CUSTOMS OBSTACLES AND DECISION TO IMPORT

by

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Abstract

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This thesis examines time to clear the customs as a factor of influence on the decision to import. Implicit cost of the transportation is a much greater barrier for imported products than direct monetary costs of crossing the border - a variety of duties, thus requiring detailed study and subsequent implementation of solutions.

We used the data on import for companies from all available rounds of the BEEPS. To fill the missing data interpolation and imputation techniques were used. To study the effect of time clearing the customs on the percentage of imported inputs, OLS regressions were used on all the samples – initial benchmark, interpolated and imputed.

The results show that a 10-day delay in customs clearing of imported goods, on average, reduces their imports by 1.6% (4.1% for Ukraine). Government subsidies, being a tool to protect domestic producers, also reduce imports. At the same time 100% foreign ownership of the company is associated with a 15% increase in imports.

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Chapter 1

INTRODUCTION

Throughout the time, international trade develops more and more impetuously, opening the borders and increasing the number of suppliers (exporters) as well as clients – importers. Many firms in order to obtain some scarce inputs or inputs of the better quality, or inputs at a lower price, import them rather than buying them from domestic suppliers. Moreover, availability of importing sources increases products (in particular, inputs) variety - not only in terms of range, but also in terms of choice of variability of trade conditions with different trade partners as well. Furthermore, importing inputs may help firms to diversify the chain of suppliers in order to reduce specific company or country risk that any firm may be subject to. Nevertheless, despite the greater trade openness and globalization, both of which makes foreign goods being perceived at the same level of availability as domestic, firms suffer from various obstacles when importing. These obstacles are mainly represented by the delivery time (which, in fact, contains many aspects) that in its turn influences importing costs.

Delivery time is indeed a very broad definition that may be viewed from different perspectives and has dozens of pitfalls. In general, customers are ready to pay more for goods transportation in order to prevent downtime. However, customers may not be willing to overpay for the faster delivery if a supplier is relatively close, but they may be willing if the transportation time constitutes several weeks. Similar situation concerns the product price – if the transportation price is too high comparing to the product price, customers may refuse to pay high transportation tariffs in favor of slower delivery. Implicit costs of transportation time are much more an obstacle for foreign goods than direct costs of crossing the border – import or export tariffs. Another determinant in transporting time is the time needed to deliver goods from the

factory to the border of exporting country and from the border of importing country to the customer.

One of the delivery time components that has not been researched much yet is the time needed for goods clearing at the customs. This, in its turn, depends on many other factors such as regulation, the level of corruption, border openness, size of the parcel waiting for export or import and its declared contents. About 24% of the transportation time is spent at borders, while a more reasonable customs-clearing time should amount to 2% of the total transportation time that is pre-Schengen target (Nordås et al., 2006). Meanwhile Djankov (2010) estimates that 75% of transportation delays were caused by administrative barriers — various customs and tax procedures, customs clearances and cargo control. If the time spent on customs is too long, firms may decide to stop importing and change their suppliers to the domestic ones.

I will be using micro-level data from the BEEPS survey conducted by the EBRD and the World Bank in order to study the relationship between the time for customs clearing of imported inputs and the percentage of foreign inputs used by firms. All the data are publicly available. There were already conducted four rounds of the survey (in 1999, 2002, 2005 and 2009) based on the results from 29 countries. However, there is an additional round of the survey for Russia, which became available at the end of the last year that provided more observations (the sample of more than 4000 firms), so the results will be ultimately up-to-date and highly relevant.

Therefore, the dependent variable of my interest is "Percentage of material inputs and supplies of foreign origin in the last fiscal year", while the exogenous variable of the main interest is "Average number of days for imported goods to clear customs in the last fiscal year". Other variables that are relevant to the model should be also controlled for as well as the robustness check performed.

Similar research has been done on slightly different topics – like delivering time (including using different transportation modes (Hummels et al, 2012)) and its influence on the import quantities (Nordås et al., 2006), the influence of trade on the financial sector (Bourgeon et al., 2012). I will scrutinize them more meticulously in the next section of the thesis. Therefore, this thesis work explores new aspects in the topic of import, specifically import of inputs as well as dealing with customs.

Results show that most of the variables used are significant. Every 10 days of custom-clearance-delay on average leads to 1.6% decrease in foreign inputs import (4.1% for Ukraine). Customs obstacles lead to frequent informal payments when clearing the customs that, in its turn, facilitate international trade increasing inputs import by 4%. Fully-foreign-owned firms tend to import 15% more. However, government subsidies serving as a protectionism policy and the firm size disincentive import by 10% each.

