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# The impact of free trade agreements on Middle East and North Africa exports of intermediate and final goods

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## Abstract

This paper is the first to analyse the impact of free trade agreements (FTAs) and the harmonisation of rules of origin (RoO) on Middle East and North African (MENA) countries' exports differentiating between final and intermediate goods for a global sample of trade partners. Data on exports from four MENA countries (Egypt, Jordan, Morocco and Tunisia) to 61 destinations over the period 1995–2016 are used to estimate a structural gravity model applying a Poisson Pseudo Maximum Likelihood (PPML) estimator. Moreover, the paper estimates the effect of the progressive adoption of the Pan-European-Mediterranean RoO. Results show that FTAs have been overall successful in increasing MENA exports. This is particularly true for FTAs that eliminate protection on agricultural products. In contrast to the existing literature, we find that the agreements concluded with European countries raise MENA exports, whereas no significant impact is found for the application of the Pan-European RoO.

**KEYWORDS**

free trade agreement, gravity model, Middle East and North Africa, panel data, Poisson Pseudo Maximum Likelihood

# 1 | INTRODUCTION

The Middle East and North Africa (MENA) region constitutes a heterogeneous group of countries mostly characterised by below average economic performance and a generally low level of integration into the global economy, combined with a high degree of export concentration in primary commodities (Rouis and Tabor,41). Despite exhibiting a great potential for trade due to its strategic location among European, African and Asian markets and its increasing availability of human capital, the MENA region is among the areas of the world that has not yet been able to profit from trade integration as an engine for economic growth (Wood & Yang, 33). The question of whether Free Trade Agreements (FTAs) have increased MENA trade integration remains controversial, considering the positive impact they could have on economic growth, overall development and political stability. In particular, countries expanded their economic cooperation with the European Union (EU), which is the most important trading partner for the Southern Mediterranean area, due to its geographical proximity and colonial ties. In the course of the Barcelona Process, this historical relationship has been deepened through the conclusion of association agreements between the EU and each Mediterranean country[1], covering the removal of tariffs for industrial goods. Moreover, the application of the Pan-European rules of origin (RoO), which were introduced progressively from 2010 on, established full cumulation and the same RoO across participating countries. Likewise, the European Free Trade Area (EFTA) states, Turkey and the Mediterranean countries have also increased their cooperation in the same timeframe. Furthermore, Jordan and Morocco expanded their economic cooperation with the USA by signing trade agreements in 2001 and 2006 respectively. Finally, Jordan concluded agreements with Singapore and Canada in 2005 and 2012, which in contrast to the agreements with the EU and Turkey, cover not only trade in industrial goods but also liberalisation in agriculture.

It is an open question whether these FTAs have increased trade in final or in intermediate goods or both. The differentiation between intermediate and final goods is crucial when analysing the impact of FTAs on trade, given the growing importance that intermediate goods' trade has gained over time in the development of global value chains. For this reason, and as pointed out by de Mello-Sampayo (17), not only trade in final goods but also trade in intermediate goods has to be considered in order to measure countries' competitiveness.

This paper investigates the impact of the FTAs on the exports of four MENA countries, namely Egypt, Jordan[2], Morocco and Tunisia (from now on referred to as Med-4) to 61 destinations over the period from 1995 to 2016. These countries are the most open in terms of concluded FTAs and the most diversified economies in the region, since oil and related products do not account for the bulk of their export earnings, as is the case for Libya and Algeria (The Economic Complexity Observatory, 31)[3]. It is reasonable to expect that the FTA effect will differ across sectors (Anderson & Van Wincoop, 3). This paper distinguishes between final and intermediate goods, since due to the growing internationalisation of production processes, these types of goods display different

[1]As of March 2018, the EU has concluded bilateral agreements with Tunisia, Israel, Morocco, Jordan, Egypt, Algeria and Lebanon. See Table A2 for more details on these agreements.

[2]Although strictly speaking Jordan does not belong to the group of Mediterranean countries, it is for convenience considered as being one of them.

[3]The private sector remains relatively small in the oil-exporting economies of the MENA region (International Monetary Fund, 37) and consequently, the expected impact of trade agreements on such countries' exports is fairly limited.

dynamics (Athukorala & Yamashita, 4) and the impact of trade policy is heterogeneous across sectors (Anderson & van Wincoop, 3).

Results of existing studies[4] investigating the impact of FTAs ratified by Med-4 are mixed at best. To our knowledge only two studies use disaggregated data, but both of those focus on a restricted sample of products and countries. Bensassi et al. (11) find a positive effect of FTAs on MENA exports, while Parra et al. (25) and Márquez-Ramos and Martínez-Zarzoso (24) do not find a positive and significant impact. Similarly, Cieślik and Hagemejer (15) and Freund and Portugal-Pérez (36), who base their analysis on aggregate data, fail to find a positive impact on MENA exports but do report an increase in imports from the EU.

The main contribution of this paper is threefold. First, diverging from the existing literature for these countries, we estimate the gravity model of trade using the Poisson pseudo maximum likelihood (PPML) estimator in order to account for the presence of a significant share of zero trade flows, which is particularly relevant when using disaggregated data. Second, we use sectoral data classified according to the Broad Economic Categories (BEC) and estimate the model for 3- and 5-year time intervals to account for adjustments to trade policy.

The main results show that the agreements have generally been successful in increasing MENA exports, but the effects differ across types of goods. For instance, the agreements that include actual liberalisation in agriculture have a greater impact on Med-4 exports than the ones covering only industrial goods. Contrary to other studies, we find a positive impact of the Euro-Med agreement on exports of final goods across different specifications.

The remainder of this paper is organised as follows. In Section 2, we review the relevant literature, paying special attention to studies that consider to some extent the effect of integration on sectoral exports. The empirical approach is discussed in Section 3, which also includes a description of the data and variables used, as well as some stylised facts concerning the evolution of trade in final and intermediated goods. Section 4 presents and discusses the results. Finally, Section 5 concludes with a summary of the main ideas put forward in the paper and some policy recommendations.

## 2 | LITERATURE REVIEW ON MENA TRADE INTEGRATION

We summarise in this section the findings of closely related papers that focus on the MENA region or cover a global sample, including North-South as well as South-South agreements, and use sectoral or aggregated data without focusing on a single sector[5]. We start by presenting the outcome of research using sectoral data (Márquez-Ramos & Martínez-Zarzoso, 24; Bensassi et al., 11) and follow with research that uses more aggregated trade flows. In both cases, the gravity model of trade is the methodological framework (Cieślik & Hagemejer, 15; Freund and Portugal-Pérez, 36; Parra et al., 25). Finally, we refer to papers that focus on a global sample and show some specific results for the MENA region.

[4]Parra et al. (26), Márquez-Ramos and Martínez-Zarzoso (24), Bergstrand et al. (12) and Cieślik and Hagemejer (14).

[5]For studies investigating North–South agreements, see Péridy (28), Bergstrand et al. (2011) and Bensassi et al. (10). For studies also including South–South agreements, see Parra et al. (26), Márquez-Ramos and Martínez-Zarzoso (24) and Cieślik and Hagemejer (14). Augier et al. (5) investigate the impact of the Pan-European RoO on trade in textiles between MENA countries and the EU. To date very few studies focus exclusively on regional agreements like GAFTA and the Agadir agreement (Abedini and Péridy (1) and Péridy (27)).

Márquez-Ramos and Martínez-Zarzoso (24) is the only paper that distinguishes between intermediate and final goods when investigating trade effects of FTAs in the MENA region. However, its main focus is on the participation of MENA countries in Euro-Med production networks, that is, the link between imports of intermediate products and exports of final products. As an additional contribution, the paper estimates the impact of the Euro-Med agreements, Turkey-Med FTAs and the USA-Morocco FTA on intermediate and final goods exports of Algeria, Egypt, Morocco and Tunisia to OECD countries over the period 1995–2008. A gravity model of exports of final goods is estimated, which includes as a regressor lagged imports of intermediate goods from the EU and the rest of the world (RoW) in order to capture the effect of the participation in regional production networks. Dummy variables to proxy for the existing FTAs and for the adoption of the Pan-European RoO are also included to fully account for the effect of the Euro-Med process. The estimation results show that imports of intermediate goods from the RoW and the EU positively impact exports of final goods. The authors conclude that the MENA countries have indeed become more integrated into regional production networks, as intermediate goods imports from the EU have a positive effect on these countries' final goods imports. This positive effect is particularly observed for capital goods and transport equipment. Finally, it is shown that the effect of the changes in RoO is stronger than the impact of the tariff elimination since no significant effect is found for any of the FTAs (Márquez-Ramos & Martínez-Zarzoso, 24).

