

# The Role of Extensive and Intensive Margins and Export Growth

Tibor Besedeš\*                      Thomas J. Prusa†  
Georgia Institute of Technology      Rutgers University and NBER

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## Abstract

We investigate and compare countries' export growth based on their performance at the extensive and intensive export margins. We decompose these margins into three distinct components: establishing new partners and markets, having relationships survive or persist, and deepening existing relationships. We show that although both developing and developed countries have a large number of new exporting relationships, differences along the extensive margin have very little impact on long-run export growth. By contrast, we find developing countries would have had significantly higher export growth were they able to improve their performance with respect to the two key components of the intensive margin: survival and deepening.

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\*Tibor Besedeš, School of Economics, Georgia Institute of Technology, Atlanta, Georgia 30332-0615

†Thomas J. Prusa, Department of Economics, New Jersey Hall, Rutgers University, New Brunswick, NJ 08901, prusa@econ.rutgers.edu

# 1 Introduction

This paper offers a new perspective on the role of extensive and intensive margins in export growth. We examine relative differences in the role of intensive and extensive margins in the growth of aggregate exports of developed and developing countries. We show that the relative performance of developing countries is particularly poor on the intensive margin in that they are unable to maintain and deepen their export relationships. By contrast, developing countries perform better on the extensive margin and often establish more new relationships than do developed countries.

In order to highlight the importance of intensive and extensive margins we decompose export growth into three distinct parts: (i) establishing new partners and markets, (ii) having relationships survive or persist, and (iii) deepening existing relationships. The first channel, creation of new export relationships, is the extensive margin; the two other channels, survival and deepening, are two dimensions of the intensive margin. Creation of new export relationships is the motivation behind many trade promotion policies. A variety of empirical and theoretical studies have shown that such policies are of limited value unless they are carefully designed to target exporting firms.<sup>1</sup> Our results cast further doubt on the efficacy of such policies as we find exporting is an activity fraught with failure.<sup>2</sup> Recent work by Hausmann and Rodrik (2003) provides another perspective on the ineffectiveness of such policies. They show that in spite of considerable efforts many countries have devoted to facilitating new export relationships just a handful of products dominate many developing countries' exports. Our results clarify why so few products account for the majority of developing country exports: new starts almost always fail.

The survival and deepening channels are often not distinguished in the literature. Ex-

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<sup>1</sup>Roberts and Tybout (1997) and Bernard and Jensen (2004) empirically demonstrate that only the most productive firms tend to be exporters. Melitz (2003), Irarrazabal and Opromolla (2006), Chaney (2008), and Arkolakis (2008) theoretically show only more productive firms export.

<sup>2</sup>The results in Eaton, Eslava, Kugler, and Tybout (2007) also indicate high failure rates.

isting research has focused only on changes in export value and the number of relationships over time and implicitly considered only trade deepening without considering the issue of export survival. Felbermayr and Kohler (2006) discuss vintage accounting but do not explicitly consider the survival issue, one of our primary interests. Eaton et al. (2007) control for relationships surviving from one year to the next, but do not take into account the full length of a relationship. We will show that this omission is not without consequence. The vast majority of developing country export relationships fail almost immediately after commencing — about 7 of 10 new export relationships fail within two years.

Higher failure rates endemic to many developing countries not only have a detrimental impact on export growth but also imply that we must be extremely careful when assessing the impact of large differences at the extensive margin. Firstly, we find that almost all the activity at the extensive margin has only a short-run impact on exports and little or no impact on a country's long-run export growth. Survival is a necessary condition for deepening and the strikingly high failure rates in initial years prevent deepening. Secondly, better survival would result in higher export growth even in the absence of deepening. Trade embodied in failures dampens a country's overall export growth. Thirdly, the assumption of a constant failure rate across years of service is starkly rejected by the data. The age of each relationship would be irrelevant if failure rates were equal across length of service. By focusing on the total number of relationships, earlier studies have overlooked the role of survival. Strikingly high failure rates make the connection between the extensive margin and long-run export growth very fragile.

We conduct our study using disaggregated bilateral manufacturing exports of 46 countries between 1975 and 2003. Since we are particularly interested in differences between developed and developing countries, our discussion focuses primarily on developing countries of Latin America, Africa, and East Asia. We find all countries experienced an expansion along the extensive margin to varying degrees. More importantly, there are differences along

survival and deepening dimensions across countries and time as well. Across countries, we find developed countries and more successful developing countries have higher survival and greater deepening. Our findings indicate new relationships are much more likely to fail than existing ones and reinforce the notion that a trade relationship's vintage and age matter.

We identify the importance of each margin for the aggregate growth of exports by performing a series of counterfactual exercises using successful developing countries as benchmarks. We ask how a country's exports would have grown had it had a different experience in each of the three dimensions. Our results confirm that the intensive margin is the dominant force in the growth of trade. However, they do not imply that the extensive margin does not or cannot play an important role. Rather, we show that in a comparison of relative performance of the growth of exports on the intensive and extensive margins, successful developing countries differ significantly from less successful ones on the intensive margin. Differences on the extensive margin are present, but are much smaller and typically in favor of less successful developing countries. These two conclusions taken together indicate that developing countries are able to form new export relationships and find new market as well as, if not better than, developed and successful developing countries, but are much less successful in maintaining those relationships. A unique contribution of this paper is documenting the high failure among new export relationships, an insight that has largely been overlooked in the existing literature.

## **2 Related Literature**

Prior research has come to different conclusions regarding the role of extensive and intensive margins in the growth of trade. A number of papers have found the extensive margin to be quite important. Hummels and Klenow (2005) examine cross-country differences in trade and find the extensive margin accounts for 60 percent of the greater exports of larger economies.

Evenett and Venables (2002) find a third of the growth of exports of developing countries between 1970 and 1997 can be attributed to the expansion of the extensive margin. Using export data for South Korea and Taiwan, Kang (2004) shows the extensive margin plays a more important role in export growth than does the intensive margin.

Felbermayr and Kohler (2006) find the extensive margin played a larger role in the growth of world trade between 1950 and 1970 and again in the mid 1990s, while the intensive margin was more important in the intervening years. Recent work by Helpman, Melitz, and Rubinstein (2008) confirms the finding of Felbermayr and Kohler (2006). They find the majority of the growth of trade between 1970 and 1997 is attributable to the intensive margin rather than the extensive margin. Eaton, et al. (2007) examine extensive and intensive margins of Colombian firm level exports. In any given year growth occurs on the intensive margin even though up to one half of firms exporting in any given firms are new. Thus, while there is a sizable expansion on the extensive margin in any given year, it has little impact on the growth of exports. Their finding of new firms exporting small amounts and facing high export failure rates is very similar to our findings of the relative importance of the intensive margin. The few Colombian firms that do survive the initial attrition do grow faster and account for about half of the growth of exports over the next decade. Amiti and Freund (2007) find the intensive margin plays a more important role in the growth of China's exports between 1992 and 2005 than does the extensive margin.

In addition to contributing to the intensive/extensive margin of the trade literature, we make a contribution to the duration of trade literature. Besedeš and Prusa (2006a, 2006b) studied duration of U.S. import relationships at the product level and found it to be very short, only four years at the median. They found differentiated goods tend to be traded in longer relationships than homogeneous goods. Besedeš (2007) shows a search cost model fits duration data well in that it can explain the preponderance of short and small valued relationships. Nitsch (2007) examines duration of German import trade finds similar results.

We now show duration of U.S. exports is short as well and other countries have an even shorter duration than the U.S.

## 3 Extensive and Intensive Margins

### 3.1 Data

Our data come from the UN Commodity Trade Statistics Database (UN Comtrade). We use data recorded using the Standard Industrial Trade Classification Revision 1. Although data are available since 1963 at the 5-digit level, we restrict our analysis to the 4-digit level data starting in 1975 due to concerns about data quality and consistency in earlier years. In addition, there is a plethora of missing years for a number of countries prior to 1975. Given that most countries' growth strategies focus on manufacturing (not agriculture) we restrict our attention to SITC industries Chemicals (SITC=5), Manufactured Materials (6), Machinery (7), and Miscellaneous Machinery (8).<sup>3</sup> The 46 countries export a total of 380 4-digit manufacturing industries to a total of 181 countries. There are 12,235,036 annual bilateral export observations. Table 1 presents the countries and years for which data are available as well as the number of annual observations for each country.

