Do Employee Spinoffs Learn Markets From Their Parents? Evidence From International Trade[☆]

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Abstract

It is well established that employee spinoffs learn their parents' technologies, but little is known about their demand-side learning. We exploit the identification in international trade data of parent markets (countries) to investigate whether exporting employee spinoffs of exporting parents have an advantage in accessing their parents' markets over exporting comparison firms well positioned to learn those markets at arm's length. We find that, controlling for the greater overlap of spinoffs with their parents' export products, at entry spinoffs access 51 percent more parent markets than exporting firms in the same 4-digit industries and municipalities as the parents. This advantage shrinks monotonically with time, becoming statistically insignificant four years after entry, indicating that intrafirm learning provides spinoffs with a four-year head start over arm's-length learning. Spinoffs do not overlap more than comparison firms with parent markets that the parents did not serve at spinoff entry, providing evidence against the alternative hypothesis that product overlap inadequately controls for greater technological similarity of spinoffs to parents.

Keywords: Employee spinoffs, intrafirm learning, export spillovers, firm performance

JEL classification: F14, L25, L26

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1. Introduction

Employee spinoffs are widely recognized to be a major mode of entrepreneurship in high-tech manufacturing (Klepper and Sleeper 2005, Franco and Filson 2006). Recognition of their importance in the rest of the economy has been growing (Phillips 2002, Eriksson and Kuhn 2006, Hvide 2009, Muendler, Rauch, and Tocoian 2012). Muendler, Rauch, and Tocoian (hereafter MRT) were the first to tabulate employee spinoffs for an entire economy: depending on definition, employee spinoffs account for between one-sixth and one-third of all new formal private sector firms in Brazil during the period 1995-2001. They found that, regardless of definition, employee spinoffs perform better on average than new firms without (identifiable) parents: their sizes at entry are larger and their survival rates are higher.

The industry studies by Klepper and Sleeper (2005) and Franco and Filson (2006) convincingly established that employee spinoffs learn their parents' technologies. In this paper, we will investigate whether they also learn their parents' markets, by which we mean information pertaining to demand rather than supply. The importance of the demand side for firm performance is increasingly recognized (Foster, Haltiwanger, and Syverson 2008, 2016, Gourio and Rudanko 2014, Kee and Krishna 2008). Does an employee spinoff in effect free-ride on its parent's "accumulation" of a "customer base" (Foster et al. 2016, p. 91)? This could be an additional explanation for the superior spinoff performance relative to new firms without parents found in the literature (Phillips 2002, Eriksson and Kuhn 2006, Muendler, Rauch, and Tocoian 2012).

In the data sets in the literature that permit identification of employee spinoff firms and their parents, firm customers are not also identified. Here we take advantage of the "unique laboratory" that exporting firms provide "because we have good data on sales broken down by market" (Fitzgerald et al. 2016, p. 1). We have been able to link the data used in MRT to Brazilian firm level export data, and thereby observe the extent to which employee spinoffs export to the same markets (destination countries) as their parents. In this regard our study resembles the export spillover literature (Aitken, Hanson, and Harrison 1997, Greenaway, Sousa, and Wakelin 2004, Koenig, Mayneris, and Poncet 2010, Fernandes and Tang 2014), which finds evidence that firms are more likely to export when other firms in the same industry and locality export.

The earlier papers in this literature (Aitken, Hanson, and Harrison 1997, Greenaway, Sousa, and Wakelin 2004) focused on spillovers from multinational enterprises (MNEs) in the same industry

and locality, whereas the more recent papers (Koenig, Mayneris, and Poncet 2010, Fernandes and Tang 2014) focus on other domestic firms and look for spillovers to specific export destinations, i.e., evidence that firm exports to specific countries are more likely when neighboring domestic firms export to those countries. Our study more closely resembles the more recent papers, but as we will show, exporting parents in Brazil are, like MNEs, typically prominent (large) firms. We can expect other firms in the same industry and locality as them to export to the same countries, not only because of similar comparative advantage, but also because the parent firms are natural targets for imitation. Thus we want to investigate whether employee spinoffs export to their parents' markets to a greater extent than other firms in the same industries and localities as the parents, to provide evidence for whether intrafirm learning gives them an extra advantage beyond what could be expected from the export spillover literature.

We will find that the countries to which employee spinoffs export overlap with the countries to which their parents export to a much greater extent than comparison firms in the same industries and localities as the parents. This is true even if we control for the much greater overlap of spinoff exports with the *products* exported by their parents, which reflects the technologies they learned from their parents. However, greater export product overlap may not capture completely the extent to which employee spinoffs are more technologically similar to their parents than the comparison firms, and hence more likely to export to the same countries. For this reason we conduct a falsification test. If greater spinoff overlap with parent export markets is the result of intrafirm learning, spinoffs should *not* have greater overlap with *new* parent export markets, i.e, countries to which the parent was not exporting when the spinoff firm entered. This is indeed what we find.

We also find that the comparison firms that are most closely matched to parent firm industries and localities tend over time to catch up to the spinoffs from those parents in terms of export market overlap. A conservative interpretation of our results, then, is that intrafirm learning does not give spinoffs a permanent advantage in accessing their parents' markets, but rather a head start over the comparison firms that are best positioned to benefit from traditional export spillovers.

The work of Mion and Opromolla (2014) is closely related to ours. They also link matched firm-worker data to export data (for Portugal), but are not concerned with employee spinoff firms. Instead they examine mobility of managers from firms that export to specific markets to other firms

that export to the same markets.[1] They find that these managers earn wage premia in their new firms, controlling for firm and worker fixed effects, a host of time-varying worker, past employer, and current employer characteristics, and mobility itself. Our results support their interpretation that these wage premia can be attributed to the managers' previous experience with the specific export markets.[2] Mion and Opromolla also find that firms to which managers moved are more likely to begin exports to the markets served by their former employers or continue exports to these markets, though not export more in value. They support a causal interpretation of these findings by instrumenting for managers' export experience with their export experience three years prior to the year in which they measure trade performance. They do not compare export behavior of firms that are well positioned to learn at arm's length from the managers' former employers with that of the firms that hire the managers.

The next section of our paper describes our data and our identification of employee spinoffs, their parents, and comparison firms. Section 3 examines the extent to which spinoffs share their parents' export destinations in their entry years relative to comparison firms that also export in the spinoffs' entry years. Section 4 does the same for the years following spinoff entries, and section 5 concludes.

