

Permanent and temporary trade relationships

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Abstract

With a very detailed firm-product level dataset on Hungarian exports in the 1992-2003 period we provide evidence for the importance of temporary trade relationships, which otherwise, could not have been easily explained by existing trade models in a satisfactory way. Fragile or temporary trade is the focus of this work. Permanent trade in a product is a stable relationship between the sending and the destination country occurring at least several years in a row. Temporary trade is such a bilateral trade relationship in a product that is either fragile in nature or is short lived. Our results suggest that about two thirds of non-zero entries of the bilateral trade flow matrices are not permanent within a 4-year period. We ask four questions: how to interpret temporary trade relationships, how important is it empirically, why does it matter theoretically and what explains temporary trade.

Keywords: international trade, exporting, firm-product level data.

JEL classification: F23, F14, D21, R12, R30

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1 Introduction

Recent results (Besedes and Prusa, 2006) suggest that trade flows are surprisingly short at the bilateral level. Others (Eaton et al., 2007) have shown the large importance of one-time exporters at the firm level. Our aim in this paper is to relate firm-level phenomena to trade at the bilateral level. For this, we show that in a larger number of cases there are only very few firms behind each cell of the bilateral flow matrix. While matching and starting in small for test the reliability of trade partners, as suggested by Rauch and Watson (2003) and then tested empirically by Besedes (2006) may play an important role in it, we also propose another explanation: a large share of short-term trade is the consequence of one-time asset or inventory sales, rather than 'testing the waters' for new product exports. Finally, we try to characterise temporary trade flows: gravity variables and asset sales all play an important role in determining the stability of trade relationships.

In 2005 The US exported 8880 (10-digit) products (Baldwin and Harrigan, 2007) and has commercial relationship with basically all countries accounted for in trade statistics. Even a small open economy, like Hungary exported 7751 products in 2003 ¹ to over 185 countries. Yet, if one looks at trade flow matrices (of country-product pairs), 82% of cells will be found zero in the US and more than 90% in Hungary.

Besides the empirical importance of zeroes, bilateral trade flow data also shows that trade relationships are surprisingly fragile in nature. Products from a given country are often shipped to given destinations one year but are not the next. Considering all the cells in Hungarian bilateral trade flow matrices that were active at least one out of a four year period, only one-third was active for the entire period, i.e. one-third of trade relationships may be defined as permanent even in such a short period.

Indeed, it is the fragile or temporary trade relationship that is the focus of this work. Permanent trade in a product is a stable relationship between the sending and the destination country occurring at least several years in a row. Temporary trade is such a bilateral trade relationship in a product that is either fragile in nature or is short lived. Types of temporary trade include One-off and short time export relationships as well as "on and off export",

¹ To make this number comparable to the Baldwin and Harrigan (2007) results, we used the same HS-10 categorization and dropped all flows below 2500 USD

when (for instance) a bilateral trade relationship is active in one year, passive the next and then active again.

We find that about two-thirds of trade relationships are temporary, rather than permanent and this results is robust to many restrictions on the sample. In terms of value, the importance of temporary trade is smaller, but still very important: it varies between 10 and 12 percent for different years.

The fragility of trade relationships is quite interesting from the theoretical viewpoint. While there are some recent attempts to construct international trade theories that can explain zero trade flows, they are not able to explain temporary trade flows in a satisfactory way. There are several theories dealing with trade relationship with most suggesting some inactivity in selected relationships. For example, regarding bilateral trade flows between countries, an explanation for this phenomenon was suggested by Helpman, Melitz and Rubinstein (2007), who developed a model of international trade with heterogeneous firms. The model predicts positive as well as zero trade flows across pairs of countries. Importantly for this paper, the model also allows the number of exporting firms to vary across destination countries².

However, these theories would mostly predict that a trade relationship lasts unless it is shocked. In factor models of trade, comparative advantage is the key motivation for firms to export. In the case a country has no comparative advantage in a product to a type of countries, it will not export. Fluctuation is possible should conditions such as the terms of trade alter substantially leading to a loss of previously enjoyed advantage in production. In new trade theories, technology and demand matter allowing for intra-industry trade. Here, a shift in demand or an alteration of production technology leading to a loss of return to scale advantages would be considered a shock large enough for trade patterns to change rapidly. A third possibility, would be a shock to the cost structure making one-time fixed cost of exporting rise above the fixed cost thus making costs be higher than expected ex-ante and lead to a stop of exporting.

It will be shown that some two-thirds of trade relationships are very short-lived and fragile. There has been some empirical evidence on short spells, but we cover the temporary trade issue more broadly, and ask four questions: how

²In a rather different exercise, Armenter and Koren (2008) proposed an atheoretical approach suggesting that a randomized export pattern would indeed produce a large number of zeroes. Such random pattern would also produce short-lived relationships

to interpret temporary trade relationships, how important is it empirically, why does it matter theoretically and what explains temporary trade.

After showing the empirical importance of temporary trade, we try to look behind temporary trade relationships using a large Hungarian dataset for manufacturing firms in the 1992-2003 period. We show the importance of temporary exports of small firms, product switching by multi-product firms and the very important role of asset and inventory sales. While all these seem to be relevant, they have markedly different theoretical consequences.

Findings may also have policy relevance. For instance, the more important are unstable trade relationships by small firms, the more room there is for state intervention helping firms keep up trade contacts. However, if it is found that temporary trade is due to multinationals switching destinations and products, policy should have no place.