We opted not to use more disaggregated trade data (HS or TS line-item data) for two reasons. First, such data are not available for all countries. Second, for those countries where HS/TS data are available, the time span is considerably shorter, often less than 10 years. In Besedeš and Prusa (2006a) we found insignificant differences in survival when we compared more disaggregated line-item tariff data with 4- and 5-digit SITC data.

A key step in our analysis involves converting the annual data into spells of service for each trade relationship. We define a trade relationship as exports of product  $x$  from country  $e$

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<sup>3</sup>Our main findings are qualitatively unchanged if we consider all industries.

to country  $i$ . Thinking of bilateral trade data in terms of relationships allows us to calculate survival and deepening rates. If a country exports the same product to the same country in two (or more) distinct non-overlapping spells of service, for example during 1978–1984 and again 1989–1994, we treat this as two independent spells.<sup>4</sup> We have data on 2,594,893 export spells as shown in Table 1. In the interest of brevity we do not discuss all issues pertaining to applying duration methods to trade data but instead point the reader to Besedeš and Prusa (2006a) where we provide an in-depth discussion.

Given the number of countries we study, we present results by grouping countries in geographical regions — U.S., EU-15, India, East Asia, Caribbean, Central America, South America, Mexico, Africa. We separate India from other East Asian countries (Indonesia, Malaysia, Philippines, Singapore, South Korea, and Thailand) as it is not associated with either the East Asian Tigers or East Asian Dragons. We also separate Mexico from Central America due to its strong trade ties with the U.S.<sup>5</sup>

### 3.2 Extensive margin

We begin by providing summary statistics about the growth in trade and relationships in Table 2. The first column shows the growth of aggregate exports for each region. The second column presents the growth of export relationships. We define the extensive margin as the number of country-product relationships an exporting country has. A country can experience a change in its extensive margin by exporting to a country that had never been serviced,<sup>6</sup> by exporting a product that had never been previously sold abroad, or by exporting an already exported product to a destination country that it had not previously serviced. We believe the

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<sup>4</sup>Our results are robust to alternative methods for handling multiple spells (Besedeš and Prusa 2006a, 2006b).

<sup>5</sup>Country specific results are available on request.

<sup>6</sup>This is the approach taken by Felbermayr and Kohler (2006). Part of the change in margins is due to the new countries created during this period, mostly due to the breakup of Yugoslavia and the Soviet Union. Felbermayr and Kohler (2006) refer to this as the pseudo-extensive margin.

country-product concept of a relationship is the best way to capture changes in the extensive margin, as it captures all possible ways the extensive margin can change. Our definition is similar to that used by Hummels and Klenow (2005) and Eaton et al. (2007) (though they define it at the firm-country, rather than country-product level). We note, however, that other definitions have been used in the literature. Helpman, Melitz, and Rubinstein (2008) and Felbermayr and Kohler (2006) define the extensive margin as the number of countries being exported to, while Amiti and Freund (2007) define it as the number of products exported. In this work, however, the nature of their data appears to have influenced the definition. Evenett and Venables (2002) define it separately as the number of countries and the number of products. As can be seen from columns 2–4 of Table 2, defining the extensive margin at the country-product level creates the largest possible of activity at the extensive margin. In effect, our approach creates the largest opportunity for extensive margin to play an important role.

There is a positive relationship between the growth in exports and growth in the number of relationships. More developed regions, such as the U.S., EU-15, and East Asia, have a much higher rate of growth of exports than export relationships. Developing regions of the Caribbean, Central and South America, and Africa have an almost one-to-one ratio of the growth of exports and export relationships. This is a first indicator that intensive margin may play a more important role than the extensive margin since exports grow much faster than export relationships in developed regions.

East Asian countries experience the largest gains in the extensive margin. Other regions experiencing large increases include Africa, India, and Central and South America. By contrast, the U.S. and EU-15 have experienced small gains. One possible explanation is that the U.S. and EU-15 have already established nearly all export relationships and therefore had little scope for gain. This is not the case, however. The maximum potential number of export relationships a country can have if it were to export all industries to all possible

destination markets is 59,280 in 1975 and 63,858 in 2003. Columns 5 and 6 reveal that no country is close to the maximum; all countries still have plenty of room to expand their extensive margin.<sup>7</sup> Our data show the U.S. utilizes slightly more than a half of all of its possible relationships.<sup>8</sup> Some countries have made tremendous gains in utilization. India increased its utilization from 14% to 41%, East Asian countries from 5% to 22%. It is clear that Latin American and African countries lag far behind, with only Mexico cracking the two digit barrier.

Columns 7 and 8 give a sense of the size of the extensive margin. For each exporting country in each year  $t$  we calculate  $n_t^0/n_t$ , where  $n_t^0$  denotes the number of relationships that are in their initial year of service and  $n_t$  denotes the total number of export relationships. In column 5 we average across countries and report the extensive margin for each region. There is a lot of activity at the extensive margin, especially for developing countries. For EU-15 and the U.S. around 10–15% of all export relationships are new in any given year; for all other regions at least 25% of all relationships are new in any given year. This suggests that the extensive margin is important for exporting success and should play an important role in explaining export growth.

In column 8 we report a trade weighted measure of the size of the extensive margin,  $(v_t^0 n_t^0)/(v_t n_t)$ , where  $v_t^0$  denotes the value of trade in a typical relationship in the initial year of service and  $v_t$  average value of trade for all relationships. The pattern is qualitatively very similar to that observed in column 7. The key difference is that trade values for new relationships are considerably smaller than those for established relationships. Comparing

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<sup>7</sup>Evenett and Venables (2002), Haveman and Hummels (2004), Helpman, Melitz, and Rubinstein (2008), and Felbermayr and Kohler (2006), among others, all show that a great number of bilateral trade relationships are not utilized.

<sup>8</sup>It might not be economically viable for every single possible relationship to actually be utilized. For example, even though the U.S. can export oil drilling equipment to every country, many countries have no need for it. This means that we might be overstating the maximum number of possible relationships. Nevertheless, a 50% utilization makes it likely that all countries are well below the upper limit of economically viable relationships.

columns 7 and 8 indicates that new relationships are considerably smaller than established ones. This further bolsters the view that new relationships can only have a meaningful impact on aggregate export growth if they survive and deepen — in their early years they are too small to have any appreciable effect on export growth.

### 3.3 Intensive margin

In contrast with existing studies of the intensive margin which focus on the volume of trade and its price and quantity components, we characterize the intensity of export relationships in terms of survival and deepening. An overlooked issue is how long a given relationship remains intact. As we will show, almost all new relationships are short-lived. Across most countries there appear to be a few winners and many losers. Simply looking at the number of new relationships tells us very little about a country's ability to perform in export markets.

#### Survival

It is useful to distinguish between calendar time and analysis time. The term calendar time is self-explanatory and simply refers to the year trade took place. In a given calendar year, however, export relationships can be of different lengths of service or vintage: some trade relationships are quite old (i.e., have been active for many years) while others are quite new. Analysis time captures the idea that relationships are of different ages. In the first year of country  $e$ 's relationship exporting product  $x$  to country  $i$ , analysis time is equal to one, in the second year it is equal to two, and so on. Thus, in any given calendar year, the distribution of duration reflects the longevity of active relationships.

In Figure 1, we graph the distribution of years of service for 1990 for three representative countries, the U.S., South Korea, and Chile. As seen, there are significant differences in profiles. For the U.S. a relatively small fraction of relationships are new whereas for Chile a

relatively large fraction of its relationships are new. Only 11% of U.S. export relationships were in their first year of service and 23% were in either their first or second year of service. By contrast, 43% of Chilean export relationships were in their first year of service and 58% were in either their first or second year of service. At the other end of the distribution, less than 10% of Chilean but more than 60% of U.S. relationships have been intact for more than 10 years.

There are several possible explanations for these differences. For instance, short duration might be a reflection of the type of goods Chile exports rather than of Chile's inherent ability to compete successfully. Previous work has found variation in duration by product type; specifically, Besedeš and Prusa (2006b) found much shorter duration for agricultural products as compared to manufactured goods. We note, however, that in this study we are only focusing on manufacturing industries. Hence, the type of goods a country exports is unlikely to fully explain survival differences across countries.