2. Data and Identification of Employee Spinoffs, Parents, and Comparison Firms

The data used by MRT derive from the linked employer-employee records RAIS (*Relação Anual de Informações Sociais* of the Brazilian labor ministry *MTE*), which record comprehensive individual employee information along with employer identifiers. By Brazilian law, every private or public-sector employer must report this information every year.[3]

[1] They group countries into seven markets: Spain; Italy, UK, France, and Germany; other EU countries; OECD countries not belonging to the EU; countries belonging to the Community of Portuguese Language Countries; China; and the rest of the world.

[2] An alternative interpretation is that firms that export to the same markets are alike in ways not captured by the included firm-level characteristics, and the wage premia reflect better match quality between the managers and the firms to which they have moved, as in Jovanovic (1979). Mion and Opromolla do not have a falsification test for their wage premia result.

[3] RAIS primarily provides information to a federal wage supplement program (*Abono Salarial*), by which every employee with formal employment during the calendar year receives the equivalent of a monthly minimum wage. RAIS records are then shared across government agencies. An employer's failure to report complete workforce information can, in principle, result in fines proportional to the workforce size, but fines are rarely issued. In practice, employees and employers have strong incentives to ascertain complete RAIS records because payment of the annual

The rules on tax ID assignments make it possible to identify new firms (the first eight digits of the tax ID) and new plants within firms (the last six digits of the tax ID). Our pristine RAIS records include 71.1 million employees (with 556.3 million job spells) at 5.52 million plants in 3.75 million firms over the sixteen-year period 1986-2001 in any sector of the economy. We limit our attention to the years 1995-2001 and use the period 1986-1994 in RAIS to ensure that firms we label as new in 1995-2001 have not operated before.[4] Moreover, RAIS does not specify the legal form of firms until 1995, information that is needed to carefully identify employee spinoffs as described below. During this 7-year period 1.54 million new firms entered.

MRT use two alternative criteria to identify employee spinoff firms and their parents and show the robustness of results under either criterion. For their preferred employee spinoff definition, they restrict their attention to new firms with at least five employees and use the criterion that if at least one quarter of the workers at a new firm previously worked for the same existing firm, the new firm is an employee spinoff and the existing firm is its parent.[5] However, if this new firm absorbed at least seventy percent of the workers in one of the parent's plants and has a legal form such that it could be owned by the parent, MRT classify it as a divestiture (an employer-initiated spinoff) rather than an employee spinoff.[6] MRT find that the performance of spinoffs is superior to new firms without parents but inferior to divestitures. In particular, size at entry is larger among employee spinoffs than among new firms without parents but smaller than among divestitures, and subsequent exit rates (controlling for size at entry) for employee spinoffs are smaller than for new firms without parents but larger than for divestitures. We will use MRT's criteria to distinguish employee spinoffs from new firms without parents and from divestitures. By these criteria, 29.0 percent of new firms in Brazil's domestically-owned private sector (that is, excluding firms with state or foreign ownership) in the period 1995-2001 with at least five employees are employee

public wage supplement is exclusively based on RAIS. The ministry of labor estimates that well above 90 percent of all formally employed individuals in Brazil are covered in RAIS throughout the 1990s.

[4]By 1995 macroeconomic stabilization had succeeded in Brazil. The Plano Real from August 1994 had brought inflation down to single-digit rates. Fernando Henrique Cardoso, who had enacted the Plano Real as Minister of Finance, became president, signalling a period of financial calm and fiscal austerity. Apart from a large exchange-rate devaluation in early 1999 and a subsequent switch from exchange-rate to inflation-targeting at the central bank, macroeconomic conditions remained relatively stable throughout the period.

[5]Previous work for the parent is defined as a job spell of at least three months.

[6]A new firm that has a legal form such that it could be owned by the parent but that absorbed less than 70 percent of workers from a parent plant are classified as spinoffs. Empirical results in MRT are robust to dropping these firms.

spinoffs.

Using firm IDs, we merge our data from RAIS with the universe of Brazilian customs declarations for merchandize exports collected at SECEX (*Secretaria de Comércio Exterior*), which reports exports by firm, destination market and product category over the period 1990-2001. The SECEX data record 238 destinations and 4,907 products at the six-digit Harmonized Tariff System (HS) level.

We will examine the extent to which the export destinations of employee spinoffs overlap with those of their parents, compared to firms the literature has shown are well positioned to learn the parents' markets at arm's length. We focus our analysis on the entry years of the spinoffs. In subsequent years, spinoffs may learn about parent markets at a distance, like the firms to which we compare them. Information from prior years could be useful if we knew when the spinoff owner(s) was employed at the parent, but unfortunately we do not observe owners in RAIS.

Table 1 shows why a very large data set is helpful to do this study. Beginning with a sample of over 96,000 employee spinoff firms and nearly 74,000 parent firms, we are reduced to only 446 spinoffs and 417 parents that both export in the entry year of the spinoff. Most of the winnowing is accomplished by the requirement that firms have to export in order to observe their markets: only two percent of our spinoffs ever export during the sample period. This is partly explained by the fact that most spinoffs are in nontraded goods industries (78 percent in Commerce or Service) and partly explained by the fact that they are small (median and mean number of employees are 6 and 13, respectively). Spinoffs that export are, of course, mostly in traded goods industries (69 percent in Manufacturing or Agriculture and Mining), and are larger (median and mean number of employees are 10 and 48, respectively).[7] Spinoffs that export in their entry years are even more concentrated in traded goods industries and still larger, and these features are yet more prominent in spinoffs that export in their entry years from parents that export in those years.

81 percent of our final sample of parent firms is in manufacturing, and the median and mean numbers of employees are both more than an order of magnitude larger than the corresponding figures for our final spinoff sample.[8] The same is nearly true of the median and mean sizes of parent

[7]Most exporting spinoffs in "nontraded" goods industries are in Commerce and are presumably wholesalers.

[8]For a parent firm we record number of employees for the year before the spinoff entry year, since in the spinoff entry year the parent may not yet have been able to replace the employees lost to its spinoff. For seven of the 417 parents in our final sample we were not able to obtain the previous year's number of employees from RAIS.

firms relative to our comparison firm samples (see Table 2). Thus parents are typically among the most prominent firms in their industries and localities and hence likely targets for imitation and learning.

