The competitive advantage in The Middle East. An empirical approach

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The competitive advantage in The Middle Asia

Introduction

This paper explores the determinants of bilateral trade flows among: Jordan, Israel and the Palestinian territories during the last 15 years. A gravity model is applied to international trade flows and empirically tested in order to investigate the relationship between the volume and direction of international trade in order to identify competitive advantage areas. Furthermore, the standard gravity model is augmented with additional variables to test whether they are relevant in explaining trade. These variables are *infrastructure endowments* and *per capita incomes*. Finally, we analyse to what extent potentials for trade between these two economic areas are important.

The use of panel data methodology in the empirical application gives a better interpretation of the independent variables that are observed during a 15-years period. A similar model is found in literature at Martínez-Zarzoso and Nowak-Lehmann [1995] in order to estimate trade flows between Mercosur and the European Union. Also, Limao and Venables (1999) use cross-section analysis over one year in an augmented gravity model that comprises infrastructural endowment. Garman, Petersen and Gilliard (1998) used cross-section analysis over various years. Finally, Bougheas et al. (1999) averaged the data over time and then applied seemingly unrelated regression analysis estimation.

Section 1 presents a brief overview of the competitive advantage situation in the trilateral trade in Middle Asia. In Section 2 we describe the analysed data and briefly expose the methodological approach that lead us to the empirical results. In Section 3 we interpret the main results and present conclusions.

Section 1: The competitive advantage and strategic territorial planning. A short overview

The standard Heckscher-Ohlin trade theory is quite clear in its predictions regarding who should benefit and who should lose from free trade in commodities. For instance, if we consider a two factor world in which countries are distinguished only by their relative endowments skilled and unskilled workers. The relative wages of skilled workers will be lower, other things being equal, in skill abundant countries (which we will denote by R, and refer to as rich countries) than in unskilled labour abundant countries (noted by P, and referred to as poor countries): we obtain that $(W_S/W_{US})_R < (W_S/W_{US})_P$, where W_S and W_{US} denote skilled and unskilled wages respectively. It is this *inequality* that drives *comparative advantage:* the rich countries will export skill intensive goods, while the poor countries will export unskilled labour intensive goods.

In order to test this theory we explored the connections that explain the trade between Israel and West Bank and Gaza in the industry of meat and vegetables production (chicken, tomatoes, potatoes and olives). We estimate elasticities of the vegetables and meat productions in Israel with respect to "exports" of these products to the Palestinian territories. On the long term, the obtained results will have to suggest that regarding the relative factor price convergence (or, in the limit, factor price equalization), when countries move towards freer trade, the relative price of skilled labour rises in rich countries, and

falls in poor countries. Moreover, the abundant factor gains in real terms in all countries, while the scarce factor loses. Thus the skilled should favour free trade in rich countries, while they should favour protection in poor countries; the unskilled in rich countries should favour protection, while the unskilled in poor countries should support free trade. In any case, Heckscher-Ohlin theory argues that individuals' interests are related to countries' factor endowments. In our model we apply this theory and estimate the impact of infrastructural changes in the export potential of a country.

Section 2: Data, methodology and empirical results

In constructing our empirical model we consider a sample of 10 trade couples from the following: Israel, Palestinian Territory, Jordan, Syria and Saudi Arabia. The time period under study goes from 1995 to 2005. Our data consists therefore, of an unbalanced panel data of 10 trading pairs, with 117 observations. Data sources are given in the appendix C. We estimated the gravity model of trade described in Section 3, in a panel data framework. The use of panel data methodology has several advantages over cross-section analysis. First, panels make possible to capture the relevant relationships among variables over time. Second, a major advantage of using panel data is the ability to monitor the possible unobservable trading-partner-pairs individual effects. We use three datasets corresponding to three different estimates, as detailed-description following.

Section 2.1. A Gravitational model for the international trade in the Middle Asian Countries. Focus on the triade Palestine-Israel-Jordan.

In this part we used STATA econometrical package in order to analyse a panel database grouped by pairs of traders (between Israel, Palestine, Jordan, Syria and Saudi Arabia), that contains observations of the following variables:

- *"Gdp_i, Gdp_j"* represent the Gross Domestic Product per capita (referred to each of the two traders taking part of an "*ij*" pair: importer/exporter);
- *"Infra_i, infra_j"* represent the infrastructural endowments (referred to each of the two traders taking part of an "*ij*" pair: importer/exporter);
- *"Export"* represents the total value of exports, in 1000 USD (referred to the exporter country);
- *"Dist_ij"* represents the geographical distance between the traders' centres (country's biggest city).

All of the above variables were observed during 10 years, from 1990 to 2005.

Summary statistics of the above variables are reported just below:

Variable	Obs[1]	Mean	Std. Dev.	Min	Max
year	208	1997.5	4.620894	1990	2005
export	146	208433.6	422806.3	580	1851000
gdp_i	176	14473.29	27409.98	1247	84023.5
gdp_j	160	16069.9	28288.08	1247	84023.5
infra_i	176	13356.57	10689.12	2495	37773
infra_j	128	8863.524	4556.473	2495	17607
dist_ij	208	381.2308	433.8349	63	1329.