The thesis is organized as follows. Chapter 2 covers the existing literature related to trade barriers. Chapter 3 describes the methodology and data used, variables overview and limitations. Chapter 4 talks about obtained results and tests, while Chapter 5 concludes the thesis, gives some recommendations and policy implications.

Chapter 2

LITERATURE REVIEW

The issue of trade barriers, trade costs and, as a consequence, trade facilitation has been studied much since the boom in the international trade. Some works were done in the previous century; however, the most prominent and valuable are from the current millennium. This is because progress in technology development allows us to differentiate trade costs by using different transportation modes and cut down on some costs due to the faster and easier procedures of clearing the customs. Surely, over time, the trading time importance has decreased because its scale is much less now, but due to the faster pace of life, every day is on count anyway. Therefore, I will explore this issue.

In the overwhelming majority of the papers, trading costs are primarily associated with transportation costs and time required for delivery. One of the most important contributions in this area Hummels et al. (2012) study the impact of transportation time associated with different transportation modes on the trade sensitivity to time. Long transportation time implies larger inventories that, in its turn, entail larger costs for the time holding and depreciation costs as well. Bigger inventories are needed in order to prevent disruptions in assembly line if the cargo is being delayed. All these extra costs are ready to be paid by customers to prevent downtime.

Hummels et al (2012) develop a model that reveals consumers' perception of the service quality that directly depends on delivery time. This factor makes producers improve customer experience by shipping products by air to obtain faster delivery time. The costs of transportation are charged proportionally to quantity rather than value of goods shipped by cargo carriers. Therefore, the ad-valorem cost of airfreight diminishes in product prices, i.e. the higher prices are for the product, the less part transportation will constitute in it. Hence, firms

with the high price products will be more likely to use airfreight, while firms with low-price products will be using cheaper ocean shipping. A consumer may not be willing to overpay for the fast delivery to save just a few days if a supplier is relatively close to him, but he may want to if a supplier is overseas and the ocean transit takes many weeks.

The authors show that the airfreight is used not only because consumers value the transportation time, but also because consumers care about ad-valorem premium. Hence, the more time ocean transit takes, the more often the airfreight is chosen. Researchers find that a day of transportation is equivalent to 0.6 - 2.3 % of an ad-valorem tariff and that customers who buy inputs for their production as parts and components, seem to be time sensitive and more likely to use air freight. Generally speaking, those, for whom time is crucial criterion in the transportation, would incur higher costs of air freight in order to gain higher customer satisfaction and loyalty.

However, there is no just single effect. In one of his previous papers Hummels (finds that firms are not only willing to pay a bit less than 1 percent of ad-valorem tariff for reducing one day shipping by ocean in favor of air transportation, but also that each additional transportation day lessens the probability of importing goods on average by 1 percent (Hummels et al., 2001).

Although this work estimates time differences that arise due to different transportation modes, it is recognized to be the reference paper when talking about trading time in general. It reinforces the significance of any time lag in goods transportation – such as transportation within the exporting country, international shipment (whatever mode is chosen), delivery within destination county and, finally, the time spent to clear the customs (both, of exporting and destination country) itself.

In addition to shipping time, some works consider the effect of time needed for import and export procedures on the international trade flows. In his other

paper, Hummels (2007) tries to predict the influence of the exogenous shock on trade. He estimates that after the September 11, 2001 terrorist attack, strengthening the security would impose bigger costs for international transactions. He assumes that all the security checks for imported goods would add a day to the time of shipping. Taking into account that manufactured import is over $800 billion a year, this extra day delay would constitute a loss of about $7 billion annually. "You could be talking about very serious expenses if goods are subject to even minimal scrutiny on the way in" says Hummels.

In the same paper, the author researches the topic closely related to the topic of this thesis. He uses the World Bank "Doing Business" data on the number of days and number of required documents for preparing international transportation to estimate the tariff equivalent of delays at customs and in ports. He uses both estimates of daily transportation costs and data on days spent to clear customs and port delays and finds that the time spent at customs is a much larger obstacle for trading than import/export tariffs are. The author also notices that it is essential to take into account the time of goods transportation from the factory to the border (port). This time may be much longer than international transportation time itself and there is larger heterogeneity among countries for this indicator rather than for the distance between them.

Nevertheless, it is not always possible to assign monetary values to time costs. Harrigan and Venables (2004) assert that valuation of these costs differs because of uncertainty in time. Delivery delays can pluck production, so producers have to order their supplies before their actual needs. In their study, the authors have focused on just-in-time production methods when supplies are bought and delivered exactly when they are needed, so as to avoid inventories costs. This issue is closely related to my thesis topic as customs delays cannot be estimated or predicted in advance, so they may become a real obstacle in just-in-time production method by creating large inventories. In addition, the authors argue that delays also matter because of physical

depreciation or obsolesce of goods during the long shipping time (including all stages of transportation). When the situation is uncertain, advantages of the established and certain timely delivery of components changes the efficient dimensional production organization and leads to clustering.