Following the export spillover literature, we next seek firms that also exported in the entry years of the spinoffs that are well positioned to learn from the parents by virtue of being in the same industries and localities. We identify firm industry and locality by the mode industry and locality assigned to its employees in the entry year of the relevant spinoff. The most disaggregated industries and localities we have are 4-digit CNAE (*Classificação Nacional de Atividades Econômicas*) and municipalities, respectively. In 2002 there were 564 4-digit CNAE industries, and in 2000 there were Brazilian 5,507 municipalities, with a mean population of 30,795 (*Instituto Brasileiro de Geografia e Estatística*). This compares to 129 4-digit MEXSIC industries and 32 Mexican states in Aitken, Hanson, and Harrison (1997); 645 5-digit SIC (1992) industries without controlling for UK locality in Greenaway, Sousa, and Wakelin (2004); 1236 4-digit products and 341 "employment areas" for France in Koenig, Mayneris, and Poncet (2010); and 425 Chinese cities without controlling for industry in Fernandes and Tang (2014), though they find their results are robust to the use of textile firms only.

Unfortunately, only 239 out of the 446 spinoffs in our sample have comparison firms that exported in their entry years and are in the same 4-digit industries and municipalities as their parents. We therefore also considered more aggregated industries and localities, specifically 3-digit CNAE and states. In 2002 there were 218 3-digit CNAE industries, and there are 26 Brazilian states. 416 out of 446 or 93 percent of spinoffs in our sample have comparison firms in the same 3-digit industries and states as their parents.

Table 2 shows the same descriptive information for the two sets of comparison firms that Table 1 showed for spinoffs and parents. We see that the comparison firms are much larger than the spinoffs, though nearly an order of magnitude smaller than the parents, probably because they are not (necessarily) new firms. We also note that many comparison firms are duplicated because they fit the selection criteria for more than one parent-spinoff pair, especially for the less restrictive sample.[9] For the remainder of this paper we will often refer to the 3-digit industry, state sample as

[9]Table 2 shows that the mean sizes for all comparison firms are always slightly higher than for unique comparison firms. Note that comparison firms can repeat when i) they are cited by more than one parent, or ii) a parent has

the "broad" sample and the 4-digit industry, municipality sample as the "narrow" sample.[10]

3. Exports of Spinoff Versus Comparison Firms in Spinoff Entry Years

We first confirm that spinoffs tend to make the same products as their parents, as has been found in the industry studies cited in our introduction. Were this not true, it would raise suspicions regarding the quality of our data. We examine the share of parent export products that are also spinoff export products versus also comparison firm export products. Specifically, we compute export product overlap as (number of export products same as parent export products)/(number of parent export products).

Table 3 shows that parents in our narrow sample export a median of 5 and a mean of 13.7 HS6 products in the entry years of their spinoffs. Their spinoffs export a median of 1 and a mean of 4.6 HS6 products in their entry years, and their comparison firms export a median of 2 and a mean of 5.2 HS6 products in the spinoffs' entry years. Despite the slightly larger number of products exported by the comparison firms, the share of parent products also exported by spinoffs is 23 percentage points higher on average. We can also consider the cases where both parent and spinoff or parent and comparison firm each exports only one product. The spinoff exports the same product as the parent in 77 percent of these cases, versus only 28 percent for the comparison firms. Comparison firm overlap with parent export products drops substantially as we move from the same 4-digit industry to the same 3-digit industry sample, as could be expected.

Table 3 shows that the exporting employee spinoffs we have identified in Brazil display high ability to produce and export the same products as their parents, both absolutely and relative to other exporting firms in the parents' industries and localities. This is what we would expect based on the abilities displayed by the spinoffs in U.S. industry studies.[11] Now we would like to go

multiple spinoffs. In either case, we have a reason to believe that the market that supports the particular industry-locality combination is especially robust because it supports more firms. Comparison firms operating in these markets are therefore likely to be larger, all else equal.

[10] Industry or locality data were missing in the spinoff entry years for seven of the 417 parent firms in our final sample in Table 1. Using data from up to two years earlier, we were able to fill in the missing information for six of these seven parents. We then used the same procedure to fill in missing industry or locality information for comparison firms. The narrow (broad) sample includes two (366) unique comparison firms for which industry or locality information was filled in. We repeated all tables in the remainder of this paper dropping these firms, and found that all results were qualitatively unchanged (and very little changed quantitatively). We then dropped the six filled-in parent firms as well, along with their associated spinoff and comparison firms, repeated all tables again, and found the same thing.

[11] It is presumed in these studies that spinoffs learned these abilities from their parents. We also believe this, but we

beyond the existing literature to ask whether exporting employee spinoffs learn about their parents' markets more than other exporting firms in the parents' industries and localities. We will address this in a table parallel to Table 3 that examines the share of parent export destinations to which their spinoffs and the comparison firms also export. Since any Brazilian product may be better suited for some destinations than others (comparative advantage), clearly we will have to go beyond descriptive statistics to a regression in which we control for the greater extent to which spinoff export products overlap with those of their parents.

Table 4 shows that parents in our narrow sample export to a median of 5 and a mean of 9.3 destinations in the entry years of their spinoffs. Their spinoffs export to a median of 1 and a mean of 3.2 destinations in their entry years, and their comparison firms export to a median of 2 and a mean of 3.3 destinations in the spinoffs' entry years. The share of parent destinations to which spinoffs also export is 18 percentage points higher on average than the share of parent destinations to which comparison firms also export. Considering the cases where both parent and spinoff or parent and comparison firm each exports to only one destination, the spinoff exports to the same destination as the parent in 81 percent of these cases, versus only 32 percent for the comparison firms.

In Table 5 we regress the share of parent firm destinations to which spinoffs and comparison firms also export on an indicator for whether a firm is the parent's spinoff and various controls. Because there are typically multiple comparison firm observations for each spinoff observation, we cluster standard errors at the spinoff-year level. The coefficient on the spinoff indicator in the first column of each panel of Table 5 reproduces the difference between spinoff and comparison firm shares shown in Table 4. The second column of each panel adds industry, locality, and year fixed effects. The third column controls for the number of spinoff or comparison firm export destinations and the number of parent export destinations, since all else equal the former will tend to increase the dependent variable and the latter will tend to decrease it. Looking across these three columns we see that the addition of the controls hardly changes the extent to which the spinoff share of parent export destinations exceeds the comparison firm share. In sharp contrast, the addition of

do not claim this is proved by Table 3. It could be that the greater overlap of spinoff products with parent products is driven by unobserved greater similarities to the parents relative to the comparison firms that are somehow unconnected to spinoff learning from parents. We will be more concerned with supporting a learning interpretation when we discuss spinoff overlap with parent markets.

the share of parent export products as a control in the fourth column reduces the coefficient on the spinoff indicator by roughly six percentage points. Nevertheless, this coefficient remains high at 12.6 percentage points for the narrow sample (more than 50 percent higher than the comparison mean of 24.9 percentage points) and continues to be very precisely estimated. This advantage of spinoff over comparison firms is greater both absolutely and relatively for the broad sample, as we would expect. The strong effect of comparative advantage is indicated by the fact that increasing the share of parent export products also exported by spinoff or comparison firms from zero to one hundred percent increases their share of parent destinations by 24 percentage points for the narrow sample.

