EXPORT INSTABILITY AND THE IMPORTANCE OF BILATERAL TRADE FLOWS*

1. Introduction

Though international trade has been widely considered unstable and volatile, there is no generally accepted definition of trade instability, nor is there a universal indicator for measuring instability. Studies have used different approaches to measure instability. Some of the measures most commonly used in past studies include the average percentage deviation around a linear trend, the standard error of an exponential trend and the average percentage deviation around a five-year moving average (Binkley, 1987). Bridgman (2010) uses standard deviation of the percentage deviation from a Hodrick-Prescott trend in a seven year moving window. Love (1992) and Sinha (1999) use the absolute value of the actual export deviations from a five-year moving average of exports. Standard deviations are also used by Engel and Wang (2008). Yotopoulos and Nugent (1976) use squared deviations from an exponential trend index; they also designed a transitory index to measure instability, similar to Knudsen and Parnes (1975). Sinha (2007) and Baum and Caglayan (2009) apply GARCH models to determine trade instability. An interesting method was chosen by Mansfield and Reinhardt (2008), who consider four different measures of volatility, one of which takes into account only export drops that are higher than 50 per cent.

There is no one correct method of measuring trade instability (Lipková, 2011). Undoubtedly, standard deviation from linear trend should not be used if the trade has a clear exponential development, and vice versa.

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In this paper, we propose a simple indicator of trade instability. Unlike other studies, we base it on relative rather than absolute numbers; in other words we do not concentrate on annual changes in trade volumes, but rather on changes in the geographical structure of a country's foreign trade with specific focus on export instability. Our objectives are to find (1) a link between export instability and the country's share of world exports and (2) a link between export instability and the share of individual export flows on the country's total exports.

2. Measuring export instability

Export instability generally implies that annual volumes of a country's exports deviate from the long-term trend. In this paper, we take a different approach, based on the geographical structure of a country's exports. We consider a country's exports stable only if their geographical structure does not change in time. Conversely, the higher the variance in geographical structure of exports, the higher the export instability will be. Consider country A that exports goods to 10 countries and each of these countries has a 10 per cent share on the exports. Regardless of the changes in absolute value of the exports, if country A's geographical structure of exports remains the same in the next trading period, we consider country A's exports stable. If the geographical structure of exports changes, e.g. one of the countries gets a disproportional share of country A's exports, then the exports are unstable.

To determine instability of country A's exports to country B, we use the following equation:

$$inst_{AB} = (\Pi^{n}_{t=1} \{2 - [\min(X_{AB(t\text{-}1)}/X_{AZ(t\text{-}1)};\ X_{ABt}/X_{AZt}) / \max(X_{AB(t\text{-}1)}/X_{AZ(t\text{-}1)};\ X_{ABt}/X_{AZt})]\})^{1/n} \quad (1)$$

where X_{AB} stands for A's exports to B, X_{AZ} stands for A's total exports, t is current time period and t-1 is previous time period. By definition, $inst_{AB}$ takes values from 1 to 2, 1 being perfect stability and 2 perfect instability.

To calculate instability of country A's geographical structure of exports, we take the median value of all bilateral instabilities:

$$inst_{A} = MEDIAN\ (inst_{AB}, inst_{AC}, \ldots inst_{AX}) \quad (2)$$

Naturally, after substituting import (total trade) for export, equations 1 and 2 can be used for measuring import (trade) instability.

3. Export instability and a country's share of world exports

The data used to calculate instability indices were taken from the UNCTAD International Trade statistics (2012). We used annual export matrices for all countries and regions of the world for three five-year periods: 1995-2000, 2000-2005 and 2005-2010. We considered using a single time series of data from 1995 until 2010; however, this proved unsuitable, as complete data for the whole period was not available for numerous country pairs. All data was adjusted for inflation.