2 Data

The dataset covers export data from Hungary, for the 1992-2003 period. The data is structured at a firm-product-destination level and includes information on transaction value and quantity. Note that the Hungarian trade structure close to EU countries as suggested by Mayer and Ottaviano (2007) even if the concentration and role of large firms slightly higher in Hungary than in most EU countries. [more] For more on the Hungarian dataset, see Bks and Harasztosi (2008).

The data used for our empirical analysis were gained from the Customs Statistics. The dataset consists of all Hungarian exports between 2000 and 2003. One observation in the database is the export of product i by firm j to country k in year t . When analysing bilateral trade flow data, we aggregate this data up: one observation in this case is the export of product i to country j in a give year. When creating the explanatory variables, however, we start from the original data.

The product dimension of the dataset is very disaggregated; it is broken down to 6-digit Harmonized System (HS) level. We define a product as a 6-digit category, although using more aggregated (4-digit) categories does not change our results. "Motor cars and vehicles for transporting persons" is an example

for a 4-digit category, while "Other vehicles, spark-ignition engine of a cylinder capacity not exceeding 1,500 cc" is an example 6-digit category.

We aggregate up the data to the bilateral level. A trade flow, $\mathbf{F}(k, i)$, is a product*destination level observation, an export between one country, Hungary, and the target country k in a good i (i.e. Hungarian export of (HS6 cat) small motor vehicles to Slovakia in 2000). A trade relationship is a 4-year long set of flows, defined as $\mathbf{R}_4(k, i)$. In this paper, our focus of analysis is a cross-section of relationships, aiming at classifying trade relationships. Temporary trade flow is defined in regards to a country pair and a product as an occasion when trade occurred at least once but not in all years during a given period. Here, we consider a four year-long period of 2000-2003. Permanent trade is defined as a spell of at least four years of un-interrupted trade in a product-country-pair category. Inactive trade is case of no trade at all for such a period. In this work, we use Hungarian data and hence, one leg of the country pair will be Hungary.

3 What is temporary trade?

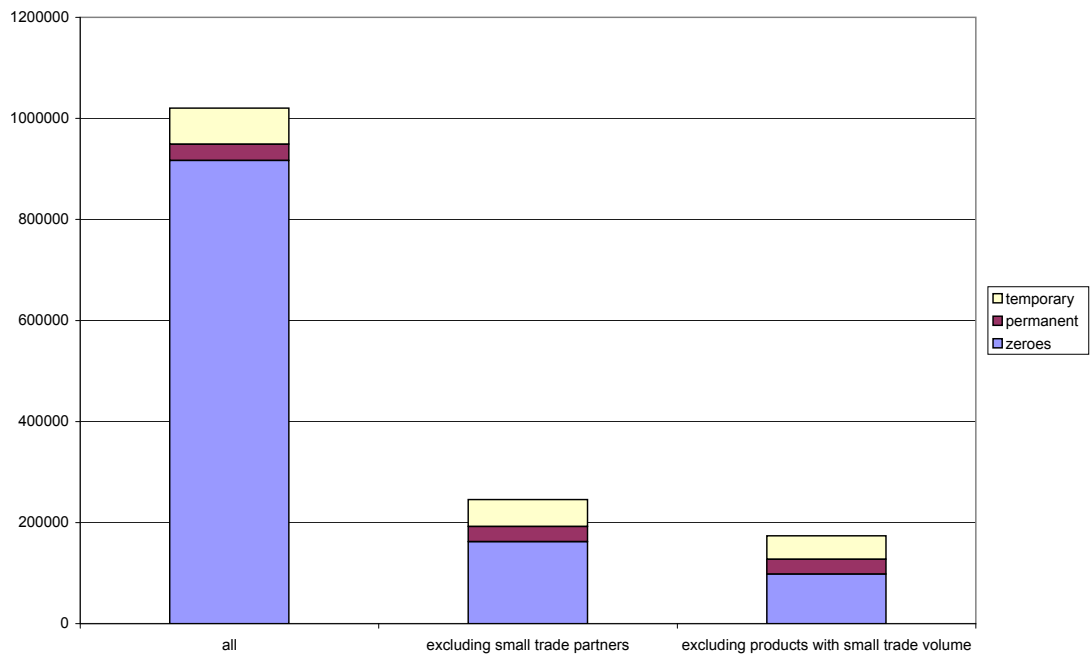
This section defines and presents the case for the importance of temporary trade relationships. As a start, we consider only the export direction of trade. In the economics literature a trade relationship has been either considered present or non-existent. Empirical evidence on international trade focused on testing how the present relationships relate to theoretical predictions by models such as the HOV or new trade theory.

First, clearly most cells of the bilateral trade flow matrices (i.e. all possible $\mathbf{F}(k, i)$ combinations are empty (e.g. Baldwin and Harrigan, 2007). However, only one-third of non-zero cells are permanently non-zero, the rest is only temporary present - i.e. we can observe one or more positive value between 2000 and 2003, but the cell was empty in at least one year. As another side of the same coin, is the instability of $\mathbf{R}_4(k, i)$ trade relationships as suggested by low predicted survival of such relationships both in the US and in our data.

Figure ?? shows the share of different cells in the Hungarian trade flow matrices. About 90% of possible trade flows are zeroes, but this number declines if one excludes products and destination markets of small importance (see next subsection). The figure also shows that about two thirds of the active cells

represents temporary trade.

Fig. 1. Number of cells with zeroes, permanent and temporary trade flows in Hungarian bilateral trade matrices



3.1 Frequency of zeroes in bilateral trade flow

Table ?? classifies the cells in the Hungarian bilateral trade flow matrix. First we turn to the importance of zeroes, then to temporary and permanent trade flows.