Adopting a slightly different perspective, Bensassi et al. (11) use highly disaggregated trade data for a number of sectors to investigate the impact of the Barcelona Process on the exports of the same four North African countries over the same period (1995–2008). The authors analyse the extent to which the extensive and intensive margins of their exports to France, Italy, Germany and Spain[6] have been impacted by the Euro-Med FTAs, also analysing the effect of RoO. They use as proxies for the intensive and extensive margins of trade the average value per shipment and the number of products exported respectively. These are the dependent variables in a gravity model of trade estimated using logged dependent variables. In contrast to Márquez-Ramos and Martínez-Zarzoso (24), Bensassi et al. (11) find that the Euro-Med agreements have been successful in increasing MENA country exports to their European partners and that this is mainly due to an increase in the intensive margin of trade, that is, these countries export more of the varieties they were already exporting. This finding is in accordance with the fact that North African countries are mainly exporters of goods with a low technological content that can be easily substituted by other countries on the international market[7]. The authors find, however, that effects differ by sector and that the increase in exports due to changes in RoO is higher than the effect of the Euro-Med agreements. Concerning the RoO, diagonal cumulation allowed the MENA countries to use cheaper or better quality inputs, increasing demand for their final products in Europe. Finally, no significant effect is found for imports from the EU, whereas a significant and negative effect on total exports is

[6]Intensive margin of trade refers to the mean value of an individual shipment or the quantity of every variety exported, whereas the extensive margin refers to the number of exporting firms or the number of varieties exported (Bensassi et al., 10, pp. 228–229).

[7]These results are in line with the findings of Chaney (13) regarding the elasticity of substitution and its effect on the two margins of trade. According to this author, a high elasticity of substitution makes the intensive margin more sensitive to changed trade barriers but makes the extensive margin less sensitive, so that in the case of the MENA countries, the decrease in trade costs is expected to impact the intensive margin.

found for imports from the RoW, which also holds for the number and quantity of goods exported. One possible interpretation is that imports from the RoW are replaced by EU inputs, which reduces the variety of goods that are exported to the RoW. This result might be due to other FTAs in force. In this context, the FTA between the USA and Morocco might have diverted exports to the USA (Bensassi et al., 11).

Among the studies that focus on total trade, Cieślik and Hagemejer (15) investigate the impact of a range of trade agreements on the imports of seven MENA countries over the period 1980–2005. These authors use a large sample of partner countries[8]. In contrast to the other papers summarised above, they find that the Euro-Med agreements only increased MENA imports from the EU but had no significant effect on their exports. This is in line with the findings of Bergstrand et al. (12) regarding their results for Euro-Med FTAs with Tunisia and Morocco. Similar results are obtained for the EFTA-Med agreements. More recently, Freund and Portugal-Pérez (36) and Parra et al. (25) extended the analysis of Cieślik and Hagemejer (15), distinguishing between broad categories of goods. Freund and Portugal-Pérez (36) distinguish between non-oil and non-natural resources imports, whereas Parra et al. (25) differentiate between industrial and agricultural goods in order to account for the different liberalisation schedules. The period covered in the latter paper is 1994–2010, and hence accounts for almost all existing trade agreements of interest with the exception of the Turkey-Jordan and the Canada-Jordan, agreements which entered into force in 2011 and 2012 respectively. Regarding the effect of the Euro-Med agreements on trade in manufactured goods, Parra et al. (25) also find a positive and significant impact of FTAs on MENA imports and a negative and significant effect on MENA exports. They argue that firms that have been mostly selling to the domestic market could not survive the newly induced competition from EU imports given the overall low productivity (Parra et al., 25). With respect to the other agreements of interest, a positive and significant coefficient is obtained for the Turkey-Med agreements on MENA imports. Regarding the impact on trade in agricultural goods, no significant effect of the Euro-Med FTAs can be found, which is not surprising considering the fact that these goods have not been subject to significant changes in the liberalisation schedule.

From these results it follows that the agreements that include liberalisation in agriculture are more beneficial for MENA trade integration as these countries clearly possess a comparative advantage in these goods. Interestingly, a positive effect on MENA agricultural exports is found for the Turkey-Med agreements, although these agreements include only a limited number of concessions for trade in agriculture. However, in contrast to the Euro-Med agreements, these concessions are included in all Turkey-Med agreements, which might be the reason for this result. Finally, with respect to the distinction between North-South and South-South agreements, both types of agreements appear to positively influence the integration of the MENA countries.

The results of previous studies that have been presented in this section show that the effect of the FTAs of interest in the MENA region depends not only on the agreement but also on the approach and specification chosen. In particular, the effect of the Euro-Med agreements is ambiguous, as two of the three studies that use disaggregated trade data – Márquez-Ramos and Martínez-Zarzoso (24) and Parra et al. (25) – find no positive effect of the Euro-Med agreements on MENA exports, whereas Bensassi et al. (11) find that these agreements were indeed successful

[8]In addition to the EU-Med agreements, they account for the EFTA agreements, bilateral agreements between the MENA countries themselves, agreements with Canada, Mexico and the USA and FTAs with countries in Central and Eastern Europe. Additionally, to Algeria, Egypt, Morocco and Tunisia, their dataset includes Israel, Jordan and Turkey.

in increasing MENA exports. However, it might be difficult to directly compare these results as there are a number of differences regarding the sample of countries, the analytical approach, the trade partners, the level of disaggregation and the years covered. It has been shown that the effect depends on the type of goods, whether differentiating between specific sectors or between agricultural and manufactured goods in general.

Most recent papers have adopted a more advanced methodological approach, in that they include zero trade flows and estimate the gravity model of trade using a PPML approach, as recommended by Yotov et al. (43). Of the papers analysing the gravity model in this framework, a few consider a global sample of countries and also present estimates of different FTAs (Baier et al., 8,9). Using total exports for a global sample of countries over almost five decades, Baier et al. (8) find that the effect of Customs Unions (CU) for total trade is more than twice the effect of FTAs and that, whereas CU membership mainly affects the intensive margin of trade[9], FTA membership affects the intensive and extensive margins equally. Using a smaller sample of 70 countries over the period 1986 to 2006, Baier et al. (9) account and test for bilateral heterogeneity in the effect of economic integration agreements on trade flows, finding considerable evidence that different pairs of countries are affected differently by the same agreement. Also the direction of trade matters, with the effects being mostly asymmetric. They present estimates of the partial FTA effect for each agreement in their sample, some of which correspond to the MENA region, including Jordan-USA, EFTA-Morocco, EFTA-Turkey, Agadir, EU-Egypt, EU-Morocco and Morocco-USA. The results show non-significant RTA effects for all of them, whereas the effects for most of the EU-Eastern European countries' FTAs are positive and significant. However, the sample period ends in 2006, and given that the effects take time to materialise and most of these FTAs were ratified in the late 1990s and early 2000s, this finding is not surprising. The authors acknowledge that FTAs can have very different effects across industries, and suggest this as a new avenue for further research. None of the above works distinguish between the effect on intermediate and final goods, which is the main novelty of this paper together with the fact the sample has been extended to include more recent years.

## 3 | EMPIRICAL STRATEGY AND DATA

To analyse the impact of trade agreements in the MENA region, we use the gravity model of international trade, which has become increasingly popular in the trade literature. Indeed, it is considered the workhorse of international trade research due to its empirical robustness and great explanatory power (Feenstra, 19; Head and Mayer, 20; Kepaptsoglou et al., 21). Derived from Newton's law of gravitation, the gravity model of trade predicts bilateral trade flows between two countries as a function of their economic mass and distance from one another (Pöyhönen, 28; Tinbergen, 32). Trade is expected to be positively related to the respective GDP of the trade partners and negatively related to the geographical distance between them, which is considered a proxy for all sorts of trade costs. In its most widely accepted specification, which has a theoretical basis, the gravity model accounts for relative trade costs by incorporating the so-called multilateral resistance terms (MRT), as shown by Anderson and Van Wincoop (2):

[9]The intensive margin measures the average exports per product of the goods already exported and the extensive margin measures exports in products that had not previously been exported.

$$X_{ijt} = \frac{Y_{it}Y_{jt}}{Y_{wt}}\left(\frac{t_{ijt}}{P_{it}P_{jt}}\right)^{1-\sigma} \quad (1)$$

where $X_{ijt}$ denotes bilateral trade between country $i$ and $j$ at time $t$; $Y_{it}$, $Y_{jt}$ and $Y_t$ denote the GDP of countries $i$, $j$ and the world at time $t$, respectively; $t_{ijt}$ denotes trade costs (typically proxied by distance) and $\sigma$ (>1) is the elasticity of substitution. $P_{it}$ and $P_{jt}$ are the country-specific MRT, which decrease if a country is remote from the main world markets. Moreover, relative trade costs are not only determined by physical factors such as distance but also by trade policy factors such as high tariff barriers or other trade costs such as non-tariff barriers (Bacchetta et al.,6). Therefore, in addition to bilateral distance, a number of variables are typically incorporated to account for trade costs between two countries, such as dummies for a common language, colonial ties, a common border and the existence of trade agreements (Parra et al., 25). In this context, it is expected that countries with similar cultural features such as a common language or colonial ties will trade more as they are likely to better understand each other's business practices than firms operating in less similar environments (Bacchetta et al., 6). Finally, trade agreements will reduce the price of the traded goods in the partner's market and are thus expected to have a positive impact on trade.

