Does opening up pay off?
A gravity model approach on Jordan’s Trade Liberalization

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Abstract

The paper assesses the impact of Jordan’s substantial trade liberalization that started in the early 1990s. Using a gravity model, large country sample and long time series, we estimate the impact of various Free Trade Agreements (FTA) and WTO accession on both Jordan’s exports and imports. Overall we find that the impact has been rather small, as no statistically significant impact on exports and imports can be found due to multilateral or preferential trade liberalization. However, there are two exceptions: The FTA with the United States has boosted Jordan’s exports and the FTA with other Arab countries (GAFTA) has led to an increase in imports.

JEL Classification: F13, F14

Key Words: Jordan, Free Trade Agreements, WTO Accession

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1. Introduction

Starting in the early 1990s, Jordan has undergone a process of significant trade liberalization. Apart from unilateral and multilateral liberalization measures, partly through the accession to the World Trade Organisation (WTO) in April 2000, it has ratified a number of free trade agreements (FTAs). To begin with, Jordan joined the Greater Arab Free Trade Area (GAFTA) in 1998, which envisages a gradual liberalization of trade in goods for its 17 member countries from the Middle East and Northern Africa. Also, Jordan continued its trade liberalization path by ratifying the Association Agreement with the European Union (which entered into force in May 2002) and FTAs with the United States (December 2001), member countries of the European Free Trade Association (EFTA, September 2002) and Singapore (August 2005).

Based on economic theory, a reduction in (tariff and non-tariff) trade barriers would lead to lower import and export prices and, therefore, – depending on the respective supply, demand and substitution elasticities – an increase in Jordan’s total trade flows. And indeed, Jordan’s exports and imports have increased considerably since the liberalization process began (Figure 1). The expansion of imported goods, however, has been much larger than the rise in exports, leading to a substantial increase in the trade deficit. Note that these figures refer to trade in goods only. While Jordan has a small deficit in the services account (US $223 million in 2006, the latest year for which complete data is available), it has a surplus in both the income account (US $518 million) and current transfers (US $2,790 million). Overall, Jordan had a US $1,972 million deficit in its current account in 2006 (Central Bank of Jordan, 2008). Since almost all of the FTAs and WTO accession focus on trade liberalization in goods only, this will be the main objective of the paper.

The empirical evidence for analytical studies on Jordan’s trade flows is very limited. So far, only two studies have estimated the effects of Jordan’s Association Agreement with the European Union. Using a computable general equilibrium (CGE) model, Hosoe (2001) analysed the impact of the Association Agreement on Jordan’s output, exports and imports. According to Hosoe’s results, all three are likely to increase due to the agreement. For

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1 The US FTA includes bilateral agreements on QIZs.
example, imports from the EU are expected to increase by 12 per cent, while exports to the EU rise by 8 per cent. Not all sectors, however, would benefit from trade liberalization. While an expansion in Jordan’s chemical and agricultural sectors could be expected, the non-metal mineral sector would decline.²

Figure 1: Jordanian trade flows and trade balance in Billion US Dollar, 1990-2006.


The second study that estimated the effects of the Association Agreement on Jordan was undertaken by Feraboli (2007). Similar to Hosoe, Feraboli also used a CGE model. Yet he employed an updated structural accounting matrix, calibrated to 1998 data, and a dynamic (rather than a static) CGE model, taking capital accumulation effects into account. He focussed on Jordan’s macroeconomic variables, such as private consumption and investment, government revenues, and welfare levels, and used three main scenarios that differ according to the response by the Jordanian government with respect to changes in revenues due to the decline in customs revenues. In all simulations, the agreement can be expected to boost Jordan’s welfare levels in the long run. To counteract any fiscal losses due to the agreement, he suggested that the government should adjust domestic taxes, for example, by increasing the value added tax rate.

