China’s Successful Exporters: Firm-Level Evidence

By

Catherine Y. Co

Department of Economics

University of Nebraska at Omaha

6708 Pine Street, Omaha, NE 68182, USA

email: [cco@unomaha.edu](mailto:cco@unomaha.edu)

Jinlan Ni

Department of Economics

University of Nebraska at Omaha

6708 Pine Street, Omaha, NE 68182, USA

email: [jni@unomaha.edu](mailto:jni@unomaha.edu)

Guan Gong

School of Economics

Shanghai University of Finance and Economics

Shanghai, China

email: [guan.gong@gmail.com](mailto:guan.gong@gmail.com)

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Abstract

Firm-level data for about 200,000 manufacturing firms operating in China show that firms’ export propensity and intensity increase with previous export experience, size, labor-skill intensity, productivity, new product introductions, and R&D intensity. There is evidence in favor of within-industry positive exporting spillovers. Export propensity and intensity also vary by ownership type. We find no evidence that firm financial position is correlated with the decision to export or how much to export. But, when firms are grouped into continuous exporters, starters, switchers, and non-exporters, we find that firm *ex ante* financial position matters among non-exporters and starters, but not among continuous exporters. Therefore, sunk costs of entry do deter firms from exporting, but fixed continuing costs of servicing foreign markets do not. Finally, unlike firms in developed countries, exporting firms in China have lower liquidity; thus, firms in China draw on internal funds when expanding into foreign markets.

*Keywords*: exports; firm heterogeneity; R&D; financial constraints; foreign direct investment

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**I. Introduction and Background**

In 2009, China became the number one exporter of merchandise goods surpassing Germany. Close to 10% of the world’s exports now originate from China, up from a 4% share in 2000.[[1]](#footnote-1) There is general agreement in the literature that China became an export powerhouse in such a short time because of the large amount of foreign direct investment (FDI) from Hong Kong, Taiwan, Japan, and other industrialized countries. Understandably, extant literature emphasizes the link between FDI and processing trade, and how processing trade dominates China’s trade (e.g., Feenstra and Hanson, 2005). However, besides foreign involvement in firm activities, firm characteristics, such as size and productivity, matter in exporting as various studies have shown using firm-level data from industrialized and industrializing countries. Broadly, these studies find that exporting is relatively rare, and firms that export, on average, are larger, more productive, more skilled labor- and capital-intensive, and pay higher wages. Interestingly, these characteristics are observed even before exporting begins.[[2]](#footnote-2)

As will be evident below, although a few papers have investigated the characteristics of successful exporters in China, as far as we can tell, a comprehensive analysis of the *ex ante* characteristics of successful exporters in China has not been done. The availability of firm-level data from China’s National Bureau of Statistics allows us to study various aspects of Chinese firms’ exporting success. We currently have access to 2005-2007 data. Our sample consists of 175,830 firms. In 2007, close to a third of our sample are exporters. Among exporting firms, 93.6% were previous exporters and 6.4% are new exporters. On average, exports are 19.4% of overall sales.

Our paper is closest in spirit to Bernard and Jensen (2004) who study the characteristics of successful US exporters. The authors find that the probability of exporting increases with firm size, productivity, labor quality, and past exporting success. Bernard and Jensen (2004) also find that firms that switch industries (their proxy for new product introductions) have higher propensities to export. Surprisingly, they find some evidence that other firms’ exporting activities in either the same industry and/or state inhibit firm entry into exporting. That is, they find negative exporting spillover effects. We consider all these factors in our investigations. Additionally, we focus on firms’ research and development (R&D) expenditures, financial position, and ownership structure.

