Review of Economic Analysis

REA Review of Economic Analysis

Do Exports of Services Lengthen the Duration of Export of Goods? Evidence from Kenya

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Volume 16, numéro 3, 2024

URI : https://id.erudit.org/iderudit/1115525ar
DOI : https://doi.org/10.15353/rea.v16i3.5238

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Éditeur(s)

International Centre for Economic Analysis

ISSN

1973-3909 (numérique)

Découvrir la revue

Citer cet article

Majune, S. K., Egwaikhide, F. O. & Kiplangat, J. C. (2024). Do Exports of Services Lengthen the Duration of Export of Goods? Evidence from Kenya. *Review of Economic Analysis*, *16*(3), 309–341. https://doi.org/10.15353/rea.v16i3.5238

Résumé de l'article

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Review of Economic Analysis 16 (2024) 309-341 1973-3909/2024309

Do Exports of Services Lengthen the Duration of Export of Goods? Evidence from Kenya

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This study investigates the effect of service exports disaggregated into nine categories (transport, travel, construction, government, ICT, personal, cultural and recreational, financial, insurance, and other business services) on the survival of goods exports in Kenya. Estimates from the discrete-time probit model with random effects on bilateral trade data covering 1996 to 2019 show that export of services positively and significantly impact the duration of goods exports. A disaggregation of the goods into intermediate, consumption, capital, differentiated and homogenous products shows that transport and ICT service exports increase the duration of export of goods. Therefore, the simultaneous advancement of goods and service exports would foster the export survival of goods. In particular, the results indicate that export survival of value chain commodities would be enhanced through enhancing modes of transportation alongside communication and connectivity infrastructure. Our results also have implications for the African Continental Free Trade Area (AfCFTA) which seeks to synchronously negotiate and promote trade in goods and trade in services within Africa.

Keywords: Service exports, Goods exports, Export survival, Export duration, Kenya

JEL classification: F14, C35, C41

1 Introduction

How long does a country maintain the sale of its products to another country? The period of uninterrupted market presence in a foreign country, known as export survival (or export

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duration), is central to export growth . Stability in export relationships minimizes risk and allows for better economic planning (Zhu et al., 2019). However, empirical works have shown that transient relationships are far more common worldwide. For instance, in Africa, Cadot et al. (2013) find that between 42% and 68% of firms in Senegal, Tanzania, Mali and Malawi exit foreign markets after the first year of trading. Between 52% and 61% of novel export relationships from Kenya die within the first year of trading, while 95% fail by the 21st year (Chacha and Edwards, 2017; Majune et al., 2020; Türkcan, Majune and Moyi, 2022). Several macroeconomic (exchange rate, financial development and GDP), firm (size and age), product (homogenous and differentiated) and gravity (language, tariffs and trade agreements) factors have been tested as potential determinants of export survival but very little is known about the contributions of services to goods exports survival.

This study examines the determinants of the duration of merchandise exports, focusing on the growing role of services exports. We are interested in what Ariu, Mayneris and Parenti (2020) describe as bi-exporters (firms that export both goods and services) but at the macro-level, simultaneously exporting services and goods, which is a reality of the modern trade landscape. We are also interested in identifying the effect of different services on the export survival of goods. We assume that exporting services boosts the survival of goods exports. Studies have thus far shown how services boost exports of goods through production, distribution and marketing (Díaz‐Mora et al., 2022; Yang et al., 2023; Dai et al., 2024). In the context of export survival, it could be that services enhance productivity and expand the scale of manufacturing exports, which ensures the sustained production and availability of commodities for external markets. Efficient and timely services such as transport, telecommunications, and business services are crucial for coordinating and managing tasks between firms, strengthening business relationships and boosting their survival.

However, the effect of services exports on the duration of goods exports might be heterogeneous. Sawadogo et al. (2023) assess a related question to ours: the role of services exports on the product diversification of goods exports in Sub-Saharan Africa (SSA). They find that exports of total services, transport, travel, insurance, financial, licensing and other business services promote the export product diversification of goods. Information, Communication and Technology (ICT), construction and creative economy services exports do not significantly impact the product diversification of goods SSA. The authors attribute these results to the low share of ICT, construction and creative economy services exports in SSA's total service exports. Also, these services are likely to have a large influence on differentiated commodities as opposed to homogenous goods, which are mostly exported by SSA countries. Trade in goods is also not found to have a positive effect on all services traded among African countries (e.g ICT) by Majune, Kaaria and Kihiu (2023). We use these results to hypothesise that all categories of services might not support the survival of goods exports.

Kenya is used as a case study for various reasons. First, it is one of the major exporters of goods and services in Sub-Saharan Africa. Between 1960 and 2019, Kenya ranked among the top thirteen goods exporters and the top three service exporters in the region (Majune and Mwania, 2021), suggesting that it has a stronger comparative advantage in services than goods. However, the overall export growth has been poor in recent years (Majune et al., 2020), attributed partly to trade policy, pursued disjointly with that of services (Majune, Gathiaka and Ndwiga, 2022), which focused largely on goods (ROK, 2017). Boosting export growth is of priority to policymakers in Kenya (ROK, 2017), and insights into the effects of services on export survival will be valuable to planning.

Second, there is precipitate de-industrialization in Kenya where the role of the services sector in the economy has increased faster than historically expected (Rodrik, 2018). For instance, the services sector contributes the highest value addition to Kenya's GDP and has created more jobs than the agricultural and manufacturing sectors (Dihel and Goswami, 2016; World Bank, 2018). Therefore, this study will provide some useful policy lessons to boost goods exports, given the reality of the growing services sector.

Lastly, none of the extant empirical works on Kenya has considered the contributions of services to the duration of exports. Chacha and Edwards (2017) focus on new Kenyan exporters' market entry and growth dynamics and the corresponding influence of firm export behavior (initial trade values, product differentiation, and extensive and intensive margins). Majune et al. (2020) determine the role of non-reciprocal trade agreements, product differentiation, and product capital intensity in Kenyan export duration. In addition, Turkcan et al. (2022) assesses the impact of tariffs on export sales, margins, and survival rates of Kenya's firms, while Majune, Türkcan and Moyi (2023)'s enquiry was pre-occupied with how the AfCFTA impacts firms' export survival through trade relationships that start before and after an agreement has been established. Therefore, the specific focus on services will not only add to the accumulating evidence on the subject matter, but will also provide a deeper understanding of policy makers in revising the current 'silo' approach to trade policy and trade negotiations that generally dissociate goods from services.

A discrete-time probit model with random effects on bilateral trade data covering the period 1996-2019 is estimated. The effect of services exports on the duration of goods exports is unambiguously positive and statistically significant. A disaggregation of the services shows that transport, travel, ICT, construction, financial and government service exports lengthen the duration of exports. Given that services matter in the duration of exports, it is desirous to develop the services sector to support the survival of export of goods.

The rest of the article is organised into five sections. Following this introduction is section 2 which presents the stylized facts of international trade in Kenya. Section 3 reviews the relevant literature, while Section 4 specifies the empirical models. Section 5 contains the results and discussions; and Section 6 concludes.

2 Some Stylized Facts on Kenya's Export and Import of Goods and Services

Table 1 shows the dollar value of goods and services exports and imports in Kenya from 1975 to 2019. The table also shows the share of goods and services in total exports over time. Kenya's goods exports have consistently surpassed services exports. However, services exports have steadily risen from a share of about 27% in the 1970s to 47% and 45% in the 1990s and 2010-2019, respectively. The substantial growth in the 1990s is linked to the pursuit of trade liberalization, particularly from 1993, when Kenya was projected to have fully liberalized (Wacziarg and Welch, 2008). As a result, the value of service exports is currently twenty-one times more than in 1975, while that of goods exports is about nine times more. Therefore, the growth of service exports has doubled that of goods during the past four decades. In addition, the total value of services exports, for the first time in the 2010-2019 period, went over US$ 20 billion.