Nordås et al. (2006) study the influence of time for import and export as well as logistics on gross international trade flows. They find that the time of the procedures for importing and exporting not only reduces volumes of trade, but also the probability that the company will enter international markets or use international resources. Grossman and Helpman (2005) in a theoretical model show that firm's decision whether it is worth outsourcing intermediate inputs depends on factors such as barriers to enter the market, contracting costs as well as customization of inputs technology. Halpern, Koren, and Szeidl (2011) explore the firm's decision to import intermediaries. Nordås with co-authors also find that more and more products become time-sensitive (especially labor-intensive ones), but the liberalization of transport services may be implemented with comparatively few costs in developing countries. Moreover, they suggest that bureaucracy related to import and export in developing countries should itself reduce incentives for local producers to export or import time-sensitive products.

Trading time becomes much more crucial in the situation with only a few trade barriers. Martinez-Zarzoso and Novak-Lehmann (2006) find that when there are no official trade limitations, trading time becomes the main obstacle for international trade. Taking into account that trade barriers have substantially decreased during the last couple of decades, we could logically assume that trading time is a significant determinant of trade patterns.

Later on, this issue has been further investigated by using time of cargo transportation from the factory to the ship in the nearest port (including clearing customs) by Djankov et al. (2010). They find that each additional day of delay reduces trade volumes on average by 1% or equally, increases the

distance between trade partners by 70 km. They also find that customs delays negatively affect trade concerning mostly time-sensitive goods such as agricultural products.

Some papers consider different sides of international trading, for example financial aspect of the issue, in addition to trading time. In particular, Bourgeon et al. (2012) study the effect of financial restrictions and cash flows on the trade flows. They use the notion of trading time that constitutes the time lag between production of manufactured goods and receiving payments. While studying financial restrictions, they are primarily concerned about uncertainty in payments from the importer. In their estimations, the distance indicator is used as a compound of shipping time and time spent at the border. They find that financial constraints have substantial impact on trade as well as trading time.

Relationship between imported inputs and firm's efficiency is another interesting topic that worth studying, so Amiti and Davis (2012) study the influence of import tariffs on wages paid. Amiti and Konings (2005) empirically show that importing firms win in productivity the most when input tariffs are abated. A 10% decrease in input tariffs leads on average to 3% productivity rise. The results are shown to be robust to inclusion of separate effects for the period of crisis in Asia. Moreover, when regressing the firms' productivity only on final goods tariff (as is commonly done in the other works), the coefficient of marginal effect is even more than doubled. This means that if input tariffs are excluded, an omitted variable problem may arise.

Empirical studies for Ireland show that firms' productivity can be improved by outsourcing inputs, which is more often observed in companies with foreign ownership (Görg and Hanley (2004); Görg and Hanley (2005); Görg, et al. (2007)). This result is also confirmed for Hungary (Halpern et al. 2005). The authors find that imported inputs affect positively the plant efficiency through complementarity and quality channels.

The works analyzed above do not seem to give a complete picture of the decision to import inputs. This thesis aims to remedy this gap and is positioned as a complement to the work on export decision. Even though decisions to export and import may be related somehow, I am convinced that importing and exporting firms are guided by different drivers in their decision-making. The export decision is based on the foreign markets demand and its peculiarities, while importing-inputs-decisions take its grounds in the production process features at the firm's level, government protectionism policy.

Since transportation time studied in the above papers is related to the customs clearing time I will refer to the methodology employed in the above papers. In the next section I will present methodological issues in more detail.

Chapter 3

METHODOLOGY AND DATA

The main question of the thesis is whether the time spent at the border for customs clearing can explain the variation in the firms' input source structure. In order to answer this question the below mentioned baseline model was used. It is developed by the thesis author to become as follows:

$$ImInput_{it} = \beta_0 + \beta_1 \cdot CustDays_{it} + \beta_2 \cdot X_{it} \quad (1)$$

where X_{it} is a vector of secondary priority exogenous variables.

3.1 Variables overview

The dependent variable is the percentage of material inputs and supplies of foreign origin in the last fiscal year (defined as *ImInput*), while the exogenous variable of our main interest is the average number of days for imported goods to clear customs in the last fiscal year (*CustDays*). Coefficient on this variable is expected to have a negative sign because every additional day of delay may be an obstacle for production and the company may want to change foreign suppliers for domestic ones.