We revisit R&D’s role in exporting success. Huang et al. (2008) use 2001-2003 data and find no evidence that Chinese firms’ exporting intensity is correlated with firms’ R&D spending. The authors attribute this to the relatively small amount of R&D done by Chinese firms. However, Sjöholm and Lundin (2010) document a 170% increase in Chinese firms’ R&D spending between 2000 and 2004. Thus, there might be an export-R&D link when more recent data are used.[[3]](#footnote-3) The authors also consider new product introductions by firms and find that exports increase with new product introductions among domestic firms. The opposite holds for foreign firms. Surprisingly, the authors did not consider a number of characteristics (e.g., productivity) deemed important in the literature. As such, we view their findings on R&D and new product introductions as tentative. However, we argue below that the authors’ strategy of considering R&D and new product introductions simultaneously has some merit. Therefore, we consider both variables in our empirical investigations.

The precipitous drop in world trade in 2009 is partly attributed to the dramatic reduction in access to credit brought about by the 2008 financial crisis (WTO, 2010). Firms with limited working capital and limited access to trade financing have less ability to export during crises periods. Even before the recent financial crisis, a number of papers have studied the role of firm financial position on the decision to export. For example, Greenaway et al. (2007) did not find evidence that foreign market entry decisions are sensitive to British firms’ liquidity and leverage ratios. Perhaps this result is peculiar to firms from industrialized countries. When applied to firms operating in emerging markets, the export-*ex ante* financial position linkage may be more relevant. For one, financial sectors in emerging markets are less developed; thus, any advantage firm liquidity or access to credit conveys are magnified.

Current literature shows that ownership structure affects exporting propensity and intensity. Bernard and Jensen (2004) find that US multinationals have higher propensities to export. Using Chinese sub-sector level data for 1995, Liu and Shu (2003) find that exports increase with FDI presence across 186 sub-sectors. The leading exporting sub-sectors are cotton textiles, clothing manufacturing, and daily electronic apparatus and electronic components. Fung et al. (2008) find that foreign firms operating in China are more likely to export than domestic firms. However, foreign firms with competitive advantages are less likely to be exporting; that is, they cater to the Chinese domestic market. Domestic firms with competitive advantages, on the other hand, are more likely to be exporting. A natural extension is to account for differences using more refined ownership structures among firms in operation in China; that is, analysis is made beyond simple domestic- versus foreign-firm comparisons. For example, exporting decisions might differ between private-shareholding firms and private firms with personal invested capital.

To address potential endogeneity between past export experience and other firm characteristics, especially with firms’ financial position, we exclude past export experience from the estimations and separately estimate the models for continuous exporters, starters, switchers, and non-exporters. Most of our results are robust to this alternative approach. One important difference is that firm *ex ante* financial position now matters among non-exporters and starters. Thus, sunk costs of entry do deter firms from exporting. Moreover, unlike firms in developed countries, exporting firms in China have lower liquidity; thus, firms in China draw on internal funds when expanding into foreign markets.

The rest of the paper is structured as follows. In the next section, we discuss the data in detail and describe the empirical specifications we use. The estimation results are analyzed in Section III and concluding remarks are provided in Section IV.

**II. Data and Empirical Methodology**

*Data*

Our dataset comes from the National Bureau of Statistics (NBS). The Annual Survey of Industrial Production includes all state-owned firms and private firms with at least 5 million yuan in annual sales. We consider all manufacturing firms in operation for all three years between 2005 and 2007 so our results are not complicated by the entry and exit of firms. Also, since we are interested in studying exporting spillover effects, we only include firms with one establishment to ensure that firms’ recorded location in the dataset is their place of operation. We checked the data for consistency and exclude observations with missing or inconsistent information (e.g., negative reported R&D expenditure). To exclude extreme values, the lower and upper 1% of liquidity and leverage ratios and the upper 1% (since bounded at zero) of R&D intensity are also excluded. We obtain a sample of 175,830 firms; these firms are responsible for about 69% of the total output of all single establishment manufacturing firms in operation in all three years (2005-2007).