In the first row we consider all observations. To eliminate countries and products with marginal importance in Hungarian exports, in the second row we exclude countries with less than 0.1% of all Hungarian exports. In row three we also exclude product with very low export volume, less than 10,000 USD

Table 1
 Classification of cells in bilateral trade flow matrix

	# cells in bilateral matrix	active cells sometime between 2000-2003	permanent	temporary
all	1020273	103570	32203	71367
excluding countries with less than 0.1% of Hungarian exports	245712	83304	29891	53413
excluding countries with less than 0.1% of Hungarian exports and products with less than 10000 USD exports between 1999-2003	173856	75625	29267	46358
		share of active cells from matrix	share of per- manent cells from active cells	share of transitory cells from active cells
all		10.15%	31.09%	68.91%
excluding countries with less than 0.1% of Hungarian exports		33.90%	35.88%	64.12%
excluding countries with less than 0.1% of Hungarian exports and products with less than 10000 USD exports between 1999-2003		43.50%	38.70%	61.30%

between 1992 and 2003. The first column shows the total number of cells in the Hungarian bilateral trade flow matrix. The number of products is all products exported within the period under study. As the table shows, there are more than 1 million entries. If one excludes countries and products less important in Hungarian exports, the size of the matrix reduces to less than 175,000. The

second column shows the number of cells which were active any time between 2000 and 2003. This is 10.15% of the whole matrix, but increases to 43.5% of the restricted matrix. Baldwin and Harrigan (2007) reported for the United States that 82% of all potential trade flows were zeroes in 2005. To make a comparison, we add up the cells which were active 2003 and compare them with the bilateral trade matrix for 2003 (and not for 2000-2003), in which we only consider product which were exported at that year. This bilateral matrix has approximately 850,000 entries. From these, 7.4% was active in 2003. This shows that in a small country, like Hungary the importance of zeroes is even greater than for the United States.

3.2 Empirical results on short spells

There is not much international evidence on temporary trade as such but there is substantial evidence on short duration export of products. A recent strand of literature focusing on the product level shows that $\mathbf{F}(k, i)$ trade flows are surprisingly vibrant and volatile and hence, most $\mathbf{R}(k, i)$ relationships are predicted to be fairly fragile. A related issue to temporary trade is the duration of export spells, i.e. the length of a permanent $\mathbf{R}(k, i)$ relationship.

Besedes and Prusa (2006), for example, show that the median duration of exporting a product is between two and four years in the United States. Similarly, Nitsch (2007) shows that the same phenomenon can be observed in Germany - the majority of trade relationships exist for only one to three years.

.... Eaton et al.(2007) Firm-level trade flows in Columbia, large importance of one-time exporters and starting in small [more]

To answer such questions, we analyse the duration of trade. In this analysis, each observation refers to a country-product combination; the duration variable shows the number of years one can observe positive values for that entry to the bilateral trade matrices between 1992 and 2003.

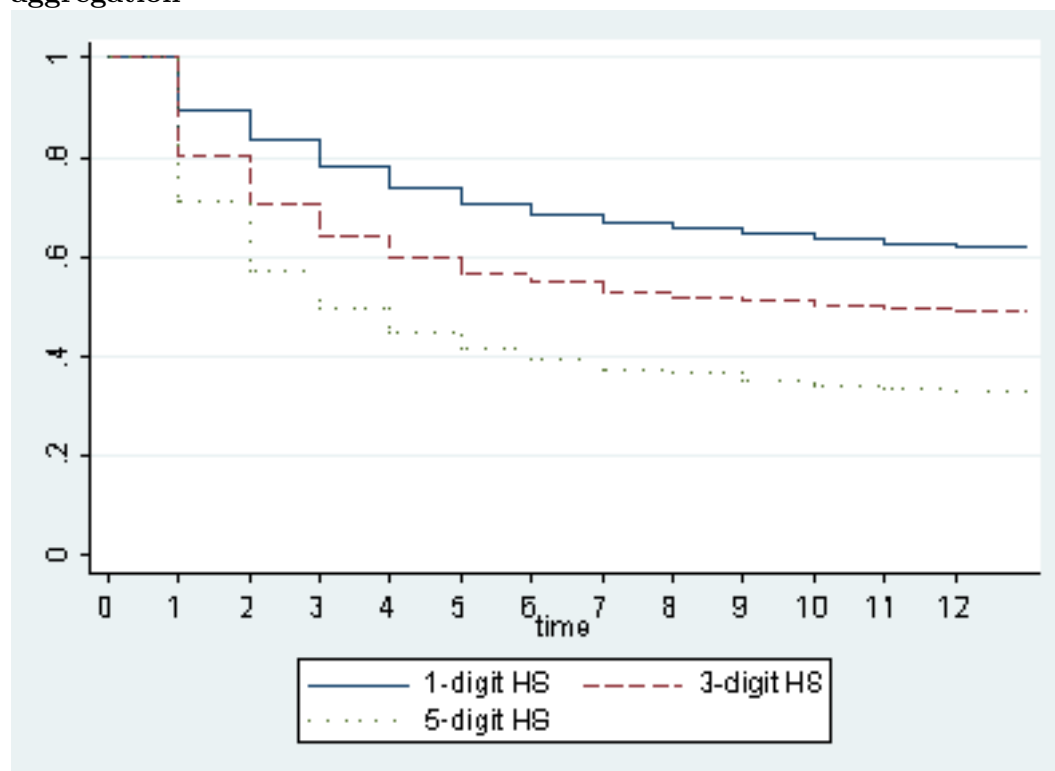
In the Hungarian data [?], it is striking that more than half of finished spells were only one year long, which suggests the very high incidence of short term exporting. Not only one-time exports are important: positive values for 2 and 3 years consist of 30% of all finished durations. However, this is close to international evidence. To show that, we estimated the Kaplan-Mayer survival functions for different levels of aggregation (Besedes and Prusa, 2006). Figure