More generally, the difference could reflect Chilean exporting strength or weakness. For example, the high fraction of short-lived relationships might reflect Chile's facility in starting new relationships (e.g., perhaps due to innovation or an advantageous exchange rate shock). On the other hand, data may reflect Chile's inability to maintain export relationships. Our analysis below suggests the latter is the primary cause. South Korea's relationship duration likely reflects its successful development strategy. Like the U.S., a relatively small fraction of South Korean relationships were new in 1990. On the other hand, like Chile, a fairly large share of South Korean relationships were less than 10 years old in 1990. Korea's profile suggests relationships which started in the 1980s were longer lived than relationships started in earlier years.<sup>9</sup>

Duration of trade relationships is most appropriately summarized by using survival anal-

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<sup>9</sup>In future work we hope to examine which explanation best explains the data; in this paper, however, we explore the implications for export growth and development.

ysis. For each country we estimate the Kaplan-Meier survival function. In our benchmark results we estimate a single survival function pooling across all industries and all years. For presentation purposes we pool the results to the regional level; we emphasize, however, that survival functions are estimated using individual country data. The survival functions are given in Figure 2. It is instructive to think of the flip-side of the survival function, the hazard rate. In Table 3 we present information on the hazard rate and the fraction of relationships that fail over the first 15 years of service.

There are a number of interesting results. First, and perhaps the most striking, is the finding that export duration is remarkably brief. As shown in Figure 2 the median survival time is 1–2 years for *all* regions. In other words for every region more than 50 percent of all export relationships fail within the first two years.<sup>10</sup> By the end of the second year of service about 53% of U.S. export relationships will have failed. This is equivalent to an average hazard rate of 32% in each of the first two years (Table 3). As striking as this result is, the U.S. actually does better than other regions. All other regions have a higher failure rate in the first two years of service, often upwards of 10 percentage points higher. The universally high failure rates suggest that we need to be particularly careful attributing impact to gains along the extensive margin. Even though the information reported in Table 2 suggest that the extensive margin and export growth are related, our survival analysis reveals that most increases in the extensive margin in any given year will not be present within a few years.

Second, while most relationships end quickly, significant regional differences still emerge. This is true in both the short and long run. In the first few years of service differences of 10 percentage points in survival are commonly observed. As mentioned above about 53% of U.S. export relationships will last two or fewer years. This compares favorably with results for the Caribbean, Central American, South American, and Mexican relationships where

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<sup>10</sup>To be clear about terminology, in survival literature failure occurs at the end of a year of service. The first possible time we can observe failure is at the end of the first year of service; the next failure time is at the end of the second year of service, etc.

more than two-thirds of relationships last two or fewer years. Over the longer run, we find that successful export relationships in regions like the U.S. and East Asia are about twice as likely to survive 15 years as compared with Central America or the Caribbean. In particular, about 20% of U.S. relationships but only about 10% of Central American and Caribbean relationships will last at least 15 years.

Taken together the first two findings reveal that we do observe clear differences between those countries and regions viewed as more successful, but that “success” must be put into perspective. Results indicate that survival has been modest for even those regions most often thought to be good exporting performers.<sup>11</sup> Even for successful exporters only about one-quarter of all relationships will last more than five years.

Third, despite differences in the magnitude of failure, the survival experience is qualitatively similar across countries and regions. Survival functions are similarly shaped. Across all exporters we find new relationships are much more likely to fail than existing ones. In Figure 2 this is seen by the survival functions’ steep slope over the first 6 to 7 years and then the flat slope over the remaining years. Said differently, relationships experience high hazard through the first 6 to 7 years. Thereafter, there is a fairly small risk of failure. The difference is sizeable: the hazard rate of new relationships can be as much as 100 times higher as that of established ones.<sup>12</sup>

Fourth, as seen in Table 3 regardless of years of service relative differences in hazard rates across regions persist, and in some cases increase. Over the first two years the Central American hazard rate is about 33% higher than the U.S.’s, over years 3–5 it is about 40% higher, and over years 6–15 it is about 80% higher. Similar worsening performance is seen for other regions that have struggled with their export performance such as Africa and

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<sup>11</sup>The results are not explained by differences in initial export size. Large differences across regions persist whether we look at smaller valued or larger valued transactions. Results available upon request.

<sup>12</sup>Based on a comparison of the hazard rate in the first year of service (i.e., a new relationship) with the hazard rates for relationships intact for at least 10 years (i.e., established relationships).

Caribbean. By contrast, the gap between the U.S. and East Asian hazard rates narrows over time. In most comparisons, however, tenuous survival is seen throughout the duration of export relationships.

Fifth, understanding duration of export relationships is vital for understanding the intensive and extensive margins. Figure 1 suggests that a high fraction of all export relationships are in their first or second year of service. This suggests there is a lot of activity at the extensive margin and, by inference, that the extensive margin is an important indicator of exporting success. On the other hand, Table 3 shows almost all new starts will quickly fail. Simply looking at activity at the extensive margin may be misleading.

Sixth, Table 3 also clarifies the appropriateness of the constant hazard rate assumption.<sup>13</sup> Empirically, hazard rates are far from constant. To see this we first report the average hazard rate over the period 1975–2003 in Table 3. This hazard rate applied over a 15 year period would yield the cumulative failure rate report in the final column.

East Asian countries provide a good example of the difference between the average hazard rate and the actual hazard rate for any given year of service. On average about 10.6% of all relationships fail in any given year. However, the average reveals very little about the true risk a relationship faces. New relationships face starkly higher failure rates: on average 36% fail during the first two years of service.<sup>14</sup> The hazard rate over the next three years of service averages 13%; over years 6 to 15 the hazard rate averages just 3%. As reported in the table, similar trends are seen for every region and country. Computing actual hazard rates makes it clear that assuming a constant hazard rate is a significant simplifying assumption. A country's average hazard rate does not reflect the exporting risk faced by nearly all of its export relationships.

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<sup>13</sup>Melitz (2003) and Bernard, Redding, and Schott (2007) develop models with this assumption.

<sup>14</sup>44% fail at the end of the first year of service and another 27% fail at the end of the second year of service, yielding an average hazard rate over the first two years of 36%.

## Deepening

Our examination of the intensive and extensive margins indicates that many new export relationships do not have an opportunity to deepen given their early failure. We characterize deepening in two ways. First, we examine deepening of “long term” relationships, by which we mean those those relationships that span the entire 1975–2003 period. Second, we consider deepening of all surviving relationships irrespective of their duration. The first method essentially performs an endpoint-to-endpoint comparison of export deepening. The second method gives a sense of deepening over the whole period.

Columns 1–3 of Table 4 characterize long term relationship deepening. As discussed above, developing countries are unable to maintain their relationships in the long run. This fact is reflected in column 1 which reports the fraction of 2003 relationships that were active in 1975. While 66% of U.S. export relationships remain intact, only half as many Caribbean and Mexican relationships remain active over the long term. Other developing regions fare even worse. Central and South America have less than a quarter of their relationships survive throughout. Africa has by far the lowest fraction at 14%. Looking at column 2 we see that long term relationships embody the majority of trade for most regions. Developed regions and Mexico have more than 90% of their 2003 export value in these long term relationships. Developing countries have far less export value in long term relationships. Central America has the lowest percentage of its 2003 exported value in long term relationships at 37%. High failure rates and low fractions of exported value embodied in long term relationships suggest an important role for survival for export growth especially for developing countries. Because relatively few of their relationships persist over the long term, developing countries have a larger share of their trade embodied in short term relationships which are far more prone to failure. A key question is what is the impact of developing countries’ inability to maintain relationships on export growth.

Column 3 examines average annual deepening of long term relationships. Interestingly, U.S. and EU-15 long term relationships deepen at a slower rate than those of East Asia, India, South America, Mexico, and Africa. Central American relationships deepen at lower rates than developed countries, while the value of trade in long term Caribbean relationships actually decreases over the period.

Columns 4 and 5 offer a different measure of deepening. We calculate median and average annual growth rates of all surviving relationships irrespective of their eventual duration. This year-to-year approach captures all deepening over the entire period, not just that embodied in those that survive the entire period. We note that except for Mexico, median and mean deepening rates are similar, suggesting that outliers do not significantly impact the means. Africa, the Caribbean, and Central and South America have median growth rates below 3% and only slightly higher mean deepening rates. The highest deepening rates belong to India and East Asian countries.

## 4 Decomposing Growth

The results so far reveal that the amount of activity at the extensive margin may overstate its importance for export growth. We now examine the extent that differences in extensive and intensive margins matter for a country's exporting success. In order to identify the impact each margin, we decompose export growth into three distinct channels.

