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Abstract

This paper diagnoses exports determinants for Syria between 1995 and 2010 using a gravity model applying Heckman's two-step approaches with Least Squared Dummies Variables. The model analyzes total and manufacturing exports separately. In addition to the standard explanatory variables, the gravity model is augmented with the nominal effective exchange rate and institutional performance variables. The results show the importance of a relative improvement in Syrian institutions to increase exports. Furthermore, the paper estimates an index that identifies countries with a high potential demand for Syrian products. Finally, the gravity model is used to simulate the impact of the ongoing conflict in Syria on the potential exports; the results show that sanctions and the deterioration in institutional factors are expected to have reduced Syria's export potential by more than 70%, which might lead to a complete collapse of the economy in the short term.

JEL Classification: F10, F17

Keywords: Trade Determinants, Syria, Gravity Model, Syrian Crisis

ملخص

تشخص هذه الورقة محددات الصادرات لسوريا بين عامي 1995 و 2010 باستخدام نموذج الجاذبية وبتطبيق نهج هيكمان من خطوتين مع تربيع المتغيرات. هذا النموذج يحلل مجموع الصادرات والتصنيع بشكل منفصل. بالإضافة إلى المتغيرات التفسيرية القياسية، ويجري تضخيم نموذج الجاذبية مع سعر الصرف الفعلي الاسمي ومتغيرات الأداء المؤسسي. تظهر النتائج أهمية وجود تحسن نسبي في المؤسسات السورية إلى زيادة الصادرات. وعلاوة على ذلك، تشير الورقة الى تقديرات فهرس يحدد البلدان التي لديها الطلب العالى المحتمل للمنتجات السورية. وأخيرا، يتم استخدام نموذج الجاذبية لمحاكاة تأثير الصراع الدائر في سوريا على الصادرات المحتملة؛ وتظهر النتائج أنه من المتوقع أن تنخفض إمكانات التصدير فى سوريا بأكثر من 70٪ بسبب العقوبات والتدهور في العوامل المؤسسية، والتي قد تؤدي إلى انهيار كامل للاقتصاد على المدى القصير.

1. Introduction

Different theoretical concepts have been used to analyze the importance of trade in the development process. The neoclassical school of growth emphasizes the key role of globalization and openness in accelerating the development process and increasing economic growth (Sachs and Warner 1997; Thirlwall 1997). It shows that openness leads countries to specialize in specific activities which positively affect the level of productivity and the products' quality. This trend is mainly significant in countries specializing in manufacturing and hi-tech products (Temple 1999). Rodrik (1999) shows that openness functions better when there are good internal conditions such as advanced industrial policies and effective institutions.

Other researchers mention that non-traditional national exports with potential comparative advantages need to be supported by industrial policies. Ha-Joon (2009) concludes that an improvement in external trade with an impact on economic growth requires applying policies related to trade liberalization, export subsidies, and infant industry protection, taking into account the appropriate time horizon for using each one of these policies.

The Syrian economy has achieved relatively high economic growth rates, exceeding 5% on average, during the last decade. At the same time, the Syrian economy had been facing a reduction in oil production—the main source of public revenues and exports—accompanied by an increase in local demand on oil derivatives. In order to compensate for the sharp reduction in oil exports, the government encouraged manufacturing exports. As a result, Syria's export structure became more diversified before the start of the conflict. Moreover, several market-oriented policies were introduced to mitigate restrictions on trade, and to provide support to exporting companies. However, the production process suffered from poor institutional performance including the absence of a clear vision of reform, the high level of corruption, the lack of accountability, and low government efficiency (PICC 2011). Syria had no clear strategy on how to either deepen trade integration with the rest of the world or benefit from it. The actual policies seemed to have been primarily motivated by short-term reactions to changes in national and international markets and by political relationships with other countries.

The study attempts to diagnose the determinants of Syrian exports during the period 1995-2010 using a gravity model. The approach has rarely been used in the literature to analyze the trade determinants of an individual transition country with a relatively small market size. The model estimates the effects of external market sizes, geographical distances, cultural differences, and free trade agreements on Syrian exports. It also captures the impact of the nominal effective exchange rate and Syria's relative institutional performance on exports. Based on the estimated results, the study predicts potential destinations for Syrian exports and draws a map of future export markets.

The crisis, which started in March 2011 as a social movement for more civil liberties, justice, and better institutions, has turned into an internal armed conflict damaging significant portions of human, social, and physical capital. The losses in security, human capital, infrastructure, equipment and buildings have been considerable. The conflict has also dramatically affected exports.

In order to understand the impact of the conflict on trade, it is important to clarify and analyze the dynamics of Syrian trade before the ongoing crisis. The analytical results serve as a benchmark to explain the impact of the crisis, and to build policy options for reinvesting in Syria's economy and its export sector once the current conflict is overcome.

The study uses a gravity model to estimate the impact of fundamental factors determining Syria's trade performance; the findings are then used to simulate the impact of the crisis on

Syria's potential exports. The crisis can be modeled by several external shocks including sanctions imposed by main trade partners, loss of Syrian GDP, depreciation of the Syrian pound, and the collapse of Syria's institutional performance.

The paper begins with an overview of the Syrian trade regime and performance between 2000 and 2010 including a descriptive analysis of the trade balance and the evolution of main trade indicators between 2005 and 2010. Section two covers the gravity model's theoretical background, model specifications and results. Section three identifies the potential importers of Syrian products. Section four simulates the crisis' impact on Syrian potential exports. Section five concludes and provides policy recommendations based on the empirical findings.

2. Overview of Trade in Syria 2000-2010

The last decade witnessed a dramatic change in the trade of goods and services in Syria during a transitional period towards more market oriented policies. Improving the country's competitiveness was one of the main goals of the development strategy to integrate Syria into the global economy. The high dependency on exporting raw materials during the 1990s has decreased mainly due to the reduction of oil production, and the increase in non-oil exports.

2.1 Trade balance

Economic growth in Syria was about 5% on average during the last decade, and non-oil exports improved substantially. However, shortcomings in the business environment raised questions regarding the sustainability of this improvement. The deficit in the trade balance of goods started to increase in 2007 despite the fast growth of non-oil exports. This deficit was mainly due to the reduction of crude oil exports in addition to the high growth of imported merchandised goods.

Figure (1) shows a deficit in the trade balance since 2004 which was affected by the considerable decrease in public sector oil exports accompanied with the increase in private sector imports. The private sector trade balance has been negative since 2000 and reached the highest deficit in 2010. In addition, the trade balance as a percentage of GDP in current prices showed a surplus between 2000 and 2004, which then turned into a deficit that reached a peak of 9% in 2009.

Syria's export growth rate had increased steadily between 2005 and 2008 to reach its peak in 2008 at 22%. Since 2009 and thereafter, this rate witnessed a sharp decrease mainly due to the reduction in oil prices. The share of oil in total exports declined from 75.3% in 2000 to 45.9% in 2010. The decline also resulted from an increase in non-oil exports which benefited from the enacting of several free trade agreements particularly the Great Arab Free Trade Agreement (GAFTA).