With respect to the estimation of the gravity model, two major challenges arise that can be addressed using panel data. The first challenge is related to the presence of unobserved heterogeneity. It refers to the fact that trade between country pairs is determined by a number of observable and unobservable characteristics. While the observable factors can be measured and incorporated into the gravity model, unobserved factors are not measurable. In the context of the gravity model, these unobservable factors, the so-called MRTs, are of major importance and should be incorporated in the estimation. The simplest and widely used method consists of adding several sets of fixed effects, as, for example, exporter and importer fixed effects (Bacchetta et al., 6, p. 107), which capture all unobservable country-specific characteristics that are time invariant. However, according to Baldwin and Taglioni (10, p. 800), these importer and exporter fixed effects should be time variant since otherwise the results would be biased.[10]

In this paper, given that we have sectoral trade data, we use exporter-sector-time and importer-sector-time fixed effects (Head & Mayer, 20). While accounting for the MRTs, these time-varying fixed effects absorb the effect of variables such as the sectoral value added of the importer and exporter countries, as well as of other observable country-specific factors that vary by country, sector and time, namely industrial policies and real effective exchange rates (Yotov et al., 43).

We diverge from the standard approach of estimating the model in its log-linear form as this approach leads to the loss of information in the case of zero trade flows. This method is adequate when the zeros are believed to be arbitrarily missing data or random rounding errors and thus carry no information (Bacchetta et al., 6). But if these zeros actually reflect zero trade or regular rounding errors associated with small trade flows, then dropping these observations will lead to a loss of information and will thus produce inconsistent estimates (Bacchetta et al., 6). Moreover,

[10]De Mello-Sampayo (16) proposes the incorporation of a competitiveness factor into the gravity model, which captures the effect of competition between countries to sell intermediate products to a specific country. In the author's words, the competition factor allows treating foreign trade, and specifically trade in intermediate goods, directed to a specific country as interdependent on decisions to trade with alternative countries. This approach is particularly relevant if a country is faced with multiple competing alternatives when taking a decision on from where to import an intermediate good.

estimating the gravity model in its log-linear form can lead to misleading conclusions in the presence of heteroscedasticity as the log transformation affects the disturbances in the sense that the errors will have generally heterogeneous variances. The PPML estimator overcomes this challenge as it does not assume homoscedasticity and is thus valid with general forms of heteroscedasticity (Silva & Tenreyro, 30).

For these reasons, to analyse the impact of trade agreements in the MENA region, we estimate a gravity model of international trade in its multiplicative form using PPML. While zero trade is less of a problem when using aggregate trade flows, it is especially relevant for this empirical application as the unit of analysis is sectoral trade flows, which contain more zeros than aggregated data[11]. We assume that zero trade flows in our dataset are explained by the fact that some goods are not traded between country pairs because of high trade costs or the fact that export items in a given commodity cannot compete in foreign markets. In this case, dropping the observations is not appropriate as they carry information. While the data extracted from UN Comtrade did not contain any zeros, balancing the data to obtain all possible importer, exporter, sector and year combinations has led to a large number of observations with missing trade values, either because they were not reported or because they were actually zero[12]. While there are a number of suitable ways to overcome the problem of zero trade flows[13], PPML is preferred here as it is straightforward in its application and avoids the theoretically inconsistent method of replacing zero trade flows with an arbitrary value or the application of one of the more complex alternative methods.[14]

In addition to the properties stated above, PPML has one key advantage in that it allows the researcher to control for endogeneity and heterogeneity issues by including a rich set of fixed effects at the country and sectoral level[15]. The sectoral fixed effects should also be allowed to vary by origin, destination and time as countries might have a comparative advantage in a certain commodity that explains a high level of exports. Furthermore, sectoral trade flows are subject to fluctuations over time, which affect individual countries differently depending on their economic structures.

Clearly, however, the inclusion of pair fixed effects does not allow the estimation of the standard gravity covariates such as distance, contiguity, language and religion, as they get absorbed by these effects. Some authors argue that pair fixed effects account for additional trade costs that are not captured by the standard gravity covariates and are thus better suited to proxy trade costs (Yotov et al. 43) when the main aim is the identification of the effect of a time-variant bilateral variable, such as FTA. Another reason for including pair fixed effects is the fact that for trade with Med-4 countries, it seems plausible to expect that unobservable factors like stability in bilateral

[11]Note that the data used here are only disaggregated to a relatively low degree (two digits) and that this problem is accentuated as the degree of disaggregation rises (Yotov et al., 43, p. 19).

[12]Balancing the dataset led to an additional 19,582 observations, which corresponds to approximately one-thirds of all observations. These zero flows are nearly equally distributed between the OECD and non-zero trade flows.

[13]Yotov et al. (43) (p. 19) present five possible solutions to this problem.

[14]According to Martínez-Zarzoso (38), inferences drawn from simulation studies like the one conducted in Silva and Tenreyro (31) should be handled with caution, as minor changes in the simulation setting can lead to different outcomes. As such, finding the best estimator for a given dataset requires a large variety of tests. Hence, the PPML estimator cannot be seen as a generally superior estimation method for gravity models.

[15]For the implementation of this estimation method, the newly available stata command ppml_panel_sg (Zylkin, 44) was employed.

political relations, the ease of customs procedures and general business links have a larger impact on bilateral trade than the standard gravity model variables. Finally, the use of PPML and the advantage related to computational power allow the use of a large sample of trade partners[16].

## 3.1 | Model specification

The basic gravity model has been augmented with the standard gravity variables accounting for trade costs and includes dummies for all trade agreements of interest as well as a dummy controlling for the Pan-European system of cumulation. Furthermore, the model contains origin-time-sector and destination-time-sector fixed effects as well as time-invariant pair fixed effects to control for the MRT and to correct for endogeneity. The model is given by

$$\begin{aligned} Imports_{ijkt} = \exp\big[&\beta_0 + \beta_1 Eumed_{ijt} + \beta_2 Turmed_{ijt} + \beta_3 USAmed_{ijt} + \beta_4 Jorfta_{ijt} \\ &+ \beta_5 RoOEU_{ijt} + \beta_6 LnDist_{ij} + \beta_7 Contig_{ij} + \beta_8 Colony_{ij} \\ &+ \beta_9 Lang_{ij} + \delta_{ikt} + \pi_{jkt} + \theta_{ikj}\big] + \varepsilon_{ijkt} \end{aligned} \tag{2}$$

where Equation (2) is estimated separately for final and intermediate goods. The general form for the gravity model estimated using PPML has been taken from Larch et al. (22). As the model is estimated using the PPML estimator, the dependent variable is in levels, where $Imports_{ijkt}$ denotes the imports of goods in sector $k$ to country $i$ (reporter country) from country j (Med-4), where $j$ is the partner country. $Eumed_{ijt}$ is a dummy equal to 1 after the implementation of the respective Euro-Med trade agreement. Since the Euro-Med and EFTA-Med agreements are very similar in terms of their coverage, these agreements are included in the Eumed dummy. However, to account for their difference with respect to trade in agricultural products, the Eumed dummy varies by sector: it is equal to 1 for all EFTA-Med agreements in sector 1 and 0 for all Euro-Med agreements, with the exception of the EU-Morocco agreement, which also includes agricultural concessions from 2009 onwards. $Turmed_{ijt}$, $Usamed_{ijt}$ *and* $Jorfta_{ijt}$ are also dummies equal to 1, following the implementation of the respective agreements with Turkey, the USA and Jordan. As all these agreements include trade in agriculture or agricultural concessions, these dummies do not vary across sectors. $RoOEU_{ijt}$ is a dummy equal to 1 when the agreement allows for the Pan-European RoO. $LnDist_{ij}$ is the distance between i and j, while $Contig_{ij}$ is a dummy equal to 1 if two countries share a common border, and $Colony_{ij}$ and $Lang_{ij}$ account for colonial ties and the official language respectively. With respect to the MRTs, $\delta_{ikt}$ is the set of importer-sector-time effects capturing the inward multilateral resistance and $\pi ikt$ the set of exporter-sector-time effects controlling for the outward multilateral resistance. Finally,$\theta ikj$ is the set of time-invariant pair fixed effects capturing the time-invariant trade costs between a country pair. Finally, $\varepsilon ijkt$ denotes the error term. As is standard in the gravity literature, the standard errors are modelled to be robust and clustered at the ID level. The inclusion of pair-sector fixed effects does not allow the estimation of the impact of the variables distance, colonial ties, a common border and the same language; however, they are still included, since one specification is estimated, for comparative purposes, including these variables instead of the set of pair-sector fixed effects.

