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The Impact of Trade on Start-up Size of Firms: The Case of Kenya

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This thesis adds to the existing literature of trade and its relation to the heterogeneity of firms in local economies. The analysis looks at the dynamics of start-ups in the tradable sectors of Kenya's economy. Analysing size of start-ups in the Kenyan economy (as opposed to a productivity measure approach) is possible due to a field study in Nairobi 2011. By using this approach the empirical analysis of this thesis emerges on an under-researched area within the trade and firm heterogeneity literature, as it is able to include small size firm data that few researchers have done so far. The analysis confirms previous findings, that start-up rate of firms in the tradable sectors are positively related to exports. However, it rejects the theory that start-up of larger firms would be more strongly correlated with exports than smaller firms. Using fixed effects regression analysis as well as an instrumental variable approach, it is shown that imports is not more strongly correlated with start-ups of large firms than medium sized firms. It is also shown that unobserved local economy effects leads to a negative correlation between small size firms and imports volumes, which confirms traditional trade theories for small firms.

Keywords: Trade, Kenya, Start-up, Size, Firms, Heterogeneity.

Tutor: Yoichi Sugita

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Prologue

Spending two months in Nairobi, the heart of economic activity in Kenya this summer was a truly inspiring experience. Everywhere I went and everyone I talked to could relate to my project: from the taxi driver to the assistant manager at the Kenyan Treasury. They all respected my will to investigate how their economy is affected by the surrounding world it interacts with, and they all had suggestions on *what* I should focus on. The strong belief in a prosperous future that I encountered in Kenya is something I have not experienced in many corners of the world. Everywhere I went people were discussing economics, with each other and with me. Maybe not in economic terms, but they were all discussing how Kenya must interact with the world in order to grow. This is not the story of my stay in Kenya, but because I stayed there, I found it even more important to finish this research project and contribute, if only a little to the understanding of how my taxi driver and my neighbour, the safari tour guide, is affected by the fact that Kenya is interacting with the rest of the world.

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List of Abbreviations

2SLS	Two Stage Least Square
ACP	Africa Caribbean Pacific States
AGOA	African Growth Opportunity Act
BEJK	Bernard Eaton Jensen Kortum
BJRS	Bernard Jensen Redding Schott
CCN	City Council of Nairobi
CEN-SAD	Community of Sahel-Saharan States
COMESA	The Common Market for Eastern and Southern Africa
EAC	East African Community
FDI	Foreign Direct Investments
GDP	Gross Domestic Product
GSP	Generalized System of Preferences
IBRD	International Bank of Reconstruction and Development
IFC	International Finance Corporation
IMF	International Monetary Fund
KNBS	Kenya National Bureau of Statistics
MEAC	Ministry of East African Community
MFN	Most Favoured Nation
OLS	Ordinary Least Squares
SITC	Standard International Trade Classification
SME	Small and Medium Sized Enterprises
SSA	Sub-Saharan Africa
TRAINS	Trade Analysis Information System
TTRI	Tariff Trade Restrictiveness Index
UNCTAD	United Nations Conference of Trade and Development
UN COMTRADE	United Nations Commodity Trade Database
USA	United States of America
WEO	World Economic Outlook
WITS	World Integrated Trade Solutions
WTO	World Trade Organization

1. Introduction

The relationship between trade and local economy effects is a well-researched area in economics. However, the methodology of how to investigate the effects of trade has evolved over time. The interest in "firm level" effects of trade liberalization is a research area that has evolved rapidly in the past ten years (Greenaway Kneller 2007). Studies vary from focusing on long-term to short-term productivity effects, wage effects, labour productivity and lately also firm heterogeneity effects of trade-liberalization (Pavcnik 2002) (Trefler 2004). Melitz (2003) was the first to model firm heterogeneity as an improvement on Krugman's (1980) widely acknowledged model of intra-industry trade. Melitz (2003) models a scenario of non-monopolistic competition and introduces firm heterogeneity by describing the reallocation of firms within a sector as an effect of trade (Melitz 2003).

The key prediction of the Melitz model is that the gains and loss from trade liberalization to firms in an industry depends on firm size. Liberalization benefits large firms that can afford entry costs of exports, by providing them access to new foreign markets, while it hurts small firms that cannot do so as competition increases with imports, making small firms uncompetitive (Melitz 2003). As a result, trade only favours the operation of large and productive firms, which increases the aggregate productivity gain from trade.

Empirical research has confirmed the Melitz theory mostly by looking at the rises and falls of firms that already existed before liberalization, but paid little attention to the size of newly created firms (Chaney 2008). This is a gap in the literature since the Melitz (2003) theory also predicts that exports encourage the entry of large firms more than that of small firms, while imports discourage the entry of small firms.

1.1 Statement of Purpose

This thesis investigates the relationship between trade and the sizes of start-ups in Nairobi, Kenya. This is made possible due to the author of this thesis conducting a 2 months long field study in Nairobi, collecting the dataset from the City Council of Nairobi's business registry (hereon referred to as CCN). Kenya is well suited for this

research question since, due to gradual trade reforms since the early 1980's, Kenya is one of the most trade-liberalized countries in Sub-Saharan Africa (SSA) (World Bank 2009). Measuring in terms of the World Bank's Tariff Trade Restrictiveness Index (TTRI)[1], Kenya has an overall lower protection rate index of 8.2%, compared to the SSA average of 11.3%. Looking at effective Most Favoured Nation (MFN) tariff rates, Kenya has an average applied tariff of 12.6%, which is in line with other developing countries (World Bank 2009).

Studying the number and size of new start-ups in the city of Nairobi makes it able to explore all firm sizes of the local economy, not just the large ones, which is often the case when measuring productivity. This will hopefully add a new valuable dimension to the on-going debate of local economy effects of trade.

The methodology used is a panel fixed effects model, measuring time and industry fixed effects. Further on, a set of different panel fixed effects and instrumental variable regressions are used to check robustness in previous models.

This paper is structured as follows: Section 2 is a brief literature review of trade and firm heterogeneity. Section 3 introduces the Kenyan economy and trade history. Section 4 presents the hypotheses used for analysis, followed by section 5 presenting descriptive statistics. Section 6 presents the empirical models used for regression analysis, followed by Section 7 presenting the results. Section 8 focuses on robustness checks. Section 9 analyses the results of the regression analysis and Section 10 concludes and presents suggestions for further research.

[1] TTRI calculates the equivalent uniform tariff that would keep domestic welfare constant. It is weighted by import shares and import demand elasticity.

2. Literature Review

2.1 Intra-industry re-allocation and trade

In the so-called "new trade theory" that has emerged in later years, firm heterogeneity and its relation to trade has become a larger area of focus than before. As mentioned in the previous section, the increased interest in firm heterogeneity was urged by Melitz (2003) model that leaped into a long neglected problem of trade theory assuming firms to be homogenous, thus disregarding the re-allocation of firms within a sector as an effect of trade. Melitz (2003) develops a dynamic industry model that is able to combine micro-level panel data of industry production with macro-level data of international trade. The model was developed due to the empirical evidence of large and persistent productivity differences *within* industries, and some evidence pointing towards the fact that these intra-industry differences were related to trade (Melitz 2003). By allowing firms to be heterogenous, this effect could be accounted for in a trade theory framework that goes beyond simple resource re-allocation theory or the economies of scale framework. Melitz framework is complemented by the work of Bernard Eaton Jensen Kortum (2000) (hereon referred to as BEJK) that introduced firm-level heterogeneity into a Ricardian trade model with firm-specific comparative advantage (Melitz 2003)(BEJK 2000).

All the while there was a lack of models incorporating firm heterogeneity before Melitz, the empirical evidence of liberalized trade leading to productivity changes within industries, has been growing since the late 1990's. Work by Bernard and Jensen (1999) shows that exporting firms are characterized as being more productive than other firms, although the relationship to what extent exporting increases firms' productivity is less clear. Pavcnik (2002) (among others) further investigate the relationship of firm heterogeneity, accounting for differences in the tradable and non-tradable sector. Pavcnik investigates the relationship between extensive trade liberalization in Chile in the late 1970's and early 1980' and plant productivity for the manufacturing goods sector, (Pavcnik 2002). Using plant-level panel data of productivity, Pavcnik find that aggregate productivity improvements generates from a

re-allocation of production from less productive to more productive plants, as an effect of liberalized trade and increased competition.

Building on Melitz model, progress by authors like Bernard, Jensen, Redding, Schott (2007) (hereon referred to as BJRS) have found evidence for the dynamic of how firms in the tradable sectors tend to survive and grow when certain exogenous factors affecting trade changes, such as falling trade policy barriers or a decline in transportation costs. The Melitz model predicts that lower-productivity non-exporting firms are likely to fall and decline as larger firms grow as an effect of increased trade (Melitz 2003). This conclusion confirms and accentuates Pavcnik's analysis, accounting for the dynamic of the growing firms and the declining firms. Pavcnik, however also found robust evidence for productivity increases in large plants being dependent on the decline of less productive plants (Pavcnik 2002).