Statistics show that raw materials' share of total exports decreased from about 80% in 2000 to less than 50% in 2010; this share was replaced by semi-manufactured and manufactured goods. Similarly, the final consumption goods' exports increased from about 10% in 2000 to more than 30% in 2010 reflecting a more diversified export basket. In terms of imports, statistics show that the share of intermediate goods in total imports had increased; whereas, the share of capital assets had decreased which might indicate that the Syrian economy had started to specialize in services and light industries.

During this period, the main destinations for Syrian exports were the European Union and Arab countries. It is worth noting that there was a remarkable increase in trade with Arab countries as a percentage of the total volume of national trade between 2000 and 2010. This can be explained by bilateral and regional trade agreements with Arab countries (mainly GAFTA). At the same time, the share of trade with the EU countries declined.

2.2 Trade Indicators 2005-2010

Trade indicators in Syria suggest notable improvements in the diversifications of exports and terms of trade between 2005 and 2010. The revealed comparative advantage index showed Syria to have advantages in goods other than raw materials.

Table (1) shows that Syrian exports had become more diversified between 2005 and 2010; the Hirschman index gradually decreased during this period from 0.69 in 2005 to 0.51 in 2010. The Export Concentration (diversification) index shows a similar trend; Syrian exports became less concentrated during this period. The Terms of Trade index increased from about 87 in 2005 to 109 in 2009 and declined to 89 in 2010; this reflects that Syrian export diversified towards relatively higher value-added goods. The Revealed Comparative Advantage (RCA) index for the Syrian exports shows that Syria has a comparative advantage in primary goods such as fuel and cotton, however, the RCA is decreasing for both goods. Although Syria has no clear comparative advantage in exporting several manufacturing product classes (other than raw materials) (RCA is less than 1), it is noticeable that Syria's RCA for some of these goods had witnessed remarkable improvements. For instance, the RCA for "Pharmaceutical Products" increased from 0.16 in 2005 to 0.24 in 2010 and reached a peak of 0,68 in 2009. Assuming that this improvement had continued, Syria might have gained a comparative advantage in this industry in the future.

The Cosine Index computes to what extent the commodity structure of a certain exporting country matches the commodity structure of an importing country. A value of zero implies that there is no complementarity, while a value of one indicates that there is a perfect complementarity.

Table 2 shows that Syrian exports match the commodity import structure of the USA, the EU, and China. Whereas the index had improved over time, the complementary in trade structures declined with respect to Russia and Iran (Mehchy et al. 2012).

The improvement in Syria's exports structure and diversification during the last decade raises questions about the sustainability of exports growth as well as the role of institutions and public policies. The next section uses gravity model techniques to identify the main determinants of Syrian exports in general and manufacturing exports in particular, in addition to simulating the impact of the crisis on potential exports.

3. Trade Determinants in Syria and the Crisis' Impact using a Gravity Model

The ongoing crisis in Syria, which started in March 2011, has escalated to an internal armed conflict with disastrous impacts on the Syrian economy and society. The crisis has been accompanied by wide-ranging sanctions on the Syrian economy implemented by different international parties. As a result, Syria's economic performance deteriorated significantly, and exports dropped sharply.

First, the gravity model identifies the determinants of Syrian exports during the period 1995-2010, including the impact of the regional trade agreements, international demand, geographical distances, cultural differences, the exchange rate, and institutional performance. Second, the model reveals potential export destinations for Syrian products highlighting potential future markets.

The gravity model is used to simulate the impact of the crisis on exports through the implementation of different shocks related to the current crisis: sanctions of main trade partners, reduction in local GDP, depreciation of the exchange rate, and a collapse in institutional performance.

3.1 Theoretical background

Gravity trade models are based on Newton's law of gravitational force. Applying this law on trade, this model considers that trade flow between two countries is determined by their population and their GDP as well as the distance between them as a proxy for transaction costs. The model has several applications including the analysis of migration and foreign direct investment, and it is considered to be one of the most applied tools to analyze and describe international trade flows under different circumstances.

The literature includes many empirical applications of the gravity model to analyze international and bilateral trade flows. These have contributed positively to improvements in the model. The general equation of the gravity model states that the volume of exports between two countries is a function of their GDP, population, and geographical distance in addition to other factors that include, for example, regional trade agreements, mutual language, and mutual religion.

The gravity model was first used by Tinbergen in 1962 to analyze international trade flows between countries, yet, Tinbergen's equation did not specify price effects and ignored the dynamics of trade flows (Tinbergen 1962). Thus, it imposes unidentified model relations which have no theoretical justifications. To overcome this, the gravity equation has been derived based on a demand function with a constant elasticity of substitution; thereby each country produces and sells goods in the international markets. These goods are differentiated from those products of other countries (Anderson 1979). Thereafter, the supply side factors have been included in the gravity model whereby the price effect is considered to be an important supply side variable to be added to the equation (Bergstrand 1985). To provide another theoretical justification for the gravity model, the concept of monopolistic competition has been adopted by the model. This approach replaces the product differentiation by country of origin with product differentiation among firms that produce traded goods (Helpman 1987).

In 1998, Deardorff highlighted the compatibility of the gravity equation with different forms of Heckscher-Ohlin models and the need for empirical evidence to distinguish between the proposed theoretical bases of different gravity models. Empirical evidence shows that without complete specialization by countries in specific goods, bilateral trade tends to be ambiguous (Deardorff 1998). However, one can distinguish between perfect and imperfect specialization theories by examining the elasticity of trade between two countries with respect to importer and exporter incomes (Feenstra et al. 2001). Larger exporter elasticity is predicted in models with free entries and monopolistic competition, whereas, restricted entries lead to larger importer elasticity. Another theoretical justification for the gravity model is based on trade models that assume firm heterogeneity (Bernard et al. 2007).

Theories deriving gravity models still suffer from several drawbacks, particularly, the lack of ability to justify all empirical variables that influence international trade flows. For instance, the difficulty in explaining the bilateral resistance which refers to the trade obstacles between two countries and the relative weight of these obstacles with respect to all other countries (Anderson and Van Wincoop 2003). To partially overcome this issue, researchers should augment variables that could reflect a part of the "bilateral resistance" such as free trade agreements between countries.

Another issue is related to the assumption of firm heterogeneity which implies that only a small number of firms serve international markets and are active only in specific countries (Bernard et al. 2007). In terms of a gravity model, this leads to a matrix of bilateral trade which has many zero entries which may generate a critical selection problem by omitting trade flows with zero values. However, the omission of zero trade flows implies that information on determinants of trade values close to zero is neglected. One approach suggests

replacing the zero values with small constants in order to avoid missing values in the log-model and thereby the loss of a significant number of observations. Another approach to deal with zero trade flows is to apply a Tobit model which replaces some of the unobserved cases for the dependent variables with positive values. But, rounding the trade flows that are below some positive value to zero is not appropriate when applying the widely used COMTRADE database which reports trade flows up to the accuracy of 1 USD (Linders and De Groot 2006).

The Heckman selection model is used extensively in empirical trade applications as it overcomes the issue of zero trade flows. It is worth noting that there are several other techniques to deal with the zero issue including the Poisson Pseudo Maximum Likelihood (PPML). The comparison shows, however, that the PPML does not appropriately estimate the gravity equation when using aggregated data in the presence of unobserved values, in contrast, the two-step Heckman selection model proved to be effective in doing so (Herrera 2010).

