussi et surtout par un afflux massif de migrants à la suite des deux guerres du Golfe (en provenance essentiellement d'Irak). En conséquence, la Jordanie doit mécaniquement réaliser des taux de croissance du PIB beaucoup plus élevés que dans les autres pays pour une même croissance du PIB par tête. Bien que la théorie économique ne permet pas de relier directement la croissance de la population à celle du PIB par tête, la Jordanie semble être négativement affectés par cette forte croissance de la population, et en particulier par l'afflux de migrants. La Syrie et l'Egypte font également face à des taux de croissance élevés de la population (supérieure à 2% l'an), bien que ce ne soit pas essentiellement dû aux flux migratoires. Cependant, **ces pays doivent tout de même accélérer leurs efforts pour contrôler la croissance de la population**.

g) Cette **recherche constitue une première étape pour la compréhension des mécanismes de localisation, de croissance et de convergence dans les pays MENA**. En dépit d'efforts considérables liés à la construction une base de données pour ces 50 dernières années et à la modélisation, l'analyse reste limitée par le manque de données ou leur mauvaise qualité pour certaines variables. De plus, cette analyse na pas pu préciser l'impact de certains variables, comme la colonisation, la corruption, les fonds de cohésion… Des recherches futures pourront être mises en place afin de mettre mieux en évidence le rôle de ces variables.

Introduction

Middle East and North African (MENA) countries have experienced a rather disappointing macroeconomic performance in the past decade, especially when compared with some Asian countries. As an illustration, according to the classification of the World Bank, the average growth rate of these countries reached only 3.8% in the 90s and 4.1% from 2000 to 2006, whereas at the same time, East Asia and Pacific countries registered respectively 8.5% and 8.4% and South Asian countries 5.6% and 6.5% (World Bank, 2008).

This modest performance questions the capacity of MENA countries to converge toward EU per capita income levels. This problem is particularly important since the persistence of huge gaps in the standards of living between the two sides of the Mediterranean is likely to reinforce economic and political problems linked to poverty, illegal migration as well as political instability in these countries.

In this regard, the implementation of the Barcelona Agreement in 1995 was intended to reinforce the economic relationship between the EU and MENA countries, as a means of boosting trade, FDI and also economic growth of these countries. This objective was stated again in the European Neighborhood Policy (ENP) and more recently when the Union for the Mediterranean (UMed) was initiated.

In addition, it is well know that the growing openness of economies to international trade (notably through regional economic integration) has a significant impact on the location of economic activities between countries. This evidence raises crucial policy issues that are often neglected when countries decide to implement trade agreements. This suggests that the Euro-Mediterranean Partnership is very unlikely to leave the economic geography of members unaffected. As a result, if the geography is changed, it is likely to have significant consequences on the growth and convergence process of MENA countries.

Thus, several questions remain currently unanswered:

- Are MENA countries converging toward EU living standards ?
- What is the direct impact of the Barcelona Agreement on this convergence process ?
- What is the relationship between the Barcelona agreement, industrial location and convergence ?

The existing literature on Mediterranean countries focus on the effect of integration on trade (Peridy, 2005) or migration (Shah, 2004; Péridy et al. 2007). With a few exceptions (Altomonte and Guagliano, 2001, Bagoulla, 2008), little attention is devote to the issue of industrial location in euro-mediterranean area. In addition, despite the importance of the concept of real convergence for both the EU and MENA countries, there is currently only a few empirical studies available applied to these countries. Rey (2005), Guétat and Serratino (2006, 2007), Erlat (2007) and Pesaran (2007) concentrate on an analysis of convergence of MENA countries across themselves. This means that the convergence test applies to the income threshold of these countries and not of the EU.

The present research aims to fill this lack of literature by analysing the relationship between regional integration, firms' location and convergence in the euro-mediterranean area. For that purpose, Part 1 analyses some stylized facts, by i) highlighting the integration process between the EU and MENA countries, ii) shedding light on the industrial structure of MENA countries and its evolution compared with that of the EU,

iii) looking at changes in GDP and other macro indicators in order to get a first insight on convergence.

Part 2 analyses in more details the industrial structure of the Euro-mediterranean area . It first calculates some location indexes (entropy and trade dissimilarity index) as a means of assessing whether MENA countries have experienced more concentration or more diversification in their industrial structure. Second, it develops a theoretical framework aimed at analysing the determinants of industrial location. In this regard, an economic geography model is developed, including vertical likages and differences in technology, following new theoretical development (Ricci (1999), Amiti and Smarzynska Javorcik (2008) and Bagoulla (2006)). Next, an empirical equation is derived from this model in order to identify the main determinants of industrial location in the euro-mediterranean area. The model is estimated with panel data econometrics. The impact of market access, market supply and regional integration on location is particularly investigated.

The final part analyses the convergence process of MENA countries with the special impact of regional integration and firms' location on the convergence process. For that purpose, the calculation of several convergence indicators is first proposed. It includes not only the traditional σ and *β-convergence*, but also the *γ-convergence* developed by Boyle and McCarthy (1999), based on a Kendall index of rank concordance. Similarly, the analysis does not only focus on convergence of various per capita income indicators (PPP, Laspeyres, chain series, per adult equivalent, per worker), but also on convergence of the Human Development Index (HDI). Next, an empirical model of convergence is estimated in order to identify its determinants and the particular effects of regional integration and firms'location.

The main results of this research program show that:

1) **Unlike most EU countries, MENA countries have experienced a concentration process since the 80s. This process has been reinforced over the past decade and mainly concerns low-technology industries.**

2) **Openness, and thus regional integration, has promoted this concentration process, through a better market access**

3) **There is some evidence of convergence of MENA countries per capita income toward EU levels. However, this convergence process mainly concerns Tunisia, Turkey, Egypt and Morocco, whereas Algeria and Jordan are not converging.**

4) **Although the Barcelona process is not alone a significant variable to explain this convergence process, loans granted by the European Investment Bank (EIB) positively contribute to this process.**

5) **The other significant variables which explain convergence are education and R&D (human capital), transport and communication (roads, telephone lines, internet) as well as public investment and openness to a lesser extent.**

6) **However, the concentration process in MENA countries' industrial structure is detrimental to MENA countries' convergence, mainly because this process mainly applies to low-technology products.**

7) The policy implications of the results are analysed at the end of this report as well as in the executive summary.

Part 1: Regional integration, industrial structure and convergence in the euro-mediterranean area: some stylized facts

Introduction:[1]

This part of the report starts by providing an overview of the different trade, and industrial indicators in the European Mediterranean Area (EMA). The aim is to investigate what the data at the abstract level reveal before delving into econometric analysis undertaken in parts two and three. Part one together with parts two and three aim at answering the question of whether the different trade initiatives between the EU and the South Mediterranean Countries (SMCs) have led to some sort of convergence. Hence, to answer this question trade patterns and industrial agglomeration are investigated in a trial to understand how the dynamics and interaction between trade and geographical location of industries have contributed to the convergence process.

Part one is divided mainly into three sections. Section one provides an overview of the process of trade integration between South and North Mediterranean countries starting with the Barcelona process signed in 1995 passing by the different Association Agreements, Neighbourhood Policy and its Action Plans and ending with the Union for the Mediterranean. Moreover, Section one provides a general overview on South-South integration with a special focus on the Greater Arab Free Trade Area (GAFTA) and the Agadir Agreement. The last part of Section one provides descriptive statistics and some indicators on trade patterns and specialization in the South and North Mediterranean countries. Section two provides a number of indicators aiming at comparing the South and North Mediterranean countries regarding their trade, its direction, and its structure, and industrial performance. Hence, comparing the productivity and average wage developments in both sides of the Mediterranean together with their trade performance (e.g. percentage of manufactured exports of total exports) is discussed. Finally, in Section three raises question of the convergence process for GDP, GDP per capita, and trade between South and North Mediterranean countries.

1.1 Regional Integration in Euro-Mediterranean Area (EMA)

1.1.1 The North-South integration process: from Barcelona to the Union for the Mediterranean (UMed)

The phenomenon of regional integration has intensified in the EMA over the last two decades. On the one hand, European Union (EU) has continued its enlargement process including more countries as well as deepening the existing framework of regional integration. On the other hand, the shape governing the regional and trade integration between the South Mediterranean countries (SMCs) and the EU has been in a state of flux moving towards deeper and stronger integration. Moreover, the SMCs have undertaken several initiatives to enhance the process of regional integration among themselves.

[1] This part has been written by Ahmed Farouk Ghoneim and Heba El-Dikn.

Focusing on the EU relations with SMCs we observe that the EU has had many initiatives related to the Arab region which include the Barcelona process and its related Association Agreements, the EU neighbourhood policy and the Union for the Mediterranean (UMed). Many of such initiatives overlap and SMCs have been obliged to adapt to such changes in EU regional trade policy. Such an adaptation does not necessarily mean that they agreed to the changes, but their bargaining power with the EU did not allow them to drift EU policies. Hence, the determining player in all relations has been the EU which has chosen a specific way in its negotiations. The European Commission prefers to deal with countries in regional contexts, however when it comes to negotiations it negotiates on bilateral basis. For example, the Barcelona process identified 12 Mediterranean countries[2] which have been considered for a new policy by the European Commission, but each of the 12 countries has its own specific association agreement with the EU which in some cases were similar (e.g. Tunisia and Morocco Association Agreements), but in other countries it differed completely (e.g. Israel Association Agreement is completely different from that of Egypt). Such policy (i.e. dealing with countries in two contexts, regional and bilateral) has its pros and cons. Its pros include ensuring a certain degree of harmonization among the EU policies adopted towards a certain geographical region which helps to lessen the burden of huge diversification among different countries. Moreover, it provides the countries negotiating or dealing with the EU with precedents on certain issues during negotiations or implementation of a certain trade commitments, which in turn enhances the knowledge and build some sort of understanding among trade negotiators of what and what not can be achieved when dealing with the EU. Its cons include the absence of specificity for each country which in turn can lead to negative consequences in the process of dealing with countries in a regional context as a result of the aggregation process (Ghoneim, 2009 forthcoming).

The Barcelona process of 1995 announced the start of a new type of cooperation replacing the old forms where reciprocity in terms of market access was included, and political, security, cultural, and social dimensions were added to the list of cooperation, beside the traditional economic, trade, and financial cooperation. The Association Agreements between the EU and some of the SMCs were the new legal instruments of the Barcelona process. They included elements of deep integration where they embodied specific provisions on standards, conformity certification, competition rules, etc. In many cases the words "enhancing", "cooperating", "developing" were used where no specific dates were put to reach any form of deep integration, with the exception of setting dates to start negotiations on further liberalization of services and agriculture. There exists some studies that have pointed out that there are a number of factors that are behind the modest role of the Association Agreements in boosting trade between the EU and the SMCs. The factors included long transitional period, high propensity to agricultural protectionism in the EU and, the modest levels of funds provided by the EU to the SMCs (Montanari, 2007).

In 2003, the EU announced the adoption of the European Neighbourhood Policy (ENP) where the Barcelona Process remained one of its elements. In other words, the Barcelona Process was contained in the ENP. The ENP sets up Action Plans allowing the SMCs to define their own priorities where they can closely cooperate and deeply integrate with the EU. The ENP offers the SMCs an opportunity to deepen their relationship with the EU based on à la carte approach. The European Commission emphasized that ENP does not replace the Barcelona

[2] Algeria, Morocco, Tunisia, Egypt, Jordan, Lebanon, Syria, Israel, Palestinian Authority, Turkey, Cyprus, and Malta.

process, but rather it is an umbrella where the Barcelona process will be included under it. To implement both the ENP and the Barcelona process Action Plans were set, hence setting the new devise of eclectic deep integration. Action Plans, as their title imply should have specific targets, dates of implementation, and modes of implementation. The MEDA financial instruments, which are the financial resources devoted for the Association Agreements were replaced by the new European Neighbourhood and Partnership Instrument (ENPI) of finance. Elements of deep integration were intended to be intensified in the context of the ENP and its Action Plans. However, as Table 1 shows the elements that were mentioned in the Association Agreements were mentioned in the Action Plans with little deepening dimension (in terms of identifying targets to be met or specific allocated funding).

Table 1. Aspects of Deep Integration in Association Agreements and Action Plans* between SMCs and the EU

	Association Agreement	Action Plan
Tariffs / quotas	X	
Standards: (SPS, TBT)	X	X
Investment	X	XX
IPR	X	X
Trade facilitation (mainly transport)	X	X
Trade defence	X	X
Services	X	X
Network industries (mainly energy)	X	XX
Govt procurement	X	X
Comp. policy	X	X
Dispute settlement	X	X

* If one X is included in the Action Plan then it replicates to a large extent what has been mentioned under the AA. If XX is included, then this implies that there has been some kind of extra deepening efforts.

President Sarkozy's initiative in 2007 of creating a union for the Mediterranean (UMed) created a lot of debate and skepticism among both EU members as well as SMCs (Frtitz-Vannahme, 2008). The basic idea was to create some kind of special relations between a set of EU member states which are concerned about the SMCs and SMCs themselves (Aliboni et. al, 2008). President Sarkozy saw the initiative as a way of promoting peace between Israel and its Arab neighbours, as well as pushing forward the Barcelona process in a number of fields including energy and migration. However, Sarkozy's initiative did not differ much from what has been included under the Barcelona process as it included a large variety of issues (political, cultural, economic), and too many parties were involved which was expected to cause divergence of opinions and delays in taking decisions and implementation. After a series of political meetings, the EU decided to adopt Sarkozy's initiative under a new setup called Barcelona Process: Union for the Mediterranean" (UMed), which was officially launched in Paris the on the 13th of July 2008. In the European Commission communication (2008) the main features of UMed were set. Again the emphasis was to enhance the Barcelona process. The communication emphasized that the challenge of the new initiative is to enhance multilateral relations, increase co-ownership of the process and make it more visible to citizens. It builds on the Barcelona process and should increase the potential for regional integration and cohesion. Finally it complements the existing bilateral Association agreements, and the Neighborhood Policy.

It is too early to evaluate what are the main advantages and disadvantages of UMed from a SMCs' perspective. But one of the main advantages at the outset that seem to be on the

positive track is the new institutional setup designed to govern this initiative. The new institutional setup includes a co-presidency, a joint permanent committee, and a secretariat. However, the main pitfall of the ENP of diluting Barcelona process due to the inclusion of many stakeholders was not overcome. The UMed diluted Barcelona process in another way. The large number of partners involved in it which reached 44 countries due to the inclusion of all EU member states in addition to SMCs and adding to them Libya, Mauritania, Albania, Croatia, Bosnia and Herzegovina, Montenegro and Monaco implied that there is a new layer of dilution for the specific nature of Barcelona (Aliboni, et. al, 2008). UMed is just another layer of changes in the EU policy which is just adding vagueness and complexity between EU on the one hand and the SMCs on the other hand.

Whether EU initiatives towards SMCs will bring much to SMCs is highly debatable. The reason is that it does not add much to the Barcelona process and has no strong enforcing mechanism that can push forward the deep integration aspects. As stated by the communication of the European Commission (2004) "In the south, the ENP will also encourage the participants to reap the full benefits of the Euro-Mediterranean Partnership (the Barcelona process), to promote infrastructure interconnections and networks, in particular energy, and to develop new forms of cooperation with their neighbours. The ENP will contribute to develop further regional integration, building on the achievements of the Euro-Mediterranean partnership, notably in the area of trade. It will reinforce efforts to meet the objectives of the European security strategy in the Mediterranean and the Middle East". All such issues have been previously mentioned in the Barcelona process, besides they are vague targets that include anything and everything. However, it is unfair to put the blame on the mechanism of integration whether it is the Barcelona process and its Association Agreements, ENP or UMed without identifying the benchmark for evaluation. Hence, the focus is on the impact of the EU initiatives so far on the income convergence and on allocation of industries.

1.1.2 South-South integration: toward a pan Arab free trade area (GAFTA and Agadir)

The Arab SMCs (with the exception of Turkey) have always been characterized by low level of regional integration (see for example, Fischer 1993; Galal and Hoekman, 1997; Kheir-El-Din and Ghoneim, 2005 where such references are originally referring to the case of the Arab countries which include a large number of SMCs). The percentage of intra-regional trade ranged between 7% as a conservative estimate and 11% as the highest estimate where the methodology used in the measurement and the countries involved affected the result. Some analysts viewed that such percentage is low when compared with the potential that can be achieved given the characteristics of such countries (see for example Havrylyshyn, 1997) whereas other viewed that such low percentage is related to the degree of development and other characteristics of such countries (see for example, Al- Atrash and Youssef, 2000). However both lines of arguments reached the same conclusion, which is the level of regional integration is low if compared to other parts of the world as EU, NAFTA or ASEAN. A large number of Arab countries are SMCs. In this sub-section we review two main initiatives representing South-South integration. The first is GAFTA and the second is Agadir.

Arab regional integration dates back to the 1950s starting with the *Treaty for Joint Defense and Economic Cooperation.* The first initiative toward *trade* integration among the Arab countries was *The Agreement on Trade Facilitation and Regulating Transit Trade* which was signed in 1953 by a number of Arab countries. It included at the begging a limited set of countries which expanded gradually afterwards (Sabry, 2001). Ten years later the failure of Arab countries in achieving regional integration led them to enter into a new agreement, namely *The Arab Common Market Agreement* which was signed in 1964. The decree that

announced the establishment of the Common Arab Market did not mean the technical word of a common market, as it left it to be achieved in the future whereas it dealt only with liberalization of intraregional trade in the form of free trade area. However, the Arab Common Market did not succeed. As a reaction to the failure of the Arab Common Market in 1971, the idea of establishing a common external tariff was abandoned. The Arabs agreed to enter a new agreement in 1981, namely the *Agreement on Facilitation and Development of Trade*. This agreement entered into force in 1983 and aimed at reaching a free trade area and establishing a customs union (Dervis, et. al, 1998).

By the mid 1980s, Arab countries started to adopt sub-regional agreements to overcome the frequent failures of regional trials. The most important sub regional agreements were the Gulf Cooperation Council (GCC) which was signed in 1981 and the Arab Maghreb Union (AMU) which was signed in 1989. By the early 1990s and as a result of the proliferation of the RTAs, the project of the Arab trade integration was revived in the Arab League in the mid 1990s by the initiation of the GAFTA. However, the implementation mechanism differed this time, where room for flexibility was less, a negative list approach was adopted, and a strict time schedule was set. This GAFTA which in fact represents the executive deceleration for establishment of *Agreement on Facilitation and Development of Trade* (Sabry, 2001).

Initially, 14[3] out of the 22 Arab States joined the GAFTA and submitted their schedules of commitments to the Arab League Secretariat. Four[4] more member states joined later. Currently there are 18 countries which apply GAFTA[5].

If we compare GAFTA with its predecessors, we find that GAFTA represents a significant improvement. In fact it can be safely argued that it is the first RTA among Arab countries that has fixed dates with clear provisions. It adopts a negative list approach, versus its predecessors which depended mainly on a positive list approach. It allowed for exemptions to be in place for a specific time, and it set a specific deadline by which such exemptions should be eliminated, which took place regarding the agricultural goods. It contained a specific schedule for tariff reductions starting from a certain identified base year, which took place, and was even accelerated. Its provisions were clear and flexible allowing its members to undertake their liberalization efforts flexibly but in a disciplined way. By all means, GAFTA represents a success when compared to its predecessors. It is a perfect example of "shallow integration". However, it suffered from a number of problems including the absence of a full fledged dispute settlement mechanism, inability to reach a detailed rules of origin scheme, weak system of harmonized standards, and certainly absence of a supranational power or a strong leading Arab country that can force the members of GAFTA to agree on disputed matters. In other words, mainly all aspects of deep integration, are absent from GAFTA, which is a necessary condition for the success of any integration scheme in our globalized

[3] United Arab Emirates, Egypt, Kuwait , Saudi Arabia, Syria, Tunisia , Morocco, Sudan, Oman, Qatar, Lebanon , Iraq, Bahrain, and Libya.

[4] Jordan, Palestine, Yemen, and Algeria.

[5] United Arab Emirates, Egypt, Saudi Arabia, Palestine, Kuwait , Syria, Tunisia , Morocco, Jordan, Oman, Qatar, Lebanon , Iraq, Bahrain, Libya, Sudan, and Yemen. The countries that still did not join GAFTA include Algeria, Djibouti, Comoros, Somalia, and Mauritania.

world. Such issues of lack of detailed rules of origin and weak dispute settlement mechanism were lately overcome where since the beginning of 2008 GAFTA members agreed on around 60% of the detailed rules of origin, and the Arab League was almost finished in 2009 by designing a full-fledged dispute settlement mechanism (Peridy and Ghoneim, 2008).

If we compare GAFTA to the contemporary existing RTAs we find that GAFTA lags behind in many respects whether if it is compared with South-South integration schemes or South-North integration schemes. Most of the RTAs prevailing have included elements of "deep integration" (see Table 2.). As seen from the table and if we focus on the South-South integration schemes, we find that GAFTA has the highest number of "No" when compared to other agreements. There is no system of protection of intellectual property rights, no harmonization of competition rules, regulations and policies, no provision of labor movement, and no clear dispute settlement mechanism. Moreover, in the areas where "Yes" is available, the level of integration is minimal. For example in the area of customs cooperation and standards, the GAFTA calls for cooperation in such fields, without identifying how and when. A survey by the Arab League (2004) identified that most of trade frictions among GAFTA members arise from issues related to standards.

Table 2.: RTAs cover many topics besides merchandise trade

	Standards	Transport	Customs Cooperation	Services	Intellectual Property	Investment	Dispute Settlement	Labor	Competition
US									
US-Jordan	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
US-Chile	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
US-Singapore	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
US-Australia	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
US-CAFTA	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
US-Morocco	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
NAFTA	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EU									
EU-South Africa	No	No	No	No	Yes	No	Yes	No	Yes
EU-Mexico	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
EU-Chile	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
EU-Med	No	No	No	No	Yes	No	Yes	No	Yes
South-South									
MERCOSUR	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes
Andean	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
CARICOM	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
GAFTA	***Yes***	***Yes***	***Yes***	***Yes***	***No***	***Yes***	***No***	***No***	***No***
SADC		Yes	Yes		Yes	No	Yes		
COMESA	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Other									
Japan-Singapore	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Canada-Chile	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Chile0Mexico	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: World Bank (2005) Global Economic Prospects: Trade, Regionalism and Development

Agadir Agreement was signed in February 2004 between four countries: Egypt, Morocco, Tunisia, and Jordan and was expected to enter into force on the 1st of January 2005 whereas in reality it only entered into force in 2007. The Agadir Agreement was an EU initiative aiming at boosting intra-regional trade among the four aforementioned countries to enhance South-South integration. The initiative was brought up in 2001 after the declaration of the 4th Euro-Med Conference of Foreign Ministers which aimed at accelerating regional integration among the four countries. *"After reaffirming the objective of creating a free trade area by 2010, they stressed the need for the partner countries, with the support of the European Union, to open*

up further to one another economically in order to foster their successful integration into the world economy. In that regard the Ministers welcomed the desire already expressed by four countries- Morocco, Tunisia, Egypt and Jordan- to establish closer links by creating a free trade area amongst themselves, and emphasized the need for suitable back-up from the European Union to that end" (European Commission, 2003).

The Agreement requires two main conditions: the establishment of a free trade among the four countries and their adoption of a standardized similar system of rules of origin. The agreement allows for cumulation of rules of origin among Agadir members which is viewed as a way of relaxing the restrictiveness of the rules of origin of the EU which could impede the market access of the SMCs exports involved in Agadir to the EU. It is difficult to draw any conclusions on the success of Agadir as limited time has elapsed to assess its impact on enhancing South-South trade among the four countries concerned. However, it should be noticed that Agadir remained highly shallow in terms of coverage of issues (e.g. no services liberalization beyond GATS, vague provisions regarding standards). Moreover, the high geographical concentration of Agadir members with EU and the nature of their exports structures which are highly similar in inter-industry type of trade put limited hopes on the ability of Agadir to enhance South-South trade.

To sum up there have been several EU initiatives towards Arab SMCs, however they have not been given enough time to be tested including the 1995 Barcelona process where its real implementation in the form of Association Agreements is still taking place in a large number of SMCs. However, from the above review it is not clear whether there is a real economic logic behind such overlapping initiatives. Moreover, the extent of deepness included in such initiatives remained modest to a large extent.

The SMCs have also initiated a number of regional initiatives among themselves, namely GAFTA and Agadir, however they remained modest to a large extent in terms of deepness and coverage.

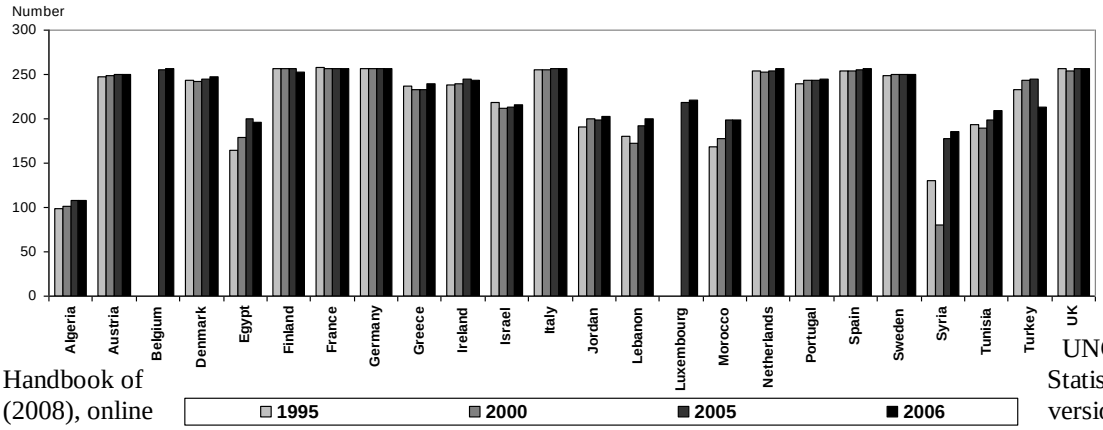
1.1.3. Specialization and trade in the EMA

In this section we use simple graphs and tables to compare different partners in the EMA regarding their trade specialization and diversification. We use a number of indicators including number of exported products, concentration indexes, diversification indexes and share of trade directed to the EU from SMCs.

Number of Exported Products

Figure 1 shows that SMCs have experienced better performance in terms of increasing the number of exported products when compared to EU countries. However, the gap between the absolute number of export products of the EU and SMCs remained wide, albeit being narrowed due to the relatively better performance of SMCs. Countries of EU experienced almost no change in the number of products exported with the exception of Greece which experienced a limited improvement. As for SMCs countries like Egypt, Lebanon, Morocco, Syria, and Tunisia experienced significant improvements over the period 1995-2006. Countries as Algeria and Israel experienced almost no improvement whereas Turkey experienced negative developments.

Figure 1: Number of Exported Products

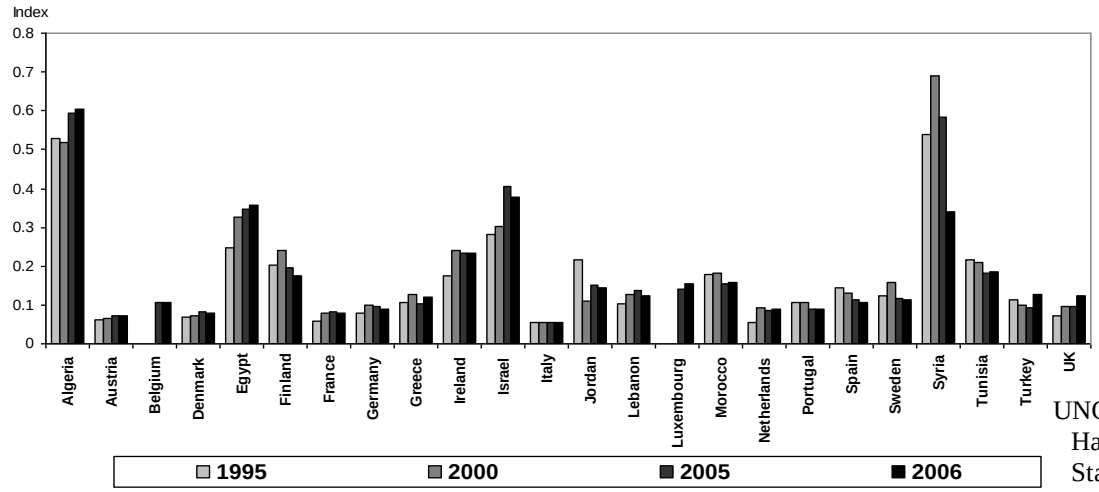


Source: UNCTAD, Handbook of Statistics (2008), online version.

Export Concentration Index

The general low level of exported products is reflected in the high exports concentration index for SMCs when compared to EU countries as shown in Figure 2. Syria and Algeria have the highest export concentration indexes followed by Egypt. Tunisia is in a comparable position to Finland and Ireland whereas Morocco, Jordan, Lebanon, and Turkey have similar export concentration ratios as the rest of EU countries. Over time the position worsened in a number of SMCs where their concentration ratios increased including Algeria, Egypt, and Israel.

Figure 2: Countries' Export Concentration Index (1995-2006)

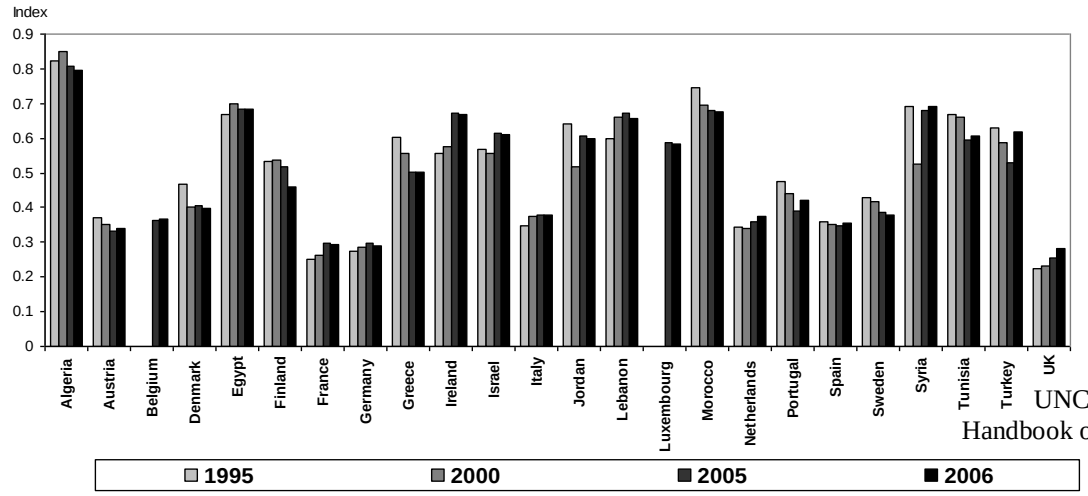


Source: UNCTAD, Handbook of Statistics (2008), online version.

Export Diversification Index

The export diversification index as shown Figure 3 reflects to a large extent the lack of export diversification in SMCs compared to EU countries. With the exception of Luxembourg and Greece there is a wide gap between the level of diversification prevailing in SMCs compared to EU countries. Moreover, there is no significant change in the diversification index between 1995 and 2006 for both SMCs and EU countries implying that their exports structures have not changed much between 1995 and 2006.

Figure 3: Countries' Export Diversification Index (1995-2006)



Source: UNCTAD, Handbook of Statistics (2008), online version.

As for the geographical orientation of exports Table 3. shows that both EU and SMCs have high geographical concentration of exports to the EU, with the exception of Jordan and to a lesser extent Israel where both countries have higher geographical concentration with the US. Regarding SMCs there is no evidence that the EU initiatives with SMCs have resulted in more concentrated geographical concentration. Some countries experienced almost no significant change in the share of exports going to EU as Egypt, Jordan, Lebanon, Tunisia, Syria, and Turkey. Some other countries experienced significant drop in the share of exports going to EU as Algeria, Israel and Morocco.

Table 3: EU Share in Total Countries' Exports (%)

	Average				
Country	**60s**	**70s**	**80s**	**90s**	**2000-2006**
Algeria	90.0	61.7	67.5	68.4	58.8
Austria	69.7	67.0	68.7	75.8	73.9
Belgium	..	..	..	..	76.7
Denmark	68.5	67.1	64.4	68.7	69.7
Egypt	41.4	42.7	51.7	44.1	40.6
Finland	66.9	63.4	56.0	63.7	59.3
France	56.7	62.2	59.4	64.0	64.8
Germany	..	..	..	63.3	64.2
Greece	64.1	65.7	64.8	69.4	61.4
Ireland	82.2	80.0	75.7	71.3	62.8
Israel	52.6	44.2	36.1	33.9	28.4
Italy	56.0	59.1	57.3	62.2	61.2
Jordan	7.2	5.4	10.4	6.6	4.3
Lebanon	21.8	19.2	16.2	25.4	17.3
Luxembourg	..	..	..	..	87.9
Morocco	80.6	76.5	66.2	61.1	70.5
Netherlands	74.2	79.0	78.6	77.7	80.3
Portugal	48.4	62.3	71.9	80.2	79.4
Spain	58.7	54.5	58.9	72.9	72.5
Sweden	64.4	62.7	56.2	58.9	58.2
Syria	37.0	53.4	64.7	52.8	49.2
Tunisia	75.3	71.9	69.0	79.2	79.5

Turkey	62.6	58.3	46.4	55.8	56.8
United Kingdom	38.3	45.4	53.6	56.1	56.9

Source: Author's calculations based on UNCTAD database, Handbook of Statistics (2008), online version.

The general trends identified in Table 3 are confirmed below in Table 4 which shows that SMCs rate of growth of exports to the world was in many cases higher than their rate of growth of exports to the EU. Focusing mainly on the 1990s and the period of 2000-2006 the data do not reveal that the rate of growth of SMCs exports to the EU were higher than that directed to the world, with the exception of Egypt in the period 2000-2006.