Table 1: Trend of goods and service exports and imports in Kenya, 1975-2019

Period	Exports				Imports	
	Goods		Services		Goods	Services
	Value (US$, Billion)	Share	Value (US$, Billion)	Share	Value (US$, Billion)	
1975-1979	4.867	73%	1.813	27%	6.000	1.704
1980-1989	10.950	63%	6.477	37%	16.305	4.534
1990-1999	18.161	53%	16.290	47%	43.063	10.317
2000-2009	31.572	62%	19.350	38%	58.070	11.987
2010-2019	58.798	56%	47.604	45%	150.792	29.054

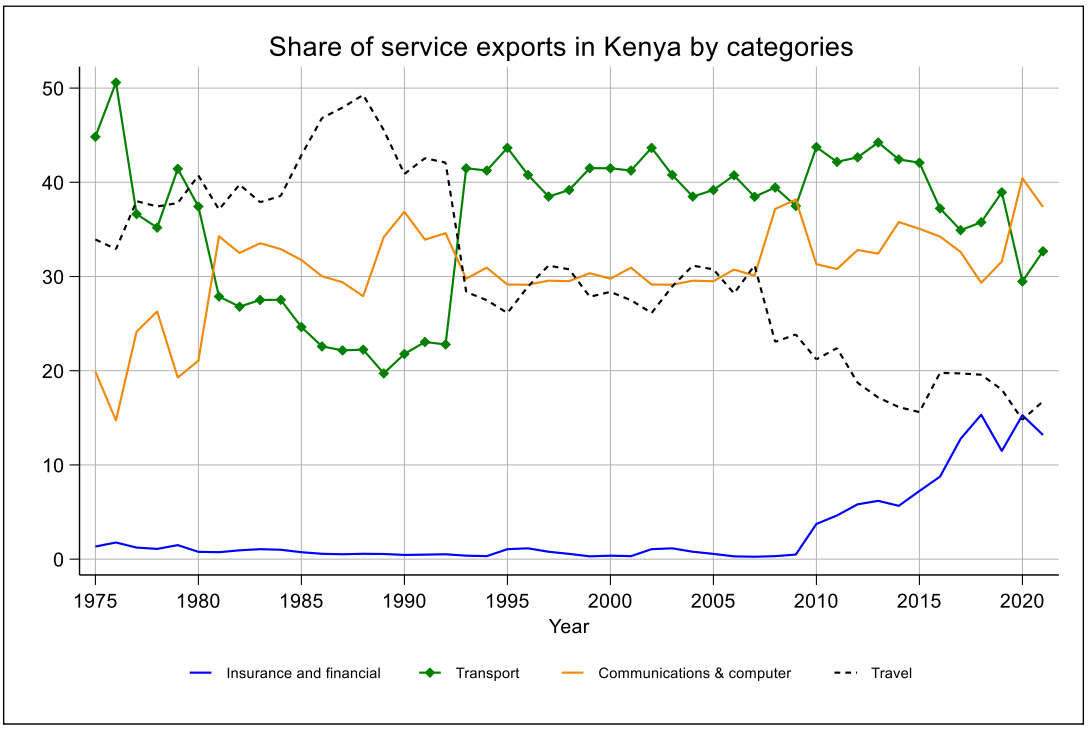
Source: Authors' computation from World Bank (2022) data

Table 1 also shows that Kenya is a net exporter of services – it exports more services than it imports. Similarly, the gap between exports of services and imports has widened over time. This fact provides two inferences. First, Kenya is definitely an outlier since the rest of Sub-Saharan Africa exports fewer services than it imports (Ayoki, 2018). Second, Kenya is characterised by a robust local services sector that requires minimal contribution from overseas. The services sector contributes the highest value addition to Kenya's GDP and has experienced stellar growth in the recent past (Dihel and Goswami, 2016; World Bank, 2018).

The relative share of the various services in total services export value is plotted in Figure 1. The graph shows that transport and travel sectors contribute the highest share of services exports from Kenya. The percentage of transport services has risen the fastest since the 1990s. Kenya also exports a significant amount of government services, such as services provided by embassies and consulates and military agencies and units. The increase in telecommunication, computer and information services, and financial services exports from 2010 is noteworthy; and this has been attributed to the growing local expertise in technology and innovation (Dihel

et al., 2012). Financial services have been boosted by innovations such as M-PESA, a mobile money application rolled out in 2006 by Safaricom, a telecommunication company (Ngui and Kimuyu, 2018). Other exports of services from Kenya include maintenance and repair services; personal, cultural, and recreational services; charges such as royalties for the use of intellectual property; and insurance and pension.

Figure 1: Kenya's service exports at one-digit level classification, 1975-2021



Source: Authors' computation from WTO (2022) data

3 Literature Review

This section is broken down into three parts for ease of appreciation. The first part briefly explains the main theories underlining export survival. The second segment is a narrative of the determinants of export survival and the third focuses on the contributions of services to export survival.

3.1 Theoretical explanation of export survival

Traditional trade theories conjecture gradual changes in global trading activity due to its relatively stable determinants on an aggregate level, such as factor endowment (Shao et al.,

2012). However, a disaggregated analysis reveals the fleeting nature of international trading patterns. Therefore, three theories arise to explain the concept of export survival.

Vernon's (1966) product cycle theory acknowledges export market dynamism as producers in developing countries catch up with technological innovation and replace those in developed countries due to their relatively low labour costs if the latter fail to innovate further. However, the theorized rate of change is slow and inconsistent with observed short trade durations (Besedeš and Prusa, 2006b). On the other hand, Bernard et al. (2010) posit that export duration is a function of product turnover and introduction in a foreign market as firms respond to demand. Their product switching theory explains that depending on the characteristics of the firm, firm-destination, and firm-product, exports of products may be discontinued upon receiving adverse demand shocks. Contrarily, products with positive demand shocks will likely be launched into foreign markets.

Lastly, Rauch and Watson's (2003) search and matching theory breaks down export survival into three phases, namely, searching/matching, deepening/investing, and abandoning/re-matching. Buyers in developed countries incur the cost of searching among a large pool of developing country exporters with varying production costs. The buyers then decide whether or not to make lump-sum investments in the matched suppliers, depending on their reliability. However, given imperfect information and uncertainty, buyers will likely begin with small orders to establish the suppliers' productive capacity. Thereafter, they choose to continue with the supplier relationships or re-match with new suppliers. These alternative actions of beginning with lump-sum investments, starting with small orders to learn, or abandoning suppliers altogether, imply relatively dynamic trading patterns.

3.2 Determinants of goods exports survival

Empirically, export duration is affected by various factors. For example, a growing body of research highlights the importance of entry investments, or sunk costs, in export survival (Alvarez et al., 2007; Meinen, 2015; Padmaja and Sasidharan, 2017). That internationally-trading firms incur irreversible fixed entry costs (related to regulatory compliance, information gathering and creation of distribution networks) regardless of export volumes. The studies posit that the higher the sunk costs, the lower the likelihood of exit from export markets; and, therefore, the longer the export duration. Tangentially, Brenton et al. (2010) explain that in the absence of perfect information, exports may be used as a signaling mechanism to reveal accurate information on fixed costs and firm productivity since low-productivity market entrants are likely to exit relatively sooner after finding exporting to be unprofitable. Further evidence confirms a greater persistence of exports from larger, more productive, multiproduct and/or foreign-owned firms (Padmaja and Sasidharan, 2017).

In their analysis of China's goods export survival data using the Cox proportional hazard, Weibull and exponential models, Shao et al. (2012) find that destination characteristics,

particularly economic size, affect export duration. Bigger markets typically involve more buyers, thus, increasing the likelihood of exporters finding and sustaining a favorable match. On the other hand, using the survival analysis method, Besedeš and Prusa (2006a) examine the Gross Domestic Product (GDP) characteristics of countries on the supply end of international markets. They report that richer northern countries (that is, countries in the northern hemisphere) have better survival rates than poorer southern countries. Besedeš and Blyde (2010) surmise that relatively well-developed institutions in northern countries improve capital availability, reduce fixed costs and enhance contract enforcement, promoting trade stability.

In Africa, Kamuganga (2012) shows that intra-Africa regional trade cooperation increases the likelihood of Africa`s export survival, especially if the agreement is deep. Teye-Gaga et al. (2023) arrive at a similar conclusion in Ghana. However, trade agreements only strengthen the survival of trade relations that are active at the time the agreement is initiated. Export ties that are formed after the creation of an agreement have a low chance of surviving. The study by Cadot et al. (2013) reveal that the survival of firms from Malawi, Senegal, Mali and Tanzania after the first year of trading is improved by the number of firms exporting an identical product from the same country in a specific market. Firm characteristics such as being a multi-product and multi-destination trader, experience, and destination factors such as trading partner's GDP, tariffs, distance and existence of a trade agreement determine the survival of exporting firms in Kenya (Türkcan, Majune and Moyi, 2022). The age of firms, size, export intensity and trade agreements enhance the probability of export survival in Ghana (Mohammed, 2018; Nkansah et al., 2022). The size, location, level of product innovation, foreign ownership of an enterprise and customs and trade regulations determine the duration of exporting in Ethiopia (Lemessa, Watabaji and Yismaw, 2018; Abegaz and Lahiri, 2020). Common language, initial export value, distance, GDP per capita, colonial ties, total export, competition, tariff and exchange rate determine the survival of exports in Nigeria (Arawomo, 2015). Using a discrete-time logit model with random effects, Adou and Majune (2022) find that the level of urbanization in the importing country determines Cote d'Ivoire's export duration.

Incidentally, none of these studies on goods export survival draws direct links with services. However, some papers focused on servicification[1] (Cui and Liu, 2018; Reddy and Sasidharan, 2022) and participation in GVCs (Díaz-Mora, Gandoy and González-Díaz, 2018; Lee, 2019; Zhu et al., 2019; Doan and Le, 2023). In this respect, reference is made to Reddy and Sasidharan (2022), which find lower exit hazard rates for enterprises with higher servicification. They employ a complementary log-log (clog-log) model to assess the role of servicification in the survival of 1,227 Indian manufacturing firms involved in both importing and exporting activities within Global Value Chains (GVCs). Cui and Liu (2018) investigate customs and firm-level data from China covering the period 2000-2006. They suggest that enterprises from

[1] The adding value to the production of a commodity by using services.

such developing countries should evolve from pure manufacturing to service manufacturing for improved goods export duration.