2.2 Entry Cost

Melitz (2003) model also incorporates entry cost for tradable sectors and concludes that entry cost is one of the policies that may hinder the participation of small firms into exporting. With a large entry cost to the tradable sector, firms that are fit to increase the productivity in the tradable sector might be held back by the high entry cost. Das, Roberts, Tybout (2007) have looked further into this relationship and found that firms operating in the tradable sector continues to serve foreign markets even when their net profits are negative, since the entry cost of re-entering the market as conditions improve are larger than sustaining a negative profit due to surrounding circumstances. Data on firms' participation into exporting used by Bernard and Jensen (1999) (USA), as well as Clerides, Lack, and Tybout (1998) (for Colombia, Mexico and the Moroccan market), confirms the self-selection bias of "better" firms entering exporting, which suggests the existence of export entry costs

2.3 Extensive Margin and Productivity

The majority of the existing literature on firm heterogeneity focuses on productivity of firms and thus draws the links between increased productivity and welfare benefits of the local economy (BJRS 2007). In Melitz (2003) model, as well as in Pavcnik (2002), and Das, Roberts, Tybuot (2007), a production function (or profit function) is

estimated in order to evaluate productivity of plants in the tradable (and sometimes) non-tradable sector. Others like Trefler (2004) estimates labour productivity between firms as an effect of free trade agreements between USA and Canada. Despite Melitz model productivity measures still vary across research (BJRS 2011). BJRS (2007) and Chaney (2008) are samples of the few papers that acknowledge the role of the extensive margin, number of exporting firms, as a factor playing a large role in trade flows between countries. Instead of estimating productivity, this thesis uses the size of firms entering the market as a proxy for firm's productivity, which is much in line with Melitz model, but an approach that few researchers have chosen due to lack of start-up data (Melitz 2003) (BJRS 2007). The classification of firm size is given by the categorization of business registries extracted from the City Council of Nairobi and are fixed over the sample period.

2.4 Import volumes and the extensive margin

In the Melitz (2003) model, imports are not supposed to have an effect on intra-industry re-allocation since Melitz's model assumes self-selection (of productivity effort) to be driven by the export market and not by the import market (Greenaway, Kneller 2007). Because of the focus on exporting firms in Melitz's model, many of the subsequent papers have focused on export effects. The only way that most models account for imports is the fact that too high import restrictions might hinder a full intra-industry re-allocation since if imports of intermediate goods decrease this halters the productivity growth in the export sector as well (Greenaway, Kneller 2007). This relation is confirmed in a study of the Canadian-US tariff rates, finding that a 4.5% reduction in tariff rates created an increase of the extensive margin of exporting firms by 46% (Baldwin, Gu 2003).

The perspective lost when settling on an empirical productivity level approach is the one predicted by traditional trade theory, namely that trade liberalization exposes domestic producers to foreign competition and reduces their market power. This often causes small scaled firms to either increase production and try to "level" with foreign technology, or exit the market as an effect of lack of economies of scale (Rodrik 1988)(Melitz 2003). By looking at start-up rate of firms, this paper opens up for the possibility to measure the effect of trade volumes both on small-, medium-

and large scaled firms simultaneously in relation to trade, which corresponds more to the market dynamics of developing country since small- and medium sized enterprises (SME:s) represent the majority of businesses and the main source of employment in most economies, especially developing countries (Fisher, Reuben 2000).

3. The case of Kenya

3.1 Kenya's economy and trade integrated

With its conveniently located costal line facing the Indian Ocean, Kenya has a long history of trade. Through history, Arab, Persian and Portuguese commercial posts along the Kenyan coast and of course, British colonial rule has helped shape the Kenya we know today (Maxon, Ofcansky 2000). Since its independence from the British Royal Crown in 1963, trade flows have been very volatile (IMF 2011).

After years of strict trade regulation, Kenya began to liberalize trade in the mid 1980s as part of the conditional agreement attached to its first Structural Adjustment Loan taken with the World Bank in 1980 (Gertz 2007). The continued trend throughout the 1990s was towards trade liberalization (with some exception of tariff increases in 1993) accompanied with loosened foreign exchange policies (Gertz 2007)(WTO 2000). Since Kenya joined the World Trade Organization (WTO) in 1995, exports and imports have increased steadily, with a sharp increase since 2002 (UN COMTRADE 2011). As depicted in the descriptive statistics section (5) below, the largest part of the increase in trade since 2002 generates from increased imports into the industrial sector. The significant event prior to the sharp increase in trade from 2002 was Kenya's signing of the African Growth Opportunity Act (AGOA) in January 2001. The AGOA is an agreement between the US and Sub-Sahara African (SSA) countries giving the SSA's exporting benefits on approximately 7,000 product lines including textiles and apparel (further details in section 3.2.1 below) (Kamau et. al. 2009). Another significant event around 2002, apart from Kenya signing the AGOA, was a shift in presidential power. The winner of the 2002 presidential election, Mwai Kibaki, who succeeded the "one party state" ruler of Kenya for 24 years, Daniel Arap Moi, enforced several policy changes through his first years in

office (US Department of State 2011). Among other reforms, Kibaki has put a strong emphasis on strengthening businesses and investments in the Kenyan economy (BBC 2002). Part of those reforms have included improvements of the information and technology sector, setting up authorities such as the Investment Authority and enforcing existing ones as the Export Processing Zone Authority (State House Kenya 2011). Adjacent to these reforms is the start (in 2002) of a professional record keeping of issued business licenses at the City Council of Nairobi, which presents the statistics for local start-ups in this paper (CCN 2011). Improved statistics is a large part of improving investments and businesses as well.

As an effect of reforms Kenya ranks quite high on some indicators in The International Finance Corporation (IFC) and The International Bank for Reconstruction and Development's (IBRD) "Doing Business 2011" report. Kenya's global rank on "ease of doing business" is still quite low however, 98 out of 183 (IBRD 2011). The report builds on comparable measures such as how long it takes for an entrepreneur to obtain a construction permit or the cost of protecting its investors etc. In most measures Kenya exceeds other Sub-Saharan countries (IBRD 2011). Some measures worth noting is that Kenya ranks 6 out of 183 on the variable "getting credit". However, Kenya's total ranking is burdened by low performance in, for instance, cost of protecting investors (93 of 183), registering property (129 of 183) etc.

3.2 Trade Agreements and Volumes of Trade

3.2.1. Main Trade Agreements

As mentioned above, Kenya is part of several larger trade agreements. Apart from its WTO membership and its AGOA participation, Kenya is also a member of CEN-SAD, COMESA, ACP, GSP and EAC[2]. Beyond that, Kenya hold bilateral agreements with over 20 countries around the world, including Argentina, China, Egypt, India, the Netherlands, Poland, Thailand, Tanzania, South Korea and

[2] CEN-SAD = Community of Sahel-Saharan States, COMESA = The Common Market for Eastern and Southern Africa, ACP = Africa Caribbean Pacific States, GSP = Generalized System of Preferences EAC = East African Community

Pakistan (State House Kenya 2011). Kenya is currently negotiating agreements with nine other countries, such as Belarus, the Czech Republic, Mozambique and South Africa (ibid.). Appendix A presents a detailed overview of Kenya's trade agreement and trade alliance memberships. From the table presented in Appendix A, it is evident that the two agreements that has taken shape and affected Kenyan trade throughout the time period investigated in this thesis, is the creation and further integration of the East African Community (EAC), as well as the African Growth Opportunity Act (AGOA).

The AGOA, which has severely liberalized trade between Kenya (among 36 other SSA countries) and the US, lead to a threefold increase in bilateral trade between Kenya and the US in 2001 (Tralac 2011)(US International Trade Administration 2011). As long as member countries comply with the prescribed "percentage value added that must take place locally" in an AGOA-beneficiary country, they are able to benefit from lower or no tariffs on approximately 7,000 export products (ibid.). The AGOA agreement has added around 1,800 products to the ones that already experienced some tariff reduction under the WTO's Generalized System of Preferences. For Kenya, this has meant a large increase in exports of textiles and apparel goods, agricultural and electronic products as well as miscellaneous manufactures (Tralac 2011). The AGOA was only meant to last until 2007, but different products within the AGOA agreement have been prolonged to last until somewhere between 2012 (textile products) to 2015 (Kamau et. al. 2009).

The creation and integration of the EAC, which includes Kenya, Uganda, Tanzania, Rwanda and Burundi, has on the other hand significantly increased Kenya's trade relations, in particular exports, to EAC countries (KNBS 2011)(EAC 2011). With the establishment of an East African Customs Union in 2005 and the establishment of the Common Market 2010, Kenya's trade policy is strongly affected by the decisions of the EAC, such as the abolishment of all tariff and non-tariff trade barriers and aligning standards for a common trade policy within the common market (MEAC 2011).

As an effect of these agreements, Kenya's trade has shifted gradually both in terms of industry composition, but also in terms of export destination and import origin, over the past ten years (KNBS 2011). The next subsection gives a short overview of the current trade flows of the Kenyan economy, before proceeding to the hypothesis section.

3.2.2 Trade flows

More than 50% of Kenya's exports comes from the agricultural sector where the commodities food, live animals, beverages and tobacco alone represented 44.1 % of total merchandise exports in 2010 (KNBS 2011). Manufactured goods and other industrial supplies represented 21.8% and 28.1% respectively in 2010 (ibid.). Given that Kenya has a rising service sector as well, the merchant export levels correspond quite well to the respective industry's share of GDP, where agriculture stood for 21.5% of GDP in 2010 (-2% since 2009) and manufacturing 10% of GDP (+0.1% since 2009) (KNBS 2011) (UN COMTRADE 2011). Largest import products are industrial (non food) supplies, and machinery and transport equipment, each representing 31.6% and 31% respectively of total imports in 2010, followed by 22.1% mineral, fuels, lubricants and related materials (KNBS 2011) (UN COMTRADE 2011). The largest export partners are Uganda (12.7%), United Kingdom (9.8%) and Tanzania (8.1%), followed by the U.S.A (5.5%), while imports come mainly from China (12.7%), United Arab Emirates (12.2%) and India (10.9%), followed equally by South Africa (6.3%) and Japan (6.1%) (KNBS 2011) (UN COMTRADE 2011).

The trade statistics shows a clear trend of exporting to the "north" and importing from the "south". As Kenya is still import driven, it is currently running a negative current account balance of -6.9% of GDP in 2010, and an average of -3% of GDP from 2001-2010 (IMF 2011). The trade overview of the Kenyan economy shows a country of shifting trade focus, as new agreements emerge. Optimal would be to investigate how the shift in policy and trade openness has affected the Kenyan economy pre 2002 and post 2002. Unfortunately, there is no significant data of the local economy that could be used for this purpose. However, given the trade agreement events and the global economic turmoil during 2002-2010, trade flows have presented enough volatility, as the descriptive statistics section will show, to

serve as a good empirical source for investigating trade effects on local economic activity. The next section thereby specifies the hypothesis used for investigating the main question of this thesis, namely to add to the trade literature by investigating the heterogeneity of firms in Nairobi's economy as an effect of trade.