3.2 Methodology and data

The study uses an augmented gravity equation which includes fundamental variables (GDP, population, and distance) as well as selected dummy variables to account for other factors that may influence the trade flows between Syria and other countries. The estimated gravity equation includes two additional variables that are considered to be important in the Syrian context: the first one is the nominal effective exchange rate and the second variable is the political risk index which proxies the institutional performance of a country.

A log-linear form is applied which results in estimating the elasticity of bilateral trade with respect to the included variables. The data covers the period between 1995 and 2010. Year dummies are included to capture time shocks that are not explained by other independent variables. The augmented gravity equation for Syrian exports determinants is:

$$\ln X_{ijt} = A + \beta_1 \ln GDP_{jt} + \beta_2 \ln POP_{jt} + \beta_3 \ln DGDP_{ijt} + \beta_4 \ln D_{ij} + \beta_5 \ln NEER_{ijt} + \beta_6 P\_RISK_{ijt} + \beta_7 Lan_{ij} + \beta_8 Rel_{ij} + \beta_9 Col_{ij} + \beta_{10} GAFTA_{jt} + \beta_{11} Tur_j + \beta_{12} EU_{jt} + Years\ Dummies + \varepsilon_{ijt}$$

Where:

- X_{ijt}: the merchandize goods exported from country (i) to country (j) in year (t) in USD
- GDP_{jt}: the GDP in current prices of the importing country (j) in year (t) in USD
- POP_{jt}: the population of the importing country (i) in year (t)
- $DGDP_{ijt}$: the absolute difference between GDP in current prices for country (i) and GDP in current prices for country (j) in year (t) in USD
- D_{ij}: distance between capitals of country (i) and country (j) in Km^2
- $NEER_{ijt}$: the nominal effective exchange rate between country (i) and country (j) in year (t)
- P_RISK_{ijt}: the political risk index for country (i) divided by the political risk index for country (j)
- Lan_{ij}: dummy variable takes 1 if country (i) and country (j) have the same official language, and takes (0) otherwise
- Rel_{ij}: dummy variable takes 1 if country (i) and country (j) have the same official religion, and takes (0) otherwise

- Col_{ij}: dummy variable takes 1 if country (i) and country (j) have the same colonial history, and takes (0) otherwise
- $GAFTA_{jt}$: dummy variable takes 1 if country (j) is member in GAFTA, and takes (0) otherwise
- Tur_j: dummy variable takes 1 if country (i) exports to Turkey, and takes (0) otherwise
- EU_{jt}: dummy variable takes 1 if country (i) exports to European Union countries, and takes (0) otherwise
- Years dummies
- ε_{ijt}: The normal random error term

GDP in current prices: a higher level of GDP in importing countries indicates a higher level of production and that increases the availability of goods to be imported, thus, the related coefficient is expected to be positive.

Population: the estimated coefficient of population for importers is expected to be ambiguous as "economies of scale" could increase imported goods with the increase in population, or the "absorption effect" by which population could have a reversed impact on traded goods. Both *GDP in current prices* and *Population* measuring the size of the imported countries

Differences in GDP: Hecksher-Ohlin theories predict that countries with different levels of GDP will trade more than countries with similar levels of GDP. Yet, Linder hypothesis states that countries with similar levels of GDP per capita will have similar preferences and, thus, will trade more with each other (Batra 1990).

Geographical distance: distance is considered to be a proxy of transport and insurance costs; its estimated coefficient is expected to be negative. However, several studies show that trade cost, in particular the transportation cost, is not only a function of distance, but also a function of public transportation and additional infrastructure variables which should be augmented (Bougheas et al. 1999). Other researchers have developed these variables to come up with a developed infrastructure index to be augmented to the gravity model equation (Martinez-Zarzoso and Nowak-Lehmann 2003).

Nominal effective exchange rate: the depreciation in the nominal effective exchange rate is expected to increase export volume, whereas the appreciation is expected to decrease it.

Political risk index: this index reflects the quality of institutions in a specific country. Several researches show that a better quality of formal institutions tends to increase bilateral trade (de Groot et al. 2003). The study uses the relative political risk index which is the ratio of importers' political risk index over the exporters' one.

Common Language, Religion, and Colonial history: commonality in these indicators between two countries is expected to decrease the cultural differences which, in turn, would increase bilateral trade.

Free trade agreements: these agreements are expected to facilitate bilateral trade between members in such agreements; actually, free trade agreements have a notable positive effect on trade flows (Frankel and Rose 2002). It is worth noting that Syria signed free trade agreements with 17 Arab countries in 2005 and with Turkey in 2007. However, EU countries have been the main destination for Syrian exports during the last three decades.

The model is applied by pooling data of 210 countries between 1995 and 2010. The Political Risk Index, which reflects the institutional differences between countries, covers only 112 countries. It is obtained from the ICRG database; this indicator is a composite of different institutional indicators including corruption, investment profile, government stability, law and

order, internal and external conflicts among others, with different weights for each sub-indicator.

UnctadStat and CEPII are the sources for the other included variables in the gravity equation. The database for UnctadStat provides information on variables for 233 countries; whereas, CEPII database provides data for the remaining variables for 225 countries. Thus, we have to remove 23 countries from the former database, and 15 countries from the latter when pooling the data. Yet, all the removed countries represent a very small share of international trade. Moreover, their trade with Syria is almost negligible during the period under study.

In addition to the Syrian model, the study applies the gravity equation for all countries (the world) including the same variables, yet, removing the dummy variables of EU and Turkey, and adding dummy variables for the partners that are members in MERCOSUR, ASEAN, and SAARC free trade agreements. Producing the trade determinants at the world level helps to identify the importance of the selected variables in determining international trade flows, and to check and highlight potential differences between those and the Syrian model.

The world model analyzes the determinants of trade flows between 89 countries (as exporters) and 210 countries (as importers) between 1995 and 2010. The 89 countries that are included as exporters meet one or more of the following criteria:

- The country's total exports per year is equal to or above 0.2% of total world exports for the period between 1995 and 2010. This covers more than 95% of the total world exports.
- At least 0.1% of the country's annual imports are from Syria for the whole period. This covers approximately 98% of Syria's annual exports each.
- The country is a member in the Arab League (22 countries including Syria).

For the Syrian model, two approaches are conducted to estimate the gravity model. The first is a panel model using Least Squares Dummy Variables (LSDV).[1] The second uses the pooled data and Heckman's selection model approach on both total and manufactured goods.