?? shows the survival functions at the 5-digit, 3-digit and 1-digit Harmonised System level. The results are very similar both qualitatively and quantitatively to survival functions from the US. The median at the 5-digit level is two years in both economies. Survival rates are naturally higher at higher levels of aggregation. The most important quantitative difference can be seen at the short durations. One-year survival rates are significantly larger in Hungary than in the US. This rate is 0.57, 0.6 and 0.78 for 5-digit, 3-digit and 1-digit categories in the US, respectively (Besedes and Pruda, 2006 p. 281). In the Hungarian data 1-year survival rates are higher by about 0.1. Long-term survival rates, on the other hand are very similar in the two economies.

[a 3 vagy 5 digit mell ide kellene 6-digit, hogy szzevethet legyen a ksbbi sajt eredmnyekkel]

To conclude, survival analysis shows that 1 to 3 year trade flows are empirically very important. Also, while 1-year trade flows play an important role in temporary trade, there are a very large number of trade relationships which are 2 or 3 years long.

Fig. 2. **Survival functions for bilateral trade flows at different levels of aggregation**



Note: Sample period: 1992-2003.

The results in the previous section had shown the importance of temporary trade flows in the Hungarian trade data. The similarity between durations of trade flows between the two economies suggests that short term positive values should also play a similarly important role in the US. The results provide important evidence for the very dynamic nature of trade flows, which cannot be explained by one-time trade costs.

3.3 Share of temporary trade relationships

Most non-zero observations are not permanent exports, however. We distinguish between two categories. First, column 3 shows the number of permanent exports, i.e. entries which were positive in all years between 2000 and 2003.

The basic result suggests that about 2/3 of all bilateral relationships are temporary. While this definition is arbitrary to a large extent, several robustness checks confirmed that this figure is above 60%.³

First, it is a quite straightforward approach. Also, four years seems to be a long enough period to be meaningful, while there is a small probability that permanent trade flows end within this period. This time period is also consistent with the results of Besedes and Prusa (2007), who estimate the duration of trade relationships and find that the survival rates decrease rapidly in the first 4-5 years (to about 45-50%), and remain reasonably stable afterwards.

The choice of the time period also seems to be reasonable for us, as transition and the most important structural changes in the Hungarian economy already took place before 1999, thus the observed dynamic nature of trade relationships is not a consequence of transition, but the normal working of a market economy. Our results are also reinforced by the fact that the results do not change qualitatively for slightly different definitions.

As the table suggests, 69% of active cells were temporary in this period. This result is striking: more than two thirds of all trade relationships were not stable for a period of four years. Temporary trade is rather the rule and not the exception.

³The importance of temporary trade is smaller, but still significant when trade value is considered rather than the number of cells: it is between 10 and 12% in different years.

We consider several robustness checks to see if this figure is reasonable in general. We consider five possible checks: number of years, period of time chosen, composition of goods (the role of agriculture), dropping nuisance (i.e. very small) deals, and dropping far-away countries. First, for the 3-year period between 2001 and 2003, the share of temporary trade relationship is 60.5%, and it is 74.7% for the 5-year period between 1999 and 2003. For the more turbulent earlier period between 1996 and 1999, the ratio is 74.3%. Second, the share and size of temporary trade is certainly sizeable for all product categories, and it is certainly not just a consequence of agricultural fluctuations: if one restricts the sample to only manufacturing products⁴, the ratio of temporary trade is very similar (67.2%). Third, if we restrict the bilateral matrix only to important trading partners and products, the share of such fragile trade relationships decreases somewhat (to 61.3%), but it still remains extremely important. Fourth, the importance of temporary trade flows depends on the economic distance between Hungary and its trading partners, but the fundamental pattern is very similar to all country groups. For example, for EU-25 countries the share of temporary trade flows is 61.4% and it is 76.8% for other countries. Trade flows seem to be somewhat more fragile for more distant trading partners.

All in all, while there is considerable variation in the importance of temporary trade, the share of temporary trade relationships is above 60% when excluding small markets, minor products, consider only EU27 countries, exclude the food sector, replace 6-digit product category with the 4-digit NACE code, or take a 5-year long period instead of four year-long spells or even considering other time periods such as 1996-1999.

Theories explaining trade flows should not ignore a phenomenon of such empirical relevance.

3.4 Share of various patterns

In this paper, we focus on all temporary trade patterns not only short duration spells. There can be 1,2,3 non-zero years out of 4 years thus yielding different types of temporary trade (To control for potential errors, we added a +/- year window to generate the various categories.)

⁴ ISIC-rev2 headings 311-390.

Tables below present share of temporary trade types by various categories.

[more]

Table 2
Share of temporary trade types I.

	no obs (out of four years)	number of cases
1		39035
2		18099
3		14624
4		30606

Next, it is worth describing what is behind the temporary pattern. There are several potential pattern, even within the temporary trade category that may shed a light on why the frequency of such phenomenon. In addition to the empty and permanent trade relationships, we defined four additional categories, each of which may signal different cost structures trading firms face and behavior they pertain.