Table 4: Average Countries' Annual Export Growth Rates (%)

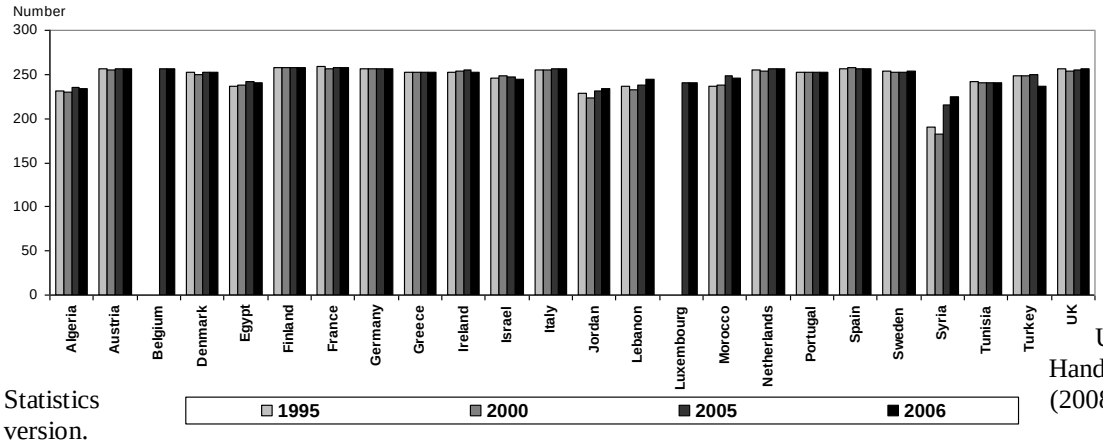
	60s		70s		80s		90s		2000-2006	
Country	**World**	**EU**	**World**	**EU**	**World**	**EU**	**World**	**EU**	**World**	**EU**
Algeria	9.2	6.6	32.6	23.3	2.0	7.5	5.2	4.3	25.6	21.4
Austria	9.0	8.7	20.8	20.9	8.3	9.2	8.0	8.5	11.3	10.4
Belgium	..	..	..	..	..	..	..	..	14.6	15.2
Denmark	8.1	7.6	17.6	18.2	7.0	7.2	6.4	6.8	9.6	9.9
Egypt	5.9	3.0	10.2	18.4	6.8	2.4	4.2	2.6	34.2	46.4
Finland	9.2	10.3	19.6	18.9	8.2	8.4	7.0	7.6	9.2	7.5
France	11.3	15.3	21.0	20.9	6.5	7.3	6.4	6.9	6.5	6.7
Germany	..	..	..	..	..	..	3.5	3.8	11.2	10.9
Greece	10.9	11.0	22.7	21.7	8.5	11.3	3.7	2.8	10.9	11.7
Ireland	9.6	9.4	23.5	23.9	11.7	11.4	13.4	11.7	6.2	5.7
Israel	15.3	13.9	20.4	19.6	9.7	7.0	8.9	8.6	9.3	7.0
Italy	15.2	17.7	20.2	20.4	7.2	8.3	5.7	6.1	8.8	8.2
Jordan	17.1	5.9	32.2	115.0	12.2	27.9	2.1	6.3	24.5	20.0
Lebanon	14.3	10.8	41.0	68.5	-4.7	12.2	6.2	7.9	22.1	8.3
Luxembourg	..	..	..	..	..	..	..	..	22.5	23.2
Morocco	4.2	4.5	18.1	17.5	6.1	5.0	12.0	13.2	7.6	6.0
Netherlands	10.9	12.4	20.9	21.2	5.7	5.8	8.1	9.3	11.5	11.0
Portugal	11.2	13.7	16.9	20.1	14.5	16.2	7.7	8.6	8.8	7.0
Spain	15.4	15.2	25.8	26.8	9.5	12.6	9.5	10.3	11.2	10.6
Sweden	10.1	10.5	17.6	17.4	6.1	6.2	6.8	6.9	8.8	8.3
Syria	7.0	14.5	27.3	40.6	11.0	5.0	8.5	9.5	45.5	39.1
Tunisia	2.4	1.0	30.7	33.0	6.5	6.0	10.2	11.2	7.9	6.5
Turkey	4.5	4.3	17.0	16.9	19.5	16.8	8.6	10.3	18.5	18.1
United Kingdom	6.2	9.5	17.6	20.6	6.5	7.3	6.0	7.4	6.8	6.3

Source: Author's calculations based on UNCTAD database, Handbook of Statistics (2008), online version.

The Imports Side:

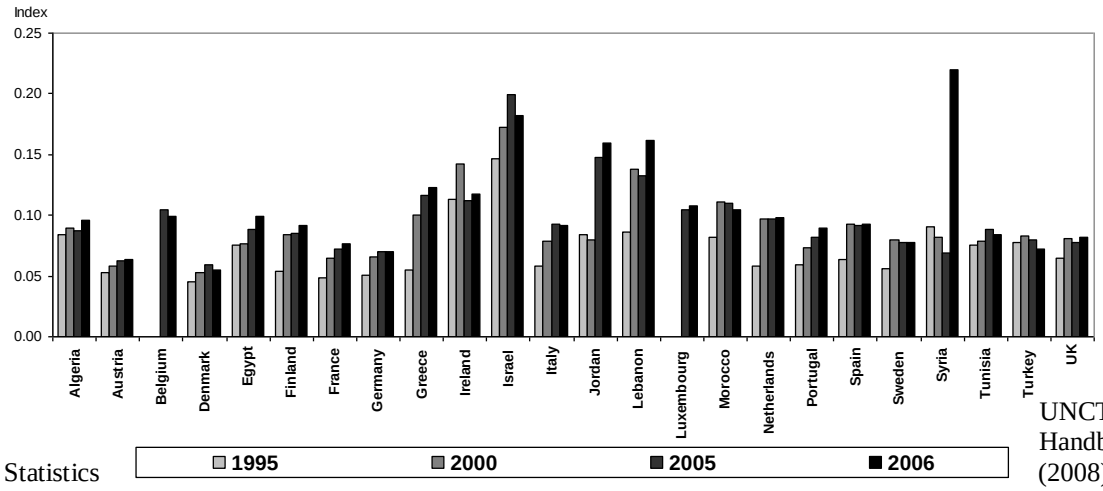
The same indicators that have been discussed in the case of exports were repeated for imports. Though there are differences between EU and SMCs in terms of concentration and diversification where EU countries enjoy less concentration and more diversification, however the differences are not significant as it is the case with the exports side.

Figure 4: Number of Imported Products



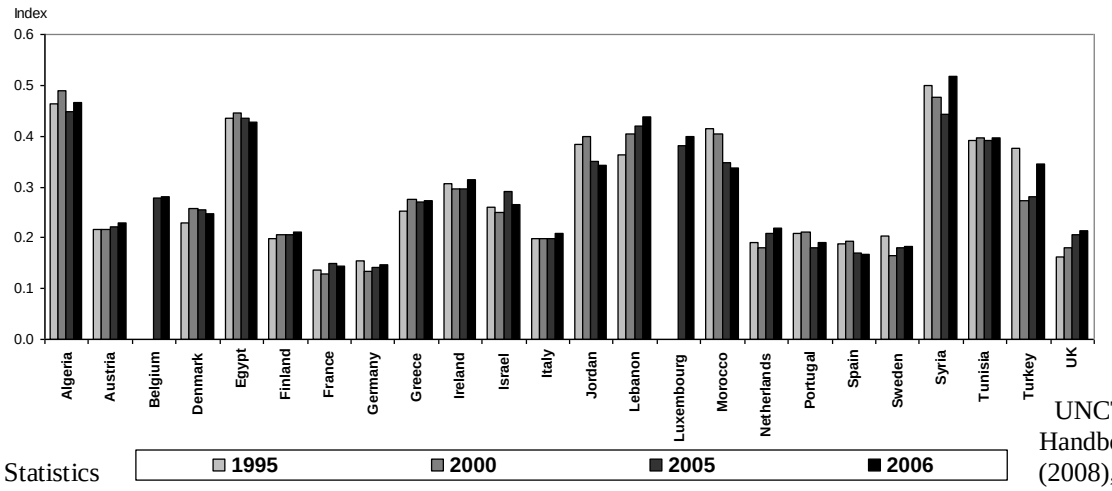
Source: UNCTAD, Handbook of Statistics (2008), online version.

Figure 5: Countries' Import Concentration Index (1995-2006)



Source: UNCTAD, Handbook of Statistics (2008), online version.

Figure 6: Countries' Import Diversification Index (1995-2006)



Source: UNCTAD, Handbook of Statistics (2008), online version

The geographical concentration of imports in Table 5 reveals that SMCs imports share from the EU has declined in all countries with the exception of Lebanon, Tunisia, and Turkey.

Table 5: EU Share in Total Countries' Imports (%)

Country	Average				
	60s	70s	80s	90s	2000-2006
Algeria	81.4	71.9	68.5	62.7	60.6
Austria	76.2	74.3	72.3	76.8	80.9
Belgium	..	..	..	..	73.0
Denmark	73.3	70.1	69.8	71.2	73.3
Egypt	45.1	49.5	52.2	43.2	35.4
Finland	66.0	60.7	55.5	61.5	64.1
France	52.5	59.7	59.7	62.1	68.4
Germany	..	..	..	60.5	61.4
Greece	63.9	56.1	59.5	68.5	58.8
Ireland	72.2	75.8	71.9	60.8	62.7
Israel	49.9	38.7	40.8	51.6	41.2
Italy	49.2	53.5	55.2	63.4	61.0
Jordan	44.5	42.0	39.4	35.3	27.5
Lebanon	50.5	55.4	61.0	52.7	48.5
Luxembourg	..	..	..	..	75.4
Morocco	68.4	64.4	55.0	54.0	55.6
Netherlands	66.5	64.9	63.9	61.9	52.3
Portugal	57.7	54.7	56.3	74.6	76.1
Spain	49.0	42.8	45.1	66.1	66.1
Sweden	65.7	65.0	62.3	64.5	70.7
Syria	52.2	51.1	47.3	43.6	29.7
Tunisia	69.7	72.0	72.1	73.1	71.7
Turkey	56.5	55.2	41.3	51.2	48.3
United Kingdom	34.7	45.8	55.5	52.7	51.7

Source: Author's calculations based on UNCTAD database, Handbook of Statistics (2008), online version.

Moreover, Table 6 shows that the rates of growth of imports of SMCs from EU did not experience significant changes in the 1990s and between 2000 and 2006 which represent the time periods of implementing EU different initiatives towards the SMCs.

Table 6: Average Countries' Annual Import Growth Rates (%)

	60s		70s		80s		90s		2000-2006	
Country	**World**	**EU**	**World**	**EU**	**World**	**EU**	**World**	**EU**	**World**	**EU**
Algeria	8.9	7.2	26.5	26.1	1.9	-0.2	0.6	0.0	16.1	15.5
Austria	8.1	8.5	22.1	21.6	7.5	7.9	6.8	7.9	10.2	9.8
Belgium	..	..	..	..	..	..	..	..	15.7	15.2
Denmark	9.3	8.7	17.8	18.0	4.0	3.6	6.1	7.3	10.0	9.3
Egypt	1.4	2.1	28.0	26.6	12.7	11.0	8.6	6.0	18.4	17.3
Finland	9.9	10.4	20.4	18.0	8.9	10.4	3.8	4.8	11.9	12.0
France	14.3	18.7	20.5	19.5	6.8	7.8	5.3	6.7	8.4	8.6
Germany	..	..	..	..	..	..	3.8	4.2	10.4	10.9
Greece	11.4	11.0	20.2	18.1	6.0	8.9	6.4	6.7	13.2	10.8
Ireland	9.3	10.0	22.1	22.5	6.3	5.2	10.8	9.4	6.4	8.3
Israel	16.2	15.9	19.4	16.4	5.7	9.2	8.4	8.1	6.8	3.3
Italy	14.9	17.0	21.2	20.8	7.6	9.9	4.4	5.1	10.8	8.8
Jordan	6.0	5.1	27.3	30.8	2.0	-1.4	6.3	5.1	18.5	13.0

Lebanon	7.0	9.4	26.5	27.8	-4.7	-3.1	11.8	9.7	8.9	6.1
Luxembourg	..	..	..	..	..	..	..	..	19.4	15.6
Morocco	5.5	5.4	22.5	21.3	4.6	4.3	9.7	11.1	11.8	10.4
Netherlands	11.0	12.7	20.5	19.3	4.8	5.8	7.9	6.9	10.8	8.9
Portugal	10.7	11.3	19.5	17.7	13.0	17.7	8.6	9.9	8.0	6.7
Spain	20.0	23.9	21.1	18.7	11.9	17.3	7.3	8.9	14.1	12.2
Sweden	9.7	9.9	18.3	17.5	5.1	5.0	4.3	5.2	11.2	11.7
Syria	8.2	8.2	27.4	29.8	-3.0	-3.4	7.6	3.6	39.6	21.7
Tunisia	6.3	3.2	28.0	29.2	6.1	5.1	9.1	9.7	7.8	7.8
Turkey	6.4	6.4	23.4	20.9	13.2	10.7	12.1	14.8	21.3	17.4
United Kingdom	6.3	8.6	18.2	22.6	7.7	8.5	5.1	4.9	8.1	7.1

Source: Author's calculations based on UNCTAD database, Handbook of Statistics (2008), online version.

The illustration of the several exports and imports indicators reveals that there has not been much change in the exports and imports structure of the EU and SMCs between 1995 and 2006. There are major differences between the two sets of countries in terms of exports indexes, which is not the case in terms of imports. At the outset, the trends revealed did not identify any significant change in trade indicators of SMCs as a result of their relationship with the EU implying that EU-SMCs trade relations were not affected in a significant manner by the different initiatives so far where there was no structural change identified in terms of diversification of trade and geographical orientation.

1.2: Firm's location and industrial structure in the EMA

SMCs do not differ much when compared to EU regarding the percentage of manufactured exports in total merchandise exports. However what is evident from Table 7 is that there has been a process of catching up in SMCs where the percentage of manufactured exports of total merchandise exports has increased significantly in all SMCs with the exception of Algeria and Syria whose main exports is oil. In many cases SMCs surpassed EU countries in the share of manufactured exports in total merchandise exports as the case of Jordan, Morocco, Turkey, and Tunisia which surpassed Denmark and Greece. However, the type of manufactured exports is not revealed in this table which is rather revealed in Table 8.

Table 7: Manufactured exports (% of merchandise exports)

	Average				
Country	**60s**	**70s**	**80s**	**90s**	**2000-2006**
Algeria	6.9	2.8	1.6	3.2	2.2
Austria	76.0	82.6	85.3	88.1	80.6
Belgium	..	..	..	82.3	80.0
Denmark	44.0	55.0	57.6	61.0	65.4
Egypt	23.6	27.1	19.2	37.4	30.4
Finland	59.9	72.5	76.6	83.3	84.0
France	71.1	74.0	74.3	79.3	82.0
Germany	87.1	87.6	86.1	86.6	84.8
Greece	15.1	41.6	51.0	50.8	54.5
Ireland	27.5	43.9	63.1	75.1	86.3
Israel	66.7	75.4	83.2	90.3	90.6
Italy	78.2	82.9	85.7	88.6	87.0
Jordan	11.3	25.8	42.7	50.6	68.5
Lebanon	50.6	67.1	..	68.8	69.9

Luxembourg	..	..	..	86.2	84.4
Morocco	7.2	16.0	39.4	55.4	66.6
Netherlands	61.5	54.7	53.1	63.5	69.2
Portugal	60.3	68.3	75.3	83.9	82.4
Spain	39.2	66.1	71.1	76.8	77.2
Sweden	66.4	76.0	79.9	82.7	80.5
Syria	..	8.6	19.8	14.0	12.2
Tunisia	15.0	24.5	49.4	76.1	78.8
Turkey	2.7	19.5	52.3	73.0	76.9
UK	80.6	79.5	70.1	80.7	80.3

Source: Authors' calculations based on World Bank database, WDI-CD (2008).

Table 8 shows that there is a vivid gap between SMCs and EU in terms of the high technology exports as percentage of merchandise exports with the exception of Israel and to a lesser extent Morocco which have similar percentages to those of the EU. This shows that the percentage of manufactured exports of total exports as an indicator does not reveal the gap existing between the type of exports that could lead to higher growth rates and have positive spill-overs on the whole economy as high-technology exports.

Table 8: High-technology exports (% of manufactured exports)

	Average				
Country	**60s**	**70s**	**80s**	**90s**	**2000-2006**
Algeria	..	..	0.0	1.1	1.7
Austria	..	..	7.4	9.5	14.6
Belgium	..	..	..	8.8	8.7
Denmark	..	..	13.7	16.1	20.5
Egypt	..	..	0.0	0.2	0.6
Finland	..	..	6.2	14.4	24.0
France	..	..	15.5	19.1	21.0
Germany	..	..	11.1	13.0	17.1
Greece	..	..	2.2	4.8	11.3
Ireland	..	..	42.9	42.6	39.0
Israel	..	..	10.1	14.7	19.2
Italy	..	..	7.0	8.0	8.3
Jordan	..	..	0.1	3.5	3.6
Lebanon	..	..	..	3.0	2.4
Luxembourg	..	..	..	14.6	13.7
Morocco	..	..	0.0	2.8	10.4
Netherlands	..	..	15.1	23.8	30.6
Portugal	..	..	4.7	4.2	8.2
Spain	..	..	6.6	7.3	7.1
Sweden	..	..	14.1	16.0	17.6
Syria	..	..	0.0	0.0	0.9
Tunisia	..	..	0.0	2.0	4.0
Turkey	..	..	..	..	..
UK	..	..	24.9	26.4	28.7

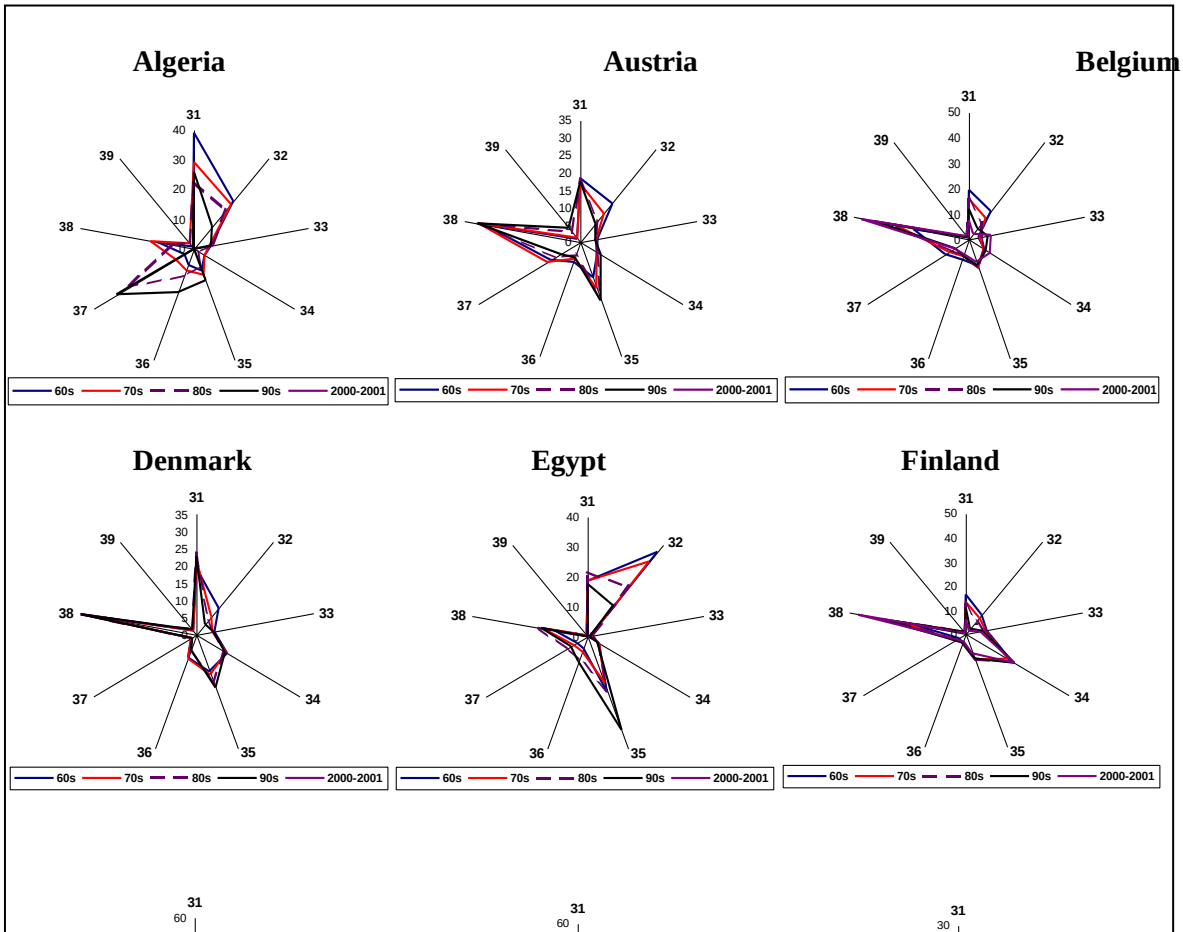
Source: Authors' calculations based on World Bank database, WDI-CD (2008).

Such differences in the structures of exports of SMCs and EU are confirmed by the distribution of the value added structures among different manufacturing sectors in SMCs and EU. What is evident in Figure 7 is that the specialization of SMCs is completely different from the specialization of EU countries. The value added of SMCs is concentrated in ISIC 31

(food products, beverages, and tobacco) and 32 (textiles, garments, and leather) whereas the value added of EU is concentrated in ISIC 37 (basic metal products) and 38 (metal products, machinery, and equipment). ISIC 35 (chemical products, petroleum, coal, rubber, and plastics) is a sector commonly shared by both SMCs and EU. Moreover what is evident from Figure 7 is that there is no significant shift in the specialization of SMCs and EU over time. Most of the EU countries remained specialized in the same sets of products since the 1960, which is also the case of SMCs. However, SMCs have experienced more diversification in terms of value added structure, with a gradual shift towards more sophisticated goods. Israel value added structure is similar to that of the EU countries, whereas Portugal and Greece value added structures are highly similar to that of the SMCs.

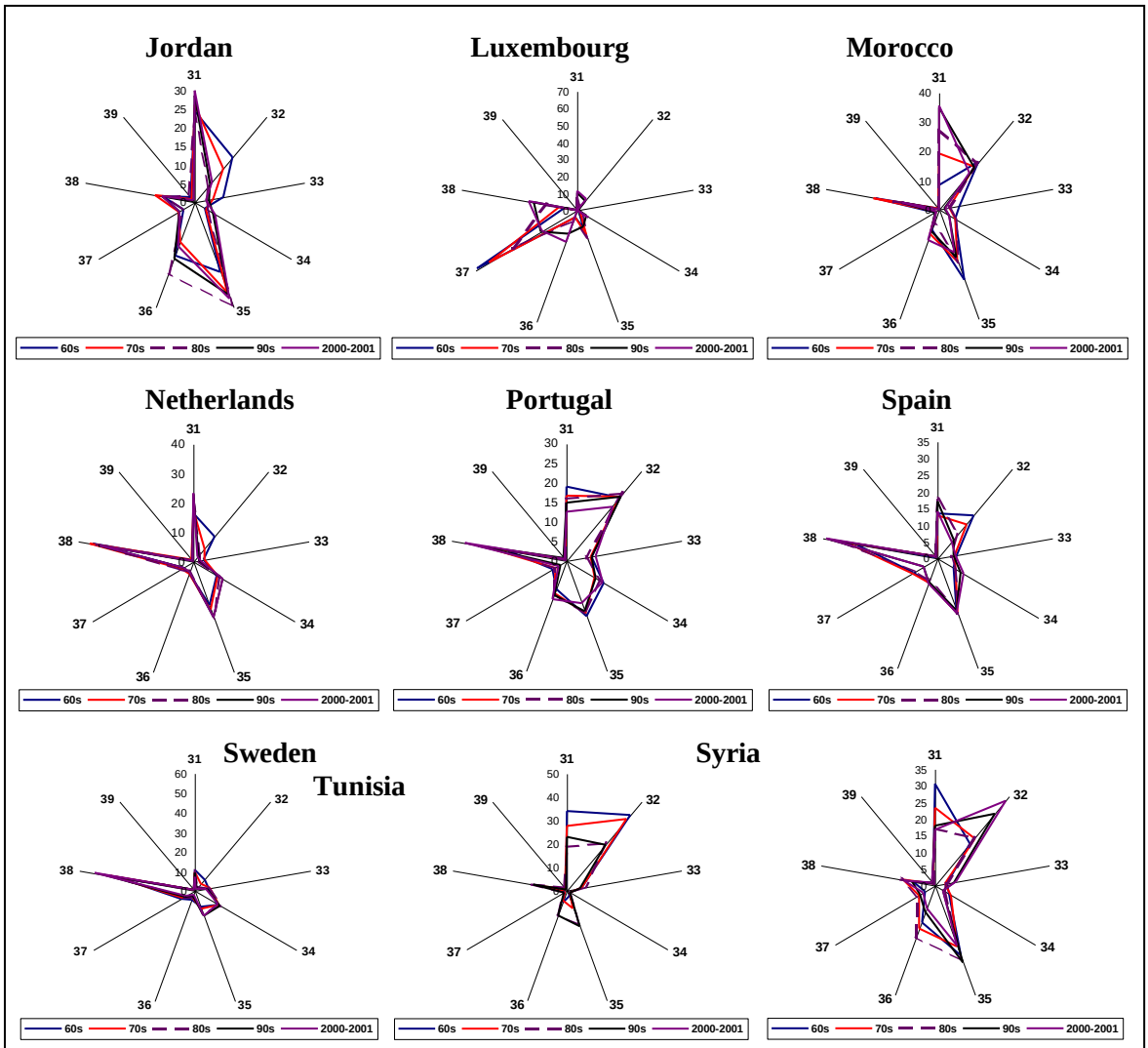
Basically, the fact that SMCs are specialized in low value added goods and the EU on high value added can have some consequences on convergence. Indeed, according to the new international trade theory and economic geography, specialization and concentration in low (high) value added products can be growth-reducing (enhancing). This will be tested empirically in Part 3.

Figure 7: Value Added Structure (%)

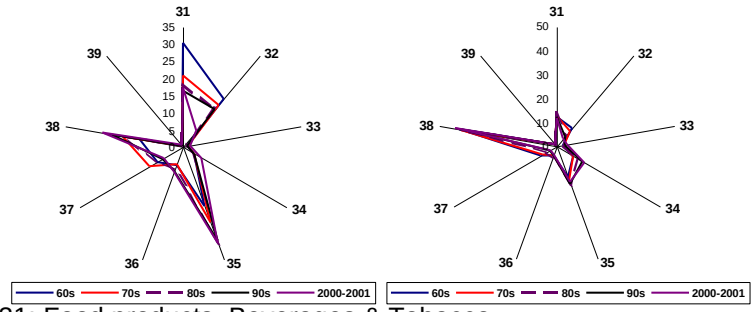


France **Germany** **Greece**

Ireland **Israel** **Italy**



Turkey **UK**



Source: UNIDO, INDASTA3 Database, 2004.

31: Food products, Beverages & Tobacco
32: Textile, garments & leather
33: Wood & furniture
34: Paper & products, printing & publication
35: Chemical & products, petroleum, coal, rubber & plastics
36: Mining products, non-metal products, except petroleum & coal
37: Basic metal products
38: Metal products, machinery & equipment
39: Other manufacture

Table 9 confirms that manufacturing as percentage of GDP is highly comparable in both EU and SMCs, however the rate of growth of manufacturing is higher in SMCs compared to EU.

Table 9: Manufacturing Growth Rate and Share in GDP (%)

	Share					Growth				
Country	**60s**	**70s**	**80s**	**90s**	**2000-06**	**60s**	**70s**	**80s**	**90s**	**2000-06**
Algeria	14.3	13.0	12.9	10.9	7.1	9.9	9.8	4.7	-1.2	2.2
Austria	..	24.4	22.4	19.8	19.8	..	3.9	2.3	2.8	2.4
Belgium	..	..	..	19.9	18.0	..	..	..	2.8	1.0
Denmark	..	19.0	18.3	16.9	15.3	..	..	..	2.2	0.5
Egypt	..	15.7	14.4	17.5	18.3	..	..	7.2	6.2	4.4
Finland	..	26.1	25.3	23.5	24.6	..	3.8	3.8	4.2	5.7
France	..	..	..	16.1	14.2	..	..	..	..	1.6
Germany	..	..	..	23.6	22.7	..	..	..	-0.5	2.3
Greece	..	..	..	..	9.9	..	..	..	..	2.4
Ireland	..	..	..	31.4	29.7	..	..	..	..	..
Israel	..	..	..	..	..	..	..	..	..	..
Italy	..	28.4	25.8	21.9	19.3	..	6.5	2.8	1.0	-0.2
Jordan	12.4	10.7	12.4	14.6	17.3	..	12.3	3.4	6.2	10.2
Lebanon	..	..	..	15.0	13.6	..	..	..	-7.4	2.2
Luxembourg	..	..	..	12.7	10.1	..	..	..	4.3	1.5
Morocco	..	..	18.0	18.2	16.8	8.1	5.5	3.7	3.4	3.5
Netherlands	..	..	18.7	17.0	14.5	..	..	3.7	2.4	1.2
Portugal	..	..	..	18.6	16.5	..	..	..	4.4	0.6
Spain	..	..	..	..	17.0	..	..	..	..	0.8
Sweden	..	..	..	21.2	20.4	..	..	..	9.4	5.3
Syria	..	..	..	17.8	8.1	..	..	..	..	16.1

Tunisia	8.3	9.9	14.4	17.8	18.0	0.5	15.3	6.8	2.7	3.9
Turkey	16.4	17.7	20.7	22.0	21.2	11.7	6.3	6.0	4.7	5.8
UK	..	28.8	24.8	21.1	15.5	..	..	..	0.7	-0.1

Source: Author's calculations based on World Bank database, WDI-CD (2008).

Finally, it is worth noting that both EU and SMCs share a common trend of declining labour concentration in industry with the exception of Jordan which experienced a slight increase. Moreover, the percentage of employment in industry in both SMCs and EU is highly comparable ranging between 20% and 30% as shown in Table 10.

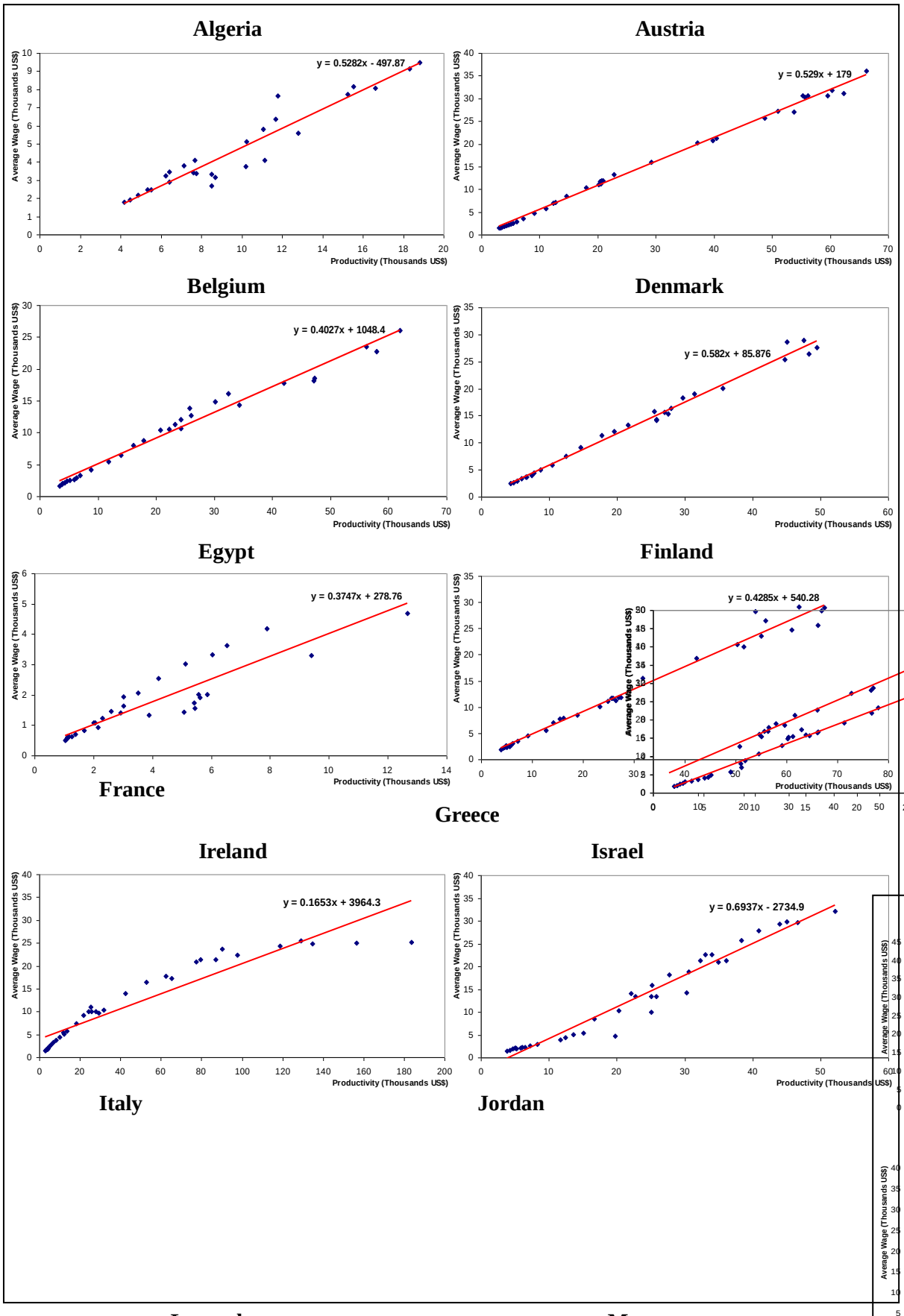
Table 10: Employment in industry (% of total employment)

	Average				
Country	**60s**	**70s**	**80s**	**90s**	**2000-2006**
Algeria	..	..	..	..	24.1
Austria	..	..	37.8	33.1	29.0
Belgium	..	..	31.4	28.5	25.3
Denmark	..	..	27.7	26.7	24.4
Egypt	..	..	21.0	22.3	20.7
Finland	..	..	32.0	27.3	26.3
France	..	..	32.7	..	24.6
Germany	..	..	..	36.3	31.5
Greece	..	..	28.1	24.5	22.6
Ireland	..	..	29.3	28.2	28.1
Israel	..	..	29.4	27.8	22.7
Italy	..	..	34.1	32.7	31.5
Jordan	..	..	19.2	..	21.7
Lebanon	..	..	..	..	..
Luxembourg	..	..	34.3	26.6	21.9
Morocco	..	..	21.0	..	19.9
Netherlands	..	..	27.6	23.2	20.3
Portugal	..	..	35.1	32.9	32.6
Spain	..	..	33.2	31.1	30.7
Sweden	..	..	30.2	26.4	23.1
Syria	..	..	29.8	29.1	26.4
Tunisia	..	..	..	..	..
Turkey	..	..	25.3	22.3	23.4
UK	..	..	32.9	28.4	23.6

Source: Author's calculations based on World Bank database, WDI-CD (2008).

