Export Survival and Comparative Advantage

(Work in progress)

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Overview

- **Export growth can be boosted**
  - By exporting more of existing products (at the intensive margin)
  - By exporting more new products (at the extensive margin)
  - By fewer failures of exports (at the sustainability margin)
- Extensive margin growth is more important than intensive margin growth
  - Hummels & Klenow (2005), Pham & Martin (2007), Brenton & Newfarmer (2007, 2009)
- Durations of export relations are very low: median export spell length is one to two years
  - Besedes & Prusa (2006), Nitsch (2007)
- Therefore the key element to achieving higher export growth are longer bilateral trade-relationships and higher survival rates of those.
  - However product churning is necessary to select core products
- It is important for the design of export-promotion policies to search for robust and policy related determinants of export survival.

Research question

- What is the role of comparative advantage in Export Duration?

Outline

- Overview
- Literature on Export Survival Determinants
- How to define the product with Comparative Advantage?
- Export duration: Prima-facie evidence
- Survival Analysis
- Results: Stratified Cox PH Model estimation
- Conclusion

Empirical Studies on Export Survival

- Seminal work of Besedes & Prusa (2006a)
- Nitsch (2009)
  - - using 10 year panel of German Imports he found that gravity variables influenced the duration of trade flows
- Fugazza & Molina (2009)
  - extended the panel of bilateral flows between 96 countries using, as regressors, gravity variables and time required for export procedures as proxies for fixed costs.
- Obashi (2009)
  - found that vertical relationships have lower hazard rates than the exports of final goods and that they are less sensitive to trade costs
- Growing number of papers have used firm-level datasets:
  - Gorg et al. (2008) have found that longer survival for products located close to the firm's core competencies and to the country's comparative advantage by using Hungarian firm level data,
  - Carballo & Volpe (2008) studied how diversification strategies affect survival of firm level activity by using Peruvian firm level data.

Role of Comparative advantage in Export Survival: How to define the product with comparative advantage?

- Identify comparative advantage of a product is one way of providing guidance of supporting a particular sector (pick winners)
- However as the traditional measure Balassa's RCA index defines country's current trade pattern, it cannot be used
- UNCTAD developed an alternative approach by building a recent database on Revealed Factor Intensity Indices at the Product Level. It extended the PRODY index developed by Hausman, Hwank and Rodrik (2005) to Revealed Factor Intensities.

Revealed Factor Intensity Indices

- Methodology inspired by Hausmann, Hwang & Rodrik (2007)
- RFII for each traded good is calculated as a weighted average of the factor abundance of the countries exporting that good.

$$RFII_k(t) = \sum \omega_k^i e^i$$

$$e^i \Rightarrow \{k^i, h^i, l^i\}$$

- Weights are a variant of Balassa's RCA indices

$$\omega_k^i = \frac{X_k^i / X^i}{\sum_i \left(X_k^i / X^i \right)}$$

Distance to Comparative Advantage

- Eucleadean distance between the vector of the country's endowments and the vector of the product revealed factor intensity
- We standardized the absolute differences between the product factor intensities and the country's factor endowments to have zero mean and unit variance.

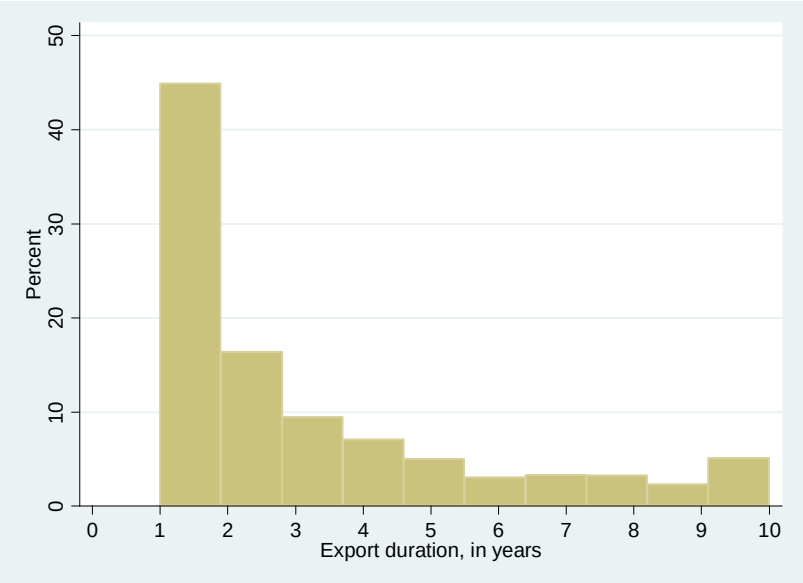
$$D_{ck} = \sqrt{std(k_c - \hat{k}_k)^2 + std(h_c - \hat{h}_k)^2 + std(l_c - \hat{l}_k)^2}$$