Zhu et al. (2019) employ a discrete-time proportional hazards model in their analysis of the participation of Chinese firms in GVCs in the period between 2000 and 2013. Given the transience of international trade relationships, many enterprises prefer to attach themselves to GVCs that optimize their production processes and create path dependence that extends export duration. The authors added that improved product quality in GVCs further maintains trade stability by enhancing bargaining power and brand reputation. Similarly, GVC enterprises with high product diversity enjoy longer export duration due to product optimization and reduced production costs resulting from economies of scope. Meanwhile, increased asset-specific investments raise the barriers of entry to new firms, thereby securing export survival for GVC enterprises. Díaz-Mora et al. (2018) use the logit model to find that foreign services value added embodied in manufacturing exports contribute positively to more resilient export relationships.

Using a gravity framework, Lee (2019) adds that developing countries can boost their exports through services trade agreements that will minimize services trade restrictions and take advantage of their large low-cost labor stock. Other gravity model-based studies demonstrate that deep trade agreements with services provisions boost the export of manufactured goods (Díaz-Mora, García-López and González-Díaz, 2022), while the liberalization of services foreign direct investment (FDI) in destination (importing) countries enhances the diversification of the export of manufactured goods from an origin (exporter) country (Bai et al., 2023).

3.3 Pathways of goods export survival through services

While some already cited papers confirm the general role of services in goods export survival, the current study estimates the disaggregated impact of specific service exports (transport, travel, construction, government, ICT, recreational, cultural, personal, financial, insurance, and other business services) on the sustenance of manufacturing exports. A few studies substantiate the mechanisms of goods export duration (one or two of these services), informing the assumption that services positively affect goods export duration are underscored.

A relatively recent work of Miroudot and Cadestin (2017) on *Information, Communication and Technology services* is illuminating. They argue that ICT improves production efficiency within GVCs and thereby enhances export survival. Specifically, the authors analyze inter-country input-output data, industry-level occupational data, and firm-level data on bundles of goods and services. They find that e-commerce platforms reduce the duration, cost, and inventory involved in distribution, while big data allow for effective and targeted marketing. Employing the Cox hazard model to analyze annual firm-level data over the period 1999-2009, Wang et al. (2017) recommend the adoption of *energy-saving technology* among Chinese

energy-intensive manufacturers for export persistence due to the finding that oil price shocks increase their hazard rate of exit from international markets.

In their contribution, Besedeš and Blyde (2010) emphasize the significance of *transport efficiency* in the longevity of international trade patterns in Latin America. These researchers also establish a Cox proportional hazard model on bilateral trade data between 47 exporting countries and 157 importing countries from 1975 to 2005, that well-developed *financial services* with enhanced capital availability extend manufacturing export duration. Arvelaez et al. (2007) show that transport deficiencies such as poor road conditions and inadequate freezing facilities at ports cut short the export of mangoes from Colombia.

Cui and Liu (2018) accentuate the positive role of manufacturing servitisation input and output on the export duration of Chinese manufacturing firms which is largely driven by product differentiation and research and development (R&D). Similarly, Miroudot and Cadestin (2017) noted the increasing product differentiation within exporting firms that integrate services such as installation, engineering, maintenance, and repair into their goods that are exported to increase customer utility and create long-term relationships. Estimating a multinomial logit model, using panel data (with samples drawn from exporting and non-exporting firms in Latin America covering 2006-2010), Lederman et al. (2016) establish that *government services*, such as export promotion and information gathering [through embassies and consulates, for instance], lengthen export duration by addressing market imperfections associated with externalities.

This part is concluded by locating the function of services in merchandise trade. For instance, logistical and business support services maintain intra-chain linkages within GVCs that decompose production stages and spread them across different countries (Reddy and Sasidharan, 2022). Service activities play a value-addition role, particularly upstream services, like R&D or product design, and downstream tasks, such as sales and marketing (Reddy and Sasidharan, 2022). Shih's smiling curve illustrates that these services provide an even greater value addition than manufacturing itself, incentivizing firms to include services up to 53% of their goods exports (Miroudot and Cadestin, 2017). Services are increasingly being used as manufacturing inputs, having doubled their rate in Sweden between 1975 and 2005 (Lodefalk, 2013), while the rate was more than 25% in Japan, Brazil and Russia in 2011, and close to 40% in India and the US (Cui and Liu, 2018).

Besides, upstream services (e.g. R&D) facilitate technological innovation, enhance firms' productivity and improve the persistence of manufacturing exports in global trade (Padmaja and Sasidharan, 2017). Finally, service solutions allow for product differentiation when bundled with goods exports, thereby entrenching brand reputation and improving export

duration (Cui and Liu, 2018; Zhu et al., 2019; Ariu et al., 2020). Companies selling both goods and services account for up to 69% of total sales and exports (Miroudot and Cadestin, 2017) and bi-exporting is associated with better goods export performance both across and within firms (Ariu, Mayneris and Parenti, 2020).

Given these crucial contributions of services in creating a comparative advantage for manufacturing firms, it is hypothesized that services bolster the sustenance of merchandise exports. It is also postulated that the effect is heterogeneous across service activities[2]. Accordingly, services are disaggregated into nine categories (transport, travel, construction, government, ICT, personal, cultural and recreational, financial, insurance, and other business services) and test their impact on export duration.

In sum, a battery of studies identifies numerous proximate determinants of the survival of merchandise exports. Some of the factors identified are product quality, product diversity, market diversity, asset-specific investments, sunk costs, firm heterogeneity, economic characteristics of origin and destination countries, and initial export values[3]. However, the significance of services in manufacturing export duration is hardly examined in the literature.

4 The Empirical Model

Survival analysis is employed to establish the effect of service exports and other factors on the duration of Kenya's merchandise exports. This begins with the following life-table estimator of the survival function[4]:

$$\hat{S}(j) = Pr(T > j) = \prod_{m=1}^{j}\left(1 - \frac{d_m}{r_m}\right) = \prod_{m=1}^{j}(1 - h_m) \quad (1)$$

where $\hat{S}(j)$ is the survival rate at the end of a period j. T is a spell, meaning the number of years that a commodity is exported consecutively from a country (in this case, Kenya) to its trading partner. A spell lasts for a period d_m, starting at t_m and ending at t_{max} ($d_m = (t_m, t_{max})$ for $m = 1, \dots, j$). Presented as $r_m = R_m - \frac{d_m}{2}$, where R_m is the number of relationships likely to fail at the start of the interval, r_m is the adjusted number of spells at risk of failure at the interval's midpoint, and h_m is the hazard rate, indicating the failure of a trade relationship (spell).

[2] Alluding to this, Reddy and Sasidharan (2022) distinguish upstream and downstream services from tasks that offer less value addition in manufacturing.

[3] Others are geographical proximity, lingual proximity, colonial ties, competition, export promotion, trade agreements, exchange rates, trade tariffs, common trade rules, and demand and supply shocks (examples are Zhu et al., 2019; Brenton et al., 2010; Padmaja and Sasidharan, 2017; Shao et al. , 2012; Besedeš and Blyde, 2010; Majune et al., 2020; and Wang et al., 2017).

[4] Refer to Jenkins (2005) for step by step derivation.

Equation 1 only establishes the survival (hazard) rate of exporting a product. Therefore, a discrete-time duration function is specified to determine the effect of services exports and other covariates on the probability of goods exports surviving such that:

$$Pr(y_{ijt} > 0|Y_{ijt}) = F[\propto_{ij} + \delta_{ij} + \lambda_t + Z_{it}\beta + W_{jt}\varphi + \varepsilon_{jt,i}] \quad (2)$$

where, y_{ijt} measures Kenya's (i) goods exports to country (j) at time (t). The model controls for fixed effects by including the number of spells $(\propto_{ij})$, the duration of spells in terms of years (δ_{ij}) and periods (λ_t), which are the respective years a trade relationship occurred. F(.) is an appropriate distribution function ensuring that $\Pr(y_{ijt} > 0|Y_{ijt})$ ranges between 0 and 1 for all *i, j, t.* The three commonly used distribution functions - logit, clog-log, and probit - are considered. These functions are classified as discrete-time models, proved by Hess and Persson (2011; 2012) to be more suitable for duration analysis than the semi-parametric continuous-time Cox (1972) proportional hazard model. The continuous-time model suffers from unobserved heterogeneity (frailty), tied spells where relationships halt simultaneously, and the assumption of restrictive proportionality that, over time, covariates have a uniform effect on the hazard rate. A host of related studies have employed discrete-time models to analyze export survival/duration (Zhu et al., 2019; Reddy and Sasidharan, 2022; Doan and Le, 2023; Teye-Gaga et al., 2023).

Handling left and right censoring is a common problem in survival analyses. It is generally acknowledged that left-censored export records are present in the data from the first year, but hardly known when they started. In contrast, right-censored records are active in the last year in our dataset, but difficult to know whether or when they will end. There is need to correct for left-censoring, otherwise, the estimates will be biased (Hess and Persson 2012). This is achieved by leaving out the first year of the recorded export flows. Following Brenton et al. (2010) and Hess and Persson (2012) who found right censoring to be less problematic in survival analysis, trade records for the last year are considered in the estimated models. A dummy variable is introduced to capture the multiple spells that arise in the sample period as done by related studies such as Besedeš and Prusa (2006a)[5].