4. Post-Entry Year Destination Overlaps Between Spinoffs and Parents

Our hypothesis is that employees who found spinoff firms learn the identities, preferences, and idiosyncrasies of the parent firms' customers and the regulatory environments of the destinations in which those customers operate, giving them an advantage in serving those customers and destinations over otherwise similarly situated domestic competitors. An alternative hypothesis is that employee spinoffs resemble their parents more than other firms in the same industry and location in ways not captured by product overlap, causing their output to sell well in the same markets as their parents' output. In other words, employee spinoffs do not have an informational advantage in reaching their parents' markets but rather what might be called a genetic advantage.

The genetic advantage hypothesis is a typical case of correlated unobservables, which in principle could be addressed using an instrument for spinoff status. Lacking such an instrument, we conduct a placebo or falsification test to distinguish the informational from the genetic advantage hypothesis. We investigate whether spinoffs overlap more than comparison firms with parent export destinations to which the parents did *not* export in the spinoff entry years. If the parent did not export to these destinations when the employees who founded the spinoff worked there, they could not have learned about the customers and destination regulatory environments from working at the parent. Under the informational advantage hypothesis, then, spinoff firms will not have a greater overlap with parents' "new" export destinations than will their competitors, the comparison firms.[12] On the other hand, if spinoffs overlap so much more with parents' entry-year export

[12]We treat any destinations to which the parents export in years subsequent to the entries of their spinoffs but

destinations because they are so much more like the parents than their competitors, they should be better positioned to take advantage of the same opportunities as their parents in new export markets as well (or, equivalently, buyers in new export markets who find their parents' output attractive should also find the spinoffs' output attractive, relative to their competitors).

We will want the placebo regressions to imitate the regressions in Table 5 as closely as possible. Recall that parents are included in the Table 5 sample only if they export in the spinoff entry years, have spinoffs that export in those years, and have comparison firms that export in those years. Thus, for each year following the spinoff entry, we retain from the Table 5 sample only those parents that export to at least one new destination in that year, have spinoffs that export (to any destination) in that year, and have comparison firms that export (to any destination) in that year. We label the years following spinoff entry $t+1$ through $t+6$, where $t+6$ is necessarily calendar year 2001, $t+5$ could be calendar year 2000 or 2001, etc. Any spinoff or comparison firms associated with parents that are retained in the regressions but do not themselves export in a given year $t+1$ through $t+6$ are dropped for that year.

In Table 6, we follow the parent, spinoff, and comparison firms from Table 5 through time, starting from one year after spinoff entry through six years after spinoff entry. For each year we lose one cohort of spinoffs and associated parent and comparison firms, so that by $t+6$ only the 1995 cohort remains. We also lose the observations for which the parent firm did not export to any new destination, or for which the parent's spinoff did not export at all, or for which there was no exporting comparison firm. Thus in $t+1$ the number of spinoff observations drops to about one-third of its level in Table 5 for both the narrow and broad samples, and continues to decline as we move toward $t+6$.

For $t+1$ in Table 6 we see that the point estimates on the spinoff indicator are very close to zero and statistically insignificant, regardless of sample or which controls are included. This continues to be true for $t+2$ through $t+4$, though the point estimates are more consistently positive. For $t+5$ the point estimates are substantial without controls though still statistically insignificant, and

to which they did not export in the spinoff entry years as "new." In fact, the parents may have exported to these destinations before the spinoffs entered. It is therefore possible that the spinoff entrepreneurs were positioned to learn these markets. We do not know, because we cannot observe them. Excluding these destinations would work against finding greater overlap of spinoffs with "new" parent export destinations and reduce the number of observations, both of which would make it less likely to find statistically significant positive coefficients on the spinoff indicator in the placebo regressions.

become close to zero when controls are added. For $t+6$ the point estimates on the spinoff indicator for the narrow sample are comparable to those in Table 5, though still statistically insignificant. At this point there are only four spinoffs left in the narrow sample.

The constant terms in the regressions without any controls in Table 6 equal the mean overlaps of comparison firms with new parent destinations in $t+1$ through $t+6$. Note that these tend to rise over time, especially for the narrow sample, and by $t+6$ reach roughly their levels in Table 5. This is consistent with comparison firms gradually learning about the parents' new markets at a distance, and with the same learning process for spinoffs, given that their mean overlap with new parent destinations is not statistically significantly different from the comparison firms' mean overlap.

Perhaps the null results of these placebo tests do not indicate that spinoffs learned from their parents about the overseas markets to which the parents were exporting when the spinoffs entered, but instead show that overseas markets change rapidly, or that spinoffs quickly become different from their parents, or that comparison firms catch up to spinoff learning within a year. For all these reasons it is worth checking that spinoff overlap with entry year parent destinations is still high and greater than for comparison firms after the entry year, so these alternative explanations of why spinoffs do not overlap more than comparison firms with new parent destinations can be ruled out.

Table 7 parallels Table 6, but the dependent variable is spinoff and comparison firm overlap with spinoff entry year ("initial") export destinations of the parent instead of parent non-entry year export destinations. For each year following the spinoff entry, we retain from the Table 5 sample only those parents that have both spinoff and comparison firms that export in that year. In $t+1$ about three-quarters of spinoff observations from Table 5 are retained for both the narrow and broad samples. The controls in Table 7 differ from those in Table 5 in two ways. First, the number of spinoff or comparison firm destinations takes its value in $t+1$, ..., $t+6$ instead of its value in the spinoff entry year. Second, the share of parent products exported by the spinoff or comparison firm is the share of spinoff entry year export products of the parent that the spinoff or comparison firm exported in $t+1$, ..., $t+6$ instead of in the spinoff entry year.