k_c, h_c, l_c -country's human capital, capital and land endowments

$\hat{k}_k, \hat{h}_k, \hat{l}_k$ -revealed factor intensities of product k

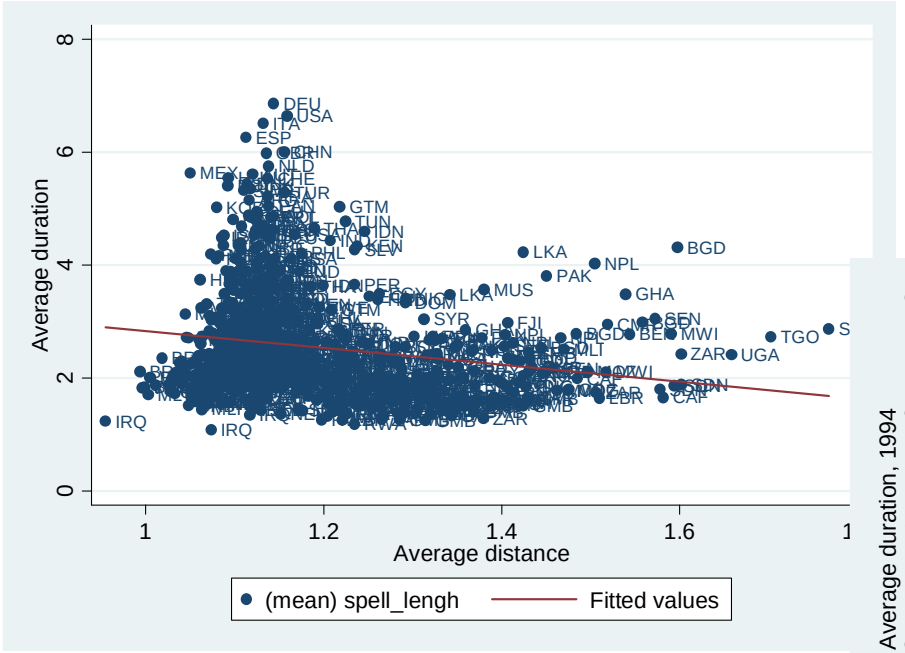
Export duration: Prima-facie evidence

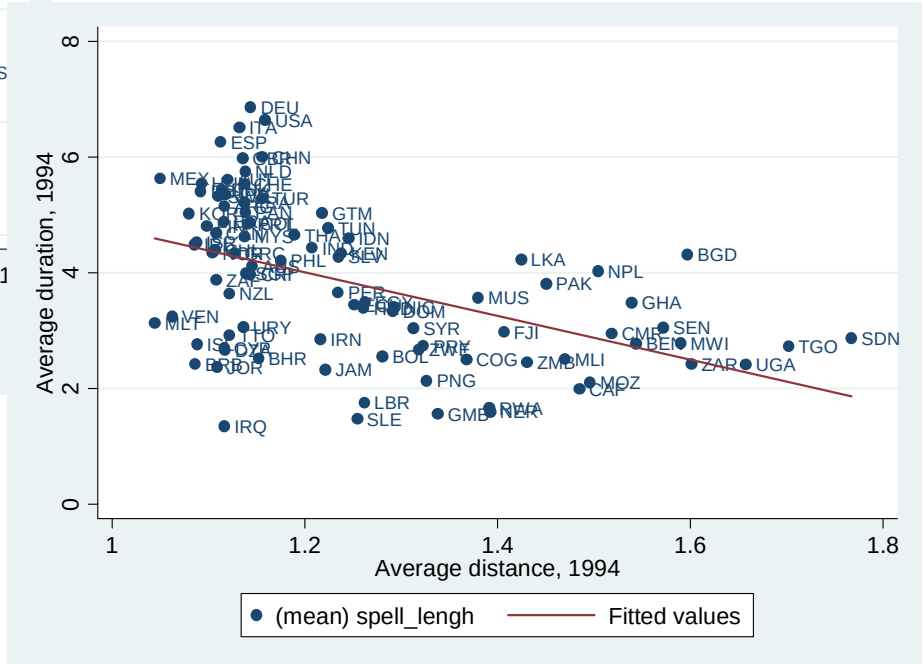
Distribution of Export duration, uncensored observations