### 4.1 An Accounting of Changes in the Growth of Trade

In order to examine how countries would perform had they had a different performance on the intensive and extensive margins, we first need to decompose exports to capture both dimensions. In any year  $t$  we can write the value of exports as

$$V_t = n_t v_t$$

where  $V_t$  is the value of exports in year  $t$ ,  $n_t$  is the number of export relationships, and  $v_t$  is the average value per relationship. Export relationships consist of those that survive from  $t - 1$  to  $t$ , denoted  $s_t$ , and new relationships, denoted  $e_t$ , so that  $n_t = s_t + e_t$ .

Export growth from  $t$  to  $t + 1$  can be written as

$$(1) \quad \begin{aligned} V_{t+1} - V_t &= n_{t+1}v_{t+1} - n_t v_t \\ &= s_{t+1}[v_{t+1} - v_t] - d_t v_t + e_{t+1}v_{t+1} \end{aligned}$$

where  $s_{t+1}$  is the number of surviving relationships,  $[v_{t+1} - v_t]$  is the per relationship growth of surviving relationships,  $d_t$  is the number of relationships that end in  $t$  with  $d_t v_t$  their total value, and  $e_{t+1}$  is the number of new relationships with a total value of  $e_{t+1}v_{t+1}$ .<sup>15</sup>

We can further refine our decomposition in two dimensions. First, since the survival of each relationship depends on its age, we need to incorporate years of service into the decomposition. Second, we can estimate survival and hazard functions at the industry level. Taking both of these into account we define

$$\begin{aligned} s_t &\equiv \{s_{z,t}^0, s_{z,t}^1, s_{z,t}^2, \dots, s_{z,t}^i, \dots, s_{z,t}^I\}, \\ d_t &\equiv \{d_{z,t}^0, d_{z,t}^1, d_{z,t}^2, \dots, d_{z,t}^i, \dots, d_{z,t}^I\}, \\ v_t &\equiv \{v_{z,t}^0, v_{z,t}^1, v_{z,t}^2, \dots, v_{z,t}^i, \dots, v_{z,t}^I\}, \\ h_t &\equiv \{h_{z,t}^0, h_{z,t}^1, h_{z,t}^2, \dots, h_{z,t}^i, \dots, h_{z,t}^I\}, \end{aligned}$$

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<sup>15</sup>Felbermayr and Kohler (2006) perform a similar decomposition but do not account for survival. Eaton et al. (2007) decompose the growth of trade into continuing, entrant, and exiting firms on a pairwise basis – comparing only two adjacent years. They do not analyze or calculate the duration of a relationship. Amiti and Freund (2007) decompose the growth of exports using end-point to end-point decomposition, ignoring survival altogether.

where the subscript  $z \in Z$  denotes the 2-digit industry to which the relationship belongs, the superscript  $i$  denotes the year of service, and  $h_t$  denotes the hazard rate of a relationship in industry  $z$  ending between  $t - 1$  and  $t$ . During the first year of service there is no failure. Hence,  $s_{z,t}^0$  denotes the survival during the first year of a spell and by definition  $s_{z,t}^0 \equiv 1$  (by extension,  $d_{z,t}^0 \equiv 0$  and  $h_{z,t}^0 \equiv 0$ ).  $s_{z,t}^1$  is the fraction of relationships that survive through the first year and into the second year of service. More generally,  $s_{z,t}^i$  denotes the number of relationships between year  $t - 1$  and  $t$  that survive through the  $i^{\text{th}}$  year of service.

We can now rewrite (1) as

$$(2) \quad V_{t+1} - V_t = \sum_{z \in Z} \left\{ \sum_{i=1}^I \underbrace{[(1 - h_{z,t+1}^i) n_{z,t}^i]}_{\text{survival-stayers}} \underbrace{[v_{z,t+1}^i - v_{z,t}^i]}_{\text{deepening}} - \sum_{i=1}^I \underbrace{[(h_{z,t+1}^i) n_{z,t}^i] v_{z,t}^i}_{\text{failure}} + \underbrace{e_{z,t+1} v_{z,t+1}^0}_{\text{entry}} \right\}$$

where  $I$  denotes the maximum potential year of service,  $(1 - h_{z,t+1}^i)$  gives the percentage of surviving relationships between  $t$  and  $t + 1$ , and  $(1 - h_{z,t}^i) n_{z,t}^i$  gives the total number of surviving relationships between  $t$  and  $t + 1$  in the  $i^{\text{th}}$  year of service.  $[v_{z,t+1}^i - v_{z,t}^i]$  represents deepening or growth of trade for surviving relationships,  $h_{z,t+1}^i n_{z,t}^i$  gives the number of relationships that end in year  $t + 1$ ,  $(h_{z,t+1}^i) v_{z,t}^i$  gives their total value, and  $e_{z,t+1} v_{z,t+1}^0$  gives the value of new entrants in year  $t + 1$ .

Equation (2) is our decomposition of the growth of exports into extensive and intensive margins. The intensive margin is comprised of deepening and survival. Higher survival (lower hazard) results in more relationships (more stayers and fewer failures). The final term captures the extensive margin. We emphasize that year of service (denoted by the superscript  $i$ ) must be accounted for because of the radically varying hazard rate across spell length. As discussed above, relationships are far more likely to fail in earlier stages. The hazard rate of new relationships can be as much as 100 times larger than that of established ones. Each summation begins at  $i = 1$  because we can only talk about survival and exit at

the the end of the first or higher year of service of each relationship. For the same reason, the last term pertaining to new relationships only contains  $i = 0$  which denotes the initial year of service.

One important issue that must be recognized when studying differences in the extensive margin is the impact of country size. In particular, country size affects the *number* of new starts. A large country like the United States clearly has a greater capacity to service more markets than a small country like Costa Rica. The key issue for our study is the change in the extensive margin over time. Therefore, our counterfactual study compares entry rates rather than the absolute number of new starts.

## 4.2 Counterfactuals

In order to perform our counterfactual exercises we need to substitute the performance of an alternative country in the above decomposition. For instance, we can ask what would have been the performance of country  $e$  had it had some other country's experience. In order to calculate how each country's exports would change with counterfactual survival we would change equation (2) to

$$\text{Survival: } \sum_{z \in Z} \left\{ \sum_{i=1}^I \left[ \left( 1 - h_{z,t+1}^{\text{CF},i} \right) n_{z,t}^i \right] \left[ v_{z,t+1}^i - v_{z,t}^i \right] - \sum_{i=1}^I \left[ \left( h_{z,t+1}^{\text{CF},i} n_{z,t}^i \right) v_{z,t}^i \right] + e_{z,t+1} v_{z,t+1}^0 \right\}$$

where superscript "CF" denotes the counterfactual values. Similarly, to find the counterfactual deepening and entry effects we calculate:

$$\begin{aligned}
\text{Deepening:} & \quad \sum_{z \in Z} \left\{ \sum_{i=1}^I [(1 - h_{z,t+1}^i) n_{z,t}^i] [v_{z,t+1}^{\text{CF},i} - v_{z,t}^{\text{CF},i}] - \sum_{i=1}^I [(h_{z,t+1}^i n_{z,t}^i) v_{z,t}^i] + e_{z,t+1} v_{z,t+1}^0 \right\} \\
\text{Entry:} & \quad \sum_{z \in Z} \left\{ \sum_{i=1}^I [(1 - h_{z,t+1}^i) n_{z,t}^i] [v_{z,t+1}^i - v_{z,t}^i] - \sum_{i=1}^I [(h_{z,t+1}^i n_{z,t}^i) v_{z,t}^i] + e_{z,t+1}^{\text{CF}} v_{z,t+1}^0 \right\}
\end{aligned}$$

This decomposition allows us to evaluate how different each country's exports would have been had it had our chosen counterfactual survival, deepening, and new relationship formation performance. Counterfactuals then allow us to examine the relative differences between countries in their intensive and extensive margins of aggregate export growth.

### 4.3 Results

We now consider the counterfactual results using two countries that have experienced strong export growth: South Korea and Spain. We chose South Korea as an example of a high achieving developing country. South Korea is unusual in the sense that it is a superior performer in nearly every dimension: it has experienced substantial overall export growth, it has had very good survival and deepening performance, and it has also demonstrated very good ability to expand along the extensive margin. Arguably South Korea might be too successful to serve as a reasonable benchmark; furthermore, South Korea (and the the East Asian economies in general) might have too many institutional and cultural peculiarities to serve as a realistic comparison for other developing countries. Simply put, it might be unreasonable to imagine other countries duplicating South Korea's experience. Mindful of this concern, we also consider Spain as the counterfactual country. Spain had good, but not spectacular export growth.