- Empty: no trade during 4 years
- One-off: 1 year out of 4
- Short: 2 or 3 years out of 4
- On and off: 1010, 1001, etc
- Start and stop: 1100, 0011, etc.
- Permanent: 4 years in a row

When setting the categories, we wanted to make sure that whatever we find is really temporary trade, rather than, say, the beginning of longer-term trade relationships. To see this, we looked at a four year period along with the year before and after the window. This allowed to filter out cases that seemed like a one-off trade but in fact, we observe the start of trade spell of unknown length. We found that the largest single category is the one-off, one-year long trade (i.e. trade in one year but not the rest⁵) One-off, one-year long activity is as frequent as permanent trade. One-off but longer activity, on-and-off pattern seem about equally important and so is start and stop. Overall, all various these patterns seem to matter with no single one dominating the whole process.

⁵ If activity occurred in the first year of the 4-year window, we excluded it should trade occurred in the preceding year, *mutatis mutandis* for the last year.

Table 3
Share of temporary trade types II

type	number of cases
one-off/short	40057
o/w one	30829
o/w two/three	9228
stop	6522
start	10814
on-and-off	14365
permanent	30606

4 What is behind temporary trade?

While the previous sections has shown the importance of temporary trade flows, it is also important to see the firm-level decisions behind them. This can shed some light on the appropriate theory which can explain both the importance of zeroes and instable trade flows. When looking behind temporary trade data we find that very often there are only few firms behind each cell, which shows the importance of firm-level decisions behind fragile trade flows. Also, gravity variables are strongly related to stability of trade flows. Further, we found that in a lager number of cases the exported good is not the product of the firm but it is asset or inventory.

After showing the importance of temporary trade, we propose a number of factors which may be behind the surprisingly dynamic nature of trade relationships, and we try to assess the empirical relevance of these factors using data at the very disaggregated level. First, we analyse the relationship between temporary trade and variables of the gravity equation. Distance and GDP should strongly affect that cost and payoff of trade, thus they may be important determinants of temporary trade.

Also, eyeballing of the data suggests, that a great number of trade relationships do not involve the product of the firm - it consists of sales of assets or inventories. The distinction between these categories may have interesting theoretical relevance.

Here we argue for three possible explanations for temporary trade

1. Not only an extensive margin issue
2. Fixed cost structure is not simple
- 3.

There is an important noise in data

4.1 Not only an extensive margin issue

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A related issue to profitability from trade and the marginal trade is the excessive margin of trade (i.e. the number of firms serving destinations). This has been analyzed in the modified gravity model with firm level self selection by Helpman, Melitz and Rubinstein (2007) who found that the extensive margin of trade is quite important. Felbermayr and Kohler (2007) explores intensive and extensive margins as well using post World War II manufacturing data and emphasise the importance of zeros. Linders (2006) investigated various econometric methods to account for zeros in trade.

When thinking on firm level phenomena behind country-product level survival, an important statistic is the number of firms behind the cells of the bilateral trade flow matrix. Table ?? shows the distribution of this, e.g. the number of firms export product i to country k in year t using the pooled data from 2000 to 2003. The most striking result is that we find only one firm behind 48.6% of the active cells; in only 7.6 percent of the cells can one observe more than 10 firms. This suggests that decisions of a small number of firms may lead to very important changes in the distribution of zeroes in trade flow matrices - firm-level variability may play a very important role in bilateral flow.

Not surprisingly, the number of firms behind a cell is strongly related to the duration of trade. Only 5.52% of cells with only one firm are permanent, compared with 57.3% when more than one firm exports in the cell (on average). Also, the vast majority of one-year-long trade relationships is present in cells when only one firm is present: there are more than 33,000 such cells compared with only 4,000 when more than one firm is present. However, as the numbers suggest, temporary trade is present in cells into which multiple firms export.

bra: number of firms behind (l. excel)

To sum up, we find that only one-tenth of all relationships is permanent when the relationship is served by one firm as opposed to only one-tenth of all relationships is temporary when the relationship is served by at least three firms.

Table 4
Number of firms in entries of the bilateral trade flow matrix

number of firms	Freq.	Percent
1	120,561	48.62%
2	42,882	17.29%
3	21,836	8.81%
4	13,645	5.50%
5	9,076	3.66%
6	6,753	2.72%
7	5,088	2.05%
8	3,847	1.55%
9	3,046	1.23%
10	2,451	0.99%
more	18,796	7.58%
Total	247,981	100.00%

Table 5
Number of firms in entries of the bilateral trade flow matrix

Number of firms	permanent	temporary	all
1	92	163 or more	<u>75</u>

bra: Share of permanent trade and the number of firms exporting to the cell
(l. stata bra

We can observe that temporary trade is most likely when only few firms serves a market. Further, temporary trade occurs even when large number of firms serves a market.

4.2 Fixed cost structure is not simple

There is a growing evidence in relation to the position and frequency of zeroes, looking at the role played by firms in explaining the zeroes. One related issue recently investigated empirically is addressing the firm level phenomena behind zeroes by considering 'marginal' trade relationships. Occasions when profitability from trade is just above zero proved to be surprisingly impor-

tant in terms of bilateral trade flow entries. [more] In addition to iceberg type trade costs fixed costs in production and trade offer further explanations for inactivity.

The workhorse model of most recent work on how firms become exporters follows Melitz and MHY in assuming that the most productive firms pay a substantial fixed cost and becomes exporter for good. Recent advances into the nature of fixed cost suggest that certain costs are related to individual countries and products (such as marketing) and thus, need to be paid over and over again. This paper aims at learning about stability of trade relationships thus, also learning about the nature of fixed costs.