	time at risk	Incidence rate	No. Of subjects	Median duration
Whole sample	***23'417'160***	***17%***	***7'819'052***	***2***
Northern countries	*15'323'754*	*16%*	*4'785'047*	*2*
Developing Countries	*7'906'207*	*19%*	*2'932'031*	*2*
LDCs	*187'199*	*35%*	*101'974*	*1*
DCs and LDCs by regions				
Africa	*1'003'121*	*25%*	*434'223*	*1*
Americas	*1'955'757*	*23%*	*766'385*	*1*
Asia	*5'134'528*	*18%*	*1'833'397*	*2*
Asian by region				
Eastern Asia	*1'741'382*	*13%*	*543'764*	*2*
Pacific Asia	*22'379*	*32%*	*11'199*	*1*
South Asia	*1'008'432*	*21%*	*394'696*	*1*
Southeast Asia	*1'737'659*	*20%*	*649'231*	*2*
Western Asia	*624'676*	*19%*	*234'507*	*2*

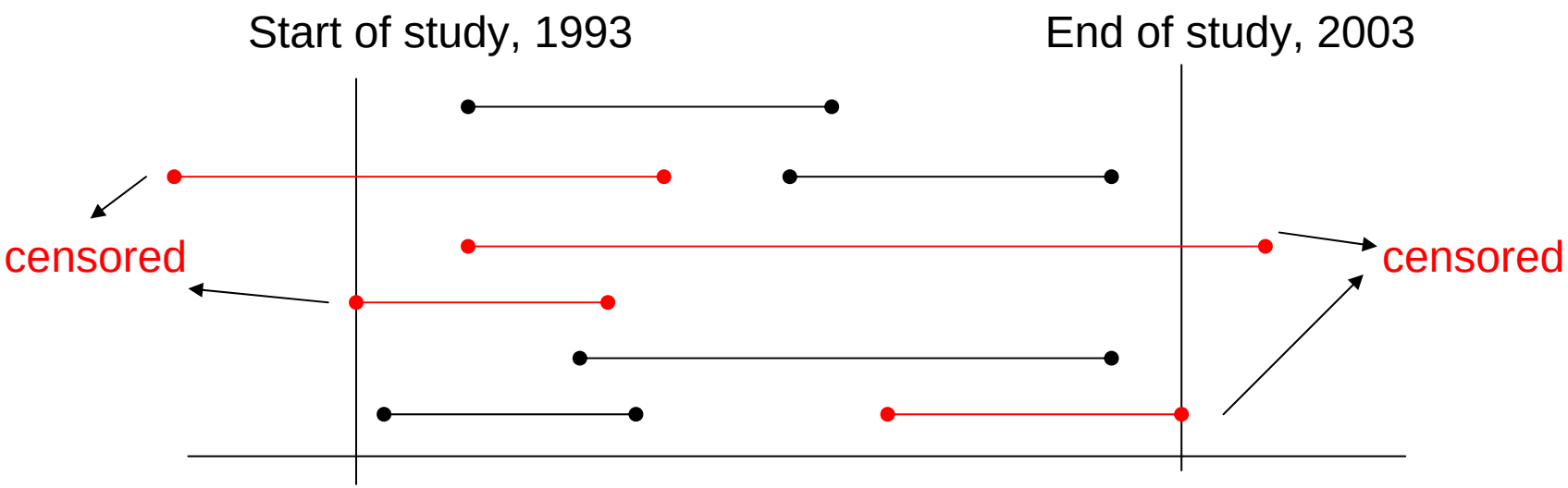
Export duration and Comparative advantage: Prima-facie evidence