To provide some sense of South Korea's and Spain's export performance, Tables 2 through 4 contain information on their intensive and extensive margins. South Korea's

aggregate exports increased by over 1,100%, while Spain's exports increase by about half as much. South Korea's long term relationships grew at an average annual rate of 6.8% compared to 7% for Spain. In terms of all relationships, South Korea's deepened at the median rate of 8.1% while Spain's deepened at 7.2% (their average rates are 7.3% and 7.2%). Their exports grew faster than most other regions.

South Korea's and Spain's survival experience is roughly similar. Spain has a slightly better survival, as evidenced by lower hazard rates. They both fall in between developed and developing countries. For example, the average hazard rate in the first two years of service for the U.S. is 32%, while for South Korea and Spain it is 37% and 35%. Central and South America, the Caribbean, and Africa all have the average hazard rate in the first two years of service above 40%.

In terms of their extensive margin, South Korea has a slightly larger average extensive margin. On average almost 24% of all export relationships in a given year for South Korea are new, while about 19% are new for Spain. South Korea almost tripled the number of export relationships between 1975 and 2003, while Spain roughly doubled the number. The number of export relationships grew much more for South Korea and Spain than it did for developed countries.

Perhaps the best indicator why South Korea and Spain are good counterfactual performers is revealed by the ratio of the growth of aggregate exports and the growth of the number of export relationships (columns 1 and 2 of Table 2). In terms of aggregate export growth the comparison countries are similar to developing countries. On the other hand, in terms of the ratio of the growth of exports to the growth in the number of relationships they are similar to developed countries. Overall, the export performance of South Korea and Spain bears some similarity to both developed and developing countries.

In Table 5 we present results from four counterfactual exercises for both South Korea

and Spain.<sup>16</sup> First, we estimate each country’s hazard rates pooling across all industries and vintages. That is, we estimate  $h_{z,t}^i \equiv h^i$ . This is the most straightforward comparison where we assume each country’s hazard rate is constant across starting year and industry. We will refer to this as our benchmark counterfactual and it serves as the basis for graphs depicted in Figures 3 and 4. Second, we estimate each country’s hazard rates allowing them to vary by 2-digit industry but assuming the hazard rates are constant across starting years, i.e.,  $h_{z,t}^i \equiv h_z^i$ . This scenario allows for the possibility that duration might vary across industries due to, say, comparative advantage reasons. In this scenario we might find a handful of industries account for most of the difference between actual and counterfactual export growth. Third, we consider a very flexible specification where we allow each country’s hazard rate to vary by year of service, industry, and starting year.<sup>17</sup> We estimate a separate hazard function,  $h_{z,t}^i$ , for each industry’s relationships starting in every observed calendar year (e.g., a hazard function for each two-digit industry for relationships starting in 1980, 1981, etc.). It is entirely possible that a country and/or industry might experience significant changes in its hazard over calendar time. By allowing the estimation to vary along this dimension, we can control for this possibility. Finally, to investigate the robustness of our results to outliers, we drop six 2-digit industries where the counterfactual country has the best survival performance.<sup>18</sup> By doing so we hope to assess whether the importance of survival is driven by a few strong performers.

In the first column we present average annual (real value) aggregate export growth for each region between 1975 and 2003 period. Moving across the table we report the *change* in the annual export growth that would occur for each of the three key factors (survival, deepening, and entry) under the specific counterfactual exercise. We consistently find large

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<sup>16</sup>Due to data limitations we perform our counterfactual exercises for the Caribbean through 2002.

<sup>17</sup>There are not enough observations for the Caribbean countries to estimate the counterfactual by industry and year.

<sup>18</sup>Dropping six 2-digit industries is equivalent to dropping the top 10% of industries.

effects under the counterfactual survival and deepening, but small ones due to entry. In most cases we find the deepening impact to be larger than that for survival, but in nearly all comparisons the impact of each is significant.

For instance, in the upper panel of Table 5 we see Central American countries experienced export growth of 4.5% over the period. If Central American countries had South Korea's survival experience but no change to their actual deepening or entry their exports would have experienced 1.5 percentage points higher annual growth rate (i.e., would have been 6% instead of 4.5%). If they had South Korea's deepening but no change to their survival or entry, their exports would have 3.4 percentage points higher annual growth rate. Finally, if they had South Korea's entry but survival and deepening were unchanged, their exports would have experienced 1.4 percentage points *lower* annual growth rate. As depicted in Figure 3 over the long 1975–2003 horizon, one percentage point higher annual growth (say, from better survival) maps into a huge increase in exports.

Africa stands out as a region where poor performance at the intensive margin has a large impact. In the benchmark counterfactual, we find African exports would have been 3 percentage points higher if it had South Korea's survival and 1.8 percentage points higher if it had South Korea's deepening. Taken together, better performance at the intensive margin would have generated almost twice the export growth that Africa actually experienced. Looking across counterfactual exercises we consistently find that poor survival plays a particularly large role explaining Africa's export performance. It seems clear that one must address Africa's poor survival if one hopes to understand its export performance.

The lower panel presents results using Spain as the counterfactual country. Generally speaking the results reinforce South Korean counterfactuals. In particular, we can again find that the intensive margin dominates the extensive margin. For virtually all regions and for all counterfactual exercises we find that substituting Spain's entry rate would lower exports and that the impact is quite small. By contrast, we find that most regions would have had

greater export growth if they had Spanish survival or deepening.

Counterfactual exercises clarify the relative impact of each of the three dimensions. First, we find that changes along the extensive margin have little impact on a country's export growth. In almost every comparison we find the impact to be small, often around  $+/- 0.2$  percentage points. Interestingly, when we find a larger impact, the effect is generally negative, meaning that substituting South Korean or Spanish extensive margin performance would result in lower export growth. The small, and often negative impact, suggests that high failure rates during the first few years of most export relationships mostly make new starts moot. That we find the counterfactual entry impact to be negative indicates that South Korea's and Spain's strong export growth is not being driven by their superior extensive margin performance. By thinking of exports in terms of relationships, we find that the extensive margin seems to play a fairly minor role in determining long run export growth.

Second, our results reveal that what appear to be fairly small differences in survival rates can create significant differences in long-run export growth. Over the first two years South Korea's average hazard rate is 37% which appears to be only slightly superior to Central America's average of 42% (Table 3). As our counterfactuals show, however, the long run impact is quite substantial. Specifically, over the 1975–2003 period South Korea's slightly superior survival translates into 1.5 percentage point higher annual growth for Central America — which cumulates into 50% larger exports than they actually experienced.

Similar results are found across all counterfactuals. Looking across all four counterfactuals South American exporters would experience 0.8–1.8 percentage point higher annual export growth with either South Korea's or Spain's survival experience. Central American, Caribbean and African countries would have experienced higher annual export growth on the order of 1–2 percentage points. African countries, in particular, suffer from dismal survival. The counterfactuals indicate that Africa's extremely poor survival is the single biggest drag on their export performance. Overall, results make it clear that even if these countries were

not able to improve their deepening or entry rates, improving export survival would result in significantly higher export growth.

Third, counterfactual results confirm the importance of export deepening. For example, in the benchmark simulation Central and South America would have experienced 3.4 percentage point faster export growth if they had South Korea's deepening. Caribbean countries would have experienced 5.9 percentage point faster export growth with South Korea's deepening. Similar results are found in the Spain counterfactual. Not surprisingly, the impact of deepening varies by industry and the counterfactual results reflect this fact. In some cases differences in industry performance lead to larger differences (e.g., South America) and in others the impact is diminished at the industry level. We also note that Mexico's deepening performance is much stronger than either South Korea or Spain. This is very much related to Mexico's post-NAFTA performance.

In contrast to the surprisingly large impact of small differences in survival, large differences in deepening often have modest impact on annual export growth. This highlights the crucial role played by survival. The case of Africa is particularly illustrative. Spain's mean deepening rate is 7.2% which compares favorably with Africa's 2.6%. Yet, over the counterfactual timeframe the impact on long run growth is modest — Africa would experience only a 0.2 percentage point higher export growth with Spain's deepening. The reason is poor survival. African relationships simply do not last long enough for markedly different deepening rates to matter.