Regarding wages and productivity Figure 8 shows that in general EU countries productivity improvements are passed to average wage increased in a significant manner when compared to SMCs. However, there are exceptions on both sides where Algeria and Israel experience high productivity gains reflections in average wages, whereas UK and Ireland have lower productivity gains reflected in average wages.

Figure 8: The Relationship between Productivity and Average Wage (General Trend)



Netherlands **Portugal**

Spain **Sweden**

Syria **Tunisia**

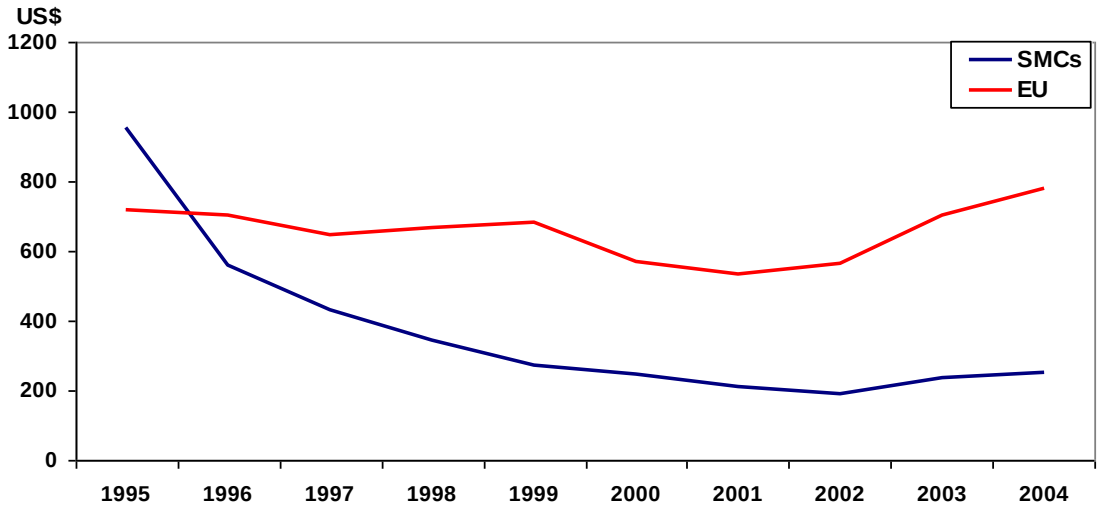
Turkey **UK**

Source: UNIDO, INDASTA3 Database, 2004.

When focusing on productivity developments alone or real wage developments, Figures 9 and 10 show that no convergence is achieved. In case of productivity in the manufacturing sector in fact it could be observed that divergence is happening instead of convergence, whereas in the case of real wages we observe neither convergence nor divergence among SMCs and EU countries. The two figures 9 and 10 confirm what Figure 8 emphasizes which is productivity changes in EU countries are highly reflected in real wages which is not the case in EU countries. Since 1995, the date of Barcelona declaration, SMCs countries on average have been experiencing a downward trend in their productivity whereas EU countries have been

experiencing an improvement. Regarding real wages it is observed that both EU and SMCs countries have followed a downward and then an upward trend without any sign of convergence.

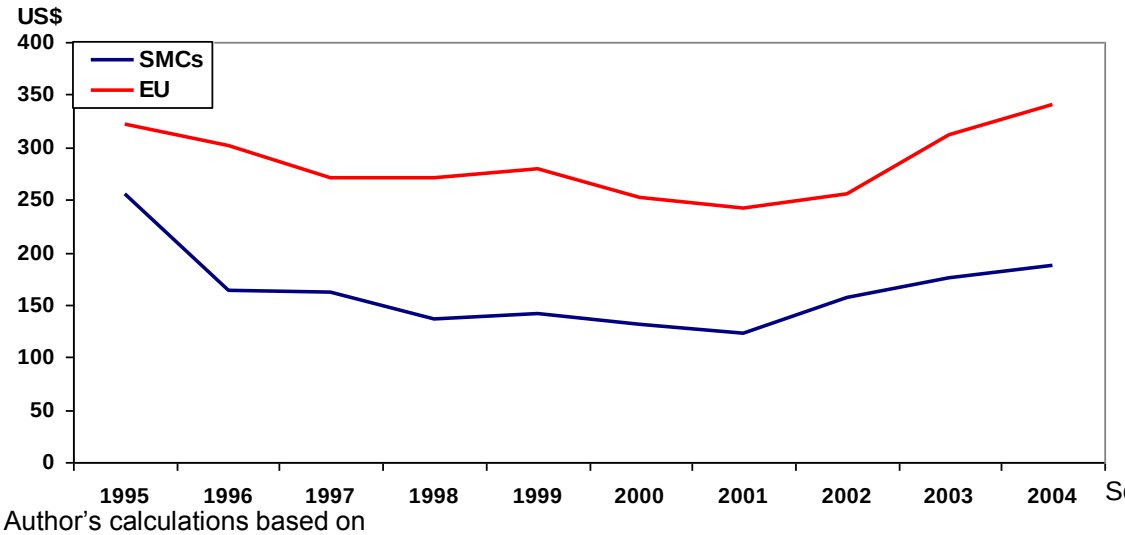
Figure 9: Average Manufacturing Productivity in Real Terms (2000=100)



Source: Author's calculations based on

- UNIDO, INDASTA 3&4 (2004, 2008)
- World Bank, WDI (2008)

Figure 10: Average Manufacturing Wage in Real Term (2000=100)



Source: Author's calculations based on

- UNIDO, INDASTA 3&4 (2004, 2008)
- World Bank, WDI (2008)

To sum up, both SMCs and EU experience similar trends and levels of the contribution of manufacturing to their economies in terms of percentage of exports, employment, and GDP. However, the indicators revealed that SMCs differ significantly from EU countries in terms of the products and sectors in which both sets of countries are specialized in, with SMCs specialized in low technology products and EU specialized in high technology products. The trends did not reveal structural changes in the economies of SMCs and EU.

1.3: The question of the convergence process

This section provides stylized facts about convergence between SMCs and the EU. It focuses on comparisons of several indicators related to growth rates of GDP, trade and specialization as well as productivity and urbanization. Part three will complement these results by assessing empirically the real convergence process, by focusing on GDP per capita convergence only.

Table 11 shows that the average GDP growth rates in SMCs are higher than those experienced in EU countries. This is expected given the differences in the level of development of SMCs versus EU countries.

Table 11: Average countries' annual GDP growth rates (%)

	Average				
Country	**60s**	**70s**	**80s**	**90s**	**2000-2006**
Algeria	4.1	7.2	2.8	1.6	4.3
Austria	4.6	4.2	2.0	2.7	2.0
Belgium	4.8	3.6	2.2	2.1	2.0
Denmark	4.8	2.5	1.9	2.4	1.9
Egypt	5.4	6.2	5.9	4.3	4.4
Finland	4.5	4.0	3.5	1.6	3.3
France	5.6	4.1	2.3	1.9	2.0
Germany	..	3.1	2.0	2.3	1.3
Greece	7.6	5.4	0.8	1.9	4.4
Ireland	4.4	4.7	3.1	7.1	5.9
Israel	9.1	5.8	3.7	5.5	3.4
Italy	5.8	4.0	2.6	1.4	1.3
Jordan	..	15.2	4.0	4.9	5.8
Lebanon	..	..	..	10.2	3.1
Luxembourg	3.5	2.7	4.6	4.8	4.3
Morocco	5.0	5.3	3.9	2.8	4.9
Netherlands	5.4	3.3	2.0	3.2	1.8
Portugal	6.0	5.3	3.4	2.9	1.3
Spain	7.8	3.9	2.8	2.7	3.6
Sweden	4.4	2.4	2.3	1.6	2.9
Syria	6.8	8.8	2.8	5.7	4.1
Tunisia	5.4	7.2	3.6	5.1	4.6
Turkey	4.1	4.7	4.1	3.9	5.1
United Kingdom	2.9	2.4	2.4	2.1	2.7

Source: Author's calculations based on World Bank database, WDI-CD (2008).

Table 12 shows that SMCs and EU countries have an increasing trade openness indicator where trade in merchandise goods (exports and imports) are increasing as percentage of GDP in all countries, with the exception of Egypt. However, the level of trade openness itself differ significantly among countries without clear classification among EU and SMCs. Hence, we find countries as Ireland, Netherlands, Belgium, Jordan and Luxembourg that have trade openness indicators higher than 100%. In fact, the trade openness indicator index is likely to suffer from size bias with small economies having a high trade openness index and large economies having low trade openness index. Hence it is difficult to draw any conclusions on the level of trade openness indicator, but it is safe to argue that a general trend of openness is observed in all EU and SMCs.

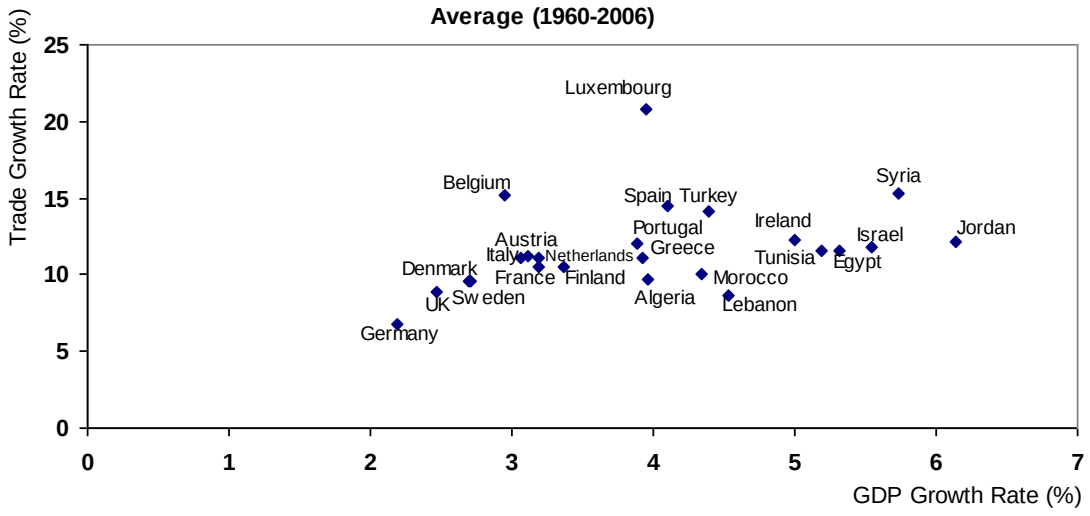
Table 12: Trade (% of GDP)

Country	Average				
	60s	70s	80s	90s	2000-2006
Algeria	62.0	62.4	50.1	50.1	63.4
Austria	47.8	61.1	69.5	73.8	97.3
Belgium	84.9	105.5	131.6	135.3	165.1
Denmark	60.7	61.1	70.4	71.6	89.8
Egypt	37.3	49.9	57.6	50.3	49.8
Finland	40.9	51.6	55.3	60.1	74.3
France	26.3	36.9	44.7	45.3	53.3
Germany	..	38.4	47.7	50.5	71.5
Greece	22.9	31.6	42.7	39.9	47.7
Ireland	72.1	88.5	106.0	133.7	165.5
Israel	46.8	98.1	94.3	72.4	80.3
Italy	27.0	38.8	41.8	42.6	52.0
Jordan	..	118.0	116.1	126.7	125.3
Lebanon	..	..	109.9	76.2	57.4
Luxembourg	154.1	168.7	187.2	204.2	280.1
Morocco	39.6	47.0	51.9	56.8	64.0
Netherlands	88.9	94.5	109.8	112.8	129.1
Portugal	41.9	47.4	62.8	63.6	66.5
Spain	20.1	28.2	37.1	43.7	57.6
Sweden	43.3	53.8	64.4	66.9	85.9
Syria	39.4	50.5	43.8	65.5	70.2
Tunisia	33.0	61.1	80.0	89.3	97.6
Turkey	8.6	13.8	29.7	41.9	61.1
UK	39.8	51.6	52.3	53.5	56.8

Source: Author's calculations based on World Bank database, WDI-CD (2008).

The two graphs below plot rate of growth of trade (exports and imports) and the rate of growth of exports versus GDP growth rates. What is evident from the two graphs is that over the whole period for which data is available (1960-2006) most of the SMCs have experienced higher GDP growth rates than trade growth. This has not been the case of EU countries which experienced trade growth and exports growth higher than GDP growth rates. It is difficult to identify any convergence from those two graphs, however the two graphs are in line with what has been discussed in the part section related to trade and specialization indicators confirm that trade may not have played the role of being an engine of growth in SMCs, because of a detrimental specialization process in SMCs. This will be empirically assessed in Part 3.

Figure 11: Trade versus GDP Growth Rates

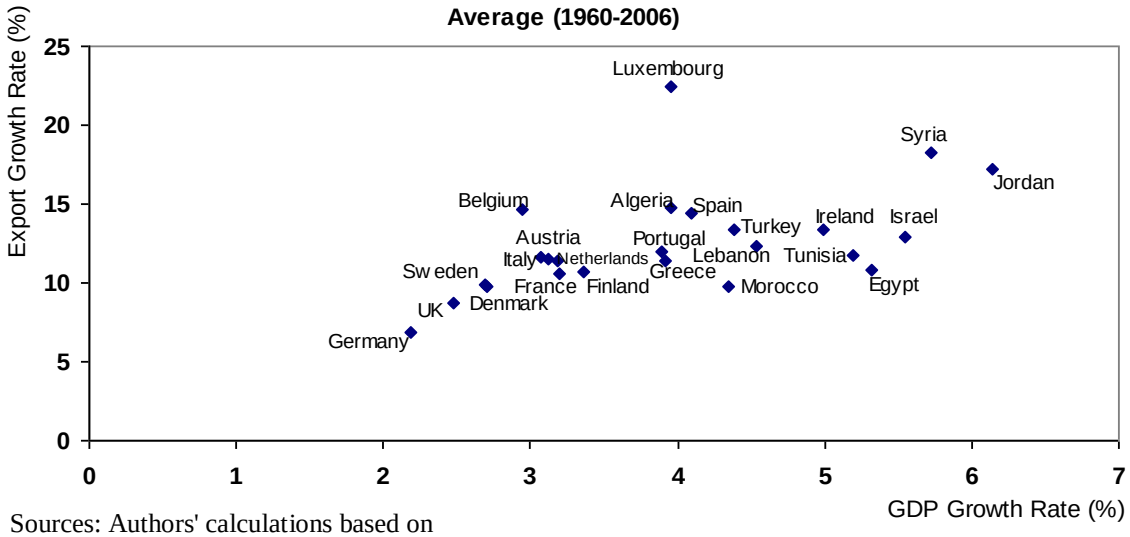


Sources: Authors'

calculations based on

- World Bank database, WDI-CD (2008).
- UNCTAD database, Handbook of Statistics (2008), online version.

Figure 12: Export versus GDP Growth Rates

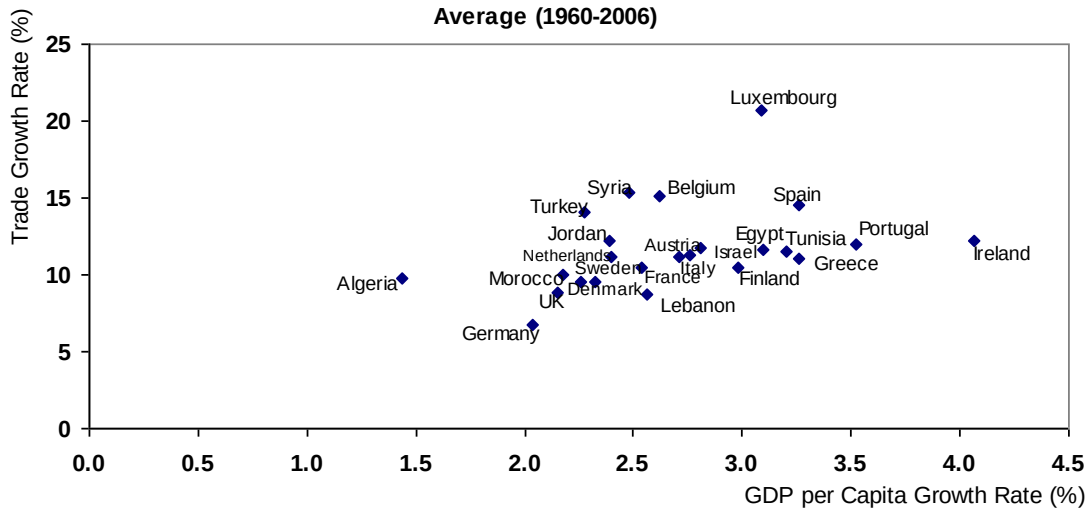


Sources: Authors' calculations based on

- World Bank database, WDI-CD (2008).
- UNCTAD database, Handbook of Statistics (2008), online version.

If we focus on GDP per capita growth rates versus trade growth rates we observe that no clear trend can be identified in both EU and SMCs where some countries on both sides seem to be experiencing more GDP per capita growth rates compared to trade growth rates and the opposite case in other countries. This implies that it is difficult to draw conclusions based on simple indicators. Again, an appropriate economic analysis is necessary to draw a more precise conclusion about the role of trade and openness on growth and convergence (refer to part 3).

Figure 13: Trade versus GDP per Capita Growth Rates



Sources: Author's

calculations based on
- World Bank database, WDI-CD (2008).
- UNCTAD database, Handbook of Statistics (2008), online version.

Finally, we followed the urbanization ratio as a proxy for convergence in both EU and SMCs as shown in Table 12. What is observed is that there is a gap between EU and SMCs. The rate of urbanization increased at a higher rate in SMCs compared to EU, however there still remain a wide gap. This confirms that above trends which emphasize that there is a wide gap, however this table indicate that it is being narrowed which is not the case of the GDP per capita graphs.

Table 12: Urban population (% of total)

	Average				
Country	**60s**	**70s**	**80s**	**90s**	**2000-2006**
Algeria	35.9	40.7	47.5	55.6	61.9
Austria	65.3	65.6	65.8	65.8	65.9
Belgium	93.1	94.5	95.9	96.7	97.2
Denmark	76.6	81.7	84.3	85.0	85.4
Egypt	40.2	43.2	43.8	43.0	42.7
Finland	43.4	56.2	60.1	61.3	61.1
France	66.3	72.4	73.7	74.8	76.3
Germany	71.2	72.7	72.7	74.5	75.2
Greece	47.1	54.9	58.3	58.9	58.9
Ireland	48.4	53.4	56.1	57.8	59.9
Israel	80.3	86.3	89.6	90.9	91.5
Italy	61.6	65.4	66.7	66.9	67.5
Jordan	53.6	57.6	65.6	76.9	81.5
Lebanon	50.0	66.1	78.4	84.5	86.4
Luxembourg	71.8	77.0	80.5	82.5	83.2
Morocco	31.7	37.5	44.5	51.5	57.2
Netherlands	60.7	63.1	66.5	72.4	78.8
Portugal	36.7	40.6	45.1	50.8	56.3
Spain	60.8	69.2	74.0	75.8	76.5
Sweden	76.5	82.3	83.1	83.6	84.1
Syria	39.7	44.9	47.7	49.6	50.4
Tunisia	40.0	48.6	54.5	61.3	64.5
Turkey	34.2	41.0	51.2	61.8	66.3
UK	77.8	82.1	88.4	89.0	89.6

Source: Author's calculations based on World Bank database, WDI-CD (2008).

To conclude, the review of the indicators identified that there is a gap between SMCs and EU. In many cases, the gap(s) in many cases are sidelining. This applies to the case of export indicators (diversification and concentration) as well as income and productivity indicators. Part 3 will go further by appraising whether SMCs have converged toward EU GDP per capita levels.

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Part 2: The determinants of north-south industrial location and the impact of regional integration[6]

2.1 Review of theoretical and empirical literature

A historic partnership has been developed since 1995 between the European Union (EU) and Mediterranean (MED) countries (the so-called Barcelona process). Thus, after many decades devoted to the internal integration process, the EU has extended the integration to its neighbouring borders.

An important literature has been devoted to the impact of trade liberalization and, more precisely, of regional integration on the location of economic activities. Regional integration agreements reduce trade barriers between member countries while maintaining barriers with the rest of the world. It gives an incentive for firms to locate in the integrated area as the market access of the firms operating within the area is improved. Less clear-cut is the relationship between the process of economic integration and the location of firms within the integrated area.

One popular concern about North/South integration is that the removal of barriers to trade accelerates trade and generates the fragmentation of production. The traditional trade theory analyses the exchange of final goods whereas the literature on fragmentation focuses on the coordination of productive activities by taking into account the spatial dimension. Following the fall in trade costs, the production process becomes divided into several stages that can take place in different locations depending of countries' comparative advantages (Jones and Kierzkowki, 1990, 2001). According to this approach, economic integration leads to the dispersion of economic activities. Countries' industrial structures will be primarily shaped by factor cost differences.

Contrary to this, the "New economic geography theory" has pointed out the incentive of firm to agglomerate following trade liberalization. The central idea of the "new economic geography" (Krugman, 1991; Krugman and Venables, 1995) and the "New trade theory" (NTT) (Krugman, 1980), is that, in the presence of trade costs and increasing returns to scale, firms tend to settle at locations that minimize transport costs related to inputs and outputs (Krugman, 1980). In core-periphery models, industrial agglomeration arises because of labour mobility (Krugman, 1991). Venables (1996) introduces cost linkages between an upstream sector and a downstream sector. Krugman and Venables (1995) and Fujita et al. (1999) merge the two sectors into one, so the input-ouput relationships switch form vertical linkages to horizontal linkages. These authors modify the core-periphery model to allow for input-output linkages while ruling out labour mobility. Linkages between firms create a new agglomeration

[6] This part has been written by Corinne Bagoulla

force in economic geography models. Robert-Nicoud (2002)[7] rules out to the critical hypothesis of labour mobility and proposes a model that combines free capital mobility and vertical linkages.

A small number of papers (Ricci, 1999, Forslid and Wooton, 2003, Venables, 1999, Bagoulla, 2006, Epifani, 2005) has considered the tension between agglomeration and comparative advantages. Using a multi-sector model, Venables (1999) suggests that location could also be based on comparative disadvantage, in particular for the industries with large technological differences. Amiti (2005) analyses the effects of trade liberalization on the location of manufacturing industries which are vertically linked and exhibit differences in factor intensities. At first stage of trade liberalization, reducing trade costs can promote agglomeration of vertically linked industries that differ in factor intensities. Once trade costs fall to very low levels, location is based on comparative advantage[8].

Some authors have analyzed the impact of regional trade agreements on industrial development combining comparative advantages and geographical aspects. Puga and Venables (1997) suggest that in a 'hub and spokes' trading arrangements, firms will tend to concentrate in the 'hub' as it give a better access to the other countries' markets. Baldwin et al. (2003) confirm that regional integration favor the largest members and could generate a core-periphery industrial pattern. Altomonte (2007) develops a theoretical model of international location that mitigates these results. He found that regional integration agreements which promote trade liberalization not only along the 'hub and spokes' countries but also across the same 'spokes' may enjoy a different pattern. Making the market accessible from every peripheral country might allow firms to exploit their comparative advantages without suffering a reduction of market access.

Existing empirical studies mainly focus on the determinants of agglomeration. Marshall (1920) identifies three specific channels of externalities (knowledge spillovers, labour market pooling, and input sharing) that may contribute to the process of industrial agglomeration. Some studies identify the relevant determinants of industrial agglomeration by regressing concentration indexes on "proxy" variables illustrating theories' forcasts (Kim (1995), Amiti (1999), Haaland *et al*. (1999), Rosenthal and Strange, (2001,2003)). Haaland *et al.* (1999) show that the most important determinant of the economic geography of Europe is the location of the expenditure, even if of the Heckscher-Ohlin and Ricardo theory should not be ignored. Davis and Weinstein (1999, 2003) also underline the significant impact market potential on the location of production. Using a sample of Japanese firms' choices of regions within European countries, Head and Mayer (2004) confirm that firms prefer to locate "where the markets are".

Recent papers have analyzed the industrial agglomeration within countries. Lu and Tao (2009) examine the trends and determinants of china's industrial agglomeration using a firm-level data set. They confirm the impact of traditional determinants on industrial agglomeration (marshallian externalities, resource endowments and scale economies). Resmini (2003) analyses the impact of East enlargement of the EU on regions in four candidates' countries

[7] Robert-Nicoud's(2002) model is a extension of the 'Footloose capital model' proposed by Martin and Rogers (1995).

[8] Firms' location choice can also depend on industries' characteristics such as transport costs and demand elasticities (Laussel and Paul, 2007).

(Bulgaria, Estonia, Hungary, Romania) between 1992 and 1999. The paper shows that because of economic integration with the EU, firms have begun to shift their production towards the EU border in order to enjoy relatively low cost access to the EU market. Considering regional integration areas, Chen (2008) underlines that because of the different sizes of participating countries, they ability to attract foreign investments can be different. Countries with relatively high production costs may experience a decline in inward FDI while their more attractive, low-cost countries experience an increase in FDI. Sanguinetti et al. (2004) confirm that the increased regional integration in the MERCOSUR generates the reorganization of production along the lines of internal comparative advantages. On the contrary, Altomonte and Gualiano (2003) show that Central and Eastern Europe countries display a greater potential in the attraction of FDI flows when compared to the Mediterranean countries. This can be due to the higher segmentation of the regional markets.

Summing up, many factors can explain the industrial location process in a North/South regional trade agreement. From the traditional trade literature it can be shown that comparative advantages promote the dispersion of firms when the integration goes deeper. The economic geography theory outlines the crucial impact on both demand and supply access on firms' location choices. When firms are vertically linked, the fall of trade costs might generate concentration or dispersion depending on firms' characteristics. Finally, the spatial distribution of activities between countries belonging to a North/South regional agreement depends on trade barriers, not only between the North and the South but also between Southern countries.

Countries in the euro-Mediterranean area have different development levels and geographical characteristics that make their comparative analysis interesting. The geographical location of the countries along EU borders combined to the integration process suggests the need for an in-depth theoretical and empirical analysis. The aim of this study is therefore to provide an assessment of firms' location choices in the euro-Mediterranean area.

2.2 Location of industries in the euro-Mediterranean area

2.2.1 Descriptive analysis

1) Literature on concentration and specialization indexes

This second part proposes a descriptive analysis of the spatial distribution of industries in a large sample of countries belonging to the Euro-Mediterranean zone.

We use output data from the United Nations UNIDO[9] National Accounts Statistics Database (2004) and from the Trade, production and protection database, proposed by CEPII[10]. It includes twenty-nine countries: thirteen European countries (Austria, Belgium and Luxembourg, Germany, Spain, Finland, France, United Kingdom (UK), Greece, Ireland, Italy, Sweden, Portugal, Netherlands), ten new entrants (Bulgaria, Cyprus, Estonia, Hungary,

[9] United Nation Industrial Development Organisation.

[10] Mayer T. & S. Zignago (2005), "Market Access in Global and Regional Trade", CEPII Working Paper N° 02.

Latvia, Lithuania, Malta, Slovakia, Poland and Romania), and six Mediterranean countries (Tunisia, Morocco, Turkey, Jordan, Israel, Egypt). Manufacturing output data are based on the International Standard Industrial Classification (ISIC) revision 2 and cover 26 manufacturing sectors form 1990 to 2003. To facilitate the interpretation of results, the countries are grouped (European countries, new entrants and Mediterranean countries) and the industries are classified according to their level of technology[11].

An important literature has been devoted to measuring production specialization and geographic concentration of industries. The concept of location has been related to the divergence of spatial spreading of economic activities, with respect to a "theoretical case". The most frequently used absolute indexes have been the Gini coefficient, the Herfindhal index and the absolute entropy index (Ainginger and Pfaffermayr, 2004). These indexes of concentration are based on the comparison between the geographic pattern of employment (or output) for one industry and the aggregate economy. As far as specialization is concerned, absolute indexes compare the sectoral distribution of employment in a given region (or country) to the total production in the region (country). Relative specialization (concentration) indexes compare sectoral (geographical) distribution of employment in a region (sector) to the share of the sector (region) in the total employment (in all regions and sectors). These relative indexes are built up by dividing up the entire geographic area into regions (or countries) and comparing the share of activity in each region with a benchmark. They have largely been used is the literature (Kim, 1995, Amiti, 1999).

However, absolute and relative indexes have been widely criticized. Combes et al. (2008) list different properties we would expect from a meaningful concentration (and specialization) index. Two specific problems deserve attention. First, it has been shown that an industry with a small number of establishments may appear to be concentrated by chance. To solve this problem Ellison and Glaeser (1997) have proposed an index that control for differences in industries' characteristics ("industrial concentration")[12]. Data of employment by sector and firms must be available to use the EG index. A second important issue that still awaits a satisfactory solution is the dependence of concentration indexes on the level and method of geographical disaggregation. The geographic unit chosen to evaluate concentration has to be relevant. If not, clusters of industries that place across geographic borders can be artificially separated. In addition, indexes do not take into account for spatial proximity between geographic units. Duranton and Overman (2005), have proposed a "continuous space concentration index" to overtake this issue. However, this method requires a precise data set that provides the location of each producing establishment, data which are frequently not available. Entropy indexes have also been largely used in the literature (Brülhart and Traeger, 2005). The most appealing property of these indexes lies in their separability. It makes it possible to decompose the degree of concentration of regions between countries and concentration across regions within each country. It also makes it possible to consider the sectors' contribution to the geographic concentration of aggregate activity. In addition, Brülhart and Traeger (2005) have introduced a difference between relative and topographic concentration. The former measures the concentration relative to the distribution of aggregate employment (or output), whereas topographic concentration deals with the concentration relative to physical space. Cutrini (2008) has also used entropy measures to combine a

[11] We use the classification suggested by the OECD (1997).

[12] This approach was adopted in other empirical studies (Maurel and Sédillot, 1999).

regional approach of localization with a national perspective. These approaches also require employment (or output) data by regions and by countries. Some very recent papers still analyze the relevance of concentration and specialization indexes, try to precise them (Cutrini, 2008), or to provide a theoretical foundation on which to build statistical tests for the measures (Guimarães, Figueiredo and Woodward, 2009).

Papers which deal with an international perspective of industrial location use some geographic concentration presented previously. However, they cannot consider properly the limits of these indexes because of the availabilities of data (Vogiatzoglou, 2006). In our study, we are interested in the evolution of the degree of specialization (concentration) of euro-Mediterranean countries (industries) within this area. In other words, the specialization (concentration) structure of each member is compared to a benchmark distribution (that of the whole Euro-Mediterranean zone). We use simple indexes (entropy and dissimilarity index[13]) and interpret them in regard to their limits[14].

Using the indexes described previously, numerous researchers have examined the data looking for evidence of specialization and geographic concentration patterns in Europe (Kim, 1995, Amiti, 1999, Aiginger and Pfaffermayr, 2004, Brülhart, 2001a, 2001b, 2004, Dumais, Ellison and Glaeser, 2002)[15]. Amiti (1999) suggests that specialization level has increased between 1968 and 1990 in some European countries (Belgium, Denmark, Germany, Greece, Italy, and Netherlands), whereas is has significantly decreased in others (France, Spain and UK). On the contrary, there has been a significant increase in specialization for all European countries between 1980 and 1990. Aiginger and Pfaffermayr (2004) and Midelfart-Knarvik et *al*. (2004) confirm these results. However, some analysis has indicated that European countries appear more and more diversified (Brülhart, 2001b).

Considering geographic concentration in Europe, Amiti (1999) finds that 17 out of 27 industries esperienced an increase in geographical concentration in the eighties. Other studies have confirms this results considering (Brülhart, 2004). Midelfart-Knarvik et *al*. (2004) show that labor-intensive industries have become more concentrated in peripheral countries between 1970 and 1997. The geographic concentration of US manufacturing industries has been studied by Ellison and Glaeser (1997), who find an increase to the location level in almost all of the industries.

Few articles focus on the distribution of activities in heterogeneous areas. Resmini (2003) has analyzed the impact of East enlargement of the EU on regions in four candidates countries (Bulgaria, Estonia, Hungary, Romania). The analysis of the concentration index indicate the relocation of economic activities across regions/sectors between 1992 and 1999. Lu and Tao (2009) have analyzed the industrial agglomeration in China. They have calculated the EG index at various geographic and industrial scopes. Their results suggest increasing geographic concentration in china's manufacturing industries during the sample period of 1998-2005.

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[13] There are presented in annexe 1.

[14] The assets of these indicators and the availability of the data guided this choice. Unfortunately the Ellison and Glaeser (1999) index could not be used since sufficiently disaggregated data is not available.

[15] See Combes and Overman (2004) for a comprehensive survey.

However, it has proven difficult to distil strong stylized fact from this research as studies differ quite strongly in the data and measures they employ.

2) *Evolution and characteristics of industrial production in the euro-Mediterranean area*

Geographic concentration and specialization indexes:

X denotes the variable of interest (output*)*, *i*, the industry and *j*, the country and *t*, the year.

The region-industry location quotient (L_{ijt}) is given by :

$$L_{ijt} = \frac{C_{ijt}}{C_{jt}} = \frac{S_{ijt}}{S_{it}}$$

With, Cijt, the concentration ratio ($C_{ijt} = \frac{X_{ijt}}{X_{it}}$) and $C_{jt} = \frac{\sum_i X_{ijt}}{\sum_i \sum_j X_{ijt}}$.

Sijt is the specialization ratio ($S_{ijt} = \frac{X_{ijt}}{X_{jt}}$) and ($S_{it} = \frac{\sum_j X_{ijt}}{\sum_i \sum_j X_{ijt}}$). Note that $X_{it} = \sum_j X_{ijt}$ and $X_{jt} = \sum_i X_{ijt}$

Given these definition, we calculate :

<u>The entropy-concentration index:</u>

$$E_{it} = \sum_j C_{ijt} ln(L_{ijt})$$

And the

<u>The entropy-specialization index:</u>

$$E_{jt} = \sum_i S_{ijt} ln(L_{ijt})$$

To have other indexes, we can also use dissimilarity indexes (Krugman, 1991) :

<u>For concentration</u>

$$D_{it} = \sum_j |C_{ijt} - C_{jt}|$$

<u>For specialization</u>

$$D_{jt} = \sum_i |S_{ijt} - S_{it}|$$

It is necessary to underline the main characteristics of the industrial production in our sample of countries before studying the evolution of the concentration and specialization indexes[16].