The variable Z_{it} is a vector containing product-specific characteristics - initial export value, lagged duration, and total export value - and Kenya-specific factors (Kenya's GDP, for example). The initial value of export at the start of an export spell (the period a product is

[5] A spell is an uninterrupted period of a trade relationship between partners for a specific product. This spell is single if the trade relationship lasts for the entire period of study (1996 to 2019). The trade relationship is considered to have multiple spells if it recurs after collapsing and it can occur more than once.

exported to a specific destination for the first time during a spell) is used to evaluate the effect of ex-ante trust between trading partners. The lagged duration (the number of years a previous spell lasted) is used to assess the impact of a previous experience on the hazard rate. The total value of the exports of a product is also included to account for the effect of experience on export survival. All the product-specific factors are expected to reduce Kenya's hazard rate of exports. Kenya's GDP measures the effect of domestic production capacity on survival, which is expected to be positive.

W_{jt} is a vector containing destination-specific factors, namely, service imports from Kenya, gravity factors (distance, contiguity, and regional trade agreement (RTA)), and macro-economic indicators (importer's GDP, exchange rate, and financial development). Service imports – variables of interest – are the services (transport, travel, construction, government, ICT, recreational, cultural, personal, financial, insurance, and other business services) that Kenya exports to respective trading partners. The general conclusion from the literature is that services complement goods exports and ultimately boost export survival.

The gravity literature posits that countries that are geographically close (shorter distance) have low trade costs (Yotov et al., 2017), and thus, countries that share a common border – contiguity – incur low trading costs. And so, the survival rate of exports is expected to be low the longer the distance a trading partner is from Kenya and if they do not share a border with Kenya. Regional Trading Arrangements (RTAs) are included to capture the influence of trade integration on the survival of exports. Export survival is expected to be high when a trading partner shares a trade agreement with Kenya since this reduces the cost of market entry and operations in the foreign market (Türkcan et al., 2022). An importer's GDP signals external demand (Brenton et al., 2010). This way, its growth is expected to stimulate export survival.

An increase in the exchange rate signals an appreciation of the importer's exchange rate and it is expected to boost Kenya's export survival. Financial development is calculated using the Principal Component Analysis (PCA) approach for four indicators: domestic credit to the private sector (% of GDP); domestic credit provided by the financial sector (% of GDP); domestic credit to the private sector by banks (% of GDP); and broad money (% of GDP). It has been shown by Ma and Xie (2019) and Cea et al. (2022) that the level of financial development in a destination country enhances export volumes of foreign firms that have access to external credit. Consequently, financial development is expected to boost export survival.

The parameters β and φ are vectors of coefficients corresponding to covariates. A positive coefficient indicates an increase in the hazard rate, while a negative coefficient signifies a decline in the hazard rate; $\varepsilon_{jt,i}$ stands for the error term. Table A.1 in the Appendix contains the definitions of all the variables and their sources.

5 Results

This section contains the descriptive statistics and the estimation results. They are discussed in turn.

5.1 Descriptive statistics

Annual country-product-destination data from the UN Comtrade Database between 1996 and 2019 are collected. Products are at the 6-digit level classification of the Harmonized System (HS), which are concorded to the 2017 HS revision to ensure consistency across years. Table 2 reports the mean and median duration of exports across the various samples. The survival rates after the first, twelfth, eighteenth, and twenty-fifth years and the number of observations are also reported in Table 2.

The average spell lengths for all goods exports (full sample) in Kenya is low, 2.2 years, coinciding with the average values observed in China, Peru, and other developing countries (Brenton et al., 2010; Shao et al., 2012). Evidence shows an even shorter year-long median spell length for all our goods categories, mirroring the dull performance reported by Kamuganga (2012) in Africa and Türkcan et al. (2022) in Kenya. These statistics are concerning given the importance of exporting duration in overall export growth (Brenton et al., 2010).

The dynamics of the descriptive statistics across broad categories of commodities - intermediate, consumption and capital–following the Broad Economic Categories (BEC) Rev.5 classification (United Nations, 2018) are determined. The mean duration of survival is longer in consumption goods (2.4 years), followed by intermediate (2.2 years) and capital (1.9 years) goods. All the three categories of commodities have a median export duration of 1 year. The final sample analysis compares the export survival of differentiated goods to homogenous goods. Homogenous goods are found to have a longer mean duration than differentiated goods. This result is congruent with the finding of Majune et al. (2020), partly explained by the general argument that developing countries, including Kenya, trade more in homogenous than heterogeneous goods.

There are drastic declines in survival rates of all goods exports after the first year. The full sample enjoyed a 38% survival probability after the first year, dipping to 5.2% and 3.6% after 12 and 18 years, respectively, and to 2.4% after 25 years. These results mask the stylized facts from other Kenya-specific studies (Kinuthia, 2014; Chacha and Edwards, 2017; Majune et al., 2020; Türkcan et al., 2022) and some non-Kenyan contexts (Cui and Liu, 2018; Besedeš and Blyde, 2010). Consumption and homogenous goods have the highest survival rates over time, reflecting the predominance of agro-products (e.g., vegetables, tobacco, processed food and beverages) in Kenya's export sector (Chacha and Edwards, 2017) at the expense of capital goods (capital goods production is still at infancy) that record some of the lowest survival rates.

Curiously, homogenous goods record a 4.5% higher survival rate than differentiated goods after the first year, but the latter catches up in year 18 and finishes with a 0.4% greater likelihood of survival after year 25. This confirms that while differentiated products typically involve higher search and investment costs earlier on, they entrench brand reputation and customer loyalty in overseas markets over time, precluding complete substitution, unlike homogenous products (Besedeš and Prusa, 2006b)[6].

Table 2: Duration of Kenya's exports with different samples, 1996-2019

Sample	Spell length (in years)		Survival rate by year (%)				No. of observations
	Mean	Median	1st	12th	18th	25th	
Full sample	2.2	1	38.0	5.2	3.6	2.4	431,136
Intermediate goods	2.2	1	36.0	4.9	3.3	2.1	195,391
Consumption goods	2.4	1	41.0	6.2	3.9	3.0	174,341
Capital goods	1.9	1	34.0	3.6	2.6	1.8	53,395
Differentiated goods	2.2	1	36.5	5.1	3.6	2.5	314,290
Homogenous goods	2.4	1	41.0	5.4	3.1	2.1	116,824

Notes: Intermediate, consumption, capital and the goods not classified are created based on the Broad Economic Categories (BEC) Rev.5 classification (United Nations, 2018). Differentiated and homogenous goods are created following Bernini et al. (2018).

5.2 Estimation Results and Discussions

The results of the models (probit, logit and clog-log) are reported in Table A.2. The signs of the estimated coefficients (hazard rates) are qualitatively similar across the three specifications. Use is made of the log-likelihood values that appear at the bottom of Table A.2 to establish the most suitable model. Evidently, the probit model has the largest log-likelihood value, suggesting that it offers a better fit relative to the clog-log and logit models. Therefore, subsequent interpretations are on the estimation results of the probit model.

Table 3 presents the probit regression results where individual services are part of the covariates[7]. A negative coefficient indicates that the variable reduces the hazard rate of exit of

[6] Majune et al. (2020) point out that experience increases Kenya's capacity to export differentiated goods.

[7] Data on bilateral services trade is collected from the Extended Balance of Payments Services (EBOPS) of 2002 and 2010. The EBOPS 2002 is hosted by the Organization for Economic Co-operation and Development (OECD) and it ranges from 1995 to 2012, while the EBOPS 2010 is quartered by the World Trade Organisation (WTO) and it ranges from 2013 to 2019. The two datasets were merged for the estimations covering 1995 to 2019. Some recent studies that have used EBOPS data include Nordås (2018), Fu et al. (2020), Visagie and Turok (2021), Xiong and Sun (2023) and Shirah et al. (2023). The

goods exports, thereby increasing their survival rate. Inversely, a positive coefficient suggests that the variable increases the hazard rate, thus decreasing the survival rate.

Accordingly, Table 3 confirms that service export variables positively and significantly impact the duration of goods exports. More specifically, transport, travel, ICT, construction, financial and government services whose coefficients are statistically significant. The result of ICT and transport services exports are in accord with a priori expectations as both are primarily used for linkage, communication, and coordination efficiency within GVCs (Lee, 2019) and participation that enhances the sustenance of merchandise exports (Zhu et al., 2019). The result of financial services exports is not surprising because financial services provide the necessary capital and intermediation to foreign GVC firms whose continued trade involvement in Kenya lengthens the exporting of goods.

