FEM44-11

FEMISE RESEARCH PAPERS

Migration, Comparative Advantages and Knowledge Diffusion In The EU-Mediterranean Region

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September 2019

Ce rapport a été réalisé avec le soutien financier de l'Union Européenne dans le contexte du projet UE-FEMISE sur: "Support to economic research, studies and dialogue of the Euro-Mediterranean Partnership". Le contenu du rapport relève de la seule responsabilité des auteurs et ne peut en aucun cas être considéré comme reflétant l'opinion de l'Union Européenne.

This document has been produced with the financial assistance of the European Union within the context of the EU-FEMISE project "Support to economic research, studies and dialogue of the Euro-Mediterranean Partnership".. The contents of this document are the sole responsibility of the authors and can under no circumstances be regarded as reflecting the position of the European Union.

FEMISE 2018 Internal Competition: 4th round

F E M I S E R E S E A R C H PROGRAMME on "*Support to economic research, studies and dialogue of the Euro-Mediterranean Partnership*"

***Research* No. FEM44-11**

MIGRATION, COMPARATIVE ADVANTAGES AND KNOWLEDGE DIFFUSION IN THE EU-MEDITERRANEAN REGION.

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Financial contribution from FEMISE in the context of the Commission-FEMISE contract no. ENPI/2014/354-494.

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RESEARCH PROJECT FEM 44-11

MIGRATION, COMPARATIVE ADVANTAGES AND KNOWLEDGE DIFFUSION IN THE EU- MEDITERRANEAN REGION.

MIGRATION, COMPARATIVE ADVANTAGES AND KNOWLEDGE DIFFUSION IN THE EU-MENA REGION.[1]

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Abstract

The issues we investigate are related to how migration flows between MENA and EU contribute in shaping EU trade. We document industry specific shifts in tradable goods looking at how migration stocks correlate with EU country's extensive margin (EM) and intensive margins (IM) of trade. First, we use the indicators of extensive and intensive margins (at 4-digit SITC product level) by Hummels and Klenow (HK) which allow to measure the impact on bilateral trade at country level, including trade between sending and receiving countries of migration. This model captures the effects through two different channels, preference/information and knowledge spillovers. To isolate the effect in terms of knowledge diffusion between EU and MENA, following Bahar et al. (2014, 2018) we test the effect of migration on comparative advantages of the host country with third countries, excluding countries of origin and destination of migration. The novelty of the approach we propose is threefold. First, we explore the link between migration and intensive and extensive margin of trade between EU and MENA countries also disentangling the knowledge transmissions channels in relation to migration flows among EU and MENA countries. Secondly, we investigate how the pro trade effect with respect to MENA migration flows differs with respect to flows from other main EU partner areas. Thirdly, we check for the degree of technology embodied in traded goods by considering low, medium and high technology classes. Overall, the estimation results show that the trade effect of immigration from MENA to EU both for IM and EM is always positive while that of emigration from EU to MENA is negative or not significant. However, the trade effects of immigration encountered between EU and MENA partners are lower with respect to other EU partner areas. Besides, the migration induced effect on bilateral trade is higher in low tech than in medium and high tech. If we concentrate on trade of EU with third countries, a measure adopted as a proxy for the spillover channel, we observe that immigration from MENA increases the intensive margin of EU trade in medium tech products but not the extensive margin and emigration does not have a significant impact. Interdependencies between migration and trade policies pointed out by the results of our investigation are meaningful for migration policies of EU countries towards MENA.

Keywords: Trade-migration link, panel data approach, extensive and intensive margin.
JEL classification: F14, F22, L14

[1] FEMISE 2018 Internal Competition: 4th round. F E M I S E R E S E A R C H PROGRAMME on "Support to economic research, studies and dialogue of the Euro-Mediterranean Partnership" Research No. FEM44-11- Financial contribution from FEMISE in the context of the Commission-FEMISE contract no. ENPI/2014/354-494.

Summary

The present study explores the trade creation effects of migration flows from the MENA region to EU.[2] The issues we wish to investigate is how migration inflows and outflows between MENA and EU contribute in shaping trade of EU destination countries and to creating a process of international diffusion of knowledge between the partners associated with the pattern of international migration. To this purpose we adopt two different trade indicators of intensive and extensive margin (Hummels and Klenow,1995; Bahar and Rapoport, 2015).

The choice of EU and MENA countries comes from the different situations the two areas have been experiencing in the last two decades and are supposed to do in the future. All member states of the European Union, indeed, have faced a need of labour (because of low fertility rates, extnded life expectancy and a large part of workers reaching retirement age) (Bommes et al., 2014). The MENA countries, instead, are described by Fabres (2008) as 'an ideal demographic match' for Europe, because of the presence of young active workers that can compensate the shortage of the youthful skilled or unskilled labour of EU countries. But what are the effects of the migration flows between EU and MENA countries on sending and receiving countries?

We will discuss our findings in the light of the outcomes of previous research on closely related issues also focused on the Euro-Mediterranean area. In particular, the trade-migration nexus and the role of migrant networks and proximity, have been extensively analysed in the literature, in which it is explored how migrants promote and help to deal with heterogeneity in international markets.

As pointed out by previous studies, a pro-trade effect of immigrants arriving to EU from MENA countries exists. Especially Southern EU-countries (and, Italy, Spain, France and Portugal) have shown clear trade creation effects of people´s flows arriving to these countries.[3]

Our approach extends previous analyses in the follow directions. We study whether the pro trade effect impact on the number of products exported (the extensive margin of trade) or hinges on the intensity of exports of the basket of products already exported. We also investigate how MENA behave with respect to other geographical areas and we see the degree of technology embodied in traded goods by considering low, medium and high technology classes. Furthermore, the main novelty of our study is to try to extend the analysis to the issue of knowledge spillovers effects. The novelty of the approach we propose is that the knowledge transmissions channels rather than being explored in relation to FDI and to trade, more investigated issues, are seen in relation to migration flows among EU and MENA countries. Of all international factor flows, migration is indeed the strongest knowledge diffusion driver. The labour mobility from MENA region, also needs to be considered as a vehicle of (tacit) knowledge transfer to countries of origin and destination. To our knowledge this issue has not been explored in the context of the EU- MENA migration and trade flows. Knowledge transfer and spillovers are likely to be behind the trade effects we catch although at this level of aggregation (without seeing what happens to sectors and to micro units, like firms and individuals), we cannot say much about the mechanisms which may drive them.

To look at the extensive margin and at the intensive margin we follow two different methodologies. Following Hummels and Klenow (2005) we decompose the share of a country's exports in the world exports into the extensive and intensive margins. The extensive margin is the share of country's basket of export goods in world's export basket, whereas the intensive margin is the share of country's exports in world's exports in country's basket of export goods. An alternative indicator of extensive and intensive margin is also adopted. Following Bahar et al. (2014, 2018) we check whether migrants can explain variations in good-specific productivity, as measured by the ability of countries to export those goods, for products that are intensively exported by the migrants' home/destination countries. We investigate how an increase in the stock of immigrants/emigrants (MENA- EU) from country exporters of a given product is, on average, associated with an increase in the likelihood that the receiving countries will export (import) that same product in the next years, controlling for the previous exports and imports in the same product. We use a disaggregated indicator at 4-digit SITC which measures new appearances of product in a country's export basket in order to see if migrants can explain variation in in the ability of countries to export those goods inducing a process of international diffusion of knowledge between the two areas. Good-specific productivity is measured by the ability of countries to export those goods. Then, to look at the intensive margin, we use the annual growth rate of a pre-existing export product.

Hence, this methodology exploits changes in countries' export baskets and investigate new exports as a proxy for knowledge diffusion leading to cross-country productivity spillovers. The key assumption is that, after controlling for product-specific global demand, firms in a country will be able to export a good only after they have become productive enough to compete in global markets.

2 MENA definition: Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq; Jordan, Kuwait, Yemen, United Arab Emirates, Lebanon, Libya, Morocco, Oman, Palestinian Territory, Qatar, Saudi Arabia, Sudan, Syria, Tunisia. (no Turkey and Israel).

3 See the FEMISE project FEM34-01-CP2010: The Trade Creation Effect of Immigrants: Characterising Socioeconomic Opportunities Arising From Linkages Between People's And Goods' Flows Inside The Mena Region and the FEM34-30-CP2010: Analyzing the Immigration-Induced Changes in Product Diversity and Trade Patterns: The Case of the EU-Mediterranean-Eastern Europe Zone.

The HK model tests the effect of migration on bilateral trade and captures the effects through two different channels, preference/information and knowledge spillovers. To look at the extensive and intensive margin by product, and to refine the analysis of knowledge diffusion between EU and MENA, following Bahar et al. (2014, 2018) (BR), we also test the effect of migration on the extensive and intensive margins (at 4-digit SITC product level) of the host country with third countries, excluding countries of origin of migration, in order to isolate the effects of knowledge spillovers from the effect coming from preference/information.
We also disaggregate by degree of technology of traded goods. We identify three product categories, i) low tech, ii) medium tech and iii) high tech products and conduct pooling test for product groups. We may expect that networks of immigrants promoting more trade in low tech than in medium and in high tech products, as one would expect that this kind of products require more investment in getting the necessary information to accomplish the entrance in new markets. Besides, by introducing the product classification we improve our understanding of the intensive margin. This is defined for all products and does not measure the direction of market extension. When we estimate the model for three product categories, we get somewhat an idea about its direction. For example, the effect of immigration on intensive margin we expect to be ordered in some way. EU (and MENA countries) we expect expand extensive margin more in the low tech as a result of migration. In the case of intensive margin, the immigration's effect we expect to be the opposite with migration helping to increase exports of existing medium and high tech products.
Moreover, the differences between all countries vs MENA countries and other country groups are also explored. We define different country groups: i) MENA, ii) North Africa, Mediterranean countries iii) developed countries, iv) (rapidly growing) East Asian developing countries, v) Africa developing countries.
We consider different publicly available data sources that include bilateral data on migration and trade. We adopt mainly the United Nations, Department of Economic and Social Affairs. Population Division (2017). Trends in International Migrant Stock: The 2017 revision (United Nations database, POP/DB/MIG/Stock/Rev.2017). UN dataset covers a long time period (since 1990), and updates until 2017. In terms of country coverage, it is also the most complete source.
Trade data are from the Observatory of Economic Complexity (OEC website) and they are classified according the SITC4 REV.2. For historical SITC classification data (1962 - 2000), the data are from The Center for International Data from Robert Feenstra. For more recent data (2001 - 2017), data are provided by UN COMTRADE. Finally, we use also data from the CEPII Gravity dataset (Head and Mayer, 2014), for variables on bilateral relationships to be used in the estimation of the gravity model.
Our findings can be summarised as follow:

- We find different effects for immigration and emigration in both estimation approaches adopted.
- In the case of HK indicators, the effect of immigration on IM and EM is always positive while there is a negative effect for EU emigrants with respect to MENA and with respect to the different partner regions.
- There are differences across EU partner regions with a lower trade effects of immigration encountered for trade of EU with MENA partners.
- The impact of immigrants (both for EM and IM) also shows a quite different pattern across products technology groups for EU MENA trade where the coefficient is higher in low tech than in medium and high tech.
- As for the BR indicators, we find evidence of trade effects which are focused on the IM while there is no impact on the EM.
- The impact occurs for immigrants while there is no significant effect for emigrants.
- Comparing the results for the three technology product categories, the impact on the IM appears stronger in medium tech products while it is lower in high and low tech.