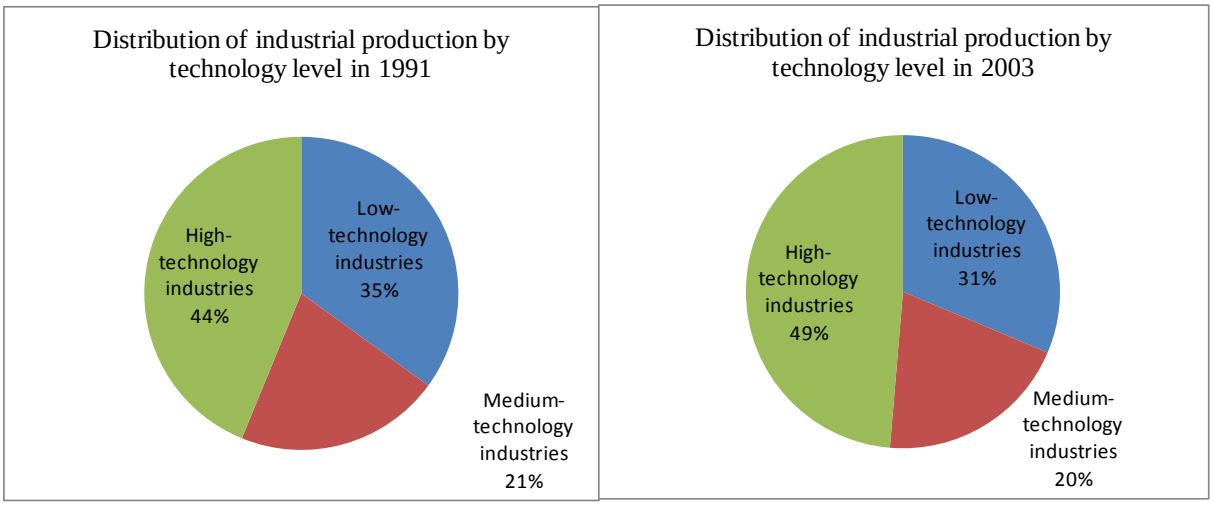
[16] This analysis precises the descriptive analysis and prevents any misinterpretation of the indexes.

The industrial sector doesn't represent the same part of the GDP in all countries in the sample. In European countries, the share of industrial value added in the GDP in 2003 varies between 21% in France and 29 % in Germany and Spain[17]. In addition, these shares have decreased in all European countries between 1990 and 2003. The share of industrial VA in the new member states' GDP is more significant (between 22 % in Latvia and 35 % in Romania and Slovakia). However, these countries have experienced a significant structural adjustment over the past decade and the importance of the industrial sector in their economy dramatically decreased between 1990 and 2003 (between -40 % and -50% in all countries excepted in Lithuania[18]). The industrial sector also account for a significant part of the economy in Mediterranean countries. In 2003, the share of industrial value added in the GDP reaches 36% in Egypt, 29% in Turkey, 28 % in Morocco and Tunisia and 27% in Jordan[19]. Unlike the other countries, these shares have raised between 1990 and 2003 in some Mediterranean countries (Egypt, 24% and Turkey, 27%) and feebly decreased in Jordan, Tunisia and Morocco.

However, the industrial production has increased in our sample between 1990 and 2003[20]. However, some industries seem to expand more than others. The production of low, medium and high technology industries have increased respectively by 30 %, 37 and 61% during the period.

Figure 1 represents the evolution of the industrial production distribution considering the technology level of industries.

Figure 1



[17] Data source: *The World Bank indicators*, 2007.

[18] Note that the data are not available in 2003 for Malta and Cyprus.

[19] Data for Israel are not available.

[20] Total industrial production increased by 46 % between 1990 and 2003.

The share of the low-technology and medium-technology industries in total production have decreased between 1991 and 2003. Contrary to this, the high-technology industries have recorded an increase in their share in total production between 1991 and 2003. This suggests that the industrial production growth in our sample of countries mainly has occurred in high-technology industries, whilst production of many low-technology sectors relatively decline.

Data in table 1 confirm the significant raise of high-technology productions. The share for high-technology industrial production in total production in each group of countries has increased between 1990 and 2003. This increase is particularly significant for European countries. In parallel, whereas European countries and new member States reduced their production in many 'traditional' sectors, the share of low-technology industries in total production remains stable in Mediterranean countries.

Table 1

Distribution of the industrial production by country group and technology level in 1990 and 2003

	1990			2003		
	Low-technology industry	Medium-technology industry	High-technology industry	Low-technology industry	Medium-technology industry	High-technology industry
Mediterranean countries	46,3%	21,8%	31,5%	46,2%	19,4%	34,5%
New entrants	44,5%	23,2%	32,6%	43,4%	22,1%	34,4%
European countries	34,3%	21,1%	44,6%	30,2%	19,8%	49,8%

3) Specialization and geographic concentration analyses

In this part, specialization and spatial distribution of industries will be measured thanks to two relative indexes: the dissimilarity index and the entropy index.

Table 2 gives the entropy and dissimilarity specialization indexes for each country. With the exception of Ireland and Finland, European countries[21] appear less specialized than new entrants and Mediterranean countries. Malta, Tunisia, Cyprus and Latvia are the most specialized countries (in average) in the period studied. Conversely, UK, Germany, France and Spain are the more diversified countries of the zone.

The significant specialization level of Malta is essentially due to an important production in high-technology industries, in particular in electric machinery[22]. On the contrary, the high specialization level in Tunisia is related to an important production in low-technology industries (footwear and leather products industries). Cyprus, Latvia and Lithuania are also specialized in low-technology industries. In Cyprus, an important part of the national production takes place in food products (30% of the country's total industrial production) and other non-metallic mineral products (12%)[23]. Latvia and Lithuania are both specialized in

[21] Remember that we have classified countries in three categories : countries belonging to the 15 UE (European countries), news entrants and Mediterranean countries.

[22] Note that considering the Balassa index, a country is specialized if the part of a industry in the country's total industrial production is significant relatively to the importance of this industry in the industrial production in the area. The level of specialization so depends on the kind of countries introduced in the database.

[23] As food products industry constitutes an important part of the area industrial production, Cyprus appear to be relatively more specialized in other non-metallic mineral products.

wood products and wearing apparel. Those industries constitute respectively 24 % and 3% of Latvia's industrial production and 9% and 10 % of Lithuania's industrial production[24].

With the exceptions of Ireland, relatively specialized in industrial chemicals industry and Finland, specialized in paper and products, European countries are the most diversified countries in this zone. We can also note that even if France and Germany are very diversified, their level of specialization increase in high-technology industries between 1990 and 2003. New entrants and Mediterranean countries are much more specialized, especially in low-technology productions.

Table 2

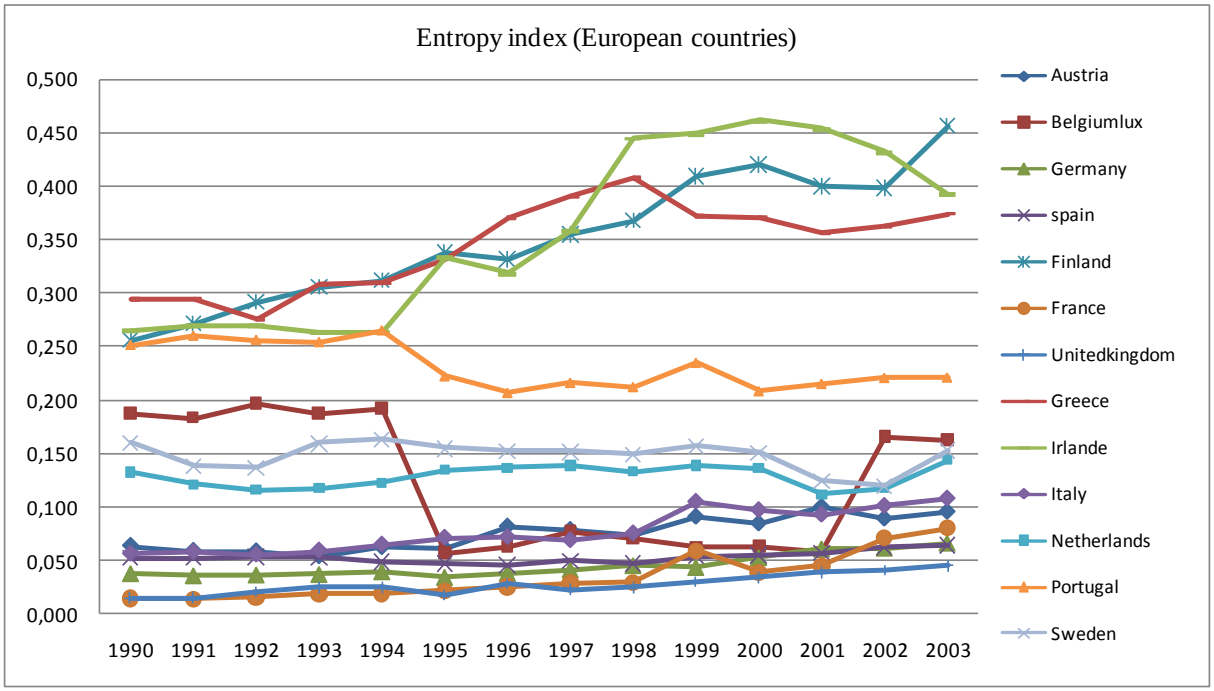
	entropy index				dissimilarity index			
country	**90-94**	**95-99**	**2000-03**	**Rank***	**90-94**	**95-99**	**2000-03**	**Rank***
European countries								
Austria	0,059	0,077	0,092	25	0,269	0,321	0,357	24
Belgium and Luxembourg	0,189	0,066	0,112	23	0,455	0,286	0,386	21
Finland	0,287	0,360	0,418	10	0,528	0,619	0,688	12
France	0,016	0,033	0,059	28	0,136	0,208	0,278	26
Germany	0,037	0,041	0,060	27	0,233	0,226	0,280	28
Greece	0,296	0,375	0,366	11	0,642	0,702	0,690	11
Irland	0,265	0,380	0,435	9	0,602	0,725	0,791	10
Italy	0,058	0,078	0,099	24	0,267	0,305	0,344	25
Netherlands	0,121	0,136	0,127	20	0,409	0,427	0,407	20
Portugal	0,257	0,219	0,216	17	0,547	0,490	0,493	16
Spain	0,052	0,049	0,060	26	0,269	0,236	0,257	27
Sweden	0,151	0,153	0,137	19	0,362	0,412	0,370	22
United kingdom	0,020	0,025	0,040	29	0,139	0,151	0,193	29
New entrants								
Bulgaria	0,195	0,289	0,325	14	0,451	0,575	0,571	15
Cyprus	0,590	0,536	0,577	3	0,811	0,828	0,880	2
Estonia	0,453	0,407	0,500	6	0,943	0,749	0,749	5
Hungary	0,113	0,124	0,132	22	0,380	0,371	0,358	23
Latvia	0,334	0,499	0,663	4	0,678	0,817	0,902	3
Lithuania	0,589	0,428	0,382	5	0,928	0,797	0,733	6
Malta	0,676	0,720	0,825	1	0,956	0,953	1,034	1
Poland	0,159	0,114	0,107	21	0,450	0,406	0,401	19
Romania	0,215	0,332	0,385	13	0,492	0,646	0,688	13
Slovakia	0,198	0,204	0,204	18	0,473	0,431	0,428	18
Mediterranean countries								
Egypt	0,312	0,311	0,377	12	0,674	0,691	0,771	7
Israel	0,156	0,269	0,276	16	0,459	0,501	0,536	17
Jordan	0,447	0,427	0,420	7	0,719	0,748	0,738	9
Morocco	0,368	0,401	0,433	8	0,727	0,770	0,754	8
Tunisia	0,507	0,609	0,657	2	0,801	0,836	0,816	4
Turkey	0,210	0,254	0,281	15	0,493	0,545	0,564	14

* Considering the mean between 1990 and 2003 (in decreasing order)

Figures 2, 3 and 4, make it possible to check whether specialization has changed significantly in the euro-Mediterranean area between 1990 and 2003.

Figure 2

[24] Note that like in Cyprus, food products constitute an important part of the industrial production in Latvia and Lithuania. But, because of the significant level of production in this industry in the euro-Mediterranean area, the relative specialization of this to countries in food products remains moderated.



"Small" countries or Southern European countries are the most concentrated in the European countries sample in 2003 (figure 2). Finland is specialized in the printing and publishing and paper industries and Ireland appears specialized in the industrial chemical products. Greece is specialized in pottery, china and earthware products.

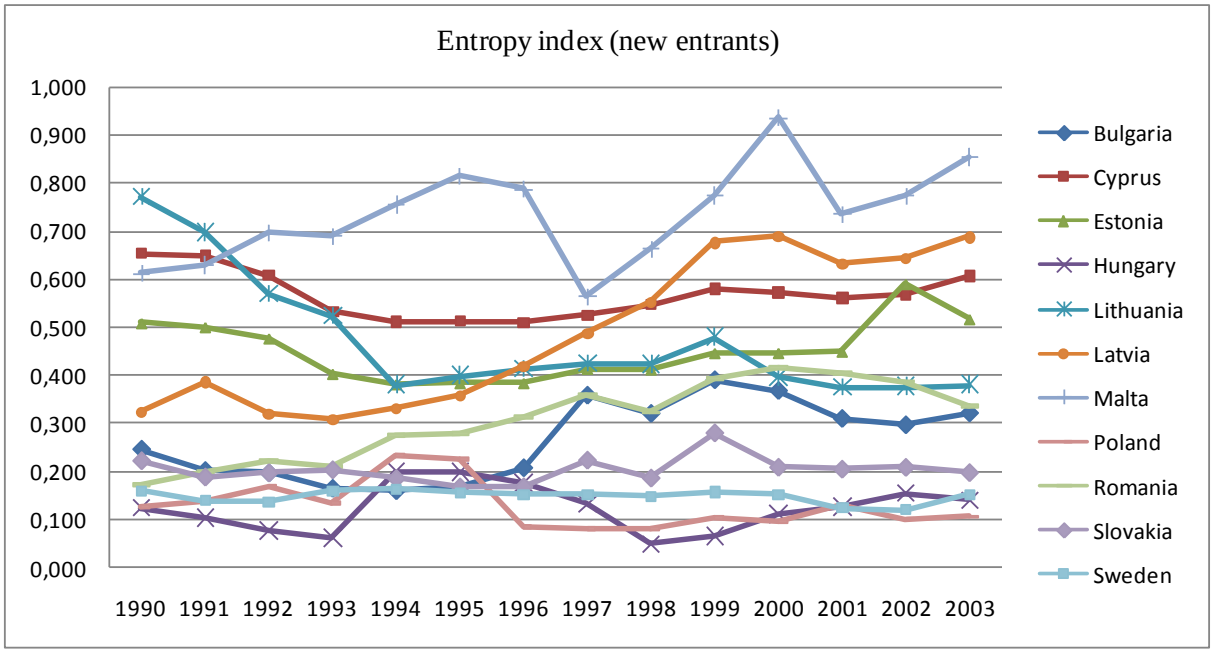
The specialization has slowly increased in European countries between 1990 and 2003[25]. The entropy index significantly increases in France and UK and decreases in Portugal (-10%), Belgium/Luxembourg (-10%) and Sweden (-4%). The increasing specialization in France is partly due to an important increase of the location in France of the transport equipment industry. This industry represents 14% of the French industrial production in 1990 and 28% in 2003. It also relates to the significant decrease in the location of some low and medium technology sector in France between 1990 and 2003 (printing and publishing, footwear and other manufactured products). On the opposite, Portugal has significantly diversified it industrial structure between 1993 en 2003. The share of some low-technology industries in to total production has decreased (about -60% in tobacco and leather products industries) in favor to high-technology sectors (professional en scientific equipment, 67%).

The evolutions of the entropy indexes are less monotonous in new member states (figure 3). Hungary, Latvia and Cyprus are the most specialized. The entropy indexes increase for six of the ten new member states between 1990 and 2003. The increase is particularly significant for Latvia (112%)[26], Romania (95 %) and Bulgaria (30%). On the opposite, Lithuania and Poland show an important decrease of their entropy index.

[25] 9 out to the 13 European countries show an increase of their entropy index.

[26] Latvia appears increasingly specialized in wood products and iron and steel industry. In 2003 these industries represent respectively 24% (2% in 1990) and 6 % (1% in 1990) of the Latvia's industrial production.

Figure 3



In figure 4, we can note that Tunisia, Egypt and Morocco are the most specialized Mediterranean countries. The specialization level significantly increases in Mediterranean countries during the period studied, especially in Israel (79%), Tunisia (38%) and Turkey (39%). The increase is less significant for Egypt (8%). Only Morocco and Jordan experience a slight decrease of their entropy indexes during the period.

Beside the specialization, increasing economic integration in the euro-Mediterranean zone is also expected to influence the concentration of industrial activity.

Figure 4

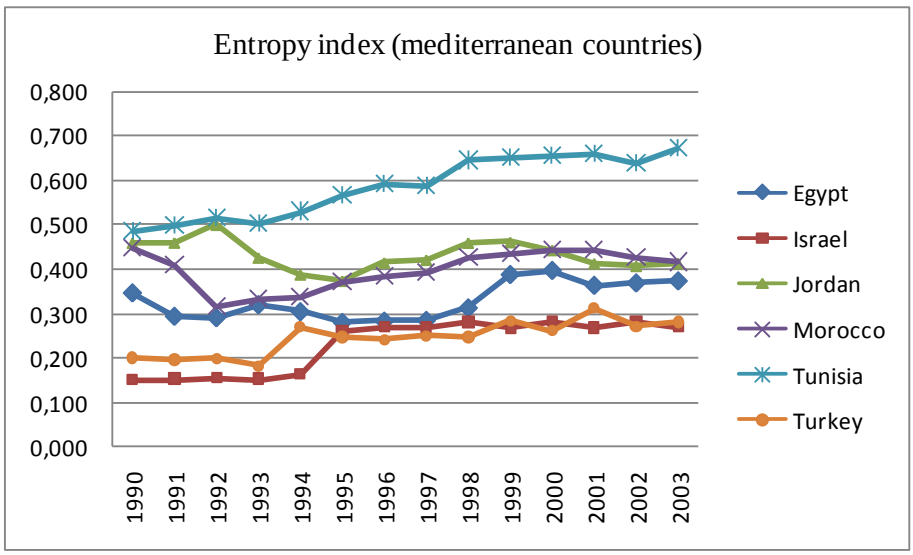


Table 3

		Entropy index				Dissimilarity index			
Isic code	Sector	90-94	95-99	2000-03	Rank*	90-94	95-99	2000-03	Rank*
Low-technology industries									
311	Food products	0,043	0,047	0,048	22	0,232	0,259	0,249	19
313	Beverages	0,053	0,068	0,074	17	0,248	0,292	0,302	15
314	Tobacco	0,161	0,199	0,210	6	0,461	0,474	0,483	6
321	Textiles	0,154	0,243	0,276	5	0,428	0,554	0,601	5
322	Wearing apparel, except footwear	0,183	0,251	0,343	4	0,455	0,556	0,664	4
323	Leather products	0,355	0,539	0,601	3	0,711	0,895	0,926	2
324	Footwear, except rubber or plastic	0,393	0,528	0,627	2	0,731	0,909	0,996	1
331	Wood products, except furniture	0,138	0,125	0,151	8	0,347	0,352	0,404	9
332	Furniture, except metal	0,054	0,065	0,082	15	0,216	0,268	0,342	16
341	Paper and products	0,133	0,153	0,150	7	0,280	0,309	0,313	14
342	Printing and publishing	0,106	0,053	0,081	13	0,417	0,243	0,294	12
361	Pottery, china, earthenware	0,545	0,687	0,695	1	0,824	0,806	0,808	3
Medium-technology industries									
355	Rubber products	0,045	0,049	0,056	21	0,185	0,205	0,233	21
356	Plastic products	0,026	0,020	0,021	26	0,157	0,145	0,134	26
362	Glass and products	0,037	0,049	0,039	24	0,161	0,207	0,199	25
369	Other non-metallic mineral products	0,064	0,064	0,108	14	0,266	0,289	0,414	11
371	Iron and steel	0,054	0,062	0,084	16	0,226	0,231	0,303	18
372	Non-ferrous metals	0,042	0,053	0,067	19	0,168	0,190	0,223	23
381	Fabricated metal products	0,089	0,024	0,037	20	0,245	0,138	0,188	24
390	Other manufactured products	0,148	0,099	0,100	10	0,441	0,359	0,380	7
High-technology industries									
351	Industrial chemicals	0,039	0,106	0,210	9	0,207	0,353	0,612	8
352	Other chemicals	0,030	0,037	0,055	25	0,160	0,184	0,250	22
384	Transport equipment	0,053	0,082	0,110	12	0,249	0,314	0,369	13
383	Machinery, electric	0,045	0,039	0,052	23	0,244	0,198	0,204	20
382	Machinery, except electrical	0,052	0,054	0,060	18	0,251	0,272	0,279	17
385	Professional & scientific equipment	0,096	0,121	0,129	11	0,311	0,373	0,347	10

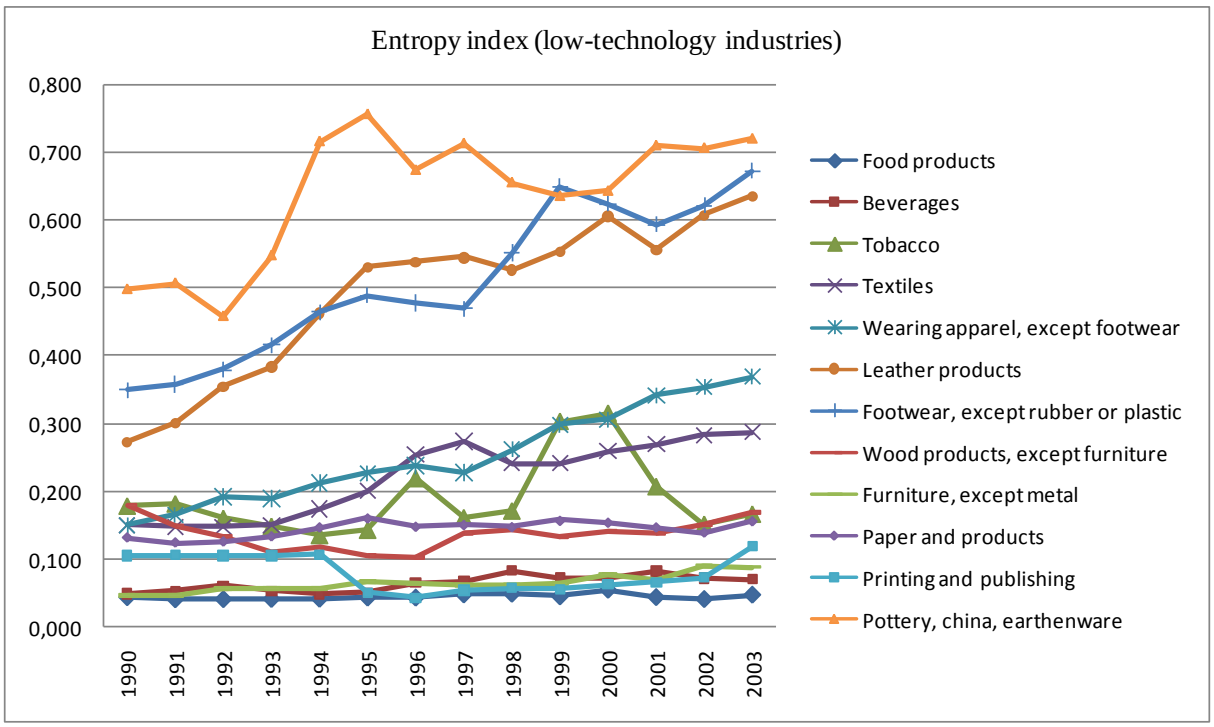
* Considering the mean between 1990 and 2003 (in decreasing order)

In the euro-Mediterranean zone, low-technology industries are more geographically concentrated than medium and high-technology industries. Food products is the only low-technology industry relatively dispersed across the zone.

Pottery, China and earthenware, footwear, textiles, leather and wearing apparel are the most geographically concentrated industries. Pottery, China and earthenware is principally located in Romania, Greece and Bulgaria[27]. The production of footwear is located in Portugal, Romania and Italia. This industry constitutes respectively 8%, 2% and 50% of these countries industrial production. Footwear industry is also located in Tunisia and Morocco. Textile and wearing apparel industries were mainly located in Turkey (both industries represent about 10 % of the national industrial production). Textile products are also largely produced in Egypt and Estonia.

We can also note that the concentration level has increased for 20 industries (out of 26) between 1990 and 2003. This increase is particularly significant in many low-technology sectors (figure 4): wearing apparel (144%), leather products (133 %) or textile (91%). Tobacco is the only low-technology industry that shows a decrease of it entropy index (-7%) between 1990 and 2003.

Figure 5



Considering medium-technology industries (figure 5), we can note that three sectors show a significant decrease of their entropy index between 1990 and 2003: fabricated metal products (-55%), other manufactured products (-45%), and plastic products (-22%) . On the contrary, the other medium-technology industries exhibit an increase of their geographic concentration level (other non-metallic mineral products, 102%, non ferrous metals, 66%).

[27] Note that the sector is said to be located if the location quotient exceeds 1. In this case, the share in the industry's total production of the country studied exceeds the country's share in total production.

With the exception of industrial chemical products, high-technology industries appear not to much concentrate. However all high-technology industries show an increase of their entropy index level. This increase is particularly significant in the industrial chemicals industry (415%) and transport equipment (144%).

Figure 6

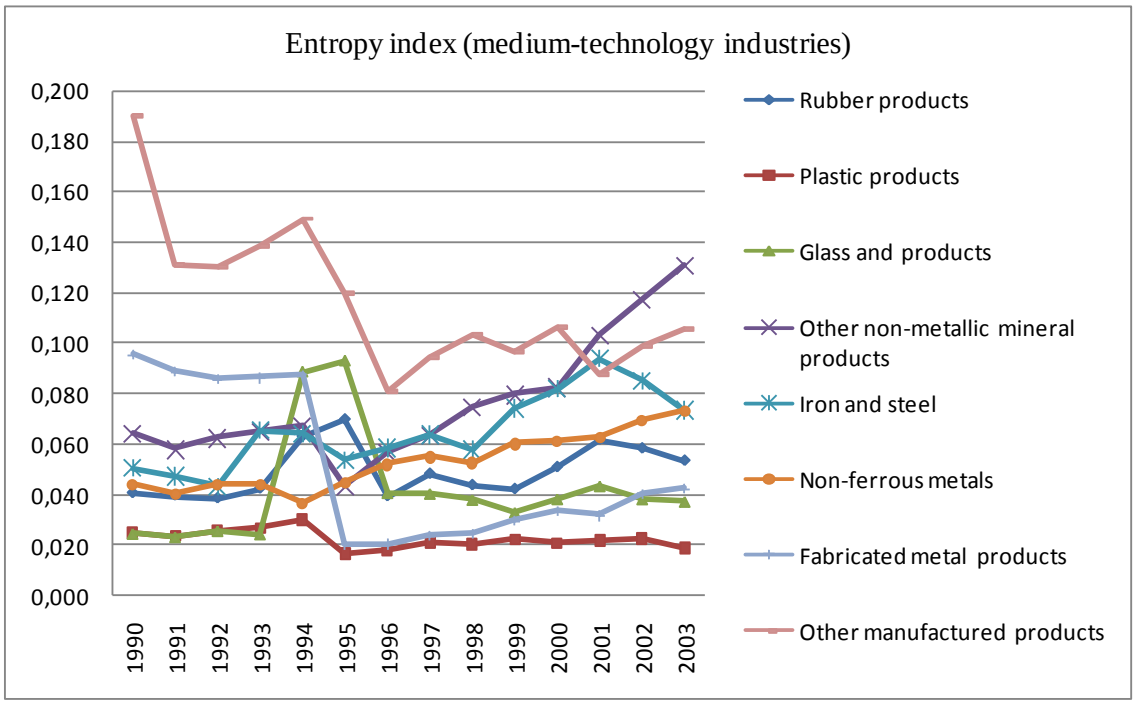
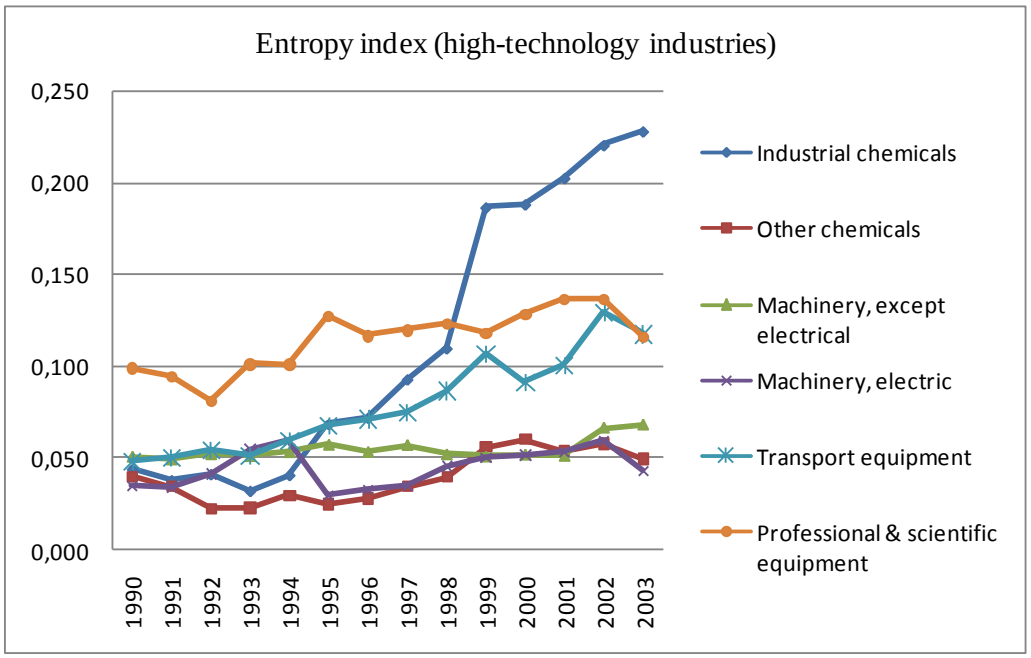


Figure 7



The increasing geographical concentration and specialization suggested by the results can be partly explained by the significant heterogeneity of the sample of countries studied. Low-technology sectors are very concentrated because they concern a restricted number of

countries (especially Mediterranean and new member states). Whereas European and some new member states reduced their production in many 'traditional' sectors, Mediterranean countries reinforced their comparative advantage in these sectors. Medium-technology industries are evenly distributed because they are present in many European countries and new member states, which make up a significant part of our sample. In addition, European countries significantly increased its comparative advantage in high-technology industries between 1990 and 2003.

2.2.2 The theoretical model

In this part, the aim is to develop a theoretical model to better explain the previous descriptive analysis. We propose to develop a 'vertical linkages economic geography model', based on Robert-Nicoud (2002) and Venables (1996) and exposed by Baldwin et al. (2003, Chapter 8). We also extend it to incorporate differences in technology between countries as in Ricci (1999), Amiti and Smarzynska Javorcik (2008) and Bagoulla (2006).

In our theoretical model, the world consist in *c =1,k,.., l* countries. We chose to focus on the manufacturing sector, composed by firms that operate under increasing returns to scale and produce differentiated goods and is inhibited by iceberg trade costs.

The representative consumer in country *k*[28] has an utility function denoted:

$$U_k = \left[\sum_{c=1}^{l} n_c \left(\frac{c_{ck}}{\tau_{ck}}\right)^{(\sigma-1)/\sigma}\right]^{\frac{\sigma}{(\sigma-1)}} \quad ; \quad \sigma > 1 \qquad (1)$$

n_c denotes the set of varieties produced in *c*. Demand and import for varieties produced in country *c* is given by c_{ck}. Demand can provide from country *k*[29]. Products can also be imported from other countries (*c)* and incurred a Samuelsonian iceberg trade cost. It means that for one unit sent, $\tau_{ck} - 1$ units melt in transit. So to deliver one unit from one country to another, τ_{ck} units must be shipped as only a fraction $1/\tau_{ck}$ arrived. $\frac{C_{ck}}{\tau_{ck}}$ thus represents the amount of good that arrives in *k*.

The corresponding indirect utility function can be written as $V_k = \frac{E_k}{P_k}$. E_k is Country *k*'s total expenditure on manufactures which come from consumers and firms. P_k denotes the price index defined over the prices of individual varieties produced in *c* and sold in *k*:

$$P_k = \left(\sum_{k=1}^{l} nk\left(p_k * \tau_{ck}\right)^{1-\sigma}\right)^{\frac{1}{1-\sigma}} \qquad (2)$$

P_k is called the 'perfect' price index since it translates expenditure into utility.

---

[28] *k* can represent a European country (belonging to the "North") or a Mediterranean country (belonging to the "South").

[29] In this case, $c = k$, $\tau_{ck} = 1$.

The maximization of the utility function subject to the budget constraint (E_k), gives the country *k*'s demand function for each goods, produced in *c (1,k,…P)*.

$$c_{ck} = E_k * p_{ck}^{-\sigma} * P_k^{\sigma-1} \quad (3)$$

With

$$p_{ck} = p_c^{-\sigma} * \tau_{ck}^{1-\sigma} \quad (4)$$

Where p_c denotes the f.o.b price in *c*[30].

Now we consider firms' behavior in the manufacturing sector in the country *c*.

The total production of each firm is $x_c = \sum_k^I c_{ck}$. Production of a typical industrial variety entail a fixed cost of one unit of capital (*K*) and a variable cost that involves β_c of labour and intermediate inputs per unit output.

The cost function of a representative variety in a representative industry in the country *c* is given by:

$$r_c + w_c^{1-\mu} P_c^{\mu} \beta_c x_c \quad (5)$$

rc denotes the rewards to capital[31]. We assume that this cost takes the form of a Cobb-Douglas aggregate of labour and P_c. Labour has the price w_c and input share $(1-\mu)$. The composite intermediate good has the price in the country *c* (P_c) and input share (μ).

In the short run equilibrium, capital is inter-regionally immobile. In this equilibrium, consumers maximize utility and firms maximize profits. All the markets clear for a given distribution of capital between regions.

On the supply side, as usual, Dixit-Stiglitz monopolistic competition implies that 'mill pricing' is optimal for industrial firms:

$$p_c = \frac{w_c^{1-\mu} P_c^{\mu} \beta_c \sigma}{\sigma - 1} \quad (6)$$

In the model, the profit of a single firm in *c* is given by:

$$\pi_c = p_c x_c - w_c^{1-\mu} P_c^{\mu} \beta_c x_c \quad (7)$$

The equilibrium can be derived as follows: expenditure (E_i) on industry output produced in *c*, come from producers and consumers located in *c* and from other countries *k*. The product

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[30] Note that if $c = k$, $p_{ck} = p_k$.