[16]According to Bacchetta et al. (6), the gravity estimation should be estimated using all countries and not just the countries involved (if one is interested in the effects of an FTA) as this leads to more stable and precise estimates.

Furthermore, the model is estimated for the different sectors to investigate whether – and if so, to what extent – the effects of the FTAs vary by sector.

## 3.2 | Data, variables and stylised facts

Data on bilateral trade flows between the four MENA countries of interest and 61 reporter countries[17] for the period from 1995 to 2016 come from UN Comtrade. We chose to use imports of the reporter countries rather than exports of the Med-4, as data on imports are usually reported more carefully (World Bank, 34). The list of countries has been taken from Parra et al. (25), as according to the authors, trade with these countries accounts for the bulk of MENA trade[18].

In addition to the set of OECD countries, the sample contains a number of partners from both in and outside the region, such as the United Arab Emirates, China, India and Singapore. The main estimations are conducted for the whole sample. For comparative purposes, robustness checks are performed using the subsample of OECD countries, as in Márquez-Ramos and Martínez-Zarzoso (24). The subsample of OECD countries contains, with some exceptions,[19] all members of the Euro-Mediterranean partnership as well as Canada and the USA. Singapore is added to the subsample of OECD countries, so that all countries that have concluded agreements with the Med-4 are included.

We use sectoral-level data classified according to the Broad Economic Categories (BEC) at two-digit level (See Table A1 in the Appendix). This classification distinguishes between goods in seven different sectors[20] and differentiates between their end use. The year 1995 is chosen as the starting point as the first FTA of interest, namely the one between the EU and Tunisia, entered into force in 1998 (see Table A1 for a list of the relevant FTAs). Data on gravity variables such as contiguity, distance and colonial ties come from CEPII[21], while GDP data are taken from World Bank World Development Indicators.[22]

Table 1 shows the mean share of each sector by country. In Egypt, Jordan and Morocco industrial supplies and thus intermediate goods register by far the highest share, whereas in Tunisia consumer goods and thus final goods are the most important sectors. Capital goods and transport equipment show the lowest mean shares in Egypt, Jordan and Morocco, whereas for Tunisia food and beverages is the least important sector.

Table 2 shows the average shares of specific commodity codes per country, to account for the relative importance of final and intermediate goods. Among categories included in transport equipment, Parts and Accessories (sector 53), which is classified as intermediate goods, shows the largest averages across countries. In the case of capital goods, the importance of intermediate goods (sector 42: Parts and accessories of capital goods – except transport equipment) varies by country. While intermediate goods make up the largest share of imports coming from Morocco

[17]See Table A2 for the list of partner countries.

[18]In their paper, MENA refers to the Med-4 as well as six additional countries.

[19]Cyprus, Lithuania, Malta, Romania and Bulgaria.

[20]Sectors 3 and 7 are excluded from the analysis.

[21]Centre d'Etudes Prospectives et d'Informations Internationales.

[22]While we include GDP in preliminary estimations, it drops out from our preferred models due to collinearity with origin-sector-time and destination-sector-time fixed effects, which are used to proxy for MRTs (see Tables 3 and 4).

**TABLE 1** Mean sector share by country in percentage

| Sector | Food and Beverages (1) | Industrial Supplies (2) | Capital Goods (4) | Transport Equipment (5) | Consumer Goods (6) |
|---|---|---|---|---|---|
| Egypt | 19.12 | 49.72 | 3.18 | 2.84 | 25.14 |
| Jordan | 10.30 | 54.59 | 2.95 | 1.77 | 30.39 |
| Morocco | 20.97 | 34.46 | 8.41 | 6.93 | 29.24 |
| Tunisia | 7.90 | 26.32 | 12.43 | 9.37 | 43.99 |

Source: Authors' calculations.

and Tunisia, the share is smaller than that of final goods (Capital goods: commodity code 41) for Egypt and Jordan. The same applies to food and beverages. For Egypt, Jordan and Morocco primary products (sector 11) make up the largest average share of imports coming from Med-4 countries, whereas for Tunisia processed products (12) are of greater importance.

Among industrial supplies, in which both subsectors correspond to intermediate goods, mean imports of processed industrial supplies (22) from Med-4 explain the large shares of imports coming from this sector. In the case of consumer goods, semi-durable consumer goods (62) have the highest shares. Thus, the export profiles of the four countries are quite similar, although small differences appear. All in all, intermediate goods are of major importance across countries, as can also be seen in Figures 1 and 2. These figures show that with the exception of Jordan, intermediate goods account for the bulk of MENA exports. For the sample of OECD countries (Figure 1), the absolute value of Med-4 exports of intermediate goods (measured as the imports of their trading partners) is about twice as much the value of final goods exports, while for the RoW sample, trade in intermediate goods is 2.5 times the value of the final goods trade (Figure 2).

Both graphs show a decline in exports following the financial crisis in 2007, followed by a sharp recovery that ended around 2011 with the Arab Spring, but a general increasing pattern prevails over the study period. For all countries, except Jordan, the decline was greater for intermediate goods than for final goods. More specifically, for Egypt and Tunisia, a sharp decline for both types of commodities occurred following the Arab Spring. For Morocco, exports of intermediate goods stayed relatively constant following the Arab Spring with a small upward trend. For Jordan, it seems that the country's exports have been less affected by the Arab Spring and the financial crisis, and are generally more stable.

The picture changes, however, when one looks at the evolution of exports to the RoW. For Jordan, the sample of countries included in the RoW is clearly more important in terms of final goods but also subject to more variation. For the remaining Med-4 countries, fluctuations also seem higher for the intermediate goods trade. Interestingly, exports of both types of commodities decline towards the end of the study period for this subsample, with a drop in exports of intermediate goods already observable from 2011 onwards. With respect to final goods, the exports recovered following the Arab Spring but started to decline from 2014 onwards.

## 4 | RESULTS AND DISCUSSION

In this section, we present the estimation results obtained for Equation (2) under four different model specifications. Table 3 presents the effects on exports of final goods and intermediate

**TABLE 2** Mean share of the specific commodity codes by country in percentage

| | Food and Beverages | | Industrial Supplies | | Capital Goods | | Transport and Equipment | | | Consumer Goods | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Subsector** | **11** | **12** | **21** | **22** | **41** | **42** | **51** | **52** | **53** | **61** | **62** | **63** |
| **Type** | **Int.** | **Final** | **Int.** | **Int.** | **Final** | **Int.** | **Final** | **Final** | **Int.** | **Final** | **Final** | **Final** |
| EGY | 11.58 | 5.95 | 7.48 | 45.8 | 1.76 | 1.25 | 0.13 | 0.52 | 2.37 | 4.76 | 12.93 | 5.46 |
| MAR | 15.02 | 5.84 | 9.25 | 22.16 | 0.93 | 7.51 | 2.8 | 0.45 | 6.92 | 0.31 | 24.13 | 4.67 |
| TUN | 2.71 | 5.06 | 2.26 | 18.48 | 7.2 | 7.94 | 0.01 | 0.77 | 10.64 | 1.79 | 36.62 | 6.51 |
| JOR | 5.84 | 1.94 | 14.9 | 37.11 | 2.43 | 0.58 | 0.05 | 0.48 | 1.17 | 3.3 | 23.11 | 9.1 |

*Note:* Int. denotes intermediate goods.