For the world model, only Heckman's selection model is conducted. As mentioned above, gravity model data faces a major issue in dealing with zero trade flows between countries. Thus, and in order to predict the correlations that produce the zero observations for the dependent variables, the paper applies the two-step Heckman selection model (Heckman 1979) that determines whether or not the analysis includes the actual trade flows. Moreover, the Heckman selection model provides consistent, asymptotically efficient estimates for all the parameters in the model. This approach is explained as follows:

Selection equation: $\pi_{ij} = \alpha 0 + \alpha 1 \ln(GDP_i) + \alpha 2 \ln(POP_i) + \alpha 3 \ln(DGDP_j) + \alpha 5 \ln(D_{ij}) + \ldots\ldots\ldots\ldots + \varepsilon_{ij}$

$r_{ij} = 1$ if $\pi_{ij} > 0$ and $r_{ij} = 0$ if $\pi_{ij} \leq 0$

Regression equation: $\ln(\ddot{X}_{ij}) = \beta 0 + \beta 1 \ln(GDP_i) + \beta 2 \ln(POP_i) + \beta 3 \ln(DGDP_j) + \beta 5 \ln(D_{ij}) + \ldots\ldots\ldots\ldots + \mu_{ij}$

$\ln(X_{ij}) = \ln(\ddot{X}_{ij})$ if $r_{ij} = 1$ and $\ln(X_{ij})$ = unobserved if $r_{ij} = 0$

The selection equation (Probit) aims to determine whether or not there is bilateral trade between country i and country j. The variables included in this equation should at least equal the number of variables in the regression equation (OLS) (Verbeek 2000).

[1] Time dummies have been used as well as the random effects approach instead of fixed effects, since some explanatory variables, like geographical distances and language, are fixed for each of the included countries across time.

The analysis begins with estimating the trade determinants for Syria. After that, the results are compared with the world determinants. The estimation of each model has three sub-models; the first one is the gravity equation without the nominal exchange rate and political risk variables, the second one includes the nominal exchange rate variable, and the third sub-model adds the political risk variable, respectively. Thereafter, the potential Syrian export partners are identified by comparing the actual bilateral exports from Syria in 2010 with the predicted values of these bilateral exports. Finally, the results of the applied gravity model for Syria are used to simulate the impact of the current crisis on Syrian exports.

3.3 Results and Implications

The gravity model is applied for world trade and Syrian levels using the Heckman approach for both manufacturing and total exports.

3.3.1 World Exports Determinants

The results (table 3) show that the GDP of the partner country, which represents the potential demand for exports, has a positive and significant effect on exports which is less than one. Similarly, an increase in the “economic distance" between exporters’ and importers’ GDP leads to an increase in world exports, and this is consistent with Hecksher-Ohlin theories.

The increase in population size of the partner negatively affects the demand on overall world exports; it is negative and significant after controlling for exchange rates and institutions. This supports the absorption assumption that the larger population leads to less exports. As expected, the geographic distance, which is a proxy for transportation costs, negatively affects world exports and the effect is statistically and quantitatively significant.

Having a similar official language, colonial history or official religion has a positive and significant effect on world exports. These variables combined are considered a proxy for countries’ cultures. Thus, a similar or close culture between countries is expected to increase bilateral trade.

In general, free trade agreements have a positive and significant effect on world exports. This effect differs according to the agreements; for instance, being a member in ASEAN and SAARC tends to increase the country imports from the world in all sub-models, whereas, the effect of being a MERCOSUR member on world exports becomes negative and significant after controlling for partners’ institutional variable. Yet, the MERCOSUR effect turns positive when the gravity equation is applied to manufacturing exports only (Annex 1).

In terms of the impact of institutions, the model shows that better institutional quality in exporting countries increases total world exports, whereas, a better institutional quality in importing countries reduces total exported goods from all countries (ceteris paribus). The relative political risk index has a negative and significant effect on total world exports. This means that a relative improvement in the exporters’ political risk index increases world exports, whereas the relative improvement of partners’ institutions decreases the exports of all other countries. This reflects the general direction of exports in the world "North to South exports", since the advanced economies have better institutions, and thus, have a higher probability to export more than the less-developed economies which have a relatively low quality of institutions.

By controlling for importers’ institutions, the nominal effective exchange rate has a negative and significant impact on world exports. In other words, currency depreciation is expected to increase total world exports, as expected. In manufacturing exports, the model shows the same results after controlling for importers’ institutions and for the relative political risk index.

Two points need to be mentioned here. First, these results are qualitatively comparable when applying the model to manufacturing exports. Second, the time dummy variables show a decline in exports over time compared to 1995.

3.3.2 Syrian Total Exports Determinants

Similar to the world model, we apply the Heckman approach[2] to identify Syria's export determinants (table 4). The results show that partners' GDPs, which reflect the potential international demand for Syrian goods, has a positive and significant effect on exports which is close to one. These results may contribute to the diversification of Syrian exports destinations to include more emerging economies which have achieved notable economic growth.

Unlike the world model, the population size of the partner country increases the demand for total Syrian exports positively and significantly. The effect of "economic distance", which represents the absolute difference between Syria's GDP and other world countries' GDPs, is positive and significant (after controlling for institutions). This finding is similar to the world model, and consistent with Hecksher-Ohlin theories. Moreover, and as expected, the geographic distance affects negatively and significantly Syria's total exports. As in the world model, the order of magnitude of the coefficient is large compared to other variables.

Commonality in culture and heritage between countries effects positively and significantly total Syrian exports, since the model shows that the same official language and religion have a notable impact on total Syrian exports. The results of such correlations are evident with respect to Iran, Turkey, and Arab countries which have several cultural commonalities with Syria. The same colonial history seems to play a significant role in increasing the probability of a country to import from Syria. For instance, countries such as Algeria, Tunisia, and Morocco that engage in strong commercial relationships with Syria have a similar colonial history.

The GAFTA has a positive and significant impact on Syrian exports; apparently this agreement has played an important role in shifting Syria's exports from oil towards manufacturing exports. Similarly, the free trade agreement with Turkey has positive effects on Syrian total exports. Although Syria has not signed an official free trade agreement with the EU, there were several agreements with countries from the EU in order to facilitate trade flows with Syria. Yet, most of the Syrian exports to European countries are raw materials.

In terms of institutions, the model shows that Syrian exports are negatively affected by the partner country's quality of institutions, and positively affected by Syria's own quality of institutions. This could be explained by the fact that Syria's main partners used to be EU countries that have a relatively low political risk, yet, and after the reduction in oil exports, Syria has increased its exports to GAFTA countries that have relatively high political risk. The results show that the relative institutional development in Syria increased its exports.

In general, Syrian total exports are expected to increase with a depreciation of the currency. However, controlling for institutions in the model makes the impact of the nominal exchange rate insignificant, unlike the correlation at the world exports level.

3.3.3 Syrian Manufacturing Exports Determinants

The model[3] using manufacturing trade only differs from the model for total exports in several ways (table 4). One of the main differences is the fact that the free trade agreement with Turkey plays no significant role in increasing the Syria's probability to export manufactured goods because Turkey imports mainly raw materials from Syria. "Distance" has a more

[2] LSDV approach results are reported in Annex (2)
[3] LSDV approach results are reported in Annex (3)

negative effect on manufactured exports, which could be explain by the preferences given to oil and raw materials exports in terms of transportation and insurance by multi-national companies. Currency depreciation has a higher positive effect on manufacturing exports than on total exports before controlling for institutions, which may be due to the low elasticity of the price of imported raw materials in general and oil in particular.