Overall, the counterfactuals highlight the importance of performance at the intensive margin and the modest impact of differences at the extensive margin. Our results confirm the findings of Felbermayr and Kohler (2006) and Helpman, Melitz, and Rubinstein (2008) who find the majority of the growth of trade is due to the intensive margin rather than the extensive margin. Eaton et al. (2007) also find most growth takes place at the intensive margin, with new entrants only starting to play a significant role after they survive the initial

years of attrition.

## 5 Concluding Comments

In this paper we take a disaggregated data approach to studying the differences in the growth of aggregate exports for 46 mostly developing countries. We use product level trade data to examine differences in intensive and extensive margins of exports of these countries. We find countries differ in their export performance along each margin. Our analysis indicates, however, relative differences along the extensive margin have very little impact on long run export growth. By contrast, we find relative differences along both channels of the intensive margin — survival and deepening — have a large impact on long run export growth. Our findings with respect to survival are particularly interesting. What appear to be modest differences in survival can have a significant impact on long run exports. To our knowledge, we are the first to document the role played by export survival in export growth.

Our results confirm the findings of Felbermayr and Kohler (2006), Eaton et al. (2007), and Helpman, Melitz, and Rubinstein (2008) who find the majority of the growth of trade is due to the intensive margin rather than the extensive margin. While Helpman, Melitz, and Rubinstein conjecture the Evenett and Venables (2002) developing country sample is not representative and that some growth in trade was misclassified to be on the extensive margin, our analysis provides additional insight. First, export survival for developing countries is shorter than that for developed countries. As a result, changes in the extensive margin are far less informative for developing countries. Second, similar to Evenett and Venables we find that the fraction of 2003 export relationships that were intact in 1975 to be far smaller for developing countries than for developed countries (Table 4). While this could indicate that new relationships are more important for developing countries, we find that for many developing countries (e.g., Africa, Central America, the Caribbean) new relationships

rarely last more than two years. Failure is so endemic to many developing country export relationships that the large amount of activity at the extensive margin contains little real information about the prospect for export growth.

More generally, our paper implies researchers need to be cautious in interpreting changes in the extensive margin as an indication of export success. For example, Debaere and Mostashari (2005) and Kehoe and Ruhl (2003), document large changes in the extensive margin following NAFTA. While the unique nature of Mexico–U.S. trade might give rise to longer lived export relationships, point-to-point comparisons (e.g., 1990 vs. 1999) might not be as informative if relationships are mostly short-lived. The results also highlight the need for careful cross-country study of the growth of disaggregated trade (e.g., 10 digit or firm level). Our analysis of product level export growth indicates that export growth at the aggregate level involves significant dynamics.

Our findings also extend the insight of Hausmann and Rodrik (2003) who argue that developing countries' shortcoming at the discovery stage is an important explanation for limited export success. Our paper indicates their explanation is only a part of the story for even when new export markets are discovered the relationship often fails within few years.

Finally, one must be cautious in applying our results to policy prescriptions. We have not uncovered the underlying explanation for the poor survival performance of developing country exports. Until we know whether it is a manifestation of comparative advantage or due to structural reasons, be they poor infrastructure or business environment, it is not clear how survival could be improved and at what cost. While our results show long run export growth would be much higher with better survival, it is not clear how feasible it would be for developing countries to improve their survival performance.

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Table 1 - Data snapshot

Region	Country	Years covered	Annual observations	Spells
USA	USA	1975-2003	879,998	136,519
EU-15	Austria	1975-2003	491,619	102,431
	Bel.-Lux.	1975-2003	663,650	136,046
	Denmark	1975-2003	451,626	100,710
	Finland	1975-2003	298,607	70,651
	France	1975-2003	954,651	141,234
	Germany	1975-2003	1,039,793	137,490
	Greece	1975-2003	174,420	54,228
	Ireland	1975-2003	200,962	58,026
	Italy	1975-2003	887,177	150,052
	Netherlands	1975-2003	677,529	131,921
	Portugal	1975-2003	214,649	60,617
	Spain	1975-2003	567,516	115,207
	Sweden	1975-2003	502,450	100,494
	United Kingdom	1975-2003	994,530	158,051
India	India	1975-2003	388,573	107,926
East Asia	Indonesia	1975-2003	149,637	46,715
	Malaysia	1975-2003	206,859	57,055
	Philippines	1975-2003	101,601	32,079
	Singapore	1975-2003	354,752	78,939
	South Korea	1975-2003	385,170	87,150
	Thailand	1975-88, 1990-2002	238,572	81,567
Caribbean	Barbados	1975-2003	23,246	8,996
	Jamaica	1975-2002	21,485	8,259
	Trinidad and Tobago	1975-2003	36,432	13,127
Central America	Costa Rica	1975-2003	41,681	13,197
	El Salvador	1975-2003	27,412	9,028
	Guatemala	1975-2003	41,310	13,379
	Honduras	1975-2003	15,484	6,914
	Nicaragua	1975-87, 1989-2003	12,456	5,689
South America	Argentina	1975-2003	137,992	39,691
	Bolivia	1975-2003	12,076	5,829
	Brazil	1975-2003	311,480	73,143
	Chile	1975-2003	74,921	25,604
	Colombia	1975-2003	91,055	26,462
	Ecuador	1975-2003	23,652	9,837
	Paraguay	1975-2003	8,261	3,528
	Peru	1975-81, 1983-2003	60,610	21,522
	Uruguay	1975-2003	30,311	10,166
	Venezuela	1975-2003	63,261	24,044
Mexico	Mexico	1975-2003	192,462	53,771
Africa	Algeria	1975-2003	9,718	5,869
	Egypt	1975-2003	56,977	24,619
	Madagascar	1975-86, 1991-2003	12,983	6,536
	Morocco	1975-70, 1971-2003	56,421	20,865
	Tunisia	1975-2003	49,009	19,710

Table 2 - Export and Extensive Margin Growth Rates, Manufacturing Industries, 1975-2003

Region/Country	(1) Growth of Exports	(2) Growth in Export Relationships	(3) Growth in Countries Exported to	(4) Growth in Exported Industries	(5) Realized Potential in 1975 (59,280)	(6) Realized Potential in 2003 (63,858)	(7) Extensive Margin (avg.)	(8) Value-weighted Extensive Margin (ava.)
USA	154%	17%	12%	1%	49%	53%	0.126	0.008
EU-15	153%	41%	19%	2%	28%	37%	0.163	0.007
India	556%	215%	26%	8%	14%	41%	0.271	0.032
East Asia	1601%	369%	74%	24%	5.1%	22%	0.271	0.029
Caribbean*	49%	75%	52%	9%	1.4%	2.3%	0.353	0.076
Central America	257%	237%	106%	77%	0.9%	2.9%	0.329	0.059
South America	286%	203%	85%	56%	2.6%	7.2%	0.290	0.052
Mexico	3206%	142%	21%	11%	6.9%	15%	0.283	0.032
Africa	340%	267%	81%	54%	1.1%	3.8%	0.415	0.077
South Korea	1129%	290%	30%	8%	8.6%	31.3%	0.239	0.022
Spain	569%	104%	29%	1%	22%	42%	0.190	0.021

\* Through 2002

Table 3 - Hazard Rates and Propensity to Fail

Region	Hazard Rates				Cumulative Failure Rate (years of service 1-15)
	Average or Constant	Years of Service			
		1 & 2	3--5	6--15	
USA	0.096	0.32	0.11	0.04	0.78
EU-15	0.116	0.35	0.12	0.04	0.84
India	0.119	0.38	0.14	0.04	0.85
East Asia	0.106	0.36	0.13	0.03	0.82
Caribbean	0.148	0.49	0.19	0.07	0.91
Central America	0.146	0.42	0.16	0.07	0.91
South America	0.140	0.40	0.16	0.05	0.90
Mexico	0.132	0.41	0.15	0.05	0.88
Africa	0.146	0.48	0.20	0.07	0.91
South Korea	0.108	0.37	0.13	0.03	0.82
Spain	0.105	0.35	0.13	0.04	0.81

\* Average failure rates computed directly from number of surviving relationships