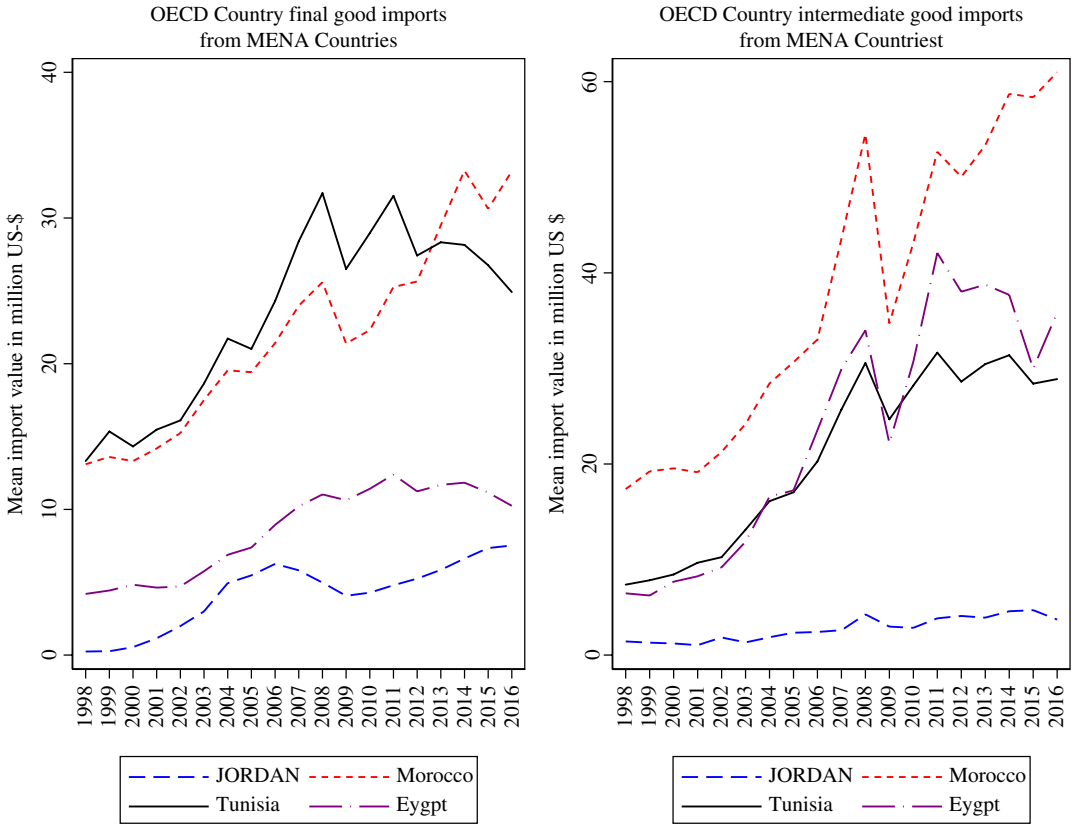


**FIGURE 1** Evolution of MENA exports to OECD by type of good. Source: Authors' calculations

goods for the complete sample of countries, while Table 4 presents the same models using only OECD[23]countries. In each table, we estimate the effect of free trade agreements on exports using pair fixed effects (columns (1) and (3)) and using standard gravity variables (columns (2) and (4)). Even though the dependent variable is in levels rather than in logarithms, the coefficients obtained from estimation with PPML can be interpreted as with ordinary least squares (Shepherd, 29). Regressors specified as logs can also be interpreted as elasticities and variables included in levels as semi-elasticities.

Coefficients obtained in models (2) and (4), which are the results from the specifications including the standard gravity variables without pair fixed effects, are not in line with the general expectations and in some cases have an unexpected sign.

The distance coefficient for exports of final goods is negative, as expected, but is larger than the estimates found in the literature, which usually range between −0.7 and −1.5. The effect of distance on exports of intermediate goods is also negative and significant, although – contrary to expectations – of lower magnitude than for final goods. Plausible explanations for these results

[23]In addition to the estimation with PPML, the model was estimated in its log-linear form with fixed and random effects, since this method has been used by many authors who analyse MENA trade integration. The results are available upon request.

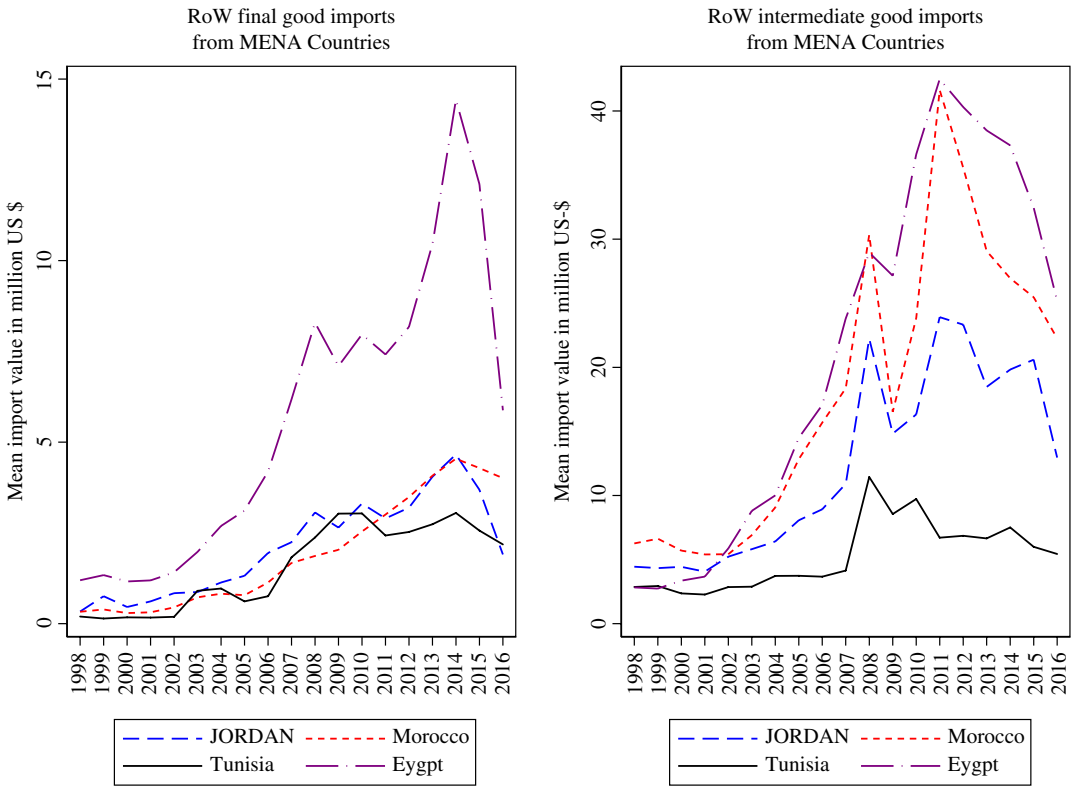


**FIGURE 2** Evolution of MENA exports to the RoW by type of goods. Source: Authors' calculation

are the considerable infrastructure constraints affecting the cost of exporting outside the region and raising the value of the distance coefficient.

The effect of contiguity on final exports, expected to be positive, displays a negative and large value. The sign changes in the case of intermediate goods, which might occur if exports of final goods to neighbouring countries are negligible while there are substantial exports of intermediate goods.

Having a common language has a large and positive effect on exports of final goods, but the coefficient is over three times larger than the 0.5 usually obtained in the literature, as shown in column (2) (Egger & Lassmann, 18). Conversely, the effect of having a common language is negative and insignificant when analysing exports of intermediate goods. This might point to a preference for trading final goods with partners speaking the predominant language in the region: Arabic. Even though it is informative to obtain results using standard gravity variables, the magnitude of the coefficients for the FTA variables seems to be biased upwards.