Other variables that should be controlled for constitute the vector X, and are listed further. Direct supply chain can mean less transportation and transaction cost as well as faster and more reliable supply, so the expected coefficient sign on the dummy variable whether any of these inputs and supplies imported directly (*ImDirect*) is positive. The level of the obstacle for transportation of goods, supplies, and inputs (*TranspObs*), as well as the obstacle level represented by the customs and trade regulations (*CustObs*) – are categorical variables. These two variables are the pure measures of obstacles to import goods in the survey. Obviously, expected signs on their coefficients are negative.

Foreign owners are assumed to be more loyal to foreign purchases and willing to use foreign (imported) inputs (Halpern, 2011), so the coefficient on percentage of the firm owned by private foreign individuals, companies or organizations (*Foreign*) is expected to have positive sign. Dummy variable (*GovSub*) indicates whether the company received governmental financial support or not over the last 3 years, which may either show the good terms with the government or operating in a privileged and subsidized (protected) sector. Hence, if the company is in the protected sector, the government implements protectionism policy and the expected sign is negative. The variable of additional payments/informal gifts frequency to deal with customs/imports by firms like the respondent (*InformGift*) represents corruption level in the country. Expected sign of the coefficient on this variable is unclear as from the one hand, higher corruption imposes additional costs and inconveniences for importing firms, but from the other hand, this facilitates trade after all. The firm size (*Size*) is unclear as well. Positive sign may be caused as larger firms are assumed to have more need in resources, which may be scarce or very specific and not present at the domestic market in the required amount, as well as they are assumed to have more resources to enter international markets. However, negative sign may be caused by the fact that larger companies may be more vertically integrated, and produce their inputs themselves. Finally, the control for year (*Year*) and 2008 is expected to have a negative influence on imports due to the global financial crisis.

All the data taken from one source - Business Environment and Enterprise Performance Survey (BEEPS) conducted by EBRD[1] and World Bank as it is micro-level data and cannot be combined with the data from other sources. The used dataset is a panel collected from 4 rounds of survey (29,716 observations) plus an additional round for Russia in 2012

[1] http://www.ebrd.com/russian/pages/research/economics/data/beeps.shtml

(4,222 observations). Hence, overall there are almost 34 thousands of observations in the initial data. Although the data are panel, they are very unbalanced, so pooled data were used in the model.

From the initial whole sample of the data the following statistics can be presented:

There are representatives that fully depend on imported inputs (10% of the firms) as well as those that depend fully on domestic suppliers - 44% of firms did not import at all in the year prior to the survey. From those firms that import, on average respondents imported 56% of their material inputs and supplies with roughly one third of them imported directly. In the range of time spent clearing the customs between zero days and 1 calendar year, firms reported for their inputs to spend on average 5 days clearing the customs. However, it should be mentioned that only half of the firms that import responded to the question. Transportation, clearing customs and trade regulations were slight obstacles for the firms according to the survey. Moreover, most of the firms never paid additional payments or gave informal gifts to deal with customs. Just a small share of firms (8%) received government subsidy over the last 3 years and the same share of firms were hold by foreign individuals.

3.2 Dealing with variables

For all the categorical variables, answers that could not be applied to the firm or refusals to answer that initially produced negative values were substituted by missing values.

Some tests on missing data patterns show that if the data on *ImInput* are missing then there are no data on *ImDirect*, which is obvious. The next causality is - if there are no data on *GovSub* then there are no data on *InrofmGift* either. There are 3,275 missing observations, so this is not a coincidence. This may be due to

the fact that a person responsible for the survey filling in does not gain such financial (and often informal) data or the firm did not want to reveal such data.

Initially, only 13% of observations had the data on all the variables, 28% had one variable missing, 14% had two variables missing and 22% had three variables missing.

Concerning variables of our interest, *ImInput* and *CustDays*, 18% of observations have answers for both variables. Only these observations were used in all the regressions for them to be most trustworthy. The half of the variables have information on the *ImInput*, but do not have on *CustDays* – the exogenous variable of main interest; and one third of observations do not have information on both of these variables. Such observations were dropped as well as observations with more than three variables missing because they contributed very little.

As a result, the sample is reduced to 6 thousands of observations with already 73% of them having information on all the variables, 12% missing only one variable and 13% missing two variables (Table 1).