*Econometric Model*

Our base specification follows from Bernard and Jensen (2004) where firms’ exporting decisions are assumed to be determined by the following latent variable:[[4]](#footnote-4)

(1)

where *Exp* is a qualitative variable equal to one if firm *i* exports at time *t* (*Exp*\* > 0), and zero for non-exporters (*Exp*\* ≤ 0). To avoid potential endogeneity problems, all controls are lagged by one period. Firm characteristics (*Firm*) include firm’s export status in period *t-1*; if non-exporter at *t-1*, firm’s export status in *t-2*. Past exporting experience should convey an advantage as exporting requires a large amount of knowledge normally not required when selling only locally (e.g., regulations or requirements to sell abroad). Other firm characteristics include firm size, average wage, productivity, and new product introductions. Spillovers (*Spill*) include within industry-region spillover, within-industry spillover, and within-region spillover. Finally, is a well-behaved error term.

Firm size is proxied by the natural log of employment. Larger firms experience the necessary economies of scale to be competitive in unfamiliar foreign markets. There is strong evidence from the literature that exporters tend to be larger than non-exporters. Labor skill is proxied by the natural log of average wage. Currently, China’s comparative advantage is in low-skilled labor intensive goods; thus, we expect the propensity to export to decrease with skill intensity.

We use Levinsohn and Petrin’s (2003) procedure to calculate firm productivity at *t-1*. This procedure essentially corrects for possible endogeneity between productivity and input use. For example, when there is a positive productivity shock, firms may expand output by increasing its input use. Levinsohn and Petrin’s (2003) procedure corrects for this simultaneity problem by proposing the use of intermediate inputs (e.g., direct materials) as proxies for unobserved productivity shocks. Following Bernard and Jensen (2004), our estimates are based on detailed industry-specific production functions.[[5]](#footnote-5) We assume a Cobb-Douglas production function. We use value added for output and total fixed assets for capital. The number of employees and direct materials expenditure are the two variable inputs, the latter as proxy for unobserved productivity shocks. All else equal, we expect the propensity to export to increase with firm productivity. As a robust check of productivity’s effect on the propensity to export, we also estimate an alternative measure using Levinsohn and Petrin’s (2003) procedure but this time using firm revenue instead of value added.[[6]](#footnote-6)

Bernard and Jensen (2004) use a qualitative indicator for whether a plant switches industry to test the notion that plants with new products are more likely to export. They find strong evidence that the propensity to export increases when plants switch industries. Our data set contains information of whether (and to what extent) firms introduce new products in a given year.[[7]](#footnote-7) We control for past new product introductions in the export regressions to capture the notion that firms’ exporting possibilities are larger because they have a wider product set (extensive margin).[[8]](#footnote-8) Thus, all else equal, past new product introductions is expected to increase the likelihood of exporting. We use two measures: a qualitative indicator for new product introductions and the share of new product output to total output.

We adopt Bernard and Jensen’s (2004) definition of spillover as follows: within industry-region spillover is the share of exports to total sales in firm *i*’s four-digit industry and its region; within-industry spillover is the share of exports to total sales in firm *i*’s four-digit industry but outside its region; and, within-region spillover is the share of exports to total sales in firm *i*’s region but outside its four-digit industry. These measures can be thought of as capturing agglomerations of exporting activities across industries and space. Spillovers may result from labor turnover, participation in industry trade associations, and/or informal contacts among firm managers and workers. Thus, industries and areas with large concentrations of exporting activities or high international trade exposure will not only have the necessary information on how to penetrate foreign markets, how to access trade financing, how to deal with foreign exchange fluctuations, how foreign tastes differ from Chinese tastes, etc., but in most cases, will have the necessary support infrastructure to help firms export. Export propensity is expected to increase with potential spillovers.

We augment equation (1) as follows:

, (2)

where **Z** includes firm R&D expenditure, financial position, and a set of qualitative indicators for ownership type. Matrix **D** includes a set of qualitative indicators for firm’s provincial location and firm’s two-digit industry classification.