Contrary to the existing literature, our results show that agreements concluded with EU and EFTA countries, captured by the Euro-Med dummy, have a positive and significant effect across specifications when considering final goods exports (column (1) in Tables 3 and 4). The effect of the EU FTA indicates that trade is 46% higher after the agreement when including pair fixed effects and the complete sample. This result is economically important, especially if one takes into account the fact that a number of studies either do not find any significant effect of the Barcelona Process or find a negative effect on MENA exports. Our results seem plausible, keeping in mind that all other studies discussed in the literature review are obtained by estimating the model in

**TABLE 3** The Impact of FTAs on MENA Exports of Final and Intermediate Goods

| Dependent Variable: MENA-4 exports to the reporting importers | | | | |
|---|---|---|---|---|
| | Final Goods | | Intermediate Goods | |
| Explanatory variables | (1) | (2) | (3) | (4) |
| Eumed | 0.379*** | 1.272*** | 0.022 | −0.093 |
| | (0.121) | (0.129) | (0.116) | (0.086) |
| Turmed | 0.351 | 0.229 | 0.664*** | 1.483*** |
| | (0.216) | (0.536) | (0.115) | (0.233) |
| Usamed | 0.142 | 0.599*** | 0.788*** | −0.161 |
| | (0.222) | (0.220) | (0.286) | (0.117) |
| Jorfta | 0.836*** | 1.290*** | 0.635 | −1.296*** |
| | (0.126) | (0.419) | (0.643) | (0.446) |
| RoO_EU | 0.012 | 1.317** | 0.175 | −0.389 |
| | (0.073) | (0.519) | (0.114) | (0.237) |
| Ln dist | | −1.698*** | | −1.127*** |
| | | (0.047) | | (0.043) |
| Contig | | −1.031*** | | 0.220** |
| | | (0.126) | | (0.110) |
| Colony | | 0.341*** | | 1.114*** |
| | | (0.101) | | (0.092) |
| Lang | | 1.863*** | | −0.112 |
| | | (0.126) | | (0.110) |
| Observations | 28,745 | 29,217 | 23,228 | 23,356 |
| $R^2$ | 0.997 | 0.846 | 0.973 | 0.776 |
| Importer-Sector-Time FE | Yes | Yes | Yes | Yes |
| Exporter-Sector-Time FE | Yes | Yes | Yes | Yes |
| Pair-sector FE | Yes | | Yes | |

*Notes:* Robust standard errors in parentheses. ***$p < .01$, **$p < .05$, *$p < .1$. Errors clustered by id: exporter-importer-sector. Importer-Sector-Time FE capture the inward multilateral resistance. Exporter-Sector-Time FE capture the outward multilateral resistance. Pair-sector FE are exporter-importer-sector FE.

its log-linear form, meaning a large share of observations with zero trade flows drop out and they also cover a shorter time period.

The finding that the Euro-Med integration process had a non-significant impact on MENA exports of intermediate goods is in line with results of other studies and can be associated with increased integration in regional production networks in the course of the Barcelona Process, as suggested in Márquez-Ramos and Martínez-Zarzoso (24). A robust effect only for final goods is plausible in this context, if companies transferred the assembly of final products to MENA countries. Alternatively, the finding of a significant effect only for final goods could be explained by the fact that the elimination of import tariffs in MENA countries enabled MENA exporters to source cheaper and/or better quality inputs from European trade partners. This efficiency gain in sourcing is likely to have positively impacted the competitiveness of MENA exporters and thus the exports of final goods. Such a result is in line with Márquez-Ramos and Martínez-Zarzoso

**TABLE 4** The Impact of FTAs on MENA Exports of Final and Intermediate Goods to OECD countries

| Dependent Variable: MENA-4 exports from the reporting importers | | | | |
|---|---|---|---|---|
| | Final Goods | | Intermediate Goods | |
| Explanatory Variables | (1) | (2) | (3) | (4) |
| Eumed | 0.384*** | 1.499*** | −0.004 | −0.490*** |
| | (0.131) | (0.156) | (0.176) | (0.113) |
| Turmed | 0.354* | 0.214 | 0.523*** | 1.342*** |
| | (0.203) | (0.585) | (0.085) | (0.320) |
| Usamed | 0.053 | 0.623*** | 0.853*** | 0.214** |
| | (0.171) | (0.204) | (0.302) | (0.100) |
| Jorfta | 0.777*** | 1.133*** | 0.475 | −0.618 |
| | (0.126) | (0.385) | (0.737) | (0.444) |
| RoO_EU | −0.031 | 1.609*** | 0.386** | −0.129 |
| | (0.092) | (0.525) | (0.160) | (0.327) |
| Ln dist | | −2.100*** | | −1.160*** |
| | | (0.070) | | (0.053) |
| Contig | | −2.572*** | | 2.835*** |
| | | (0.340) | | (0.318) |
| Colony | | 0.336*** | | 0.933*** |
| | | (0.104) | | (0.098) |
| Lang | | 1.831*** | | 0.251*** |
| | | (0.131) | | (0.090) |
| Observations | 17,283 | 17,525 | 13,740 | 13,820 |
| $R^2$ | 0.997 | 0.874 | 0.986 | 0.912 |
| Importer-Sector-Time FE | Yes | Yes | Yes | Yes |
| Exporter-Sector-Time FE | Yes | Yes | Yes | |
| Pair-sector FE | Yes | | Yes | |

*Notes:* Robust standard errors in parentheses. ***$p < .01$, ** $p < .05$, *$p < .1$. Errors clustered by id: exporter-importer-sector. Importer-Sector-Time FE capture the inward multilateral resistance. Exporter-Sector-Time FE capture the outward multilateral resistance. Pair-sector FE are exporter-importer-sector FE.

(24), who find a positive and robust effect of lagged imports of intermediate goods from the EU on MENA exports of final goods.

Contrary to this, the effect of the Turkey-Med agreement on trade is statistically significant and positive for intermediate goods exports across specifications. As with the Euro-Med agreement, the coefficient for intermediate goods is at least twice as large when using standard gravity variables compared to pair fixed effects (column (4) in Table 3). The agreement led to an increase of 94% in exports of intermediate goods considering model results using pair fixed effects.[24]

[24]In contrast, Márquez-Ramos and Martínez-Zarzoso (24) find no significant effect of the Turkey-Med agreement on the two types of goods. Parra et al. (26) investigate the impact of the Turkey-Med agreement on trade in manufactured goods and find a positive but insignificant effect of this agreement on Turkey's imports from MENA countries. For agricultural trade, however, the authors find a significant effect amounting to an 89% increase in MENA exports to Turkey.

This finding might be explained by the fact that MENA exports to Turkey had not been subject to tariff reductions before the Barcelona Process, unlike exports to Europe. Thus, the Turkey-Med agreements might have prompted Turkish importers to source goods from MENA countries that had not been competitive in terms of prices prior to the agreement. Another reason might be the South-South nature of this trade agreement. Even though Turkey clearly exhibits a higher level of development than the Med-4, it would seem reasonable to expect that these countries are more similar in terms of their economic structure than most European countries are to the Med-4. Similarities among countries could make them rather unnatural trading partners due to a lack of complementary of trading schemes, as suggested by Magee (23). However, similarities could also help to ensure favourable conditions when negotiating trade agreements with countries of a similar development level (United Nations Conference on Trade and Development, 42). Moreover, the fact that the effect is larger and more robust for trade in intermediate goods might be explained by the fact that these goods may have a higher elasticity of substitution than final goods. According to Chaney (14), the demand for a given good is relatively insensitive to changes in trade costs if this good is highly differentiated and thus has a low elasticity of substitution. If one assumes that the intermediate goods imported by Turkish firms are relatively undifferentiated and can be easily substituted, this could explain the large effect of the trade increase.

Considering the impact of USA agreements with Jordan and Morocco, the coefficient is not significant in the case of final goods when controlling for all possible unobserved pair characteristics (column (1)), but it is significant and positive in the case of intermediate goods (column (4)).

However, in contrast to the agreement with Jordan, tariffs on agricultural products are phased out over a far longer period in the USA-Morocco agreement (see Section 2.4). Furthermore, the existence of the qualified industrial zones (QiZs) in Jordan definitely contributes to this large effect as these zones significantly increased trade between the two countries, which was probably reinforced by the existence of the FTA. Busse et al. (13) also find that the agreement between Jordan and the USA significantly boosted the exports of the former. As the effect for both trade agreements was estimated jointly, conclusive statements on the different effects cannot be made. Márquez-Ramos and Martínez-Zarzoso (24) investigate the impact of the USA-Morocco FTA and find no significant effect of this agreement on final or on intermediate goods. An explanation for this result might be the fact that the agreement entered into force in 2006 and their data cover only the years until 2008. Parra et al. (25) also analyse the effect of this agreement using years up to 2010 and actually find a positive and significant effect on Egyptian exports of industrial and agricultural goods occurring 2 years after the agreement entered into force. Parra Robles et al. (40), who examine the effect of the agreements the USA have concluded with Israel, Jordan and Morocco, find a positive and significant effect of these agreements on exports of industrial and agricultural goods with the effect being larger for manufactured products.

In the case of the agreements that Jordan concluded with Singapore and Canada in 2005 and 2012, respectively, there is a positive and large impact on final exports (column (1), Table 3). Both agreements include liberalisation in agricultural and industrial goods, which might explain this large effect. For intermediate goods, no significant effect is detected for the specifications using pair fixed effects, while for the specification using the standard gravity variables a negative and highly significant effect is detected. In both cases, the coefficients from the standard gravity specification are larger than when using pair fixed effects.