[31] Note that since the fixed cost consists only of capital, the operating profit accrues to capital owners by free entry *r* is also the capital reward.

market equilibrium requires setting demand equal to supply. Summing the expenditures of across all locations, we obtain:

$$x_c = p_c^{-\sigma}\left[\sum_{l=1}^{c+k}\frac{\mu E_l \tau_{cl}^{1-\sigma}}{P_l^{1-\sigma}}\right] \quad (8)$$

Finally, substituting the product market clearing condition and, the profit maximizing price into the demand gives:

$$x_c = \left(\frac{w_c^{1-\mu}P_c^{\mu}\beta_c\sigma}{\sigma-1}\right)^{-\sigma}\left[\sum_{l=1}^{c+k}\frac{\mu E_l \tau_{cl}^{1-\sigma}}{P_l^{1-\sigma}}\right] \quad (9)$$

Since capital is used only in the fixed cost, the reward to capital is the operating profit of a typical variety, using the demand function and mill pricing we obtain:

$$\pi_c = \left(w_c^{1-\mu}P_c^{\mu}\beta_C\right)^{1-\sigma}\left[\sum_{l=1}^{c+k}\frac{\mu E_l \tau_{cl}^{1-\sigma}}{P_l^{1-\sigma}}\right]\left[\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} - \left(\frac{\sigma}{\sigma-1}\right)^{-\sigma}\right] \quad (10)$$

In the model agent are short-sighted and capital moves in search of the highest current nominal reward. Inter-country factor flows are governed by the ad hoc equation[32]:

$$\dot{s_c} = s_c(1-s_c)(\pi_c - \pi_k) \quad (11)$$

$s_c = \frac{n_c}{N_l}$ is country's *c* industry share, which also represents the share of capital employed in *c*[33].

In the long run, capital owners employ their capital wherever it earns the higher return. In this case, capital has no incentive to move and $\dot{s_c} = 0$.

We have shown that the share of a representative industry country *c* is related to profit (π_{ic}).

$$s_c = f(\pi_c) \quad (12)$$

Due to the characteristics of the profit equation, it is not possible to get an explicit reduced form solution for the equilibrium number of firms in each period. As we do not observe the potential profitability of each location, we assume that firms choose the country yielding the highest profit. For the empirical specification, as Amiti and Smarzynska Javorcik (2008), we assume that we assume the function $f_t = ln(\pi_{ct})$.

So, we obtain :

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[32] Note that in the FCVL model pure profits are eliminated and capital rewards are equal to operating profits. In the long run the spatial allocation of capital takes time and hence, current operating profits might differ from the average in the short run.

[33] Remember that capital is mobile between countries whereas capital owners are immobile. Capital is only employed in meeting the fixed costs of industrial firms. Physical capital can be separate from its owners and so, the country in which capital's income is spent may differ from the country in which it is employed (Martin and Rogers, 1995).

$$\ln(\pi_{ct}) = \begin{matrix}(1-\sigma)(1-\mu)\ln w_{ct} + (1-\sigma)\ln(\beta_{ct}) + (1-\sigma)(\mu) \\ \sum_m \ln\left(\sum_{l=1}^{c+k} n_l (p_{lt}\tau_{clt})^{1-\sigma}\right) + ln\left(\left(\sum_{l=1}^{c+k} \frac{\mu E_{lt}\tau_{clt}^{1-\sigma}}{P_{lt}^{\sigma-1}}\right)\right) + v_i\end{matrix}$$

(13)

v_i represents industry's fixed effects (such as the market power).

Our estimating equation considering the share of the industry *i* in c at time *t* depends on three main variables: labour costs (LC), supply access (*SA*) and market access (*MA*). *X* is the vector of different control variables.

$$s_{ict} = \alpha_0 + \alpha_1 LC_{ict} + \alpha_3 SA_{ict} + \alpha_4 MA_{ict} + X_{ict} + \epsilon_{ict} \quad (14)$$

Thus, in the model, there are different forces governing the nature of the agglomeration and dispersion of firms:

- First agglomeration force: *backward linkage*. Transportation costs imply that firms buy a large amount of intermediates goods on the domestic market. Then, when more capital is allocated in the country *c*, production shifting results in expenditure shifting. This raises profits in *c* and s_c rises.
- Second agglomeration force: *forward linkage*. If s_c increases, more varieties are produced in *c*. That reduces the production costs (P_{Mc}) in this country and raises country's *c* profit.
- Third agglomeration force: *market-access effect*. Spatial distribution of expenditure affects spatial distribution of firms. In the presence of trade barriers, firms are incited to locate in the largest market.
- First dispersion force: *market-crowding effect (local competition effect)*.When more firms settled in *c*, market shares decrease for existing firms and hence, the profit in this country shrinks.
- Second dispersion force: *countries' comparative advantages*. The profit also depends on wages and productivity.
- Other elements affect the profit : elasticity of substitution between varieties ($\frac{\sigma}{\sigma-1}$), the share of labour and intermediate inputs in production[34] (μ).

All these variables are linked to the level of trade barriers. In the next section we propose to evaluate these trade barriers thanks to a gravity equation before estimate the location model.

2.2.3 The role of trade costs: a measure through the gravity equation

The evolution of trade costs and asymmetry in market access caused by the differences in the structures of tariffs and other non tariff barriers becomes a growing concern in integrated zones. Indeed, the level of trade cost has proven to have a significant impact on firms' location choice.

[34]It's a key parameter as it represents the importance of the linkage between firms.

Economic theories suggest that when a preferential trade agreement (PTA) is formed, firms from outside the region are motivated to move their production to the integrated bloc because the benefit of preferential market access. The effect can however not be uniform across integrated countries. Puga and Venables (1997) and Baldwin et al. (2003) show that firms are tend to concentrate in the country that has the better access to the other countries' markets. For Chen (2008), the distribution of firms within the integrated zone depends on the level of trade costs. At the first stage of the integration, countries that are integrated with a larger number of countries or countries with a larger market size are more likely to experience an increase in firm location. As it becomes less costly to export within the integrated region, firms can than have a greater incentive to concentrate their production in the country with lower production costs. In addition, as countries belong to several PTA, they can constitute a hub and export to all spokes at low tariff (Chen, 2008). Altomonte (2007) shows that regional integration agreements which promote trade liberalization not only along the 'hub and spokes' countries but also across the 'spokes' may enjoy a different pattern. Making the market accessible from every peripheral country might allows firms to exploit their comparative advantages without suffering a reduction of market access. Because of the importance of trade costs for economic geography, a growing literature is aimed at measuring and understanding them.

Within the euro-Mediterranean area, trade barriers between countries may be significant (especially between South/South countries). They may be the result of physical transport costs, political dissension of imperfect trade integration. However, a high quality data on direct measures of policy barriers are poor and incomplete especially with regard of non-tariff barriers to trade.

Given these problems, many authors use and indirect measure of market access, based on the theory of gravity. The border effect approach, initiated by McCallum (1995), has been recently completed by theoretical foundations (Deardorff, 1998, Anderson and van Wincoop, 2003). The border effect approach permits to account for the fact that internal demand is largely met by domestic producers (Mayer and Zignago, 2005)[35]. In addition, the border effect approach captures all the trade impediments related to the existence of national borders. By using a bilateral trade equation derived from a theoretical model, some authors show how taking the theory seriously can provide a much more useful interpretation (Anderson and van Wincoop, 2003, Head and Mayer, 2004).

Following this recent literature, we propose to infer the trade costs in the euro-mediterranean area from an economic model linking trade flows to observable variables and unobservable trade costs. As Head and Mayer (2004), Chen (2004) and Altomonte (2007), we use information from international trade flows to calculate a proxy for transport costs. Redding and Venables (2004) and Head and Mayer (2004) show that the demand function (equation n°9 in our theoretical model) can be reinterpreted as the volume of sales per firm in each location. Expressing these in aggregate value gives exports from *c* to *l :*

$$X_{cl} = n_c p_{cl} x_{cl} = n_c p_c^{1-\sigma} \mu E_{\ l} \tau_{cl}^{1-\sigma} P_l^{\sigma-1} \qquad (15)$$

$$\ln\left(X_{cl}\right) = \ln\left(n_c {p_c}^{1-\sigma}\right) + \ln\left(\mu E_{\ l} P_l^{\sigma-1}\right) + \ln\left(\tau_{cl}^{1-\sigma}\right) \qquad (16)$$

[35] The border effect methodology consists in comparing the relative volumes of intra and international trade for two countries.

Bilateral trade flows depend on the importer' "capacity market" $(\mu E_l P_l^{\sigma-1})$ and on the product of the number of firms and their price competitiveness $(n_c p_c{}^{1-\sigma})$. Those terms include both origin and destination price levels, which are related to the existence of "multilateral resistance". $(\tau_{cl}^{1-\sigma})$ are the bilateral market access given by:

$$(\tau_{cl}) = \boldsymbol{dist}_{cl}^{\alpha_4} \boldsymbol{b}_{cl}^{\delta_{cl}} \qquad \textbf{(17)}$$

The gravity specification if the trade equation is nested in the previous demand function is given by:

$$\ln(X_{cl}) = \alpha_1 + \alpha_2 \ln(Y_{ct}) + \alpha_3 \ln(Y_{lt}) + \alpha_4 \ln(d_{cl}) + \alpha_5 \delta_{cl} + \beta_c + \gamma_l + \rho_t + \varepsilon_{clt}$$
(18)

With $\boldsymbol{\alpha_4 = (1-\sigma)\rho}$ $\boldsymbol{and}$ $\boldsymbol{\alpha_5 = (1-\sigma)lnb_{cl}}$ (19) and (20)

Bilateral trade flows between *c* and *l* (X_{cl}) depend on the country masses, proxied by their GDP, on their bilateral access (d_{cl}) **and on the border effect**. Anderson and van Wincoop (2003) have shown the necessity to control for the unobserved country-specific heterogeneity ("multilateral resistance") to obtain a correct specification of the gravity equation. Following Head and Mayer (2004) and Altomonte (2007), we have so included country fixed-effects in the estimates (β_c *and* γ_l).

Data and econometric strategy

In the table 4, we estimate equation (18) using COMTRADE database. It includes the bilateral exports of 28 countries[36] from 1994 to 2003 (7840 obs.). We also need intra-country trade data (*Xcc*). As in many order papers, we construct such data by subtracting total exports from GDP (Chen, 2004, Wei, 1996). The implementation of the model also needs international and intra-national distances. These measures have proved to have a significant impact on the border effect estimate (Head and Mayer, 2002). To avoid this problem, both international and intra-national distances are based on bilateral distances between cities weighted by the share of the city in the overall country's population[37].

To estimate the magnitude of border effects, we test different specifications based on the gravity equation. A fixed effect model[38] is presented in column (1), (Table 4). This regression method has interesting features. It gives the same estimates coefficients as we would obtain from the within model and also permit to estimate time-invariant variables. In the column (2), we use the random effects estimator including bilateral effects. The Hausman specification test revealed that the fixed effect model is preferred[39] to the random model. A first solution

[36] All the countries, except Belgium/Luxembourg mentioned in the descriptive analysis (Section 2.2.1) are included here.

[37] Data on distances are available in the following address : www.cepii.fr

[38] The dummy variable regression method is used in order to separately take into account for exporter, importer and time effects .

[39] This test compares the fixed versus random effects under the null hypothesis that the individual effects are uncorrelated with the other regressors in the model (Hausman , 1978). As if H0 is rejected, a random effect model produces biased estimators.

would have been to perform the Hausman-taylor estimator. However, we did not find exogenous time-varying variables as good instruments. The other solution is to use an alternative procedure for the estimation of time-invariant variables: the fixed effect vector decomposition technique (FEVD) proposed by Plümper and Troeger (2007)[40]. This approach produces the most efficient and the least biased estimators if compared with the random effects model. The estimator decomposes the unit fixed effects into an unexplained part and a part explained by the time-invariant variables. In a first step, a fixed effects model is obtained to estimate of the unit effects. The second step involves an OLS regression of the fixed effects vector on the time invariant variables. This permits to decompose the fixed effects vector into a part explained by the time-invariant variables and an unexplainable part, the error term. In the last stage the model is re-estimate by pooled OLS, including all explanatory variables, the time invariant variables and the error term. This model is presented in column (3). Finally, as random and FEVD models do not control from the potential endogeneity of GDPs[41], we re-estimate the fixed effect model using an instrumental variable estimator[42]. The choice of instruments is validated by the application of the Sargan test. Because we use lagged variables as instruments, the number of observations is less than 7056 observations.

This analysis tends to evaluate the importance the border effect within the euro-Mediterranean area. The table 4 reports the average border effect in trade between the countries belonging to the euro-Mediterranean area. The models fit of the regression is in line with the usual finding in gravity literature. All the estimated coefficients have the expected sign and are significant. The parameter distance is more than the unity and The intra-trade is, on average, 11 times (*=exp(2,42)*) larger than the cross-border trade in the euro-Mediterranean area.

Table 4 : Gravity equation estimation

Dependant variable (exports) : $\ln(X_{ci})$	(1) Fixed effects model (b)	(2) Random model	(3) FEVD model	(4) Fixed effect IV Model(c)
Exporter GDP($\ln(Y_{ct})$)	0,53 (0,14)***	0,80***(0,02)	0,77***(0,04)	0,80 (0,20)***
Importer GDP ($\ln(Y_{it})$)	0,57 (0,17)***	0,99***(0,02)	0,90***(0,03)	0,58 (0,20)***
Distance ($\ln(d_{ci})$)	-1,65(0,03)***	-1,64***(0,08)	-1,64***(0,01)	-1,66 (0,03)***
Boder effect (δ_{ci})	-2,51 (0,11)***	-2,53***(0,36)	-2,53***(0,04)	-2,42 (0,12)***
Nb. of obs.	7840	7840	7840	6272
R2	0,83	-	0,97	0,83
Wald test, Chi (4)		4660, 96***		
Nb. of bilateral obs.		784	784	784
Const.	4,82 (6,52)	-12,61***(0,89)	-8,54***(0,14)	-2,06 (4,39)
Wald tests				
Exporter effects	47,31***	No	No	Yes
Importer effects	24,32***	No	No	Yes
Bilateral effects	No	Yes	Yes	No
Time effects	1,56*	Yes	Yes	No
Hausman test, Chi 2(2)		48,35***		
Sargan Statistic				5,87**

[40] This technique has also been used by Daumal and Zignago (2008).

[41] These explanatory variables in the model are correlated with the idiosyncratic error.

[42] We use lagged variables as instruments for both exporter and importer GDP.

Notes: (a) *significant at 10%, ** significant at 5%, *** significant at 1%. Robust Standard errors in parentheses. (b) Dummy variables regression (country exporter, country importer, time). (c) Dummy variables regression (country exporter, country importer) with lagged (t-1 and t-2) variables used to instrument GDPs.

Since bilateral trade barriers vary across countries, the average border effect can mask substantial differences across country groups. In other to check this differences, in a second stage, we break down the sample into three country groups: 12 European countries (EU), 10 new member states (NE) and 6 Mediterranean countries (MED). Border effects have been re-evaluated for each group separately (see Table 5).

Table 5: Gravity equation, by country group.

	EU Model	EU Model	NE Model	NE Model	MED Model	MED Model
Dependant variable (exports) : $\ln(X_{ci})$	(1) Fixed effect IV Model	(2) FEVD model	(1) Fixed effect Model (b)	(2) FEVD model	(1) Fixed effect Model (b)	(2) FEVD model
Exporter GDP($\ln(Y_{ct})$)	0,37***(0,13)	0,37 (0,04)***	0,89***(0,38)	0,83***(0,02)	0,12 (1,48)	0,01 (0,03)
Importer GDP $(\ln(Y_{it}))$	0,75***(0,13)	0,67 (0,03)***	0,71*(0,39)	0,76***(0,02)	1,92 (1,44)	1,71 (0,03)***
Distance $(\ln(d_{ci}))$	-1,40***(0,02)	-1,56(0,01)***	-1,96***(0,06)	-1,90***(0,3)	-2,71***(0,23)	-1,22 (0,03)***
Boder effect (δ_{ci})	-1,74***(0,07)	-1,43 (0,02)***	-1,90***(0,20)	-2,07***(0,12)	-2,78***(0,62)	-5,83 (0,11)***
Nb. of obs.	1296	1440	1000	1000	360	360
R2	0,96	0,99	0,85	0,94	0,70	0,98
Nb. of bilateral obs.	124	124	100	100	36	36
Const.	-2,50(4,15)	6,58*** (0,20)	5,65 (4,51)	-6,18***(0,76)	-3,58 (28,35)	-11,47*** (1,05)
Exporter effects	Yes	Yes	Yes	No	Yes	No
Importer effects	Yes	Yes	Yes	No	Yes	No
Bilateral effects	No	No	No	Yes	No	Yes
Time effects	No	No	No	Yes	No	Yes
Hausman test, Chi (2)		79,88***		62,68***		8,16**
Sargan Statistic			0,255		0,113	

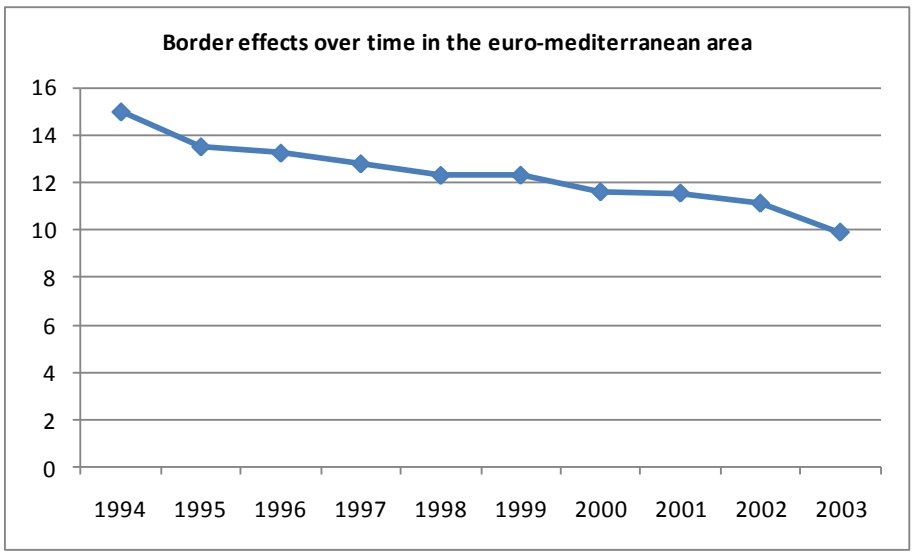
Notes: (a) *significant at 10%, ** significant at 5%, *** significant at 1%. Robust Standard errors in parentheses. (b) As we can find good instruments the GDPs, we present the simple dummy variables regression (country exporter, country importer).

When the border effects have been estimated by country groups, we notice that the EU border effect is relatively low in comparison to NE and MED border effects. Crossing the national frontier inside the EU reduce trade by 6 times (*exp(1,74)*), whereas it generates a decrease of trade by a factor 7 in the NE group and 16 in the MED group. This result show shows the limit of the integration between Mediterranean countries and tend to confirm Almonte and Gualiano's (2003) results: Eastern Europe is more integrated than Mediterranean countries. This no-existence of an important "Mediterranean" market could have an important impact on firm's location choices. Eastern countries can be more attractive than Mediterranean countries.

To analyze the time evolution of border effects, that is the change in the degree of economic integration in the area between 1990 and 2003, we introduce in the gravity equation (18) a time dummy variable which is interacted with border indicator. Figures 8 reports the time evolution of the average border effect. The average euro-Mediterranean border effect slightly

decreases between 1994 and 2003 but remains very high. This result underlines the need of a deeper integration between the partners of the euro-mediterranean area.

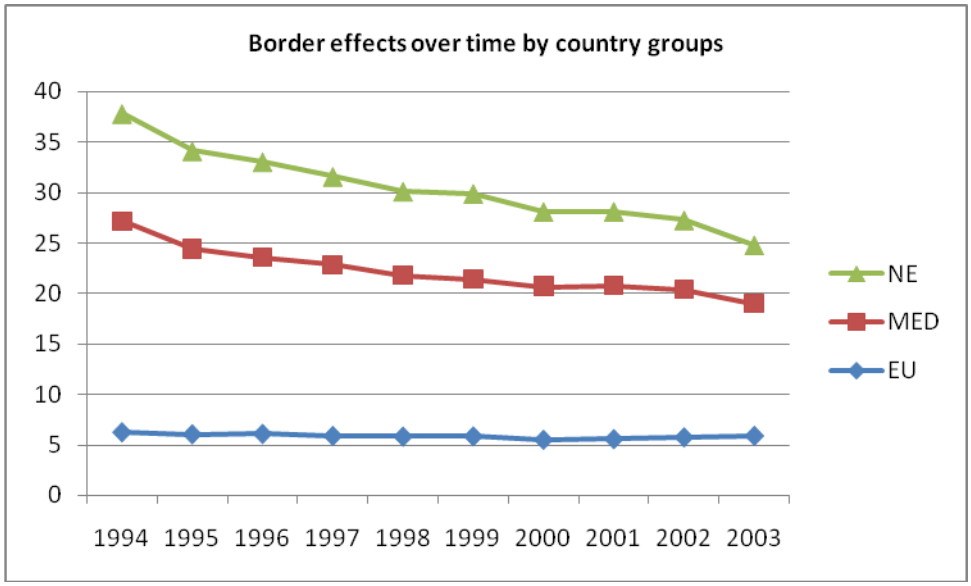
Figure 8



Notes : The figure is based on the regression of the fixed effect model, with exporter, importer and border*time dummies.

Figure 9 breaks down the border effects by country groups. Border effects decrease slowly in EU (from 6,2 to 5,21 between 1994 and 2003) whereas the decrease is more significant in new member states (from 10,6 to 5,7) and Mediterranean countries (from 21 to 13 between 1994 and 2003).

Figure 9



Notes: The figure is based on the regression of the fixed effect model, with exporter, importer and border *time dummies.

Following Olper and Raimondi (2005), we also propose to evaluate the ad-valorem equivalents (AVEs). Considering equation 20 and the fact that δ_{cl} is one plus the tariff equivalent of all trade barriers associated with the national border, the AVE is given by :

$$AVE = \exp\left(\frac{\alpha_s}{1-\sigma}\right) - 1 \qquad (21)$$

Table 6: Border effects and implied AVES (average 1994-2003)

	Border effect average	AVEs
EU	5,70	54,50
NE	6,69	60,80
MED	16,12	100,37

Note: The results come from the estimation of fixed effect models. σ=5 in the calculations.

Finally, the results from the trade equation have also been used to evaluate the supply and market accesses (MA and SA). Following Redding and Venables (2004) and Head and Mayer (2005), the coefficients of the countries and partners dummies in the trade equation[43] provide estimates of market and supply capacities whereas the distance and border coefficients provide estimates of the bilateral trade cost measure ($\tau_{lt}^{1-\sigma} = \emptyset_{cl}$). The estimation of Market and supply accesses is given by:

$$\widehat{MA}_{ct}\_est = \sum_l^{c+k} \widehat{\emptyset}_{cl} \exp(\hat{\beta}_c) \qquad (22)$$

And

$$\widehat{SA}_{kt}\_est = \sum_l^{c+k} \widehat{\emptyset}_{cl} \exp(\hat{\gamma}_k) \qquad (23)$$

[43] To obtain these coefficients, the gravity equation has been estimated for each of the 10 years.

Where $\widehat{\emptyset_{cl}} = \exp(\widehat{\alpha_3})\, d_{cl}^{\widehat{\alpha_2}}$ when $c \neq l$.

And Where $\widehat{\emptyset_{ll}} = d_{ll}^{\widehat{\alpha_2}}$ when $c = l$.

We run the gravity equation (24) using the fixed effect model per year in order to obtain countries fixed effects, distance and border coefficients per year[44]:

$$\ln(X_{cl}) = \alpha_1 + \alpha_2 \ln(d_{cl}) + \alpha_3 \delta_{cl} + \beta_c + \gamma_l + \varepsilon_{cl}$$

2.2.4 Industrial location and regional integration

In previous sections, we have shown that concentration and specialization levels depend on countries and industries' characteristics. Remember that geographic concentration is higher in low-technology industries. In addition, European countries appear relatively less specialised than new entrants and Mediterranean countries.

The aim of this section is so to explain the spatial distribution of industries in the euro-Mediterranean area and to evaluate the impact of regional integration and international openness on geographic concentration. The concentration ratio (corrected by the countries' sizes) is used to evaluate geographical concentration.

4) Model specification

As we have shown in section 2.2.2, the theoretical model considerers that the share of a representative industry *i* in the country *c* is related to the profit (π_{ic}). The equation 14 proposed in the section 2.2.2 must now be precised. It becomes:

$$\ln c_{ict} = \alpha_0 + \alpha_1 \ln(LC_{ct}) + \alpha_3 \ln(SA_{ict}) + \alpha_4 \ln(MA_{ict}) + X_{ict} + v_i + v_c + v_t + \epsilon_{ict} \quad (24)$$

The location of the industry (*i*) in the country (*c*) and in the period (*t*) thus depends on the supplier's access(SA_{ict}), the market access (MA_{ict}) and the level of labour costs (LC_{ict}). Other variables could have an impact on firm's location choices as quality of the infrastructures, of the global business environment. International trade costs and firms characteristics have also to be considered in such analysis. The vector X_{ict} includes all these control variables. The terms v_i, v_c, v_t represent industry, country and time fixed effects.

5) Variables and data description

In section 2.2.1 we have mentioned all the concentration and specialization indexes found in the empirical literature. In our econometric analysis, the dependent variable is the concentration ratio, weighted by the relative size of each country in the euro-mediterranean area:

[44] We do not include GDPs so as the masse effect is captured by the countries' individual effects coefficients. Those coefficients are then used to calculate countries' richest in the market potential function.

$$\ln\left(C_{ict}\right) = \log\left(\frac{\frac{X_{ict}}{X_{it}}}{\frac{GDP_{ct}}{GDP_{t}}}\right) \quad (25)$$

Where, X_{ict} denotes the output in the industry (*i*), country *(c)* at time (*t*). GDP_{ct} is the current GDP in *c* at time *t* and GDP_{t} represents the total courant GDP in the euro-mediterranean area in *t*. This variable makes it possible to assess the geographic distribution level of the industries in the integrated area, corrected for the relative size of each country[45]. In addition, contrary to other geographic concentration indexes, the concentration ratio makes it possible to take into account the three observation levels in our database (by countries, industries and years).

The low level of labour costs is one of the main factor responsible for firms' location in developing countries. As precise data on wages are not available, following Mayer et al. (2007), we proxy labour costs by the GDP per capita. This measure is expect correlated with wages and corrected for productivity differentials between countries.

$$\ln\left(Lab_{ct}\right) = \ln\left(GDPc_{ct}\right) \quad (26)$$

We expect a negative relationship between labour costs and the location of industries.

Firms buy inputs from their one country and from other countries (especially in countries belonging to the integrated area). The supply access effect comes through the price and the availability of inputs. Our measure of the supply access measures proximity to inputs (including from the same industry[46]) available in the home country and in other countries in the area:

$$\ln\left(SA_{ict}\right) = \varphi_i \sum_{l}^{c+k} \sum_{i}^{n} \frac{X_{nlt}}{X_{nt}} * dist^{-1}{}_{cl} \quad (27)$$

φ_i is the share of industrial inputs in each industry[47] and $\frac{X_{ilt}}{X_{it}}$ illustrates the relative production of industry *n* in neighbor countries. $dist^{-1}{}_{cl}$ is the distance between countries[48]. This variable is a proxy for the proximity of other industries in the considering country. We expect a positive link between this variable and the dependent variable of the model.

---

[45] Other variables, as the location quotient, have been tested but the ratio concentration ratio is the most pertinent in our analysis. It is closer to the theoretical model and easier to interpret than the location quotient.

[46] While studying the input-output table of some countries we have noticed that at the level of data disaggregation we have, the main share of input used in the production process comes from the same industry.

[47] As technical coefficients for each country/industry are not available we introduce these shares in order to take into account of the importance of inputs in each industry production level. These data are obtained by studying countries' input-output tables (OECD).

[48] We use the same measure of distance as in the gravity equation (see section 2.2.2).

As evoked in the previous section, we also derived our supply access measure from our previous gravity approach:

$$\ln\left(SA_{ct}\_est\right) = \sum_{l}^{c+k} \tilde{\emptyset}_{cl} \exp\left(\hat{\gamma}_{lt}\right) \quad (28)$$

Where $\hat{\gamma}_{lt}$ is the exporter's fixed effects coefficient[49].

The profit (and location) is an increasing function of the market access. Numerous formulation of the market access has been proposed in the literature. All constitute an extent of Harris' (1954) the market potential function. Amiti and Smarzynska Javorcik (2008) construct a measure of market access that reflects the demand coming from both firms and households. Some recent studies derive measure of market access from a gravity approach. Redding and Venables (2004) and Head and Mayer (2004) use the estimated parameters of the country fixed effects in bilateral trade equation in order to calculate countries' supply and market accesses. Thus, we use two alternative measures of the market access. The first one is the classical Harris' (1954) the market potential function:

$$\ln(MA_{ct}) = \ln\left(\sum_{l=1}^{c+k} \frac{GDP_{lt}}{dist_{cl}}\right) \quad (29)$$

Different market access variables are alternatively introduced in order to explicitly distinguish the access to the UE market (*lmajt_eu*) from the access to the new member states (*lmajt_ne*) and Mediterranean countries (*lmajt_med*) markets.

$$\mathbf{\ln(MA_{ct}\_eu) = \ln\left(\sum_{l=1}^{c_{eu}+k\_eu} \frac{GDP_{lt}}{dist_{cl}}\right)} \quad \mathbf{(30)}$$

With *c_eu and k_eu* represent the countries belonging to the EU sample.

$$\mathbf{\ln\left(MA_{ct\_ne}\right) = \ln\left(\sum_{l=1}^{c_{ne}+k\_ne} \frac{GDP_{lt}}{dist_{cl}}\right)} \quad (31)$$

With *c_ne and k_ne* represent the countries belonging to the NE sample.

$$\mathbf{\ln\left(MA_{ct\_med}\right) = \ln\left(\sum_{l=1}^{c\_med+k\_med} \frac{GDP_{lt}}{dist_{cl}}\right)} \quad (32)$$

With *c_med and k_med* represent the countries belonging to the MED sample.

The second measure of the market access is built along the lines of the method proposed by Redding and Venables (2004) and Head and Mayer (2004). It is derived from our gravity approach.

$$\ln\left(MA_{ct}\_est\right) = \sum_{l}^{c+k} \tilde{\emptyset}_{cl} \exp\left(\hat{\beta}_{lt}\right) \quad (33)$$

Where $\hat{\beta}_{lt}$ is the importer's fixed effects coefficient[50].

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[49] See section 2.2.2 for details on the gravity estimation.

[50] See section 2.2.2 for details on the gravity estimation.

The international openness of each country can also impact on firms' location choices. A internationally "open" country have an easier access to both international demand and supply. Openness could attract firms in a country. However international openness can also generate more competition in markets. The coefficient of this variable can so be positive of negative. The openness indicator presented in the Penn World Table (Heston *et al.*, 2006) is used to evaluate the countries international openness.

Some variables are also included in order to control industrial location from the quality of the economy environment in each country. *Serv.ct* is the share of services (in value added) in the countries' GDP. It evaluates the quality of services in the country. *Roadct* measure the share of road paved (in the total) and control for the quality of infrastructures.

Finally, variables are introduced in the model in other to take into account firms' characteristics. The number of firms in each industry (*firmi*) is used as a proxy of scale economies. The variable (*techi*)[51] illustrates the technological level of the industries studied: low (1), medium (2) and high (3). As we have seen in our descriptive analysis, low-technology industries are relatively more concentrated. We so expect a negative relationship between industries' technological level and industrial location.

In this part, we use the same dataset as in the descriptive analysis (see Section 2.2.1) for the output and the number of firms. The database includes twenty-nine countries (thirteen European countries (EU), ten new entrants (NE) and six Mediterranean (MED) and covers 26 manufacturing sectors form 1990 to 2003. We thus have 10556 observations. Data on both internal and external distance come from the CEPII database. Indicators on services and road come from the World Bank (*World Development Indicators*, 2007).

6) Estimation strategy

Several model specifications are proposed in order to test the impact of the different measures of supply and market access on industrial location. Our estimation strategy is similar to the one used in the estimation of the gravity equation. Country, industry*time fixed effects are introduced in the models in other to take into account of heterogeneity between industries, countries and years. We consider the endogeneity problem of both supply access and market access in the model. The revealed endogenous variables are instrumented by the value of the variable at the previous year. The validity of the instruments is proved thanks to the Sargan test. In addition, the Hausman specification test permit to choose between the within IV model and the random IV model. We also performed the panel fixed effects regression with vector decomposition (Fevd model). It has the advantage to better estimate the rarely changing variables, as *road_ct* and *servi_ct* (Plümper and Troeger, 2007)[52].

Table 7
Summary statistics of main variables (1990-2003)

Variables	Label	Mean	Std. Dev.	Median	Mini	Maxi
Concentration ratio	$\ln c_{ict}$	3	0,94	3,12	0	6,40

[51] We use the OECD classification of industries (Hatzichronoglou , 1997).

[52] Note that the Hausman estimator cannot be used here as we don't have time-invariant variable in our model.

Labor costs	$\ln(lab_{ct})$	15,80	1,13	16,10	13,36	17,48
Supply access	$\ln(sa_{ict})$	0,018	0,012	0,013	0,005	0,069
Estimate supply access	$\ln(sa_{ct}\_est)$	0,63	0,91	0,23	0,01	5,49
Market access (Harris)	$\ln(ma_{ct})$	6,25	0,55	6,16	5,16	8,13
Estimate market access	$\ln(ma_{ct}\_est)$	0,97	1,44	0,31	0,051	6,72

The results of the estimates of equation (24) are reported in table 8. Columns (1-2), (3) and (4-5) propose different measures for both supply access and market access. First of all, our results largely confirm the importance of labour costs in firm's location choices. In the euro-Mediterranean area, industries seems to be located in countries which benefit from the lower labour costs. This result confirms our descriptive analysis, the most concentrated industries are primarily present in Mediterranean countries and new member states. Supply access variables have high positive and significant coefficients. This is in line with economic geography theory's expectations which consider the access of input as one of the main location force. On the contrary, market access variables coefficients are generally negative and significant. That is not so surprising in our sample of countries. As we have seen in the descriptive analysis, the more important one country is or the richer its neighbours are, the less the industries appear concentrated in those countries. Northern European countries have a higher market access and attract high-technology industries which are the least concentrated ones.