4. Hypotheses

To be able to successfully analyze the effect of trade on the heterogeneity of start-ups in Nairobi, it is essential to define what indications are needed. The analysis focuses on testing the three specific research hypotheses related to the effect of trade on small business start-up rate in Nairobi. The reason the hypothesis and analysis focuses on Nairobi is because the local start-up rate data is collected in Nairobi. However, over 40% of Kenya's economic activity is concentrated around Nairobi and almost all other economic activity generates from either Mombasa or the counties located west of Nairobi (together with Nairobi they stand for 80% of Kenya's economy) (World Bank 2011_2). The reason for such high economic activity in the counties west of Nairobi is the large amount of arable land. A significantly large part of economic activity in Kenya is therefore linked to Nairobi, thus investigating the local economic sector of Nairobi captures a significant part of the Kenyan economy.

Hypothesis 1a: There will be an increased within industry resource re-allocation in the tradable sector as *export* volumes increase within that sector, i.e. start-up of large firms will be significantly positively correlated with export volumes and have a larger start-up rate than small of medium sized firms.

Hypothesis 1b: There will be an increased within industry resource re-allocation in the tradable sector as *import* volumes increase within that sector, i.e. start-up of large firms will be significantly positively correlated with import volumes and have a larger start-up rate than medium sized firms.

In accordance with "new trade theory" models, such as Melitz (2003) and BJRS (2007), it is expected for the extensive margin of large firms to be positively, and to a larger extent than smaller sized firms, correlated with trade flows. Motivated by Baldwin and Gu's (2003) findings, start-up rate of large firms are therefore expected

to have a positive correlation even with the increase in imports, since this is only supposed to further facilitate trade for the largest companies in the economy.

Hypothesis 2: Small sized start-ups in the tradable sector are expected to be negatively correlated with increased imports volumes.

In accordance with traditional trade theory, this hypothesis aims at accounting for the dynamic between liberalized trade and the extensive margin of small firms in the economy, which new trade theories have failed to account for (Pavcnik 2002).

5. Descriptive Statistics

The table below is a summary of the sources and time of data collection for the variables that will be used either in the main models of the analysis or as control variables at a later stage.

Table 1. Descriptive Statistics Specification

Variable	Measuring	Source	Collected
Ind	Industry classification of local economy	Nairobi City Council	June-Aug 2011
Size	Indicating size of sector; small, medium, large	Nairobi City Council	June-Aug 2011
No Startups	Number of startups each sector, each year	Nairobi City Council	June-Aug 2011
Entry cost	Cost to enter the economy	Nairobi City Council	June-Aug 2011
T/NT	Tradeable/Non-Tradable Sector	Authors construction	November 2011
Imports	Value of Imports tradable merchant and service sector (USD Millions)	WTO/COMTRADE	November 2011
Exports	Value of exports tradable merchant and service sector (USD Millions)	WTO/COMTRADE	November 2011
Tariff	Tariff Data for tradable merchant sectors	WITS/TRAINS	November 2011
GDP Index	Aggregated GDP for U.K., U.S.A., Uganda and Tanzania (USD Millions)	IMF WEO database	November 2011

5.1 Start-up Data Kenyan Economy

The dataset used to measure heterogeneity of start-ups in the local Kenyan economy consists of the City Council in Nairobi's (CCN) complete record of business license registrations from 2002-2009. Before 2002, there was no significant record keeping and license registration of local firms in Nairobi. Through a two month long field study in Nairobi, June-August 2011, in cooperation with the University of Nairobi's

Department of Development Studies and private Kenyan researchers, the author of this thesis was able to access the accumulated database of the CCN's licensing registry 2002-2009. The database contains 162 532 licensing registrations, of which some businesses have registered more than once, due to the renewal of their license throughout the given time period. In order to register a company in Nairobi, an entrepreneur needs to present a physical address and pay a fee that ranges from 5 000-100 000 Kenyan Shilling (KES)[3], depending on the nature and size of the firms (CCN 2011) (WITS 2010). Given that the literacy rate in Kenya is 85% of the population, and the fact that there are a lot of penalty fees for not carrying a license, the database is believed to be a quite accurate depiction of the economic activity in Nairobi (CCN_2 2011) (US Department of State 2010). However, the informal sector is large in Kenya, but mainly corresponds to small-sized firms in the non-tradable sector and thus creates no large bias in analyzing the hypotheses. During the field study, an attempt was made to collect similar data from Mombasa City Council, since Nairobi and Mombasa represent the largest areas of foreign activity in the Kenyan economy, but due to time constraints and the substandard of records at the Mombasa city council, the data could not be used for this thesis and would be considered the only shortcoming for measuring the effect on the total Kenyan economy, which is why the hypothesis only refers to trade effects in Nairobi (UNCTAD 2005). Below is a table depicting the variables from the Nairobi City Council licensing database that were combined in order to create a "count" variable for start-ups, divided by sector and size, as well as an entry cost variable. For a full table of all available variables in the database and their record keeping, please see Appendix B.

Table 2. Description of data quality from City Council of Nairobi

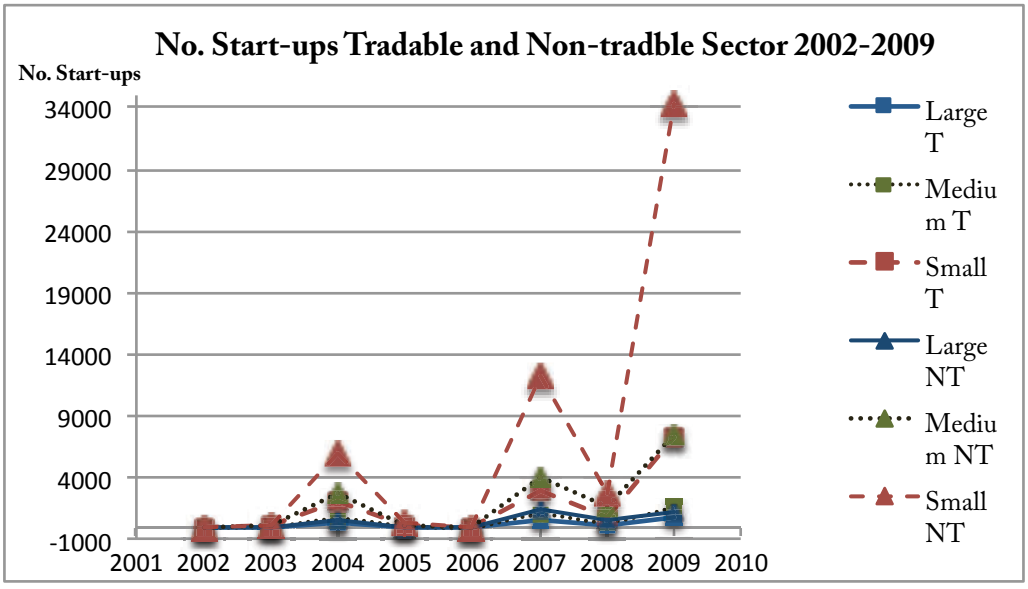
Variable	Description	Condition of data
BusiCode	162532 registered business codes divided into 88 different categories of business description according to business sector and size of firm	GOOD
BusiName	162532 registered business names	GOOD
AnnualFee	162532 registries of 88 different types of fees depending on type of business and size	GOOD

Source: Nairobi City Council

[3] Corresponding value of KES 5 000-100 000 is $50-$1 000 (IMF 2011)

To be able to use the database as a proxy for the startup rate and heterogeneity of firms, it was cleared from all businesses registrations that generated from business license renewal, so that it only contained business registrations as their first point of entry into the economy, leaving 131 073 registered businesses. The database thereby comprises a count of 131 073 startups spread over 44 different sectors. Out of the 44 sectors, only 22 are categorized according to size as: small size firm, medium size and large size firm, with each size assigned one separate categorical code, creating a total of (22x3) 66 different sector/size categories. In order to measure level of heterogeneity, only the 66 categories classified by size of firm are used in the further analysis, dropping the 22 sectors that were note reported according to size. This leaves ((22 sectors x 3 sizes) x 8 years) 528 start-up observations with a total count of 95 751 startups spread over 22 different economic sectors, divided into small, medium and large size firms during 2002-2009. A brief illustration of the aggregate start-up data, divided into tradable and non-tradable sectors is depicted below:

Graph 1. Number of Start-ups Tradable and Non-Tradable Sector 2002-2009

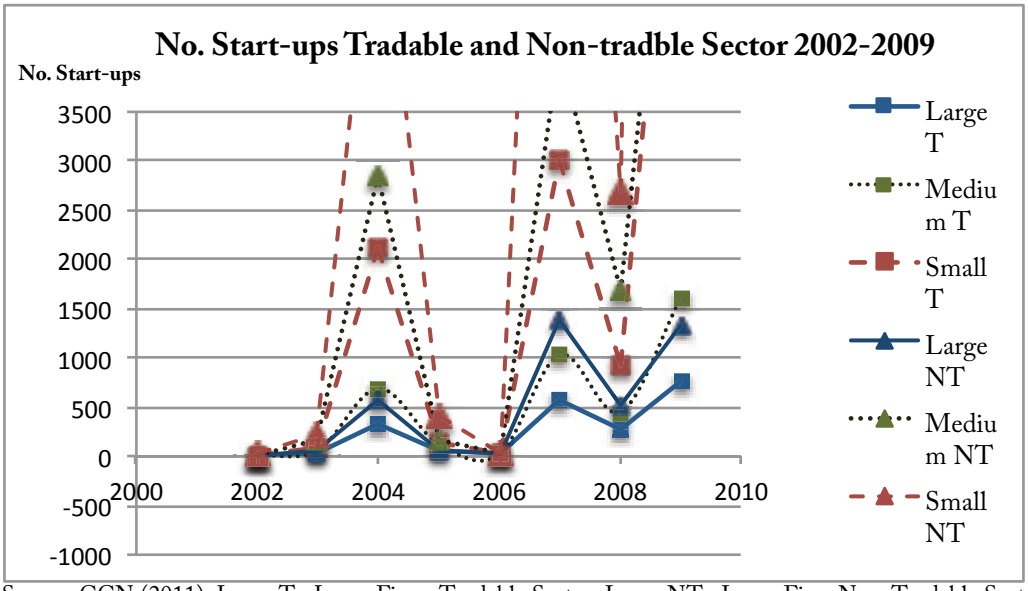


Source: CCN (2011): Large T= Large Firms Tradable Sector, Large NT= Large Firm Non-Tradable Sector

The graph above depicting number of start-ups shows a clear declining relationship between size of firm and number of start-ups. Also, the non-tradable sector start-ups of small- and medium sized firms experience a significantly larger start-up rate than

the tradable sectors. All start-up rates, independent of size are very volatile, with clear peaks in year 2004, 2007 and 2009. In order to explore this relationship further, the extreme values of start-up rate of small sized non-tradable sector are placed outside of the graph, which makes it possible to further explore the relationship between the sizes of start-ups and the tradable, versus non-tradable sectors.