The lower trade effects of migration encountered for the MENA with respect to the more intense increase in the extensive margins of manufactures following the arrival of immigrants from Eastern Asian countries, suggest at least two possible hypotheses: i) the higher share of homogenous trade flows in the EU-MENA trade, compared to other trade exchanges of this region, and ii) the lower impact of network effects between EU and MENA compared to those arising for more distant regions, where immigrants´ networks play a greater role in reducing more drastically some existing impediments to trade (informational failures and institutional fragilities guaranteeing successful commercial treats). In this way, a higher assimilation of MENA citizens in EU, seems to be suggested, in line with the results of Foad (2010).
The different pattern across products technology groups for EU MENA trade, where the coefficient is higher in low tech than in medium and high tech, might suggest a lower relative skill endowment of migrant from MENA.
Isolating trade of EU with third countries excluding those of migration we find hints of knowledge transfer effects between the two regions which are focused on the IM while there is no impact on the EM. The impact occurs for immigrants while there is no significant effect for emigrants. These results are in line with our expectations. Immigrant can transfer knowledge through direct interaction while in the case of emigration there is a more indirect process of

knowledge transfer which could happen through return migration or links and communication between emigrants and their co-nationals back home. Besides, knowledge diffusion at the IM might be easier as the fixed costs associated with starting an industry have already been paid for while the lack of evidence of knowledge diffusion at the EM might depend on this being part of a more complex process. Comparing the results for the three technology product categories, knowledge diffusion at the IM appears stronger in medium tech products while it is much lower in low and high tech.

The findings of our analysis provide useful inputs for improving the policy making process in the host countries, especially in the field of migration policy, by enhancing the understanding of trade creation effects of networks of migrants and the knowledge transfer.

Our results show that the migration processes between countries are likely to induce some positive externalities in the side of trade flows and diffusion of tacit knowledge spread between the two areas.

Interdependencies between migration and trade policies pointed out by the results of our investigation are meaningful for migration policies of EU countries, individually and as whole region. Policymakers should care that on the margin more migration may generate trade. A change in the comparative advantage is especially meaningful on a policy ground. New comparative advantages or reinforcing existing comparative advantages may change the pattern of specialization. This potentially may matter economically especially with respect to specific work categories and to specific sectors. The role of highly-skilled migrants is likely to explain why the marginal effect on extensive and intensive margin differ across technology groups of products. Hence, to have more robust policy implications we should further investigate upon issues such as info about the sector of occupation and the skills of migrants. We should also follow the adoption of an ethnic network approach and test for interactions between the characteristics of migrants and the immigration-induced changes in product and trade patterns in the EU-Mediterranean zone. This project marks a first step into a very complex field of research.

Introduction

The issues we investigate are related to how migration flows between MENA and EU contribute in shaping the extensive (EM) and the intensive margins of trade (IM). The aim of the paper is to investigate how migration flows between MENA and EU contribute in creating trade and how it can also be shaping the specialisation of these partner countries spurring a process of international diffusion of knowledge between the two regions. The novelty of the idea is to study the knowledge transmission effects in relation to migration flows rather than in relation to FDI and to trade, a more investigated channel. Of all international factor flows, migration is indeed the strongest knowledge diffusion driver.

Two measures of trade margins one from Hummels-Klenow (2005) at country level and another from Bahar et al. (2014, 2018) (by product) are adopted. In the first indicator (HK) the extensive margin is the share of country's basket of export goods to a partner in world's export basket, whereas the intensive margin is the share of country's exports to a partner in world's exports in country's basket of export goods. This model tests the effect of migration on bilateral trade and captures the effects without separating across the three different channels, preference, information and knowledge spillovers.

To look at the extensive and intensive margin by product, and to refine the analysis of knowledge diffusion between EU and MENA, following Bahar et al. (2014, 2018) (BR), we also test the effect of migration on the extensive and intensive margins (at 4-digit SITC product level) of the host country with third countries, excluding countries of origin of migration, in order to isolate the effects of knowledge spillovers from the effect coming from preference/information. We use new appearances of product in a country's export basket in order to see if migrants can explain variation in the ability of countries to export those goods, for products that are intensively exported by the migrants' home/destination countries. For the intensive margin, we use the annual growth rate of a pre-existing export product. We investigate how an increase in the stock of immigrants (emigrants) from country exporters of a given product is, on average, associated with an increase in the likelihood that the receiving (sending) country will export that same product in the next years. Hence, our methodology exploits changes in countries' export baskets and investigate cross-country knowledge spillovers leading to new exports as a proxy for knowledge diffusion.

We combine different publicly available data sources that include bilateral data on migration and trade and adopt a gravity framework. We adopt mainly the United Nations, Department of Economic and Social Affairs. Population Division (2017). Trends in International Migrant Stock: The 2017 revision (United Nations database, POP/DB/MIG/Stock/Rev.2017). UN dataset covers a long time period (since 1990), and updates until 2017. In terms of country coverage, it is also the most complete source.

Trade data are from the Observatory of Economic Complexity (OEC website) and they are classified according the SITC4 REV.2. For historical SITC classification data (1962 - 2000), the data are from The Center for International Data from Robert Feenstra. For more recent data (2001 - 2017), data are provided by UN COMTRADE. Finally, we use also data from the CEPII Gravity dataset (Head and Mayer, 2014), for variables on bilateral relationships to be used in the estimation of the gravity model.

Our dataset is covering years from 1990-2015 (we can't extend our analysis to 2017 because the CEPII dataset is at our disposal up to 2015). The total number of bilateral observations amounts to over 7 million of observations (28 European countries*6 periods*781 product categories*225 partners). The models are estimated for each of the five years between 1990 and 2015 for the migration and for trade between EU and all its trade and migration partners (more than 150 countries). Hence our data set covers approximately 50 per cent of the global stock of migrants: the extensive country coverage – 225 countries of origin and 28 EU destinations – attenuates the sample selection bias due to the specific choice of the countries entering the analysis and it allows to exploit differences between countries at different income levels.

We focus on people´s flows within the Mediterranean region which include EU and MENA and constitute a quite relevant social and economic process, with net benefits for both the origin and destination countries. In 2015 more than 18 million of nationals born in the southern basin of the Mediterranean were living in EU countries, this being one of the most important corridors for people´s flows in the world, which are mainly supported by the nearness of African and European continents and their dissimilar level of wealth and employment opportunities. The rapid increase in immigrant population in the EU is one of the most challenging political and sociological issues of today, being also important for its economic consequences (Fargues, 2006).

We will discuss our findings in the light of the outcomes of previous research on closely related issues also focused on the Euro-Mediterranean area. In particular, the trade-migration nexus and the role of migrant networks and proximity[4], have been extensively analysed in the literature, in which it is explored how migrants promote and help to deal with market heterogeneity in international trade.

As pointed out by these previous studies a pro-trade effect of immigrants arriving to EU from MENA countries exists. Especially Southern EU-countries (Italy, Spain, France and Portugal) have shown clear trade creation effects of people´s flows arriving to these countries.

[4]FEMISE program FEM34-01-CP2010: The Trade Creation Effect of Immigrants: Characterising Socioeconomic Opportunities Arising From Linkages Between People's And Goods' Flows Inside The Mena Region and FEM34-30-CP2010: Analyzing the Immigration-Induced Changes in Product Diversity and Trade Patterns: The Case of the EU-Mediterranean-Eastern Europe Zone

However, we deepen the analysis of trade creation looking at the knowledge transfer issue and also we add a few other important extensions to previous analyses: we check whether the trade effect of migration impacts on the extensive margin of trade or whether it hinges on the intensity of exports of the basket of products already exported, how important is the degree of technology embodied in traded goods by considering low, medium and high technology classes and finally, we control how does MENA behave with respect to other geographical areas with respect to this type of trade impact.

The pro-trade effect is generally studies as based on two mechanisms :

Preference channel (Mij,➔ Tijp, Tji,p) (immigrants from country i (MENA) to j (EU) import goods p from j and export good p to j)

Information channel (Mij ➔ Tij,p & Tji,p) (immigrants from country i (MENA) to j (EU) import goods p from j and export good p to j)

We added the consideration of a third channel: the Knowledge diffusion channel (M ij,p ➔ Ti,k,p & Tj,k,p immigrants from country i (MENA) to j (EU) import goods p from j and export good p to j in sectors k of comparative advantage of country origin (destination) of migrants.

In the first econometric model we concentrate on the three channels together. In the second econometric model we concentrate on the third channel by adopting the approach in Bahar which uses different (less aggregated) indicators with respect to the ones used in HK (to measure the knowledge transfer also at product level) and consider a different perspective : the effects on trade of the country with third countries excluding countries of origin of migration, in order to isolate the effects of knowledge spillovers from the effect coming from preference/information.

We consider the Revealed Comparative Advantage (Balassa, 1965) to construct our variable of interest for the empirical specification when the extensive margin is estimated. When we estimate the effect of migration on the intensive margin, we use the compound average growth rate (CAGR) in the export of product *p*. The main question is does international migration from MENA (i specialized/RCA in π) to EU (j specialized/RCA in p) shape the comparative advantage of sending and receiving countries ?

We find different effects for immigration and emigration and for EM and IM in both estimation approaches adopted. In the case of HK indicators, the effect of immigration is always positive. However, a lower trade effects of immigration encountered for trade of EU with MENA partners is observed with respect to different EU partner regions such as with the East Asia developing region and with developed partners. The impact of immigrants on EM and IM also shows a quite different pattern across products technology groups for EU MENA trade with respect to others EU trade partner. For the EM with MENA the coefficient is higher in low tech than in medium and high tech. The effect on the IM is instead lower in low tech with respect to medium and high tech. For EU flows with developed countries, the effect on EM is similar across the different sectors while for migration flows

between EU and East Asia the impact on the EM is higher in high tech products. For the IM the effects of migration with Developed countries do not change by sector while for East Asia they are negative.

Focusing on the emigrant stocks, effects are always negative which suggests a substitution effect between the intensive and extensive margin and people´s flows arising not only with MENA but also with respect to the different partner regions. Indeed, only in the East Asian developing countries the sign is showing positive on the intensive margin. The differences between MENA and developed countries are much lower in this case.

As for the BR methodology, which isolates the impact of knowledge transfer focusing on migration between EU and MENA, we find evidence of knowledge transfer effects between the two regions which are focused on the IM while there is no impact on the EM. The impact occurs for immigrants while there is no significant effect for emigrants. These results are in line with our expectations. Knowledge diffusion at the IM might be easier as the fixed costs associated with starting an industry have already been paid for while the lack of evidence of knowledge diffusion at the EM might depend on this being part of a more complex process. Immigrant can transfer knowledge through direct interaction while in the case of emigration there is a more indirect process of knowledge transfer which could happen through return migration or links and communication between emigrants and their co-nationals back home. Comparing the results for the three technology product categories, knowledge diffusion at the IM appears stronger in medium tech products.

These findings provide useful inputs for improving the policy making process in the host countries, especially in the field of migration policy, with the aim of enhancing the understanding of trade creation effects and on how the integration processes between countries show positive externalities and diffusion of tacit knowledge between the two areas.

The remainder of the paper is as follows. In section 1 we describe the present and recent past of good´s and people´s flows for the MED countries, while in section 2 we review the main contributions of the related literature. In section 3 we describe the data and develop the empirical model and its theoretical anchor that will inform the research. Section 4 contains the results of the two different estimation strategies: estimating the extensive and the intensive margin at country level with a general gravity-type equation with a PPML approach, and then the adoption of an analysis of extensive and intensive margin disaggregated at product level adopting an indicator of comparative advantage shift at product level as measure of extensive margin and a compound growth rate of revealed comparative advantages to measure the intensive margin. We also split up the trade vector by heterogenous groups of countries and for different technology categories of products controlling for the geography and economic development, and institutional distance in driving the trade-migration linkage. This section also includes

the discussion of the research findings. Finally, section 5 concludes and suggests policy implications derived from our results.