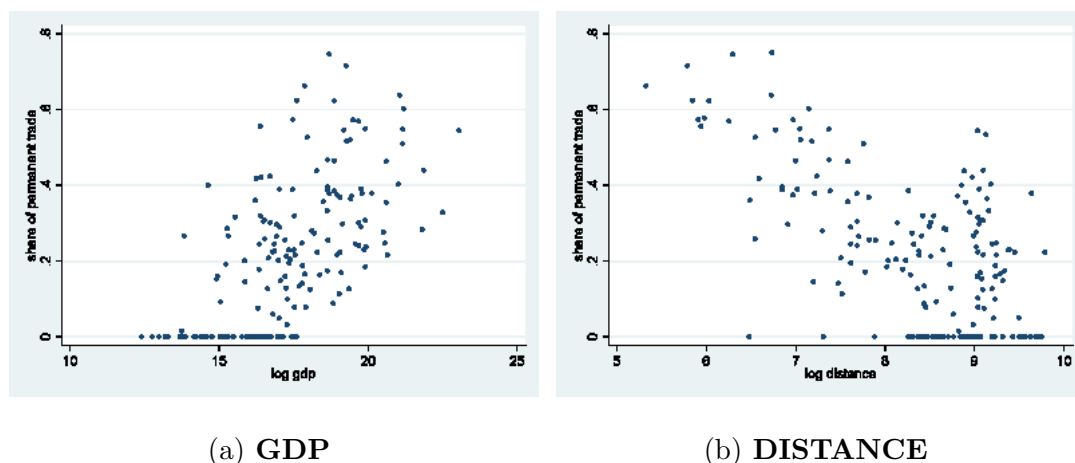
4.2.1 distance and temporary trade

One way to address this is to consider the relationship of distance and temporary trade

Export to distant markets requires higher fixed costs. Fixed cost/self-selection models predict that only most productive firms will export to distant markets, and these are the large stable exporters. Thus, the closer the market, the less trade shall be temporary as (i) the more firms can go into trade and (ii) the more likely they trade for many years.

In this subsections we provide some evidence that gravity variables play an interesting role in determining whether trade relationships are permanent. For the US, Bernard, Jensen, Redding, and Schott (2007) showed that distance has a strong negative effect on the number of products exported and that average sales of individual products is increasing with distance. Lawless-Whelan (2007) took this result and argued that this finding is consistent with models of heterogeneous firms and fixed costs associated with exporting to each market. For this, we calculate the trade fragility index, which is the share of products that were traded permanently for a given destination country. Figure ?? depicts shows the relationship between (log) distance, (log) GDP and this measure of fragility. The graphs clearly suggest that these variables are fundamental determinants of trade fragility: fragility increases with GDP and decreases with distance.

Fig. 3. Effect of gravity on trade fragility index



4.2.2 Possible explanations for temporary trade

[kell szerkesztgetni]

This paper will consider both the role of zeros in trade and the dynamism of product level exports and investigate the firm-level phenomena behind these dynamics. While acknowledging the overwhelming presence of permanent zeros in trade flow matrices, we investigate features of temporary versus permanent trade. Permanent trade is defined when there are no zeros in a (country-product) cell for given time period (between 2000 and 2003 in our exercise), as opposed to temporary trade that prevails when the cell is positive in some (but not all) years.

In particular, we identify reasons behind temporary trade relationships in two steps. First there may be few number of firms behind each country-product pairs. Second, after showing the importance of short export spells, we propose three factors behind temporary trade: instable exporting activity of single-product (exporting) firms, product switching of multi-product firms and trade in assets and inventories.

The first possible explanation is that small firms start and stop - they export whenever there is an opportunity to do so. Second, multi-product firms may switch their product portfolio frequently, and this adjustment can play an im-

portant role in export survival. Third, a great number of trade relationships do not involve the product of the firm - it consists of sales of assets or inventories. These explanations may have very different theoretical consequences. The aim of the paper is to quantify the role these features play in explaining dynamics of product level trade. Results may have important consequences for standard fixed costs theories.

About short-term trade relationships, a recent contribution is Rauch and Watson (2003). These authors argue, that when firms from developed countries try to find suitable trade partners in less developed countries, it can be optimal to 'test' potential foreign partners by starting small. They should only continue the relationship, if the potential partner successfully stood this test. They also analyse the relationship between starting small, risk and search costs. They also show that starting small can increase the expected duration of cooperation. Besedes (2006) test this model empirically using US trade data. He shows that initial size, risk and search costs play an important role. Higher reliability and lower search costs lead to larger initial transactions and longer duration. According to the empirical results, this relationship is true both for developed and less developed countries.

In case of small firm exports standard theories of exporting may apply - however the importance of short-term exports by small firms may suggest that usual theories of large and fixed trade costs are not that important in determining these kinds of decisions. Probably, theories assuming more flexible exporting technology (e.g. Arkolakis, 2007) are more relevant when describing the behavior of these firms.