We see that in $t+1$ the coefficients on the spinoff indicator are slightly larger than the coefficients on the spinoff indicator in the entry year regressions (Table 5) for both the narrow and broad samples. The spinoff indicator coefficients shrink from $t+1$ to $t+2$ and again from $t+2$

to $t + 3$, remaining statistically significant. Results for the narrow versus broad samples diverge for $t + 4$ through $t + 6$, with the spinoff indicator coefficient becoming statistically insignificant for the former but remaining statistically significant for the latter. A conservative interpretation of our results, then, is that intrafirm learning does not give spinoffs a permanent advantage in accessing their parents' markets, but rather a four-year head start (entry year through $t + 3$) over the comparison firms that are best positioned to benefit from arm's length learning.

We can quantify the spinoff export advantage by comparing the coefficients on the spinoff indicators in Table 5 and Table 7 when all controls are included, which are the smallest coefficients, to the constant terms in the regressions without any controls, which equal the mean overlaps of comparison firms with the parent export destinations in the spinoff entry years. In their entry years spinoffs export to 51 percent (0.126/0.249) more parent markets than comparison firms in the same 4-digit industries and municipalities as the parents. This export overlap advantage decreases to 45 percent (0.135/0.297) one year later, 32 percent (0.107/0.336) two years later, and 21 percent (0.080/0.375) three years later. For the broader sample, in their entry years spinoffs export to 68 percent more parent markets and 69 percent more one year later. This advantage steadily declines to 40 percent in $t + 5$ before jumping to 62 percent in $t + 6$.

5. Conclusions

It is well established that employee spinoffs learn their parents' technologies, but little is known about their demand-side learning. We exploit the identification in international trade data of parent markets (countries) to investigate whether exporting employee spinoffs of exporting parents have an advantage in accessing their parents' markets over exporting comparison firms well positioned to learn those markets at arm's length. We find that, controlling for the greater overlap of spinoffs with their parents' export products, at entry spinoffs access 51 percent more parent markets than exporting firms in the same 4-digit industries and municipalities as the parents. This advantage shrinks monotonically with time, becoming statistically insignificant four years after entry, indicating that intrafirm learning provides spinoffs with a four-year head start over arm's-length learning. Spinoffs do not overlap more than comparison firms with parent markets that the parents did not serve at spinoff entry, providing evidence against the alternative hypothesis that product overlap inadequately controls for greater technological similarity of spinoffs to parents.

Our results suggest that intrafirm learning about parent markets may contribute to superior spinoff performance relative to startups without parents.

A broader message of this paper is that international trade data can be useful in understanding how a firm accumulates a customer base. Our results imply that one method is for the firm founders to establish relationships with customers and knowledge of market idiosyncracies prior to startup. Subsequent to startup, Chaney (2014) and Morales, Sheu, and Zahler (2014) provide evidence that another method is "snowballing," i.e., using markets (countries) successfully entered as jumping off points for entry into adjacent markets. The duration of buyer-supplier (importer-exporter) relationships in international trade (Monarch and Schmidt-Eisenlohr 2016) can provide still more insight into the dynamics of firm demand.

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Table 1: Exporting Employee Spinoffs and Their Exporting Parents

	Number	Mean size[a]	Median size[a]	share[b] Agri&Mining	Manuf	Commerce	Service
Spinoffs							
Total	96386	13	6	.02	.21	.37	.41
Ever exported[c]	1978	48	10	.03	.66	.24	.07
Exported in entry yr	782	64	14	.04	.70	.22	.04
Exported in entry yr and parent exported in that yr	446	88	18	.04	.74	.17	.04
Parents							
Total	73997	235	23	.04	.27	.36	.33
Ever exported[c]	6143	927	161	.04	.76	.13	.07
Exported in entry yr of spinoff	3360	1110	277	.04	.82	.09	.05
Exported in entry yr of spinoff that exported in its entry yr	417[d]	1110	246	.03	.81	.11	.04

[a] The mean and median size for parents are calculated from 68114, 5798, 3307, and 410 parent firms for each row, respectively. Size data are available for all spinoffs.

[b] Industry shares for spinoffs (parents) are calculated from 88675, 1958, 774, 446 (61418, 5652, 3259, 409) spinoff (parent) firms for each row, respectively.

[c] Starting with the second row of the table for both spinoffs and parents, firms were dropped that in the spinoff entry year exported only to destinations coded as Brazil, not reported, or provisions for ships or airplanes.

[d] 21 of these parents had multiple spinoffs.

Table 2: Comparison Firms that Export in the Spinoff Entry Year

	Number	Mean size	Median size	share Agri&Mining	Manuf	Commerce	Service	Parents	Spinoffs
4-digit CNAE, Municipality	2634	107	33	.012	.70	.23	.06	226	239
Unique Firms	1991	101	32	.013	.70	.25	.03		
3-digit CNAE, State	27582	140	54	.003	.88	.10	.02	389	416
Unique Firms	9938	113	37	.007	.77	.21	.02		

Notes: Comparison firms export in the spinoff entry year and are in the same industry and locality as the spinoff's parent. Firms were dropped that in the spinoff entry year exported only to destinations coded as Brazil, not reported, or provisions for ships or airplanes. Other parent and spinoff firms were excluded from the comparison set for any given parent-spinoff pair.

Table 3: Descriptive Statistics for Export Products[a] in Spinoff Entry Years

4-digit Industry, Municipality

	mean	sd	med	max[b]	uniq[c]	N
Parent no.	13.73	24.57	5	163	.22	239[d]
Spinoff no.	4.56	11.53	1	141	.50	239
Comparison no.	5.19	12.06	2	189	.42	2634
Spin. overlap	.42	.38	.33	1	.77	239
Comp. overlap	.19	.32	.00	1	.28	2634

3-digit Industry, State

	mean	sd	med	max[b]	uniq[c]	N
Parent no.	16.38	33.07	4	210	.24	416[d]
Spinoff no.	4.60	12.92	1	141	.51	416
Comparison no.	4.40	8.77	2	189	.40	27580[e]
Spin. overlap	.41	.39	.33	1	.73	416
Comp. overlap	.10	.22	.00	1	.16	27580[e]

[a] The total number of HS6 products recorded for our largest sample is 3,987, out of a possible 4,907.

[b] The minimum number of products is always one and the minimum overlap is always zero.