[1] data which contain gaps are automatically exclude from the estimates.

Using the gravitational model for the international trade (see *Appendix A1* for the model definition), we obtained two groups of resulting effects on the trade power of a country (see *Exhibit B1* from *Appendix B* related to the estimated coefficients):

a) *Infrastructural effects*:

- 1% increase in the infrastructural endowment in the exporter country induces a 5.53% increase in its own export power (measured by value exports);
- in a symmetrical manner, a 1% increase in the infrastructural endowment in the importer country determines a negative effect of 2.10 % change in the exporter's power (measured by value exports);
- the geographical distance between the centres of two traders influences negatively the export power of the partners. Respectively, a 1% increase in the distance between two commercial centers, determines a 8,8% decrease in the export power of traders. For example, if we have take two regions that dist one from another 100 kilometers and they trade 1000 units every year, now if we imagine that this distance between them might become shorter (let's say 90 kilometers instead of 100 km), the two traders would increase their exchange to 1880 value-units of goods (that is a net 880 value-units plus in the total value of the exchanges). In this case, the "shortening" of a distance might be also interpreted as a shortening in the time employed to travel along that distance. This relevant data reflects that geographical distance between countries represents a real "barrier" for the free trade. This data may be justified by the existing "bottlenecks"[2] that cause important delays in the merchandises deliveries. However, the idea is that the farer two territories are, the weaker becomes the trade potential between them.