Graph 2. Detailed Number of Start-ups Tradable and Non-Tradable Sector 2002-2009



Source: CCN (2011): Large T= Large Firms Tradable Sector, Large NT= Large Firm Non-Tradable Sector

Here, the volatility becomes even more evident, and two clear trends prevails; first, that the start-up rate of the non-tradable sector is always slightly larger than for firms of a corresponding size operating in the tradable sector, second, there is a clear relationship of number of start-ups being smaller for larger sized firms than for small firms. The start-up rate of small firms is on average three times larger than the start-up rate for large firms. The more detailed graph also depicts the fact that the start-up rate, both the non-tradable and the tradable sectors follow the same pattern, with peaks around 2004, 2007, and 2009 as mentioned above. This relationship will be further analysed using a set of models below, aiming at separating external effects from local economy effects.

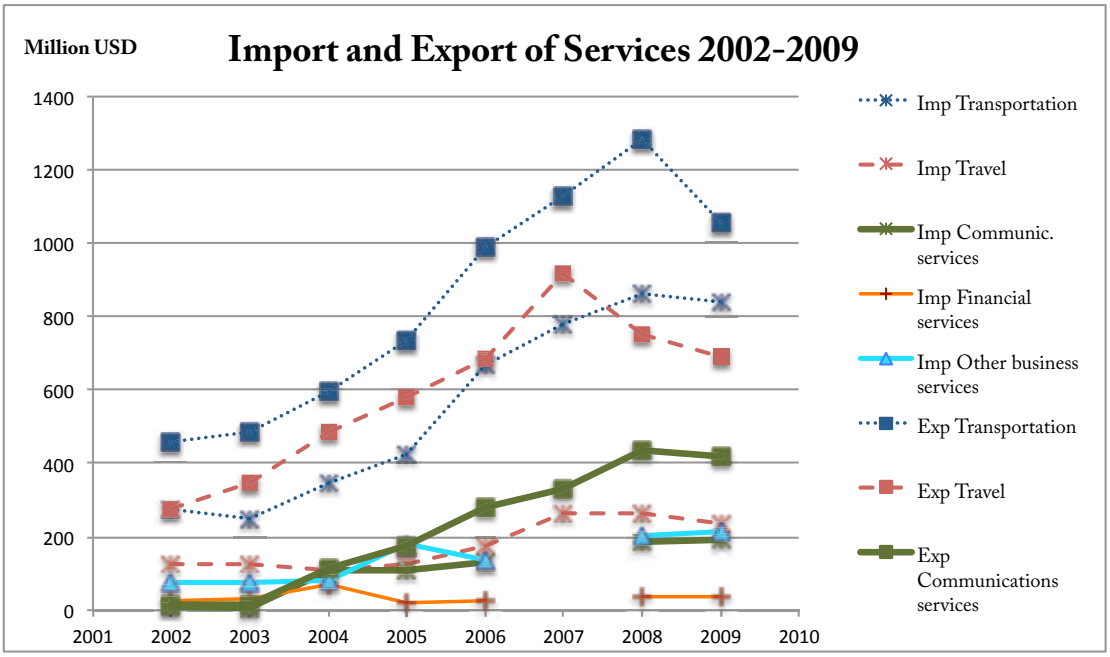
5.2 Trade Data

The trade data used in this thesis is collected from the UN Commodity Trade (COMTRADE) database as well as the World Trade Organization (WTO) statistics database of trade. COMTRADE serve as a source for trade in merchant good, while the WTO serves as a source for trade in services. Export and import volumes from the COMTRADE database are extracted using their SITC.1 (Standard International Trade Classification). SITC.1 provides commodity trade data using the 1962 Rev.1 method, which is one of the most optimal sources of trade flow when using panel data (UN COMTRADE$_2$ 2011). The SITC.1 aggregates trade flows into 10 commodity categories (see Appendix C for full specification) (UN COMTRADE 2011). WTO statistics database also provides commodity trade data, but uses COMTRADE as a source, which is why commodity trade data is collected from COMTRADE (WTO 2011). WTO uses several recognized sources for their database. Trade in services in the WTO database derives from the IMF's balance of payment data, with the addition of WTO staff calculations, which provides an easily accessible database for trade in services (WTO$_2$ 2011).

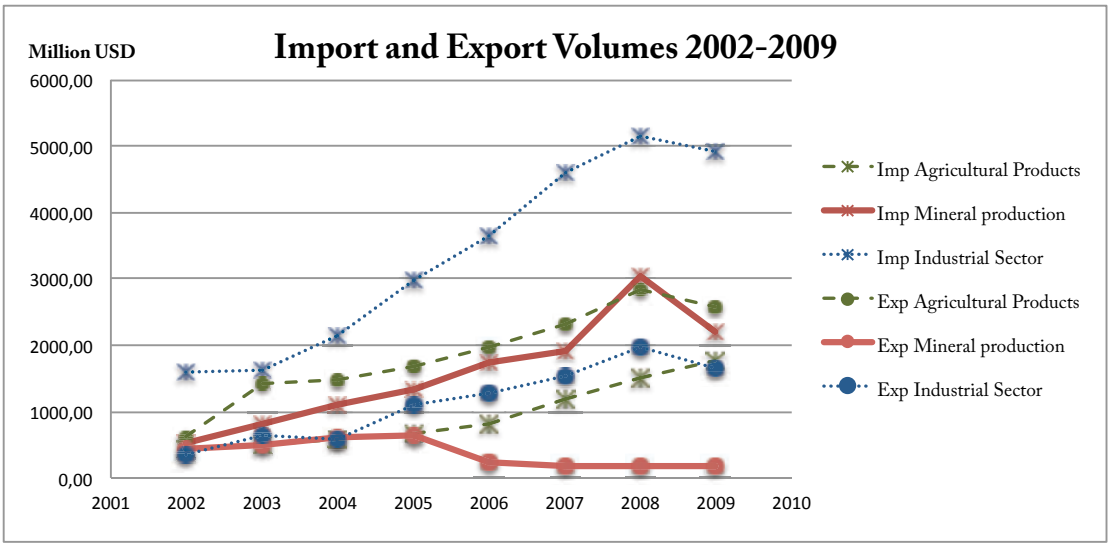
The extracted trade data from COMTRADE and the WTO has been matched with their corresponding sector of local start-up rate using the technical notes provided by both COMTRADE and WTO statistics databases (WTO$_2$ 2011) (UN COMTRADE 2011). The author has performed the matching procedure in a most careful manner, in order to ensure that start-up rate is properly measured against their correctly related trade-sector (see Appendix D for a full review of sector mapping procedure).

Depicted in the graphs below are the volumes of imports and exports 2002-2009 in the tradable sectors used in this paper in. The trade volumes are reported in million US dollars.

Graph 3. Imports and Exports Service Sector (Million USD)



Graph 4. Imports and Exports Trade in Commodities (Million USD)



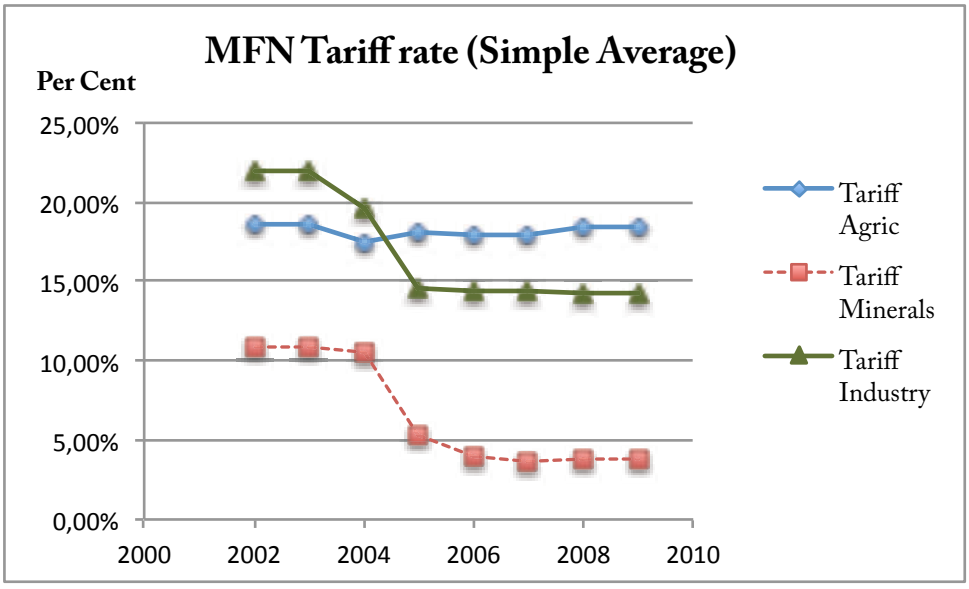
Worth noting in Graph 3. is the significant rise in exports of travel and transportation services. The export of transportation services in 2009 are more than twice as large as in 2002, despite a quite sharp decline since compared to 2008. Exports of travel services follow a similar trend. It is imperative to observe the difference in scale between the two graphs above; total exports in the agricultural sector 2008 was close

to 3000 million USD, which is twice the amount of the peak of transportation exports, leveling around 1300 million USD in 2008. The commodity that is experiencing the largest import flows, by far, is the industrial sector, which one can speculate is probably strongly correlated with the AGOA trade agreement. However, as mentioned above, this will not be investigated in this thesis due to non-available start-up data before the enforcement of the AGOA agreement.