² Hosoe (2001) also investigated Jordan’s implementation of the GATT Uruguay Round, concluded in 1994. Since Jordan’s WTO accession in 2000 involved many more commitments, the results are not directly comparable. Still, Hosoe found positive welfare effects of the implementation of the Uruguay Round.
To the best of our knowledge, no study has undertaken an *ex post* impact assessment of the various FTAs Jordan has ratified in the past 10 years and WTO accession on Jordanian trade flows. This paper intends to fill that gap. In addition to total trade flows, we will investigate the impact on Jordan’s imports and exports, as the various trade agreements might have a diverging impact on the direction of trade.

For our empirical analysis, a gravity model will be used. This type of economic model, which has been frequently used in international economics, deals with bilateral trade flows, that is, trade between country pairs. Moreover, it can be derived from underlying microeconomic foundations, faces a low risk of econometric problems, such as simultaneous and omitted variable biases, and the results are shown to be quite robust to different specifications, modelling assumptions and data sets. Therefore, this model is quite suitable for an analysis of the trade agreements Jordan has ratified so far.

On the whole, we find that the various FTAs and WTO accession have not had a statistically significant impact on Jordan’s trade flows. The exception is the US agreement that has led to an enormous increase in Jordan’s exports to the United States, and a rise in imports from other GAFTA member countries.

The paper is structured as follows: In the next section, all variables and indicators used in the analysis are introduced. Moreover, the econometric methodology will be explained and the exact model specification will be presented. While Section 3 embraces the detailed empirical results, Section 4 concludes with various policy recommendations based on the results.

### 2. Data sample, variables and methodology

**Data sample**

The data was mainly gathered directly from the Ministry of Industry and Trade of Jordan and the crosschecked with the United Nations (UN) database for trade flows *comtrade*. This helped building an extensive database and at the same time allowed us to correct obvious
errors or missing data by adding missing or correcting obviously wrongly entered data correspondingly. Appendix B provides descriptive statistics for the key variables of interest. Covering 140 countries, we are able to take basically all Jordan trade flows into account. Only for few trading partners we were not able to get Gross Domestic Product (GDP) data and therefore had to omit these countries.  

**Variables**

In order to capture the effects of the trade policy we will look at external trade aggregates. Apart from *total trade* which is constructed as the sum of *exports* and *imports*, we also consider *exports* and *imports* as dependent variables. We are therefore able to distinguish clearly between effects on the export and effects on the import side. Our GDP and trade data are given in nominal current US Dollar. We are therefore able to withstand errors otherwise introduced by inappropriate deflation of nominal trade values (Baldwin and Taglioni 2006).

For the GDP variables we expect a positive coefficient. This is straightforward as GDP measures the economic size of a country. A higher GDP in Jordan is therefore in line with a higher demand for imports. Also does an increasing economic size of a country well account for a higher export as bigger countries tend to trade relatively more. This might be explained by possibly lower supply side constraints as well as a further integration into the global economy due to economies of scale which will be reached earlier in bigger than in smaller countries (Bretschger 2002).

Another key indicator is the distance between the country pairs. The basic assumption is straightforward: Trade costs will rise with increasing distance. Distance can therefore be used as a proxy for trade costs and is expected to have a negative influence on trade.

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3 Gathering trade data sometimes proved to be difficult, especially when analyzing this many and very diverse countries. Not only is it possible for the trade figures to differ from the figures reported in the partner country, but gaps and irregularities are problems that need to be addressed correctly. In order to minimize any adverse effects on data due to such inconsistencies we were in close contact with the Ministry of Industry and Trade of the Hashemite Kingdom of Jordan (MIT). This relation provided us with most recent data directly from the source. Still, some gaps in the data remained.
We used the distance between the capitals of the countries as a measure for the geographical proximity between them. Apart from the distance we controlled for several other geographical factors, such as being landlocked, being an island and sharing a common border. Being landlocked and being an island however showed no significant influence and are therefore not reported. Sharing a common border nevertheless can make a difference through eased personal interactions, lower transport costs and usually an increased cultural understanding prevails between neighboring countries. These factors can lead to traditionally build up trading relations which in turn foster trade. Therefore a positive influence is expected.