Survival Analysis: Introduction

- Allows us to focus on the long-term sustainability of trade relationships
  - Export duration represents the number of years during which country c exports k products to its partners
- Allows us to deal with non negative survival times and their skewed distributions
- Allows us to deal with censored observations



Survival Analysis

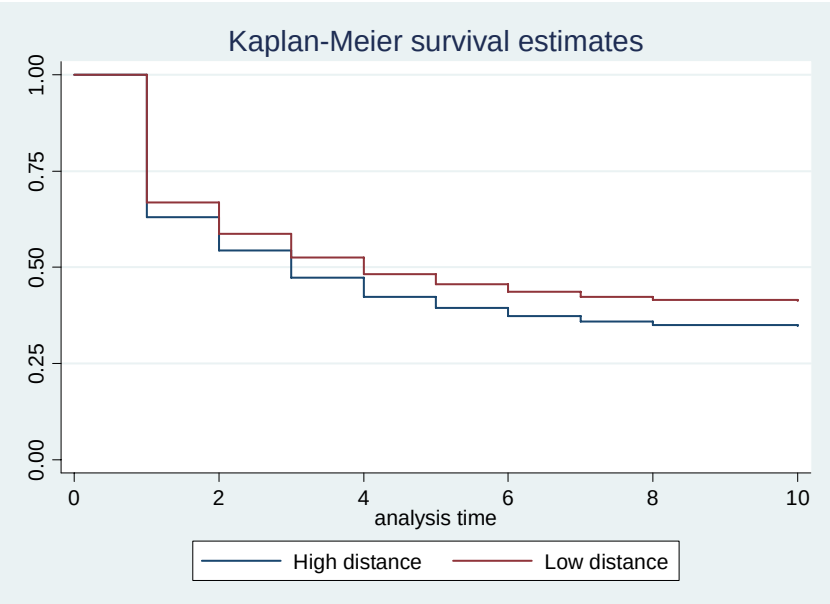
Examine the relationship between survival times distribution and some covariates of interest.

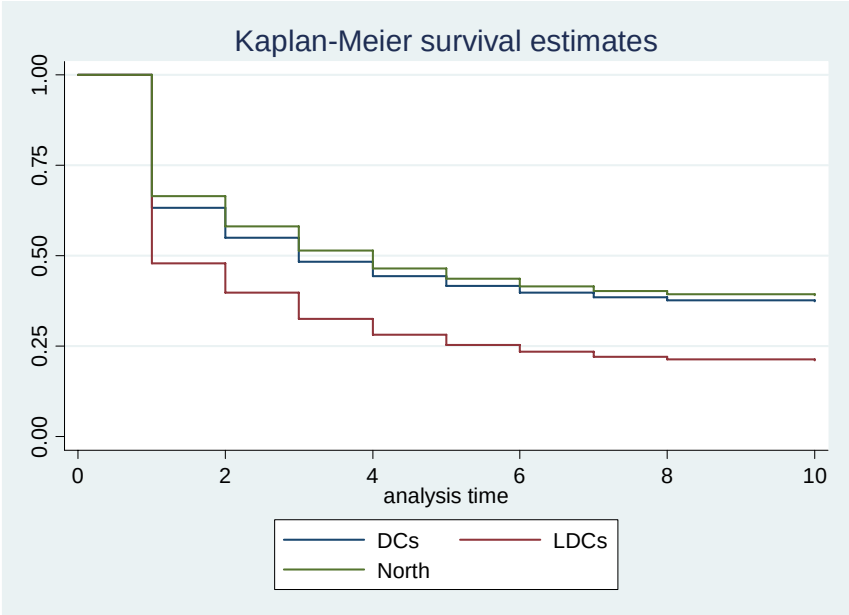
- Non parametric: Kaplan Meier Survival Estimation
- Semi-parametric: Cox Proportional Hazard Model
- Database
  - on bilateral trade flows from 1993-2003
  - 93 exporters (26 North countries, 49 DCs and 18 LDCs)
  - Distance to comparative advantage (UNCTAD data on Revealed Factor Intensity Indices at the HS 6 digit level)

Non-parametric Analysis: Kaplan Meier

$$\hat{S}(t) = \prod_{t_j \le t} \left(\frac{n_j - d_j}{n_j} \right)$$

The probability that a trade relationship will survive longer than time t.