In column (3), regional economic integration is represented by the measures of market potential that take into account only the access and size of respectively, EU, NE and Med partners. We notice that market access variables have different coefficients. An easy access of the EU market seems to promote industrial dispersion, whereas industrial concentration is higher in countries that benefit from a good access to new entrants and Mediterranean countries markets. A better regional integration in new member states and in Mediterranean countries may attract firms in those regional markets. Firms would then benefit from low labour costs without suffering from regional market segmentation. These results are conformed to those of Altomonte (2007). An increase of 1% in NE countries markets potential leads to a 0, 54% increase of industrial concentration. An increase of integration in Mediterranean countries only generate 0,11% increase of industrial concentration. That may be due to the higher segmentation of Mediterranean countries markets (see section 2.2.3) or to a better the legal framework in the NE countries. Those countries experience a convergence toward a common set of rules needed for their accession to the EU (the so-called *acquis communautaire*). Geographic concentration is also higher in low-technology industries. In addition, countries that benefit from a better quality of transport infrastructures and business environment attract more industrial production. Finally, international openness seems to promote the geographic concentration of industries in our sample our countries.

Table 8 : Regressions results

Dependent variable (lnc_ict)	(1)	(2)	(3)	(4)	(5)
	Within IV model (b)	Fevd model	Fevd model	Within IV model (b)	Fevd model
ln(lab_ct)	-0,31(0,06)***	-0,36 (0,02)***	-0,38***(0,01)	-0,08(0,01)***	-0,15(0,01)***
ln(ma_ct)	-0,21 (0,08)**	-0,20 (0,02)***			

ln(ma_ue_ct)			-0,94 (0,43) ***		
ln(ma_ne_ct)			0,54 (0,017) ***		
ln(ma_med_ct)			0,11 (0,01) ***		
ln(ma_est_ct)				-0,06(0,15)***	-0,03 (0,012) ***
ln(sa)	14,98 (4,26)***	17,46 (0,86)***	16,93 (1,35) ***		
ln(sa_est_ct)				0,11(0,02)***	0,05 (0,02) ***
Low_techn_i	0,32(0,02)***	0,39(0,03)***		0,21(0,03)***	0,34(0,002)***
Firms_i	1e-05(1,5e-06)***	1e-05(1,3e-06)***	1,1e-05(1,38e-06)***	2,1e-05 (1,64e-06)***	1,0e-05 (1,49e-06)***
Road_ct	0,0017 (0,013)***	0,007 (0,0004)***	0,015(0,0005)***	0,0013**(0,005)	0,005*** (0,005)
Serv_ct	0,018 (0,002)***	0,015(0,001)***	0,037(0,001)***	0,02***(0,001	0,019 (0,002)***
Open_ct	0,001 (0,0006)**	0,001(0,0008)***	0,0021(0,0002) ***	0,001(0,0003)***	0,002 (0,001)
Const	7,30(0,78)***	7,54 (0,18)***	7,11(0,23)***	2,5 (0,20)***	4,77 (0,18)***
Nb, observ,	9802	10556	10556	6552	7280
R2		0,92	0,21		0,18
Country effect	55,85***	Yes	Yes	37,46***	Yes
Industry *time effects	2,22***	Yes	Yes	2,32***	Yes
Hausman test, Chi 2 (6)	17,53***			14,65**	
Sargan statistic	15,06***			18,57***	

Notes: (a) *significant at 10%, ** significant at 5%, *** significant at 1%. (b) In within IV specifications, the number of observations is lower that considering the fevd model because lagged-variables are used in the regressions.

In this part of the project, we propose an empirical analysis of the apace distributions of industries in the Euro-Mediterranean area. The study is first descriptive and underlines the increasing concentration of activities considering a large sample of countries. European countries are the least specialised and attract more and more high value-added sectors whereas Mediterranean countries are more and more specialized in the production of low-technology goods. Southern European and acceding countries are in an intermediate position. They still produce many low-technology products but give up some traditional sectors. They also produce more and more medium-technology goods. Low-technology industries appear more concentrated than high technology industries in this area.

The location model confirm some “classical” results. Firms are attracted by low labour costs and a favourable economic environment. However, the results also show that geographic concentration is higher when the market access is small. European countries tend to specialize more and more in high value-added sectors which are not so geographically concentrated. On the contrary, Mediterranean countries and new member states still attracted low-technology sectors which are highly concentrated. This process is reinforced by international openness. Finally, an increase in new entrants and Mediterranean regional market accesses would reinforce geographic concentration whereas a better access to the European market would reduce it. In order word, promote South/South would accelerate the industrial concentration in those countries. However, this concentration may not generate growth if it occurs in low-technology industries.

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Part 3 - Regional Integration and Real Convergence:

The experience of the Euro-Mediterranean Area[53]

Introduction

The relationship between regional integration and convergence has been extensively debated in the economic literature. In the early analytical framework, initially developed in the Solow neo-classical growth model, income in poor countries must converge toward that in rich countries. Assuming technology to be constant, the mechanism which leads to convergence relies on the diminishing returns to capital. Indeed, countries with low capital and income per capita should have a higher return to capital. This gives rise to more capital accumulation and faster growth in poor countries. In this regard, any form of trade integration, such as regional integration, accelerates the convergence process. This is due to the fact that capital should flow to capital-scarce countries, in order to benefit from higher returns. Consequently, trade or international factor mobility can play a central role in the convergence process.

However, the renewal of growth theories in the 80s does not provide such a clear picture. For example, Romer (1986) shows that returns to capital are not necessarily diminishing. In this model, human capital with increasing returns is the main driving force of economic growth, which can lead to a divergence process, especially in case of brain drain. As another example, when taking R&D and technology into account in endogenous growth models (Romer, 1990), the relationship between trade and convergence becomes more complicated. Indeed, trade can influence the exchange of knowledge and technology which in turn can influence growth. In this respect, Amable (2000) expects that if a country specializes in high-tech industries, such as electronics, growth is likely to increase and convergence occurs. Similarly, when trade can promote knowledge spillover effects, a convergence process with technological diffusion takes place (Giannetti, 2002, Martin and Sanz, 2003).

The new literature on economic geography further complicates the relationship between trade and convergence. For example, Krugman (1991) stresses that the existence of agglomeration economies can explain that regional integration can lead to increased income inequalities across countries. In a structural model of economic geography, Redding and Venables (2004) also provide evidence that the geography of access to markets and sources of supply is a significant determinant of per capita income. Additionally, some authors recently mixed growth models with economic geography (Martin and Ottaviano, 1999; Fujita and Thisse, 2002 and Baldwin and Martin, 2004). They stress the complementarity between growth and within country spatial concentration in a mutually self-reinforcing process. This reinforces the divergence hypothesis across countries.

[53] This part has been written by Nicolas Péridy.

However, the link between agglomeration and growth has been recently revisited by showing non linearities (Bertinelli and Black, 2004, Brülhart and Sbergami, 2009). This is the Williamson hypothesis which suggests that agglomeration matters more at early stages of development. Indeed, when transport and communication infrastructure is scarce and the access to capital market is limited, efficiency can be significantly enhanced through agglomeration economies. But as infrastructure improves and the access to capital market becomes easier, congestion externalities may favour a more dispersed economic geography. Altomonte (2007) also contributes to this debate by showing that if comparative advantage effects are greater that market size effects, then trade integration leads to dispersion of economic activities.

A final factor which can influence convergence is the use of public funds, like structural and cohesion funds. These funds are accompanying the regional integration process and directly aim at reducing income inequality across regions. In a stochastic endogenous growth model, Kutan and Yigit (2007) recently show that in the presence of knowledge spillover effects, cohesion funds lead to more convergence in a regional economic area. More generally, Rodrik et al. (2004) stress the role of institutions as one major determinant of per capita income.

Summing up, the determinant of income convergence and the role of economic integration depends on a set of factors, such as return to capital, technology, human capital and knowledge spillover effects, the existence of agglomeration economies, the pattern of comparative advantages and specialization, public capital (especially infrastructure) as well as public policies which can affect the long-run growth through various incentives in terms of capital accumulation, technical innovation as well as the use of structural funds.

Given the absence of a global growth theory which simultaneously includes all these factors, the empirical analysis is needed to assess the relationship between regional integration and growth. In this regard, there is also a recent intensive literature[54]. Most of it concentrates on convergence within the EU, following the various integration processes. This concerns the effect of the accession of the EU cohesion countries, i.e. Spain, Portugal, Greece and Ireland (Barry, 2003; Martin and Sanz, 2003; Ramajo et al., 2008). These studies generally support the idea that EU integration has promoted convergence. However, they also stress that convergence has also been encouraged by various specific factors, such as the national growth strategies, the use of Cohesion Funds, labour market performance, etc.). Following the concept of structural convergence, Longhi and Musolesi (2007) also explains the coexistence of EU convergence across countries and divergence across regions.

Much fewer studies focus on the impact of other regional economic areas. For example, the effect of regional integration in Africa is investigated by Jones (2002) for the Economic Community of West African States (ECOWAS), as well as by Carmignani (2006) concerning the Common Market for Eastern and Southern Africa (COMESA). With regard to Asian countries, Jayanthakumaran and Verma (2008) show that in the

[54] In this paper, we focus on the relationship between regional economic integration and convergence. However, there is also an abundant literature concerning the general impact of trade liberalization on growth and convergence (see for example Milanovic, 2006; Frankel and Romer, 1999 as well as Baier et al. 2009 for a survey).

Association of South Eastern Asian Nations (ASEAN), the multilateral and regional integration processes are complementary for explaining income convergence.

With regard to Mediterranean countries, there are few empirical studies available. Rey (2005), Guétat and Serratino (2006, 2007, 2008 and 2009), Erlat (2007) and Pesaran (2007) concentrate on an analysis of convergence of MENA across themselves. This means that the convergence test applies to the income threshold of these countries. Results suggest that the convergence process is not uniform over time and across countries. For example, there may be some differences between oil countries and non oil countries (Rey, 2005), or convergence clubs as argued by Guetat and Serratino (2007). In any case, the convergence hypothesis is not clearly established for Mediterranean countries.

A few other studies choose another income reference threshold, such as Southern EU countries and France (Guétat and Serratino, 2008, 2009). Using time series tests for income convergence, these authors conclude that there is generally no convergence of MENA countries toward Southern EU countries levels, with the exception of Tunisia and Egypt.

This study complements the studies cited above in several aspects. First, it selects the EU as the reference threshold. The question is thus to assess whether MENA countries have converged towards EU levels, and not toward MENA countries' income long run equilibrium or Southern EU countries income. This difference may be important because Southern EU countries have experienced higher per capita GDP income growth than the rest of the EU. In this case, MENA countries could have converged toward EU levels without converging toward Southern countries income. In addition, taking EU countries as the reference is particularly relevant with regard to the new developments of the euro-mediterranean policy, especially since the Barcelona agreement in 1995.

A second major contribution relates to the analysis of the determinants of convergence (or more generally income growth differential between MENA countries and the EU). For that purpose, a panel data econometric model of conditional *β–convergence* is implemented, with alternative estimators addressing the endogeneity bias. The impact of R&D and human capital, trade and openness, economic geography as well as transport and infrastructure is tested. In addition, the impact of the EU regional policy is also tested, especially through the implementation of the Barcelona agreement in 1995 and the European Investment Bank (EIB) loans granted to these countries.

As a last contribution, several convergence indicators are tested. These are not only the traditional σ and *β-convergence*, but also the *γ-convergence* developed by Boyle and McCarthy (1999), based on a Kendall index of rank concordance. Similarly, the analysis does not only focus on convergence of various per capita income indicators (PPP, Laspeyres, chain series, per adult equivalent, per worker), but also on convergence of the Human Development Index (HDI).

This part is organised in three sections. The first one analyses the convergence hypothesis through stylised facts and the calculation of various convergence indicators. The second section focuses on modelling the determinants of per capita income differential between MENA countries and the EU. Section 3 concludes and discusses the main policy implications of the results

3.1 An analysis of per capita GDP convergence in Mediterranean countries:

3.1.1 Changes in per capita GDP: some stylised facts

A first insight about convergence within the euro-mediterranean area can be provided by looking at changes in GDP per capita in Southern Mediterranean countries compared to those of the EU. Several country groups can be identified. The first is the EU as a reference group. The EU-6 is first identified as the core reference countries. The EU-15 is also used as an alternative. MED-7 corresponds to MENA countries, including Algeria, Morocco, Tunisia, Egypt, Jordan, Syria as well as Turkey. Since data for Lebanon are often unavailable, this country is excluded from the Mediterranean country group but data are presented separately when available. Similarly, Israel is considered separately, given the huge gap between GDP per capita in this country and that in the other Mediterranean countries.

Statistics are presented over the period 1960-2007 using yearly averages[55]. More detailed results are displayed in three sub-periods. The first ranges between 1960 and 1977. It corresponds to the conclusion of the first preferential agreements between the EU and some MENA countries (Association agreements). The second period (1978-1994) corresponds to the implementation of the Global Mediterranean Policy. Finally, 1995-2007 coincides with the period of the Barcelona agreement.

As a sensitivity analysis, several indicators of GDP are considered alternatively: GDP in US constant price, GDP in purchasing power parity (PPP), the Laspeyres GDP per capita[56], the chain per capita GDP[57], the real GDP chain per equivalent adult[58] as well as the real GDP chain per worker[59] (Heston et al., 2006).

Tables 1 an 2 report these various statistics (see also Figure 1). Several major features emerge from these tables. If we first consider the whole period (1960-2007) (Table 1), it is striking to observe that the per capita GDP growth in MENA countries (MED-7) is very close to that recorded for the EU (EU-6 and EU-15), whatever the GDP indicator used. However, this

[55] When per capita GDP growth is calculated for a country group, this statistic is weighted by the share of each country in the total GDP of its group.

[56] It is obtained by adding up consumption, investment, government and exports, and subtracting imports in any given year.

[57] This is a chain index obtained by first applying the component growth rates between each pair of consecutive years, t-1 and t, to the current price component shares in year t-1 to obtain the domestic absorption (DA) growth rate for each year. This DA is then applied backwards and forwards from 1996, and summed to the constant price net foreign balance to obtain the Chain GDP series.

[58] The equivalent measure used here assigns a weight of 1.0 to all persons over 15, and 0.5 for those under age 15 (refer to Heston et al. (2006) for additional details).

[59] Worker for this variable is usually a census definition based of economically active population. The underlying data are from the International Labour Organization, and have been interpolated for other years.

result masks significant differences across countries. As a matter of fact, countries like Tunisia, Morocco as well as Egypt show per capita GDP growth rates above that of the EU. On the other hand, Algeria shows growth rates well below the EU average, whereas for Turkey and Syria, it is similar to that of the EU.

Considering changes over time, it is worth mentioning that the EU per capita GDP rate of growth is declining over time whatever the indicator considered. For example, taking the Laspeyres indicator, the rate of growth for the EU-6 declined from 3.35% in 1960-77 to 1.91% in 1978-1994 down to 1.34% in 1978-2007 at yearly average. Regarding MED-7 countries on the other hand, this rate of growth declines first (from 2.51% to 1.62%) before recovering in the last period up to 2.13%. This means that in the first two periods, the MED-7 rates of growth are generally lower than those recorded for the EU before becoming above that of the EU from 1995 onward[60].

Again, there are some differences across countries. Tunisia, Turkey and Jordan follow this general declining-recovering trend, whereas Morocco, Egypt and Syria show a declining trend over the whole period. As a result, these differentiated trends modify the ranking of the countries in terms of GDP growth over time. As a matter of fact, taking the most recent period (1995-2007), the best performance is recorded for Tunisia and Turkey (increasing trend), still followed Egypt despite its declining trend. These three countries are above the EU average. On the other hand, Morocco moves from above to EU-average (declining trend), Syria moves from above to below EU-average. Algeria and Jordan generally remain below the EU-average.

Considering finally the special cases of Lebanon and Israel, there is some evidence of convergence for Lebanon in the late period (for which data are available). However, these figures must be taken cautiously because of the effects of the war and of the reconstruction of Beirut. With regard to the performance of Israel, it first above EU averages before moving below.

To sum up, Tunisia is the country which is the most likely to have converged toward EU rates, because its growth rate remains higher that that of the EU whatever the period and whatever the indicator taken into consideration[61]. Turkey and Egypt are also likely to have converged toward EU rates, though their performance is not always above the EU-average depending on the period and the indicator taken into consideration. Morocco is an intermediate case, where the rate of growth was initially above the EU levels, but moved recently to the EU average. Finally, there is no evidence of convergence for Algeria, Jordan and Syria looking at their per capita GDP growth rates.

A final interesting set of statistics relates to the comparison of growth rates with the four cohesion EU members (Greece, Spain, Portugal as well as Ireland) (Figure 2). Over the whole period, it is obvious that these four countries perform better that MED-7. In fact, only Tunisia approaches these growth rate levels. However, the evolution over time changes this picture to some extent. As a matter of fact, the growth gap between MED-7 and cohesion countries is

[60] The only exception concerns real GDP per capita per workers where the MED-7 rate of growth also declines in the last period.

[61] With the exception of the per capita GDP chain per worker, for which Tunisia is close to the EU average.

very significant in the first period. However, this gap is narrowing in the second and last periods. In 1995-2007, the per capita GDP growth in MED-7 countries becomes greater than that of Portugal and approaches that of Spain (this is particularly true for Tunisia, Morocco, Egypt and Turkey). The gap is only increasing with Ireland, which takes advantage of the growth waves in the financial economy.

3.1.2 The calculation of convergence indicators.

In the past few years, there has been considerable progress in the statistical measurement of convergence. Indeed, starting with the traditional indicators of convergence, i.e. rank, Gini and Theil indexes, some new concepts have been developed since Sala-i-Martin (1996). The first is *σ-convergence*, which states that a group of countries is σ-converging if the dispersion of their real per capita GDP levels decreases over time:

$$\sigma = \frac{\mathrm{var}(GDPC_{it}) \big/ mean(GDPC_{it})}{\mathrm{var}(GDPC_{i0}) \big/ mean(GDPC_{i0})} \qquad (1)$$

Where var(GDPC) and mean(GDPC) refers to the variance and the mean of per capita GDP respectively for country i at year t, using the reference period 0.

A related concept *is β-convergence*. It is derived from the neoclassical growth theory and is based on the idea that if poor countries tend to grow faster than rich ones, there is absolute *β-convergence*. More precisely, denoting y_{it} as the real gross domestic product per capita in country i at year t, the linearization of the neoclassical growth model yields to the following *absolute β-convergence* specification, often called the Barro regression (Mankiw et al., 1992; Ramajo et al., 2008):

$$\Delta y_{it} = \frac{\log y_{it} - \log y_{it-1}}{t} = \alpha + \beta \log y_{it-1} + \varepsilon_{it} \qquad (2)$$

where Δy_{it} is the annual rate of growth of GDPC. α and β are the parameters to be estimated with $\beta=(1-e^{-\theta t})/t$ and θ is the rate of convergence to the steady state. In case of convergence, β is expected to be negative (the lower the initial GDPC in country i, the higher its growth rate, which suggests convergence.

Since the initial conditions can be different across countries and can explain persistent inequality in per capita income, equation (1) can be amended in order to account for a set of k control variable $x_1, \ldots x_k$, which condition the steady state of each country. This makes it possible to write a second model which can be used for testing *conditional β-convergence*:

$$\Delta y_{it} = \alpha + \beta \log y_{it-1} + \gamma_1 x_{1it-1} + \gamma_2 x_{2it-1} + \ldots + \gamma_k x_{kit-1} + \varepsilon_{it} \qquad (3)$$

As shown by Quah (1996) and Sala-i-Martin (1996), *β-convergence* is necessary but not sufficient for *σ-convergence*, while *σ-convergence* is sufficient but not necessary for *β-convergence*. This implies that the absence of *σ-convergence* indicator does not mean that there is no *β-convergence*.

Given that the *β-convergence* test has been criticized because of biases (notably because it neglects dynamics of changing national income distribution), the *γ-convergence* concept has also been introduced as a complement (Boyle and McCarthy, 1997 and 1999). It is based on the calculation of the Kendall index of rank concordance:

$$\gamma = \frac{\Delta(Ry_t + Ry_0)}{\Delta(Ry_0 * 2)} \qquad (4)$$

where Ry is the rank of per capita GDP. This index is generally stronger than the σ and *β-convergence* measures, since it captures changes in ranking across countries. More precisely, Boyle and McCarthy (1999) show that if there is no σ-*convergence*, the *γ-convergence* measure can be used to ascertain whether the *β-convergence* exists.

As a last concept, Luke (2008) proposes *the ρ-convergence*. It is based on an additional problem with the *β-convergence* concept, related to the fact that such a convergence can occur both forward and backward in time (Wodon and Yitzhaki, 2006). This puzzling result has raised doubts with respect to any conclusion drawn for the *β-convergence* analysis. This is why Luke (2008), starts from this puzzle to define a new convergence measure, using backward time analysis.

More precisely, defining $y_t=\alpha +\beta y_{t-1}$ where t=1 or 2, reverse (backward) β-convergence occurs if $|\beta_{12}|<1$. Denoting the covariance matrix for y_1, y_2 as: $\begin{pmatrix} \sigma_1^2 \sigma_{12} \\ \sigma_{12} \sigma_2^2 \end{pmatrix}$ and defining $\rho = \frac{\sigma_{12}}{\sigma_1 \sigma_2}$ as the correlation between y_1 and y_2, Luke (2008) shows that if $|\beta_{21}|<\rho^2$, there is *ρ-convergence,* whereas if $|\beta_{21}|<\rho$, there is *σ-convergence* and if $|\beta_{21}|<1$, there is *β-convergence.* There is thus a clear ranking of convergence concepts, where *ρ-convergence* is stronger than the other concepts. As a result, it is shown that we can have *β* and *σ-convergence* without having *ρ-convergence*.

The remaining of this section concentrates on the calculation on the most popular convergence indicators, including, σ, γ and β-convergence. This analysis is applied to GDP per capita in MED-7 countries over the period 1960-2007. It is supplemented by an application to convergence of the Human Development Index (HDI).

i) *σ-convergence*

Looking first at the *σ-convergence*, it is striking to observe that over the period 1960-2007, there is some evidence of divergence between MED-7 countries and the EU[62]. As a matter of fact, starting from unity, σ ranges between 3 and 3.5 in 2007 depending on the GDP indicator

[62] The EU-6 is taken as the reference country group. However, calculations carried out with EU-15 provide similar conclusions.

used (Figure 3a)[63]. However, it is worth mentioning that despite a continuous increasing value of σ, a decrease is observed for the first time in the very late period, i.e. from 2001 onward, which is an indication of recent convergence. More detailed information is provided at country level (Figure 3b). Although the evidence of divergence is globally confirmed for all MENA countries, there are significant differences. Tunisia shows the less increasing trend (from 1 to 1.8 over the period) with a significant decrease since 2000 (from 2.1 to 1.8). Tunisia is thus the country which has the less diverged. It has even converged in recent years. Turkey follows the same pattern, as well as Egypt and Morocco to a lesser extent. At the other extreme, Jordan, Algeria as well as Syria to a lesser extent experience a continuous and important increase in s over the whole period, even since 2001. For these countries, divergence with the EU is very sharp.

These results complement those found in the previous section when observing per capita GDP growth. The same country ranking is found here with better performance for Tunisia and Turkey than for Morocco (intermediate case) whereas Jordan, Algeria and Syria are diverging the most. However, results somehow differ for example in the case of Tunisia, because despite a continuous per capita GDP above EU levels (which would indicate convergence at first sight), this has not impeded the global variance to increase, except in the recent period.

A comparison with the four EU cohesion countries is provided in Figure 3c. With regard to Spain and Portugal, it is striking to observe a strong convergence process since their accession to the EU in 1985. In recent years, the value of sigma becomes very low, especially for Spain (0.25). The convergence of Ireland with EU-6 is even more striking since the late 80s. The value of σ reached 0 in 2001. This means that per capita GDP in Ireland reached the EU-6 level. After 2001, σ has increased, but in this case, this means that the Irish per capita GDP became higher than the EU-6 one. Greece is the only country for which there is less evidence of convergence during the past 45 years. These results suggest that there is a significant difference in the convergence process of the cohesion countries (generally converging rapidly to EU levels) and MENA countries, which have not *σ-converged* to EU per capita GDP

Complementary results are also given by Figure 4, which shows that there is neither evidence of *σ-convergence* nor divergence across MENA countries. In this case, there are some differences across the GDP indicator considered. As a matter of fact, when using GDP per worker or per adult, the value of sigma is decreasing whereas it tends to increase when considering the other GDP indicators. This difference can be explained by the various demographic trends in MENA countries, some of them only having completed their demographic transition (Tunisia). This explains why the per capita GDP spread across MENA countries is higher when taking all the population into account (including children).

In addition, taking the 23 countries of the euro-mediterranean area, there is rather evidence of divergence (Figure 5). As a matter of fact, all indicators provide very similar results showing a moderate increase in s until 2000, stabilizing afterward.

To sum up, the *σ-convergence* indicator provides rather evidence of divergence between MENA countries and the EU, except in recent years for specific countries, such as Tunisia, Turkey as well as Egypt and Morocco to a lesser extent. These results contrast with cohesion

[63] σ is not presented for PPP GDP per capita in Figure 3. In fact, it follows a more acute upward trend (from 1 to 7.94)

countries, especially Ireland, Spain and Portugal which show a rapid convergence process to the EU-6 per capita GDP levels. There is also evidence for divergence within the Euro-Mediterranean as a whole, despite a stable value of σ in recent years. Finally, there is no evidence of convergence across MED-7 countries.

ii) γ-convergence

As already stated previously, the absence of *σ-convergence* does not mean an absence of convergence process. This is why the *γ-convergence* indicator, based on the country ranking of per capita GDP, can be used together with the *σ-convergence* to infer about *β-convergence* (Boyle and McCarthy, 1999). The application of this indicator to the euro-mediterranean area complements the previous findings. As a first result, despite a stable or even increasing *σ-convergence* indicator, there is some little evidence of *γ-convergence* between MENA countries and the EU-15, especially since the mid-80s. As a matter of fact, the value of γ decreases down to about 0.8 or 0.9 in 2007 depending on the measure of GDP[64] (Figure 6a). A breakdown by country shows that Tunisia tends to converge (0.56) (Figure 6b). This performance is comparable to that found for Mediterranean cohesion countries (Greece, Spain and Portugal) (see figure 6d). In fact, Tunisia greatly improved its ranking, moving from the 57th to the 43rd position over the period (Figure 6c).

Turkey and Egypt also show a decrease in γ since the mid 80s (down to 0.74 and 0.77 respectively). As a matter of fact, Turkey moved from the 54th to the 48th position, whereas Egypt moved from the 64th to the 54th position. Morocco and Syria remains stable around 0.8 all over the period, whereas Jordan and Algeria show an upward trend which suggests divergence. Indeed, Jordan moved from the 34th to the 65th rank, whereas Algeria moved from the 36th to the 50th rank.

An additional result indicates that despite a constant *σ-convergence* across MED-7 countries, the *γ-convergence* indicator is clearly decreasing, which suggests a convergence process (Figure 7). This can be further illustrated by looking at country ranking across the MED-7 region, ranging in 1960 between 34th (Jordan) and 85th (Syria) world position. This gap has been reduced in 2007 since it ranged between 41 (Tunisia) to 74 (Syria).

As a last result, there is no clear evidence of *γ-convergence* across the euro-mediterranean area, especially since the 80s (Figure 8). As a matter of fact, after some reduction of γ until the early 80s (from 1 to about 0.85), this figure has remained almost constant since then.

Overall, compared to the *σ-convergence*, the *γ-convergence* analysis is generally not supporting divergence, in particular between MED-7 countries and the EU which are found to slightly converge. Nor it supports divergence inside the euro-Mediterranean area (where γ is rather constant). Another difference is that the *γ-convergence* supports a slight convergence across Mediterranean countries, whereas σ was constant. In spite of these differences, the relative performance of the countries is unchanged whatever the convergence indicator used. As a matter of fact, the best performance in terms of convergence is that of Tunisia, followed

[64] However, when GDP is measured per worker, the value remains close to 1, which does not suggest convergence.

by Turkey and Egypt. Morocco and Syria are in a intermediate position, whereas Algeria and Jordan are diverging whatever the convergence indicator used.

iii) β-convergence

Starting from equation (2) and defining the reference country as the EU-15, the calculation of the *β-convergence* between MED-7 countries and the EU is implemented by estimating the following equation in panel data econometrics:

$$\Delta y_{it} - \Delta y_{EUt} = \alpha + \beta(\log y_{it-1} - \log y_{EUt-1}) + \mu_i + \lambda_t + \varepsilon_{it} \qquad (5)$$

Where μ_i and λ_t are country and time-specific effects, which can be considered and fixed or random depending on the final specification of the model.

Results support those found with the *γ-convergence* analysis. First, there is some evidence of convergence between MED-7 countries and EU per capita GDP levels, whatever the way GDP is measured and whatever the estimator chosen (Table 3a). This result is also valid whatever the EU reference countries used (EU-6 or EU-15) In this regard, it is worth mentioning that the Hausman test is generally significant. This favours the use of the fixed effects model (FEM).

More detailed results a country level indicate that the convergence hypothesis is clearly accepted (at 1% level) for Tunisia, Turkey, Egypt and Morocco (Table 3b). It is barely accepted for Syria (10% level) and clearly rejected for Algeria and Jordan. These results correlates those previously found with the other convergence indicators.

In addition, the hypothesis of convergence within the MED-7 region is also accepted in all cases (Table 4). In this case, the Hausman test is barely significant. This makes it possible to use the Random effect model (REM) estimator.

Finally, the convergence hypothesis is supported for the whole euro-mediterranean area (Table 5).

iv) Convergence of the Human Development Index (HDI)

One last insight about real convergence can be provided by applying the convergence indicators do the HDI. This index is particularly interesting, since it does not only take into account GDP per capita, but also life expectancy and education (literacy rate). As a result, it provides a wider view about a country development convergence process than the GDP per capita only.

The calculation of the *σ-convergence* unambiguously concludes to a convergence of all MED-7 countries. This conclusion is somewhat different than that previously calculated for GDP per capita. This difference is due to the fact that MED-7 country have generally progressed at a greater rate for life expectancy and education than for standards of living. In the 60s for example, life expectancy was generally lower than 50 years for most MED-7

countries. In 2005, it is always greater than 70 years, whereas in most EU countries during the same period, life expectancy increased by only 10 years, i.e. from 70 to 80 years.

As a result, the HDI index tended to progress more rapidly in MED-7 countries than in the EU-6 (Figure 9). As a matter of fact, it moved for 0.54 to 0.73 in MED-7 countries and from 0.86 to 0.94 in EU countries[65]. At country level, it is striking to observe that the countries which enjoyed the greatest convergence of the GDP per capita are the ones who experienced the greatest convergence in the HDI index, i.e. Tunisia, Turkey and Egypt. This means that these countries have a better performance than the other in the three components of the HDI. On the other hand, Jordan and Algeria to a lesser extent converge at a slower pace.

Results of the *γ-convergence* confirm the previous results, though evidence of convergence is less established for Jordan and Algeria (Table 4).[66]Calculations of the *β-convergence* between MED-7 countries and the EU also support the convergence hypothesis, with a β-parameter significant at 5%-level (Table 7). As a final result, there is also some evidence of σ- and *β-convergence* of the HDI within the MED-7 area and within the overall euro-mediterranean area (Figure 11 and Table 7).

To sum up, the calculation of convergence for HDI levels complements the results previously found with GDP per capita only. In this regard, it can be argued that i) the convergence process between the Mediterranean countries and the EU is well established; ii) Tunisia, Turkey and Egypt remain the countries which show the greatest convergence rates; iii) the euro-mediterranean area is also converging as well as HDI within the MED-7 area.

3.2 The determinants of convergence in the Euro-mediterranean area

Starting from equation (3) and (5), the final model of conditional *β-convergence* can be written as;

$$\Delta y_{it} - \Delta y_{EUt} = \alpha + \beta(\log y_{it-1} - \log y_{EUt-1}) + \gamma_1 x_{1it-1} + \gamma_2 x_{2it-1} + ... + \gamma_k x_{kit-1} + \mu_i + \lambda_t + \varepsilon_{it} \quad (6)$$

where x corresponds to a set of control variables. For the same reasons as in equations (3) and (5), β must be negative for assuming convergence. Indeed, the lower GDP per capita in country i relative to the EU, the higher should be its per capita GDP growth compared to the EU.

As a sensitivity analysis, several alternative dependent variables are tested, as in the previous section. They include GDP in US constant price, GDP in purchasing power parity (PPP), the Laspeyres GDP per capita, the chain per capita GDP, the real GDP chain per equivalent adult

[65] Calculations of average HDI in EU-6 or EU-15 provide very close figures.

[66] The differences can be explained by the fact that the ranking in HDI is sensitive due to the very small differences in HDI levels across two countries which differ for one rank. For this reason, the use of the *γ-convergence* seems less reliable when it applies to GDP per capita ranks.

as well as the real GDP chain per worker (source: Heston et al., 2006). Additionnally, the HDI is also included as an alternative dependent variable.

The choice of the control variables is guided by the theoretical literature surveyed in the introduction. It is also guided by Sala-i-Martin (2004), who empirically identifies 18 significant variables which determine long-run growth, from a Bayesian Averaging Classical Estimates (BACE) approach.

According to this theoretical and empirical literature, the control variables selected here include six groups:

- Human capital and technology
- patterns of specialisation, openness, regional integration and FDI
- economic geography (agglomeration indexes)
- transportation and communication
- public funds (cohesion funds and European Investment Bank (EIB) loans
- other variables, mainly defined in Sala-i-Martin (2004), such as investment price, government consumption, investment share, population density, life expectancy, colonies as well as corruption

For each group, several alternative variable measurements are proposed as a sensitivity analysis. The complete description of variables, data and sources, are left in the Appendix.

The choice of the estimators is guided by the specificity of the dataset, which contains panel data with both time-varying and time-invariant variables. Preliminary estimations are driven with standard fixed effects (FEM) and random effect models (REM). However, given that preliminary Hausman tests on REM indicate the presence of endogeneity problems, the estimator finally selected is the Hausman and Taylor estimator (HT). It assumes that some of the explanatory variables are correlated with the individual-level (country i) random effect μ_i. As an alternative, the generalized two-stage least squares instrumental variables estimator (G2SLQ IV) and the error component two-stage least squares instrumental variables estimator (EC2SLQ IV) are also used, since they consider that some independent variables are correlated with the idiosyncratic error ε_{it}. The first has been developed by Balestra and Varadharajan-Krishnakumar (1987). It uses the exogenous variables after they have been passed through the feasible GLS transform. The second one has been developed by Baltagi, where the variables are passed through the Within and Between transform (Baltagi, 2005; Baltagi and Li, 1992). In all cases, the estimation is based on instrumental variables and the initial income is used as the instrumented (endogenous) variable[67].