[c] For the first three rows, this column gives the fraction of firms that exported only one product. For the last two rows, this column gives the fraction of spinoff or comparison firms that shared the unique product with the corresponding parent firms.

[d] Parents with multiple spinoffs are counted multiple times.

[e] Two unique comparison firms have information for export destinations but not export products, reducing the number of observations from 27582 in Table 2 to 27580.

Table 4: Descriptive Statistics for Export Destinations[a] in Spinoff Entry Years

4-digit Industry, Municipality

	mean	sd	med	max[b]	uniq[c]	N
Parent no.	9.28	10.88	5	61	.22	239[d]
Spinoff no.	3.22	4.65	1	43	.51	239
Comparison no.	3.30	4.32	2	45	.46	2634
Spin. overlap	.43	.36	.33	1	.81	239
Comp. overlap	.25	.32	.09	1	.32	2634

3-digit Industry, State

	mean	sd	med	max[b]	uniq[c]	N
Parent no.	9.77	12.54	4	77	.23	416[d]
Spinoff no.	3.33	5.00	2	47	.48	416
Comparison no.	3.74	4.93	2	94	.43	27582
Spin. overlap	.40	.36	.33	1	.68	416
Comp. overlap	.20	.25	.11	1	.24	27582

[a] The total number of destinations recorded for our largest sample is 201, out of a possible 238 from the SECEX data.

[b] The minimum number of destinations is always one and the minimum overlap is always zero.

[c] For the first three rows, this column gives the fraction of firms that exported to only one destination. For the last two rows, this column gives the fraction of spinoff or comparison firms that shared the unique destination with the corresponding parent firms.

[d] Parents with multiple spinoffs are counted multiple times.

Table 5: Regressions for Parent Export Destinations in Spinoff Entry Years

4-digit Industry, Municipality					**3-digit Industry, State**				
	base	controls	count	wProd		base	controls	count	wProd
Spinoff	.182	.178	.189	.126	Spinoff	.201	.187	.194	.136
	(.026)***	(.023)***	(.022)***	(.02)***		(.017)***	(.017)***	(.016)***	(.015)***
Spin/Comp destinations			.030	.028	Spin/Comp destinations			.027	.025
			(.002)***	(.002)***				(.0009)***	(.0009)***
Parent destinations			-.009	-.008	Parent destinations			-.003	-.003
			(.002)***	(.002)***				(.0006)***	(.0006)***
Product overlap				.240	Product overlap				.196
				(.027)***					(.015)***
Const.	.249	-.052	.024	-.045	Const.	.201	-.060	-.052	-.012
	(.018)***	(.065)	(.067)	(.058)		(.007)***	(.113)	(.114)	(.102)
Obs.	2873	2873	2873	2873	Obs.	27998	27998	27998	27996
Spinoffs	239	239	239	239	Spinoffs	416	416	416	416
Comparisons	2634	2634	2634	2634	Comparisons	27582	27582	27582	27580
R^2	.023	.262	.415	.439	R^2	.010	.158	.424	.439

Notes: Dependent variable is spinoff/comparison overlap with parent export destinations in spinoff entry years. Starting with the "controls" column for both samples, all columns have 4-digit industry, municipality, and year controls. Standard errors are clustered by spinoff-year. ***significance at one,**five,*ten percent levels.

Table 6: Regressions for New Parent Export Destinations, years $t+1$ through $t+6$

	4-digit Industry, Municipality					3-digit Industry, State				
		base	controls	count	wProd		base	controls	count	wProd
t+1	Spinoff	-.003	.005	-.004	-.007	Spinoff	.002	.011	.006	-.010
		(.035)	(.033)	(.03)	(.029)		(.024)	(.024)	(.023)	(.022)
	Spin/Comp destinations			.024	.024	Spin/Comp destinations			.016	.015
				(.002)***	(.003)***				(.001)***	(.001)***
	Parent New Dest.[a]			-.029	-.029	Parent New Dest.[a]			-.008	-.009
				(.007)***	(.007)***				(.005)*	(.005)*
	Product overlap[b]				.045	Product overlap[b]				.137
					(.108)					(.038)***
	Const.	.138	.179	.210	.212	Const.	.111	.067	-.028	.020
		(.021)***	(.201)	(.177)	(.175)		(.015)***	(.192)	(.167)	(.165)
	Obs.	788	788	788	788	Obs.	8189	8189	8189	8189
	Spinoffs	76	76	76	76	Spinoffs	135	135	135	135
	Comparisons	712	712	712	712	Comparisons	8054	8054	8054	8054
	R^2	7.18e-06	.238	.406	.407	R^2	6.96e-07	.200	.331	.337
		base	controls	count	wProd		base	controls	count	wProd
t+2	Spinoff	.045	.020	.017	.019	Spinoff	.031	.031	.034	.024
		(.046)	(.051)	(.051)	(.051)		(.031)	(.029)	(.029)	(.025)
	Spin/Comp destinations			.019	.019	Spin/Comp destinations			.017	.016
				(.003)***	(.003)***				(.001)***	(.001)***
	Parent New Dest.[a]			.001	.001	Parent New Dest.[a]			-.015	-.014
				(.0003)***	(.0008)				(.01)	(.009)
	Product overlap[b]				-.016	Product overlap[b]				.073
					(.151)					(.035)**
	Const.	.108	.661	.569	.572	Const.	.109	.256	.102	.109
		(.024)***	(.009)***	(.021)***	(.025)***		(.015)***	(.11)**	(.108)	(.106)
	Obs.	552	552	552	552	Obs.	4732	4732	4732	4732
	Spinoffs	48	48	48	48	Spinoffs	95	95	95	95
	Comparisons	504	504	504	504	Comparisons	4637	4637	4637	4637
	R^2	.002	.328	.448	.448	R^2	.0003	.189	.356	.358
		base	controls	count	wProd		base	controls	count	wProd
t+3	Spinoff	.035	.041	.059	.054	Spinoff	-.018	-.018	-.019	-.025
		(.068)	(.08)	(.07)	(.072)		(.032)	(.031)	(.029)	(.028)
	Spin/Comp destinations			.023	.022	Spin/Comp destinations			.019	.019
				(.004)***	(.004)***				(.002)***	(.002)***
	Parent New Dest.[a]			.008	.006	Parent New Dest.[a]			.007	.005
				(.001)***	(.003)**				(.002)***	(.002)***
	Product overlap[b]				.085	Product overlap[b]				.071
					(.113)					(.042)*
	Const.	.160	-.099	-.477	-.437	Const.	.129	.304	.159	.137
		(.033)***	(.046)**	(.077)***	(.104)***		(.016)***	(.006)***	(.015)***	(.02)***
	Obs.	247	247	247	247	Obs.	2955	2955	2955	2955
	Spinoffs	22	22	22	22	Spinoffs	63	63	63	63
	Comparisons	225	225	225	225	Comparisons	2892	2892	2892	2892
	R^2	.001	.242	.434	.437	R^2	.0001	.189	.400	.403

continued

Table 6: Regressions for New Parent Export Destinations, years $t+1$ through $t+6$, cont'd