We revisit R&D’s role in exporting as current evidence in the literature is mixed. Huang et al. (2008) find no evidence that exporting intensity is correlated with firms’ R&D spending using firm-level data for 2001-2003 while Liu and Shu (2003) find a positive correlation using sector-level information in 1995. We ask if R&D investments at time *t-1* contribute to the likelihood of entering foreign markets at time *t*. R&D at *t-1* may increase the propensity to export at *t* because these may lead to small but meaningful improvements on existing products at *t-1* (thereby increase firms’ intensive margins) or new product introductions at *t*. Recall, that we also include new product introductions in equation (2). Thus, the simultaneous inclusion of both new product introductions and R&D intensity is essentially equivalent to asking whether investments in R&D have separate and quantifiable effects, over and above new product introductions (increase in extensive margin).

The 23% drop in world trade in 2009 during the financial crisis necessitates a reexamination of the trade and financial health link. There is some evidence of an export-financial position linkage in the literature. For example, Amiti and Weinstein (2009) find that Japanese firms’ exports are sensitive to the financial health of the firm’s reference bank. The reference bank handles most of a firm’s transactions; thus, would most likely provide trade financing for a firm’s exports. Firms associated with unhealthy banks are less likely to obtain the necessary trade financing to make foreign sales.

Besides the need for trade financing, the presence of large market entry costs may also deter firms from selling in foreign markets. That is, because of foreign market entry costs and the long lag between the time of (export) shipment and delivery (thus, payment), firms with (internal and/or external) access to working capital, are more likely to be exporters. This is because access to working capital provides a way to pay for the sunk cost of entry; it also provides a way to cover current costs as the firm waits for payments.[[9]](#footnote-9) Using data from the United Kingdom, Greenaway et al. (2007) do not find evidence that foreign market entry decisions are sensitive to firms’ *ex ante* liquidity and leverage ratios.[[10]](#footnote-10) Bellone et al. (2010) also find no relationship between exporting and *ex ante* financial position using French firm-level data.

Using industrialized country data, the evidence of an export-*ex ante* financial position linkage is currently mixed. The financial sectors of emerging markets are less developed; thus, the export-*ex ante* financial position linkage may be more relevant to firms operating in these markets. This is because any advantage firm liquidity or access to credit conveys to firms may be magnified when financial sectors are less developed. A firm’s ability to cover its short-term obligations increases with its liquidity ratio while a firm’s ability to access external financing to cover foreign market entry cost is reflected in its leverage ratio.[[11]](#footnote-11) Thus, we expect the propensity to export to increase with firm liquidity or leverage. However, Bellone et al. (2010, p.353) point out that “a firm may be liquid but nonetheless present a bad financial situation… strong fundamentals may compensate for a temporary shortage of liquid assets.” Thus, we cannot rule out the possibility that the propensity to export declines with liquidity. Likewise, high leverage may indicate weak fundamentals; thus, lower propensity to export may also be associated with higher leverage.[[12]](#footnote-12)

There is clear evidence in the literature that exporting propensity is dependent on ownership structure. Fung et al. (2008) use firm-level data for 1998-2005 and find that foreign firms operating in China are more likely to export than domestic firms. We use more refined ownership structures. That is, we expect exporting decisions to vary among various domestic ownership structures (e.g., private shareholding versus private with personal invested capital); and, among firms with equity capital from Hong Kong, Macao, and Taiwan (HKMT hereafter) versus firms with equity capital from foreign sources­­­­. We include a set of qualitative indicators to differentiate state-owned enterprises (SOEs), collective-owned enterprises, private shareholding firms, private firms with personal capital, firms with equity capital from HKMT, firms with foreign equity, and all other firm types (which essentially include firms with equity combinations from SOEs, collective, and private firms).[[13]](#footnote-13) We use SOEs as our base ownership type. If indeed, foreign firms are in China to take advantage of the low cost of labor, then foreign firms are expected to have a higher propensity to export than domestic firms. Firms with equity capital from HKMT are expected to have higher export propensity compared to firms with equity from foreign countries. This expectation is based on the preponderance of evidence that FDI from Hong Kong and Taiwan are primarily motivated by China’s pool of cheap labor while FDI from the European Union and the United States are primarily motivated by China’s large potential market (see e.g., Zhang, 2005).[[14]](#footnote-14) Moreover, the country has encouraged export-oriented FDI in lieu of market-oriented FDI.