[67] In the HT estimator, additional variables are assumed to be endogenous. These are education, specialisation, openness, R&D as well as regional integration.

As a final estimators, we present the Baltagi-Wu (BW) GLS which assumed a panel autocorrelation of the residuals, as well as the GLS for heteroskedastic error structures (HGLS)[68].

Tables 8a and 8b show the results for model estimated for the whole period (1960-2007), using a) alternative estimators and b) alternative independent variables as a sensitivity analysis. Some secondary variables are dropped from the estimations because they are non significant and introduce multicolinearity problems. These are life expectancy, population density and coastal population density, corruption as well as colonization.

Basically, the results are fairly stable whatever the choice of the independent variable and whatever the choice of the estimator. As a matter of fact, the initial income level is always negative and significant at 1%-level. This means that MED-7 countries are converging to the EU level over the whole period, conditionally to the other independent variables included in the model. This result correlate those found with the non conditional *β-convergence* calculated the previous section.

Some other variables are also very significant. These are first education and R&D, which both significantly contribute to growth in MED-7 countries. Second, transport and communication also play a determinant role for explaining convergence. As a matter of fact, roads, telephone lines and even internet show all a positive and significant sign whatever the estimator.

Trade, specialization and economic geography also matter. Indeed, inter-industry specialisation tends to reduce growth in MED-7 countries. This result can be explained by two reasons. The first is that the absence of intra-industry trade reveals the lack of product differentiation and scale economies. Following the new international economics (Krugman, 1995), this deprives MED-7 countries from important trade and growth gains related to product varieties and lower prices due to scale economies. A second and more important reason is that MED-7 countries generally specialize in low-value added products, i.e. textile and clothing, fuel products, basic chemicals or agriculture. This type of specialization is less growth creating than specialization for higher value added products (electronics, car industry, etc…). This result is supported by the economic geography variable which is negative. This means that the agglomeration of economic activities (measured first by urbanization) is detrimental to convergence because it concerns low value added industries, as stated by economic geography theory. This last result can be related to part 2, which has shown that MED-7 countries have experienced a significant concentration process since the 90s. We show here that this process is rather detrimental to convergence.

The openness parameter is generally positive and significant. However, the significance level never exceeds 10% whatever the model specification. This indicates that openness is not a primary variable which explains growth, as also shown by numerous empirical studies.

The direct impact of the Barcelona agreement is measured in three alternative ways. First, a temporal dummy is introduced in the model (it is equal to unity since 1995 and zero before). In tables 8a and 8b, this variable is positive but insignificant. Second, the model has been estimated in two distinct periods, i.e. 1961-94 and 1995-2007. For each model, the *β-convergence* parameter is estimated. Results show that this parameter does not significantly

[68] The other standard tests, such as LM, multicolinearity (VIF), omitted variables, etc… have been preliminary implemented and are available upon request.

differ in these two periods. As a last exercise, the model is estimated by multiplying the initial income variable with a yearly dummy. This makes is possible to estimate a β-parameter for each year. Again, results show that the β-parameter is not changing significantly over time.

Amongst the remaining variables, the share of government consumption in GDP has an expected negative sign. This can be explained by the fact that public consumption is financed by distortionary taxes which reduce the growth rate (Sala-i-Martin, 2004). However, the share of public sector investment in GDP shows a positive sign. This result supports the role of public investment in MED-7 countries, especially concerning transport, infrastructure and technology.

To sum up, Tables 8a and 8b stress the primary role of education, technology, transport and communication as growth determinants. Trade specialization and firm agglomeration play a negative role due to specialization in low value added activities. However, at this stage, there is no evidence of a significant impact of the Barcelona agreement.

The results presented above are complemented with additional sensitivity analysis. For that purpose, the model is re-estimated with an extended number of variables, used as different proxies for agglomeration, specialization and regional integration. However, since these extended variables are not available for the whole period, the estimation period is restricted to 1995-2007 (Table 9)[69]. Results are the following. First, the alternative proxies for specialization are significant. As a matter of fact, the high-tech export specialization is positive[70]. Again, this supports the positive growth impact of high-value added product specialization. Trade dissimilarity presents an expected negative sign, because as trade in MED-7 countries becomes more dissimilar to that of the EU, it poorly matches international demand.

FDI is also introduced in the model as a complement of trade specialization and openness but this variable proves to be insignificant. This means that there is no clear link between FDI and convergence in MENA countries. Again, it may be that openness and FDI inflows are a necessary but not sufficient condition of convergence. It depends on whether they apply to promising high-value added products.

The use of alternative economic geography variables support and complement the results found previously. Indeed which replacing the urbanization index by a concentration index or an entropy variable, these variables have both a significant and negative sign. This reinforces the idea that economic agglomeration in MED-7 countries has not supported growth in recent years, because of the low value added of the products involved.

Finally, the indirect impact of the Barcelona agreement is tested by introducing a variable which accounts for EIB loans. This variable is unambiguously positive and significant at 1%. This means that although the convergence rate has not significantly changed since the

[69] As a means of saving space, results are presented by using the Laspeyre GDP per capita as the independent variable. The complete set of results which includes the estimations for the other independent variables is available upon request.

[70] This variable is significant at 10% level because of muticolinearity problems with primary export and R&D (inverse correlation). When removing these two variables, the high-tech export variable becomes significant at 1% level.

Barcelona agreement implementation in 1995, the EIB instrument is a useful tool for promoting growth and convergence in MED-7 countries.

As a final table, Table 10 shows the estimation model applied to the whole euro-mediterranean area (23 countries). The parameter estimates are generally less significant than for MED-7 countries alone. This is mainly due to the fact that there are much less cross-country differences across EU countries than between MED-7 and the EU. As a result, education, R&D, transport and communication, as well as government share in consumption and public investment are still significant, but generally no longer at 1%. Moreover, some other variables are insignificant. The first concerns specialisation and economic geography variables. The main explaining reason is that the country sample includes both developed countries (EU) and emerging countries (MED-7). As shown before, when countries specialize in low value added products (MED-7), specialization and concentration negatively affect convergence. However, when it applies to high value added products (EU), specialization and concentration can have an opposite sign. This is why the corresponding parameter estimate is insignificant here. The endowment in primary industries also shows an insignificant parameter estimate. Again, this is due to small cross-country differences concerning this variable, especially across EU countries.

Another result shows that the euro-mediterranean agreement is not significantly improving convergence. This result supports the previous findings. Moreover, the EU integration - measured by a dummy which is equal to one when a country integrates the EU- is not significant either. This means that the EU integration process alone has not accelerated the convergence process. However, there is some evidence that the cohesion funds provided to Spain, Portugal, Greece and Ireland have supported convergence[71]. Finally the EIB loans do not seem to have improved convergence. This final result is in contradiction with that found for MED-7 countries alone. This can be explained by the fact EIB loans in EU countries are not devoted to support their growth process[72], whereas for MED-7 countries, it is devoted to support the Barcelona process in the perspective of accelerating growth.

[71] The parameter corresponding to cohesion is not always significant. This can be explained by the leack of relevant data before 1993.

[72] For example, Luxembourg, which is the EU country with the highest GDP per capita, does not ask great amounts of EIB loans, even as a percentage of its population.

Appendix: Measurement, data and sources.

Dependent variable:

As explained in the text and as a sensitivity analysis, seven alternative dependent variables are selected:

- GDP in US constant price
- GDP in purchasing power parity (PPP)
- Laspeyres GDP per capita
- chain per capita GDP
- real GDP chain per equivalent adult
- real GDP chain per worker
- Human development index. Source: United Nations Development Programme, Human Development Report, various issues.

Independent variables:

Human capital and technology:

- Education: it is measured by the secondary schooling enrolment rate. Source: WDI (2008)
- Technology: Two proxies are defined to account for technology (Source: WDI 2008)
    - Research and Development expenditures as a percentage of GDP
    - Patents applications, resident and non resident (data from 1985 to 2007)

Trade, specialization and openness

- Pattern of specialization. Following Amable (2000), two alternative variables are used to capture the impact of specialization on convergence:
    - Inter-industry specialization: $I_j = \frac{1}{2}\sum_i \left| \frac{X_{ij}}{X_{.j}} - \frac{M_{ij}}{M_{.j}} \right|$ with $0<I_j<1$

      The higher I_j, the more trade balances are dissimilar across industries, and then the higher inter-industry trade (source: own calculations from UNCTAD, 2008, Handbook of Statistics)

    - Trade dissimilarity: $A_j = \frac{1}{2}\sum_i \left| \frac{X_{ij}}{X_{.j}} - \frac{X_{i.}}{X_{..}} \right|$ with with $0<A_j<1$

The higher A_j, the less the export structure of country j matches international demand (the more trade is dissimilar). This is expected to negatively affect growth, since in this case, trade patterns of country j is at odds with that of international demand. (source: UNCTAD, 2008, Handbook of Statistics)

- Openness. It is calculated in two alternative ways:
    - Trade in goods and services as a percentage of GDP at current price (WDI 2008) and Heston et al. (2006)
    - Trade in goods and services as a percentage of GDP at constant price (Heston et al. (2006))
- Regional integration: dummy which accounts for the various regional agreements between the EU and Mediterranean countries, especially the Barcelona agreement in 1997.
- FDI: flows and stocks in million US dollars. Source: UNCTAD, World Investment Report, 2008 (data from 1970 to 2007)
- Endowment in natural resources: primary exports as a percentage of total exports. Source: UNCTAD 2009 (Comtrade)

Economic Geography variables:

- Agglomeration: The sign is expected to be negative for countries which are specialised in low value added product, like MED-7 countries. However, it can be positive for the other countries, since the agglomeration of firms of industry i in country j leads to a rise in productivity and thus a rise in wages and growth.
- Concentration (specialisation index): We denote first X as the variable of interest (output*)*, *i*, the industry and *j*, the country and *t*, the year.

  Defining *Sijt* as the specialization ratio at industry-level:

$$S_{ijt} = \frac{X_{ijt}}{X_{jt}}$$

  And

$$S_{it} = \frac{\sum_j X_{ijt}}{\sum_i \sum_j X_{ijt}}$$

  With $X_{it} = \sum_j X_{ijt}$ and $X_{jt} = \sum_i X_{ijt}$

  Thus, the specialization (concentration) index is equal to:

$$D_{jt} = \sum_i |S_{ijt} - S_{it}|$$

It measures to what extent the shares of the various industries i in country j output differ from those in the other countries (data from 1980 to 2003 from UNCTAD, INDSTAT 2008)

- Entropy-specialization index. As a alternative, this index is based on the Balassa location index L_{jt}, which measures the ratio of industry i's production to country j's total output, corrected by the ratio of country j's production to that of the whole euro-mediterranean area (data from 1980 to 2003 from UNCTAD, INDSTAT 2008)

$$E_{jt} = \sum_i S_{ijt} ln(L_{ijt})$$

- Urban: people living in areas defined as urban in each country, as a share of total population. Source: World Bank, Global Development Network Growth database

Transportation and Communications

- transportation: road paved as a percentage of total roads (source: WDI 2008);

- communications:

  - telephone lines per 1000 inhabitants (Source: World Bank, Global Development Network Growth database)

  - internet users (per 100 people, source: WDI 2008).

Public funds:

- Cohesion funds: Commission of the European Communities, annual report on the Cohesion Fund (various issues). Given the various changes in the EU regional policy, it is very difficult to get relevant and comparable data over a long term period. For this reason, data stems from the cohesion fund reports, published first in 1993 which provide reliable time series (data from 1990 to 2007)

- European Investment Bank loans: EIB Group, Annual Report, various issues (data from 1996 to 2007)

Other factors:

- Investment price: price level of investment expenditure basket on PPP basis. Source: Heston et al. (2006) (the related coefficient is expected to be negative, since a relative initial high price reduces future possible income growth).

- Government consumption: share of government consumption in GDP. Source: Heston et al. (2006). A negative sign is expected because public consumption is financed by distortionary taxes which reduce the growth rate. It is alternatively measured either as a percentage of GDP in PPP (Heston et al. 2006), as a percentage of gross domestic income in PPP (Heston et al. 2006) or as a percentage of constant GDP (WDI).

- Investment share: public-sector investment as a share of GDP (negative sign expected) (Heston et al. (2006). It is measured either as a percentage of GDP in PPP or as a percentage of gross domestic income in PPP (Heston et al. 2006).

- Coastal population density: share of population in costal area. Source: Gallup et al. (2001) (expected positive sign)

- Population density. Source: WDI 2008 (positive sign expected).

- Life expectancy (at birth in total years). Source: WDI 2008 (positive sign expected)

- Colonies : Source: Gallup et al. (2001)

- Corruption. It is measured by the Transparency International Corruption Perception index (2008). The index defines corruption as the abuse of public office for private gain and measures the degree to which corruption is perceived to exist among a country's public officials and politicians. It is a composite index, drawing on 14 polls and surveys from 12 independent institutions, which gathered the opinions of businesspeople and country analysts. Since this index ranges from zero (highly corrupted) to 10 (no corruption), an increase in this index denotes a reduction in corruption. Thus, a positive sign is expected.

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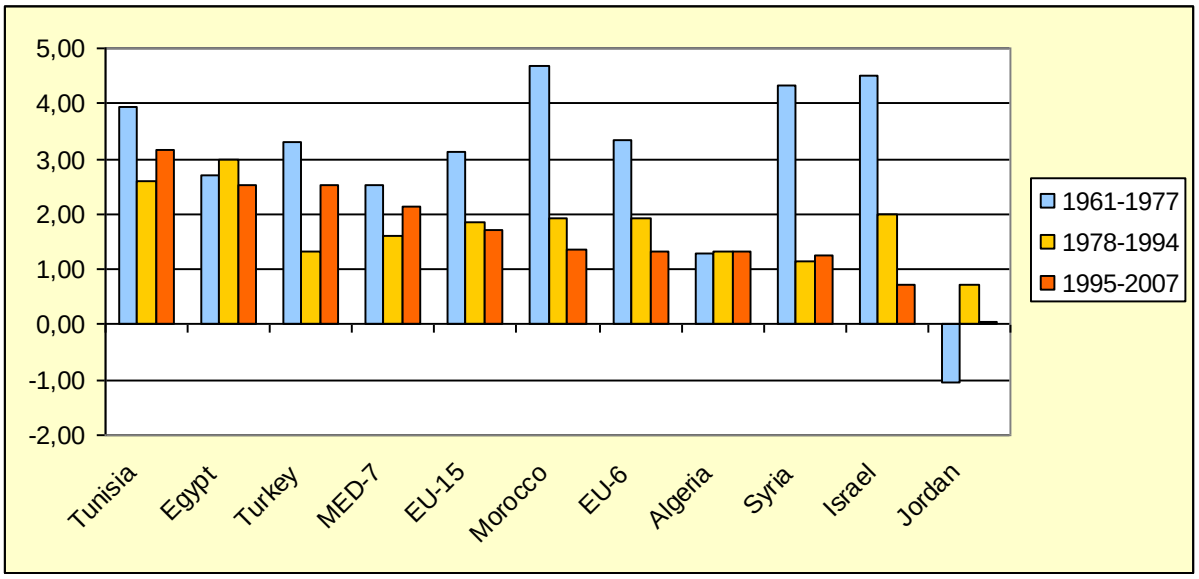
Tables and Figures

Table 1: GDP per capita growth rates (%, yearly averages)

1960-2004	Constant	PPP	Laspeyres	Chain series	GDP chain p. eq. adult	GDP chain per worker
Tunisia	3,20	6,20	3,24	3,23	2,97	2,53
Morocco	2,19	6,60	2,77	2,80	2,61	2,53
Egypt	3,10	6,09	2,76	2,73	2,61	2,41
Israel	2,82	6,19	2,55	2,48	2,37	1,77
Turkey	2,94	5,84	2,38	2,40	2,22	2,08
Syria	2,47	6,74	2,33	2,32	2,19	2,11
EU-6	2,50	6,36	2,28	2,31	2,16	2,06
EU-15	2,38	6,26	2,28	2,31	2,18	2,08
MED-7	2,50	5,78	2,08	2,09	1,91	1,64
Algeria	1,44	5,81	1,31	1,34	1,13	0,78
Jordan	2,77	4,35	-0,11	0,03	-0,20	-0,48

Source: own calculations from Heston et al. (2006)

Figure 1: Trends in GDP per capita growth rates (%, Laspeyres, yearly averages)



Source: own calculations from Heston et al. (2006)

Table 2: Trends in GDP per capita growth rates (%, yearly averages)

GDP constant

	1961-1977	1978-1994	1995-2007
Tunisia	4,20	1,89	3,61
Turkey	4,36	1,31	3,23
MED-7	3,62	1,01	2,99
Egypt	3,49	2,94	2,79
Morocco	2,71	1,45	2,50
Jordan	4,38	1,48	2,35
Algeria	2,60	-0,36	2,28
EU-15	3,21	1,92	1,91
Lebanon			1,71
Israel	4,23	2,27	1,67
EU-6	3,75	2,00	1,54
Syria	4,59	1,42	1,07

GDP PPP

	1961-1977	1978-1994	1995-2007
Tunisia	6,82	6,63	4,83
Egypt	6,81	6,52	4,52
Algeria	8,34	4,37	4,39
MED-7	7,35	5,72	3,79
Syria	11,50	4,25	3,75
EU-15	8,02	6,51	3,61
Lebanon			3,32
Turkey	7,45	6,15	3,32
EU-6	8,57	6,50	3,22
Morocco	9,51	6,29	3,21
Jordan	4,31	5,51	2,86
Israel	8,28	6,85	2,61

GDP Laspeyres

	1961-1977	1978-1994	1995-2007
Lebanon			4,82
Tunisia	3,93	2,60	3,16
Egypt	2,70	3,00	2,53
Turkey	3,31	1,34	2,53
MED-7	2,51	1,62	2,13
EU-15	3,14	1,87	1,70
Morocco	4,69	1,94	1,36
EU-6	3,35	1,91	1,34
Algeria	1,29	1,33	1,32
Syria	4,34	1,14	1,26
Israel	4,49	2,01	0,71
Jordan	-1,04	0,71	0,05

GDP chain series

	1961-1977	1978-1994	1995-2007
Lebanon			4,76
Tunisia	3,99	2,51	3,17
Turkey	3,29	1,39	2,54
Egypt	2,65	2,97	2,53
MED-7	2,55	1,60	2,13
EU-15	3,24	1,85	1,69
Morocco	4,84	1,86	1,37
Algeria	1,46	1,24	1,33
EU-6	3,50	1,89	1,32
Syria	4,32	1,14	1,25
Jordan	-0,09	-0,97	0,71
Israel	4,30	2,02	0,70

GDP chain per equivalent adult

	1961-1977	1978-1994	1995-2007
Lebanon			4,12
Tunisia	3,98	2,22	2,65
Turkey	3,24	1,11	2,32
Egypt	2,60	2,90	2,22
MED-7	2,56	1,36	1,80
EU-15	3,09	1,68	1,62
EU-6	3,28	1,73	1,25
Morocco	4,87	1,55	1,05
Syria	4,45	1,01	0,77
Algeria	1,58	0,99	0,75
Israel	4,18	1,90	0,61
Jordan	-0,83	0,49	-0,26

GDP chain per worker

	1961-1977	1978-1994	1995-2007
EU-15	3,06	1,45	1,61
Tunisia	3,91	1,86	1,60
Egypt	2,76	2,83	1,40
EU-6	3,16	1,51	1,32
Morocco	5,10	1,39	0,66
MED-7	3,12	1,07	0,47
Turkey	4,29	1,16	0,38
Syria	5,04	0,97	-0,24
Algeria	2,50	0,28	-0,82
Israel	4,08	1,47	-0,86
Jordan	-0,25	-0,13	-1,25
Lebanon			3,25

Source: own calculations from Heston et al. (2006)

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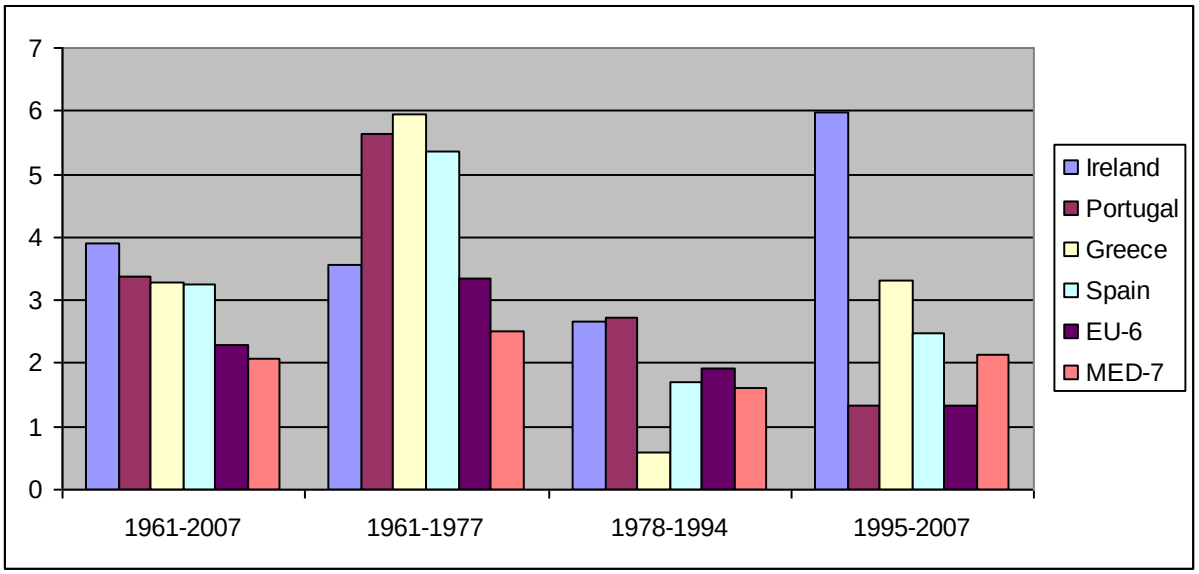
Figure 2: Trends in GDP per capita growth rates: a comparison with cohesion countries (Laspeyres, %, yearly averages)



Source: own calculations from Heston et al. (2006)

Figure 3a: σ-convergence between MED-7 countries and the EU

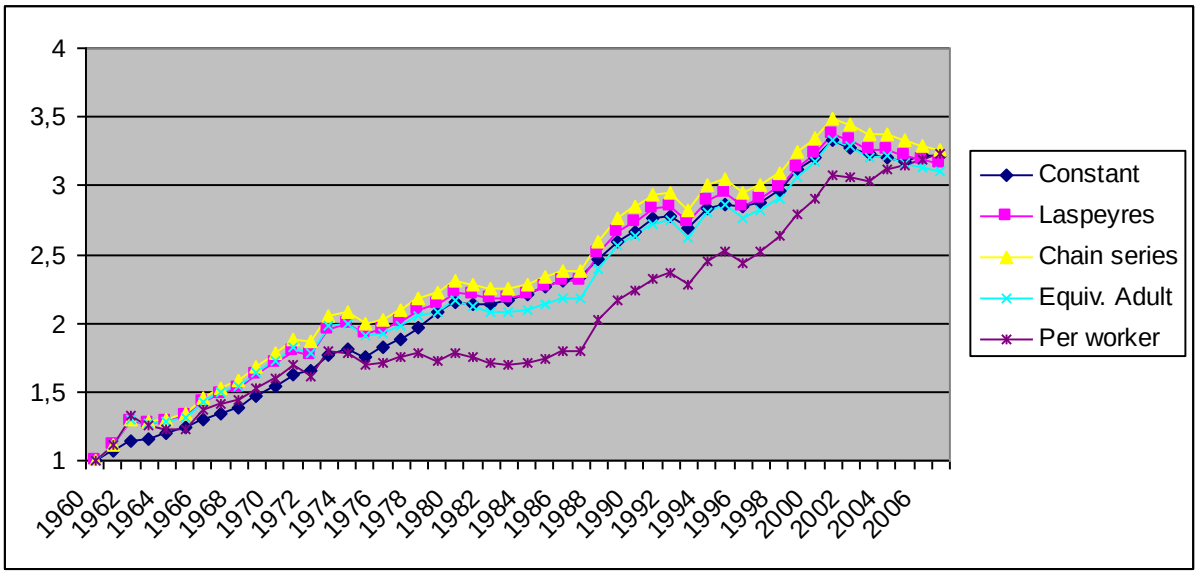


Figure 3b: σ-convergence between MED-7 countries and the EU (breakdown by country, Laspeyres)

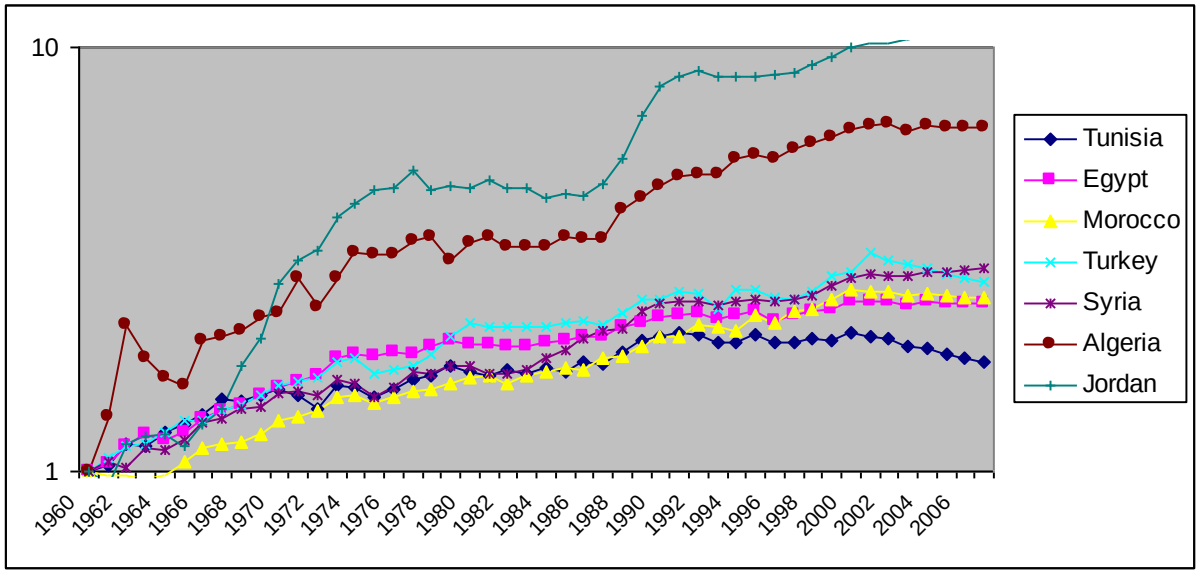


Figure 3c: σ-convergence between Cohesion countries and the EU (Laspeyres)

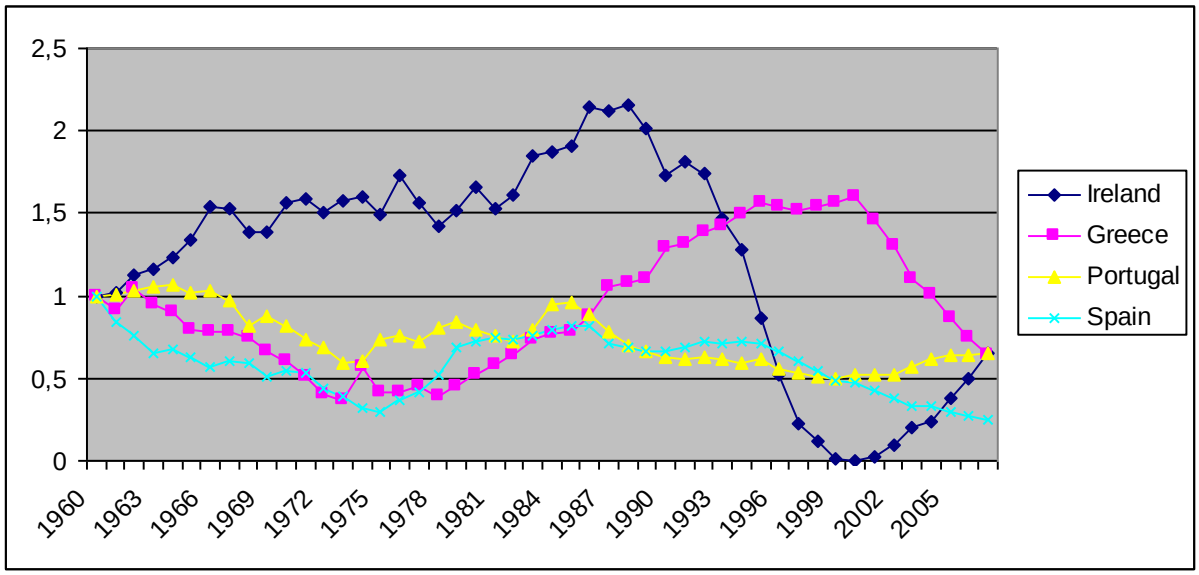


Figure 4: σ-convergence across MED-7 countries

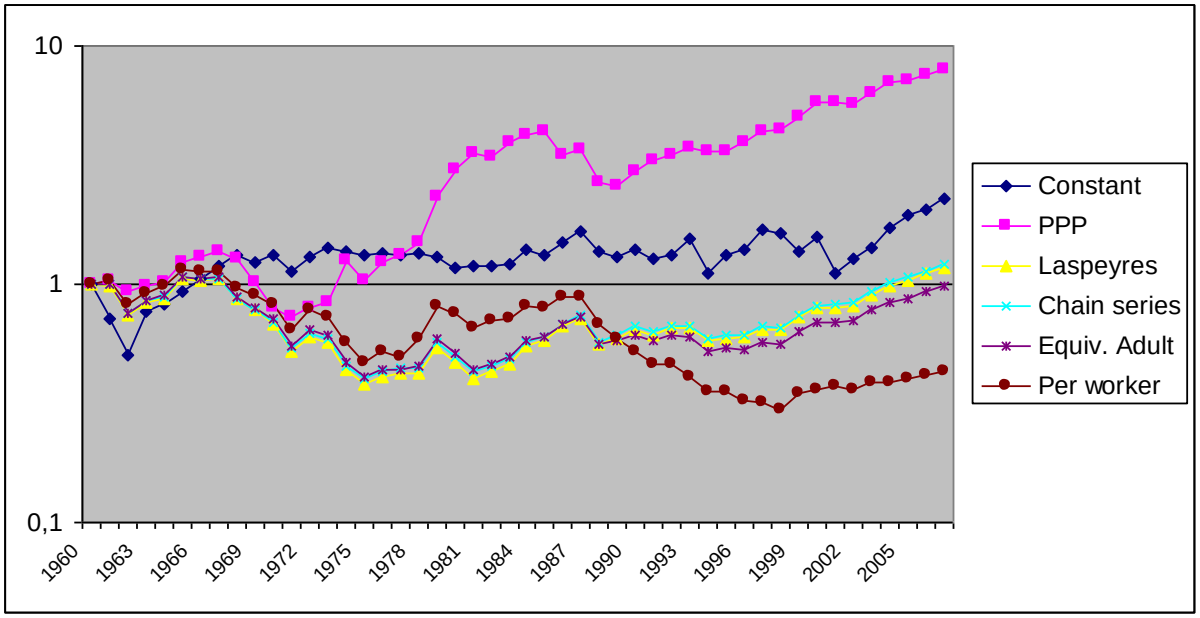


Figure 5: σ-convergence within the euro-mediterranean area (23 countries)

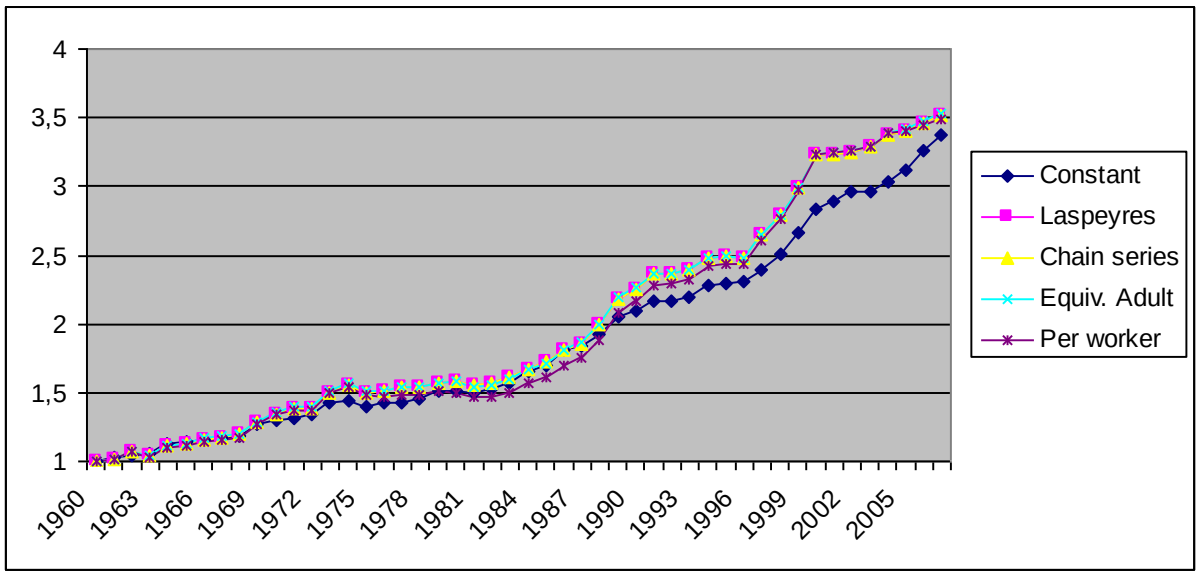


Figure 6a: γ-convergence between MED-7 countries and the EU

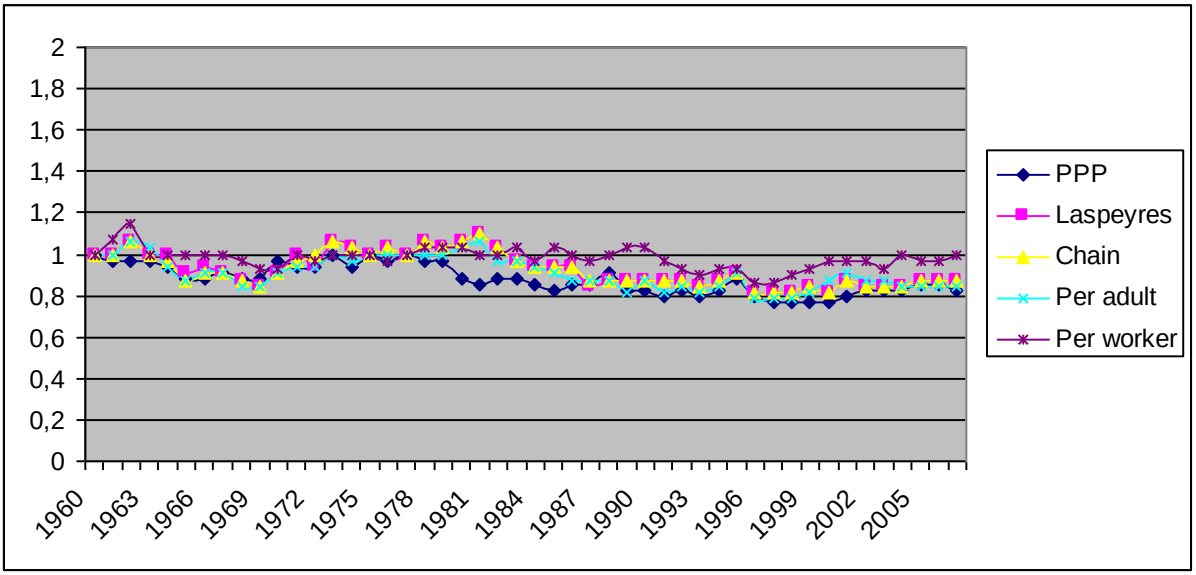


Figure 6b: γ-convergence between MED-7 countries and the EU (breakdown by country, Laspeyres)