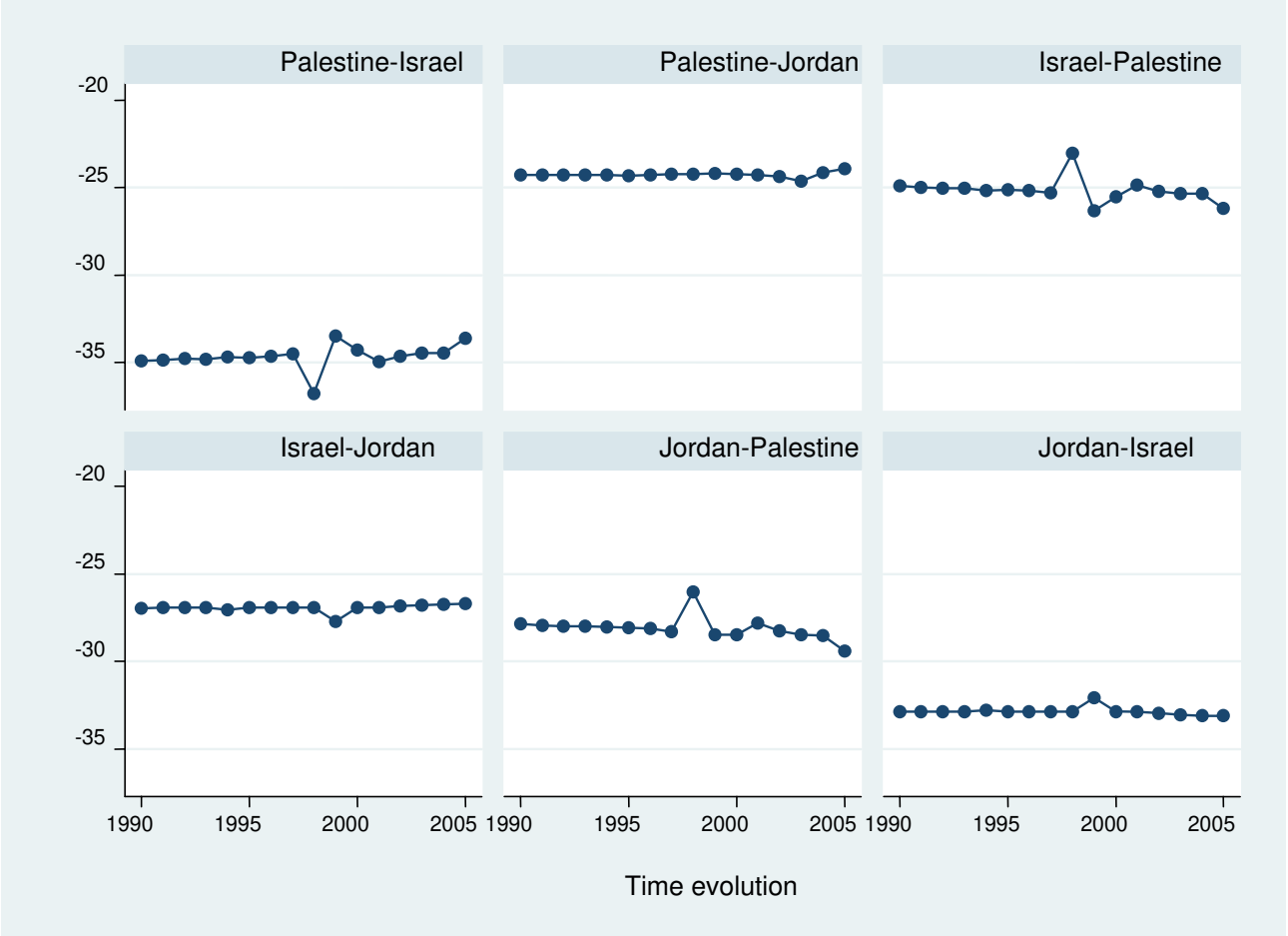
b) *Trade effects:*

- a 1% increase in the importer's GDP/capita causes a 1.97% increase in the exporter's export potential. This data might reveal that an increase in the purchasing power of the buyer stimulates the international trade with neighbour countries, by pulling in new trade flows. Therefore, stimulating a GDP increase would have a positive effect on the bilateral trade between the countries in Middle Asia.

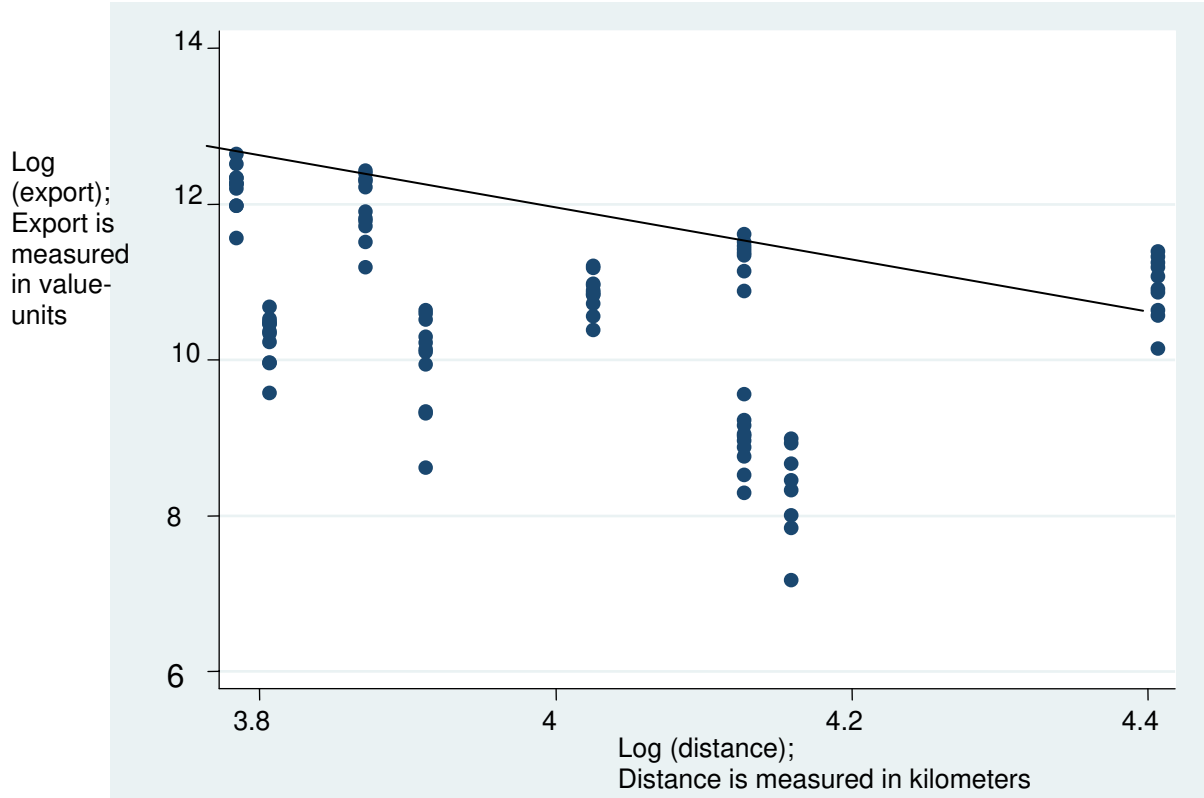
The same results are presented in a graphical manner, as following:

[2] By "bottlenecks" we mean the negative externalities of the transport network, that damage to the individual consumer's utility derived from using the transport services along the considered distance.

Graph 1: Infrastructural Endowments Differences, by pair of countries



Graph 2: A negative Distance effect on Exports.



Section 2. 2. A Consumer Price Index Profile of the Palestinian Regions.

We analysed a panel dataset grouped by 4 regions: Jerusalem, Gaza Strip, West Bank and the rest of Palestinian Authority. The following variables related to these regions are observed from 1st of January 2005 to 1st December 2006 in the form of Consumer Price Indexes:

- the transport-related CPI,
- food industry related CPI,
- beverages and tobacco related CPI,
- textiles related CPI,
- furniture related CPI,
- educational services related CPI,
- medical care related CPI,
- recreational activities related CPI,
- miscellaneous products related CPI.