Semi-parametric Cox Proportional Hazard Model

The Cox Proportional Hazard regression model is given by

$$h\langle t \,|\, X \rangle = h(t)\exp(X_1\beta_1 + ... + X_p\beta_p)$$

- The predictors, $X_1,...X_p$ are assumed to act additively on $\log h\langle t \,|\, x\rangle$.
- $\log h\langle t \,|\, x\rangle$ changes linearly with the β s.
- The effect of the predictors is the same at all times t.
- Makes no assumption about the form of $h(t)$

The Stratified Cox Model allows the form of the underlying hazard function to vary across levels of stratification variables.

$$h\langle t \,|\, X, Z = j\rangle = h_j(t)\exp(X\beta),\ j = 1,...C \text{ (number of levels in Z)}$$

Estimation results: Comparative Advantage

Stratified Cox Proportional Hazard estimation

	All	Northern Countries	DCs	LDCs	Asia
Initial export (log)	0.964***	0.972***	0.948***	0.952***	0.945***
	(-9.14)	(-7.53)	(-9.11)	(-4.45)	(-6.37)
Distance (log)	1.093***	1.091***	1.087***	1.175***	1.062***
	(14.49)	(12.19)	(6.61)	(4.57)	(3.69)
Market Diversification (log)	0.271***	0.230***	0.318***	0.526***	0.260***
	(-14.94)	(-10.52)	(-11.17)	(-5.13)	(-10.73)
Product Diversification (log)	0.293***	0.388***	0.199***	0.568***	0.182***
	(-9.11)	(-5.09)	(-10.47)	(-3.29)	(-9.22)
Observations	7,819,052	4,785,047	2,932,031	101,974	1,833,397

Robust z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Fixed effects are controlled by stratifying at exporter, importer and product
Clustered by reporter

$$\beta^{\ln(10)} - 1 = 1.093^{Ln(10)} - 1 = 1.227 - 1 = 0.227$$

Estimation results: Export Diversification

Stratified Cox Proportional Hazard estimation

	Model 1	Model 2	Model 3	Model 4	Model 5
Initial export (log)	0.962***	0.964***	0.964***	0.966***	0.964***
	(-8.48)	(-9.14)	(-9.18)	(-8.49)	(-9.18)
Distance (log)	1.161***	1.093***	1.046	1.067	1.046
	(23.62)	(14.49)	(0.9)	(1.35)	(0.9)
Market Diversification (log)		0.271***	0.269***	0.266***	0.269***
		(-14.94)	(-14.97)	(-14.81)	(-14.97)
Product Diversification (log)		0.293***	0.294***	0.291***	0.294***
		(-9.11)	(-9.11)	(-8.99)	(-9.11)
Distance (log)*Market Diversification(log)			1.067***	1.069***	1.067***
			(10.53)	(10.71)	(10.53)
Distance(log)*Product Diversification(log)			0.979***	0.976***	0.979***
			(-3.41)	(-4.25)	(-3.41)
Stratified by					
Exporter	yes	yes	yes	yes	yes
Importer	yes	yes	yes	yes	yes
Product (HS 6 digit)	yes	yes	yes	yes	yes
Clustered					
Exporter	yes	yes	yes	yes	yes
Importer					
Observations	7'819'052	7'819'052	7'819'052	7'045'032	2'527'787

Robust z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Conclusions

- Median export duration is 2 years for the whole sample (7’819’052 obs)
- Initially large exports will have longer duration
- Robust negative relationship between the distance to comparative advantage and the export survival.
- Further robustness check using Parametric Survival (Duration) Models

Thank you very much