Table 1 - *Ten Regions with the Lowest Export Instability*

	1995-2000		2000-2005		2005-2010	
	Region	*inst*	Region	*inst*	Region	*inst*
1.	Dominica	1.157	Germany	1.159	Myanmar	1.006
2.	Germany	1.162	Netherlands	1.161	Guinea-Bissau	1.069
3.	Hong Kong	1.165	Nepal	1.162	Benin	1.149
4.	Netherlands	1.165	United Kingdom	1.163	Germany	1.157
5.	United Kingdom	1.173	Dominica	1.167	Spain	1.166
6.	Italy	1.178	Belgium	1.171	Taiwan	1.166
7.	USA	1.184	Singapore	1.172	China	1.167
8.	Sri Lanka	1.188	China	1.174	Belgium	1.170
9.	Singapore	1.190	Italy	1.176	USA	1.171
10.	Taiwan	1.192	France	1.179	Vietnam	1.175

Note: only regions with complete trade data for at least 10 export partners were included in the analysis. The majority of regions had complete trade data for more than 100 export partners, except Dominica (19 and 21 partners), Nepal (40), Myanmar (89), Guinea-Bissau (22), Benin (78) and Vietnam (80). Complete data is available upon request.

Source: own calculations based on UNCTAD data.

The regions with the lowest export instability tend to be countries whose share of world exports is high (table 1). While this tendency is not absolute, the results obtained from linear regression analysis indicate there is a negative link between instability of a country's geographical structure of exports and its share of world exports (table 2).

TABLE 2 - *Regression Statistics 1 – Country's Share of World Exports*

	1995-2000	2000-2005	2005-2010
Multiple R	0.6761	0.7305	0.6517
R Square	0.4571	0.5336	0.4248
Adjusted R Square	0.4543	0.5313	0.4220
Standard Error	0.0255	0.0255	0.0324
Observations	196	201	205
Significance F	< 0.01	< 0.01	< 0.01
Intercept	0.1083	0.1081	0.1041
P-value	< 0.01	< 0.01	< 0.01
X Variable 1	-0.0206	-0.0223	-0.0210
P-value	< 0.01	< 0.01	< 0.01

Source: own calculations based on UNCTAD data.

From a purely statistical point of view, the link is not strong. However, we can look at export instability of the largest exporters and their counterparts to get a clearer picture. In the period 2000-2005, out of the export instabilities of the 25 countries whose share of world exports exceeded one per cent, all were lower than 1.4. In addition, out of these countries, only Mexico's and Russia's export instabilities were higher than 1.3. On the other end of the list, 26 countries with lower than 0.001% share of world exports had export instabilities of 1.4 or higher (the only exceptions being Dominica and Cook Islands). This further hints at the existence of a link between the two variables.

4. EXPORT INSTABILITY AND THE IMPORTANCE OF BILATERAL TRADE FLOWS

We will now focus our attention on bilateral trade flows. Using equation 1 and UNCTAD data, we can calculate export instabilities for all country pairs for three five-year periods: 1995-2000, 2000-2005 and 2005-2010. We then calculate the share of each country pair in total exports of the exporting country.

Linear regression analysis using all data shows no link between trade instability and the share of particular export flow in a country's total exports. Therefore, we will perform separate regression analyses for five different types of trade flows depending on their share in the country's total exports (table 3).