Summary statistics are reported in the table below:

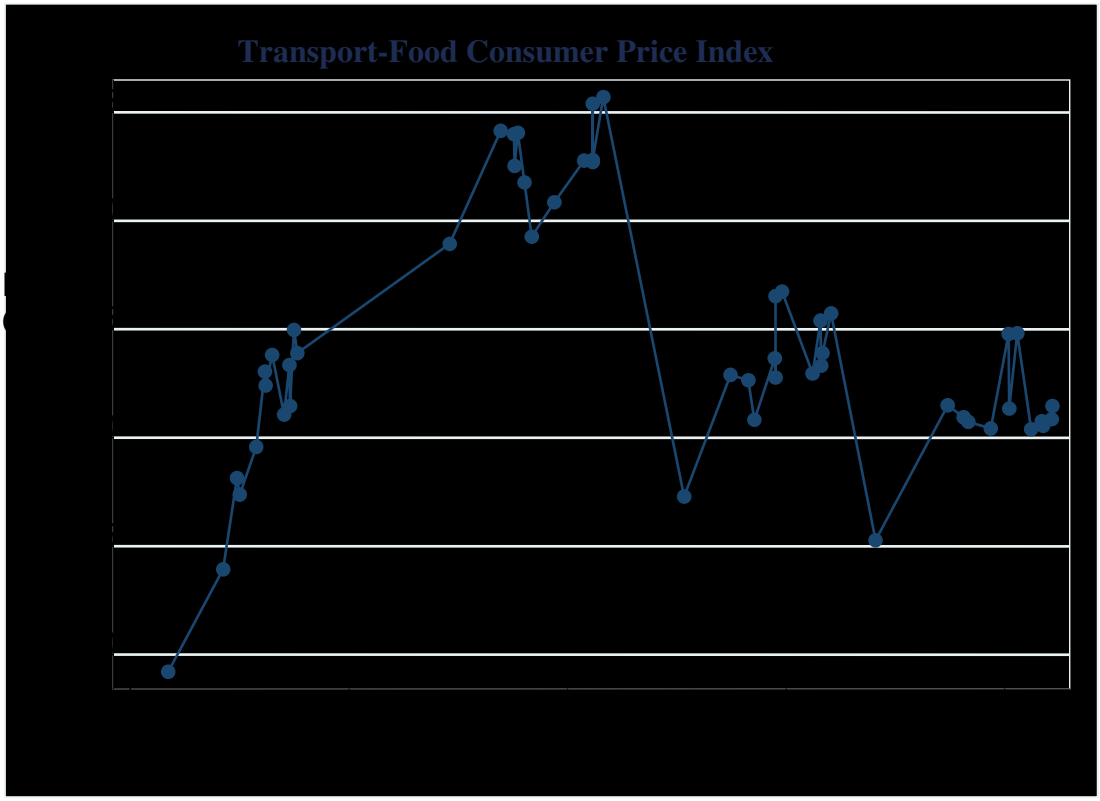
Variable	Obs	Mean	Std. Dev.	Min	Max
group	0				
id	52	2.5	1.128942	1	4
year	52	16928.46	173.185	16448	17136
food	52	144.3467	5.804936	129.22	155.7029
bevg_tob	52	167.3515	2.120443	160.8859	170.657
textiles	52	131.0674	8.493784	119.3257	144.7057
housing	52	154.1922	12.39714	130.0149	174.0289
furnitur	52	130.652	16.37097	110.2126	156.2115
transpor	52	187.1517	25.70751	143.4539	224.3097
educatio	52	140.2405	5.508593	135.2693	150.7338
medical_	52	154.4693	4.677842	148.2269	164.3939
recreati	52	93.22625	7.855396	83.61067	105.7823
miscella	52	158.4285	10.59368	139.0115	176.679

Using the linear regression described in *Appendix A2*, we obtain the following results (see *Exhibit B2* from *Appendix B* related to the estimated coefficients):

- the following variables induce a reduction in the transport-related CPI: the food-CPI, educational-CPI and recreational-CPI.
- The other variables considered (beverages & tobacco-CPI, textiles-CPI, furniture-CPI, medical care-CPI) engine an increase in the transport-related CPI.

For example a 1-point increase in the education-CPI determines a 3.76-point reduction in the transport-CPI. the Similarly, a 1-point increase in the beverages and tobacco-CPI determines a 0.95-point increase in the transport-CPI. So, more expensive the beverages & tobacco industry goods become, more expensive transport services will become. From the policy-maker's point of view here, in the future it would be interesting to study elasticities in price changes in order to estimate the effects of increasing/decreasing prices.

Graph 3: An approximately Concave Relation between Food CPI and Transport CPI



Section 2.3. Specific industry-based trade potential estimates.