1. An overview of good´s and people´s flows between MENA and the EU region vis-à-vis other geographical areas

EU plays a very prominent role representing one of the largest trading partners of countries in the MENA region. If we look at Tab.1 we see that the share of EU as destination for MENA exports, in spite of a sizeable decrease after 1995, in 2015 was still almost 22 per cent. In 2015, 30% of the total Mena imports came from Europe (tab. 2). Three of the five main export partners for MENA are in Europe (Italy, France and UK) and two of top five countries to which Middle East & North Africa imported goods are European (Germany and Italy, before China, USA, United Arab Emirates) (according to World Bank data, 2019).

Tab. 1. Destination areas of MENA Exports[5]

Destination areas of MENA Exports	1990	1995	2000	2005	2010	2015
EU28	42.19	33.90	29.08	24.98	19.78	21.70
Developed Countries	41.51	37.44	43.15	39.39	31.46	12.82
Eastern Asian developing countries	3.16	7.39	9.50	11.23	23.61	18.78
African developing countries	0.01	0.26	0.04	0.59	0.66	0.96
Northern Africa Countries	0.57	0.87	0.78	0.84	1.13	1.48
Eastern Europe	0.00	0.00	0.07	0.15	0.21	0.37
South-Mediterranean Countries	2.64	2.41	1.93	2.09	2.03	3.01

[5] MENA: Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq; Jordan, Kuwait, Yemen, United Arab Emirates, Lebanon, Libya, Morocco, Oman, Palestinian Territory, Qatar, Saudi Arabia, Sudan, Syria, Tunisia. Developed Countries: (Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg Netherlands, New Zealand, Norway, Portugal, Slovenia, South Korea, Spain, Sweden, Singapore, Switzerland, Turkey United Kingdom, USA.
Eastern Europe: Belarus, Bulgaria, Czech Republic, Hungary, Poland , Republic of Moldova, Romania, Russian Federation, Slovakia, Ukraine.
East Asian developing countries (Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Fiji, India,Indonesia, Kiribati, Lao P.D.R., Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nepal, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka.
Africa Developing Countries Ethiopia, Rwanda, Ghana, Côte d'Ivoire, Senegal, Benin, Kenya, Uganda, and Burkina Faso.

MENA Countries	2.95	5.54	4.83	8.56	9.94	29.18
Other Countries	6.96	12.19	10.62	12.18	11.18	11.69

Source. UN COMTRADE.

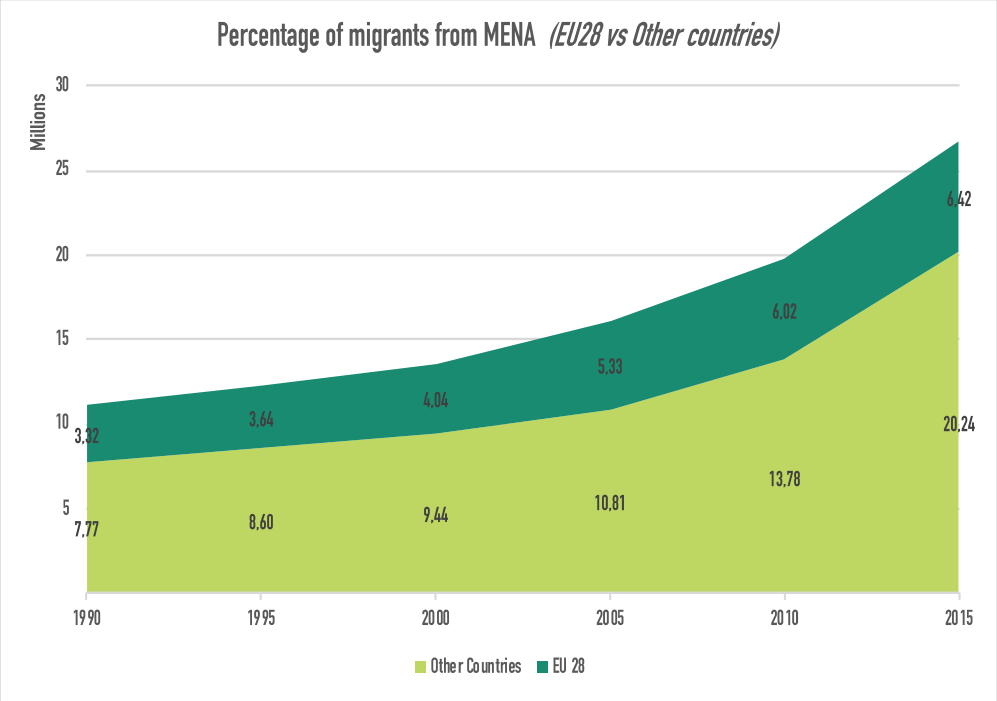
Tab. 2. Origin areas of MENA Imports

Origin areas of MENA Imports	1990	1995	2000	2005	2010	2015
EU28	52.02	46.55	43.87	37.38	30.98	28.34
Developed Countries	24.50	22.51	22.97	18.14	17.27	18.69
Eastern Asian developing countries	3.98	7.63	9.56	13.54	17.54	18.77
African developing countries	0.10	0.13	0.17	0.15	0.28	0.33
Northern Africa Countries	4.39	4.54	4.22	2.27	3.77	4.80
Eastern Europe	0.00	1.02	1.90	3.61	3.12	2.08
South-Mediterranean Countries	2.28	2.17	1.64	3.14	3.94	3.03
MENA Countries	3.61	6.01	7.49	13.02	13.73	12.51
Other Countries	9.11	9.44	8.18	8.74	9.37	11.46

Source. UN, COMTRADE.

People´s flows to EU are also very important inside the MENA region, with historical linkages between expecially Northern African (NA) and EU countries. Almost one out of four migrants from MENA comes to Europe (6,4 millions equal to 24.1% in 2015, see fig. 1) (UN, 2017).

Fig. 1 – Percentage of migrants from MENA to EU28



Source: Own Calculation on UN Data *(United Nations, Department of Economic and Social Affairs. Population Division (2017). Trends in International Migrant Stock: The 2017 revision)*

The main people´s flows arriving to the EU region were those from Turkey, Morocco, Algeria and Tunisia, with immigrants mainly establishing in Spain, France, Italy and Germany. There was a remarkable growth in immigrants arriving to these three countries along 2002-2010. The period was characterised by high volumes of (in some cases government-promoted) regular entrances of immigrants, resulting in an annual increase of 23% between 2000 and 2007, and causing a structural change in the foreigners´ presence on the countries. Immigrant population grew by a factor of 2 in Portugal, of 3 in Italy and of 4 in Spain, between 2002 and 2010, recording a rate of immigrants to total national population of 4.3%, 7.0% and 12.2%, respectively at the end of the period (Artal Tur et al., 2011). Total (official and unofficial) migration flows originating in the MENA account for approximately 10-15 million people, which represents some 3%-5% of total MENA population (Eurostat, 2017).

2. Review of the literature

This study belongs to the literature on international knowledge diffusion in that it looks at the role of migrants as a major input to increase knowledge diffusion, productivity and technology improvement. It builds on Bahar et al. (2014), who suggest that the appearance of new industries in a country's export

basket can be partly explained by the local character of knowledge diffusion. That is, knowledge spillovers follow a highly geographically localised diffusion pattern, which is attributed to its 'tacitness' (Jaffe et al., 1993; Keller, 2002, 2004; Bottazzi and Peri, 2003; Kerr, 2008; Breschi and Lissoni, 2009). This vision has been originally suggested by Arrow (1962), who argued that the transmission of this tacit or non-codifiable knowledge relies on human minds rather than on written words. Thus, if tacit knowledge can induce sector-specific shifts measured by new exports, then migrants, who are naturally carriers of tacit knowledge, would shape the comparative advantage of their sending and/or receiving countries.

All the factors that affect human capital accumulation have notable effects on economic and political outcomes, and international migration is one of these. Starting from the consideration that people decide whether to migrate based on the costs and benefits they expect, individual migration decisions can affect those left-behind and the origin countries in different ways (Rapoport, 2018). These effects can be in some way direct and immediate (e.g., wage effects on labour markets, remittances) or be externalities that can contribute to integrate home countries into the world economy. These externalities, in their turn, can be positive or negative. Traditionally, one of the main concerns about the international migration was the so called "brain drain"; but the more recent literature has found positive spill-overs and incentive-creating effects of migration by creating business opportunities as well as by favoring the circulation and diffusion of knowledge (Miguelez, 2017). The effects of migration in shaping the comparative advantage of origin and destination country has been introduced in the analysis. The channels through which tacit knowledge diffuse can be several, but, in most of the cases, they involve human interaction. This implies the international migration to be a good medium to facilitate the transfer of knowledge and technology. Traditionally, the most common way to measure knowledge diffusion has been to consider patent and inventor data (specifically patent citation) (Thompson and Fox-Kean, 2005; Singh and Marx, 2013). More recently, another way to track knowledge diffusion has been used: following Bahar et al. (2014) the evolution of the export basket of countries has been identified as a useful proxy to measure the knowledge diffusion.

Our study also hinges on a large strand of literature which analyses the relationship between trade and migration, following the pioneering work of Gould (1994). Early contributions include those of Head and Ries (1998), Rauch (1999), and Rauch and Trindade (2002). All these studies concluded that, in aggregate, migration leads to a trade creation effect.

The pro-trade effect of migration flows within this literature builds on two main channels. The first channel is due to the "preference" of immigrants for some type of homeland products, which is also called by White (2007) the "transplanted home bias" or "ethnic good" effect, resulting in an increase of imports and exports of host countries. Immigrants can generate additional demand for goods from

their source countries, both directly, through their own consumption (as when, in their utility function, they attach a higher weight to the consumption of products from their origin country), or indirectly, by affecting natives' preferences (through a diffusion of preferences effect).

The second channel affects both import and export flows, being defined as the "network" or the "information bridge" channel (Dunlevy, 2006). The first mechanism is related to an information effect: immigrants can increase bilateral imports and exports because they help overcoming information problems thanks to their having a better knowledge of their origin and host-country markets, the connections and knowledge about the respective institutional and business environments, as well as the linguistic skills that are needed to start and develop import and export activities across countries. In this case, networks of immigrants promote new business opportunities by reducing transaction trade costs (i.e. improving information channels, or moderating institutional failures in business relationships, like security and arbitrage issues) (Rauch, 2001; Wagner et al., 2002; Briant et al., 2014). In the "network approach", the basic idea is that information costs are a major component of the fixed costs that firms must pay to enter a new market. In this way international networks of people would be of great help in reducing such fixed trade costs and larger stocks of immigrants in a given destination would help firms to overcome such start-up and commercialization fixed costs in foreign markets, improving both export participation and intensity of exports.

Immigrants' ties to their home country may promote trade for at least three reasons. First, immigrants have a good knowledge of the customs, language, laws as well as business practices in both the host and home countries. Accordingly, their presence helps bridging the information gap between sellers and buyers on both sides, hence promoting bilateral trade opportunities, and establishing lasting ties based on trust and mutually understood culture. Second, immigrant networks may provide contract enforcement through sanctions and exclusions, which substitutes for weak institutional rules and reduces trade costs. As the literature has shown, these two types of trade-enhancing effects are relevant in pushing both imports and exports flows between destination and home countries of immigrants. And third, immigrants bring their taste for homeland products, leading to the correspondent preference effect, which is more likely to promote imports from the home country towards the destination country.

Following this literature, recent empirical contributions, employing a gravity approach, demonstrate that trade and migration flows could positively covariate. In general, studies began focusing on the different impact of immigration in generating new exports and imports in order to disentangle the importance of preference and network effects (White, 2007; Felbermayr and Toubal, 2008).