In case of large firms, recently developed theories of multiproduct exporters (e.g. Bernard, Redding and Schott, 2007) may provide more relevant predictions than standard theories of single-product firms. It is possible that large multiproduct firms have a different cost structure to smaller single-plant firms and hence, they are less sensitive to the national cut-off point. Indeed, foreign owned firms, most of them being member of a multinational group, may

have paid a fixed cost of trade at a group level, and hence may enter trade more easily, even at a lower productivity level. In Hungary, a vast majority of exporter volume is carried out by foreign-owned firms. [more]

Table 6
Possible explanations

Theory/proposition	Empirical strategy
Different trading technology: Low fixed cost, high variable cost	-High export value -On and off pattern
Search-cost models - Starting in small	-One-off occasions by one firm -Small , domestic firms behind -Differentiated good (rather than homogenous)
Multi-product multinationals have different fixed costs	Multi-product firms Mixed pattern (on and off) Multinationals

4.3 *There is an important noise in data*

Eyeballing the data suggests that sales of different assets or inventories may provide an explanation for the large number of short export spells.⁶ For this reason, we tried to distinguish between the products of firms and other goods exported by them. It is not a straightforward exercise, however. One possibility is to classify the goods exported based on export value. This can be problematic, however, when high-value machines are exported⁷. In this pa-

⁶ Consider, for example a large firm producing mainly lamps. This firm exported more than 500 products. From these, 8 products are exported for most of the years for a very large number of countries. All these 8 products have the same HS-4 code, 8539, "electric filament or discharge lamps, parts". About 150 of the exported products are in the same two-digit category, 85, "electrical machinery and equip. and parts, telecommunication equip., sound recorders, television recorders". From the database it is quite obvious that the remaining very large number of exported products are mainly one-off exports, and has nothing to do with the main product of the firm. As a consequence, in the case of this firm we classify all products in the 85 HS-2 category as 'products' and everything else as 'other exports'

⁷ There may be several problems. For example, frequency alone fails to detect own products as larger goods may be exported infrequently by nature. There may be issues with large goods such as an assembly line.

per, we based our classification on the number of years and disaggregated product categories exported within the very broad 2-digit product categories. To this end, we first counted for every firm the number of the year-product (6-digit) combinations with positive exports for every HS 2-digit product category. We dropped all the firms, for which this number was below 6, as for these firms finding out the main export product category would lead to very noisy results.⁸ Then, we classified the HS 2-digit category with the greatest number of positive observations (positive 6 digit-product x year observation) as the 'product' of the firm, other product categories were classified as 'other exports'.⁹

When calculating these statistics, we use up information from all years, assuming that the same 2-digit product category remains the main product of the firm for all the period. This method is a crude one, but in our opinion it has a few good properties. First, each firm is categorized into a two-digit category, which is a very broad one. Goods from other 2-digit categories can also be products of the firm, but they are different in a large degree from the main product line of the firm. On the other hand, a number of assets and inventories may be classified as product because they are in the same 2-digit product category as the products of the firm. Despite all these caveats, this categorization seems to be useful in showing the qualitative importance of this phenomenon. Also, it is somehow reassuring that changing the details of this procedure does not lead to qualitative changes in our regression results.

This method shows that exporting other products plays a very important role in Hungarian trade. In 2003, 53% of all export observations (at firm-product-destination level) were not products of the firms. The revenue share of these products is somewhat lower, but still very large: 37.6%. More than a third of Hungarian exports is not coming from products which are the main activity of firms. At the bilateral level more than 36% of all export spells the exported good was different from the product of the firm. 87% of these trade flows very permanent.

The distinction between export products and other exports seem to be important in analyzing real trade data. Exporting assets, inventories and other goods is responsible for a very large number of temporary trade flows, and

⁸ The main results are qualitatively similar to slight modifications of this procedure. Changing the threshold number does not affect the results importantly. For example, applying 3-digit product categories or allowing more than one key product does not change our main findings.

⁹ As a consequence, this variable does not depend on t .

these flows may respond to very different incentives than trade of products.

5 Regression analysis: the determinants of temporary trade

In this analysis we aim at explaining determinants of the probability of a trade relationship being permanent for the 2000-2003 period. For this exercise we apply a probit model, where the dependent variable is whether the relationship is permanent (was present between 2000 and 2003). The sample consists of all entries of the bilateral trade matrix which were positive in at least one year between 1992 and 2003. An observation is a product*destination pair. The estimated equation is the following:

$$P(y_{ij} = 1) = \Phi(\beta X_{ij}) + \epsilon_{ij} \quad (1)$$

s The dependent variable shows whether the export is permanent, i.e. it takes the value of one, if the product was exported in 2003 and the 3 previous years and zero if the trade relationship is temporary (i.e. zero at least one year and positive for at least year). Explanatory variables include gravity, number of firms, main product, unit value, export value, whether the firm is multi product.

5.1 Explanatory variables

In this subsection we describe three types of explanatory variables: gravity variables, dummies and variables reflecting asset sales.

5.1.1 Gravity

In our regression, we included traditional gravity variables. We include the two most important variables from a gravity equation: log distance between the two countries¹⁰ and the export market's log GDP in 2003.

¹⁰ The distance is the weighted distance developed by Head and Mayer (2002) using city-level data, $\theta = 1$. The source of this data is CEPII.

5.1.2 Dummies

Besides the gravity equation variables we include a set of dummies which show the broad economic category of the good (the base category is consumer goods, and the dummies included are intermediate, capital and other goods).

5.1.3 Other variables

In further specifications we include other factors discussed earlier in this paper. We include the ratio of firms for which the product is an export product (vs. asset and inventory sales). We also include the log of unit value into our specifications as a proxy for transport cost. In the last specification we also include the number of firms exporting in the cell (average for years when the trade flow is positive).

Table 7
Results

	(1)	(2)	(3)
	all trade flows	only 1 firm	more firms
ln distance	-0.397*** (0.027)	-0.083*** (0.014)	-0.300*** (0.023)
ln gdp	0.163*** (0.015)	0.046*** (0.010)	0.133*** (0.012)
Observations	94738	49448	45290

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.1.4 Firm-level features

So far, we have mostly ignored the firms behind trade flows. Given the heterogeneity of firms (see ...), and consequently, different expected behavior by firms, we merged our dataset with that of trading firms (see BH 2008), and generated two key variable based on size and ownership. Small firms are defines as having sales of less than one million euros or employ less than 50 employees. Other are large firms. In 2000, out of a total of 6118 companies that exported, there were 1522 large exporters and 4584 small exporters. As for foreign share, 3623 (59%) were domestically owned, 1630 (27%) were fully owned subsidiaries, while 864 (14%) were partially owned by non-domestic residents.