	4-digit Industry, Municipality					3-digit Industry, State				
		base	controls	count	wProd		base	controls	count	wProd
t+4	Spinoff	.046	.041	.054	.044	Spinoff	.001	.014	.014	.003
		(.084)	(.091)	(.081)	(.076)		(.052)	(.048)	(.039)	(.039)
	Spin/Comp destinations			.018	.017	Spin/Comp destinations			.018	.017
				(.004)***	(.003)***				(.002)***	(.002)***
	Parent New Dest.[a]			.029	.016	Parent New Dest.[a]			.023	.014
				(.002)***	(.006)**				(.0008)***	(.004)***
	Product overlap[b]				.217	Product overlap[b]				.135
					(.089)**					(.059)**
	Const.	.177	-.077	-.193	-.284	Const.	.131	.524	.721	.616
		(.043)***	(.041)*	(.052)***	(.062)***		(.018)***	(.02)***	(.005)***	(.046)***
	Obs.	163	163	163	163	Obs.	1733	1733	1733	1733
	Spinoffs	16	16	16	16	Spinoffs	33	33	33	33
	Comparisons	147	147	147	147	Comparisons	1700	1700	1700	1700
	R^2	.002	.416	.556	.583	R^2	7.44e-07	.162	.382	.392
		base	controls	count	wProd		base	controls	count	wProd
t+5	Spinoff	.077	.044	.048	.011	Spinoff	.116	.091	.076	.034
		(.094)	(.117)	(.115)	(.105)		(.078)	(.071)	(.062)	(.049)
	Spin/Comp destinations			.017	.016	Spin/Comp destinations			.015	.015
				(.003)***	(.004)***				(.004)***	(.004)***
	Parent New Dest.[a]			-.077	-.115	Parent New Dest.[a]			.179	.167
				(.033)**	(.039)***				(.009)***	(.011)***
	Product overlap[b]				.248	Product overlap[b]				.179
					(.134)*					(.076)**
	Const.	.196	.971	-1.121	-2.256	Const.	.115	.875	2.263	2.118
		(.056)***	(.056)***	(.763)	(.986)**		(.029)***	(.026)***	(.069)***	(.1)***
	Obs.	116	116	116	116	Obs.	951	951	951	951
	Spinoffs	13	13	13	13	Spinoffs	23	23	23	23
	Comparisons	103	103	103	103	Comparisons	928	928	928	928
	R^2	.005	.453	.570	.598	R^2	.005	.204	.333	.346
		base	controls	count	wProd		base	controls	count	wProd
t+6	Spinoff	.215	.174	.178	.181	Spinoff	.111	.048	.050	-.050
		(.235)	(.264)	(.254)	(.273)		(.143)	(.156)	(.14)	(.138)
	Spin/Comp destinations			.013	.014	Spin/Comp destinations			.017	.014
				(.005)***	(.005)**				(.004)***	(.003)***
	Parent New Dest.[a]			-.021	-.021	Parent New Dest.[a]			-.023	-.024
				(.004)***	(.005)***				(.007)***	(.006)***
	Product overlap[b]				-.011	Product overlap[b]				.383
					(.383)					(.068)***
	Const.	.222	.413	.399	.401	Const.	.213	.155	.073	.066
		(.045)***	(.132)***	(.139)***	(.17)**		(.031)***	(.039)***	(.057)	(.05)
	Obs.	49	49	49	49	Obs.	262	262	262	262
	Spinoffs	4	4	4	4	Spinoffs	9	9	9	9
	Comparisons	45	45	45	45	Comparisons	253	253	253	253
	R^2	.043	.224	.287	.287	R^2	.004	.169	.270	.326

Notes: Dependent variable is spinoff/comparison overlap with parent export destinations in year $t+k$ excluding those in spinoff entry years. Starting with the "controls" column for both samples, all columns have 4-digit industry, municipality, and year controls. Standard errors are clustered by spinoff-year. ***significance at one,**five,*ten percent levels.

[a] Number of parent export destinations in year $t+k$ excluding those in spinoff entry years.

[b] Spinoff/comparison overlap in year $t+k$ with parent products exported to new destinations in year $t+k$.

Table 7: Regressions for Initial Parent Export Destinations, years $t+1$ through $t+6$