Three main stylised facts also emerge from the literature: (i) the trade–migration link appears stronger for differentiated goods than for homogeneous commodities; (ii) the effect of immigrants on imports is

typically estimated to be larger than the one on exports; and (iii) there is ample evidence of a stronger pro-trade effect for high-skilled migrants. By running a gravity model separately for each aggregated group, Rauch and Trindade (2002) estimate separate elasticities of trade with respect to immigrant stocks for differentiated goods, goods traded on organised exchanges, and goods that display some reference price. Their statistics show that the pro-trade effect of ethnic networks on differentiated products is at least 24 per cent larger in magnitude compared to the correspondent impact on goods that exhibit some reference price and 60 per cent greater with respect to goods traded on organised exchanges. The same classification and a similar methodology have been used by Felbermayr and Toubal (2012) and Ehrhart et al. (2014). As for the explanation of the gap between the immigrant's elasticity of imports and exports this is assumed to be the preference channel of migration. Bratti et al. (2014) summarise the results of a sample of the most influential contributions to the trade–migration literature and find a significant difference in magnitude. Furthermore, the meta-analysis proposed by Genc et al. (2010), which is based on 48 studies and about 300 estimates, indicates a discrepancy in the metamodal elasticity between imports and exports of approximately 0.03. Lastly, the third stylised fact indicates that the better the ability of the ethnic networks to receive and process information on trading opportunities, the higher the pro-trade effect. By focusing on a balanced panel of low-income Southern sending countries and high-income Northern receiving countries, Felbermayr and Jung (2009) find that the pro-trade elasticity of high-skilled workers is almost four times bigger than that of low skilled workers when migration of all skill groups is accounted for. Other studies such as Herander and Saavedra (2005), Felbermayr and Toubal (2012) and Ehrhart et al. (2014) show higher pro-trade effects of high-skilled ethnic networks compared to the correspondent impact of the total stock of immigrants. Many studies focus on North Mediterranean countries. Blanes and Martín-Montaner (2006) analyze the case of Spain, with some 4.3 million of (legal and legalized) immigrants arriving at this country along the first decade of the new century. Original contribution of the authors starts by identifying the relevant trade creation effect of immigrants for intra-industry (IIT) trade exchanges. Braiant et al. (2008) shows that the main mechanisms behind the link migration-trade rely on the information effect, that is, immigrant's additional information about products and social and political institutions, together with the social or ethnic network effect, showing that immigrants with a medium level of education and those related to business activities are the ones who have a significant positive effect on bilateral trade. Another contribution is that of Murat and Pistoresi (2009), who study the relationship between emigration, immigration and trade, employing data for Italy. The sample splits for 51 foreign trading partners and time focus spans from 1990-2005. Their results suggest that networks of Italian emigrants in foreign countries clearly boost trade, but this pro-trade effect does not depend on institutional and

cultural dissimilarities of the trading partners. Immigrants arriving to Italy are shown to reduce imports, finding a substitution effect of factor-and-goods´ flows.

Tedesse and White (2007) also study the Italian case for the period 1996-2001 and observe that immigrants increase trade flows by exploiting superior information regarding host country and home markets and/or by acting as conduits that bridge cultural differences between their host and home countries. Greater cultural bilateral distance is also found to positively stimulate pro-trade effects. Regarding the analysis for Portugal, Faustino and Leitão (2008) tests the relationship between immigration and Portuguese bilateral trade, considering the fifteen European partners (EU15), and using a static and dynamic panel data analysis, showing that the stock of immigrants has a positive effect on Portuguese exports, imports and bilateral intra-industry trade. Their results also show that immigration affects all types of trade positively by decreasing trade costs. In the static model, a 10% increase in immigration induces a 6% increase in exports and a 5.5% increase in imports. The effect on the Portuguese trade balance is then positive, what can be considered a static welfare social gain, although dynamic results show a negative one in the long run. Authors´ findings also suggest that when immigrants to Portugal originate from a Latin partner country, the effects on trade are stronger than in the case of immigrants from non-Latin countries.

For the case of France, a relevant contribution is due to Briant et al. (2008), who found an important trade creation effect for immigrants arriving to France; particularly, the trade enhancing effect of immigrants is investigated along two intertwined dimensions: the degree of complexity of traded goods, and the quality of institutions in partner countries. The trade enhancing impact of immigrants is, on average, more salient for countries with weaker institutions. However, this positive impact is especially large on the imports of simpler products, so the preference channel seems to be acting in this case. When we turn to complex goods, for which the information (fixed-costs) channel conveyed by immigrants used to be the most valuable, immigration enhances imports regardless of the quality of institutions in the partner country. For exports, immigrants substitute for weak institutions on both simpler and complex goods.

Studies focused on the MENA region versus EU are more recent (e.g. Foad, 2010; Peridy, 2012 for France; Artal-Tur et al., 2012 for Italy, Spain and Portugal; Ghoneim and El-Deken, 2011; Ça atay et al., 2010; Giovannetti and Lanati, 2016; Giovannetti, Lanati and Venturini, 2019).

Foad (2010) examines the immigration-trade linkage separately for migrants moving from the Middle East and North Africa (MENA) to both Europe and North America for a sample spanning 1991-2001, in order to test how differences in income and education (by selection issues in migration) existing between these two groups affect such pro-trade effect, given that MENA migrants to North America are observed to be less numerous, but more educated. The author expects that the fact that these

migrants going to North American used to show more cultural assimilation in that area should weaken both network and preference effects, then affecting the trade-enhancing effect. What he founds is that the migration-trade link is shown to be stronger for migrants in Europe, with the strongest output for imports. He also observes that the migration-trade link is stronger for differentiated goods than for homogeneous goods, especially for differentiated goods´ imports into Europe. These results suggest that while network effects matter, immigrant preferences for native country goods are the key factor driving the migration-trade link.

Peridy (2012) for France for the period 2001-2010 shows that the network effects predominate in econometric output, with some 10% additional numbers of immigrants leading to trade creation of about 2%-5%. Although the specific trade creation effect of migrants coming from MENA countries seems to be lower than those of more remote regions, the observed effect is still significant, particularly for the network channel. Results also show that the pro-trade effect of migrants is significant for imports but also for exports, and for differentiated products, while much less for homogenous products. As the paper explains, the lower trade effects of migration encountered for the MENA countries could be a result of the higher share of homogenous trade flows in the France-MENA trade, compared to other trade exchanges of this country, or a consequence of the lower impact of network effects between France and MENA, given the lasting tradition of arrivals from that destination.

Artal-Tur et al. (2011), for Italy, Spain and Portugal in the period 2001-2010, show how all three countries have accumulated stocks of migrants of more than 10 million people, mainly coming from Morocco, Algeria and Tunisia, which makes their results of pivotal relevance for the EU-MENA region. The investigation builds on subnational (province level) data. Estimation output shows clear trade creation effects, in both exports and imports, through the network channel for all three countries, with the preference channel appearing just slightly in imports from some geographical areas historically closer to the receiving countries of immigrants (Latin America, Western Europe, and Mediterranean countries). The network effect is the predominant one. Second, networks are created inside the provinces, not usually spilling over nearby territories. The more distant the territories (in terms of geography, culture, income per capita, or institutions), the bigger is the trade creation effect. Ghoneim and El-Deken (2011) in the case of Egypt for 2001-2010, have shown that Egyptian migrants are able to create trade with major EU receivers of people´s flows. However, the effect appears just to work for specific type of products and not with all countries. Particularly, migration enhances trade between Egypt and the EU through both preference and network channels, but with a predominant role of the former over the latter channel, as in usual South-North studies. The type of trade enhanced by Egyptian migrants differs on the exports and imports side, where Egyptian emigrants help to enhance Egyptian homogenous and differentiated exports to the EU (clear preference channel), and European

homogenous and reference-priced imports to Egypt (closer to network effects and market opportunities in Egypt). Regarding the Gulf countries, results have shown no great trade effects of migrants´ networks of Egyptians arriving to these countries. Similarities between people in this area, in cultural and social terms, appear to be reducing trade gains derived from flows of information through MENA networks. Moreover, migration to Gulf countries is mostly temporary, so networks do not seem to play the same role than they do in the EU and other destination countries of Egyptians´ emigrants (as North America, for example).

Cagatay et al. (2013) empirical analysis is carried out to analyze the impact of migration on bilateral trade between the EU and Mediterranean countries and on product diversity in the EU over the period 1998-2010. Immigrants are grouped with respect to their origin as Mediterranean and Eastern European countries. Trade analyses cover both industry-level bilateral exports and imports and product diversity is measured by focusing both on industry-level employment and number of enterprises. Almost in all cases a positive correlation between migration and both exports and imports is found. This outcome also supports the "information bridge hypothesis" which boosts trade via lowering transaction costs. The empirical evidence found on the relationship between migration and product diversity in some industries is not as strong as the one between international trade and migration. Therefore, the evidence on existence of "transplanted home bias" that boosts imports from the origin countries and motivates production in some industries in host countries, is not verified.

In evaluating of the impact of highly skilled emigrants on the development of the country of origin a recent literature started to analyze the impact of highly skilled migration on trade quality and productive integration with the destination countries. Giovannetti and Lanati (2016) analysis for the period 1995-2000, not only study the link between emigration and exports from the origin country but also the link between skill level of the migrants and the quality level of the good exported. Building on this paper a more recent contribution by Giovannetti, Lanati and Venturini (2019) focused on Mediterranean countries and further explored for this region the channel of transmission from migration to trade to understand if the growth in highly skilled migrants has ended up in an increase in exports of higher quality in the Mediterranean countries. According to this study migrants favor international trade by reducing the transaction costs and thus supporting exports. This effect is higher for those goods for which the country of origin has a comparative advantage. Besides, low skilled emigrants trigger exports of low-tech goods, while high skilled migrants are more likely to favor high quality technological exports. They consider both the preference channel where highly skilled migrants by earning a higher wage, prefer and consume higher quality goods, and the distribution channel, highlighting that highly educated migrants can promote more easily than low skilled goods coming from the country of origin

with more technological content. Given the increase in alphabetization and the improvement of the educational systems in the Mediterranean countries, this issue is quite relevant.

The literature on South Mediterranean countries is still scant and more research is needed for this important North-South corridor, in order to generate more evidence informing the EU Trade and Migration Common Policies, as well as the EU Neighboring Policy. Studies on the MENA region are still scarce, and only few are covering the recent important wave of people´s flows of the new century.

In such context, the present paper is directed to keep filling some of these existing gaps of knowledge in the field. The analysis of this paper focuses on the change in comparative advantages in EU destination countries associated with migration try applying the tools provided by the last developments of the literature and building on a long panel dataset up to 2015.

3. Data and estimation methodology

One of the main concerns about the international migration literature has been the lack of data. So, traditionally, most of the contribution were theoretical. More recently, however, the availability of new migration data has contributed to a new body of literature. For our purpose we consider different publicly available data sources that include bilateral data on migration and trade.

For data on migration, we adopt those from the United Nations, Department of Economic and Social Affairs (United Nations, Department of Economic and Social Affairs. Population Division (2017). Trends in International Migrant Stock: The 2017 revision). UN dataset covers a long time period (since 1990), and updates until 2017 providing data on international migrant stocks by age, sex and origin for the mid-point (1 July) of each year: 1990, 1995, 2000, 2005, 2010, 2015 and 2017.

Concerning the trade, we use product data from the UN COMTRADE. Data are available from 1962 to 2017, with products classified according to the Standard Industry Trade Classification (SITC) (Rev. 2)[6] with a 4-digit level of detail.

Moreover, we use the CEPII Gravdata dataset for distance and cultural data (the dataset provides information on colony– colonizer relationship, and common language, as well as data on the same religion between pairs of countries).