Trade can also be eased by a common cultural background such as sharing a common religion and speaking the same language. While modeling the common religion as a continuous variable from 0 to 1 giving the percentage of Muslims in the population, we controlled for a common language with a dummy variable which is set to one if countries share a common language. We expect both coefficients to have a positive sign.

The trade agreements were also modeled as dummies which are set to one for the member states, once the agreement entered into force. The agreement with the European Union (EU) also includes new accession countries until 2007. In these cases the dummy has been set to one once the countries have concluded their membership with the EU. For the Agreement with the United States of America (US) the dummy has been set to 2001. The other dummies where set correspondingly (EFTA 2002, GAFTA 2002, Singapore 2005). At the outset it is not clear which sign the coefficients will have. Since obstacles to trade are removed a classical argumentation would lead to expect a positive impact on the trade figures of Jordan. We also controlled for a unilateral liberalization with a dummy for the

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4 Note that Melitz (2007) convincingly points out some cases, such as the North-South case, where distance should indeed have a positive influence.

5 There are different approaches being used in the literature. These include, but are not limited to the distance between the main ports of the countries or the closest distance using the borderlines of the corresponding countries. As shown by Disdier and Head (2008) in an extensive analysis the distance effect however remains persistent throughout different measures and samples (see also Frankel 1997:72). This holds true for studies that cover a world sample of countries such as ours (Melitz 2007). Therefore we chose to use the distance between capitals.

6 Trade relations are often associated with trust which can build up over time and thereby foster trade in the mid- and long-run.

7 New accession countries to the EU in 2007 were Bulgaria and Romania.

8 Since the agreement went into force in December 2001 we also set the dummy to one beginning in only 2002. This however did not affect the results.
WTO accession of Jordan in 2000, which should in line with the foregoing argumentation have a positive coefficient.

Apart from the above mentioned external shocks can seriously influence trade. In the case of Jordan this is mainly due to two factors: Firstly, Jordan is a relatively small open country. With a population of little more than 6 million inhabitants and more than one third (2.5 million) gathered in the main capital (Amman), it is particularly vulnerable to external shocks. Secondly Jordan is located in a politically volatile surrounding. Apart from the Iran/Iraq war (1980 to 1988) and the Iraq wars in 1991 and 2003, there have almost constantly been armed conflicts in neighboring regions, such as in Lebanon and the Israeli/Palestine territory.

Although its neighbors in general possess a fair share of oil resources, Jordan does not. Therefore, the oil crisis since 2003/2004 is also affecting the economics situation of Jordan. One way to account for these shocks in our analysis is to include event specific dummies. In view of the manifold potential effects this however proves to be difficult as one might omit events that may not be obvious but still have the potential to influence trade flows. Therefore we included a full set of year dummies, capturing any year specific exogenous variation that is not specifically addressed by our model.

**Methodology**

To get a better fit in a gravity model setup it is often useful to take logarithms of all continuous variables. This poses a problem with the trade data as it frequently includes a fair share of zero values and the logarithm for 0 is not defined. Hence the result is a rather big loss of data.

Analysing our data showed however, that it contains few zeroes (below 15%). Adding 1 before transforming using the natural logarithm prevents even this loss of data.

Traditionally random or fixed effects models have been used for the estimation of gravity equations. These do not allow estimating parameters of variables that vary only in a single dimension. All time invariant variables are therefore eliminated and under certain circumstances variation across countries is ignored (Hausman and Taylor 1981:1377f.).