We analysed a panel dataset grouped by Palestinian Governorate (10 groups of observations) where the following variables have been observed during 1995-2005:

- the Israeli exports towards 10 Palestinian governorates ("*i_export*");
- the meat production in the Palestinian governorates ("*meat_j*");
- the meat production in Israel ("*i_meat*");
- the geographical distance between each Governorate's center and the Israel's center ("*dist ij*").

Summary statistics are reported just below:

Variable	Obs	Mean	Std. Dev.	Min	Max
year	110	2000	3.17675	1995	2005
i_gvrnt	110	5.5	2.885427	1	10
i_export	107	78450.83	75657.77	0	308500
meat_j	94	4.213848	.6421019	2.321	5.874
vegetabl	110	17.4408	7.545037	0	26.326
i_meat	110	475555.5	27565.84	456891	540539
i_vegeta	110	2859642	75642.19	2693895	2943600
distance	99	57	11.44998	44	82

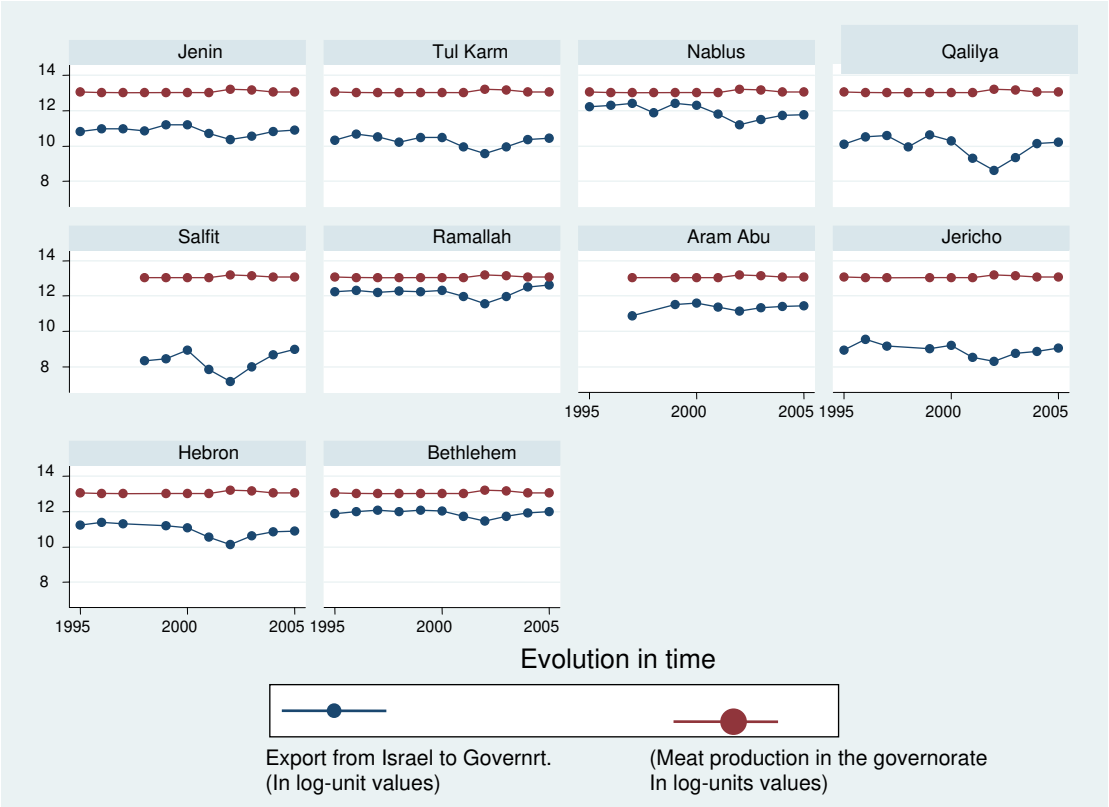
```
. *panel variable:  id, 1 to 4 time variable:  year, 12 Jan 05 to 01 Dec 06, but with gaps;
```

From the empirical estimation of the model presented in the appendix A3, it results that:

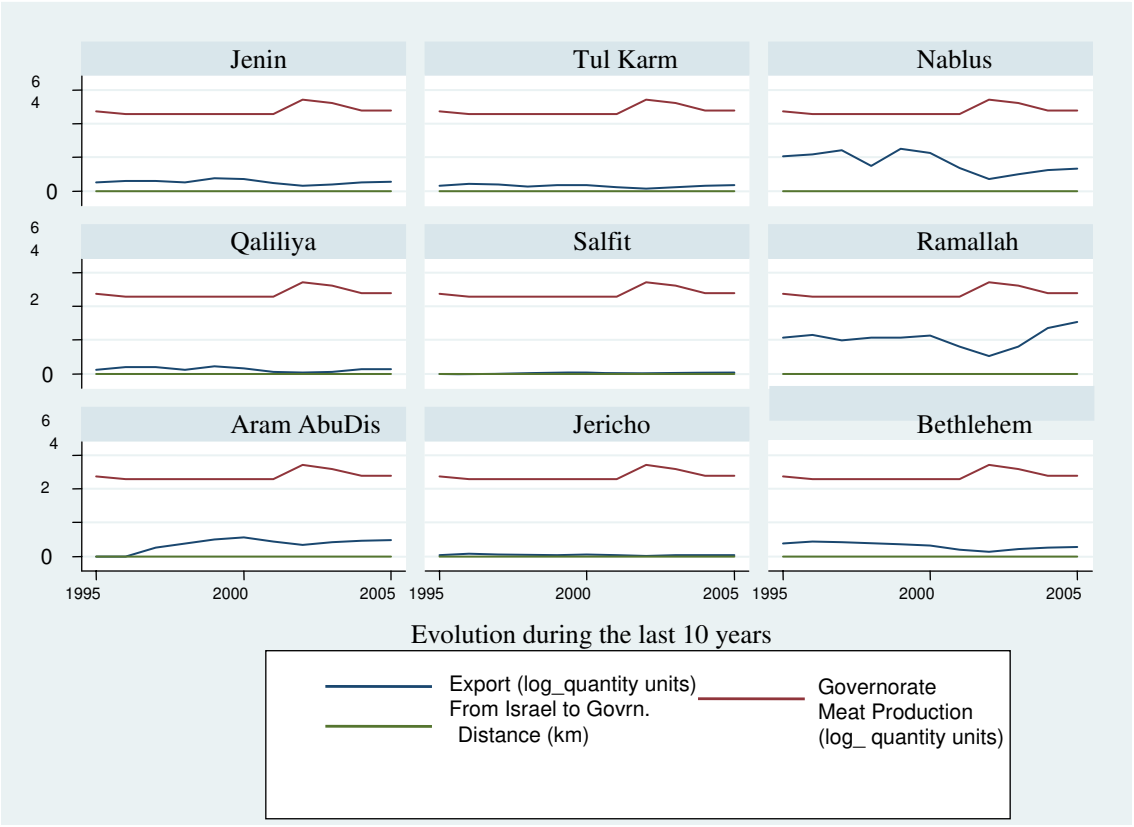
- An increase in meat production in the Governorates would affect negatively meat import from Israel;
- A 10% increase in the origin-destination geographical distance would reduce considerably the export potential of the food industry (respectively by 24.5%). This distance-related data may be

interpreted similarly to the distance-related case 1. It reveals that more distant are two trade partners one from another (Israeli or Palestinian), less possibilities they have to exchange food products. In fact, the longer is the time employed to travel along the distance, the higher is the possibility that fresh food products get to their expiry conditions and be transformed into lost profits.

Graph 4: Evolution in time of Exports from Israel to Palestinian Governorates and the meat production in the importer Governorates.



Graph 5: Evolution in time of Exports from Israel to Palestinian Governorates and the meat production in the importer Governorates related to geographical distance