Our results diverge from those of Busse et al. (13), who estimate the effect of the Singapore-Jordan FTA also using a PPML estimator and find a negative and significant effect of this agreement on Jordanian exports; however, they did not use sectoral MRTs. Márquez-Ramos and

Martínez-Zarzoso (24) on the other hand, find that this FTA has a positive and significant effect on exports of manufactured goods but find a negative effect on agricultural exports. However, results are not strictly comparable to the ones shown in this paper, as the impact of FTAs between Canada and Jordan is not included in the abovementioned studies. This is indeed not surprising given that the agreement is quite recent.

According to the World Trade Organization (35), there is, however, a high degree of trade complementarity between Canada and Jordan, such that it is expected that the agreement will lead to trade creation rather than causing trade diversion. This has also been confirmed in simulations predicting that Jordan's exports of apparel and accessories, vegetables as well as a number of chemical and mineral products will increase due to this agreement.

Regarding the effect of the more flexible RoO that apply for trade among the Med-4, Turkey, the EU and EFTA states, no significant effect is found for either type of good that is robust across specifications. Only for final goods do we find a positive and significant effect for the specifications without pair fixed effects that are of similar magnitude for both samples and exceed the effect of the Euro-Med trade agreement per se. The finding that the changed RoO had a higher effect than the tariff reduction is in line with Márquez-Ramos and Martínez-Zarzoso (24), who find a positive and significant effect of the changed RoO on MENA exports of final goods. Bensassi et al. (11) also find that the effect of the more flexible RoO is greater than the effect of the simple tariff reduction. Unfortunately, the latter study does not distinguish between final and intermediate goods. The fact that the effect of the RoO on final goods is significant only for the specification without fixed effects might be explained by the lack of sufficient variation in this variable. In summary, as suggested by the theory, time-invariant pair fixed effects seem to be a better proxy for trade costs than the standard gravity variables.

Regarding the effect of the trade agreements on the imports of MENA trade partners, it is evident that each agreement significantly affects either final or intermediate goods, if the most accurate specifications in columns (1) and (4) are considered. This indicates the importance of distinguishing between these types of goods in economic analyses as they display different dynamics.

Finally, with respect to trade in agriculture, results show that the agreements including liberalisation in agriculture lead, as expected, to a larger increase in imports when the percentage change is considered. This underlines the often stated importance of increasing market access for MENA agriculture goods in European markets. In general, however, it can be said that all the agreements considered are found to significantly increase imports of the MENA trade partners. In this context, the positive effect of the Euro-Med agreements is surprising, as similar analyses have found that these agreements do not affect MENA exports. Clearly, the use of a different estimation method is one factor explaining this result. To investigate whether this promising result holds, the following section performs a robustness check using intervals rather than the full set of years, as a number of authors state that it is more appropriate to use intervals.

## 4.1 | Robustness: Impact for OECD countries, for different time intervals and by sector

As additional robustness checks, the model for final and intermediate goods is first estimated for a subsample of OECD countries, then using intervals of 3 and 5 years, and finally for specific sectors. These results are available upon request. The results for OECD countries are presented in Table 4. Even though using a slightly reduced sample of countries, which in any case includes

the partners of all FTAs considered, should not influence the estimates much, it matters for the Turkey-Med agreements and the changes in RoO. For the other agreements, however, there is no significant difference in the coefficients.

The approach for the second robustness check is chosen as trade agreements are typically phased in over a period of 5–10 years and it is thus not possible to capture their full economic effect in single-year observations (Baier & Bergstrand, 7). Furthermore, according to these authors, as the economic effects of an FTA include a change in the terms of trade that tend to have lagged effects on the volume of trade, it is reasonable to expect that trade agreements might still have an effect on trade 10 years after the agreement entered into force. To account for this fact, it is common in the trade literature to estimate the gravity model using data for intervals rather than for data pooled over consecutive years. Following the recommendation in Yotov et al. (43), we chose to estimate the model using 3- and 5-year intervals. The results in Table A2 (in the Appendix) show that the effect of the relevant trade agreements is robust across the different intervals for the Euro-Med agreements and Jordan's FTAs. This could indicate that the tariff eliminations that occurred directly when these agreements entered into force matter the most. Furthermore, the results indicate that the effect of the tariff eliminations is persistent (at least for time horizon considered here). However, as every third and fifth year was kept in the dataset regardless of when the single trade agreements entered into force, the explanations provided are more like educated guesses as it could be the case that the trade agreement dummy switches to one at the start of an interval, when the agreement has actually already been in force for 1 or 2 years. If one were interested in specifically investigating the effect after a certain number of years following the entry into force, lags would have to be included for the single dummies. However, as the main interest of this paper does not lie in investigating the possible delay in the impact of trade agreements, it was deemed sufficient to investigate the robustness of the estimates as depicted. As before, the coefficients for the USA-Med agreements are significant for trade in intermediate goods, but the coefficient obtained for the 3-year intervals is of much larger magnitude. This finding might be explained by the fact that for some goods that highly benefited from the trade agreement, tariffs were not eliminated directly when the agreement entered into force. For the Turkey-Med agreements and the changes in RoO, the time interval considered matters, as the coefficients display a different pattern of significance. For the Turkey-Med agreement and trade in intermediate goods, the coefficient loses significance for the 3-year intervals but is significant in the case of 5-year intervals. This could indicate that the effect of the initial tariff elimination is not persistent, whereas additional tariff eliminations that occur 5 years after the agreement entered into force significantly impact trade. For the changes in RoO, the estimation results using intervals are more promising than the results presented in the preceding section. The results for final goods clearly show the relevance of accounting for adjustments over time as this policy change is found to greatly increase imports when 5-year intervals are considered. This result seems reasonable, especially if one considers the emergence of production networks, as companies cannot adjust their production processes in a short timeframe. However, as the coefficient is compared to the other coefficients of much higher magnitude, it might be the case that the 5-year intervals overestimate the effect of this policy instrument. On the other hand, since other studies find that the changes in the cumulation regime have a much greater effect than the trade agreements per se, this strong effect might actually confirm this finding. For intermediate goods, on the other hand, a significant effect is found only for the 3-year period. As in the case of final goods, it is plausible to expect that it takes more than 1 year for MENA exporters to change their source of inputs. The finding that the positive effect did not persist

might be explained by the fact that the new input sources were less efficient in terms of quality, which in the longer run negatively affected exports. Although not significant, the negative coefficient found for the 5-year intervals could support this explanation. Summarising, it can generally be said that the effect of the trade agreements is robust, although there are differences for the Turkey-Med agreements and the RoO. Finally, the effect of the different trade agreements has been estimated for single subsectors to account for the expected heterogeneity between them (See Tables A4 and A5 in the Appendix, for subsectors belonging to final and intermediate goods respectively). It seems that sector 6, consumer goods, is mainly driving the results for final goods, whereas sectors 1 and 2, food and beverages and industrial suppliers, are driving the results for intermediate goods.

## 5 | CONCLUSION

This paper investigates the impact of a number of trade agreements on the exports of final and intermediate products of four MENA countries – Egypt, Jordan, Tunisia and Morocco – during the period from 1995 to 2016. Unlike the other MENA countries, the analysed countries are relatively well integrated into the global economy considering the number of agreements concluded. Nevertheless, they still lag behind in terms of economic development and would thus benefit from the growth potential generated by increasing exports.

To examine the extent to which these agreements have been successful and to consistently identify the impact of the relevant agreements, the analysis employed a gravity model specification that includes a rich set of fixed effects to control for endogeneity and heterogeneity at country and sector level. This specification was then estimated using the PPML estimator to account for the large share of zero trade flows in disaggregated data.

The estimation results show that the concluded agreements have been overall successful in increasing exports of the Med-4. In particular, the positive impact of the Euro-Med agreements is promising as the majority of studies that analyse the impact of these agreements also using disaggregated data find no positive impact on MENA exports. Furthermore, the results indicate that it is important to distinguish between intermediate and final goods, as it was found that the agreements had an impact either on final or on intermediate goods. In this context, the results show that the Euro-Med agreements as well as Jordan's FTAs with Canada and Singapore have been successful in boosting exports of final goods. The respective effects amount to an increase in exports of 46% and 130% respectively.

For intermediate goods, the Turkey-Med and USA-Med agreements were found to have increased exports of the Med-4 by 94% and 119% respectively. These effects show that the agreements including liberalisation in agricultural goods do indeed have a greater effect than those including only industrial goods. This is in line with expectations, as MENA countries clearly have a comparative advantage in these products. With respect to the effect of the Pan-European RoO, it was found that it takes several years until they actually affect exports. This result is surprising as other studies have found that the effect of this change was instantaneous and bigger than the impact of the trade agreements per se. Regarding the impact on the different sectors, it was found that mostly undifferentiated goods profited from the tariff liberalisation. These findings are in line with the theories indicating that goods that are easily replaced by others – in other words, that are highly substitutable – are also more sensitive to tariff changes. Additionally and most interestingly, a positive effect of the Euro-Med agreements was found on exports of food and

beverages. Thus, the agricultural concessions granted by the EU and EFTA seem to have been successful in improving MENA market access to Europe.