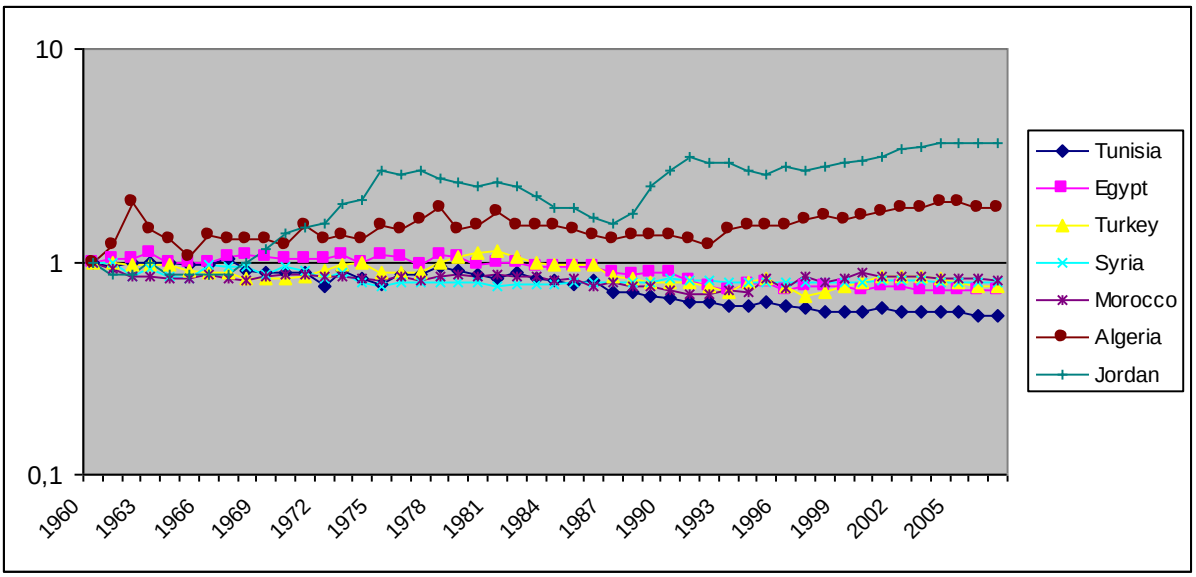


Figure 6c: Evolution of country ranking in terms of GDP per capita (Laspeyres)

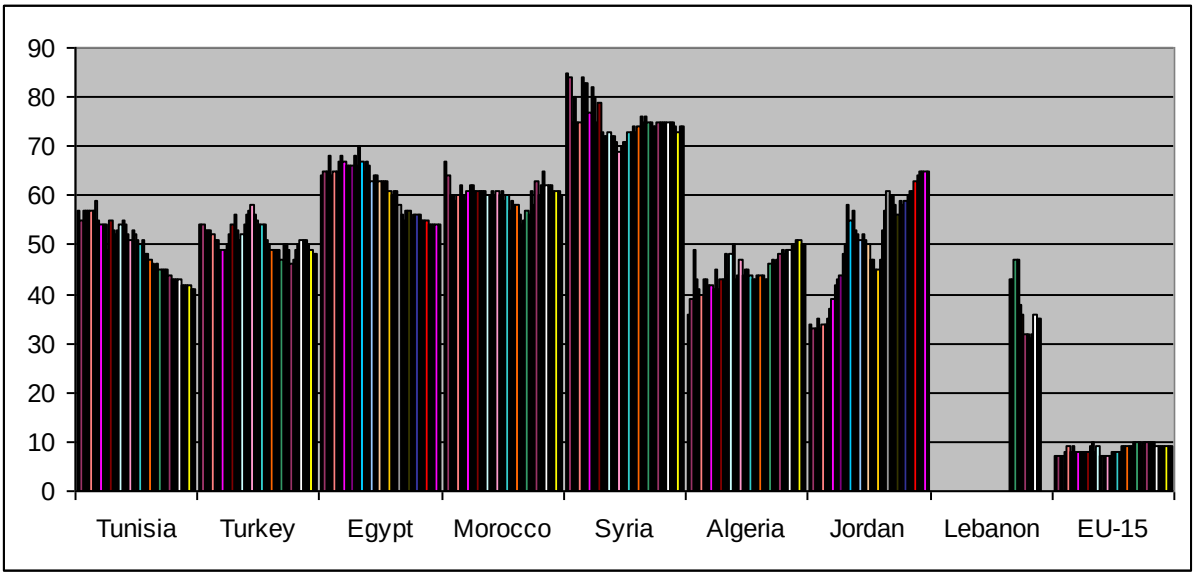


Figure 6d: γ-convergence between Cohesion countries and the EU (Laspeyres)

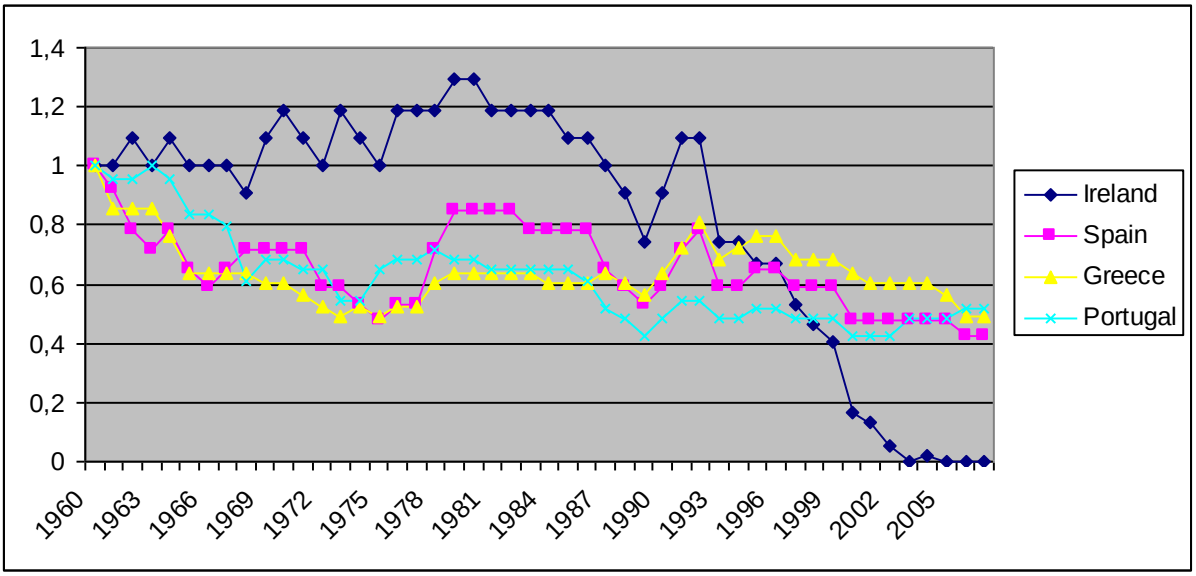


Figure 7: γ-convergence across MED-7 countries

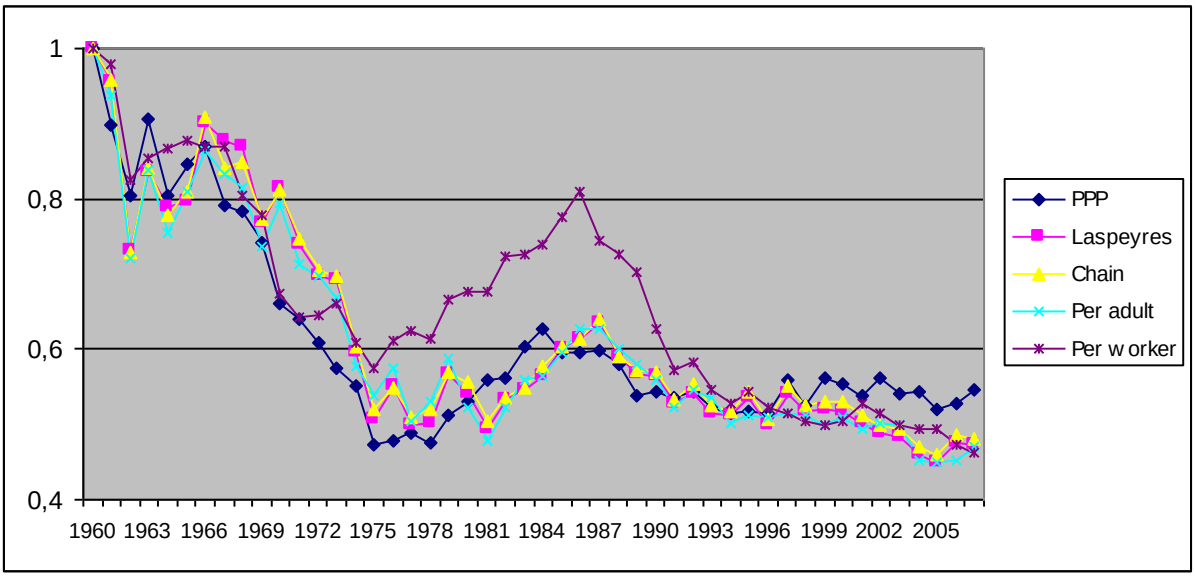


Figure 8: γ-convergence within the euro-mediterranean area (23 countries)

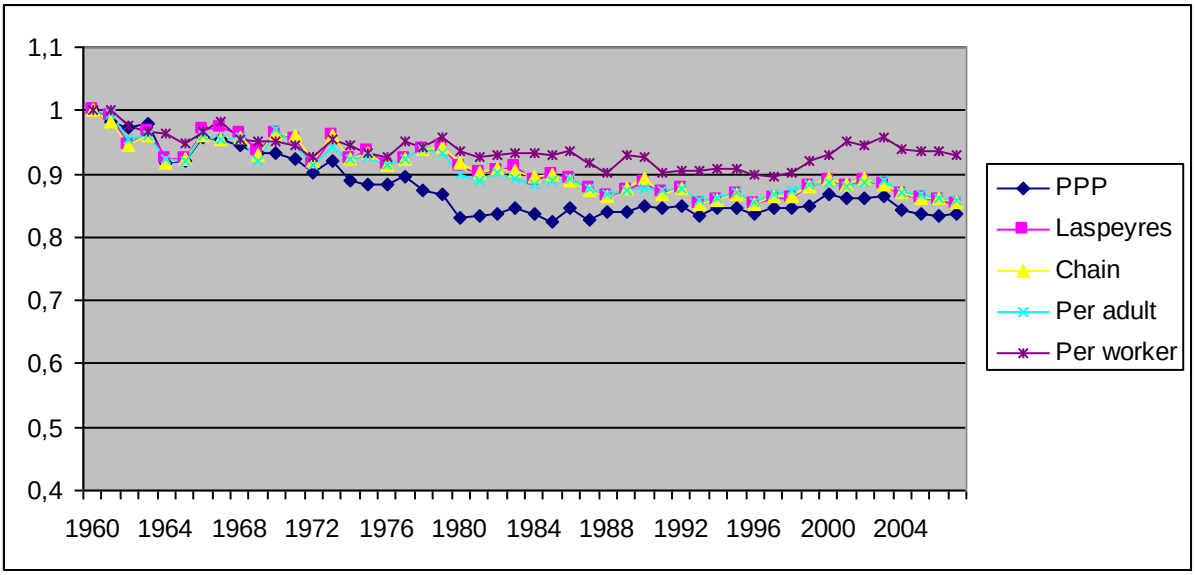


Table 3a: β-convergence between MED-7 countries and the EU

	EU-6			
	OLS	FEM	REM	Hausman
GDP constant price	-1.872**	-11.348***	-1.674**	17.04***
GDP PPP	-2.872***	-9.803***	-2.674***	12.94***
GDP Laspeyres	-2.018***	-6.183***	-1.904***	5.75***
GDP chain value	-2.029***	-6.396***	-1.896***	6.17***
GDP per adult	-2.121***	-6.026***	-2.019***	4.99**
GDP per worker	-2.201***	-3.549**	-2.257***	0.74
EU-15				
	OLS	FEM	REM	Hausman
GDP constant price	-1.817**	-11.082***	-1.817**	16.24**
GDP PPP	-2.631***	-8.711***	-2.631***	9.66***
GDP Laspeyres	-1.946***	-5.853***	-2.587***	4.73**
GDP chain value	-1.939***	-6.018***	-2.493***	5.32***
GDP per adult	-2.031***	-5.569***	-2.429***	4.14**
GDP per worker	-2.120***	-3.129**	-2.131***	0.43

Table 3b: β-convergence between MED-7 countries and the EU (Breakdown by country, Laspeyres)

	EU-6	EU-15
Tunisia	-37.264***	-37.237***
Turkey	-35.627***	-36.903***
Morocco	-32.041***	-32.722***
Egypt	-18.442***	-19.728***
Syria	-14.274*	-13.320*
Algeria	-13.283	-11.470
Jordan	-4.082	-3.060

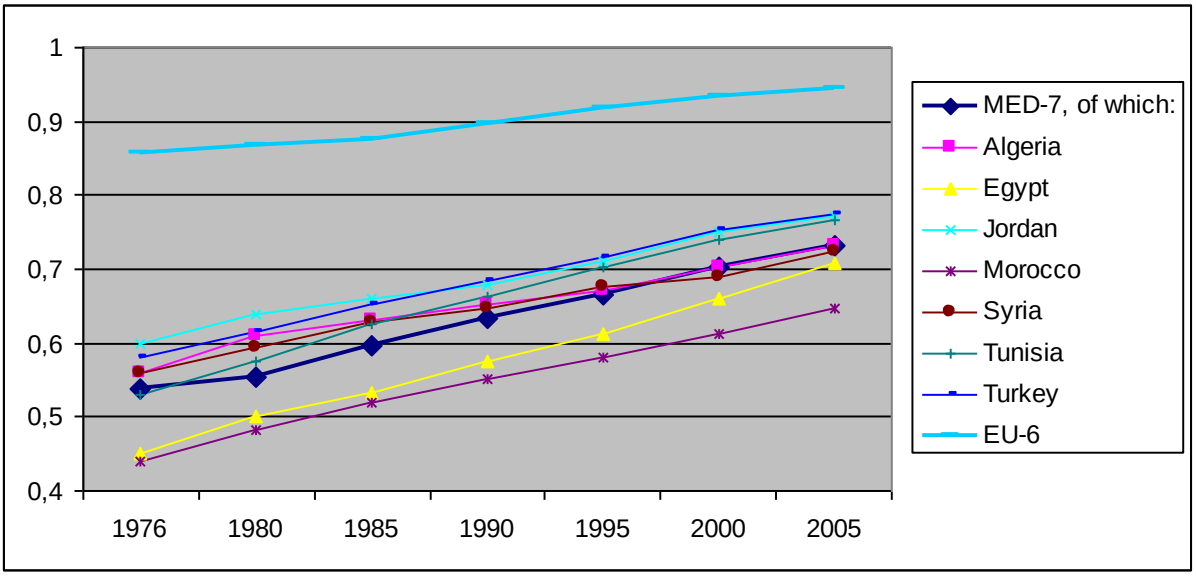
Table 4: β-convergence across MED-7 countries

	OLS	FEM	REM	Hausman
GDP constant price	-0.00108**	-0.00197***	-0.00108**	2.29
GDP PPP	-0.000988	-0.00110***	-0.00111***	1.55
GDP Laspeyres	-0.00058***	-0.00087***	-0.000666***	1.18
GDP chain value	-0.000584***	-0.000894***	-0.000673***	1.37
GDP per adult	-0.000591***	-0.000957***	-0.000672***	2.51
GDP per worker	-0.000321***	-0.000598***	-0.000321***	7.08**

Table 5: β-convergence within the euro-mediterranean area (23 countries)

	OLS	FEM	REM	Hausman
GDP constant price	-0.0000266*	-0.0001009***	-0.000279**	12.20***
GDP PPP	-0.0000134***	-0.0002004***	-0.000134***	38.84***
GDP Laspeyres	-0.0000331***	-0.0001346***	-0.0000581***	19.30***
GDP chain value	-0.0000343***	-0.0001386***	-0.0000579***	19.87***
GDP per adult	-0.0000305**	-0.0001325***	-0.0000522***	22.03***
GDP per worker	-0.0000169***	-0.0000779***	-0.0000327***	26.74***

Figure 9: The Human Development Index (HDI) in Mediterranean countries.



Source: UNCTAD (2009)

Figure 10: σ-convergence of the HDI between MED-7 countries and the EU

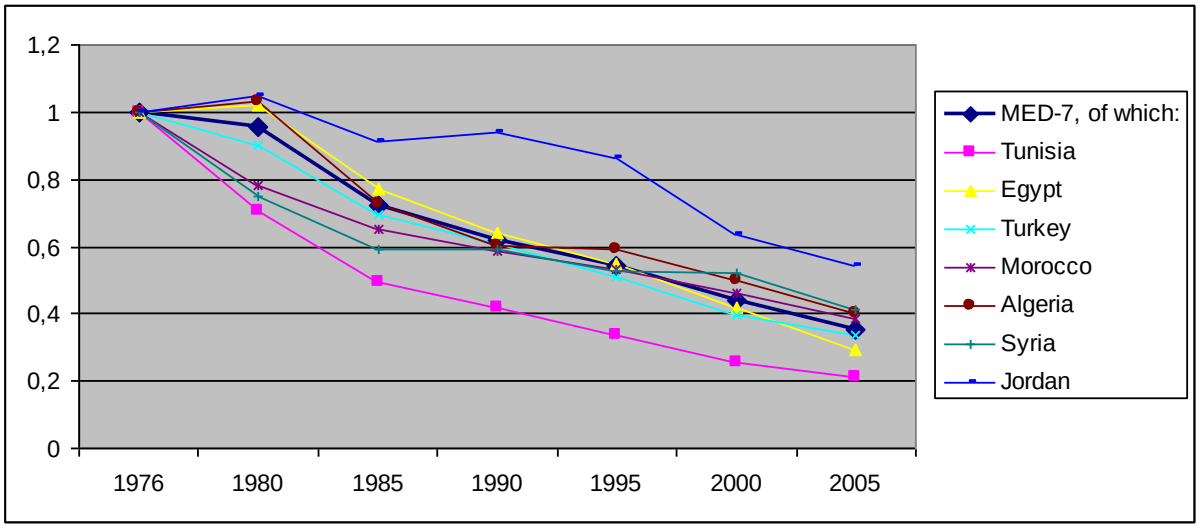


Figure 11: σ-convergence of HDI within MED-7 and within the Euromed areas

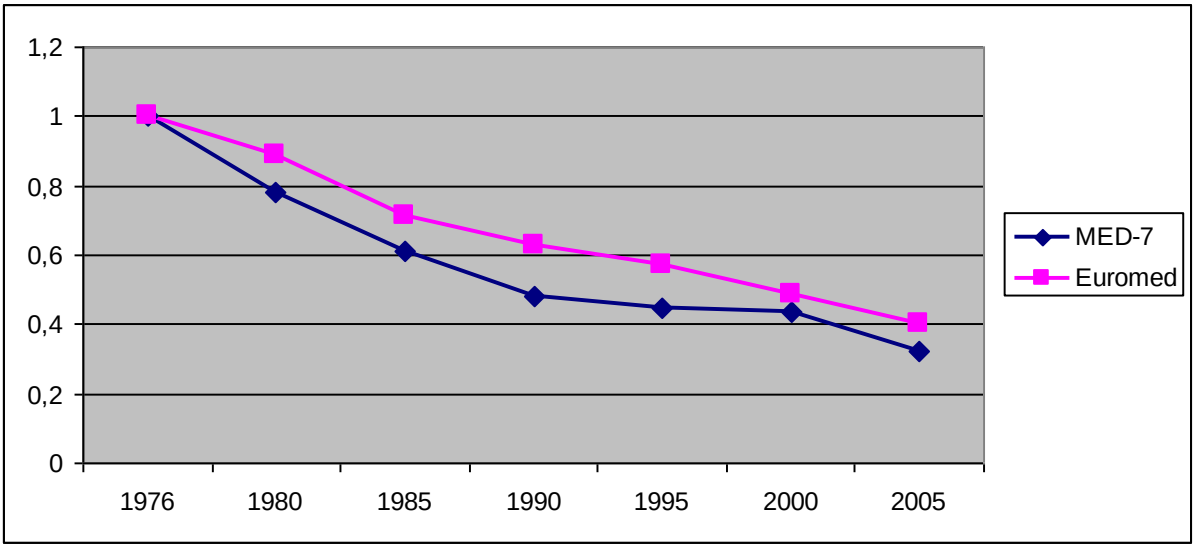


Table 6: γ-convergence of the HDI between MED-7 countries and the EU

	MED-7, of wh	Turkey	Tunisia	Egypt	Morocco	Syria	Algeria	Jordan
1980	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
1985	0,98	0,93	0,96	0,98	1,00	1,05	1,00	1,03
1990	0,98	0,86	0,96	0,98	0,98	1,17	1,07	1,08
1995	0,92	0,84	0,94	0,96	0,98	1,23	1,14	1,05
2000	0,96	0,84	0,94	0,95	0,96	1,05	1,05	1,00
2005	0,92	0,79	0,82	0,91	0,93	0,98	1,02	1,03

Table 7: β-convergence of the HDI.

	OLS	FEM	REM	Hausman
between MED7 and EU6	-2.274**	-0.457*	-2.274***	1.11
within MED7	-2.006***	-3.814***	-3.139***	3.17**
within Euromed	-0.468*	-0.917*	-1.999***	0.36

Table 8a: Estimation results (1960-2007, various estimators, Laspeyre GDP per capita)

	HT	G2SLQ IV	EC2SLS IV	BW GLS	HFGLS
initial income level (beta)	-10.546***	-10.550***	-10.549***	-11.8911***	-10.487***
Human Capital and Technology					
Education	0.0111**	0.0119**	0.0111**	0.0236**	0.0123*
R&D	7.549**	7.515**	7.5485**	8.2272**	7.492**
Trade, specialization and openness					
Inter-industry specialization	-1.283**	-1.273**	-1.273**	-1.506**	-1.270**
Openness	0.0558*	0.0560*	0.0559*	0.0635*	0.0555*
Endowment in natural resources	-0.2332*	-0.2314*	-0.2314*	-0.2780**	-0.2305*
Barcelona agreement (dummy)	0.183	0.228	0.229	0.008	0.183
Economic geography					
Urban	-0.0042*	-0.0038*	-0.0038*	-0.0107*	-0.0010
Transport and communication					
Road	2.006**	1.994**	1.995**	2.384**	1.988**
Telephone	0.0221**	0.0211**	0.0212**	0.0253**	0.0213**
Internet	2.5949**	2.5799**	2.5792**	3.0942***	2.5733**
Other:					
governement share in consumption	-0.2714**	-0.2712**	-0.2712**	-0.2809**	-0.2705**
public investment	0.1603*	0.1647*	0.1647*	0.1666*	0.1630*
investment price	0.0153	0.0156	0.0155	0.0162	0.0156
Wald test (country)	39.36***	25.17***	25.16***	40.12***	41.79***

Table 8b: Estimation results (1960-2007, alternative independent variables)

	constant	PPP	Laspeyres	chain series	per aduldt	per worker	HDI
initial income level (beta)	-20.441***	-11.782***	-10.546***	-10.576***	-10.987***	-8.9049***	-32.2502***
Human Capital and Technology							
Education	0.0187**	0.0514**	0.0119**	0.0113**	0.0146*	0.0163**	0.0102***
R&D	14.065***	8.0356***	7.515**	7.705**	7.719***	6.5772**	0.7896**
Trade, specialization and openness							
Inter-industry specialization	-1.040**	-0.6652*	-1.283**	-1.2393**	-1.3117**	-1.1900**	-0.0682*
Openness	0.0055	0.0296	0.0558*	0.0559*	0.0556*	0.0458*	0.0094*
Endowment in natural resources	-0.4957***	-0.0793	-0.2332*	-0.2153*	-0.2297*	-0.1864*	-0.1234***
Barcelona agreement (dummy)	0.439	1.399	0.183	0.286	0.155	0.126	0.187
Economic geography							
Urban	-0.2598***	-0.0647*	-0.0042*	-0.0225	-0.0354*	-0.0722**	-0.0463**
Transport and communication							
Road	2.8776***	1.1210*	2.006**	1.9214*	2.0331**	1.6599*	0.2343**
Telephone	0.0209**	0.0112*	0.0221**	0.0213**	0.0236**	0.0156*	0.0076**
Internet	4.3601***	1.2084*	2.5949**	2.4519**	2.6014*	1.9465*	0.1940*
Other:							
governement share in consumption	-0.3575***	-0.3961***	-0.2714**	-0.2907**	"-0.2767**"	-0.2185*	-0.0074
public investment	0.2716***	0.2578***	0.1603*	0.1982**	0.2085**	0.2075**	0.0221
investment price	0.0224	0.0125	0.0153	0.0116	0.0177	0.0187	0.0017
Hausman test	4.25	3.94	5.55	3.33	1.88	4.40	2.22
Wald test (country)	64.26***	39.41***	39.36***	40.25***	39.71***	36.76***	38.84***

Table 9: Estimation results (1995-2007, alternative dependent variables)

initial income level (beta)	-25.8223***	-25.0531***	-25.7795***	-47.8599***	-47.1601***
Human Capital and Technology					
Education	0.0052*	0.0371	0.0051*	0.3042***	0.3234***
R&D	3.6453**	5.2525***	3.9958**	3.9200**	2.5675**
Trade, specialization and openness					
Inter-industry specialization	***-0.4522****			*-0.8185***	*-0.8277***
hign tech specialization		***0.1291****			
trade dissimilarity			***-0.4471****		
Openness	0.0183*	0.0171*	0.0173*	0.2237*	0.2151*
FDI	**0.0001**	**0.0003**	**0.0004**	**0.0001**	**0.0002**
Endowment in natural resources	-0.1486*	-0.2005*	-0.0802	-0.3815**	-0.3876**
Economic geography					
Urban	***-0.2222****	*-0.1584**	*-0.1678**		
specialization (concentration)				***-9.8046****	
entropy					***-7.3959****
Transport and communication					
Road	1.019**	1.365**	1.083**	0.1770*	0.2049**
Telephone	0.0952*	0.1015*	0.0241*	0.0702**	0.0748**
Internet	1.9844**	0.8959*	1.8035**	0.3215**	0.1719*
Other:					
governement share in consumption	-0.6761***	-0.7082***	-0.6802***	-1.407**	-1.6029***
public investment	1.2097***	11819***	1.1722***	1.0113***	1.0248***
investment price	0.0041	0.0368	0.041	-0.0641	-0.0666
Public funds					
EIB loans	**0.0051*****	**0.0497*****	**0.0050*****	**0.0195*****	**0.0120*****
Hausman test	4.10	5.08	4.54	4.56	5.99
Wald test (country)	47.57***	47.01***	47.02***	59.57***	59.44***

Table 10: Estimation results on the euro-mediterranean area (23 countries)

initial income level (beta)	-25.8223***	-25.0531***	-25.7795***	-47.8599***	-47.1601***
Human Capital and Technology					
Education	0.0052*	0.0371	0.0051*	0.3042***	0.3234***
R&D	3.6453**	5.2525***	3.9958**	3.9200**	2.5675**
Trade, specialization and openness					
Inter-industry specialization	***-0.4522****			*-0.8185***	*-0.8277***
hign tech specialization		***0.1291****			
trade dissimilarity			***-0.4471****		
Openness	0.0183*	0.0171*	0.0173*	0.2237*	0.2151*
FDI	**0.0001**	**0.0003**	**0.0004**	**0.0001**	**0.0002**
Endowment in natural resources	-0.1486*	-0.2005*	-0.0802	-0.3815**	-0.3876**
Economic geography					
Urban	***-0.2222****	*-0.1584**	*-0.1678**		
specialization (concentration)				***-9.8046****	
entropy					***-7.3959****
Transport and communication					
Road	1.019**	1.365**	1.083**	0.1770*	0.2049**
Telephone	0.0952*	0.1015*	0.0241*	0.0702**	0.0748**
Internet	1.9844**	0.8959*	1.8035**	0.3215**	0.1719*
Other:					
governement share in consumption	-0.6761***	-0.7082***	-0.6802***	-1.407**	-1.6029***
public investment	1.2097***	11819***	1.1722***	1.0113***	1.0248***
investment price	0.0041	0.0368	0.041	-0.0641	-0.0666
Public funds					
EIB loans	**0.0051*** **	**0.0497*** **	**0.0050*** **	**0.0195*** **	**0.0120*** **
Hausman test	4.10	5.08	4.54	4.56	5.99
Wald test (country)	47.57***	47.01***	47.02***	59.57***	59.44***

Table 11: basic demographic indicators (2000)

	Total population growth (%)	Natural rate of growth (%)	Migration rate (%)
Algeria	1,47	1,52	-0,05
Egypt	2,00	2,04	-0,04
Jordan	3,10	2,36	0,74
Morocco	1,74	1,86	-0,12
Syria	2,58	2,58	0,00
Tunisia	1,08	1,15	-0,07
Turkey	1,60	1,52	0,08

Source: US Census

Conclusion and policy implications

This research has shown that despite a lack of σ-convergence for the MENA region taken as a whole there is some evidence of convergence between Southern Mediterranean countries and the EU, although some countries are not converging, especially Algeria and Jordan.

The analysis of the determinants of convergence revealed that some variables are crucial for explaining the convergence process. These are first education and R&D. In this regard, it is worth mentioning that some MED-7 countries have made significant efforts in the past decades. As a matter of fact, the secondary enrolment rate, which was below 50% in most MENA countries before 1990, has reached in 2005 more than 75 % in Turkey (76%), Tunisia (83%), Egypt (86%), Jordan (88%) and Algeria (83%). Significant progress has also been made in Syria and Morocco, although this rate is still below 70% in these countries. This progress must be pursued in the coming years in order to reach the 100% rates of developed countries.

Similarly, given the importance of R&D for explaining growth, MED-7 countries should go on investing in this field. Some countries have already done significant progress in recent years, especially Tunisia, Turkey and Morocco. In these countries, the R&D expenditures approach 1% of GDP. This is close to the levels reached in Southern EU countries, but still far from those in France and Germany (greater than 2%) as well as Sweden and Finland (more than 3.5%). However, Algeria, Egypt, Jordan and Syria exhibit rates which are lower than 0.35%. These countries should make considerable efforts in the coming years to improve their research capacity as a means of catching up the GDP per capita gap with the EU.

MED-7 countries should also continue to invest in transport and communication. For instance, Turkey, Tunisia, Jordan and Morocco have significantly improved their roads and developed highways and other transport infrastructure. These countries (including also Egypt) have also considerably improved the telephone access, with more than 100 telephone lines per 1000 inhabitants. The internet access is also progressing. As a matter of fact, in 2005, Morocco enjoyed 24 internet users for 100 people, Jordan 23, Tunisia 17. However, these countries still remain far from EU levels (generally greater than 50 users per 100 people). As a result, investments in this area must be a priority. This remark applies particularly to Algeria, Egypt and Syria which generally show a wider gap with EU levels. In this regard, the econometric results showed that public investment play a significant role in the convergence process. This means that States must give priority to investments in the areas above mentioned (R&D, education, transport and communication), even if public investment must be complemented by private investment.

MED-7 countries should also continue to open their economies even if openness and FDI are not sufficient conditions for growth. In addition, these countries must change their specialization process toward more high-tech (value-added) products more similar to international demand. As a matter of fact, these countries still face a detrimental specialization process which is growth-reducing simply because of the nature of the goods involved. In addition, the geographical concentration and agglomeration process is also detrimental to growth for the same reasons. A move toward higher value added industries specialization and concentration process would change this detrimental relationship by promoting growth. Again, the development of education and R&D and more generally human capital may be helpful for the change in this process.

Finally, we have seen that also the Barcelona agreement has not made it possible to directly stimulate convergence. However, the EIB loans have significantly contributed to convergence. As a result, these loans must be encouraged and developed, especially for projects in line with human capital, transports and infrastructure. The contents of the Barcelona program should also be reconsidered in the light of the Union for the Mediterranean so as to include more growth-creating projects.

As a final point, some countries still face detrimental demographic and migration indicators (Table 11). The case of Jordan is particularly significant. Indeed, the population in this country has increased much more than in the other MENA countries, i.e. from 3 to 6 million inhabitants since 1990. This is due to both higher natural increase and also the inflow of foreign population after the two Gulf wars (especially from Iraq). As a consequence, this country must mechanically enjoy a much higher GDP growth rate for the same GDP per capita growth. Although economic theory does not directly relate population growth to standards of living, Jordan is likely to be negatively affected by population growth, partly due to the inflow of migrants. Syria and Egypt also face a high growth rates (more than 2% each year) though it is not due to migration. Still, these countries should also accelerate their efforts to control the population growth.

This research is a first step for understanding the growth and convergence process in MENA countries. Despite considerable efforts to build up a comprehensive database over almost 50 years, this research is still limited by the lack of data for some variables and by the use of sometimes rough proxies. It also failed to adequately show the precise impact of particular variables, such as corruption, colonization, cohesion funds… Future research can be conducted to focus of the role of specific variables.