Table 1. Missing variables pattern

Missing vars	**Freq.**	**Percent**
0	4,493	72.97%
1	734	11.92%
2	779	12.65%
3	151	2.45%
Total	6,157	100.00%

Descriptive statistics for all variables from the benchmark sample as well as expected signs are presented in Table 2 below:

Table 2. Summary statistic on the benchmark OLS sample

Variable	Obs	Mean	Std. Dev.	Min	Max	Exp. sign
% of material inputs and supplies of foreign origin	4493	61.922	33.046	1	100	N/A
Avg # of days for imported goods to clear the customs	4493	5.246	9.947	0	365	-
Were any of these material inputs and supplies imported directly?	4493	0.444	0.497	0	1	+
How much of an obstacle is transportation of goods, supplies, and inputs?	4493	0.705	1.026	0	4	-
How much of an obstacle are customs and trade regulations?	4493	1.382	1.151	0	4	-
What % of this firm do the private foreign individuals, companies or organizations own?	4493	21.622	37.684	0	100	+
Over the last 3 years, has this establishment received any government subsidies?	4493	0.112	0.316	0	1	-
How often do firms like you pay additional payments/informal gifts to deal with customs/imports?	4493	1.103	1.473	0	5	+/-
Size of the firm	4493	1.086	0.824	0	2	+/-

As was mentioned, half of the variables are either categorical or dummy. Categorical variables to become more relevant were transformed by eliminating answers, driven by survey specification of answer refusals, "Do not know" and "Does not apply" that produced negative values.

3.2.1 Interpolation

In addition to the initial (benchmark) sample, interpolation was made within all the variables for them to have no missing observations, thus OLS to use more observations in the regression. At first, as it was already mentioned, all missing observations on *ImInput* and *CustDays* were dropped as there were three fourth of the data missing, and interpolating would mean actually more generating new data rather than interpolating of the existing data. After this, 6157 observations were left. All missing values for other variables were generated from normal distribution with mean and standard deviation taken from observations within a country of missing observation. See summary statistic for the interpolated data at the Table 3 below.

Table 3. Summary statistic on the interpolated sample

Variable	**Obs**	**Mean**	**Std. Dev.**
ImInput	6157	60.7125	32.9363
CustDays	6157	5.4598	10.8483
ImDirect	6157	0.4829	0.4997
TranspObs	6157	0.7676	1.0815
CustObs	6157	1.4012	1.1856
Foreign	6157	20.0408	36.6863
GovSub	6157	0.1189	0.3237
InformGift	6157	1.1267	1.4175
Size	6157	1.0520	0.8172

3.2.2 Multiple imputation

The other technique used to deal with missing data is multiple imputation. Imputation is a Monte Carlo technique that replaces missing data with the simulated one using an M number of imputations (iterations). M is recommended to be equal to the percentage of missing values (Rubin, 1987), given that in our case missing values account for 22% we have generated M = 22 imputations. Each of the imputed complete dataset is further analyzed using standard techniques separately, but the results are combined to produce estimated and standard errors to incorporate the uncertainty on missing values. This method was initially developed to deal with large public surveys with missing data present, so its use is quite native. This method was further developed by Schafer (1997) to deal with missing data within several variables.

The efficiency of an estimate is calculated by the formula:

$$(1 + \frac{\gamma}{m})^{-1} \quad (2)$$

where γ is a non-response rate (Rubin, 1987). The efficiency comparison under different levels of missing observations can be found in Table 4.

Table 4. Efficiency of an imputed estimate

m	γ				
	0.1	0.3	0.5	0.7	0.9
3	97	91	86	81	77
5	98	94	91	88	85
10	99	97	95	93	92
20	100	99	98	97	96

Hence, having 22% non-response rate and the same number of imputations should produce extremely accurate estimate.

Indeed, summary statistics does not change much after imputations are made (Table 5).

Table 5. Comparison of all samples

Variable	Number of observations				Mean				Standard Deviation			
	OLS	Raw sample	Interpol.	Imput.	OLS	Raw sample	Interpol.	Imput.	OLS	Raw sample	Interpol.	Imput.
ImInput	4493	6157	6157	6157	61.9220	60.7125	60.7125	60.7125	33.0460	32.9363	32.9363	32.9363
CustDays	4493	6157	6157	6157	5.2460	5.4598	5.4598	5.4598	9.9470	10.8483	10.8483	10.8483
ImDirect	4493	6157	6157	6157	0.4440	0.4829	0.4829	0.4829	0.4970	0.4997	0.4997	0.4997
TranspObs	4493	6104	6157	6157	0.7050	0.7664	0.7676	0.7682	1.0260	1.0823	1.0815	1.0843
CustObs	4493	6064	6157	6157	1.3820	1.4014	1.4012	1.3986	1.1510	1.1877	1.1856	1.1869
Foreign	4493	6084	6157	6157	21.6220	19.7922	20.0408	19.7884	37.6840	36.6469	36.6863	36.6512
GovSub	4493	5281	6157	6157	0.1120	0.1129	0.1189	0.1150	0.3160	0.3164	0.3237	0.3190
InformGift	4493	4770	6157	6157	1.1030	1.1000	1.1267	1.0867	1.4730	1.4696	1.4175	1.4640
Size	4493	5894	6157	6157	1.0860	1.0512	1.0520	1.0555	0.8240	0.8215	0.8172	0.8196

3.3 Limitations

There seems to be an involved problem with using time to clear the customs as an exogenous variable for an amount to import. Transport capacity and frequency of travels obviously depend on trade volumes; hence, the direction of causality can therefore be opposite. (Djankov et al., 2010)

Test on statistical difference across categories of transportation obstacles show that they are not statistically different for both benchmark and imputed samples. Categories of other variables are statistically different.