After the merging procedure, we end up with a dataset covering from 1990-2015 at five years interval[7] covering more than 200 countries and more than 700 single products.[8]

[6] For more historical data (1990-2000), the data are from The Center of International Data of Robert Feenstra. For more recent data (2005-2015) they are from the UN COMTRADE with corrections implemented by Hausmann et al. (2014) for the bilateral trade data.

[7] We are not able to extend our analysis as the CEPII Gravdata is at our disposal up to 2015.

This research wants to contribute to a recent and growing body of literature that studies the diffusion of knowledge across borders as a result of international human mobility (Valette, 2017) and the subsequent shaping in the trade and in the comparative advantage of nations (Bahar et al., 2014). In analysing the impact of migration flows between MENA and Europe on trade of European countries, we consider two aspects of migration on trade: the effects on bilateral trade, and the effects on trade with third countries. To this end, we use different indicators (and different methodologies) to estimate the extensive and intensive margins.

In the first estimation strategy, we use a set of country-level indicators to measure the margins of trade as proposed by Hummels and Klenow (2005), and we will estimate an augmented gravity model with migration and trade variables through PPML[9]

We start by proposing a Pseudo-Maximum Poisson Likelihood (PPML) estimation procedure with dummy variables for country, province and year effects, because it is best suited to the estimation of our empirical model while dealing with excess of zeros in trade flows.[10]

Dummies specification allow to partially control for omitted variables bias and fixed effects problems arising in the estimation procedure in Poisson model given the existence of possible correlations between some of the covariates and the own characteristics´ of the origin/destination country/provinces, as well as existing correlations with time effects (see Baldwin and Taglioni, 2006).

Furthermore, we refine the analysis in the second model. As this model includes all observations, and therefore tests the effect of migration on extensive margin and intensive margin in general the effect might come through more trade between sending and receiving countries. Therefore, it would capture the effects through two channels, information and knowledge spillovers. Hence, we estimate the model by calculating extensive and intensive margins in trade with third countries (third countries are those with total number of immigrants and emigrants less than a certain threshold) to isolate the effects of knowledge spillovers.[11]

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[8] One of the future data to be exploited are the database developed by Docquier, Lowell and Marfouk, henceforth DLM07 (2007). The data are based on the Censuses of OECD countries and there is information on the migration stocks of foreign born by origin country for the years 1990 and 2000. This dataset may be useful for our purpose (as in Bahar and Rapoport, 2018) as it allows to disentangle the education and gender dimensions. It should be noticed that this dataset has been recently updated to 2010 (see Valette, 2017). To the same purpose we might also take advantage of the IAB brain-drain database (Institut für Arbeitsmarkt- und Berufsforschung) developed by Brücker, Capuano, and Marfouk (2013), which breaks down by country of origin the stocks of migrants (defined as foreign-born individuals) of 20 OECD countries.

[9] The basis of the trade modeling is mostly relying on specific forms of the gravity equation. From a theoretical point of view, this equation has been renewed by Anderson and van Wincoop (2003), who introduce the role of multilateral resistance for explaining bilateral trade. This means that bilateral trade not only depends on traditional mass variables (GDP) and bilateral trade costs (often proxied by distance), but also on multilateral trade costs and other trade barriers. The model presented below considers these new developments in the gravity equation.

10 We also compare the OLS wth the PPML estimations in Tab. A.2 in Appendix.

[11] To estimate this model, we first mark country-pairs where immigration+emigration exceeds the threshold value (500, 1000, 1500, etc.). For example, we create a new variable as follows:

gen imdummy = (im + em) > 500

In this second methodology, we use more disaggregated (product-level) as indicators of both the increase in the export of already exported products, and the change in the countries' export basket. Another reason why we undertook this second methodology is that with the HK method, we analyze bilateral trade between sending and receiving countries, whereas with this second method we focus on the effect of migration on extensive and intensive margins of all products of the host country. Hence, we analyse two aspects of migration on trade: 1) the effects on bilateral trade; 2) the effects on overall trade.

To address endogeneity issues in both models we use instrumental variables coming from a gravity model to provide exogenous variation of migration.

In the next paragraphs, we will show more in details the two approaches.

3.1. First estimation strategy

At this stage, we want to measure the trade creation linked to migration flows in the EU-MENA using country-level indicators. According to the methodology proposed by Hummels and Klenow (2005), we decompose the share of country's exports on the world exports, in extensive and intensive margins, in which the extensive margin is measured as:

$$EM_{i,j,t} = \frac{\sum_{i \in I^C} X_i^W}{\sum_{i \in I^W} X_i^W} \quad [1]$$

And the intensive margin is given by:

$$IM_{i,j,t} = \frac{\sum_{i \in I^C} X_i^C}{\sum_{i \in I^C} X_i^W} \quad [2]$$

In which (X_i^C) is the value of country c's exports and (X_i^W) are world's exports; I^C is the set of goods exported by country c and it is a subset of I^W(all goods exported in the world). Both indicators lie between 0 and 1.

What we want to estimate is the following equation:

$$LHS = \alpha + \beta \ln(EMI_{ijt}) + \gamma \ln(IMM_{jit}) + \xi \ln(Previous\ export_{ijt-1}) + \rho \ln(Total\ imports_{jit}) + \\ + \xi \ln(Accumulated\ export_{ijt-1}) + \rho \ln(Total\ imports_{jit}) + z_{ijt} + \varphi_{it} + \theta_t + \delta_{ij} \quad [3]$$

Then, we calculate EM and CAGR variables (equations 4 and 5 in out paper) for EU countries by using only those country-pairs where imdummy == 0, then we estimate the same model as before.

Where the Left Hand Side (*LHS*) is alternatively the Extensive and Intensive margin à la Hummels and Klenow (2005); EMI_{ijt} is the total stock of emigrants (in log) from country i to j; IMM_{jit} is the total stock of immigrants (in log) from country *j* to *i*.

As first step, we construct the instruments, following Frankel and Romer (1999), implementing a gravity model to compute predicted bilateral migration (immigrants and emigrants) stocks based on common cultural and historical characteristics of the sending and receiving countries of the migrants.

$$migrants_{i,j,t} = \alpha + \beta_1 X_{i,j} * \theta_t + \theta_i + \theta_j + \nu_{i,j,t} \quad [4]$$

The gravity model in Equation [4] is based on cultural and historic bilateral variables between the sending and receiving countries of migrants (Frankel and Romer 1999; Bahar and Rapoport 2018) and we will estimate it through a PPML.

Silva and Tenreyro (2006), indeed, suggest that the application of a PPML estimator in gravity settings gives better performance, relative to linear models, in settings where many zeros are present in the dependent variable.

The variables included in the estimation are dummy variables indicating: a (former) colony–coloniser, a same coloniser, a same language relationship, and same religious beliefs. We added receiving country, sending country and time dummies interacted with the variables in X of Eq. 4. The variables included in the estimation of equation 4 all have a time dimension. Not only there are dummy variables indicating: a (former) colony–coloniser, a same coloniser, a same language relationship, and same religious beliefs, but we also added receiving country, sending country and time dummies interacted with the variables in X of Eq. 4 to allow for differential effects of these dyadic variables across periods. Therefore, this allows for time-variation in explanatory variables. This means that the predicted stocks of dyadic migrants Mijt is variable over time and can be adopted for instrumenting migration variations over time.

For the instruments to be valid, the exclusion restriction must be that product specific exports to the whole world are not correlated with common bilateral geographic, cultural, or historical ties with its migrants' countries. We use three precautions to avoid this. First, we control for country-year fixed effect. This means that, even if the cultural or historical background of the country could be a source of comparative advantage for products, our country-by-year fixed effects would account for these effects. An additional precaution we take is to include in our right-hand side, as a control, the aggregate trade from/to the same set of countries where the migrants on the right-hand side are in/from. In this way we avoid that in our instrumentation methodology there might be a component in aggregate bilateral

trade which can also be explained by the same variables that explain aggregate bilateral migration. Thus, if cultural and historical variables that explain aggregate bilateral migration also explains aggregate bilateral trade (which is, of course, very likely the case), then by controlling for actual aggregate bilateral trade to and from the same set of countries where migrants are in or from, we overcome this problem. Furthermore, a third tool we adopt to ensure validity of the instrument, is to reconstruct the left-hand side variables such that they exclude exports to countries where (more than 500) migrants are in or from. Thus, by construction, in this specification, we exclude product-level exports to all countries with a propensity to send or receive migrants, which are countries with same coloniser, same language, same religion and former colony–coloniser relationship. So, if there is a concern that our product-level exports dependent variable to a given set of countries is partly explained by the same bilateral relationships that explain migration, then we exclude product-level export flows to that same set of countries.

After predicting migration stocks, we will use the predicted figures as instrument in the following estimation to provide an exogenous variation in the number of migrants, both from and to partner countries (Bahar and Rapoport, 2018).

In our specification, we include some trade variables: the accumulated value of exports and the total value of imports. Moreover, z_{ijt} includes explanatory variables capturing bilateral ties between territories (as contiguity, colonial ties, geography, and distance); φ_{it} represents a set of importing (exporting) countries-by-time effects (to capture multilateral resistance), θ_t is a set of year dummies (i.e. a time-specific effect which captures business cycles), δ_{ij} are product-country pair dummies.

At this stage, to estimate Eq. [3], we use PPML to control for (all) pair-specific unobserved characteristics, ruling out all possible omitted variables bias and zero trade flows accounting for unobserved heterogeneity as recommended by Baier and Bergstrand (2007) and Briant et al. (2008).

3.2. Second estimation strategy

In our work, as said, we implement a second estimation strategy to use different (less aggregated) indicators with respect to the ones used in the first stage (to measure the knowledge transfer also at product level) and to consider a second perspective: the effects on trade of the country with third countries.

We consider the Revealed Comparative Advantage (Balassa, 1965) to construct our variable of interest for the empirical specification when the extensive margin is estimated. In particular, we construct a variable that equals *1* if country *i* achieved a *RCA* of *1* or more in product *p* at time *t* conditional on having $RCA_{i,p,t-1}$=0 in the previous period,

$$EM_{i,p,t} = 1 \; if \; RCA_{i,p,t-1} = 0 \; and \; RCA_{i,p,t} \geq 1 \quad [5]$$

When we estimate the effect of migration on intensive margin, we use the compound average growth rate (CAGR) in the export of product *p*.

$$IM_{i,p,t} = \left(\frac{exports_{i,p,T}}{exports_{i,p,t}}\right)^{1/T-t} - 1 \quad [6]$$

Subscripts show the difference between models. In equations 1, 2 and 3 (the HM model), the subscripts of dependent variables are ijt. In other words, the dependent variable is a country-pair level (not country-level). In the case of second model [equations 5, 6 and 8] subscripts are ipt, i.e., the dependent variable is a country-product pair. Therefore, the HM model tests the effect of migration on bilateral trade, whereas the second model tests the effect of migration on extensive and intensive margins of all products exported by the host country to all the trade partners except for countries of origin and destination of migrations.

As first step, we construct the instruments like before, using equation 4, i.e. following the work from Frankel and Romer (1999) and from Bahar and Rapoport (2018), we instrument migration using estimates from a gravity model and compute predicted bilateral migration stocks based on common cultural and historical characteristics of the sending and receiving countries of the migrants. Thus, at a first stage we estimate a gravity equation (through a Pseudo-Poisson Maximum Likelihood, PPML). Then, we use the instruments to provide an exogenous variation in the number of migrants, both from and to partner countries.

Further, with the predicted bilateral migration stocks, we reconstruct the aggregate migration stocks using the already mentioned weighting procedure (using RCA). For each combination of country c, product p and year t, we compute the total sum of predicted immigrants (emigrants) from (to) all other countries.

After predicting migration stocks, we will use the predicted figures as instrument in the following IV 2SLS estimation to provide an exogenous variation in the number of migrants, both from and to partner countries (Bahar and Rapoport, 2018).