3.4 Potential Exports Destinations

The predicted values of bilateral exports are estimated based on the exports model for the total Syrian economy using the Heckman approach and controlling for the nominal exchange rate and institutions. Thereafter, for each export destination, the ratio of the actual Syrian exports in 2010 (A) over potential exports (P) to a given country as predicted by the model, is used to identify potential export markets for Syria. In case this ratio (A/P) is less than one for an export destination, actual Syrian exports to that country are lower than predicted by fundamental factors in the model. In other words, Syria is under-exporting to that country and there are opportunities for Syria to expand its exports to this country.[4] If this ratio is greater than one, Syria's actual exports to that country exceed the potential exports according to the model (Annex 4).

Figure (2) shows that the 33 markets with good export opportunities for Syrian products (as predicted by the model) are mainly European (11 cases) and MENA countries (10 cases). Moreover, Syria is under-exporting to the following Asian countries: the Philippines, China, Pakistan, Indonesia, and Malaysia. Thus, Syria should consider EU and MENA countries as strategic partners, and it may benefit from promoting trade with new partners in Asia, for instance, through bilateral trade agreements with these countries.

Figure (3) shows that actual Syrian exports to 29 countries exceed potential exports predicted by the model. Most of these countries are from the EU and the Arab region, in addition to Russia, the USA, and countries from South America. These are usually countries that import oil from Syria such as Austria, the Netherlands, or the Republic of Korea. In addition, it includes countries that have a particular preference to import from Syria due to special political circumstances such as Iraq. Most of these cases may not be sustainable since they depend on specific goods and temporary political circumstances.

In order to build beneficial bilateral trade relationships, Syria needs to concentrate more on the markets with a potential to increase bilateral trade. Partnerships with other countries in terms of trade should be based on Syria's strategic economic vision and not on political preferences that may not be sustainable.

3.5 The impact of the crisis on Syrian exports

The study estimates the impact of the crisis on Syria's export potential by simulating the impact of several different shocks on predicted exports according to the model in 2010. These export values are compared with the predicted values obtained in 2010 without these shocks. The study attempts to include shocks that reflect the changes taking place in the real sector over the last two years.

3.5.1 Contraction of GDP in current USD

The paper estimates a total negative impact on GDP in current USD of 26%, derived from a 15% reduction in real GDP during the last two years, a 40% increase of the GDP price deflator, and a depreciation of the Syrian Pound from 46.5 per USD to 75 per USD. The simulated results show a reduction in the potential of total Syrian exports by 3.2%.

[4] Note that we neglect partner countries that are predicted to import Syrian goods with values of less than 1 million USD.

3.5.2 Imposed sanctions

After the crisis started in 2011, many countries imposed political and economic sanctions on Syria. The model estimates the impact of these sanctions on total Syrian exports by reversing the positive effect of the preferential trade agreements with the key export partners. This includes the cancelation of GAFTA which reduced Syria's exports to all Arab countries except Iraq, Lebanon, and Sudan. This shock reduces potential Syrian exports by 21.8%. Similarly, the impact of the cancelation of the preferential trade agreements with EU countries leads to a reduction of 10.4% in Syrian potential exports while the cancelation of the free trade agreement with Turkey causes a decline of 10.7% in Syrian potential exports. In total, the imposed sanctions on Syria have reduced potential exports by 42.9%, which implies a negative impact on the Syrian economy in the short, medium, and long terms.

3.5.3 Currency depreciation

The Syrian Pound is assumed to lose about 60% of its value which is based on the official exchange rate published by the Central Bank of Syria. The depreciation of the Syrian Pound increases the predicted potential exports only by 0.4%.

3.5.4 Deterioration in institutions quality

The crisis in Syria is having a very strong and negative impact on institutions. This needs to be reflected in the political risk index which consists of 12 sub-indicators. Almost all of these usually deteriorate substantially in the case of an internal armed conflict. Some of these sub-indicators are government stability, socioeconomic conditions, investment profile, internal conflict, religious tensions, and law and order. The index ranges between 0 and 100, where 0 is the highest political risk. For Syria, this index declined from 70 in 1995 to 58 in 2010. To capture the crisis impact on institutions, the study assumes that the index declines to a level of 49 which is the maximum value in the very high risk category. The total impact of this shock on Syrian exports is enormous; it reduces potential exports by 28.7 %.

Figure (4) shows that the accumulated loss in Syria's export potential due to the current crisis is about 74%. In other words, the model estimates that Syria's predicted export values during the crisis amount to only 26% relative to predicted exports before the crisis. The estimates imply that a continuation of the crisis will completely erase Syria's export sector.

4. Conclusion and Policy Implications

Syrian non-oil exports had achieved high growth rates during the last decade, which contributed to economic growth and to a shift in the structure of exports towards more diversified and higher value added goods. Arab countries had replaced European countries as the main destination of Syrian exports.

The gravity model shows the importance of a partner country's market size in terms of GDP and population in predicting Syrian exports. The difference between Syrian GDP and that of its partners affects the exports positively, whereas, geographic distance plays an important and negative role in determining Syrian export destinations. This means that neighboring regions such as MENA and the EU are important markets for Syrian exports. Cultural similarities, as expected, have a positive and economically significant effect on Syrian potential exports. Trade agreements with the Arab region (GAFTA), the EU countries, and Turkey also have a positive impact on Syrian exports. Changes in the nominal effective exchange rate do not significantly affect Syrian exports given that the Syrian pound had been relatively stable during the period 1995-2010. Of the included variables, the relative institutional performance for Syria has the highest effect on Syrian potential exports.

In terms of potential trading partners, many countries in the Arab region and the EU are strong potential importers of Syrian products. Thus, despite the relatively high levels of trade

with Arab and EU countries, there is still room for expansion. Besides the traditional markets, Asian countries such as the Philippine or Indonesia should also be considered.

The crisis decreases Syria's export potential substantially. Total exports are predicted to amount to only 26% of their potential by the end of 2012. This loss is an accumulation of several factors including a reduction in nominal GDP (-3.2%), imposed international sanctions (-42.9%), a depreciation of the Syrian pound (0.4%), and a deterioration in the relative institutional quality (-28.7 %).

The continuation of the crisis into 2013 is expected to lead to a complete collapse of the Syrian economy in general and the trade sector in particular. Thus, all efforts should be allocated to overcome the crisis and to work on building different and more efficient institutions which prove to play an important role in re-entering the "lost markets" as well as in regaining the trust of international and national investors and trading partners in the Syrian economy.