Government service exports also promote the likelihood of goods export survival, per column 6 in Table 3. This is similarly observed in travel exports (refer to column 2 in Table 3), for this is expected given that incoming tourists and business travelers usually procure Kenyan goods alongside Kenyan travel services. Intriguingly, increased export of insurance services reduces merchandise export survival probability (refer to column 7 in Table 3). Diakantoni et al. (2017) shed light on the cascade effect that arises as trade costs, such as applied tariffs and insurance costs, accumulate along various stages within GVCs, impeding the competitiveness of exported products. It is reckoned that highly-regulated insurance markets impose hard-to-avoid trade costs on foreign GVC firms involved with exporting goods through Kenya. Thus, a rise in these insurance service exports restrains GVC participation in Kenya, lowering the chances of continued goods exporting. There is hardly any evidence that personal, cultural, recreational, and other business services significantly impact the duration of goods exports in Kenya. Similar results are found by Sawadogo et al. (2023), who assess the role of trade in services in export product diversification in SSA, and are attributed to the low share of these services in total exports.

The results of other covariates are also presented in Table 3. The importer's GDP has the expected sign, suggesting a growth in demand and purchasing power. Conversely, an increase in Kenya's GDP lowers the survival rates of its goods exports in foreign markets. The intuition of this result is that the growth of Kenya's economy reduces its chances of maintaining existing merchandise export relationships (perhaps, due to increased local demand for the exportables). It this sense, growth is anti-trade biased! Nonetheless, some authors (see, for example, Hess and Persson, 2011; and Türkcan and Majune, 2022) have reported similar results.

definitions of respective services are in Table A.3 in the Appendix. Table A.4 presents their summary statistics alongside those of other covariates.

Table 3: Baseline probit regression results by service

	(1) Transport	(2) Travel	(3) ICT	(4) Construction	(5) Financial	(6) Govt.	(7) Insurance	(8) PCR	(9) OBS
Service export	-0.1591***	-0.0603***	-0.1958***	-0.4420**	-0.0895**	-0.0605***	0.0915***	-0.0612	0.0152
	(0.015)	(0.016)	(0.071)	(0.184)	(0.042)	(0.018)	(0.035)	(0.072)	(0.018)
GDP importer	0.0090	-0.0362***	-0.0705***	-0.0524***	-0.0466***	-0.0473***	-0.0213**	0.0311***	-0.0886***
	(0.010)	(0.012)	(0.007)	(0.008)	(0.008)	(0.009)	(0.008)	(0.007)	(0.011)
GDP Kenya	0.1501***	0.3559***	0.4248***	0.5865***	0.2202***	0.6191***	0.2941***	0.4562***	0.5418***
	(0.027)	(0.047)	(0.030)	(0.031)	(0.075)	(0.047)	(0.029)	(0.032)	(0.035)
Exchange rate	-0.0080	-0.0063	-0.0354***	-0.0121**	-0.0054	0.0051	0.0062	-0.0246***	0.0066
	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.006)
Financial development importer	0.0298***	0.0221***	-0.0122*	-0.0422***	0.0119*	0.0064	0.0097	-0.0046	-0.0220***
	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)	(0.008)
Distance	0.2305***	0.2954***	0.3141***	0.3981***	0.1649***	0.2069***	0.0719**	-0.1347***	0.5427***
	(0.030)	(0.034)	(0.027)	(0.025)	(0.028)	(0.027)	(0.030)	(0.023)	(0.031)
Contiguity	-0.0309	0.3021***	0.6672***	0.1611***	0.1777***	0.5169***	-0.5437***	-0.2106***	0.4916***
	(0.048)	(0.042)	(0.042)	(0.038)	(0.039)	(0.059)	(0.046)	(0.033)	(0.043)
RTA	0.2785***	0.0085	-0.0741*	0.1724***	-0.0943**	-0.1263***	0.1265***	-0.1778***	0.1325***
	(0.037)	(0.043)	(0.042)	(0.042)	(0.043)	(0.041)	(0.046)	(0.032)	(0.046)
Initial export value	-0.0255***	-0.0265***	-0.0179***	-0.0352***	-0.0322***	-0.0228***	-0.0395***	-0.0310***	-0.0309***
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
Lagged duration	-0.0669***	-0.0710***	-0.0582***	-0.0486***	-0.0499***	-0.0672***	-0.0632***	-0.0689***	-0.0353***
	(0.005)	(0.006)	(0.005)	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
Total export value	-0.0868***	-0.0965***	-0.0946***	-0.0949***	-0.0783***	-0.0797***	-0.0809***	-0.0817***	-0.0937***
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
Observations	43456	29562	36901	36165	36272	30386	41641	43353	31684
Spells	192168	192168	192168	192168	192168	192168	192168	192168	192168
Trade relations	95842	95842	95842	95842	95842	95842	95842	95842	95842
Log-likelihood	-20593	-15038	-18768	-18762	-18636	-15664	-20591	-22145	-15760

Notes: This table reports the estimated coefficients and the corresponding robust standard errors clustered at the importer-service level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The dependent variable is a binary variable that equals one if an export spell is ended and zero otherwise. ICT means computer and information services, OBS stands for other business services, while PCR means personal, cultural, and recreational service

An appreciation in the importing country's real exchange rate decreases exit probability, although the coefficients of most of the specifications are statistically insignificant. The effect of the importer's financial sector development on the survival of goods imports from Kenya varies by the type of service they import from Kenya.

The gravity variables show that distance encumbers goods export survival by increasing transport costs and uncertainty8. The contiguity results indicate that Kenyan goods have fewer odds of survival in the immediate neighboring countries9. RTAs contribute to the sustainance of export survival when ICT, financial, government and personal, cultural, and recreational services are exported. However, the likelihood of goods surviving in external markets diminishes when transport, construction, insurance and other business services are part of covariates. Perhaps these An appreciation in the importing country's real exchange rate decreases exit probability, although the coefficients of most of the specifications are statistically insignificant. The effect of the importer's financial sector development on the survival of goods imports from Kenya varies by the type of service they import from Kenya.

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The product-level factors in Table 3 exert an expected negative influence on exit probability. An increase in initial export value lowers hazard rates, coinciding with the findings of Chacha and Edwards (2017) and reinforcing the point made by Besedeš and Blyde (2010) that large initial exports signal a degree of trust between trading partners, thereby elongating export survival. The length of previous spells in trade relationships (lagged duration) also enhances the present export duration by providing firms with a valuable learning-by-doing experience (Brenton et al., 2010). Elsewhere, it is inferred that total annual export values within a spell worsen survival odds by increasing the potential losses incurred in the event of an exit.

[8] Consistent with the findings of Shao et al. (2012), and Besedeš and Blyde (2010).

[9] Findings on this are diverse in the literature. Türkcan et al. (2022) and Majune et al. (2020) explain that fellow East African countries tend to export similar products as Kenya, reducing the latter's competitiveness. Still, Majune et al. (2020) find evidence of favorable export response in the greater Eastern and Southern African region, affirming that geographical proximity without sharing a border promotes survival.

Moreover, like sunk costs, these high trade values signal firms' size and productivity levels, which positively correlate with export survival (Padmaja and Sasidharan, 2017).

Next, are the results of the effects of respective services on the duration of goods exports classified as intermediate, consumption, capital, differentiated and homogenous. Table 4 presents the results where the coefficients of particular services have been extracted from the detailed probit regression results shown in Tables A.5 to A.9 in the Appendix.

Table 4: Probit regression results by product characteristics

	(1) Intermediate	**(2) Consumption**	**(3) Capital**	**(4) Differentiated**	**(5) Homogenous**
Transport services	-0.1514***	-0.2019***	-0.0583	-0.1565***	-0.1834***
	(0.024)	(0.022)	(0.046)	(0.017)	(0.028)
Travel services	0.0203	-0.1380***	-0.1139*	-0.0912***	-0.0377
	(0.025)	(0.024)	(0.062)	(0.020)	(0.029)
ICT services	-0.2042*	-0.3793***	-0.1358	-0.2551***	-0.2853*
	(0.116)	(0.109)	(0.192)	(0.080)	(0.171)
Construction services	0.1753	-1.3901***	-0.3707	0.0395	-1.3705***
	(0.278)	(0.281)	(0.685)	(0.219)	(0.355)
Financial services	-0.3261***	0.0325	-0.0834	-0.0960**	-0.2362***
	(0.067)	(0.064)	(0.128)	(0.048)	(0.090)
Government services	-0.0283	-0.0081	-0.1983***	-0.0582***	-0.0356
	(0.028)	(0.028)	(0.060)	(0.022)	(0.035)
Insurance services	0.1980***	0.0594	-0.1899*	0.0780*	0.0604
	(0.056)	(0.052)	(0.108)	(0.041)	(0.069)
PCR services	0.0134	-0.1002	-0.0703	0.0861	-0.5130***
	(0.116)	(0.111)	(0.227)	(0.085)	(0.145)
OBS	-0.0357	0.0467*	0.1081	0.0221	-0.0253
	(0.031)	(0.026)	(0.066)	(0.022)	(0.034)

Notes: The table reports the estimated coefficients and the corresponding robust standard errors clustered at the importer-service level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. The dependent variable is a binary variable that equals one if an export spell is ended and zero otherwise. ICT means computer and information services, and OBS stands for other business services while PCR means personal, cultural, and recreational services. Intermediate, consumption and capital goods are created based on the Broad Economic Categories (BEC) Rev.5 classification (United Nations, 2018). Differentiated and homogenous goods are created following Bernini et al. (2018). The models are run with all regressors in equation 2; and only coefficients of service export indicators are reported in this table. See Tables A.5 to A.9 for details of the regressors.