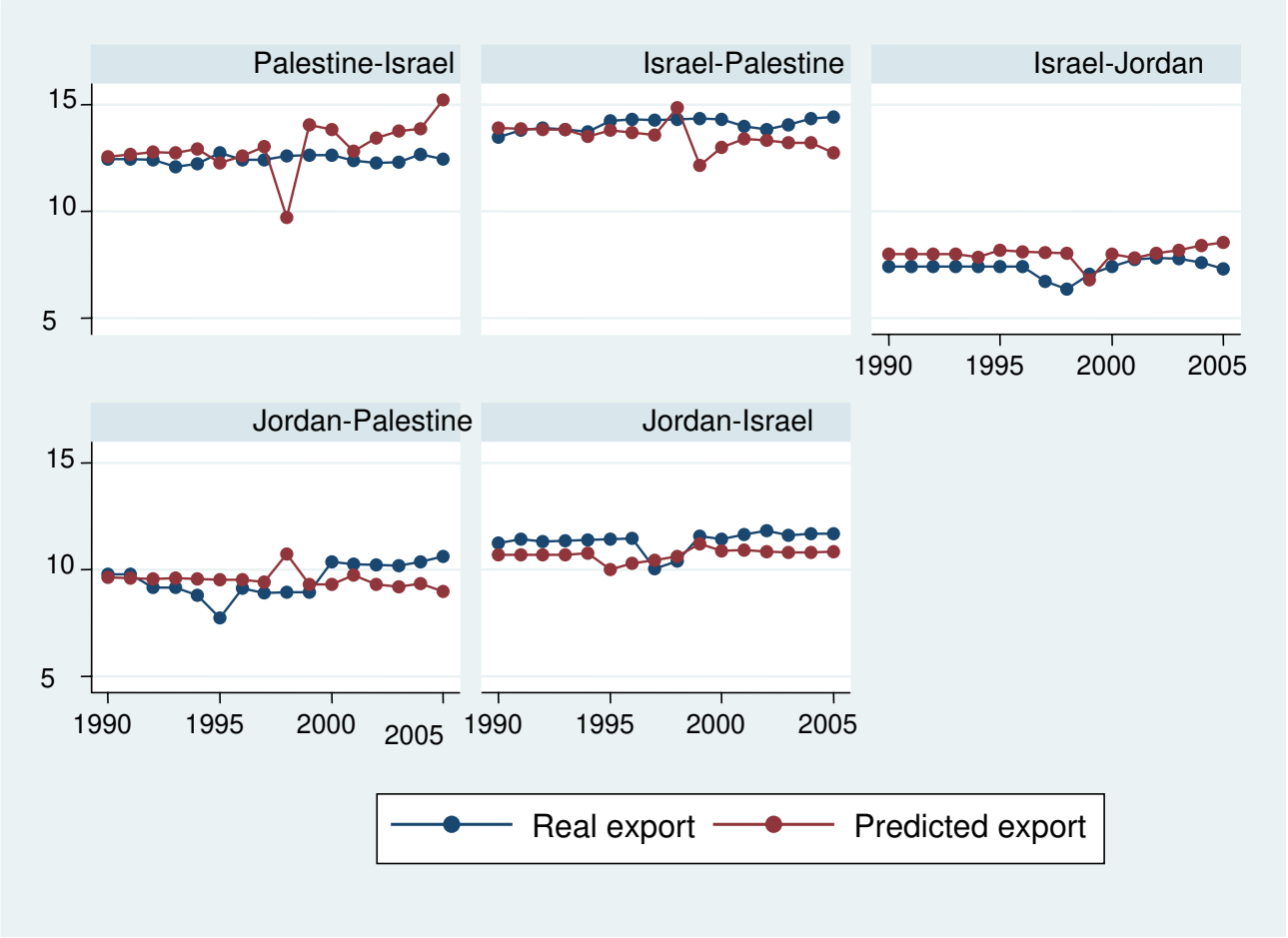


Section 3: Conclusions

The estimated data reveal that potential exports will increase once that infrastructural endowments will improve. Also, by taking a look at the estimates available through the PRIZM project, we observe the following:

a) The West Bank is a net importer from Israel, but it is predicted that it considerable increases its import-demanded trucks per day at the WBG/Israel Crossings (it imported from Israel 256 trucks per day in 2002, 320 trucks in 2003, 400 in 2004, 499 trucks in 2005, 624 trucks in 2006, predicted 780 trucks in 2007 and predicted 976 trucks in 2008. Trucks going out for Exports are also on a positive trend, from 38 trucks in 2002 to 47 trucks in 2003, 59 trucks in 2004, 74 trucks in 2005, 92 trucks in 2006, predicted 116 trucks in 2007 and predicted 144 trucks in 2008. Moreover, the governorates that absorb the major part of imported trucks in West Bank are: Kami, Jenin, Qaliyia and Tulkarm, while other regions are major exporters (but at the same time, net importers).
b) On the other side, looking at the graph below (Graph 6) we observe that in most of the cases the predicted export potential stay under the level of real export (exception is made during the "Intifada" period where we observe a trend "break-through"). From this affirmation we might conclude that, under the "normalityù2 hypothesis, there is an underlying underestimated trade potential between the three areas, that might be developed through appropriate measures (investments in infrastructures that might reduce the time and the costs employed in the activity of transferring goods from one market to another) .

Graph 6: Real versus Predicted values: export potential within the bilateral trade in the Middle East.



The actual level of exports is below those that normal trade relations would support. Our findings support the hypothesis of the importance of the infrastructural variables into gravitational models since they are all statistically significant and present the expected sign, apart from some rare exceptions. Our results concerning infrastructure might have some important implications for economic policy. Viewing infrastructure as a international public good rises the question of how the cost of infrastructure should be shared between trading partners. For the Jordan-Palestine-Israel trilateral trade it seems that only exporter's infrastructure fosters trade, therefore investing to improve the trading-partner infrastructure appears not to have spill-over benefits for the investor! However, since in our study we are not considering the difference between trade creation and trade diversion (Endoh, 2000), these results have to be taken with caution and eventually studied more in detail in a further research.

With reference to the specific behaviour of the trade flows in the case of a part of the food industry, future research could reveal (provided data are available) that investing in infrastructures as freight villages fosters trade between partners, and so, fosters economic growth. As far as it concerns the CPI conditional evolution, further research will be needed to confirm the effect that transport-CPI changes (and therefore profit) have on other CPIs. There is also possible to provide estimates of the trade and traffic volumes that these infrastructures may support in the future, provided they will be requested by the interested parties.