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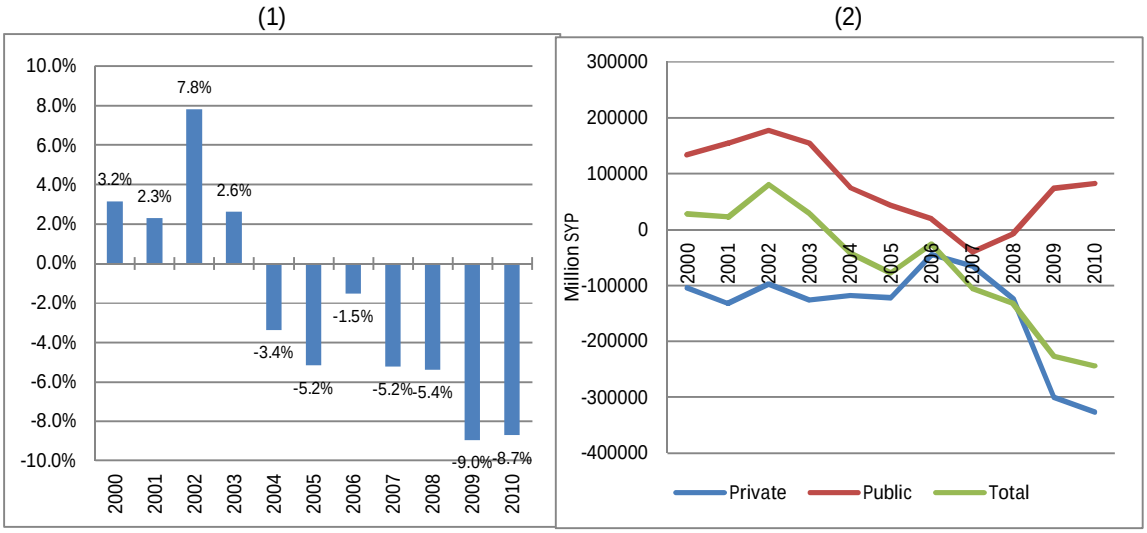
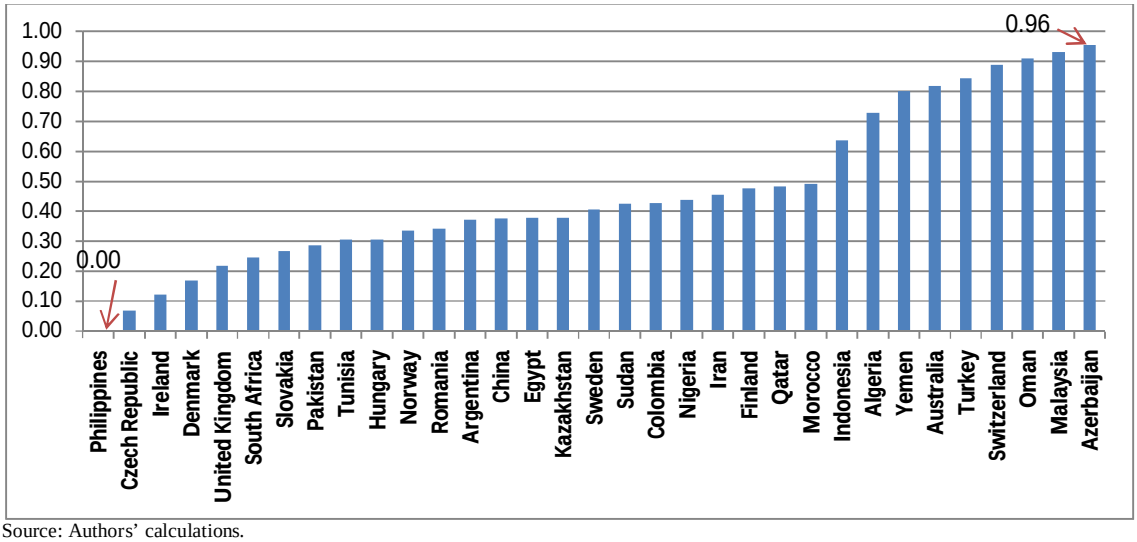
Figure 1: Trade Balance Surplus/Deficit as a Percentage of Current GDP between 2000 and 2010 (1), Trade Balance by Sector in Million SYP between 2000 and 2010 (2)



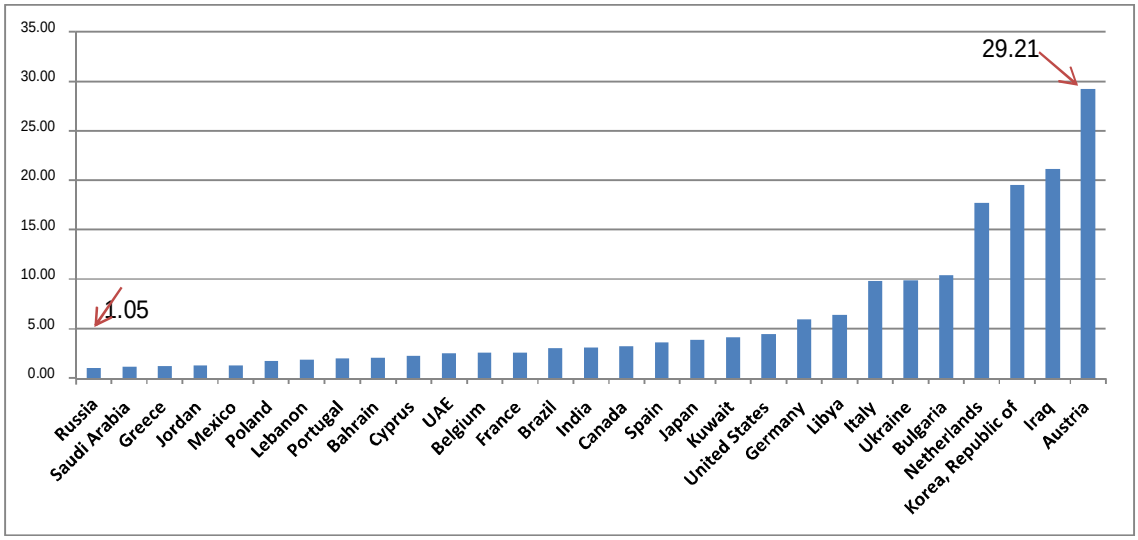
Source: CBS data 2000-2010.

Figure 2: Potential Exports Destinations for Syria



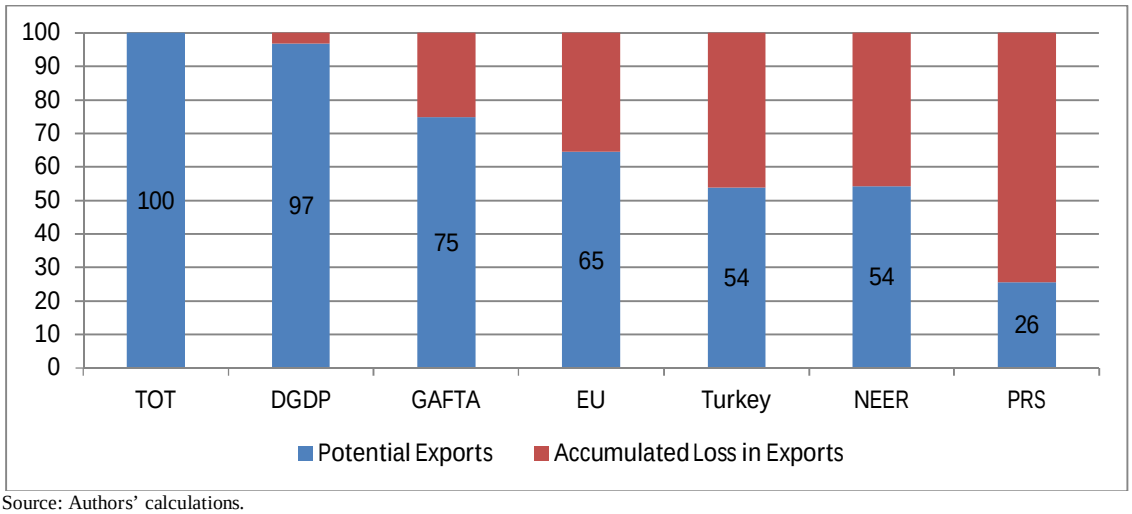
Source: Authors' calculations.