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10 In addition it has been shown by Silva and Tenreyro (2006), that in case of excessive zeroes a skewed result will be probable. They therefore suggest using a pseudo-poisson maximum likelihood estimator (PPML). This method was applied to a gravity model setting by Martin and Pham (2007).
This implies that one does not get parameter estimates for the variation that is captured in the country fixed effects, although these could be most interesting. Therefore Hausman-Taylor (1981) and Wyhowski (1994) proposed a different model that incorporates the advantages of the random and fixed effects models. Egger (2005) has shown that the Hausman-Taylor estimator (HTE) is consistent or at least equivalent to the random and fixed effects estimators. McPherson and Trumbull (2003) have also tested different estimators and found the HTE to be superior in the estimation results.

The HTE is basically a hybrid of the fixed effects and the Generalized Least Squares (Random Effects) models (Gardner 1998:39f.). While the original specification for a linear panel data survey would be:

\[ y_{it} = x_{it}' \beta + z_{it}' \alpha + \epsilon_{it} \quad (1) \]

where \( y_{it} \) is the dependent variable of country \( i \) in period \( t \), \( x_{it}' \) and \( z_{it}' \), respectively symbolize the time varying and time invariant covariates. \( \alpha \) and \( \beta \) are the vectors of coefficients associated with the covariates.

The model suggested by Hausman-Taylor (1981) takes the form:

\[ y_{it} = x_{1it}' \beta_1 + x_{2it}' \beta_2 + z_{1it}' \alpha_1 + z_{2it}' \alpha_2 + \epsilon_{it} + u_{it} \quad (2) \]

The main assumption of the HTE is that the explanatory variables that are correlated with the error term \( u_{it} \) can be identified. Four sets of observed variables are classified as follows: 

- \( x_{1it} \) are variables that are time varying and uncorrelated with \( u_{it} \). In our case we identified all dummy variables that stand for trade liberalization (i.e. EU, USA, GAFTA, EFTA, Singapore, WTO) and the year dummies as such.
- \( x_{2it} \) are variables that are time varying and correlated with \( u_{it} \). In our case this would imply the GDP of the partner country as well as the GDP of Jordan, for it can clearly be argued that total trade, exports, imports could have an influence on these GDP figures.
- \( z_{1it} \) are variables that are time invariant and uncorrelated with \( u_{it} \). In our example the variables common religion, common border, common language and
distance are uncorrelated and also time invariant. \( z_{2i} \) describes the last set of variables used in this form, which are time invariant and correlated. However none of our indicators fit this definition.

The following assumptions are valid for the random terms in the model:

(3) \( E[u_i | x_{1it}, z_{it}] = 0 \) though \( E[u_i | x_{2it}, z_{2i}] \neq 0 \),

(4) \( \text{Var}[u_i | x_{1it}, z_{1i}, x_{2it}, x_{3i}] = \sigma_u^2 \)

By construction the OLS or GLS estimators will be inconsistent if any of the variables used in the model will be correlated with the random effects. Therefore Hausman and Taylor (1981) instrument their estimates by taking deviations from group means such as:

(5) \( y_{it} - \bar{y}_i = (x_{1it} - \bar{x}_{1i})' \beta_1 + (x_{2it} - \bar{x}_{2i})' \beta_2 + \epsilon_{ui} - \bar{\epsilon}_i \)

The authors show that these instruments are sufficient as long as the number of time varying and exogenous variables is at least equal to the number of variables that are time invariant and correlated, which we can affirm for all our estimations. Therefore the group mean deviations of \( x_{1it} \) and \( x_{2it} \) serve as instruments. \( z_{it} \) are also included as instruments as they are exogenous. And finally the group means of \( x_{1it} \) are also included in the variables.\(^{11}\)

Our final equation which is used to estimate the coefficients will be:

(6) \( \ln \text{TotalTrade}_{it} = \beta_{0it} + \beta_{1it} \ln GDP_{Jordan} + \beta_{2it} \ln GDP_{PartnerCountry} + \beta_{3it} \ln distance_{it} + \beta_{4it} \text{TradeDummies}_{it} + \beta_{5it} \text{YearDummies}_{it} + \beta_{6it} \text{CommonLanguage}_{it} + \beta_{7it} \text{CommonReligion}_{it} + \beta_{8it} \text{CommonBorders}_{it} + \epsilon_{it} \)

Correspondingly total trade\(_{it} \) will be exchanged for exports\(_{it} \) and imports\(_{it} \).