It should be also mentioned that the dataset may be subject to the selection bias. It may occur if some small companies (which, nevertheless, import their inputs) refuse to answer a long survey due to the lack of free human resources or they simply were not asked to complete the survey because of the limit number of interviews for each country or because company did not met formal criterion for the survey[2].

When interpolating, there could be a mistake in choosing the correct data distribution, so interpolated results may not be the best and should not be considered as a reference.

However, imputed sample produced reliable results and will be referred to when concluding results.

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[2] http://www.ebrd.com/russian/downloads/research/economics/microdata/beeps_report_ebrd_april10.pdf

C h a p t e r 4

EMPIRICAL RESULTS

4.1 Benchmark sample: OLS

The first step to take is to run OLS on the primary sample (without interpolation) to establish a benchmark for further comparison. The benchmark sample includes only those firms that have information for all the variables; hence, reducing the used sample to around 4.5 thousands observations. All variables are in levels as our dependent variable already represents percentages. Regression R-squared equals to 10%, with intercept capturing two thirds of the variance in imports. Despite this, most of the variables are statistically significant (except for some categories of *GovSub, TranspObs* and *CustObs*).

Tests on joint significance of categorical variables show that transportation obstacles are jointly significant, but different types of obstacles do not seem to be particularly important for importing inputs decision. While custom obstacles, informal payments and firm size are both jointly significant and significantly different between categories. For example, only major customs obstacles seem to be highly important for the importing decision.

The variable of our main interest (*CustDays*) has the expected sign and is highly significant, but does not appear to be very influential in terms of magnitude – every 10 additional days clearing customs, ceteris paribus, on average lowers import by only 1%. Moreover, even small obstacles in transportation lower the quantity of imported goods by almost 3%. On the contrary, if goods are imported directly, import is higher by 5.7%.

One counter-intuitive result is that customs and trade regulations obstacles increase import by 3-6% depending on the magnitude of the obstacle. A possible explanation is that firms may use informal payments to deal with

customs. Moreover, only coefficients on frequent payments are statistically significant and increase import by 6-11%! This result, in turn, does not come as a surprise – more frequent payments provide more protection (though informal and illegal) to companies' imported inputs and after such a payment (actually, a bribe) there will be much less, or even no at all, further problems with clearing customs.

The effect of government subsidy on the import is negative as it was expected initially – firms provided with a subsidy imported less by 9.7%. This may be explained by subsidies playing a role of a protectionist policy. The size of the firm has negative sign that may be explained, as it was mentioned above, by the fact that large firms may have their own production of all the inputs, while small firms need to use third-party inputs, imported in case the domestic suppliers are absent. The coefficient on firm size is highly significant and shows that medium firms and large firms have lower share of imported inputs (by 8.9% and 14.7% respectively) compared to small firms. In the year 2008 firms imported less by 12.3% compared to 2002, presumably due to the world financial crisis.

Detailed statistics on benchmark OLS results can be found in Table 6. It is easy to see that the sample used for OLS is very different from initial statistics, so the results may be biased due to selection problem.

4.2 Interpolation

After interpolation, we can observe that data are very close to our initial sample and indeed, OLS regression produces very similar R-squared (9.4%).

Regression coefficients have slightly changed as well. As was already said, this may be due to the sample selection bias or due to the wrong distribution assumption. The coefficient on the number of days clearing the customs increases in magnitude. It may seem small, but with a week delay (which is quite

common in our country), import will be less by 1.4% instead of 1% decrease in the benchmark OLS. That, in turn, may be a large amount of money if the shipment scale is of large production size.

The variable of direct import captures 6.3% of the variability in imports. This may be due to the collinearity of variables – if a company has direct import, which means it is an importer a priory. Government subsidies, in contrast, become less significant in domestic inputs protection. The firm size dummies also lose its significance drastically.

Transportation obstacles have the expected signs and some of their categories in fact may capture the effect customs-clearing time as the customs obstacle.

All categories of informal payments now increase consistently – more frequent payments lead to much more import (up to +12%). Again, their positive effect is explained by high trade regulations along with customs obstacles needed to be mitigated.

Moreover, interpolated sample reveals additional statistically significant year that affected import – 2012. Compared to 2002, import in each 2008 and 2012 was less by 12.5%.