Figure 3: Exceeding Potential Exports



Source: Authors' calculations.

Figure 4: Crisis Impact on Syria Potential Exports



Source: Authors' calculations.

Table 1: Syria's Trade Indicators (2005 – 2010)

	2005	2006	2007	2008	2009	2010
Hirschman	0.69	0.41	0.43	0.41	0.40	0.51
Export Concentration	0.71	0.59	0.63	0.56	0.60	0.63
Terms of Trade (TOT)	86.64	81.21	104.18	106.20	109.13	89.34
RCA						
Fuel	5.43	2.65	3.10	2.28	2.73	3.46
Cotton	10.35	9.12	8.04	16.00	7.67	8.55
Pharmaceutical Products	0.16	0.22	0.35	0.50	0.68	0.24

Note: All indicators are based on UN COMTRADE (2010) (World Trade Integrated Solution - WITS) except the "Terms of Trade" which is based on the UNCTAD(2010).

Table2: Cosine Index (2005 and 2010)

	USA	EU	China	Russia	Iran
2005	0.61	0.5	0.34	0.09	0.33
2010	0.66	0.62	0.51	0.13	0.12

Source: Researchers' calculation based on WITS for world countries and CBS (2000-2010) data for Syria.

Table 3: World Total Exports Determinants

lexport	**(1)**	**(2)**	**(3)**	**(4)**
lgdp_p	0.653***	0.671***	0.627***	0.807***
	(0.004)	(0.004)	(0.008)	(0.007)
lpop_p	-0.004	-0.018***	-0.014	-0.135***
	(0.004)	(0.004)	(0.008)	(0.007)
Ldist	-1.061***	-1.058***	-1.037***	-1.008***
	(0.008)	(0.008)	(0.010)	(0.009)
Ldgdp	0.767***	0.762***	0.810***	0.723***
	(0.006)	(0.005)	(0.008)	(0.005)
common official language	0.611***	0.599***	0.619***	0.910***
	(0.019)	(0.018)	(0.025)	(0.024)
common colonial history	0.445***	0.446***	0.275***	0.467***
	(0.024)	(0.024)	(0.036)	(0.034)
common religion	0.165***	0.187***	0.486***	0.250***
	(0.013)	(0.013)	(0.019)	(0.017)
gafta_p	0.588***	0.587***	0.604***	0.409***
	(0.023)	(0.023)	(0.026)	(0.024)
mercosur_p	0.052	0.031	-0.137***	-0.125***
	(0.040)	(0.040)	(0.041)	(0.039)
asean_p	0.943***	0.954***	1.210***	1.202***
	(0.028)	(0.028)	(0.036)	(0.033)
saarc_p	0.083**	0.104***	0.375***	0.189***
	(0.034)	(0.034)	(0.055)	(0.052)
leer_05		-0.070***	-0.163***	-0.011
		(0.008)	(0.012)	(0.013)
pol_risk_p			-0.005***	
			(0.001)	
pol_px				-1.604***
				(0.028)
_cons	-4.948***	-4.962***	-5.091***	-3.131***
	(0.107)	(0.103)	(0.149)	(0.099)
Number of observations	278,514	268,648	147,163	126,732
Rho	-0.384	-0.383	-0.014	-0.510

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors in brackets

Table 4: Syrian Total Exports Determinants

Lexport	**(1)**	**(2)**	**(3)**	**(4)**
lgdp_p	1.116***	1.131***	0.921***	0.923***
	(0.071)	(0.071)	(0.091)	(0.091)
lpop_p	0.315***	0.294***	0.166***	0.159***
	(0.041)	(0.043)	(0.058)	(0.058)
Ldist	-1.195***	-1.185***	-1.084***	-1.083***
	(0.065)	(0.066)	(0.069)	(0.069)
Ldgdp	-0.049	-0.037	0.161***	0.163***
	(0.055)	(0.056)	(0.058)	(0.058)
common official language	2.194***	2.212***	2.781***	2.796***
	(0.243)	(0.245)	(0.331)	(0.331)
common colonial history	0.047	0.081	0.505**	0.514**
	(0.149)	(0.149)	(0.209)	(0.209)
common religion	0.808***	0.848***	0.311	0.309
	(0.151)	(0.152)	(0.206)	(0.206)
gafta_p	0.866***	0.866***	0.764**	0.748**
	(0.267)	(0.269)	(0.314)	(0.313)
tur_p	1.506***	1.446***	1.892***	1.890***
	(0.556)	(0.558)	(0.536)	(0.536)
eu_p	1.009***	1.048***	1.150***	1.154***
	(0.162)	(0.162)	(0.165)	(0.165)
leer_05		-0.120*	0.003	-0.009
		(0.070)	(0.124)	(0.124)
pol_risk_p			-0.026***	
			(0.005)	
pol_px				-1.660***
				(0.341)
_cons	-6.732***	-6.962***	-3.675***	-3.807***
	(0.555)	(0.552)	(0.708)	(0.689)
Number of observations	3,159	3,118	1,706	1,706
Rho	0.718	0.759	0.036	0.032

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors in brackets

Table 5: Syrian Manufacturing Exports Determinants

lexport	**(1)**	**(2)**	**(3)**	**(4)**
lgdp_p	0.865***	0.880***	0.694***	0.700***
	(0.071)	(0.071)	(0.081)	(0.081)
lpop_p	0.273***	0.243***	0.197***	0.187***
	(0.039)	(0.039)	(0.054)	(0.054)
ldist	-1.486***	-1.497***	-1.304***	-1.302***
	(0.066)	(0.066)	(0.066)	(0.066)
ldgdp	0.024	0.043	0.197***	0.199***
	(0.050)	(0.051)	(0.050)	(0.050)
common official language	1.502***	1.495***	2.220***	2.218***
	(0.237)	(0.239)	(0.304)	(0.303)
common colonial history	0.495***	0.549***	1.015***	1.027***
	(0.148)	(0.148)	(0.195)	(0.195)
common religion	1.199***	1.235***	1.082***	1.077***
	(0.153)	(0.153)	(0.197)	(0.197)
gafta_p	1.083***	1.076***	0.702**	0.704**
	(0.259)	(0.260)	(0.287)	(0.286)
tur_p	-0.432	-0.572	-0.232	-0.238
	(0.542)	(0.542)	(0.492)	(0.492)
eu_p	1.043***	1.058***	1.167***	1.175***
	(0.158)	(0.157)	(0.150)	(0.150)
leer_05		-0.177**	-0.138	-0.143
		(0.069)	(0.111)	(0.111)
pol_risk_p			-0.009*	
			(0.005)	
pol_px				-0.681**
				(0.317)
_cons	-5.787***	-5.978***	-4.676***	-4.637***
	(0.595)	(0.592)	(0.713)	(0.691)
Number of observations	3,159	3,118	1,706	1,706
Rho	0.863	0.888	0.426	0.422

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors in brackets

Annex 1. World Manufacturing Exports Determinants (Heckman two-step approach)