5.3 Tariff Data

Tariff data is collected from the World Integrated Trade Solutions (WITS) database that uses UNCTAD's "Trade Analysis Information System" (TRAINS) as a source (WITS 2011). The TRAINS database contains information on tariffs for 119 countries (WITS 2011). When collecting the data from the WITS database, tariff data was collected using the most favoured nation (MFN) approach. Depicted in the table below is therefore the so-called simple average of Kenya's MFN tariffs for each of the three aggregated commodity groups examined in this paper. There is no equivalent "tariff" data on trade in services as the simple average MFN tariff. The tariffs are presented in per cent and show the effective average tariff rate applied in each industry (WITS 2011).

Graph 5. Most Favoured Nation Tariff rate Kenya, simple average



Source: WITS, TRAINS database

As can be noted from the graph above, Kenya is keeping their tariffs on agricultural products at a quite high average, where the simple average MFN tariff has even increased slightly since 2004. This is a stringent plan from the Kenyan government in securing food supply and protecting the productivity in the sector of its largest exporting products: coffee, tea and horticulture products (State House Kenya 2011).

5.4 GDP Index Data

In order to create a variable representing Kenya's "market access" to exporting markets, the GDP for Kenya's 4 largest exporting partners, United Kingdom, Uganda, Tanzania and the United States, is collected from the IMF World Economic Outlook database. The GDP is measured in current prices of U.S. dollars and just like trade flows they are reported in millions of U.S. dollars (IMF 2011). The index consists of aggregating the GDP volumes for the four markets into a single variable. As GDPs fluctuates, the GDP index will change and serve as an index of the total size of Kenya's largest export markets. Further discussion about this variable can be found in section 8.

5.5 Overview Descriptive Statistics

Table 3. Overview Descriptive Statistics

	No Startups	Entry Cost	Import	Export	Tariff	GDP Index
Mean	182.34	35 242.42	706.76	739.05	0.14	17 070.87
S.D.	60.32	1 104.27	75.97	35.6	0.01	99.42
N	528	528	288	240	72	288
Pearson's Correlation		-0.2602	0.0523	0.2086		

Table 3 gives an overview of means and standard errors of the descriptive statistics that are used for the regression analysis. Results from a Pearson's correlation test also show that the explanatory variables are independently correlated with number of start-ups, i.e. they are relevant. Table 4 shows the results of a t-test ensuring that means and variances of independent variables are statistically different from each other.

Table 4. Univariate Analysis

	Equality in means t-test (prob)	Equality in Variance t-test (prob)
Import	0.000***	0.000***
Exports	0.000***	0.000***
Entry Cost	0.000***	0.000***

Table 5. Overview Number of Start-ups and Entry Cost according to size of firm

	LARGE	MEDIUM	SMALL		LARGE	MEDIUM	SMALL
No. Start-ups	33.97	116.14	396.93	Mean Entry Cost	55 227.27	31909.09	18590.91
S.D.	8.21	41.71	175.07	S.D.	2 017.71	1436.43	975.72
N	176	176	176	N	176	176	176

Further on, Table 5 presents means and standard errors for start-ups and entry costs. As expected there is a clear relationship between size and start-up rate, with on average, ten times as many small business start-ups compared to large business start-ups. There are also quite clear thresholds of entry cost depending on the size of businesses, where the average entry cost for large firms is twice as high as entry cost for small sized businesses.

6. Empirical Model

The following section presents the empirical models applied when addressing the hypotheses. For convenience of the reader, the hypotheses are repeated in conjunction with each model.

Hypothesis 1a: There will be an increased within industry resource re-allocation in the tradable sector as export volumes increase within that sector, i.e. start-up of large firms will be significantly positively correlated with export volumes and have a larger coefficient than small of medium sized firms.

Hypothesis 1b: There will be an increased within industry resource re-allocation in the tradable sector as import volumes increase within that sector, i.e. start-up of large firms will be significantly positively correlated with export volumes and have a larger coefficient than medium sized firms.

Since the descriptive statistics section have already confirmed the fact that large start-ups are much fever in number than medium or small size start-ups, it will be more interesting to estimate a model using the logarithm of start-ups within each size group as an effect of the logarithm of trade volumes. Using the logarithmic function doesn't only account for the sectors with many start-ups (indifferent of size) it also

gives a fair estimation of the sectors with very few start-ups, in which an increase from *one* start-up to *two* start-ups causes a 100% increase for that sector, but might become insignificant comparing continuous variables. The reason for using the logarithm of trade volumes as well, instead of the entities is because import volumes range from 6 million dollars for some industries at one point in time, to 6595 million dollars for another industry at one point in time, while export volumes range from 15 million dollars to 3000 million dollars for different industries over the selected years (UN COMTRADE 2011) (WTO 2011). It therefore serves a greater purpose to measure the percentage change of startups against the percentage change in import- and export volumes. To create accurate estimate, the integer 1 is added to each start-up entry removing omitted variable bias for point in time of zero start-ups.

The model is thereby estimated by creating 3 separate log- log panel fixed effects models; one for large size start-ups, one for medium size and one for small size start-ups. The fixed effects model accounts for industry fixed effects and time fixed effects. The models look as follows:

$$\ln\left(Startups + 1_{Large,it}\right) = \beta_0 + \beta_1 \ln\left(exports_{it}\right) + \beta_2 ln(imports_{it}) + \beta_3 ind_i + \beta_4 Year_t + \varepsilon_{it} \quad (1)$$

$$\ln\left(Startups + 1_{Medium,it}\right) = \beta_0 + \beta_1 \ln\left(exports_{it}\right) + \beta_2 ln(imports_{it}) + \beta_3 ind_i + \beta_4 Year_t + \varepsilon_{it} \quad (2)$$

$$\ln\left(Startups + 1_{Small,it}\right) = \beta_0 + \beta_1 \ln\left(exports_{it}\right) + \beta_2 ln(imports_{it}) + \beta_3 ind_i + \beta_4 Year_t + \varepsilon_{it} \quad (3)$$

Where $\ln\left(Startups_{it}\right)$ is the logarithm of number of start-ups (large, medium or small sized) within each tradable sector (i) at time (t). β_0 is the intercept for each different size of startups, $\ln(exports_{it})$ is the logarithm of export volumes (in million US dollars) for each industry (i), in the tradable sector, at time (t). $\ln(imports_{it})$ is the logarithm of import volumes (in million US dollars) for each tradable industry (i), ind_i is a binary industry dummy variable for all 22 different industries (i) in the dataset. $Year_t$ is a year specific fixed effects dummy. ε_{it} is the error term. In this model, if coefficients are significant, a 1% change in trade volumes would have an percentage effect of the number of startups within that industry (i) at time (t) corresponding to the value of the coefficient. The variables of most interest are, of course the export and import variables in analyzing hypothesis 1a and 1b. In hypothesis 1a, the export variable is most important, especially the export variable in

the equation for large sized firms, which is expected to be positive and larger than the export variable in the equation for medium- and small sized firm. In hypothesis 1b the import variable is most important and is expected to be positively correlated with start-up rate for large and medium sized firms. The industry and year dummies only serve as control variables.

Hypothesis 2: Small sized start-ups in the tradable sector are expected to be negatively correlated with increased imports volumes. Equation (3) using the panel fixed effects model can be used to account for hypothesis 2 as well as a control for hypothesis 1a and 1b. For hypothesis 2, the important variable is the import variable, which is expected to be negatively correlated with start-up rate in equation 3.

7. Results

The results from the logarithmic panel fixed effects model are reported below.

Table 6. Results Fixed Effects model with robust standard errors

	Industry FE		**Time FE**		**Both FE**	
	Coeffiecient	S.E	Coeffiecient	S.E	Coeffiecient	S.E
LARGE						
import	0.52	0.34	-.15	0.15	-0.93***	0.23
exports	0.63	0.35	.53*	0.20	0.48	0.25
intercept	-6.95**	2.49	-2.17*	0.96	1.91	1.16
N	79		79		79	
R2	0.4294		0.6431		0.9009	
MEDIUM						
import	0.62	0.38	-0.14	0.15	-0.77*	0.33
exports	0.75	0.39	0.69**	0.23	0.56*	0.27
intercept	-7.87**	2.75	-3.05**	1.13	0.67	1.52
N	79		79		79	
R2	0.3920		0.7048		0.8895	
SMALL						
import	0.58	0.45	-0.31*	0.14	-0.99*	0.38
exports	0.98*	0.44	1.15***	0.24	0.86**	0.32
intercept	-7.83*	3.13	-4.63***	1.34	1.29	1.60
N	79		79		79	
R2	0.4390		0.7314		0.8705	

* p<0.05; ** p<0.01; *** p<0.001

All results are reported using robust standard errors, controlling for heteroskedasticity in order to ensure consistent estimates of variance and correct F-statistics. The F-statistic for all regressions is <0.05 and thus rejects the hypothesis that all of the models coefficients are zero. As can be seen from the output table most results are significant in the time fixed effects and in the industry and time fixed effects model. The R^2 values are quite high (0.64-0.90) indicating that the independent variables explain a large part of the regression (up to 90% for large firms with industry and time fixed effects).