\(^{11}\) As this is not intuitive an econometric proof is provided by Hausman and Taylor (1981) in their paper.
3. Empirical Results

Turning to our results, we find that the standard gravity model indicators, such as distance and GDPs have the expected signs. Distance sways throughout all specifications between -.9 and -1.3 and is always significant at a 5% level (see Table 1). Only in two cases distance drops further down to around -2.1. In these cases exports are the dependent variable and when controlled for geographical and cultural proximity the influence goes back to traditional levels of around -1.0.\(^{12}\) Therefore our results are perfectly within the usually perceived range and prove the robustness of the model and the underlying dataset. Both GDP variables are also as expected positive and except for two cases always highly significant.

Looking at total trade we get coefficient estimates of around .4 for the GDP of the corresponding partner country and around .7 for the GDP of Jordan. This changes dramatically if we look closer into exports and imports. While the coefficients stay about the same for imports (.4 and .7) we get highly significant (at a 1% level) estimates of around 1.4 and 1 for the exports.

\(^{12}\) Although Baldwin and Taglioni (2006) point out, that this level is not theory based, but is within the usually perceived range in gravity models.
Table 1: Empirical Results.

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Notes: 1, 5, and 10 per cent significance levels are denoted by ***, **, and * respectively.

Standard errors are given in parentheses.
(1) The Agreement with the United States of America (US) at first glance also did not seem to have had an impact on Jordan’s trade. This picture however changes dramatically as we look into the export figures. Here we can clearly find a very large impact. The coefficient is highly significant at a 5% level in all specifications and stays constantly at 3.4 which results in an enormous 14 fold increase. This outcome mainly has to be credited to special US trade preferences in the textile and apparel sector. On imports and total trade however, the FTA has not had any significant impact, as the coefficients are not statistically significant.

Figure 2: Total Imports (right axis) for EU27 and GDP of Jordan (left axis) in millions of current US Dollar from 1981 – 2007.

![Graph showing total imports and GDP over time](image)


(2) The GAFTA agreement in turn does seem to have a positive influence on total trade in Jordan. Again the differentiation in exports and import side reveals a clear difference. While imports have a positive coefficient of around 0.4 which is significant at a 1% level (as well as the coefficients for total trade), the export side cannot back up this result. On the contrary it shows to have a negative influence that proves to be significant at the 5% level in two out of three specifications. This result could be interpreted as benefits realized by the other GAFTA members. They have been able to export more into Jordan.

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13 Again, this estimate includes the QIZs. We follow Halvorsen and Palmquist (1980) and Kennedy (1981) in calculating the effect of a dummy variable in a semilogarithmic specification. Therefore the percentage change in the dependaple variable amounts to 100 x \{exp[estimated coefficient of dummy variable – ½(estimated variance of coefficient)]-1\}. 
after the entry into force of the GAFTA. However, in terms of higher exports Jordan could not benefit.

A common critique on this result is that Jordan had severe increases in the import value from GAFTA nations, as it does not own ample oil sources, thereby making it a net importer of oil that is extremely dependent on oil flows from abroad and therefore vulnerable for any oil price shocks and increases such as have happened since the late 1990s. But even if we exclude oil imports from our figures the agreement still has a significant and positive impact on Jordan’s imports.\textsuperscript{14}

(3) The results for the FTA with the EFTA suggest that total trade and imports have been decreasing. Yet this outcome is driven by the very particular trade pattern of Iceland, which has to be classified as a clear outlier. As the EFTA consist of only four countries and we could not include one member state due to data issues, each country has a particularly strong effect on the overall result.\textsuperscript{15} Excluding Iceland resolves in no significant trade effects as a consequence of the FTA with the EFTA.