To control for any province- or industry-specific differences that may affect firms’ exporting decisions, we include a set of qualitative indicators for firm’s provincial location and firm’s two-digit industry classification.[[15]](#footnote-15) We expect firms in coastal provinces such as Fujian and Zhejiang to have higher propensities to export, all else equal. Exporting propensity varies across industries as well. For example, firms producing electric equipment and machinery and garments have higher export propensities compared to those producing plastics.

Besides the decision to export, a Tobit version of equation (2) is also estimated to develop an understanding of the factors that contribute to firms’ export levels (export intensity). Zero observations are not dropped as “observed zeros contain valuable information which should be exploited” (Felbermayr and Kohler, 2006, p. 644). Following common practice (see e.g., Felbermayr and Kohler, 2006; Eichengreen and Irwin, 1995), trade data are adjusted by one yuan; thus, when the natural logarithm of these adjusted trade values are obtained, zero values are retained in the estimations. The following Tobit regression model is estimated:

, (3)

where if ; and if

*Export* is the natural log of firm *i* exports at time *t*. All other variables are as defined previously.

**III. Analysis of Results**

Recall that we study the exporting propensity and intensity of a cross-section of close to 200,000 firms in 2007, and our regressors are measured in 2006. Table 1 contains the descriptive statistics of our data. We obtain real values (Year 2000=100) by using appropriate price indices (e.g., ex-factory price index to deflate output).[[16]](#footnote-16) About 30% of the firms in our sample were exporters in both 2007 and 2006, and 3% were not exporters in 2006 but exporters in 2005. Mean exports are 29 million yuan (US$3.9 million).[[17]](#footnote-17) A third of our sample exported in the prior two years. On average, our sample had 235 employees and paid an average wage of 16,451 yuan per year. Using Levinsohn and Petrin’s (2003) methodology, our sample had an estimated productivity of 2.50% (based on value added) and 1.88% (based on revenue).

**Table 1 near here**

In 2006, 8.6% of our sample introduced new products and the mean share of new products to total output was 3.4%. The share of other firms’ exports to total sales measures potential spillovers from exporting. The three spillover measures averaged 22%.[[18]](#footnote-18) Mean R&D intensity was 0.09% with a median rate of zero. Very few firms in China conduct R&D. But, 1% of the sample had an R&D intensity of at least 2.7%.[[19]](#footnote-19) The liquid assets-to-total assets ratio is 0.09, on average. And, the current liabilities-to-current assets ratio is 0.93, on average. Less than 10% of the sample is either state- or collective-owned. Close to a fifth are private shareholding firms and the largest group (50% of our sample) is comprised of private firms with personal invested capital. Firms with equity investment from HKMT and foreign firms are each about 12% of the sample.

Correlations for our continuous regressors appear in Table 2. For the most part, the pairwise correlations are less than 0.50 with two exceptions: between two of the spillover measures (at 0.61) and between liquidity and leverage (at -0.88). It is possible that firm productivity and financial position are related to firm’s investments on R&D; but, as the correlations in Table 2 show, these variables are not correlated at all.

**Table 2 near here**

Probit (Tobit) regression estimates are in the first (last) two columns of Table 3. We estimate several models but present results for only two models as the rest are qualitatively similar to those presented here. The models in Table 3 use firm productivity based on value added (Levinsohn and Petrin, 2004) and the share of new products to total output to measure new product introductions.[[20]](#footnote-20) Odd (even) numbered models use liquidity (leverage) ratio to measure firm financial health. All models have significant explanatory power with p<0.01 for the Wald Test that all regressor coefficients are set to zero. Pseudo R-squares for the probit (Tobit) estimates are 0.71 (0.31) indicative of a good fit. The probit models also have good predictive powers with 94.6% predicted-actual match rates. Since results for both probit and Tobit models are qualitatively similar, there appears to be no difference in the determinants of firms’ export propensity (extensive margin) and export intensity (intensive margin).