Table 8
Results when only one firm is exporting

	(1)	(2)	(3)	(4)
ln distance	-0.085*** (0.014)	-0.108*** (0.013)	-0.107*** (0.013)	-0.103*** (0.015)
ln gdp	0.046*** (0.010)	0.055*** (0.009)	0.054*** (0.009)	0.021** (0.010)
unit value	0.005 (0.007)	0.002 (0.007)	0.002 (0.007)	0.008 (0.006)
export product		0.460*** (0.023)	0.455*** (0.023)	0.190*** (0.024)
multi-product firms			-0.183*** (0.070)	-0.171** (0.075)
average export value				0.179*** (0.005)
Observations	49350	47288	47288	47288

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9
Results when multiple firms are exporting

	(1)	(2)	(3)	(4)
ln distance	-0.301*** (0.023)	-0.317*** (0.024)	-0.265*** (0.019)	-0.254*** (0.022)
ln gdp	0.133*** (0.012)	0.137*** (0.013)	0.116*** (0.012)	0.078*** (0.014)
unit value	0.001 (0.004)	0.000 (0.004)	0.005 (0.004)	0.022*** (0.005)
export product (share of firms)		0.345*** (0.037)	0.348*** (0.031)	0.052** (0.022)
number of firms			0.053*** (0.003)	0.044*** (0.003)
average export revenue				0.142*** (0.006)
Observations	45290	45194	45194	45194

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Some of the firms exported a basket of goods while others sold one or only a few. In 2000, $x\%$ of firms were multiproducts, while z were single product firms. [Balzs ide]

5.2 Results

In Table ?? we present our baseline results using the gravity variables. The first column presents the results for the whole sample, and then we report regressions separately for cells with only one firm exporting and for cells with multiple firms.

The gravity coefficients play a significant and very strong role in determining which products are permanent exports. The coefficient of distance has a strong and negative effect. Long-distance trade relationships are less stable than short-distance ones, even when controlling for the number firms exporting. The economic size of the country has a positive impact: exports for larger markets are more likely to be permanent.

Table ?? reports the effect of other variables when only one firm is exporting to a cell. The unit value of the product does not seem to matter in this case. It is very important, however, whether the exported good is the product of the firm or other export (mainly assets and inventories). Such other exports are very much likely to be temporary. [?] The relevance of asset- and inventory sales suggests that in some cases the underlying motivations of exporting firms are very different from what is assumed in standard international trade models. Such decisions might be more relevantly modeled by investment or logistics decisions, which may have completely different motivations and determinants than what is usually assumed in trade theory. All in all, studying the empirical relevance of these 'non-standard' exporting motivations may provide important new predictions on important factors driving trade flows.

Multi-product firms are less likely to export permanently. These firms may change their product mix more frequently. [more]

Not surprisingly, larger export volume leads to more stable trade relationships. [more]

Table ?? reports the results of regressions for cells in which multiple firms export. Similarly to the previous specification, unit value does not have a

significant effect. Export product shows the share of firms for which the good is an export product and not other good. We find, that this variable has a strong positive effect. Also, the more firms export in a cell, the more likely the trade relationship to be permanent. Finally, export revenue also has a positive effect on the duration of trade. Interestingly, in the last specification unit value becomes significant: the larger the unit value is, the more stable the trade relationship is, controlling for trade revenue.

All in all, our results suggest that gravity-type models are able to shed some light on the stability of trade relationships. Both distance and gdp were highly significant in all cases. Some other variables also have important explanatory power in these regressions: whether the good is an important product of the firm, whether the firms are multi-product, the number of firms and export volume.

Table 10
Possible explanations

Theory/proposition	Empirical strategy	Empirical strategy
Fixed cost, self-selection	Distance negative on temp. Trade	NO
Different trading technology: Low fixed cost, high variable cost	High export value	NO
	On and off pattern	YES
Search-cost models - Starting in small	On-off occasions by one firm	YES
	Small , domestic firms behind	N/A
	Differentiated good (rather than homogen)	N/A
Multi-product multinationals have different fixed costs	Multiproduct firms	YES
	Mixed pattern (on and off)	YES
	Multinationals	N/A
Assets and inventories	Own products	YES

5.3 *Is changing comparative advantage affect temporary trade?*

As a robustness check, we inspect temporary trade more closely. So far we have ignored cases, when a cell becomes active in the middle of our 4-year period owing to permanent change in the economy such as alteration of comparative advantage, change of trade policies, or emergence of new markets such as the Russia. This would manifest in the data as a sequence of, say, [0 0 1 1], with conditions changed from 2000 to 2001. However, should this sequence be preceded by an active cell in 1998 or a non-active cell in 2004, this would be false alarm. Hence, to check the validity we selected occasions when such a sequence would be preceded by a 0 and followed by 1.

Now, regressions were rerun having subtracted such cases. Results indicate...

[majd eldntjk mit szeretnkn evvel]

6 Conclusions

Temporary trade is surprisingly important Often there is one or just a few firms behind entries of the trade flow matrix Permanent: larger and closer destinations Noise, in terms of inventory sales plays a large role

Several problems for fixed costs based theories results give no clear indication so far