(4) The FTA with Singapore has not had any impact on trade flows (imports and exports) so far. This result however may lack a sufficient time horizon, as it only went into force at the end of 2005. This leaves us with 3 recent observations, thereby making the results volatile and possibly weak.

(5) Finally, Jordan’s accession to the WTO has not had a significant impact on its imports and exports so far.

Besides the effects from some outliers (Iceland), there are a number of reasons why the FTAs (and WTO membership) have not been more successful in boosting Jordan’s ex- and imports. This applies in particular to Jordan’s exports to the EU, but also to the FTAs with EFTA, GAFTA, and Singapore.

First of all, the time frame for the analysis (up to the end of 2007) might have been too short. Frequently, tariffs are not eliminated immediately after the agreement went into force but rather lifted step by step over a time span of up to 10 or more years. Moreover,

\textsuperscript{14} Results are not reported but are available upon request.
\textsuperscript{15} Apart from Iceland, Switzerland and Norway are incorporated, while Lichtenstein has been omitted due to a lack of trade data.
exporters need sufficient time to exploit the trade opportunities abroad due to the special trade preferences. Both factors are likely to imply considerable time lags, meaning that any or larger trade effects might still be occurring in the future.

Second, restrictive and complicated rules of origin and various product standards in the importing country have the potential to undermine trade preferences. If the bureaucratic procedures imply considerable time, effort and expenses or, even worse, if they exclude products that do not meet the rules of origin or product standards, trade effects are very likely to occur. In fact, exporters sometimes do not take advantage of trade preferences as part of the FTA if compliance costs outweigh the preference itself.

Also the EU reserves the right to postpone sensitive sectors from liberalization. These are sometimes sectors in which other countries may have a cost advantage producing. This can lead unrealized benefits, that might otherwise have influenced trade. At the same time of liberalization efforts rules of origin and other labels do sometimes act as non-tariff barriers. Therefore potential gains of liberalization at least in the short and possibly in the middle run are hindered.

Figure 2: Structure of exports from Jordan to the EU in 2006 (Sectors according to HS2002).

Another point that has to be risen refers to production capabilities. Even if sectors with considerable competitiveness are included in agreements, Jordan still remains a considerably small country. Having a total population of around 6 million people can put limits on the supply side. These constraints will not necessarily persist, as sectors can adapt, but they will show how well the supply side can adjust to new demands borne by trade liberalization.

Looking at the export sector of Jordan stresses another factor mentioned earlier: As can be seen in Figure 2, more than 14% of Jordan’s exports to the EU accrue in the fertilizer sector. Put together with other chemicals and minerals this percentage even rises to more than one third (36%) of total exports to the EU. These sectors however have not had high demand growth rates in the past. Furthermore, they do not possess a high margin as they are almost raw products, with only little value added within Jordan. In addition prices on commodity markets have been and continue to be under pressure internationally, thereby possibly eroding the base for profitable exports in countries with a corresponding export structure.

The US agreement on the other hand seemed to have had a huge influence. As already explained it has led to a 14 fold increase in exports due to the agreement. However a closer look reveals the preferential role the apparel and clothing sector had been given. Figure 3 shows, that the sector had a 65 per cent fraction of all exports. This rate rose to almost 90 per cent in 2006 and the amount exported in this sector rose by 26 times to almost 1.2 billion US Dollar in 2006.

Therefore the influence of the agreement needs to be put into perspective as it draws mainly on one sector that has been given an extraordinary access to the US textile market.