7.1 Results Hypothesis 1a

The coefficient for large size start-ups are positive as expected, but the large size ln(export) beta-value is smaller than the beta values in the regressions for medium and small sized start-ups. However, not all estimates are significant. For large start-ups, the coefficients are only significant in the time fixed effects model, showing that a 1% increase in exports leads to a 0.53% increase in start-ups of large firms, or more intuitively, a 10% increase in export increases large size start-ups by 5.3%. However, the results for medium- and small size firms in the time fixed effects model is 6.5% and 11.5% respectively for a 10% increase in exports. The relationship of medium- and small sized firms experiencing larger start-up effect in relation to exports is consistent over all three "fixed effects" model, even though estimates are not always significant for the large start-up measures. This contradicts the hypothesis and will be further investigated below.

7.2 Results Hypothesis 1b

The import coefficients of large firm start-up rate are negative and not positive as predicted. However, not all results are significant. For large start-ups, the import coefficient is only significant in the time and industry fixed effects model, and there it is negatively correlated with imports. The results indicate that in the time and industry fixed effects model a 1% increase in imports decreases large firm start-ups with 0.93%. In the same model medium sized firms are also negatively correlated with imports, but to a less extent than large start-ups as medium sized start-ups decrease with 0.77% for a 1% increase in imports. For hypothesis 1b, there is no clear pattern

evolving over the results of the three different fixed effects models, since the industry fixed effects model returns positive, but insignificant coefficients for start-up rates when correlating against imports, while the time and industry fixed effects model generates negative and significant estimates.

7.3 Results Hypothesis 2

Looking at the time fixed effects and the industry and time fixed effects model the coefficients of imports are negative as expected in the small size regression. Start-up rate of small-sized firms are negatively correlated with an increase in imports where a 1% increase induces a 0.33% and a 0.99% decrease in small size start-up rate in the time fixed effects and both fixed effects model respectively.

The results showing that large start-ups experience a smaller increase than medium sized firms is rather troubling since that would imply that productivity is not increasing with exports in the Kenyan economy. In accordance with Melitz (2003), one can assume that the results on the start-up rate of large sized firms (or the lack of results) might have to do with industry fixed effects such as entry cost. The effect of entry cost might lead to distorted results and will therefore be checked for. Further on, it is important to perform robustness checks on the model, in order to ensure there is no serial correlation and that the hypothesis are analysed using the best possible method.

8. Robustness check

The fact that only small size start-ups have a significant result in the industry fixed effects model indicates that there might be some industry specific variable that affects start-up rate rather than trade volumes. In this section, some further regressions will be estimated in order to capture both industry and time fixed effects further.

8.1 Industry fixed effects

The results in the previous section indicates that productivity does not increases with increased exports, since the start-up rate of large firms is not positively and significantly correlated with exports, to a larger extent than start-up rate of medium or small-sized firms. However, it shall be noted that export is still to be considered

positive for the Kenyan economy since all sizes of start-ups are positively correlated with exports. The correlation it just affecting small- and mediums sized firms to a larger extent than the large ones. This is an indication that there might be some constraint in the economy holding back the creation of large firms. One variable that can be used to test for robustness within the industry sector is entry cost. Since entry cost varies over industry and over size, but is not related to trade, it might be an industry specific factor that holds companies back from growing.

The characteristics of the entry cost variable can be revisited at the end of section 5. In the descriptive statistics, it becomes evident that the start-up of a large firms is not only associated with a higher cost of production, it also entails a higher entry cost equivalent of around Ksh 55200 (USD 615) for a large firm, compared to Ksh 31900 (USD 355) for a medium sized firm on average (CCN 2011)(IMF 2011). Given that the average income per capita in Kenya 2009 was USD 761, an increase in entry cost of approximately USD 260, should be considered a significant investment (KNBS 2011).

Running a simple OLS including entry cost to the model, with robust standard errors is interesting as a first step since it shows the isolated relation between start-up rate and entry cost. Then differentiating according to size of start-ups using a simple OLS with entry cost and robust standard errors reveals which size of start-ups is affected most negatively due to entry cost. Large firm start-up rate should be most negatively correlated with entry cost. The model estimated follows:

$$\ln (Startups + 1_{it}) = \beta_0 + \beta_1 \ln (exports_{it}) + \beta_2 ln(imports_{it}) + \beta_3 Entry\ cost_i + \varepsilon_{it} \quad (4)$$

$$\ln (Startups + 1_{Large,it}) = \beta_0 + \beta_1 \ln (exports_{it}) + \beta_2 ln(imports_{it}) + \beta_3 Entry\ cost_i + \varepsilon_{it} \quad (5)$$

$$\ln (Startups + 1_{Medium,it}) = \beta_0 + \beta_1 \ln (exports_{it}) + \beta_2 ln(imports_{it}) + \beta_3 Entry\ cost_i + \varepsilon_{it} \quad (6)$$

$$\ln (Startups + 1_{Small,it}) = \beta_0 + \beta_1 \ln (exports_{it}) + \beta_2 ln(imports_{it}) + \beta_3 Entry\ cost_i + \varepsilon_{it} \quad (7)$$

Then, in order to test serial correlation within the industry fixed effect model a further panel fixed effects model is created that pools the industry sizes in the tradable sector together and then separate the ones that have a large start-up cost from the

ones that have a smaller start-up cost. This model captures a further fixed effect from the industry start-up rate that is not related to trade, and might explain the effect that large and medium sized firms are positively correlated to trade, but experiencing a smaller start-up rate than small sized firms start-up rates.

The two regressions that are estimated are based on a threshold slightly above the mean entry cost for medium sized firms, but slightly below the mean of large start-ups, namely Ksh 37000. All firms experiencing entry costs above Ksh 37000 are considered to experience high entry cost and all firms with an entry cost below Ksh 37000 are considered to have a low entry cost.

$$\ln (Startups + 1_{High\ Entry\ cost}) = \beta_0 + \beta_1 \ln (exports_{it}) + + \beta_2\, ln(imports_{it}) + \beta_3\, ind_i + \beta_4 Year_t + \varepsilon_{it} \quad (8)$$

$$\ln (Startups + 1_{Low\ Entry\ cost}) = \beta_0 + \beta_1 \ln (exports_{it}) + + \beta_2\, ln(imports_{it}) + \beta_3\, ind_i + \beta_4 Year_t + \varepsilon_{it} \quad (9)$$

In order for entry cost to have a significant industry fixed effect, we expect the regression with a high entry cost to have the lowest correlation with exports out of the two regressions.

The reason for creating one single threshold at Ksh 37 000 (and not categorize according to high, medium and low entry cost) is to be able to account for the non-tradable sector where it becomes evident from looking at the data that few firms have as high entry costs as above Ksh 50000. By creating the threshold at Ksh 37 000 a third regression on the non-tradable sector experiencing high entry cost can be estimated as follows

$$\ln (Startups + 1_{NT,High\ Entry\ cost}) = \beta_0 + \beta_1 \ln (exports_t) + + \beta_2\, ln(imports_t) + \beta_3\, ind_i + \beta_4 Year_t + \varepsilon_{it} \quad (10)$$

This serves as a control group against the tradable sector. If the non-tradable sector is experiencing a similar start-up rate as the tradable sector does in relation to trade flows, the entry cost does have a significant industry fixed effect.

8.2 Trade fixed effects

As a robustness check for trade volumes an instrumental variable regression is estimated, using tariff as an instrument on imported products and an aggregated GDP index of Kenya's four main exporting partners as instrument on exports. This

separates time and local economy fixed effects that depend on other variables than trade volumes, not captured by the fixed effects model.

By estimating a two stage least square model (2SLS), the trade volume effect on start-ups can be further controlled for. Tariff rate is used as an instrument on import volumes since imports tend to increase when tariffs decrease (endogenous variable), all the while tariff rates are not affected by the local Kenyan economy and thus separates the import volume effect from any local start-up effect (exogenous instrument). Further on, the GDP index of Kenya's four main export recipient countries is used as a proxy for market access of exports for Kenya. Kenya is such a small exporting country that their export volumes are strongly dependent on the size of the recipient economies (endogenous variable), rather than those economies being dependent on the volume of Kenya's economy. The "market access" index therefore serves as a good instrument controlling for something affecting export volumes, that is not related to any local economy characteristics (exogenous instrument). The instrumental variable regressions for each size of start-ups look as follows:

$$\ln(Startups + 1_{Large,it}) = \beta_0 + \beta_1 X_{imports,it} + \beta_2 Z_{exports,it} + \varepsilon_{it} \quad (11)$$

$$\ln(Startups + 1_{Medium,it}) = \beta_0 + \beta_1 X_{imports,it} + \beta_2 Z_{exports,it} + \varepsilon_{it} \quad (12)$$

$$\ln(Startups + 1_{Small,it}) = \beta_0 + \beta_1 X_{imports,it} + \beta_2 Z_{exports,it} + \varepsilon_{it} \quad (13)$$

As a second stage least square model, where the first stage estimate X(imports) and Z(exports) as follows:

$$\ln\left(X(Imports)_{it}\right) = \beta_0 + \beta_1 \ln\left(Tariff_{it}\right) + u_{it} \quad (14)$$

Cov (Tariff, X(Imports)) $\neq 0$
Cov (Tariff, ε)=0

$$\ln\left(Z(Exports)_{it}\right) = \beta_0 + \beta_1 \ln\left(Market\ access\ index_{it}\right) + v_{it} \quad (15)$$

Cov (Market access index, Z(Exports)) $\neq 0$
Cov (Market access index, ε)=0

The results predicted by this model measures a more isolated correlation between start-up rate and trade volumes, since the local economy effects on trade volumes is reduced.