However, this method predicts the values imperfectly and the regression based on it has both some advantages and disadvantages over other models. Nevertheless, the results became less significant than in the benchmark sample. Detailed statistics on interpolated OLS results can be found in Table 6.

4.3 Multiple imputation

The OLS on imputed as well as on interpolated samples contained 37% more observations comparing to the benchmark OLS. However, the results from the multiple imputation model are much closer to the benchmark one as well as are more significant than those from the interpolated sample, sometimes even

more significant than in our initial model. That is why, we will treat this results as plausible and use them as final results.

Answering the main research question, we can conclude that every 10-day delay of imported inputs to clear the customs results in 1.3% average decrease in imports. Moreover, if inputs are imported directly without any intermediaries, imports tends to increase by 6.5%. Firms can take advantage from direct imports comparing to indirect because intermediaries are eliminated from the imports chain, reducing cost and time.

Minor and moderate transportation obstacles may decrease import correspondingly by 2 to 3 percent depending on the obstacle magnitude. Customs and trade regulation obstacles of the major magnitude increase import on average by 3.5%. This counterintuitive result will be explained later together with the results on informal payments and gifts.

Companies fully owned by foreign individuals tend to import 15% more, so there is quite a significant relationship between foreign ownership and the share of imported goods. Government subsidies provided over the last 3 years on average decrease imports by 9.6%. This may imply governmental protectionism policies when giving a subsidy.

Frequent and usual informal gifts and payments to deal with customs increase import correspondingly by 5 and 11 percent, being both significant at 99% level. Positive values can be explained by customs corruption. Informal payments facilitate import by loyalty of customs' officers. Furthermore, the more customs' procedures are the obstacle – the more payments are required, leading to increasing officers' loyalty and, after all, simplifying customs procedures.

Company size increase leads to the fall in inputs import from 8 to 13 percent for medium (22-99 employees) and large (more than 99 employees) companies

respectively with results significant at 99% level. The underlying explanation proposed is that large companies are more vertically integrated and have their own production lines to cover some of own demand in used inputs, having less need in imported goods. Moreover, having own inputs production line provides just-in-time production both to avoid extra storage costs and to assure certainty of supply.

Three out of five years (2005, 2008, 2012) have significant results, decreasing import comparing to 2002. Hence, such a radical change in significance for 2012 in interpolated sample is confirmed by the imputed one. Coefficients on both 2008 and 2012 years remained the same – decreasing the inputs import by about -12.5% comparing to 2002. However, in 2005, the import level was less than the level of 2002 on average by 1.9% - the difference is not as big as in the after-crisis years.

Constant term still captures almost two thirds of the variation in import. In order to improve model fit the underlying survey needs to be extended by additional questions concerning import (for example, cost to import, customs and other import duties, whether imported goods have a domestic substitute, etc.). Detailed statistics on imputed OLS results as well as comparison of all the obtained results can be found in Table 6 below.

Table 6. Comparison of all results

Variable	OLS	Interpolated	Imputed
CustDays	-0.1030**	-0.1378***	-0.1277***
ImDirect	5.7125***	6.3307***	6.4916***
TranspObs			
Minor	-2.5366**	-1.9802*	-2.2194**
Moderate	-2.6436*	-2.4521*	-2.7196**
Major	1.1880	-0.3223	-0.5361
Very severe	-5.8135	-1.4096	-1.8100
CustObs			
Minor	0.9941	0.5332	0.2938
Moderate	2.6621*	1.0024	0.5012
Major	5.4730***	3.8056***	3.5391***
Very severe	5.8667	1.6614	0.05604
Foreign	0.1324***	0.1456***	0.1480***
GovSub	-9.7180***	-9.9676***	-9.6474***
InformGift			
Never	-1.7794	-1.1457	-0.4029
Seldom	0.0123	-0.7218	1.7047
Sometimes	0.1620	1.0520	1.2670
Frequently	5.6522***	6.2796***	4.9810***
Usually	10.7114***	12.3435***	10.5246***
Size			
Med (20-99 empl)	-8.8708***	-8.3698***	-7.9423***
Large (>99 empl)	-14.6909***	-13.1631***	-12.8149***
Year			
2005	0.8701	-1.4169	-1.8614*
2007		0.5704	1.0796
2008	-12.3047***	-12.5362***	-12.8255***
2009	-1.0208	-1.9273	-2.1046
2012		-12.5660***	-12.3431***
const	65.7988***	65.2874***	64.9717***

legend: * p<0.05; ** p<0.01; *** p<0.001

4.4 Case of Ukraine

To investigate the effect of customs delays on importing decision of the Ukrainian firms we use the imputed sample of 250 companies (compared to benchmark sample of 145 observations without imputation). The results are close, but with some differences.