Joining the WTO on the other hand did not show significantly in the data. This may arise due to the fact that gains from a WTO membership might be seen more in a long term perspective as they can entail a rather lengthy period of adjustment, and are therefore not captured by our model.
The GAFTA agreement shows that members of this agreement have been able to export more to Jordan than before the agreement went into force. Jordan could not realize increased exports. This could also point to supply side constraints. Also complementary trade structures can be critical for carrying out trade gains. This might also apply for Singapore which has ratified an agreement in 2003, as it seems not clear at the outset how trade gains on the export side of Jordan may be realized with Singapore. However a deeper analysis would be needed to determine which factors can actually account for these results.

4. Conclusions and Policy Implications

Efforts have been made in the past in Jordan to open up the economy towards more trade. This is especially the case for the opening up phase that Jordan is going through since the late 1990s. Since then some six free trade agreements have been ratified and put into force.
It therefore seems that an outward and export oriented strategy is pursued by policy makers in Jordan.\textsuperscript{16}

In our paper we analyze the impact of the most influential FTAs, i.e. the EU-Jordan Association Agreement, the US-Jordan Agreement, the FTA with the EFTA and another FTA with Singapore. As pointed out in the beginning to our knowledge no ex-post assessment has been made evaluating these efforts. Therefore it is most interesting to see if and when which efforts are beginning to take effect.

The results of our investigation show, that the results of opening up in the form of FTAs can be manifold and require thoughtful handling. A simple strategy that opening up will pay off in terms of increasing trade flows eventually cannot be supported. Rather we show the importance of beforehand caution when FTAs are ratified.

Potentially promising FTAs can yield rather low increases in overall trade performance if certain sectors are left out or if the national industry cannot meet the new borne demand or is caught off hand. Turning to our empirical results, we find that some agreements do indeed significantly alter trade from the Jordan perspective. This however did not always turn out as was wished for or expected. The EU-Jordan Association Agreement for example has been expected to be very valuable in terms of export performance. We found however, that this agreement did not have any significant influence in total trade, export or import performance. The US agreement on the other hand turned out to be very prosperous regarding a particular sector, i.e. the textile sector.

As a result of our analysis, policy makers should especially take into account, needs and potential that are given by the supply side. Competitiveness, (national) market size and a disadvantageous export structure can hinder or prohibit a country from reaping the possible benefits of trade liberalization. However, even if only unidirectional agreements are put into force they might still lead to spill over effects in other sectors. We have not addressed these issues in this study and leave this open for future research. This will help to point out more precisely which fields need to be tackled to get the desired outcome. Giving out reasonable policy recommendation without further research might lead to adverse results. Therefore our results should be handled with care and require careful interpretation.

\textsuperscript{16} For more detailed information on trade and economic agreements of Jordan see Ministry of Industry and Trade (2008).
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Appendix A: Definition of Variables and Data Sources

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Trade</td>
<td>Calculated as the sum of exports and imports</td>
<td>Comtrade Database and MIT</td>
</tr>
<tr>
<td>Exports</td>
<td>Aggregated total exports of Jordan in nominal current Dollar</td>
<td>Comtrade Database and MIT</td>
</tr>
<tr>
<td>Imports</td>
<td>Aggregated total imports to Jordan in nominal current Dollar</td>
<td>Comtrade Database and MIT</td>
</tr>
<tr>
<td>GDP Jordan</td>
<td>GDP of Jordan measured in nominal current Dollar For 2007, projections have been used</td>
<td>World Development Indicators (2007); World Economic Outlook</td>
</tr>
<tr>
<td>GDP Partner Country</td>
<td>GDP measured in nominal current Dollar For 2007, projections have been used</td>
<td>World Development Indicators (2007); World Economic Outlook</td>
</tr>
<tr>
<td>Common Religion</td>
<td>Index from 0 (0%) to 1 (100%) for distribution of muslim religion</td>
<td>infoplease.com</td>
</tr>
<tr>
<td>Common Border</td>
<td>Common border between source and host country</td>
<td>Dollar &amp; Kraay dataset</td>
</tr>
<tr>
<td>Common Language</td>
<td>Sharing a border with Jordan</td>
<td>Dollar &amp; Kraay dataset</td>
</tr>
<tr>
<td>Distance</td>
<td>Distance in km between source and host country</td>
<td>Own construction</td>
</tr>
<tr>
<td>EU</td>
<td>Dummy Association Agreement with the European Union, 0 or 1</td>
<td>Own construction</td>
</tr>
<tr>
<td>USA</td>
<td>Dummy Free Trade Agreement with the United States, 0 or 1</td>
<td>Own construction</td>
</tr>
<tr>
<td>GAFTA</td>
<td>Dummy Free Trade Agreement with GAFTA member countries, 0 or 1</td>
<td>Own construction</td>
</tr>
<tr>
<td>EFTA</td>
<td>Dummy Free Trade Agreement with EFTA member countries, 0 or 1</td>
<td>Own construction</td>
</tr>
<tr>
<td>Singapore</td>
<td>Dummy Free Trade Agreement with Singapore, 0 or 1</td>
<td>Own construction</td>
</tr>
<tr>
<td>WTO</td>
<td>Dummy WTO accession, 0 or 1</td>
<td>Own construction</td>
</tr>
</tbody>
</table>