8.3 Robustness results

8.3.1 Entry Cost

The first robustness checks, separating industry fixed effect (entry cost) from trade, shows significant results with robust standard errors. As expected, the simple OLS regressions do confirm that start-up rates are positively related to export volumes and negatively related to increases in entry cost, this is most significant for large firms. The reason for not including entry cost in the initial fixed effects model is because the first fixed effects model served a purpose of estimating all industry specific effects that are not specified by the model. By singling out entry cost one of those industry fixed effects is investigated. The R^2 values in this model are, however, quite low (ranging from 0.23-0.29) indicating that this only captures about 23%-29% of all industry characteristics affecting start-up rate. Worth noting is that, time fixed effects are not accounted for either in the simple OLS regression.

Table 7. Results OLS with entry cost

	TOTAL		LARGE		MEDIUM		SMALL	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
entrycost	-0.74***	0.17	-1.04**	0.34	-0.65	0.35	-0.69*	0.34
import	0.07	0.09	0.18	0.16	0.12	0.16	-0.06	0.16
exports	0.87***	0.14	0.59*	0.23	0.81**	0.24	1.19***	0.27
intercept	3.86*	1.93	8.26*	3.99	3.09	4.02	1.96	3.80
N	237		79		79		79	
R2	0.2780		0.2776		0.2323		0.2928	

Regarding hypothesis 1a, it is interesting to note that even though entry cost is negatively correlated with start-up rate and to a larger extent for large start-ups than small start-ups, exports still have a more positive effect on small start-ups than large start-ups in the OLS model. Regarding hypothesis 1b and hypothesis 2, the coefficients for imports are not significant and do not provide any further insight.

Table 8. Fixed Effects model tradable sector testing for entry cost

	Industry FE		Time FE		Both FE	
	Coeffiecient	S.E	Coeffiecient	S.E	Coeffiecient	S.E
HIGH (> 37000 Ksh)						
import	0.54*	0.21	0.20*	0.09	-0.70***	0.17
exports	0.43	0.24	0.39*	0.18	0.46**	0.16
intercept	-5.63***	1.63	-3.19***	0.93	0.72	0.79
N	110		110		110	
R2	0.5008		0.6375		0.8854	
LOW (<37000)						
import	0.59	0.44	-0.76***	0.15	-1.04**	0.34
exports	1.33**	0.41	1.14***	0.20	0.90**	0.31
intercept	-11.20***	2.88	-2.59**	0.84	0.59	1.53
N	127		127		127	
R2	0.3092		0.8280		0.8720	

* p<0.05; ** p<0.01; *** p<0.001

The industry fixed effects model for "high" and "low" entry cost shows significant results for most fixed effects, with robust standard errors. It is only the industry fixed effects model that does not produce significant results, which together with lower R^2 values than the other models indicates that there is still some industry fixed effect not fully captured. The results confirm that firms experiencing a higher entry cost in the tradable sector do benefit less than firms with lower entry costs. For a 1% increase in exports, firms with low entry cost increases by 0.9%, while firms with a high entry cost increase with 0.46% when controlling for time and industry fixed effects. Looking at hypothesis 1b, the entry cost shows dual results in relation to imports, with a negative correlation in the time fixed effects model and the industry fixed effects model for high entry cost and a significant negative correlation when controlling for both fixed effects. The results cannot bring a full insight into hypothesis 2 as the industry fixed effects model is not producing significant results. As for the other models, they confirm that firms with smaller entry cost are negatively correlated with imports, to a larger extent than firms with high entry cost.

Table 9. Fixed Effects model non-tradable sector testing for entry cost

	Industry FE		Time FE		Both FE	
	Coeffiecient	S.E	Coeffiecient	S.E	Coeffiecient	S.E
HIGH (> 37000 Ksh)						
import	0.57*	0.22	-0.20*	0.08	-0.90***	0.17
exports	0.79***	0.22	0.79***	0.13	0.64***	0.16
intercept	-7.55***	1.56	-3.28***	0.66	1.29	0.85
N	237		237		237	
R2	0.3614		0.6640		0.8228	

* p<0.05; ** p<0.01; *** p<0.001

Comparing the start-up rate of firms in the tradable sector against the non-tradable sector, firms in the non-tradable sector with a high entry cost are, surprisingly enough, more strongly positively correlated with an increase in exports than firms in the tradable sector. A 1% increase of exports, when controlling for time and industry fixed effects yields a 0.46% increase of firms in the tradable sector compared to a 0.64% increase of firms in the non-tradable sector. Imports, again, produce dual results with both negatively and positively significant correlations indicating that there might be further fixed effects not specified in this model that affects both firms in the trade and the non-tradable sectors.

8.3.2 Trade

The results of the two stage least square model (2SLS) shows significant results with robust standard errors. The Wald chi^2 statistics confirms, just like the previous F-statistics that the coefficients are jointly significant with 2 degrees of freedom. The first stage F-statistics of the instrumental variable regression is 17.44, indicating strong instruments.

Table 10. Results Two-stage Least Square Model

	TOTAL		LARGE		MEDIUM		SMALL	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
import	1.38***	0.37	1.24**	0.41	1.59***	0.45	1.31*	0.56
exports	1.34***	0.23	1.02***	0.28	1.24***	0.30	1.76***	0.42
intercept	-17.22***	2.60	-14.48***	2.54	-18.03***	2.98	-19.15***	4.07
N	72		24		24		24	
R2	0.5331		0.6572		0.6257		0.4850	
Wald chi2(2)	76.73		48.69		53.14		32.75	

* p<0.05; ** p<0.01; *** p<0.001

The results show a positive significant correlation between export volumes and start-ups, however small size start-ups still experiences a larger start-up rate than large and medium sized firms, which is an indication that there are still some constraints to large firm start-ups that is not captured by this model. The most interesting result from the two-stage least square model concerns hypothesis 1b and hypothesis 2, namely that start-up rate is no longer negatively correlated with imports, but rather positively and significantly correlated with imports. Large start-ups are, however, still less positively correlated with imports than medium sized firms (1.24% against 1.59% for a 1% increase in exports). As for small start-ups, they are no longer negatively correlated with imports, but rather positively correlated experiencing a 1.31% increase for a 1% increase in imports. The instrumental variables regression has managed to isolate the start-up rate that is related to trade volumes and to a smaller extent to any local economy effect. The fact that large start-ups still have a smaller start-up rate than medium sized firms in correlation with both imports and exports indicate that trade only affects productivity to some extent.

The fact that small size start-up rate is positively correlated with imports, as oppose to negatively correlated as in the previous models, shows that the instrumental variable regression has managed to reduce some local economy effect, that is not captured by the fixed effects model, hindering the start-up of small firms in relation to imports. All results will be further analysed in the next section.

9. Analysis

Hypothesis 1 a: The fact that exports coefficients for large firms in the original fixed effects models were insignificant, except for its significantly positive, yet small correlation in the time fixed effects model, shows that there is some local economy condition affecting the start-up rate of large firms, that is not captured by the original fixed effects model. Checking for entry cost using OLS, it is confirmed, as in Melitz (2003) model, that entry cost does reduce start-up rate, and it does so to a larger extent for large firms than firms with a lower entry cost. However, when using thresholds for entry cost in the fixed effects models, there is still a significant positive correlation with exports showing that entry cost does affect start-up rate negatively,

but it does not reverse the positive relation between exports and start-ups in Kenya. Both the OLS model and the fixed effects model confirm that small firms and the pool of firms with low entry cost experience a higher start-up rate than large firms or firms with a high entry cost. This then rejects the hypothesis that large firm start-ups are positively, and to a larger extent than small- or medium sized firms, correlated with exports. The results indicate that there might be other factors, not captured by this model, affecting productivity of large firms. Infrastructure might be such a variable, playing a significant role in the productivity of large firms. Infrastructure can be divided into two parts: first, regular infrastructure such as electricity and water supple, access to roads, internet, telecommunication, and second: non-monetary costs of large firm productivity, such as more rigorous permit regulations, and a higher financial risk etc. (World Bank 2009). The "doing business in" report on Kenya shows that lack of necessary infrastructure is one of the main issues having a negative impact on business investments in Kenya (IBRD 2011). If infrastructure is poor it can have a large negative effect on growth of companies since the investment needed to grow might not be returned (World Bank 2009). However, the two stage least square model, using instrumental variables aiming at reducing the local economy effect in the relationship between trade and start-up rate still shows that small firms experience a significantly positive effect of exports that is larger than for large firms. Here, medium sized start-up rate is experiencing the largest effect though. This indicates that there might be some further country specific effect of Kenya that makes previous heterogeneity results not apply to the case of Kenya. One of those country specific factors might be the fact that Kenya's trade is strongly affected by the AGOA agreement, making Kenya a "stopover" for many products. Studies have shown that imports and foreign direct investments (FDI) in Kenya from Asian countries, within the textile and garment sector, has increased more than tenfold since 2002 (Kamau et. al. 2009). As an effect, the positive effect of increased exports to the U.S. under the AGOA agreement might only be captured by the productivity of foreign owned firms placing some part of their production in Kenya in order to export "duty free" to the U.S. (Kamau et. al. 2009). Thus, the productivity increase in the tradable sector in relation to exports in Kenya is most significant for medium and small sized firms that might be supplying inputs to the larger foreign owned firms. Another country specific

factor that is important for Kenya is related to agriculture. Since agriculture is Kenya's largest export sector, extensive margin dynamics within this sector will have a large effect on the total economy outcome. One explanation why this sector might not rise in productivity as predicted when only looking at productivity in manufacturing sectors is because it is constrained by weather conditions. Kenya's is often victim of severe droughts, which obstructs growth of agricultural production (World Bank 2011). If there is a risk of a drought, undertaking large investment in increase plant size will not be prioritized as it induces a too high risk.

Hypothesis 1b: The hypothesis that large firms are positively correlated with imports is not sustained in the original fixed effects models that show conflicting results, where the only significant correlation for large firm start-ups and imports is negative, in the time and industry fixed effects model. When running a simple OLS regression, controlling for entry cost, both large and medium sized firms have a positive, but insignificant correlation with imports where large firms have a stronger correlation as the hypothesis, inspired by Baldwin and Gu (2003) predicts. It is only in the instrumental variable regression that the coefficients for imports are consistently positive and significant. However, yet again medium and small sized firms are experiencing a larger start-up rate effect in relation to imports. Hypothesis 1b is thus rejected since there is no sign of a significant productivity increase for large firms in relation to imports. The analysis of this effect is analogous to the one for hypothesis 1a, namely that the country effect reducing productivity of large firms might have to do with foreign owned firms operating in the market.