Table 4 - Export Deepening, Manufacturing Industries, 1975-2003

Region/Country	(1)	(2)	(3)	(4)	(5)
	Long Term Relationships			Year-to-Year Survivors	
	Fraction of 2003 Relationships	Fraction of 2003 Trade Value	Growth of Trade Value (Intensive)	Median Growth Rate	Mean Growth Rate
USA	66.4%	93.1%	3.4%	3.1%	3.8%
EU-15	53.1%	90.1%	3.3%	5.0%	5.0%
India	26.5%	72.5%	6.6%	9.3%	7.3%
East Asia	17.8%	56.7%	8.7%	7.4%	7.7%
Caribbean*	34.7%	53.1%	-1.1%	1.0%	2.3%
Central America	21.0%	37.0%	1.6%	2.5%	3.2%
South America	23.9%	61.0%	3.7%	2.9%	3.2%
Mexico	33.1%	94.5%	14%	4.8%	9.6%
Africa	14.2%	60.8%	7.1%	1.3%	2.6%
South Korea	40.2%	86.4%	6.8%	8.1%	7.3%
Spain	21.1%	52.6%	7.0%	7.2%	7.2%

\* Through 2002

Table 5 - Decomposition of Trade Growth

What if South Korea Experience: Annual Increase in Exports													
	Benchmark			By Industry			By Industry & Year			By Industry Drop 6 Highest Industries			
	Actual	Surv	Deep	Entry	Surv	Deep	Entry	Surv	Deep	Entry	Surv	Deep	Entry
USA	3.3%	-0.2%	3.4%	0.0%	-0.1%	2.4%	-0.0%	0.9%	3.1%	-0.0%	0.0%	-0.2%	-0.5%
EU-15	3.3%	0.1%	1.9%	0.1%	0.1%	2.4%	0.2%	0.3%	5.7%	0.2%	0.2%	5.3%	0.2%
India	6.7%	0.2%	-0.3%	-0.1%	-0.5%	-0.2%	-0.1%	1.7%	-1.4%	-0.0%	-0.7%	1.7%	-0.1%
East Asia*	11.2%	0.3%	-1.6%	-0.8%	0.5%	1.8%	-0.3%	0.4%	1.0%	-0.4%	0.2%	3.6%	-0.8%
Caribbean***	0.4%	3.5%	7.4%	0.5%	2.9%	1.5%	0.6%	3.5%	2.6%	0.6%	2.8%	1.4%	0.5%
Central America	4.5%	1.5%	3.4%	-1.4%	1.5%	-0.1%	-1.7%	2.4%	4.6%	-1.2%	1.0%	-0.4%	-1.4%
South America	4.8%	1.0%	3.4%	0.0%	1.2%	9.6%	0.7%	1.8%	3.2%	0.6%	0.8%	2.3%	0.5%
Mexico	12.8%	0.6%	-4.4%	0.3%	1.0%	-5.3%	1.1%	0.3%	-2.8%	1.0%	0.4%	-4.2%	0.2%
Africa	5.2%	3.0%	1.8%	-0.6%	2.2%	0.5%	-0.1%	2.3%	0.9%	-0.1%	2.9%	3.3%	1.0%

What if Spain Experience: Annual Increase in Exports													
	Benchmark			By Industry			By Industry & Year			By Industry Drop 6 Highest Industries			
	Actual	Surv	Deep	Entry	Surv	Deep	Entry	Surv	Deep	Entry	Surv	Deep	Entry
USA	3.3%	-0.1%	2.9%	-0.0%	-0.2%	3.7%	-0.2%	0.3%	3.5%	-0.2%	-0.1%	1.7%	-0.6%
EU-15**	3.1%	0.1%	2.7%	-0.0%	0.1%	2.2%	-0.1%	0.0%	2.7%	-0.0%	0.2%	3.8%	-0.0%
India	6.7%	0.4%	-0.2%	-0.4%	0.3%	1.1%	-0.3%	0.7%	-0.1%	-0.5%	0.0%	1.3%	-0.6%
East Asia	10.3%	0.4%	-2.1%	-0.7%	0.1%	0.1%	-0.7%	0.4%	0.7%	-0.8%	-0.1%	2.3%	-0.7%
Caribbean***	0.4%	3.7%	6.3%	0.0%	13.8%	1.9%	0.0%	3.0%	3.6%	0.0%	2.6%	4.3%	0.4%
Central America	4.5%	1.7%	1.1%	-1.8%	1.8%	2.2%	-2.4%	1.5%	2.0%	-2.1%	2.1%	3.2%	-1.4%
South America	4.8%	1.2%	2.0%	-0.2%	0.9%	2.1%	-0.3%	1.3%	2.1%	-0.3%	0.8%	2.6%	-0.3%
Mexico	12.8%	0.7%	-5.8%	0.1%	0.8%	-2.1%	0.2%	0.1%	-2.9%	0.2%	0.4%	-2.7%	0.1%
Africa	5.2%	3.2%	0.2%	-0.9%	2.5%	0.7%	-0.7%	1.6%	2.5%	-0.8%	2.5%	2.6%	-0.3%