Appendix B: Descriptive Statistics for the Main Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>In (Trade)</td>
<td>2920</td>
<td>14.956</td>
<td>3.157</td>
<td>6.190</td>
<td>21.912</td>
</tr>
<tr>
<td>In (Exports)</td>
<td>2399</td>
<td>12.618</td>
<td>4.828</td>
<td>0</td>
<td>20.970</td>
</tr>
<tr>
<td>In (Imports)</td>
<td>2654</td>
<td>14.832</td>
<td>3.097</td>
<td>3.970</td>
<td>21.798</td>
</tr>
<tr>
<td>In (GDP Jordan)</td>
<td>3433</td>
<td>22.657</td>
<td>2.052</td>
<td>22.115</td>
<td>23.483</td>
</tr>
<tr>
<td>In (GDP Partner Country)</td>
<td>3888</td>
<td>23.843</td>
<td>0.375</td>
<td>18.035</td>
<td>30.256</td>
</tr>
<tr>
<td>Common Religion</td>
<td>3888</td>
<td>0.283</td>
<td>0.380</td>
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<td>1</td>
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<tr>
<td>Common Border</td>
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<td>0.164</td>
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<td>1</td>
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<tr>
<td>Common Language</td>
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<td>0.153</td>
<td>0.360</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>In (Distance)</td>
<td>3888</td>
<td>8.262</td>
<td>0.852</td>
<td>4.718</td>
<td>9.692</td>
</tr>
</tbody>
</table>
Appendix C: Country Sample

Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belarus, Belgium, Bolivia, Bosnia Herzegovina, Brazil, Brunei Darussalam, Bulgaria, Cambodia, Cameroon, Canada, Chad, Chile, China, China, Hong Kong SAR, Colombia, Costa Rica, Côte d'Ivoire, Croatia, Cuba, Cyprus, Czech Republic., Democratic People's Republic of Korea, Denmark, Djibouti, Dominican Republic., Ecuador, Egypt, El Salvador, Eritrea, Estonia, Ethiopia, Finland, France, Gabon, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Kazakhstan, Kenya, Kuwait, Kyrgyzstan, Latvia, Lebanon, Libya, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Morocco, Mozambique, Myanmar, Namibia, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Republic of Korea, Republic of Moldova, Romania, Russian Federation, Rwanda, Saudi Arabia, Senegal, Serbia and Montenegro, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, Somalia, South Africa, Spain, Sri Lanka, Sudan, Sweden, Switzerland, Syria, Tajikistan, TFYR of Macedonia, Thailand, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United Republic of Tanzania, Uruguay, USA, Uzbekistan, Venezuela, Viet Nam, Yemen, Zambia, Zimbabwe