**Table 3 near here**

First, past export experience increases the likelihood and intensity of current year exports. Both indicators for past export experience are statistically significant with p<0.01 in all models. The coefficient for the two-period lag export indicator is smaller, this is indicative of “decay” in the importance of past export experience over time. Bernard and Jensen (2004) find a similar “decay” phenomenon using US data. Marginal effects from the probit regressions indicate that a typical firm exporting in 2006 has a 0.79 higher likelihood of exporting in 2007 compared to a firm not exporting in 2006.[[21]](#footnote-21) A typical non-exporter in 2006 but was an exporter in 2005 has a 0.32 higher likelihood of exporting in 2007. These estimates are higher than the 0.66 (one-year lag) and 0.27 (two-year lag) probabilities found by Bernard and Jensen (2004) for US plants. Also, all else equal, marginal effects from the Tobit regressions show that exports are 10-23% higher, on average, for firms with past exporting experiences.

Both (log) employment and (log) wage are statistically significant with p<0.01 and have positive coefficients in all models which means that larger firms and those that pay higher wages have higher propensity to export and higher export intensity, all else equal. The positive coefficient estimates for wages are inconsistent with our prior that export propensity and intensity decrease with firm labor’s skill intensity. However, these are in line with studies using data from industrialized countries (e.g., Bernard and Jensen, 2004). Thus, although China has a low labor cost advantage and is unskilled labor abundant, firms that pay higher wages have higher exporting propensity and intensity.

As shown in Table 3, there is strong evidence that the propensity to export and export intensity tend to increase with productivity when using value added as proxy for output in the production function. Past studies using Chinese data either find no relationship or a “productivity paradox.” For example, Wang et al. (2009) use firm-level data from the World Bank from 1997 to 2000 and find no evidence in support of the notion that more productive firms have higher propensity to export. Their results may be an artifact of the type and location of firms in the World Bank sample. They have about 1,500 firms in their sample and these firms are from five manufacturing industries (electronic equipment, electronic components, vehicles and vehicle parts, apparel and leather goods, consumer products) and three services industries. The firms are located in Beijing, Tianjin, Shanghai, Guangzhou, and Chengdu. With wider industry and region coverage, we find that more productive firms are more likely to be exporters; and, more productive firms export more.

We do not confirm Li and Yin’s (2010) “productivity paradox.” The authors use firm-level Chinese data from 1998 to 2007. Essentially, the authors compare the mean approximate total factor productivity (ATFP) rates of exporters and non-exporters. They find that non-exporters are more productive than exporters in most of the 20 sectors they consider. For example, among apparel, footwear, and headwear producers, they estimate ATFP rates of 2.36 and 2.56 log points for exporters and non-exporters, respectively. We suspect that means tests will not show any significant difference in the mean ATFP rates between exporters and non-exporters. As we have shown, there is no “productivity paradox.”

Export propensity and intensity are positively correlated with the share of new product output to total output. A similar phenomenon is observed by Bernard and Jensen (2004) for US plants. Marginal effects from the Tobit regressions indicate that a ten percentage point increase in new product share increases exports by 7.5%. The extensive margin of trade is clearly important among firms operating in China.

Only two of the potential spillover controls are statistically significant with p<0.01. Both are related to the industry firms belong to. We obtain positive coefficients—the likelihood that firms in an industry will export increases with the industry’s export intensity, all else equal. This is opposite of Bernard and Jensen’s (2004) finding using US data where the presence of exporters discourages firms from exporting. Since the coefficient for the within industry-region spillover variable is larger than the coefficient for the within-industry but outside the region spillover, proximity among exporters matters. However, proximity by itself is not important since the within-region but outside the industry spillover variable is not significantly different from zero.