By using an instrumental variable approach, we will estimate the following equation through a 2SLS.

$$LHS = \beta_{migrants} Migrants_{j,i,t} + \beta_{trade} trade_{i,j,t} + \beta_{fdi} FDI + \alpha_{c,t} + \varepsilon_{p,t} \quad [7]$$

As in the previous specification, the LHS is alternatively the extensive or intensive margin estimated. However, eq 7 is defined if export_ipt is defined, i.e, only those products where export_ipt >= 0 is used in estimation).

Note that, the result would capture the effects through two channels mixed together, preference/information and knowledge spillovers. In order to only focus on knowledge spillovers this model does not include all observations, i.e. we do not not test the effect of migration on extensive margin and intensive margin in general as this might be affected also by the effect which come through more trade between sending and receiving countries. Following BR estimates we calculate extensive and intensive margins in trade with third countries, i.e. excluding those countries where migrants are in or from, to isolate the effects of knowledge spillovers.[12]

The variables migrants include stocks of immigrants from ($IMM_{j,i,t}$), and of emigrants to ($EMI_{i,j,t}$) other countries (areas). However, the migration variables need to be weighted in order to achieve a dyadic dimension i.e. to capture the knowledge diffusion channel, we need to weigh immigrants and emigrants flows by products for which the country has a previous comparative advantage.[13] Hence, for each country c and product p, on the right-hand side, we include the total of immigrants from and emigrants to countries that export product p with a RCA above 1 at the beginning of the period.

We also include country-by-year fixed effects to control for any country level time-variant characteristics that correlate with both national migration determinants and trade variables such as income, size, institutions. Furthermore, we include the accumulated exports of product p in the previous period and value of imports of product p. Moreover, when the intensive margin is estimated, we include also the compound average growth rate (CAGR) of the export value in the previous period in order to control for previous growth trend). We also add FDI taken from OECD International Direct Investment Statistics (2013).

Finally, we include θ_t a set of year dummies (i.e. a time-specific effect which captures business cycles).

12 Third countries defined as all the partners excluding the region of origin of migrants or destination of emigrants. For example, we create a new variable for the margins excluding the MENA region.

13 Considering the dependent (Δtrade margin byproduct and time (Δ TMp,t) i.e. the Ext/Int margins à la Bahar et al. (by product). Regresssor are not the Stocks of immig/emig by country (Mc,c', Mc',c) as this would not capture the knowledge diffusion channel. We rather need to have a dyadic dimension to capture it:

$$\Delta TM_{c,p,t} = f(\mathbf{\Sigma_{c^*}\ M_{c,c^*,t}.TM_{c^*,p,t}}\ ,\ TM_{c,p,t},\ X_{c,p,t})$$

Knowledge diff. (emig) Lag Controls

About calculating the weights. we create a new variable, R_j = 1 if RCA_j >= 1. Then multiply immigrant and emigrants by R_J, then collapse the data over j, i.e, in Stata's notation, by (i p t). By doing that, we do not sum the number of migrants, but we sum the R_j values, i.e., we sum the number of migrants from the countries for those products in which they are competitive (RCA>=1). The idea is the following. Let's assume country 1 has migrants from countries 2, 3, and 4, and countries 2 and 3 have RCA>1 for product X only. Then, the total number of migrants from country 2 and 3 will have an impact on country 1's export behavior.

What must be emphasized is that our immigration and emigration stocks are symmetric. So, we must limit our instrumental variable estimation to one endogenous regressor only (either immigrants or emigrants). Otherwise, we may have less instruments than endogenous variables if we included both immigrants and emigrants in the same regression model.

To sum up, we try to clean our analysis for unrelated to knowledge transmission channels, or to migration being associated with good-specific productivity increases. Even if our focus is on migrants, we also control for trade, which tend to be highly correlated with migration figures. Second, migrant networks could generate lower transaction costs for bilateral trade in specific goods, thus inducing bilateral exports between migrants' sending and receiving countries (Gould, 1994; Rauch and Trindade, 2002; Aubry et al., 2017). Therefore, in order to deal with this possibility, we calculate all the specifications using an alteration of the dependent variable, which measures exports to the rest of the world excluding flows to countries where migrants are in or came from. In this case, the increase in exports cannot be explained by its bilateral component. Third, if a given country *c* receives migrants from countries that are exporters of a given product *p*, then there could be a local shift in demand for product p, assuming changes in aggregate preferences. This shift would also occur in all other countries that similarly received the same type of migrants, thus increasing global demand for for product p. Thus, to satisfy global demand, many countries, including country c , could become exporters of good p. To rule out this possible explanation, we control for the global demand of each good by adding product-year fixed effects. We also add country-year fixed effects, which would control for all country-level time variant characteristics that would make a given country more likely to export and receive migrants at the same time.

We expect stronger effects for immigrants (who possess tacit, embodied knowledge that they can transfer through direct interaction) and for high tech sectors (given that they both have more knowledge to be transferred and a greater ability to transfer such knowledge). A complementary argument supporting the significance of immigrants at the extensive margin is that migrants are positively self-selected on risk-attitudes and entrepreneurial culture (Jaeger et al., 2010).

Theoretically, emigration could still be a relevant channel as knowledge diffusion could happen through return migration, or through links and open communication between emigrants and their co-nationals back home.

It is unclear whether most of the knowledge transfer effect should take place at the extensive or the intensive margin. On the one hand, knowledge diffusion at the intensive margin should be stronger because the fixed costs associated with starting an industry have already been paid for; on the other hand, the fact that the knowledge brought by migrants might be an input for such fixed cost calls for significant effects at the extensive margin as well (Bahar and Rapoport, 2018).

4. Results

We run the estimation strategy 1 for the extensive and intensive margin of trade for MENA-EU and for other areas of origin and destinations of people flows, also disaggregated by technology groups of products (tab. 3).

We also run the estimation strategy 2 to study the dynamic of the extensive and intensive margin of trade for -EU with respect to the rest of world, given different levels of immigration stocks and controlling for trade and disentangling immigration and emigration (tab. 4).

In both strategies, we assume that migration variables are endogenous. Hence, to address endogeneity issues we instrument migration using estimates from a gravity model like in equation 4.

We estimate the gravity model using a PPML[14] and we use the predicted migration stocks as instrument to provide an exogenous variation in the number of migrants, both from and to partner countries (Bahar and Rapoport, 2018) (see tab. A.1 in Appendix).

The adoption of estimated migration variables, instead of realized values is an extension of the HK model. We also tried different alternatives estimates of the HK model. We compared two different methodologies, OLS vs PPML. We run our estimates of extensive and intensive margins for immigration and emigration for all sectors and for different technology product categories: low tech, med-tech, high tech. We also distinguish different country groups as origin areas.

In tab. 3, we only focus on the most relevant results. We do not present the results for the "All" category of products because the results show that sectoral differences are significant, i.e., we cannot pool all sectors. Regarding country groups, as our focus is on MENA, we only show here the comparison with "Developed countries" and "East Asian developing countries".[15] Finally, we only present the PPML estimates. However, the OLS and PPML results are usually similar except some intensive margin cases. In the case of intensive margin, the OLS and PPML give conflicting signs. This may be due to smaller number of changes over the intensive margin (see Tab A.2 in Appendix).

Tab. 3. PPLM extimates of Extensive and Intensive margin of exports (Hummels and Klenow indicators at country level)

PPML results			
	Low tech	Med-tech	High-tech
Immigrants – extensive margin			
MENA	0.101***	0.073***	-0.020

14 See Table A.1 in Appendix for the results of gravity model run to build the instrument of the estimation with IV.
15 See the table A.2 in the Appendix with the results not presented here.

Developed	0.242***	0.230***	0.245***
East Asia	0.537***	0.490***	0.628***
Immigrants – intensive margin			
MENA	0.124	0.413***	0.375***
Developed	1.017***	0.940***	1.034***
East Asia	-2.406***	-3.578***	-2.641***
Emigrants – extensive margin			
MENA	-0.171***	-0.154***	-0.078***
Developed	-0.120***	-0.112***	-0.118***
East Asia	-0.364***	-0.290***	-0.326***
Emigrants – intensive margin			
MENA	-1.108***	-0.839***	-1.089***
Developed	-0.425***	-0.382***	-0.421***
East Asia	1.321***	2.533***	1.538***

* p<.10, ** p<.05, *** p<.01

In most of the estimates run, we observe significant effects of the two variables of interest in the model (immigrants and emigrant stock). This is observed on both intensive and extensive margin of exports. The coefficient values are around 1%-3%, which appears to be high and most of the coefficient are significant.

The effect of immigration on extensive margin along sectors, show a different pattern across products groups for MENA countries. The coefficient is higher in low tech than medium tech and high tech. For developed countries, the effect is higher and does not change by sectors. For East Asia, it is even higher. Hence, a lower trade effects of immigration encountered for trade with MENA partners is observed.

The more intense increase in the extensive margins of manufactures following the arrival of immigrants observed from Eastern Asian countries, and the lower trade effects of migration encountered for the MENA suggests different possible hypotheses: i) the higher share of homogenous trade flows in the EU-MENA trade, compared to other trade exchanges of this region, and ii) the lower impact of network effects between EU and MENA compared to those arising for more distant regions, where immigrants´ networks play a greater role in reducing more drastically some existing impediments to trade (informational failures and institutional fragilities guaranteeing successful commercial treats). In this way, a higher assimilation of MENA citizens in EU, seems to be suggested, in line with results of Foad (2010).

The effect of migration on the intensive margin for MENA is lower in low tech, and very high in medium and high tech. Thus, migration increases intensive margin mainly for medium and high-tech products. For developed countries the effects are much stronger and does not change by sector. For

East Asian countries, it is negative and very strong. There might be a kind of substitution effect. (African developing countries in the Appendix also show some substitution effects).

Focusing on emigrant stocks, effects are always negative: there might be substitution effect between the intensive and extensive margin and people´s flows arising and with respect to the different partner regions. Indeed, only in East Asian developing countries the sign is showing positive on the intensive margin. The differences between MENA and developed countries are much lower in this case.

In terms of the size of elasticities between the two margins of trade, observed in Table 3, in general, greater trade effects seem to appear for the intensive margin of trade than for the extensive margin both for the emigrant and for immigrant. The higher elasticity of intensive margin with respect to extensive margin for emigrants and immigrant is also verified across the different origin areas.

In terms of product technology, the impact is overall associated to all the tech groups, however a strong heterogeneity exists for the Mena region where a more pronounced positive influence in the extensive and intensive margin of the low-tech sectors is observed.

Our results do seem to prove the existence of general protrade effects arising for exports for those countries more (geographically) distant, which should be benefiting more from easier informational and institutional (enforcement, commercial laws) packages transferred by migrants 'networks.

The rest of the variables in the model (not shown in the tables for the sake of space) have all the expected signs while dummy variables capturing bilateral ties between territories, such as common language , show a negative and significant coefficient, what seems to be indicating that (controlling for all other factors) the higher the mutual knowledge, the lower the trade effects. Goodness-of-fit is high for all estimations, as expected in a gravity framework.

Now we turn to the estimation of equation 7 related to the second pro trade effect of migration. With respect to the previous methodology here we have tried to refine the analysis only focusing on the effects of immigrants and emigrants on trade of EU with third countries excluding trade with the partners of origin and destination area of migration to isolate the effects of knowledge spillovers.