Hypothesis 2: The relationship between small sized start-up rate and imports shows inconsistent result from the original fixed effects model. While the time and industry fixed effects model shows a significant negative correlation of small size start-ups and imports, the industry fixed effects model shows insignificant results. This inconsistency is repeated both in the simple OLS model and when controlling for entry cost using fixed effects models. The instrumental variable regression results shows positively significant correlation with imports where a 1% increase in imports leads to a 1.31% increase in small size start-ups. These findings are consistent with traditional trade theory predicting that the negative correlation between small sized

firms productivity and growth given import volumes are explained by factors in the local economy such as lack of economies of scale, lack of capital, lack of technological innovativeness etc. (Rodrik 1988). Since such local economy effects are not captured by the original fixed effects model it is expected for the instrumental variable regression to show results that contradict the original model as local economy effects are reduced in the instrumental variable regression.

10. Conclusion

This paper aimed at investigating the size of start-ups of Kenya's tradable sectors in order to determine to what level trade affects intra-industry heterogeneity. This paper thereby emerges on an under-researched area and removes the risk of bias accompanied with using an estimated production function meant to correspond to effects of trade. The analysis of the tradable sectors of Kenya's economy shows that productivity increases are focused around medium sized firms rather than larger firms. This shows a new angle of the trade-local economy relation, where Kenya's economy might not be facilitating enough for large firms to emerge and fully reap the benefits of increased export and imports. Research shows that Kenya's favourable trade agreements with the U.S. might have skewed the levels of foreign ownership in some sectors, which might impede the further productivity growth of local firms. This is a very interesting area of research to emerge on for the countries affected by the AGOA agreement. Unfortunately Kenya only has detailed FDI data for 2007-2008 as the collection of industry and country of origin specific data only started in 2009 (KNBS 2011). However, since the methodology used in this thesis enables the analysis to capture intra-industry dynamics across all sizes of firms, the findings in this thesis might just be an angle that the productivity approach has failed to account for since medium- and small sized firms are excluded in those models. The trade theory literature is certain to emerge deeper into the micro level effects of trade with years to come. Large research projects accounting for micro level effects in countries all the while performing cross-section analysis for a set of countries will add significantly to the literature as this paper indicates that the reason why previous theories are rejected has to do with characteristics that are specific to Kenya.

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Appendices

Appendix A

Summary of Kenya's Trade Agreements

Name	Explanation	Member Since	Members	Agenda	Implications
WTO	World Trade Organization	1995	153 countries (of which 117 developing countries)	Trade negotiations, with the aim of freer trade, non-discrimination, environment protection	Most favoured nation (MFN) tariffs apply, transparency required.
GSP	Generalized System of Preferences	1995	131 beneficiaries	Formal system of exemption from the MFN principle with the purpose of lowering tariffs for the least developed countries.	Kenya's manufactured products are entitled to preferential duty treatment in the United States of America, Japan, Canada, New Zealand, Australia, and most European countries. No quantitative restrictions applies to Kenyan exports on any of the 3,000-plus items currently eligible for GSP treatment
AGOA	African Growth Opportunity Act	2001	37 designated Sub-Saharan African (SSA) countries	Expands U.S. trade programs giving (duty-free) benefits beyond the Generalised System of Preferences (GSP) as long as countries comply with the prescribed percentage value added that must take place locally in an AGOA-beneficiary country.	Duty-free access to the U.S. market under the combined AGOA / GSP program includes approx. 7,000 product tariff lines: of which 1,800 AGOA products beyond products included in the GSP legislation. This includes items such as apparel and footwear, wine, certain motor vehicle components, a variety of agricultural products, chemicals, and steel.
EAC	East African Community	2000	Kenya, Uganda, Tanzania, Rwanda and Burundi	Regional intergovernmental organisation seeking to widen and deepen Economic, Political, Social and Culture integration in order to improve the quality of life of the people of East Africa through increased competitiveness, value added production, trade and investments.	Partners with many international organizations. 2005: Establishment of an East African Customs Union. 2010: Establishment of the Common Market. 2011: Negotiations for the East African Monetary Union.

Name	Explanation	Member Since	Members	Agenda	Implications
COMESA	The Common Market for Eastern and Southern Africa	1981	Burundi, Comoros, DR Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, South Sudan, Sudan, Swaziland, Uganda, Zambia, Zimbabwe	Creating a large economic and trading unit that is capable of overcoming some of the barriers that are faced by individual states	Free trade area since 2000. Established a unified customs union in June 2009 with plans of fully implementing it by 2012, incl. harmonization of macroeconomic policies. Negotiates with EU o.b.o. member states.
ACP	Africa Caribbean Pacific States	1975	79 member states	Coordination of actions within the ACP group. Integrating ACP states into the global economy, negotiate o.bo. member states, especially against the EU.	2000: ACP-EU trade cooperation, abolishing non-reciprocal trade preferences. 2004: Economic Partnership Agreements (EPA's) being negotiated between EU and COMESA part of ACP.
CEN-SAD	Community of Sahel-Saharan States	2008	Benin, Burkina Faso, Central African Republic, Comoros, Chad, Djibouti, Egypt, Eritrea, Ghana, Guinea, Guinea-Bissau, Gambia, Ivory Coast, Kenya, Liberia, Libya, Mali, Mauritania, Morocco, Niger, Nigeria, São Tomé and Príncipe, Senegal, Sierra-Leone, Somalia, Sudan, Togo, Tunisia	Create a free trade agreement and an integrated market	Negotiations underway
IGAD	Intergovern-mental Authority on Development	1986 (restructuring in 1996)	Djibouti, Ethiopia, Kenya, Somalia, South Sudan, Sudan, Uganda	Intergovernmental body for development and drought control in East Africa. Cooperation in achieving: food security and environmental protection, peace and security and humanitarian affairs, economic cooperation and integration	Partnership program with several OECD countries, the International Organization for Migration, United Nations Development Programme and the World Bank. No enforcement, only policy reviews.

Sources: ACP (2011), AGOA (2011), COMESA (2011), EAC (2011), IGAD (2011), Tralac (2011), WTO (2011)

Appendix B

Detailed descriptions of variables and quality of variables available from the CCN's business registry

Variable	Description	Condition of data
AutoNo	162532 generated numbers depending on time of application	GOOD
AccNo	162532 account number registered	GOOD
BusiRegNo	94360 firms assigned business registration numbers used to identify companies other than account number	MEDIUM
BusiDescript	97651 firms assigned a business descriptions, by unstandardized text entry	MEDIUM
BusiCode	162532 registered business codes divided into 88 different categories of business description according to business sector and size of firm	GOOD
BusiName	162532 registered business names	GOOD
Address	120087 registered addresses	MEDIUM
Telephone	63412 registered telephone numbers	POOR
Email	10001 registered e-mail addresses	POOR
PlotNo	12153 firms assigned a plot number licensing registrations	MEDIUM
AnnualFee	162532 registries of 88 different types of fees depending on type of business and size	GOOD
Fax	237 registered fax numbers	POOR
NoOfEmployees	127838 records of number of employees	MEDIUM
ExpiryDate	142225 date of expiry for license (different duration depending on type of license)	MEDIUM
LicenIssueDt	162532 registries	GOOD
PayableAmount	162532 registries	GOOD
ReceiptNo	162532 registries	GOOD
PayDate	162532 registries	GOOD
LicenceNo	162532 registries	GOOD
IssuedDate	148619 registries	MEDIUM

Source: City Council of Nairobi 2011

Appendix C

UN COMTRADE SITC.1 Categories

0 Food and Live Animals
1 Beverages and Tobacco
2 Crude materials, inedible, except fuels
3 Animal and vegetable oils and fats
4 Mineral fuels, lubricants and related materials
5 Chemicals
6 Manufactured goods classified chiefly by material
7 Machinery and transport equipment
8 Miscellaneous manufactured articles
9 Commod. & transactions. Not class. Accord. To kind

Source: UN COMTRADE 2011

Appendix D

UN COMTRADE and WTO categories mapped against CCN Variables

UN COMTRADE/WTO trade sector classification	City Council of Nairobi sector classification of tradable sectors
TRADE IN COMMODITIES	
Food and Live Animals	Agricultural Products
Beverages and Tobacco	
Crude materials, inedible, except fuels	
Animal and vegetable oils and fats	
Mineral fuels, lubricants and related materials	Mining Extraction Operations
Chemicals	Industrial Plant
Machinery and transport equipment	
TRADE IN SERVICES	
Travel	High Standard Lodging House/Hotel
	Lodging House with Restaurant Bar
	Lodging House
	Restaurant with Bar/Members Club
	Eating House;Snack Bar;Tea House
Transportation Services	Transportation Co.
Communications services	Communications Co.
Financial Services	Financial Services
Other business services	Professional Services Firm

Source: UN COMTRADE (2011), WTO2 (2011), CCN (2011)

Excluded UN COMTRADE sectors:

Miscellaneous manufactures: instruments, photography, optical goods, watches and clocks, toys and games, and other manufactured articles, n.e.s. (SITC divisions 81, 88, 89 minus group 891).

Excluded WTO Trade in Services sectors:

Personal, cultural, and recreational services: subdivided into two categories, (i) audiovisual services and (ii) other cultural and recreational services. The first component includes services and fees related to the production of motion pictures, radio and television programmes, and musical recordings. Other personal, cultural, and recreational services includes services such as those associated with museums, libraries, archives, and other cultural, sporting, and recreational activities.

Both of these sectors were excluded since the CCN business registry does not categorize the sectors corresponding to these trade sectors according to size, and thus it could not be included in the regression analysis.