Lexport	**(1)**	**(2)**	**(3)**	**(4)**
lgdp_p	0.556***	0.582***	0.562***	0.828***
	(0.004)	(0.005)	(0.009)	(0.008)
lpop_p	0.006	-0.010**	-0.055***	-0.248***
	(0.005)	(0.005)	(0.009)	(0.008)
Ldist	-1.098***	-1.093***	-1.159***	-1.148***
	(0.009)	(0.009)	(0.011)	(0.009)
Ldgdp	0.786***	0.784***	0.938***	0.829***
	(0.007)	(0.006)	(0.009)	(0.006)
common official language	0.497***	0.486***	0.482***	0.891***
	(0.020)	(0.020)	(0.028)	(0.025)
common colonial history	0.327***	0.337***	0.040	0.355***
	(0.026)	(0.026)	(0.040)	(0.037)
common religion	0.169***	0.200***	0.625***	0.378***
	(0.014)	(0.014)	(0.021)	(0.018)
gafta_p	0.583***	0.574***	0.638***	0.410***
	(0.024)	(0.024)	(0.029)	(0.025)
mercosur_p	0.302***	0.271***	0.065	0.058
	(0.043)	(0.043)	(0.046)	(0.042)
asean_p	0.959***	0.956***	1.317***	1.366***
	(0.031)	(0.030)	(0.039)	(0.036)
saarc_p	0.019	0.038	0.440***	0.225***
	(0.036)	(0.036)	(0.061)	(0.055)
leer_05		-0.105***	-0.229***	-0.046***
		(0.008)	(0.013)	(0.014)
pol_risk_p			-0.010***	
			(0.001)	
pol_px				-2.810***
				(0.034)
_cons	-4.796***	-4.912***	-5.979***	-3.131***
	(0.124)	(0.120)	(0.174)	(0.107)
Number of observations	278,514	268,648	147,163	126,732
Rho	-0.356	-0.351	0.371	0.116

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors in brackets

Annex 2. Syrian Total Exports Determinants using LSDV Approach

	(1)	(2)	(3)	(4)
lgdp_p	0.729***	0.710***	0.804***	0.820***
	(0.106)	(0.109)	(0.149)	(0.148)
lpop_p	0.347***	0.325***	0.362**	0.342**
	(0.106)	(0.107)	(0.153)	(0.153)
ldist	-1.031***	-1.032***	-1.029**	-1.026**
	(0.400)	(0.400)	(0.493)	(0.495)
ldgdp	0.128	0.150*	0.117	0.117
	(0.080)	(0.077)	(0.081)	(0.081)
common official language	2.390***	2.413***	3.204***	3.196***
	(0.620)	(0.627)	(0.781)	(0.786)
common colonial history	-0.395	-0.406	0.278	0.300
	(0.320)	(0.326)	(0.465)	(0.469)
common religion	0.438	0.433	0.281	0.269
	(0.361)	(0.362)	(0.574)	(0.575)
gafta_p	0.644*	0.625*	0.512	0.512
	(0.366)	(0.366)	(0.376)	(0.379)
tur_p	2.054***	2.057***	2.158**	2.141**
	(0.773)	(0.772)	(0.916)	(0.920)
eu_p	0.595	0.612	0.884	0.900
	(0.570)	(0.568)	(0.688)	(0.691)
leer_05		-0.096	-0.053	-0.061
		(0.106)	(0.103)	(0.103)
pol_risk_p			-0.008	
			(0.011)	
pol_px				-0.710
				(0.766)
_cons	-4.720***	-4.607***	-5.280***	-5.083***
	(1.070)	(1.072)	(1.643)	(1.627)
Number of observations	2,153	2,130	1,530	1,530
r2_o	0.691	0.692	0.667	0.668
Rho	0.584	0.593	0.585	0.585

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors in brackets

Annex 3. Syrian Manufacturing Exports Determinants using LSDV Approach

	(1)	(2)	(3)	(4)
lgdp_p	0.547***	0.517***	0.598***	0.635***
	(0.106)	(0.105)	(0.147)	(0.148)
lpop_p	0.239**	0.218**	0.340**	0.295**
	(0.097)	(0.097)	(0.143)	(0.146)
ldist	-1.287***	-1.303***	-1.247***	-1.243***
	(0.369)	(0.370)	(0.440)	(0.445)
ldgdp	0.101	0.141*	0.129*	0.129*
	(0.083)	(0.077)	(0.075)	(0.075)
common official language	1.718***	1.744***	2.446***	2.405***
	(0.609)	(0.611)	(0.727)	(0.730)
common colonial history	-0.013	-0.019	0.797	0.846
	(0.350)	(0.354)	(0.547)	(0.543)
common religion	0.817**	0.817**	0.839	0.813
	(0.356)	(0.353)	(0.538)	(0.538)
gafta_p	0.823**	0.813**	0.633	0.658*
	(0.378)	(0.379)	(0.390)	(0.391)
tur_p	0.146	0.093	0.176	0.130
	(0.726)	(0.732)	(0.849)	(0.857)
eu_p	0.595	0.627	0.743	0.768
	(0.481)	(0.480)	(0.564)	(0.572)
leer_05		-0.125	-0.045	-0.048
		(0.080)	(0.109)	(0.110)
pol_risk_p			0.007	
			(0.012)	
pol_px				-0.076
				(0.829)
_cons	-2.602**	-2.568**	-5.220***	-4.645***
	(1.028)	(1.020)	(1.633)	(1.637)
Number of observations	2,054	2,031	1,473	1,473
r2_o	0.667	0.671	0.681	0.682
Rho	0.583	0.581	0.555	0.555

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors in brackets

Annex 4. Syrian Potential Exports Destinations

Countries with Potential to Import from Syria		Countries Exceeding their Potential Imports from Syria	
Country	**A/P**	**Country**	**A/P**
Philippines	0.00	Russia	1.05
Czech Republic	0.07	Saudi Arabia	1.16
Ireland	0.12	Greece	1.21
Denmark	0.17	Jordan	1.27
United Kingdom	0.22	Mexico	1.29
South Africa	0.25	Poland	1.73
Slovakia	0.27	Lebanon	1.82
Pakistan	0.29	Portugal	2.01
Tunisia	0.31	Bahrain	2.12
Hungary	0.31	Cyprus	2.27
Norway	0.33	UAE	2.53
Romania	0.34	Belgium	2.55
Argentina	0.37	France	2.58
China	0.37	Brazil	3.05
Egypt	0.38	India	3.12
Kazakhstan	0.38	Canada	3.23
Sweden	0.41	Spain	3.63
Sudan	0.42	Japan	3.87
Colombia	0.43	Kuwait	4.16
Nigeria	0.44	United States	4.48
Iran	0.46	Germany	5.91
Finland	0.48	Libya	6.42
Qatar	0.48	Italy	9.82
Morocco	0.49	Ukraine	9.88
Indonesia	0.64	Bulgaria	10.41
Algeria	0.73	Netherlands	17.73
Yemen	0.80	Korea, Republic of	19.57
Australia	0.82	Iraq	21.12
Turkey	0.84	Austria	29.21
Switzerland	0.89		
Oman	0.91		
Malaysia	0.93		
Azerbaijan	0.96		