Appendices

APPENDIX A:

A1.Gravitational model for the international trade:

$Export_{ij} = \beta_0 GDP^{\beta_1}{}_i GDP^{\beta 2}{}_j Infra^{\beta 3}{}_i Infra^{\beta 4}{}_j Dist_{ij}$ and by taking logs on both sides we obtain:

$$\ln(Export_{ij}) = \ln(5.05) - 0.466 * \ln(gdp_i) + 1.976 * \ln(gdp_j) + 5.534 * \ln(Infra_i) - 2.106 * \ln(Infra_j) - 8.874 * \ln(dist_{ij})$$

From Appendix B1 it can be observed that 5 out of the six elasticities are significant at 95%.

A2. A consumer price index profile during the last years is estimated through the following regression:

$$transp_{i,t} = 550.16 - 1.23 * food_{i,t} + 0.95 * bevg\_tobb_{i,t} + 1.19 * textiles_{i,t} +$$
$$+2.39 * furniture_{i,t} - 3.76 * educat_{i,t} + 1.36 * medic_{i,t} - 6.63 * recreat_{i,t} + 0.77 * miscell_{i,t}$$

From Appendix B2 you can note that 8 out of 9 regressors are significant at 95%.

A3. A gravitational model for the food industry in the trade between Israel and Palestine is estimated as the following:

$$\ln(Export_{ij}) = \ln(85.556) - 4.936 * \ln(meat_i) - 0.532 * \ln(meat_j) - 2.454 * \ln(dist_{ij}).$$

From Appendix B3 it can be observed that all but the constant term are significant at 95%.

APPENDIX B:

Exhibit B1: Estimates of the model presented in the appendix A1:

```
Random-effects GLS regression                   Number of obs      =        80
Group variable (i): group                       Number of groups   =         5

R-sq:  within  = 0.0059                         Obs per group: min =        16
       between = 0.9519                                        avg =      16.0
       overall = 0.8347                                        max =        16

Random effects u_i ~ Gaussian                   Wald chi2(5)       =    373.76
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

logexport	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
loggdp_i	-.4661173	.2256154	-2.07	0.039	-.9083153	-.0239193
loggdp_j	1.976422	.2476637	7.98	0.000	1.49101	2.461834
loginfra_i	5.53473	.9222031	6.00	0.000	3.727245	7.342215
loginfra_j	-2.106916	.7884439	-2.67	0.008	-3.652238	-.5615943
logdist_ij	-8.874693	.7308242	-12.14	0.000	-10.30708	-7.442304
_cons	5.058138	7.936193	0.64	0.524	-10.49651	20.61279
sigma u	0					
sigma e	.46451346					
rho	0	(fraction of variance due to u_i)				

Exhibit B2: Estimates of the model presented in the appendix A2

```
Random-effects GLS regression                   Number of obs      =        52
Group variable (i): id                          Number of groups   =         4

R-sq:  within  = 0.6565                         Obs per group: min =        13
       between = 0.9999                                        avg =      13.0
       overall = 0.9913                                        max =        13

Random effects u_i ~ Gaussian                   Wald chi2(8)       =   4899.56
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

transpor	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
food	-1.238708	.2227727	-5.56	0.000	-1.675335	-.802082
bevg_tob	.9531784	.4973306	1.92	0.055	-.0215716	1.927928
textiles	1.194074	.695027	1.72	0.086	-.1681537	2.556302
furnitur	2.39652	.5006234	4.79	0.000	1.415316	3.377724
educatio	-3.760607	.5044074	-7.46	0.000	-4.749228	-2.771987
medical_	1.360249	.2966334	4.59	0.000	.7788579	1.941639
recreati	-6.638268	.9109595	-7.29	0.000	-8.423716	-4.85282
miscella	.775043	.2420525	3.20	0.001	.3006289	1.249457
_cons	550.1696	118.0316	4.66	0.000	318.8319	781.5074
sigma_u	0					
sigma_e	2.328325					
rho	0	(fraction of variance due to u_i)				

Exhibit B3: Estimates of the model presented in the appendix A3

```
Random-effects GLS regression                   Number of obs      =        79
Group variable (i): i_gvrnt                     Number of groups   =         8

R-sq:  within  = 0.5331                         Obs per group: min =         7
       between = 0.2133                                        avg =       9.9
       overall = 0.2178                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(3)       =     70.65
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

logi_export	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
logmeat_j	-.5320509	.2637046	-2.02	0.044	-1.048902	-.0151993
logi_meat	-4.936309	.6245021	-7.90	0.000	-6.160311	-3.712307
logdistance	-2.454813	1.390649	-1.77	0.078	-5.180434	.2708083
_cons	85.55618	9.856795	8.68	0.000	66.23722	104.8751
sigma u	.70812608					
sigma_e	.29162385					
rho	.85499343	(fraction of variance due to u_i)				

APPENDIX C:

Data sourcing

- PIEFZA feasibility study;
- Palestinian Trade Authority
- Palestinian Research Bureau of Statistics
- Statistics Bureau of Jordan
- The Foreign Direct Investment Authority in Jordan
- World Bank
- International Monetary Fund
- The UNCTAD organization
- The Israel's Statistics Bureau

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