The export duration of intermediate goods is enhanced by transport, ICT and financial services. Given that intermediate goods are heavily linked to GVC trade (Antràs, 2020), this result implies that these services are vital for the sustainability of Kenya's value-chain trade. However, the results reveal that exports of insurance services reduce the survival of intermediate exports. This echoes the initial finding that these services reduce the duration of goods exports (see Table 3).

Column 2 in Table 4 presents the coefficients of the effect of services on consumption goods exports. A rise in transport, travel, ICT and construction service exports raises the survival prospects of consumption goods exports from Kenya. However, other business services reduce the duration of export consumption goods from Kenya. The survival of capital goods is supported by government service exports as shown in column 3. This suggests that creating and strengthening relationships between governments through embassies and consulates , which are part of government services, is likely to enhance the sustainability of capital goods. The duration of capital exports is also boosted by insurance and travel service exports.

The last two columns of Table 4 show the effect of specific service exports on the duration of differentiated and homogenous goods exports. The survival of differentiated goods, which can be likened to intermediate goods (Besedeš and Prusa, 2006b), and thus vital for GVC trade, is boosted by transport, travel, ICT, financial and government service exports. The largest effect emanates from ICT services, implying that eliminating the barriers to communication and connectivity is key to the export of differentiated goods. The last column shows that exports of transport, ICT, construction, financial and personal, cultural, and recreational services improve the survival prospects of homogenous goods exports. Overall, the positive effects of transport and ICT service exports appear larger on export duration of most goods from Kenya (significant in four out of the five categories) relative to other business services and personal, cultural, and recreational services (only significant in one out of the five categories).

6 Concluding Remarks

The study has examined the effects of services exports on the survival of merchandise exports in Kenya. A discrete-time probit model with random effects on bilateral trade data covering the period 1996-2019 was estimated. Services were disaggregated into nine categories (transport, travel, construction, government, ICT, personal, cultural and recreational, financial, insurance, and other business services) to have a deeper insight. The findings are instructive.

The impact of services exports on the duration of goods exports was positive and statistically significant, specifically for transport, travel, ICT, construction, financial and government services. A disaggregation of the goods into intermediate, consumption, capital, differentiated and homogenous showed that transport and ICT service exports lengthened the duration of

these categories of merchandise exports. The results imply that the export of services complements goods exports. In particular, transport and ICT service exports stand out most significantly in fostering global value chain trade. Therefore, enhancing modes of transportation alongside communication and connectivity infrastructure can be accorded a high priority by both the government and the private sector in order to increase the duration of goods exports. Our results are ripe for the AfCFTA, which is at the implementation stage, and it negotiates goods and services concurrently, signalling a new wave in Africa's trade negotiations that previously often left the trade in services for the last stage of discussions (Majune, Kaaria and Kihiu, 2023; Debrah et al., 2024).

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Appendix

Table A.1: Variable definition and source of data

Variable	Description	Source
Dependent variable	Dummy with 1 indicating the end of spell i during the m^{th} time interval, 0 otherwise	Comtrade
Service export	Natural logarithm of bilateral trade in a given service (transport, travel, construction, government, ICT, PCR, financial, insurance, or OBS) between Kenya and trade partners (USD millions)[10]	OECD/WTO
Distance	Natural logarithm of the distance (kilometers) between Nairobi, Kenya's capital city, and the capital of a partner country	CEPII database
Contiguity	Dummy if a country has a common border with Kenya	CEPII database
RTA	Dummy if a country shares a Regional Trade Agreement (RTA) with Kenya	CEPII database
GDP Kenya	Natural logarithm of GDP (current) (USD millions) for Kenya	WDI
GDP importer	Natural logarithm of GDP (current) (USD millions) of a partner country	WDI
Financial development importer	Principal Component Analysis for Domestic credit to the private sector (% of GDP), Domestic credit provided by the financial sector (% of GDP), Domestic credit to the private sector by banks (% of GDP), and Broad money (% of GDP), in the partner country	WDI
Exchange rate	Natural logarithm of the partner's real exchange rate in USD	WDI
Initial export value	Natural logarithm of the total value of goods exports in the initial year of the trading spell	CEPII database
Lagged duration	Number of years that the previous spell of the same export relationship lasted	CEPII database
Total export value	Natural logarithm of the total value of goods exports in a given year within the spell	CEPII database

Notes: ICT means computer and information services, and OBS stands for other business services, while PCR means personal, cultural, and recreational services.

[10] Given that the service exports tend to have many zero values, the transformation entails adding an arbitrary 1 to the value of the service before logging it.

Table A.2: Estimation results of the discrete-time hazard models with random effects

Variables	(1) Clog-log	(2) Probit	(3) Logit
Service export	-0.0189***	-0.0165***	-0.0277***
	(0.003)	(0.002)	(0.004)
GDP of importer	-0.0583***	-0.0630***	-0.1060***
	(0.003)	(0.003)	(0.005)
GDP Kenya	0.4287***	0.4406***	0.7328***
	(0.010)	(0.009)	(0.016)
Exchange rate	-0.0157***	-0.0148***	-0.0245***
	(0.002)	(0.002)	(0.003)
Financial development importer	0.0075***	0.0085***	0.0140***
	(0.002)	(0.002)	(0.004)
Distance	0.3433***	0.3425***	0.5762***
	(0.010)	(0.009)	(0.016)
Contiguity	0.0759***	0.1009***	0.1796***
	(0.013)	(0.013)	(0.021)
RTA	0.0776***	0.0695***	0.1149***
	(0.015)	(0.014)	(0.024)
Initial export value	-0.0399***	-0.0382***	-0.0637***
	(0.001)	(0.001)	(0.002)
Lagged duration	-0.0315***	-0.0180***	-0.0327***
	(0.002)	(0.002)	(0.003)
Total export value	-0.1013***	-0.0997***	-0.1677***
	(0.001)	(0.001)	(0.002)
Year dummies	Yes	Yes	Yes
Spell no. Dummies	Yes	Yes	Yes
Duration dummies	Yes	Yes	Yes
Observations	359244	359244	359244
Spells	192168	192168	192168
Trade relations	95842	95842	95842
Log-likelihood	-185905	-185256	-185309

Notes: This table reports the estimated coefficients and the corresponding robust standard errors clustered at the importer-product level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The dependent variable is a binary variable that equals one if an export spell is ended and zero otherwise. Total services are considered in this case.

Table A.3: Description of services

Service	Description
Total services	Includes total bilateral flows of services
Travel services	Includes business and personal (tourism) travel services
Transport services	Includes sea, air, and road transport services
Financial services	Includes explicitly charged financial services, and financial intermediation services
Insurance services	Includes direct insurance, auxiliary insurance services, and reinsurance
Computer and information services	Includes computer software and telecommunication services
Other business services	Includes legal, research, and development services
Government services	Includes services by embassies and consulates, military units and agencies, and other government services
Construction services	Includes construction services
Personal, cultural, and recreational services	Includes audio-visual and related services, and other personal, cultural, and recreational services

Table A.4: Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
ICT services	50,798	0.0781	0.2236	0.0000	1.9698
Construction services	40,084	0.0317	0.0892	0.0000	1.2263
Financial services	40,013	0.1221	0.2897	0.0000	2.0699
Government services	47,329	0.6399	0.8114	0.0000	5.5844
Insurance services	48,585	0.1184	0.2849	0.0000	2.6058
OBS	28,555	0.9404	1.1403	0.0000	4.5205
PCR services	44,763	0.0702	0.1465	0.0000	1.6081
Transport services	48,321	2.1481	1.2664	0.0000	5.6830
Travel services	40,680	2.1417	1.4486	0.0000	5.9382
GDP importer	428,662	17.7820	2.4020	12.2155	23.7867
GDP Kenya	431,136	17.2935	0.7117	16.0179	18.3746
Distance	431,136	7.6697	1.1209	6.2267	9.6642
Contiguity	431,136	0.2903	0.4539	0.0000	1.0000
Financial development importer	431,136	-0.1059	1.9637	-2.3299	10.3722
Exchange rate	361,909	4.4004	2.9599	-4.7473	22.6254
RTA	431,136	0.5176	0.4997	0.0000	1.0000
Initial export value	430,876	7.5277	2.7622	-2.8332	19.2144
Lagged duration	431,136	1.2220	2.1620	0.0000	23.0000
Total export value	431,124	11.5737	2.9979	-2.0794	20.7823

Notes: ICT means computer and information services, and OBS stands for other business services, while PCR means personal, cultural, and recreational services.