TABLE 3 - *Regression Statistics 2 – Importance of Bilateral Trade Flows*

Share	Period	Multi. R	R square	Adj. R sq.	St. error	Observ.	Intercept	X Var.
All flows	*1995-2000*	0.3961	0.1569	0.1568	0.0566	16855	0.0609	-0.0120
	2000-2005	0.4128	0.1704	0.1704	0.0597	19323	0.0556	-0.0219
	2005-2010	0.4110	0.1689	0.1688	0.0596	21164	0.0540	-0.0211
> 1%	*1995-2000*	0.6722	0.4519	0.4518	0.0419	4402	-0.0165	-0.0309
	2000-2005	0.6646	0.4416	0.4415	0.0428	4713	-0.0197	-0.0306
	2005-2010	0.6700	0.4490	0.4489	0.0421	5363	-0.0139	-0.0298
0.1-1%	*1995-2000*	0.6038	0.3646	0.3645	0.0476	5239	0.0191	-0.0304
	2000-2005	0.6314	0.3986	0.3985	0.0486	5616	0.0085	-0.0323
	2005-2010	0.5731	0.3284	0.3283	0.0515	6348	0.0226	-0.0285
0.01-0.1%	*1995-2000*	0.4715	0.2223	0.2222	0.0515	5059	0.0645	-0.0247
	2000-2005	0.5177	0.2680	0.2679	0.0529	5977	0.0553	-0.0276
	2005-2010	0.4404	0.1940	0.1938	0.0577	5773	0.0614	-0.0228
0.01-0.001%	*1995-2000*	0.4179	0.1746	0.1741	0.0523	1653	0.0953	-0.0235
	2000-2005	0.4652	0.2164	0.2161	0.0548	2202	0.0861	-0.0264
	2005-2010	0.3702	0.1371	0.1367	0.0588	2721	0.0884	-0.0198
< 0.001%	*1995-2000*	0.3705	0.1373	0.1355	0.0524	502	0.1237	-0.0226
	2000-2005	0.3665	0.1343	0.1333	0.0540	815	0.1280	-0.0210
	2005-2010	0.1852	0.0343	0.0333	0.0635	959	0.1464	-0.0111

Note: P-value for all data: < 0.01. F significance for all models < 0.01.
Source: Own calculations based on UNCTAD data. All data was log transformed.

Results of the regression analyses are not unexpected. They show that the more important the bilateral export flow is for the country, the more predictable and stable it is. On the contrary, instability of bilateral export flows of low importance is unpredictable.

5. CONCLUSIONS

Our research suggests that the magnitude of changes in the geographical structure of a country's exports is linked to the country's share of world exports. Major exporting countries tend to have a stable geographical structure of exports, while small countries with little importance in global trade have higher levels of export instability. Countries with the most stable geographical structure of exports include China, USA, Germany, Singapore and the Netherlands.

On the bilateral-trade-flow level, there is no significant link between export instability and the share of individual export flows on a country's total exports. However, a substantial variance is observed between export flows of different importance. If we take into consideration only the most important bilateral export flows (those with the share of a country's exports higher than 1 percent), a negative link between the level of export instability and the share of a country's exports is observable. Instability of less important export flows seems to vary greatly and is therefore unpredictable.

The results of our research are potentially significant for governments aiming to efficiently conduct their export promotion policies.

Martin Grančay
University of Economics, Faculty of International Relations, Bratislava, Slovak Republic

Nóra Szikorová
University of Economics, Faculty of International Relations, Bratislava, Slovak Republic

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ABSTRACT

This paper suggests an alternative way of measuring export instability, based on changes in the geographical structure of a country's exports. Regression analyses indicate that there is a negative link between the level of export instability and the country's share of world exports. On a bilateral-trade-flow level, a link between export instability and the share of individual trade flows in a country's total exports weakens with the falling importance of examined trade flows.

Keywords: International Trade, Trade Volatility, Trade Instability, Export Instability, Bilateral Trade Flow

JEL Classifications: C40, F19, F40

RIASSUNTO

Instabilità dell'export e importanza dei flussi commerciali bilaterali

Questo studio propone un metodo alternativo per la misurazione dell'instabilità dell'export basata sulle modifiche nella struttura geografica delle esportazioni di un dato paese. Le analisi di regressione indicano che c'è una relazione negativa tra il livello dell'instabilità delle esportazioni e la quota di export mondiale relativa al paese in esame. A livello di flussi commerciali bilaterali, il legame tra l'instabilità delle esportazioni e la quota individuale sul totale export di un paese si indebolisce con il diminuire dell'entità dei flussi considerati.