	4-digit Industry, Municipality					3-digit Industry, State				
		base	controls	count	wProd		base	controls	count	wProd
t+1	Spinoff	.196 (.03)***	.198 (.029)***	.202 (.027)***	.135 (.027)***	Spinoff	.23 (.02)***	.215 (.02)***	.212 (.019)***	.159 (.018)***
	Spin/Comp destinations			.031 (.002)***	.029 (.002)***	Spin/Comp destinations			.026 (.0009)***	.025 (.0009)***
	Parent Initial Dest.[a]			-.009 (.002)***	-.008 (.002)***	Parent Initial Dest.[a]			-.003 (.0009)***	-.002 (.0008)***
	Product overlap[b]				.240 (.056)***	Product overlap[b]				.171 (.018)***
	Const.	.297 (.021)***	-.037 (.073)	-.034 (.088)	-.074 (.072)	Const.	.232 (.008)***	-.02 (.102)	-.045 (.094)	-.018 (.086)
	Obs.	1897	1897	1897	1897	Obs.	18515	18515	18515	18515
	Spinoffs	178	178	178	178	Spinoffs	320	320	320	320
	Comparisons	1719	1719	1719	1719	Comparisons	18195	18195	18195	18195
	R^2	.026	.299	.458	.482	R^2	.013	.185	.448	.463
		base	controls	count	wProd		base	controls	count	wProd
t+2	Spinoff	.138 (.036)***	.161 (.035)***	.171 (.032)***	.107 (.03)***	Spinoff	.206 (.023)***	.179 (.024)***	.183 (.023)***	.139 (.022)***
	Spin/Comp destinations			.031 (.003)***	.029 (.003)***	Spin/Comp destinations			.026 (.001)***	.025 (.001)***
	Parent Initial Dest.[a]			-.013 (.003)***	-.012 (.003)***	Parent Initial Dest.[a]			-.004 (.0008)***	-.003 (.0008)***
	Product overlap[b]				.224 (.043)***	Product overlap[b]				.156 (.02)***
	Const.	.336 (.024)***	.088 (.083)	.195 (.106)*	.179 (.086)**	Const.	.247 (.009)***	.145 (.101)	.080 (.098)	.100 (.089)
	Obs.	1305	1305	1305	1305	Obs.	13402	13402	13402	13402
	Spinoffs	113	113	113	113	Spinoffs	231	231	231	231
	Comparisons	1192	1192	1192	1192	Comparisons	13171	13171	13171	13171
	R^2	.011	.296	.441	.461	R^2	.010	.191	.450	.462
		base	controls	count	wProd		base	controls	count	wProd
t+3	Spinoff	.084 (.045)*	.103 (.046)**	.125 (.04)***	.080 (.035)**	Spinoff	.171 (.027)***	.167 (.027)***	.165 (.026)***	.132 (.025)***
	Spin/Comp destinations			.028 (.003)***	.026 (.003)***	Spin/Comp destinations			.025 (.001)***	.024 (.001)***
	Parent Initial Dest.[a]			-.019 (.005)***	-.016 (.004)***	Parent Initial Dest.[a]			-.003 (.0008)***	-.002 (.0009)***
	Product overlap[b]				.190 (.046)***	Product overlap[b]				.124 (.018)***
	Const.	.375 (.024)***	.092 (.095)	.330 (.119)***	.253 (.096)***	Const.	.249 (.011)***	.233 (.005)***	.101 (.013)***	.079 (.013)***
	Obs.	813	813	813	813	Obs.	9605	9605	9605	9605
	Spinoffs	72	72	72	72	Spinoffs	159	159	159	159
	Comparisons	741	741	741	741	Comparisons	9446	9446	9446	9446
	R^2	.004	.314	.461	.478	R^2	.007	.212	.487	.495

continued

Table 7: Regressions for Initial Parent Export Destinations, years $t+1$ through $t+6$, cont'd

	4-digit Industry, Municipality					3-digit Industry, State				
		base	controls	count	wProd		base	controls	count	wProd
t+4	Spinoff	.090 (.057)	.094 (.06)	.113 (.056)**	.087 (.055)	Spinoff	.152 (.035)***	.150 (.035)***	.142 (.033)***	.116 (.031)***
	Spin/Comp destinations			.025 (.003)***	.024 (.004)***	Spin/Comp destinations			.025 (.001)***	.024 (.001)***
	Parent Initial Dest.[a]			-.005 (.003)	-.007 (.004)*	Parent Initial Dest.[a]			-.004 (.001)***	-.004 (.001)***
	Product overlap[b]				.114 (.079)	Product overlap[b]				.105 (.022)***
	Const.	.348 (.029)***	-.096 (.068)	-.186 (.135)	-.118 (.138)	Const.	.258 (.014)***	.254 (.009)***	.137 (.018)***	.125 (.018)***
	Obs.	586	586	586	586	Obs.	5905	5905	5905	5905
	Spinoffs	48	48	48	48	Spinoffs	92	92	92	92
	Comparisons	538	538	538	538	Comparisons	5813	5813	5813	5813
	R^2	.005	.342	.462	.468	R^2	.005	.217	.493	.498
		base	controls	count	wProd		base	controls	count	wProd
t+5	Spinoff	.106 (.057)*	.095 (.068)	.110 (.054)**	.067 (.05)	Spinoff	.193 (.041)***	.167 (.039)***	.146 (.034)***	.095 (.033)***
	Spin/Comp destinations			.023 (.004)***	.021 (.004)***	Spin/Comp destinations			.022 (.002)***	.021 (.002)***
	Parent Initial Dest.[a]			-5.53e-06 (.001)	-.002 (.003)	Parent Initial Dest.[a]			-.002 (.002)	-.003 (.001)**
	Product overlap[b]				.194 (.072)***	Product overlap[b]				.162 (.045)***
	Const.	.362 (.043)***	.118 (.057)**	-.115 (.082)	-.048 (.056)	Const.	.239 (.018)***	.312 (.01)***	.150 (.024)***	.139 (.023)***
	e(N)	319	319	319	319	Obs.	2753	2753	2753	2753
	Spinoffs	27	27	27	27	Spinoffs	55	55	55	55
	Comparisons	292	292	292	292	Comparisons	2698	2698	2698	2698
	R^2	.007	.422	.539	.557	R^2	.01	.258	.519	.53
		base	controls	count	wProd		base	controls	count	wProd
t+6	Spinoff	.212 (.09)**	.124 (.121)	.127 (.089)	.079 (.087)	Spinoff	.249 (.069)***	.230 (.071)***	.204 (.056)***	.151 (.068)**
	Spin/Comp destinations			.021 (.01)**	.019 (.01)*	Spin/Comp destinations			.023 (.003)***	.022 (.003)***
	Parent Initial Dest.[a]			.041 (.017)**	.039 (.017)**	Parent Initial Dest.[a]			.052 (.006)***	.052 (.006)***
	Product overlap[b]				.208 (.09)**	Product overlap[b]				.137 (.084)
	Const.	.319 (.069)***	.600 (8.47e-16)***	.526 (.033)***	.530 (.033)***	Const.	.243 (.024)***	.297 (.018)***	-.528 (.101)***	-.535 (.105)***
	Obs.	142	142	142	142	Obs.	1198	1198	1198	1198
	Spinoffs	8	8	8	8	Spinoffs	18	18	18	18
	Comparisons	134	134	134	134	Comparisons	1180	1180	1180	1180
	R^2	.020	.431	.520	.529	R^2	.012	.255	.522	.528

Notes: Dependent variable is spinoff/comparison overlap in year $t+k$ with parent export destinations in spinoff entry years. Starting with the "controls" column for both samples, all columns have 4-digit industry, municipality, and year controls. Standard errors are clustered by spinoff-year. ***significance at one,**five,*ten percent levels.

[a] Number of parent export destinations in spinoff entry years.

[b] Spinoff/comparison overlap in year $t+k$ with parent export products in spinoff entry years.