The summary statistics for the panel used in the analysis are presented in the Table 4.T he upper panel (1) presents the summary statistics when the Extensive Margin is estimated, and the lower panel (2) when the Intensive Margin is estimated. In our data, emigrants are on average more than immigrants, but when migrants are weighted for the RCA, the figures of emigrants are on average lower than the mean of weighted immigrants when we consider the MENA countries. This is because in our specification we considered migration flows between EU-MENA, weighting migrants by RCA values of MENA countries: the receiving country in the case of emigrants from EU to MENA, and by RCA values of the sending countries when we consider immigrants to EU from MENA countries. We must, indeed, consider that poorer countries (MENA countries, in our case) tend to have lower RCA values,

on average, than richer ones (European countries). Moreover, from our data, the unconditional probability for the average country-product of achieving RCA>1 (starting from having RCA=0 in previous period) is 9.5%, while the average country-product Compound Average Growth Rate (CAGR) is about 27%.

Tab. 4. Summary Descriptive Statistics

(1) Extensive Margin

Variable	Obs	Mean	Std. Dev.	Min	Max
New Products	121,090	0.095	0.293	0	1
Emigrants	120,871	28,537.42	36,711.92	1	1,627,067
Immigrants	121,044	20,167	28,106.81	1	856,493
Predicted Emigrants	116,352	22,651.36	29,120.82	32.234	1,238,810
Predicted Immigrants	116,530	14,175.81	19,297.91	9.687	538,454.3
Predicted Emigrants *(weighted)*	116,352	7,631.458	16,205.02	0	1,238,811
Predicted Immigrants *(weighted)*	116,530	3590.124	6,321.746	0	183,507.1
Predicted Emigrants *(weighted, only MENA)*	116,352	27.474	446.82	0	128,722.7
Predicted Immigrants *(weighted, only MENA)*	116,530	115.536	1,051.785	0	151,029
Total trade (in mln $)	121,090	298.00	1,770.00	2	1.98e+11

(2) Intensive Margin

Variable	Obs	Mean	Std. Dev.	Min	Max
CAGR	92,991	0.274	1.434	-15.39888	14.704
Emigrants	92,958	27,958.51	32,119.75	4	1,021,438
Immigrants	92,989	21,394.9	28,047.83	1	822,671
Predicted Emigrants	89,671	22,771.84	24,831.27	135.74	66,4257.4
Predicted Immigrants	89,706	15,159.51	19,781.83	61.498	351,606.6
Predicted Emigrants	89,671	7,629.574	12,979.79	0	619,405.3

(weighted)					
Predicted Immigrants *(weighted)*	89,706	3,808.276	6,226.485	0	18,3507.1
Predicted Emigrants *(weighted, only MENA)*	89,671	30.601	216.766	0	26,177.02
Predicted Immigrants *(weighted, only MENA)*	89,706	127.164	992.911	0	11,7351.1
Total trade (in mln $)	92,991	357,00	1,990.00	11	1.98e+11

Source: own calculation.

In tab. 5 we present the results for MENA-EU migration flows pro trade effects by technology groups. We find evidence of positive effects on the IM for immigrants while there is no significant effect on the EM. Knowledge diffusion at the IM might be easier because the fixed costs associated with starting an industry have already been paid whereas knowledge diffusion at the EM is a part of a more complex productivity growth process. No evidence on EM and IM appears for emigrants. This is in line with our expectations as immigrant can transfer it through direct interaction while in the case of emigration there is a more "indirect nature" of knowledge transfer which could happen through return migration or links and communication between emigrants and their co-nationals back home. In columns 5-10 we also compare the results for the IM for three technology product categories. The coefficients of the estimates show a positive and significant coefficient both in the general estimation and in all the technological categories for the intensive margin of trade proxy, while emigrants show no significant effect on margins in all the technological categories. Knowledge diffusion at the IM is much stronger in medium tech products while a lower impact is observed in low and high tech.

Tab. 5. Effects on EU28 RCA and CAGR – (Emigrants (Immigrants) to (from) MENA) – IV[(a)]

<	All Products				Low-Tech Products				Med-Tech Products				High-Tech Products			
	Intensive Margin		Extensive Margin		Intensive Margin		Extensive Margin		Intensive Margin		Extensive Margin		Intensive Margin		Extensive Margin	
	(1)	(2)	(3)	(4)	(5)	(8)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(11)	(15)	(16)
Emigrants		**-0.026**		**-0.024**		**0.020**		**-0.018**		**-0.076**		**0.048**		**-0.217**		**-0.039**
		[0.027]		**[0.015]**		**[0.041]**		**[0.026]**		**[0.059]**		**[0.090]**		**[0.167]**		**[0.270]**
Immigrants	**0.031*** **		**0.004**		**0.024***		**0.008**		**0.040****		**0.004**		**0.022**		**0.027**	

	[0.010]		**[0.004]**		**[0.013]**		**[0.007]**		**[0.016]**		**[0.009]**		**[0.034]**		**[0.018]**	
Previous Growth	-0.268***	-0.299***			-0.294***	-0.350***			-0.320***	-0.403***			-0.266***	-0.484***		
	[0.008]	[0.010]			[0.016]	[0.021]			[0.017]	[0.025]			[0.041]	[0.080]		
Imports	0.300***	0.261***	-0.009	-0.009	0.372***	0.380***	-0.018	0.005	0.348***	0.258***	-0.007	-0.002	0.729***	0.494***	-0.003	0.047
	[0.017]	[0.020]	[0.008]	[0.011]	[0.027]	[0.032]	[0.015]	[0.020]	[0.037]	[0.050]	[0.022]	[0.035]	[0.061]	[0.099]	[0.038]	[0.085]
Accumulated Exports	-1.272***	-1.335***	0.019*	0.020	-1.228***	-1.075***	-0.002	-0.036	-1.365***	-1.424***	0.053*	0.082*	-1.179***	-0.862***	-0.007	0.031
	[0.027]	[0.034]	[0.011]	[0.015]	[0.046]	[0.054]	[0.023]	[0.031]	[0.056]	[0.070]	[0.030]	[0.046]	[0.094]	[0.181]	[0.049]	[0.145]
FDI	-0.014*	-0.001	0.003	0.005	0.001	-0.006	0.008	0.016*	-0.013	0.005	-0.009	0.008	0.020	0.090	0.009	-0.014
	[0.009]	[0.009]	[0.005]	[0.006]	[0.012]	[0.013]	[0.008]	[0.010]	[0.017]	[0.020]	[0.012]	[0.017]	[0.038]	[0.056]	[0.024]	[0.046]
N	10664	6492	13103	7992	3554	2157	4406	2685	1900	1076	2284	1284	431	177	529	222
r2	0.442	0.480	0.102	0.101	0.427	0.466	0.103	0.107	0.528	0.554	0.101	0.107	0.605	0.501	0.112	0.124

(a) Emigrant are migrant from EU, and immigrants are migrant into EU. Standard errors in brackets * p<.10, ** p<.05, *** p<.01

The results from our estimations show that a country with a 10% increase in the stock of immigrants from MENA countries (that export a product p and with an RCA>1) is associated with an increase in the export growth rate of 0.31 percentage points. This percentage is a little bit lower for products with low-tech products (0.24), and slightly higher (0.41) for products with medium level of technology. It must be noticed that an increase of 0.32 percentage points could be approximated to an increase, for the average European country, of almost 1.5 million of US$ in the total trade of a given product p. These results suggest that immigrants coming from MENA countries may be an impactful driver of knowledge for European trade although this effect do not consist of creation of new exported products, but in deepening and reinforcing the specialization already detained.

As for the other variables of the model, we expected a positive coefficient for accumulated exports since there is a considerable literature showing how trade is a driver of knowledge diffusion (Coe et al., 2009) rather than being mere shipping of goods (Frankel and Romer 1999). Yet, stronger export links are also a driver of specialization which might counteract the learning effect of trade while import are a vehicle of knowledge transmission which may spur new export. Hence, we are not surprised to find a very significant and positive coefficient on imports while a not significant one for accumulated exports. This confirms that knowledge flows are obtained in inflows rather than in outflows of goods.

The lagged CAGR, the growth-related control we use when the intensive margin is estimated, has the expected sign correlating negatively with future growth, consistent with convergence effects.

5. Conclusions and policy implications

Overall, our study highlights the positive effects that EU-MENA migration could produce in terms of trade growth for host countries due to different channels like network, preferences and knowledge transfer. We also propose a preliminary investigation to isolate the knowledge spillover behind the trade margin effects of EU-MENA migration flows.

The effect of immigration on the extensive and intensive margin for MENA-EU trade is evident. Immigration increases the extensive margin of EU exports although mainly in low tech and with a weaker effect with respect to migration flows from developed countries and East Asia towards EU.

The impact of EU MENA migration on the intensive margin of trade is also significant and positive although less intense than for developed countries. Quite surprisingly, the impact of migration from East Asian countries, turns negative suggesting a kind of substitution effect (African developing countries in the Appendix also show some substitution effects).

Focusing on emigrant stocks between MENA and EU, the effects are always negative: there might be substitution effect between the trade margin and people´s flows between EU and MENA. However, the same effect is observed with respect to the developed partner countries. Indeed, only in East Asian developing countries the sign is positive on the intensive margin.

In our estimations of EU trade with third countries induced by migration, which is aimed to explore the knowledge channel behind the pro trade effect of EU-MENA migration, our results show how migration can induce trade growth and change the country specialization as measured by its revealed comparative advantage. We do consider in this case trade of goods in which the country of origin was specialized and in which the country of destination gains in terms of specialization. The findings suggest that people flow from MENA can be contributing to productivity shifts in specialization. By performing this exercise, we find a positive effect for immigrants, which suggest possessing of tacit and embodied knowledge that migrants can transfer through direct interaction. Emigration, instead, is not significant maybe because of the more "indirect nature" of knowledge transfer. The knowledge transfer across outflows of migrants is less immediate as knowledge diffusion could happen through return migration, or through links and communication between emigrants and their co-nationals back home.

If we look at the margins of trade, the theoretical expectations are unclear on whether most of the effects should take place at the extensive or the intensive margin of trade. In our results, knowledge diffusion seems to have a stronger impact on the intensive margin of trade, maybe because the fixed

costs associated with starting an industry have already been paid for, and firms can increase the value of already exported goods more easily. Knowledge diffusion, indeed, is part of a more complex productivity growth process (Bahar et al., 2018; Jaeger et al. 2010), so its effect on firm's productivity and on the capability of acquiring comparative advantage, may require more time.

The findings of our analysis provide useful inputs for improving the policy making process in the host countries, especially in the field of migration policy, with the aim of enhancing the understanding of trade creation effects of networks of migrants and the knowledge transfer.

Interdependencies between migration and trade policies pointed out by the results of our investigation are meaningful for migration policies of EU countries, individually and as whole region.

The first relevant result is the positive correlation between migration and trade, an outcome which supports three possible explanations: the "information bridge hypothesis", i.e. the disappearance of certain transaction costs due to migration; the existence of "transplanted home bias" which boosts imports from the origin countries; thirdly, the knowledge transmission effects. It is a **relevant policy recommendation informing public opinion of these positive effects of integration on trade and global connections. This might contribute to influence attitudes towards immigration and discrimination practices**.

Focusing on the third channel, the knowledge transfer effect, which has not been measured in previous studies, t**he results from our estimations show that a 10% increase in the stock of immigrants from MENA countries (that export a product p and with a Revealed Comparative Advantage higher than 1) is associated with an increase in the export growth rate of EU countries by 0.32 percentage points. This percentage is a little bit lower for products with low-tech products (0.29), and slightly higher (0.41) for products with medium level of technology. It must be noticed that an increase of 0.32 percentage points could be approximated to an increase, for the average European country, of almost 1.5 million of US$ in the total trade of a given product p.** Policymakers should care that on the margin more migration may generate trade and put in the narrative of migration policies this spillover effect, which have an economic meaningful size.