Table A.5: Probit regression results for intermediate exports by service

	(1) Transport	(2) Travel	(3) ICT	(4) Construction	(5) Financial	(6) Govt.	(7) Insurance	(8) OBS	(9) PCR
Service export	-0.1514***	0.0203	-0.2042*	0.1753	-0.3261***	-0.0283	0.1980***	-0.0357	0.0134
	(0.024)	(0.025)	(0.116)	(0.278)	(0.067)	(0.028)	(0.056)	(0.031)	(0.116)
GDP importer	0.0089	-0.0875***	-0.1175***	-0.0695***	-0.0608***	-0.0758***	-0.0508***	-0.0889***	0.0375***
	(0.016)	(0.019)	(0.012)	(0.013)	(0.012)	(0.014)	(0.014)	(0.019)	(0.011)
GDP Kenya	0.0641	0.4821***	0.3348***	0.7599***	0.2446**	0.4157***	0.2775***	0.5018***	0.4966***
	(0.044)	(0.070)	(0.046)	(0.055)	(0.113)	(0.084)	(0.044)	(0.058)	(0.051)
Distance	0.3729***	0.3448***	0.5013***	0.4127***	0.2114***	0.2484***	0.1094**	0.6029***	-0.1287***
	(0.051)	(0.056)	(0.046)	(0.041)	(0.044)	(0.044)	(0.050)	(0.053)	(0.039)
Contiguity	0.1411*	0.4273***	0.8828***	0.2344***	0.1617***	0.5239***	-0.3855***	0.5895***	-0.1236**
	(0.078)	(0.064)	(0.064)	(0.060)	(0.057)	(0.092)	(0.074)	(0.069)	(0.052)
Financial development importer	0.0224*	0.0270**	-0.0191*	-0.0413***	0.0053	-0.0072	0.0042	-0.0223	-0.0146
	(0.012)	(0.012)	(0.011)	(0.011)	(0.010)	(0.010)	(0.012)	(0.014)	(0.009)
Exchange rate	-0.0070	-0.0120*	-0.0360***	-0.0102	-0.0218***	0.0056	0.0064	-0.0168*	-0.0399***
	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.007)
RTA	0.3556***	-0.0795	-0.0744	-0.0431	-0.2538***	-0.2610***	-0.1537**	0.1130	-0.2880***
	(0.061)	(0.069)	(0.070)	(0.068)	(0.068)	(0.066)	(0.076)	(0.074)	(0.051)
Initial export value	-0.0353***	-0.0262***	-0.0194***	-0.0301***	-0.0217***	-0.0161***	-0.0307***	-0.0458***	-0.0316***
	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.004)
Lagged duration	-0.0779***	-0.0655***	-0.0622***	-0.0511***	-0.0464***	-0.0550***	-0.0644***	-0.0324***	-0.0650***
	(0.007)	(0.008)	(0.007)	(0.008)	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)
Total export value	-0.0796***	-0.0980***	-0.1013***	-0.1091***	-0.0987***	-0.0864***	-0.0870***	-0.1052***	-0.0894***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)
Observations	21655	13943	17508	17194	17580	13733	20437	14711	20628
Spells	192168	192168	192168	192168	192168	192168	192168	192168	192168
Trade relations	95842	95842	95842	95842	95842	95842	95842	95842	95842
Log-likelihood	-9987	-7007	-8720	-8777	-8897	-7017	-10002	-7125	-10215

Notes: The table reports the estimated coefficients and the corresponding robust standard errors clustered at the importer-service level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. The dependent variable is a binary variable that equals one if an export spell is ended and zero otherwise. ICT means computer and information services, OBS stands for other business services while PCR means personal, cultural, and recreational services.

Table A.6: Probit regression results for consumption exports by service

	(1) Transport	(2) Travel	(3) ICT	(4) Construction	(5) Financial	(6) Govt.	(7) Insurance	(8) OBS	(9) PCR
Service export	-0.2019***	-0.1380***	-0.3793***	-1.3901***	0.0325	-0.0081	0.0594	0.0467*	-0.1002
	(0.022)	(0.024)	(0.109)	(0.281)	(0.064)	(0.028)	(0.052)	(0.026)	(0.111)
GDP importer	0.0251*	0.0181	-0.0421***	-0.0441***	-0.0308***	-0.0576***	-0.0206*	-0.0824***	0.0220**
	(0.014)	(0.017)	(0.011)	(0.011)	(0.012)	(0.013)	(0.012)	(0.015)	(0.010)
GDP Kenya	0.2174***	0.2454***	0.5581***	0.4488***	0.2123*	0.7330***	0.2620***	0.5891***	0.4257***
	(0.040)	(0.071)	(0.048)	(0.043)	(0.114)	(0.070)	(0.046)	(0.050)	(0.050)
Distance	0.1050**	0.2113***	0.1526***	0.3430***	0.0498	0.1779***	0.0514	0.4478***	-0.1390***
	(0.042)	(0.047)	(0.037)	(0.036)	(0.042)	(0.040)	(0.043)	(0.043)	(0.034)
Contiguity	-0.2011***	0.0935	0.4136***	0.1077*	0.1367**	0.5320***	-0.5716***	0.4063***	-0.3148***
	(0.073)	(0.067)	(0.071)	(0.060)	(0.065)	(0.093)	(0.073)	(0.070)	(0.053)
Financial development importer	0.0511***	0.0333***	-0.0001	-0.0330***	0.0194**	0.0084	0.0178*	-0.0126	0.0016
	(0.010)	(0.011)	(0.009)	(0.009)	(0.010)	(0.009)	(0.010)	(0.011)	(0.008)
Exchange rate	-0.0147**	-0.0044	-0.0424***	-0.0193***	-0.0010	-0.0004	0.0062	0.0200**	-0.0168***
	(0.007)	(0.006)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)	(0.006)
RTA	0.2610***	0.0946	-0.1160*	0.3509***	-0.0593	-0.1352**	0.2135***	0.0685	-0.0881*
	(0.056)	(0.064)	(0.063)	(0.061)	(0.067)	(0.061)	(0.069)	(0.069)	(0.051)
Initial export value	-0.0276***	-0.0486***	-0.0300***	-0.0544***	-0.0599***	-0.0467***	-0.0587***	-0.0405***	-0.0444***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)
Lagged duration	-0.0576***	-0.0699***	-0.0487***	-0.0397***	-0.0492***	-0.0804***	-0.0498***	-0.0398***	-0.0575***
	(0.008)	(0.010)	(0.008)	(0.008)	(0.007)	(0.009)	(0.007)	(0.008)	(0.007)
Total export value	-0.0897***	-0.0913***	-0.0798***	-0.0705***	-0.0532***	-0.0733***	-0.0739***	-0.0735***	-0.0672***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Observations	15571	11300	14059	14041	13392	12520	14889	12396	16468
Spells	192168	192168	192168	192168	192168	192168	192168	192168	192168
Trade relations	95842	95842	95842	95842	95842	95842	95842	95842	95842
Log-likelihood	-7458	-5686	-7128	-7254	-6835	-6294	-7278	-6113	-8444

Notes: The table reports the estimated coefficients and the corresponding robust standard errors clustered at the importer-service level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. The dependent variable is a binary variable that equals one if an export spell is ended and zero otherwise. ICT means computer and information services, OBS stands for other business services while PCR means personal, cultural, and recreational services.

Table A.7: Probit regression results for capital exports by service

	(1) Transport	(2) Travel	(3) ICT	(4) Construction	(5) Financial	(6) Govt.	(7) Insurance	(8) OBS	(9) PCR
Service export	-0.0583	-0.1139*	-0.1358	-0.3707	-0.0834	-0.1983***	-0.1899*	0.1081	-0.0703
	(0.046)	(0.062)	(0.192)	(0.685)	(0.128)	(0.060)	(0.108)	(0.066)	(0.227)
GDP importer	-0.0632**	-0.1267***	-0.0974***	-0.0545**	-0.1176***	0.0293	-0.0240	-0.2656***	0.0226
	(0.032)	(0.049)	(0.025)	(0.027)	(0.028)	(0.030)	(0.028)	(0.044)	(0.022)
GDP Kenya	-0.0484	0.0106	0.5205***	0.6436***	0.1909	0.3283*	0.4694***	0.7201***	0.4226***
	(0.088)	(0.175)	(0.089)	(0.100)	(0.307)	(0.169)	(0.085)	(0.124)	(0.093)
Distance	0.7263***	0.3890***	0.7012***	0.4704***	0.4285***	0.2482**	0.3669***	1.0323***	0.0146
	(0.105)	(0.140)	(0.097)	(0.085)	(0.097)	(0.100)	(0.100)	(0.123)	(0.078)
Contiguity	0.6375***	0.5928***	1.2331***	0.2081*	0.4317***	0.6028***	-0.4787***	0.9180***	-0.1711*
	(0.163)	(0.143)	(0.127)	(0.117)	(0.127)	(0.191)	(0.143)	(0.148)	(0.101)
Financial development	-0.0802***	0.1106***	-0.0647***	-0.0745***	0.0457*	0.0058	0.0502*	0.0230	-0.0014
importer	(0.025)	(0.032)	(0.022)	(0.024)	(0.026)	(0.022)	(0.026)	(0.028)	(0.020)
Exchange rate	0.0244	-0.0206	-0.0076	-0.0400**	0.0112	0.0164	-0.0051	0.0505**	-0.0082
	(0.017)	(0.016)	(0.015)	(0.018)	(0.019)	(0.020)	(0.018)	(0.022)	(0.014)
RTA	-0.0240	-0.1834	-0.1459	-0.1125	-0.1990	-0.0914	0.7446***	0.1026	-0.1678*
	(0.111)	(0.144)	(0.137)	(0.145)	(0.139)	(0.145)	(0.148)	(0.150)	(0.097)
Initial export value	-0.0000	0.0016	0.0036	-0.0016	-0.0057	0.0241**	-0.0145	0.0180	-0.0097
	(0.010)	(0.012)	(0.010)	(0.010)	(0.011)	(0.012)	(0.010)	(0.012)	(0.009)
Lagged duration	-0.0633***	-0.1134***	-0.0934***	-0.0511***	-0.0467***	-0.0854***	-0.0935***	-0.0364***	-0.1171***
	(0.015)	(0.017)	(0.014)	(0.014)	(0.011)	(0.016)	(0.013)	(0.012)	(0.014)
Total export value	-0.0988***	-0.0956***	-0.0987***	-0.1276***	-0.0998***	-0.0846***	-0.0959***	-0.1178***	-0.1029***
	(0.011)	(0.013)	(0.012)	(0.012)	(0.013)	(0.014)	(0.011)	(0.014)	(0.010)
Observations	5458	3746	4730	4312	4535	3504	5393	3947	5504
Spells	192168	192168	192168	192168	192168	192168	192168	192168	192168
Trade relations	95842	95842	95842	95842	95842	95842	95842	95842	95842
Log-likelihood	-2518	-1824	-2321	-2193	-2329	-1779	-2721	-1941	-2758