From these findings, a number of implications arise for policy making and further research. The results presented in this paper clearly support the need to expand the liberalisation of trade in agriculture with European partners as it was found that the existing concessions in the Euro-Med and EFTA-Med agreements benefit MENA exports of food and beverages. This implication is underlined by the fact that the agreements including trade in agriculture are, in line with other studies, found to have a greater impact on MENA exports than those covering only industrial goods.

With respect to future research, there is a need for more evidence on the effects of MENA trade integration for specific countries using PPML estimation, as the results for the Euro-Med agreements and the changes in RoO differ with respect to those obtained previously. Furthermore, as the chosen classification method distinguishes between goods only very broadly, it could be interesting to take a closer look at the goods included in the sectors to identify a more specific direction for export promotion at the sectoral level. Most importantly, it would be interesting to investigate whether improved export performance actually leads to economic growth. This is especially true for the Euro-Mediterranean Association Agreements that aim to generate stability through openness and the related economic success.

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## APPENDIX

**TABLE A1** Classification by Broad Economic Categories (BEC)

| |
|---|
| 1 – Food and beverages |
| 11 – Primary (I) (111: Mainly for industry, 112: Mainly for household consumption) |
| 12 – Processed (F) (121: Mainly for industry, 122: Mainly for household consumption) |
| 2 – Industrial supplies not elsewhere specified |
| 21 – Primary (I) |
| 22 – Processed (I) |
| 3 – Fuels and lubricants |
| 31 – Primary (I) |
| 32 – Processed (I) |
| 4 – Capital goods (except transport equipment), and parts and accessories thereof |
| 41 – Capital goods (except transport equipment) (C) |
| 42 – Parts and accessories (I) |
| 5 – Transport equipment and parts and accessories thereof |
| 51 – Passenger motorcars (NC) |
| 52 – Other (F) (521: Industrial, 522: Non-industrial) |
| 53 – Parts and accessories (I) |
| 6 – Consumer goods not elsewhere specified |
| 61 – Durable (F) |
| 62 – Semi-durable (F) |
| 63 – Non-durable (F) |
| 7 – Goods not elsewhere specified (NC) |

Source: United Nations Statistics Division (2017), Manual of the Fifth Revision of the BEC, page 8. https://unstats.un.org/unsd/trade/classifications/. (I) denotes intermediate, (F) final, (C) capital goods and (NC) not classified goods.

**TABLE A2** Overview of the FTAs and RoO

| FTA | Country | Partners | Entry Force | Full Liberal | RoO |
|---|---|---|---|---|---|
| EUMED | Tunisia | EU countries | 1998 | 2009 | Pan-European diagonal and Full cum. |
| | Morocco | | 2000 | 2010 | |
| | Jordan | | 2002 | 2014 | Tun, Mor, |
| | Egypt | | 2004 | 2016 | |
| USA-MED | Jordan | USA | 2001 | 2010 | Full cum Tun, Mor |
| | Morocco | | 2006 | 2020/2026 | |
| CJ-FTA | Jordan | Canada | 2012 | 2017 | Bil cum |
| TURMED | Tunisia | Turkey | 2005 | 2014 | Pan-European diagonal cum. |
| | Morocco | | 2006 | 2015 | |
| | Egypt | | 2007 | 2020 | |
| | Jordan | | 2011 | 2018 | |
| JSGP-FTA | Jordan | Singapore | 2005 | 2015 | Bil cum |

*Note:* CJFTA and JSGP are considered together in the empirical analysis under the name Jorfta.

**TABLE A3** Results for the whole sample using 3-year intervals

| Dependent Variable: MENA-4 exports | | |
|---|---|---|
| | (1) | (2) |
| | Final | Intermediate |
| Explanatory Variables | Goods | Goods |
| Eumed | 0.447*** | −0.120 |
| | (0.144) | (0.126) |
| Turmed | 0.160 | 0.199 |
| | (0.249) | (0.190) |
| Usamed | 0.135 | 1.044*** |
| | (0.210) | (0.324) |
| Jorfta | 0.811*** | 1.041 |
| | (0.145) | (0.661) |
| RoO_EU | 0.221 | 0.489** |
| | (0.273) | (0.223) |
| Observations | 10,500 | 8,678 |
| $R^2$ | 0.996 | 0.981 |
| Importer-Sector-Time FE | Yes | Yes |
| Exporter-Sector-Time FE | Yes | Yes |
| Pair-sector FE | Yes | Yes |

*Notes:* Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Errors clustered by id: exporter-importer-sector. Importer-Sector-Time FE capture the inward multilateral resistance. Exporter-Sector-Time FE capture the outward multilateral resistance. Pair-sector FE are exporter-importer-sector FE.

**TABLE A4** Results for specific sectors. Final Goods

| Dependent Variable: MENA-4 exports | | | | |
|---|---|---|---|---|
| **Explanatory variables** | **Food and Beverages (sec 12)** | **Capital Goods (sec 41)** | **Transport Equipment (sec 51–52)** | **Consumer Goods (sec 61–63)** |
| Eumed | 0.260 | 0.056 | 2.423* | 0.300** |
| | (0.241) | (0.242) | (1.331) | (0.137) |
| Turmed | −0.094 | 0.260 | | 0.577 |
| | (0.280) | (0.444) | | (0.385) |
| Usamed | −0.895*** | 0.324 | | 0.435 |
| | (0.347) | (0.426) | | (0.285) |
| Jorfta | −0.160 | −0.111 | | 0.889*** |
| | (0.465) | (0.448) | | (0.127) |
| RoO_Eu | −0.172 | −0.245 | −1.980 | 0.103 |
| | (0.145) | (0.404) | (1.342) | (0.089) |
| Observations | 4,579 | 4,596 | 2,174 | 13,807 |
| $R^2$ | 0.978 | 0.995 | 1.000 | 0.997 |
| Importer-Sector-Time FE | Yes | Yes | Yes | Yes |
| Exporter-Sector-Time FE | Yes | Yes | Yes | Yes |
| Pair-sector FE | Yes | Yes | Yes | Yes |

*Notes:* Robust standard errors in parentheses. ***$p < .01$, **$p < .05$, *$p < .1$. Errors clustered by id: exporter-importer-sector. Importer-Sector-Time FE capture the inward multilateral resistance. Exporter-Sector-Time FE capture the outward multilateral resistance. Pair-sector FE are exporter-importer-sector FE.

**TABLE A5** Results for specific sectors. Intermediate Goods

| Dependent Variable: MENA-4 exports | | | | |
|---|---|---|---|---|
| **Explanatory Variables** | **Food and Beverages (Sector 11)** | **Capital Goods (Sector 42)** | **Transport Equipment (sect 53)** | **Industrial Supplies (sect 21–22)** |
| Eumed | 0.338*** | 0.154 | 0.147 | −0.177 |
| | (0.126) | (0.249) | (0.270) | (0.150) |
| Turmed | −0.405 | −0.691 | −0.259 | 0.668*** |
| | (0.293) | (0.445) | (0.972) | (0.104) |
| Usamed | 0.540 | −0.833* | −1.025*** | 1.199*** |
| | (0.537) | (0.479) | (0.340) | (0.203) |
| Jorfta | 0.139 | 0.690 | −1.517** | 0.908 |
| | (0.247) | (0.459) | (0.660) | (0.761) |
| RoO_eu | −0.241*** | −0.858*** | −0.412 | 0.324** |
| | (0.087) | (0.210) | (0.467) | (0.134) |
| Observations | 4,532 | 4,567 | 4,468 | 9,241 |
| $R^2$ | 0.996 | 0.994 | 0.991 | 0.961 |
| Importer-Sector-Time FE | Yes | Yes | Yes | Yes |
| Exporter-Sector-Time FE | Yes | Yes | Yes | Yes |
| Pair-sector FE | Yes | Yes | Yes | Yes |

*Notes:* Robust standard errors in parentheses. ***$p < .01$, **$p < .05$, *$p < .1$. Errors clustered by id: exporter-importer-sector. Importer-Sector-Time FE capture the inward multilateral resistance. Exporter-Sector-Time FE capture the outward multilateral resistance. Pair-sector FE are exporter-importer-sector FE.