Policy makers should also consider the specific policies which need to be pursued to reinforce the knowledge transmission channel. The **diffusion of knowledge is only partly natural and spontaneous, it also depends on: educational policies access to training and to the acquisition of appropriate skills.** It may also be relevant the role of **associated institutions looking at migration as a driver of knowledge.** Furthermore, **to stimulate higher knowledge transfers, EU migration policy should allow for a more integrated oriented approach as more integrated migrants are more likely to spur knowledge transfers.**

Besides, **changes in the comparative advantage are especially meaningful on a policy ground as new comparative advantages or reinforcing existing comparative advantages may change the pattern of specialization. This potentially may matter economically especially with respect to specific job categories and to specific sectors.**

To have rich and more robust policy implications on these issues some questions are on our research agenda and much more disaggregated data will be used to obtain more detailed policy advices.[16]

First, the analysis would benefit of info about the sector of occupation of migrants and the labour market status. It is reasonable to suppose that if migrants are working in the sector in which the country has comparative advantage, it is more likely to channel the information to the home country about this comparative advantage.

Besides, there is an obvious role of highly-skilled migrants as drivers of marginal effect on extensive and intensive margin especially when it comes to knowledge effects. Hence, the role of highly-skilled migrants would explain if the marginal effect on extensive and intensive margin for a skilled immigrant (emigrant) is larger/smaller than for an unskilled immigrant (emigrant). Characteristics of emigrants in terms of education, and skill might be considered when defining migratory policies. We should also follow the adoption of an ethnic network approach and test for interactions between the characteristics of migrants and the immigration-induced changes in product and trade patterns in the EU-Mediterranean zone.

It would also be relevant to consider in future research the role of institutional and cultural variables such as cultural distance, the level of development of countries of origin and the institutional distance to check how they are related to the level of new trade flows.

In addition to this the analysis might be dealing with trade in services (tourism, other services). Finally, remittances might be included in the analysis as these are likely to be other channels that may be associated with migration and through which trade is affected. These are beyond the scope of the analysis but are issues for future research.

[16] One of the future datasets to be exploited are the database developed by Docquier, Lowell and Marfouk, henceforth DLM07 (2007) as they allow to disentangle the education and gender dimensions. It should be noticed that this dataset has been recently updated to 2010 (see Valette, 2017).

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Appendix

Tab. A1. Gravity Models Results- Estimation to predict migration stocks (PPML)

Gravity Models Results- Estimation to predict migration stocks (*PPML*)

	Emigrants Stocks	Immigrants Stocks
Colony	0.195	1.188***
	[0.177]	[0.378]
Common coloniser	2.485***	1.074
	[0.183]	[0.765]
Common religion beliefs	-13.277***	-10.559***
	[2.477]	[1.787]
Common language	2.389***	1.768***
	[0.516]	[0.553]
N	34869	35687

Standard errors in brackets

* p<.10, ** p<.05, *** p<.01

Tab. A2. OLS and PPLM estimates of Extensive and Intensive margin of exports (Hummels and Klenow indicators at country level) for all countries and for different regions[(a)]

	General				Low tech				Medium tech				High tech			
	Extensive Margin		Intensive Margin		Extensive Margin		Intensive Margin		Extensive Margin		Intensive Margin		Extensive Margin		Intensive Margin	
	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
	All Countries															
Emigrants (ln)	-0.107***	-0.124***	0.043***	-0.194***	-0.122***	-0.142***	0.037***	-0.337***	-0.102***	-0.118***	0.043***	-0.194***	-0.113***	-0.132***	0.060***	-0.019
	[0.002]	[0.002]	[0.001]	[0.016]	[0.004]	[0.004]	[0.002]	[0.026]	[0.003]	[0.003]	[0.002]	[0.031]	[0.005]	[0.006]	[0.004]	[0.049]
Immigrants (ln)	0.211***	0.246***	-0.060***	0.864***	0.232***	0.273***	-0.051***	1.056***	0.201***	0.234***	-0.060***	0.847***	0.221***	0.260***	-0.086***	0.582***
	[0.003]	[0.003]	[0.002]	[0.025]	[0.006]	[0.007]	[0.003]	[0.041]	[0.005]	[0.005]	[0.003]	[0.049]	[0.009]	[0.011]	[0.007]	[0.076]
	MENA															
Emigrants (ln)	-0.096***	-0.139***	0.057***	-0.960***	-0.118***	-0.171***	0.052***	-1.108***	-0.099***	-0.154***	0.092***	-0.839***	-0.056***	-0.078***	0.039*	-1.089***
	[0.007]	[0.010]	[0.008]	[0.062]	[0.012]	[0.018]	[0.014]	[0.109]	[0.016]	[0.021]	[0.020]	[0.128]	[0.017]	[0.026]	[0.023]	[0.164]
Immigrants (ln)	0.092***	0.061***	-0.171***	0.242***	0.123***	0.101***	-0.164***	0.124	0.092***	0.073**	-0.207***	0.413**	0.034	-0.020	-0.161***	0.375*
	[0.009]	[0.014]	[0.011]	[0.081]	[0.016]	[0.024]	[0.018]	[0.141]	[0.022]	[0.028]	[0.025]	[0.168]	[0.024]	[0.036]	[0.027]	[0.223]
	Northern Africa															
Emigrants (ln)	-0.211***	-0.253***	0.514***	2.942***	-0.188***	-0.227***	0.476***	2.456***	-0.239***	-0.282***	0.585***	3.505***	-0.150***	-0.168***	0.398***	2.401***
	[0.015]	[0.019]	[0.014]	[0.103]	[0.024]	[0.031]	[0.023]	[0.199]	[0.030]	[0.037]	[0.029]	[0.215]	[0.043]	[0.055]	[0.037]	[0.292]
Immigrants (ln)	0.261***	0.306***	-0.418***	-0.980***	0.327***	0.386***	-0.444***	-0.822***	0.230***	0.272***	-0.436***	-1.259***	0.151***	0.162***	-0.297***	-0.617***
	[0.015]	[0.018]	[0.012]	[0.083]	[0.022]	[0.027]	[0.018]	[0.118]	[0.029]	[0.036]	[0.025]	[0.188]	[0.046]	[0.057]	[0.034]	[0.207]
	Eastern Europe															
Emigrants (ln)	-0.083***	-0.092***	-0.114***	-1.785***	-0.087***	-0.102***	-0.105***	-1.842***	-0.084***	-0.098***	-0.106***	-1.782***	-0.090***	-0.106***	-0.094***	-1.648***
	[0.004]	[0.007]	[0.002]	[0.035]	[0.008]	[0.013]	[0.004]	[0.066]	[0.008]	[0.012]	[0.004]	[0.065]	[0.014]	[0.020]	[0.006]	[0.107]
Immigrants (ln)	0.117***	0.125***	0.171***	2.931***	0.128***	0.145***	0.159***	3.023***	0.120***	0.135***	0.160***	2.931***	0.134***	0.152***	0.143***	2.751***
	[0.007]	[0.011]	[0.003]	[0.047]	[0.013]	[0.021]	[0.006]	[0.089]	[0.013]	[0.019]	[0.006]	[0.086]	[0.021]	[0.033]	[0.010]	[0.144]
	Mediterranean															
Emigrants (ln)	-0.028***	-0.084***	0.121***	0.123***	-0.011	-0.066**	0.109***	-0.047	-0.047***	-0.117***	0.153***	0.330***	-0.009	-0.052	0.078***	-0.162
	[0.010]	[0.015]	[0.008]	[0.044]	[0.019]	[0.032]	[0.013]	[0.080]	[0.013]	[0.018]	[0.011]	[0.085]	[0.023]	[0.035]	[0.016]	[0.124]
Immigrants (ln)	-0.017	-0.038*	-0.230***	-0.969***	-0.037	-0.068	-0.212***	-1.061***	0.011	0.016	-0.267***	-0.884***	-0.066*	-0.110*	-0.174***	-0.562***
	[0.014]	[0.023]	[0.012]	[0.048]	[0.026]	[0.044]	[0.019]	[0.085]	[0.017]	[0.021]	[0.014]	[0.091]	[0.036]	[0.063]	[0.025]	[0.159]
	Developed countries															
Emigrants (ln)	-0.100***	-0.112***	0.055***	-0.338***	-0.106***	-0.120***	0.048***	-0.425***	-0.101***	-0.112***	0.055***	-0.382***	-0.105***	-0.118***	0.047***	-0.421***
	[0.002]	[0.002]	[0.001]	[0.011]	[0.005]	[0.006]	[0.002]	[0.023]	[0.003]	[0.003]	[0.002]	[0.021]	[0.006]	[0.006]	[0.004]	[0.037]
Immigrants (ln)	0.205***	0.231***	-0.088***	0.882***	0.213***	0.242***	-0.075***	1.017***	0.205***	0.230***	-0.087***	0.940***	0.215***	0.245***	-0.072***	1.034***
	[0.003]	[0.004]	[0.002]	[0.018]	[0.009]	[0.010]	[0.004]	[0.037]	[0.005]	[0.005]	[0.004]	[0.033]	[0.009]	[0.010]	[0.006]	[0.060]
	East Asian Developing															
Emigrants (ln)	-0.275***	-0.338***	0.129***	1.734***	-0.288***	-0.364***	0.112***	1.321***	-0.245***	-0.290***	0.153***	2.533***	-0.281***	-0.326***	0.153***	1.538***
	[0.009]	[0.015]	[0.006]	[0.097]	[0.015]	[0.022]	[0.010]	[0.154]	[0.021]	[0.034]	[0.013]	[0.197]	[0.027]	[0.040]	[0.018]	[0.248]
Immigrants (ln)	0.433***	0.524***	-0.211***	-2.777***	0.438***	0.537***	-0.187***	-2.406***	0.408***	0.490***	-0.245***	-3.578***	0.506***	0.628***	-0.259***	-2.641***
	[0.012]	[0.018]	[0.011]	[0.147]	[0.023]	[0.035]	[0.018]	[0.248]	[0.022]	[0.030]	[0.023]	[0.282]	[0.039]	[0.056]	[0.032]	[0.370]
	African developing															
Emigrants (ln)	0.325***	0.446***	1.313***	1.806***	0.392***	0.533***	1.459***	2.251***	0.261**	0.395***	1.194***	1.265*	-0.081*	0.006	0.833***	0.128
	[0.044]	[0.049]	[0.047]	[0.151]	[0.088]	[0.108]	[0.078]	[0.336]	[0.120]	[0.126]	[0.166]	[0.657]	[0.046]	[0.059]	[0.071]	[0.595]
Immigrants (ln)	-0.846***	-1.171***	-2.215***	-3.823***	-0.955***	-1.321***	-2.466***	-4.872***	-0.757***	-1.126***	-1.990***	-2.737**	-0.187***	-0.460***	-1.405***	-0.884
	[0.071]	[0.079]	[0.084]	[0.360]	[0.140]	[0.169]	[0.136]	[0.654]	[0.199]	[0.208]	[0.280]	[1.168]	[0.070]	[0.091]	[0.126]	[1.171]

[(a)] MENA: Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq; Jordan, Kuwait, Yemen, United Arab Emirates, Lebanon, Libya, Morocco, Oman, Palestinian Territory, Qatar, Saudi Arabia, Sudan, Syria, Tunisia. Developed Countries: (Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg Netherlands, New Zealand, Norway, Portugal, Slovenia, South Korea, Spain, Sweden, Singapore, Switzerland, Turkey United Kingdom, USA.
Eastern Europe: Belarus, Bulgaria, Czech Republic, Hungary, Poland , Republic of Moldova, Romania, Russian Federation, Slovakia, Ukraine.
East Asian developing countries (Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Fiji, India,Indonesia, Kiribati, Lao P.D.R., Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nepal, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka.
Africa Developing Countries Ethiopia, Rwanda, Ghana, Côte d'Ivoire, Senegal, Benin, Kenya, Uganda, and Burkina Faso.