Notes: The table reports the estimated coefficients and the corresponding robust standard errors clustered at the importer-service level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. The dependent variable is a binary variable that equals one if an export spell is ended and zero otherwise. ICT means computer and information services, OBS stands for other business services while PCR means personal, cultural, and recreational services.

Table A.8: Probit regression results for differentiated exports by service

	(1) Transport	(2) Travel	(3) ICT	(4) Construction	(5) Financial	(6) Govt.	(7) Insurance	(8) OBS	(9) PCR
Service export	-0.1565***	-0.0912***	-0.2551***	0.0395	-0.0960**	-0.0582***	0.0780*	0.0221	0.0861
	(0.017)	(0.020)	(0.080)	(0.219)	(0.048)	(0.022)	(0.041)	(0.022)	(0.085)
GDP importer	0.0028	-0.0318**	-0.0851***	-0.0530***	-0.0509***	-0.0326***	-0.0299***	-0.1317***	0.0219***
	(0.011)	(0.015)	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.013)	(0.008)
GDP Kenya	0.0938***	0.2189***	0.4037***	0.6199***	0.1090	0.5896***	0.3108***	0.5611***	0.4253***
	(0.032)	(0.067)	(0.036)	(0.036)	(0.103)	(0.058)	(0.034)	(0.042)	(0.038)
Distance	0.2807***	0.2537***	0.3460***	0.3457***	0.1705***	0.2142***	0.0805**	0.5651***	-0.0640**
	(0.034)	(0.040)	(0.031)	(0.029)	(0.032)	(0.032)	(0.034)	(0.037)	(0.027)
Contiguity	0.0086	0.2850***	0.7190***	0.1415***	0.1645***	0.5309***	-0.6018***	0.5649***	-0.1734***
	(0.055)	(0.049)	(0.049)	(0.045)	(0.044)	(0.069)	(0.053)	(0.052)	(0.038)
Financial development importer	0.0316***	0.0371***	-0.0166**	-0.0561***	0.0222***	-0.0035	0.0156*	-0.0109	-0.0004
	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.007)	(0.009)	(0.010)	(0.007)
Exchange rate	-0.0052	-0.0155***	-0.0262***	-0.0286***	-0.0052	0.0059	0.0015	0.0058	-0.0117**
	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.005)
RTA	0.2152***	-0.0586	-0.1640***	0.0090	-0.1594***	-0.1110**	0.1345**	-0.0398	-0.1522***
	(0.042)	(0.050)	(0.050)	(0.049)	(0.049)	(0.049)	(0.054)	(0.055)	(0.037)
Initial export value	-0.0154***	-0.0163***	-0.0071*	-0.0279***	-0.0354***	-0.0118***	-0.0324***	-0.0220***	-0.0293***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Lagged duration	-0.0683***	-0.0792***	-0.0679***	-0.0531***	-0.0534***	-0.0697***	-0.0601***	-0.0437***	-0.0720***
	(0.006)	(0.007)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)
Total export value	-0.0957***	-0.1019***	-0.0960***	-0.1001***	-0.0799***	-0.0866***	-0.0905***	-0.0992***	-0.0850***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)
Observations	31650	21748	27082	26539	26744	22104	30584	23619	32396
Spells	192168	192168	192168	192168	192168	192168	192168	192168	192168
Trade relations	95842	95842	95842	95842	95842	95842	95842	95842	95842
Log-likelihood	-14515	-10860	-13543	-13557	-13601	-11111	-14826	-11427	-16150

Notes: The table reports the estimated coefficients and the corresponding robust standard errors clustered at the importer-service level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. The dependent variable is a binary variable that equals one if an export spell is ended and zero otherwise. ICT means computer and information services, OBS stands for other business services while PCR means personal, cultural, and recreational services.

Table A.9: Probit regression results for homogenous exports by service

	(1) Transport	(2) Travel	(3) ICT	(4) Construction	(5) Financial	(6) Govt.	(7) Insurance	(8) OBS	(9) PCR
Service export	-0.1834***	-0.0377	-0.2853*	-1.3705***	-0.2362***	-0.0356	0.0604	-0.0253	-0.5130***
	(0.028)	(0.029)	(0.171)	(0.355)	(0.090)	(0.035)	(0.069)	(0.034)	(0.145)
GDP importer	0.0367*	-0.0223	-0.0283**	-0.0599***	-0.0346**	-0.0737***	-0.0018	0.0263	0.0625***
	(0.019)	(0.022)	(0.013)	(0.015)	(0.016)	(0.017)	(0.016)	(0.020)	(0.014)
GDP Kenya	0.2387***	0.3635***	0.4358***	0.5126***	0.3414***	0.6462***	0.2451***	0.4415***	0.5086***
	(0.055)	(0.081)	(0.056)	(0.060)	(0.116)	(0.082)	(0.056)	(0.062)	(0.061)
Distance	0.0671	0.3394***	0.2208***	0.4466***	0.2072***	0.1282**	0.0377	0.3811***	-0.3774***
	(0.065)	(0.068)	(0.054)	(0.052)	(0.059)	(0.054)	(0.063)	(0.062)	(0.050)
Contiguity	-0.3338***	0.3332***	0.5595***	0.1458*	0.1952**	0.4384***	-0.4371***	0.2637***	-0.3031***
	(0.105)	(0.086)	(0.085)	(0.078)	(0.086)	(0.115)	(0.104)	(0.086)	(0.069)
Financial development importer	0.0363***	0.0021	0.0008	-0.0135	-0.0061	0.0247**	-0.0020	-0.0456***	0.0014
	(0.013)	(0.013)	(0.011)	(0.013)	(0.012)	(0.010)	(0.012)	(0.013)	(0.010)
Exchange rate	-0.0099	0.0071	-0.0538***	0.0110	-0.0071	0.0025	0.0118	-0.0004	-0.0617***
	(0.009)	(0.009)	(0.008)	(0.009)	(0.010)	(0.009)	(0.010)	(0.010)	(0.008)
RTA	0.5390***	0.1936**	0.1269	0.4648***	0.2492***	-0.2479***	0.0901	0.4554***	-0.2838***
	(0.087)	(0.090)	(0.083)	(0.086)	(0.093)	(0.083)	(0.097)	(0.089)	(0.070)
Initial export value	-0.0459***	-0.0437***	-0.0371***	-0.0501***	-0.0201***	-0.0381***	-0.0534***	-0.0518***	-0.0327***
	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.005)
Lagged duration	-0.0622***	-0.0453***	-0.0350***	-0.0322***	-0.0356***	-0.0585***	-0.0688***	-0.0094	-0.0563***
	(0.010)	(0.011)	(0.009)	(0.010)	(0.008)	(0.010)	(0.008)	(0.009)	(0.008)
Total export value	-0.0760***	-0.0830***	-0.0870***	-0.0843***	-0.0754***	-0.0689***	-0.0672***	-0.0761***	-0.0740***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)
Observations	11739	7797	9813	9598	9526	8251	11042	8047	10907
Spells	192168	192168	192168	192168	192168	192168	192168	192168	192168
Trade relations	95842	95842	95842	95842	95842	95842	95842	95842	95842
Log-likelihood	-5899	-4077	-5088	-5046	-4927	-4399	-5662	-4149	-5823

Notes: The table reports the estimated coefficients and the corresponding robust standard errors clustered at the importer-service level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. The dependent variable is a binary variable that equals one if an export spell is ended and zero otherwise. ICT means computer and information services, OBS stands for other business services while PCR means personal, cultural, and recreational services.