\* Excluding South Korea

\*\* Excluding Spain

\*\*\* Through 2002

# Figure 1 – Distribution of Years of Service

All relationships observed in 1990

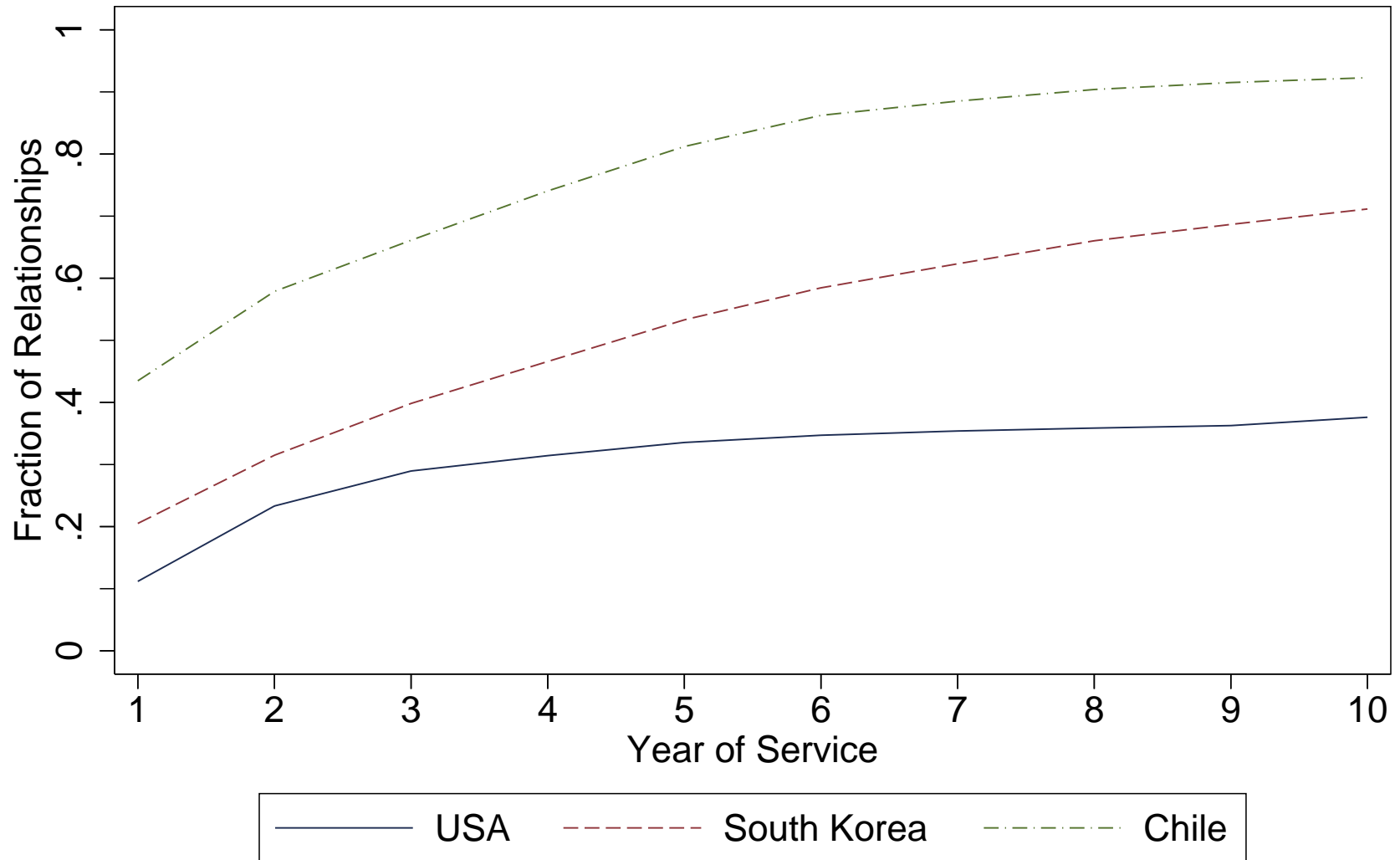
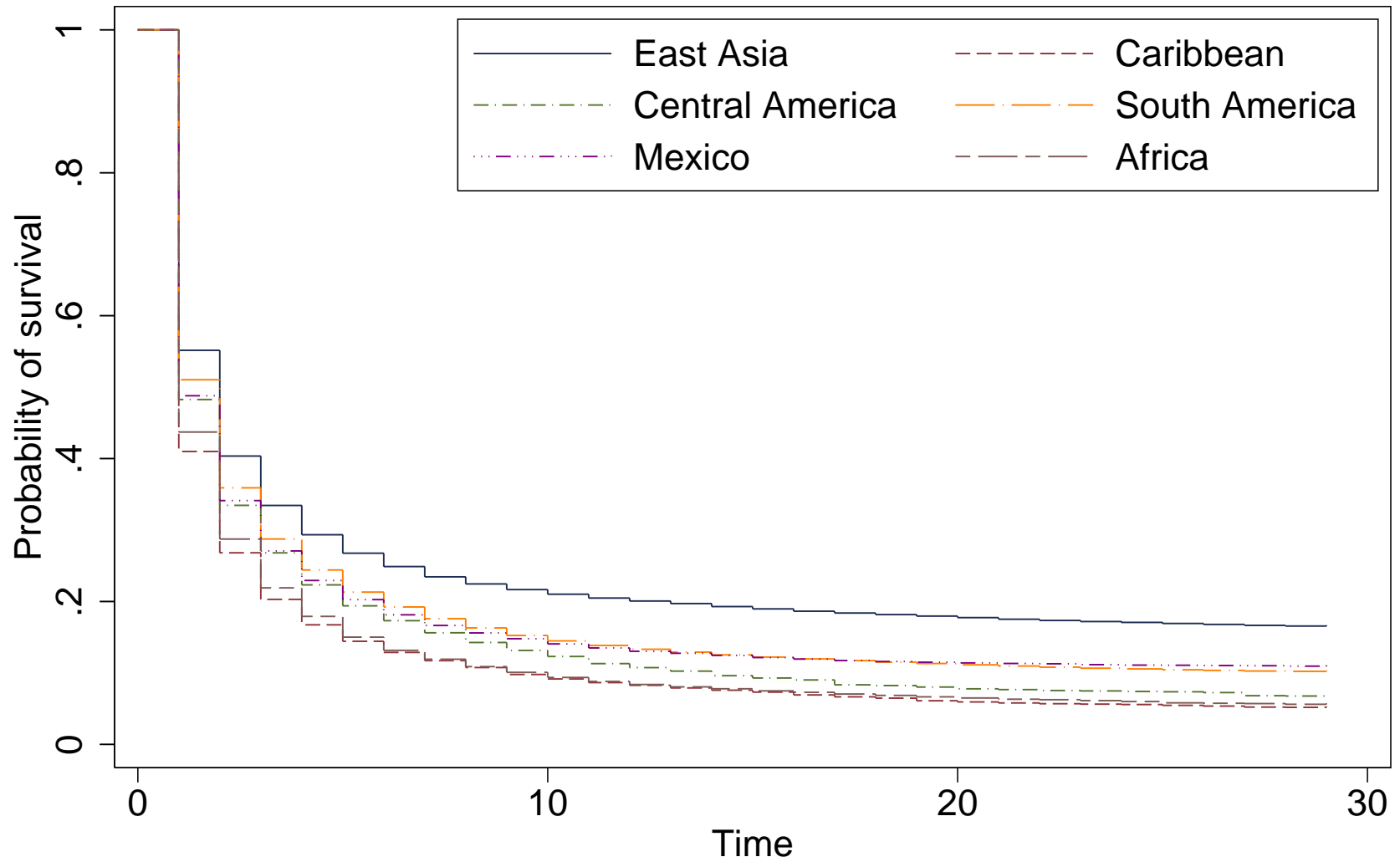
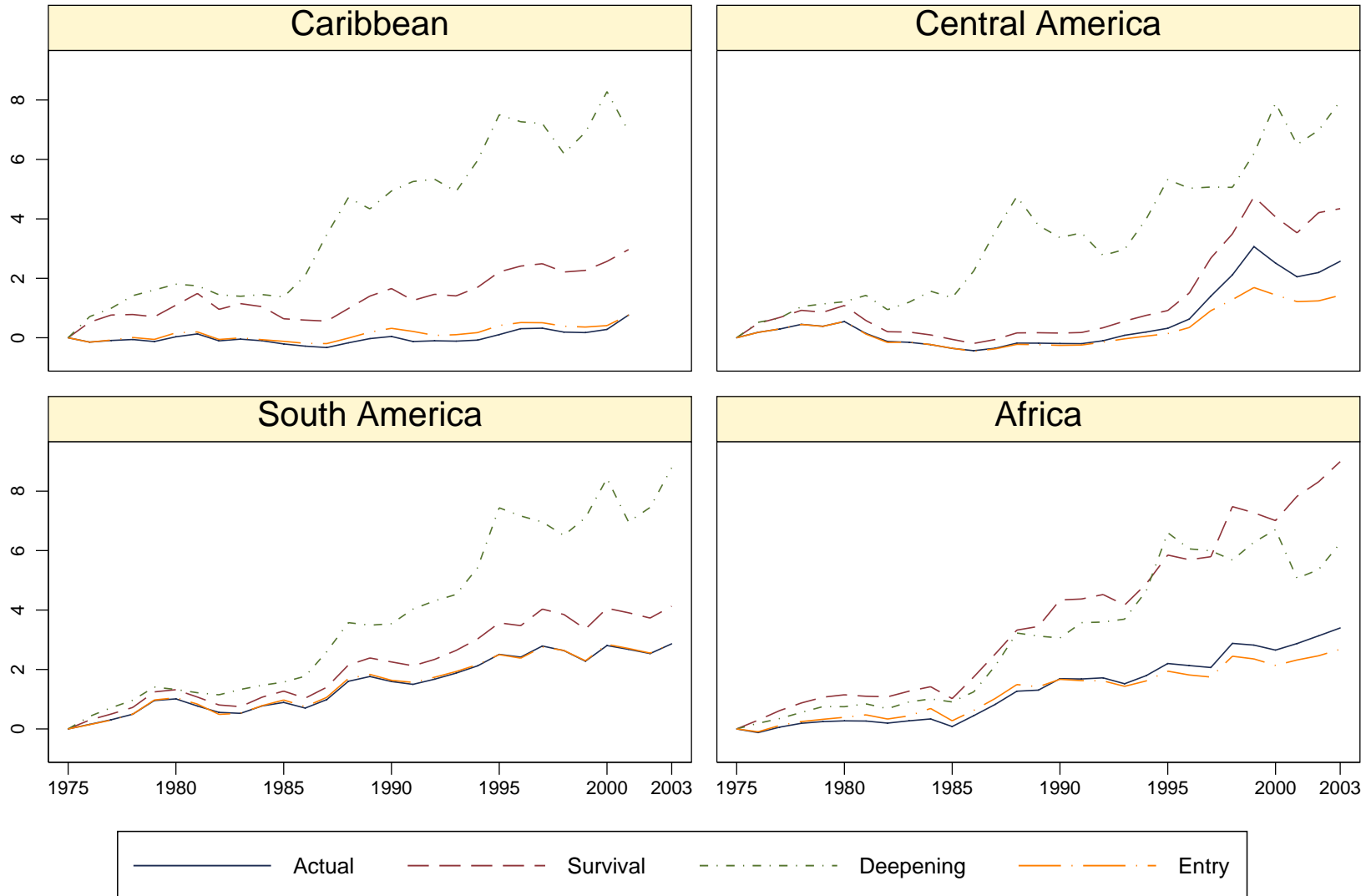


Figure 2 – Export Survival  
Country level data pooled to regional level



# Figure 3 – South Korea as Counterfactual Performer



# Figure 4 – Spain as Counterfactual Performer