Every 10-day delay clearing the customs in Ukraine decreases the quantity of imports by 4.1%. Direct import is no longer a significant factor for imports share.

Only very severe transportation obstacles matter, decreasing imports by 46% as well as government subsidies that lower import by 32%. Apparently, Ukrainian government has implemented more severe protectionism policy than average across the whole sample. Firm size still matters – it decreases import by 14-17% according to the firm size (medium and large firms respectively comparing to small firms).

Full-foreign ownership increases import by 22%. While frequent informal gifts and payments decrease imports by 12% being significant at 90% level.

4.5 Tests

Breusch-Pagan test showed heteroscedasticity given the presence of a significant outlier in the sample (a large company from the Former Yugoslav Republic of Macedonia electronic industry in 2009 that imported 90% of its inputs and it took 300 days to clear the customs using direct import). Hence, I have excluded it from the sample and reestimated the regression as robustness check. However, all the coefficients proved to be stable under robustness check in both benchmark OLS and imputed OLS regressions with an effect on dependent variable within 0.5%. Moreover, we should emphasize that coefficient on days clearing the customs has increased in its absolute value to

0.22; hence, decreasing the imported inputs by 2.2% when talking about 10-days customs delay.

Ramsey test on omitted variables suggests no evidence of functional form misspecification. See the results in Table 7.

Table 7. Tests results

Statistics	Benchmark OLS	Interpretation
Breusch-Pagan test for heteroskedasticity. H_0: Constant variance	chi2(1)=9.57 P>chi2=0.002	We do reject H_0, so the residuals are heteroskedastic
Ramsey RESET test for omitted variables. H_0: no omitted variables	F(3,4470)=1.42 P>F=0.234	We cannot reject H_0, so there are no omitted variables

4.6 Policy implications

My results suggest that delays in customs clearance can decrease the share of imported goods. If we believe that this limits firms' choice in inputs and production decisions, the government should undertake policies that would reduce delays. First, corruption at customs' can be dealt with, but according to the obtained results, it is unclear whether entities will gain from this.

However, if government is primarily concerned in protectionism it could not be in its interest to deal with customs delays which eventually favor domestic producers of the comparable inputs.

Instead of longer customs procedures, some additional tariff may be negotiated with the World Trade Organization (WTO), a member of which is Ukraine. This is expected to have a similar effect on import, but the government will gain from additional cash flows, or additional working places may be created in

order to provide less time clearing the customs, creating a win-win situation. This can be compared to quota and a tariff, where customs-clearance time is a quota restriction. Tariff is always preferred to quota and their equivalence can be found. The size of the tariff cannot be calculated within my work due to insufficiency of data; hence, it may well be the topic for future research.

Chapter 5

CONCLUSIONS

After all the analysis, quite unexpected results were obtained, nonetheless, conjectural explanation was proposed. The variable of the main interest – days spent clearing the customs, appeared to be statistically significant, still having low marginal effect. Hence, every additional 10 days spent on customs will lower the probability of import by 1.6%. This and all further listed results are presented from the robust regressions on imputed sample.

Import is decreased on average by 3% in case of moderate transportation obstacles occurrence. While customs obstacles counterintuitively increase import. However, such obstacles are treated by informal gifts or payments that, in its turn, can even facilitate more trade.

Smaller firms tend to import more than larger ones as well as firms owned by foreign individuals. Furthermore, 100% foreign-owned firm would import more by 15%, ceteris paribus. While government subsidies lower import (by 10%) in order to protect domestic producers.

In the case of Ukraine, every 10-day delay clearing the customs decreases the quantity of import by 4.1% with no significant effect from direct import. Only very slight and very severe transportation obstacles matter, decreasing import by 7% and 47% respectively as well as government subsidies that lower import by 32%. Firm size decreases import by 14-17% according to firm size, while full-foreign ownership increases import by 22%. Regression model on Ukrainian firms has data only from 2002, 2005 and 2008 with no statistically significant differences from 2002 base year.

After all, it may be proposed to governments to implement some policies to reduce customs-clearance time, for example substitute long customs procedures by some additional customs duty. Surely, this is have to be

negotiated with WTO first. This is expected to have similar effect on import, but the government will gain from additional cash flows or from creation of additional working places in order to reduce time clearing the customs. However, if the government adheres to a protectionism policy, it may not be interested in facilitating import. The size of such a customs duty or tariff cannot be calculated within my work due to insufficiency of data; hence, it may be the topic for future research.

Corruption at customs' may also be somehow dealt with, but the effect on entities is unclear under given results. Anyway, government concerned about protectionism may win from eliminating corruption twofold.

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