In addition to new product introductions, export propensity and intensity are found to be positively associated with R&D spending. Although the breakdown for process-related R&D and product-related R&D are not available, our results suggest that over and above product-related R&D (captured by new product introductions), R&D spent last period related to improvements on existing products (some of which are process-related) increases the propensity to export and how much is exported. Though very few firms in China perform R&D, the export effect of R&D on firms that do is substantial, a one percentage point increase in R&D intensity increases exports by 27%. Our results do not support Huang et al.’s (2008) finding that Chinese firms’ export intensity is not correlated with firm R&D spending although a comparable percentage of the firms in our sample do not invest in R&D.

The two financial position controls are statistically insignificant. There is no evidence that firm financial position matters in firms’ decisions to export, and how much to export. Our findings are consistent with those found using data from industrialized countries such as Greenaway et al. (2007) and Bellone et al. (2010) using data from British and French firms, respectively. Berman and Héricourt (2010) pool data from nine non-industrialized countries, their sample includes firms from China in 1998-2002. They find a positive export-*ex ante* financial position linkage. Since they pool data from nine countries, it is not possible to discern from their results if their overall conclusion would apply to just the Chinese firms in their sample.

Finally, compared to state-owned enterprises, private Chinese firms (shareholding firms and firms with personal invested capital) have higher exporting likelihood and intensity. The same goes for firms with either foreign equity or with equity from investors from HKMT. The coefficients for the last two types are larger than those for private Chinese firms. And, those for foreign firms are larger than those for HKMT firms. This difference is statistically significant at the 5% level in both the probit and Tobit models. The latter is opposite of our expectations and is inconsistent with the notion that FDI from HKMT are primarily export-oriented while non-HKMT FDI are primarily market-oriented. One possible explanation for our results is this: There has been a change in the relative importance of FDI sources in the 2000s. And these new important FDI sources are primarily in China to access its pool of cheap labor. For example, the share of the United States in realized FDI between 1979 and 1999 was 8% (second only to Hong Kong) while South Korea’s share was less than 3% (see Zhang, 2005). However, by 2005-2006, the US share dropped to about 5% while South Korea’s share doubled to 7%. The change in the composition of FDI sources, and thus, the motivation for FDI in China may be one reason why foreign firms’ exporting propensity and intensity are larger than those for HKMT firms.[[22]](#footnote-22)

*Robustness Check*

It is possible that past export experience is correlated with the other regressors in the estimating equation, especially with firms’ financial position. Berman and Héricourt (2010) argue that financial position may matter more for firms entering foreign markets for the first time. Implicitly, this suggests that financial position may matter less for continuous exporters. Thus, equations (2) and (3) are re-estimated excluding past export experience. Firms are then sorted into four groups: continuous exporters, starters, switchers, and non-exporters. Essentially, we ask if there are differences in the 2007 exporting decisions among these four types of firms. Continuous exporters are firms with positive exports in both 2005 and 2006; starters are firms that have positive exports only in 2006; switchers have positive exports in 2005 but zero exports in 2006; and, non-exporters are firms with zero exports in both 2005 and 2006. Note that this grouping is based on firms’ status in 2005 and 2006; therefore, it is possible that a firm classified as a non-exporter have positive exports prior to 2005. This limitation needs to be kept in mind when interpreting the results that follow.

The Probit and Tobit estimates for these four groups are in Table 4A to Table 4D, respectively. Pseudo R-squares for the Probit (Tobit) estimates range from 0.08 to 0.13 (0.02-0.07). These are lower than those in the pooled regressions. But, the Probit models still provide good predictive powers with a 74-97% predicted-actual match rates. As in the pooled estimates, in all four groups, export propensity and intensity increase with firm size and labor-skill intensity (except switchers). Productivity is statistically significant only among continuous exporters and starters (Table 4A and Table 4B). This implies that only productive firms will continue to export in 2007. Among non-exporters, there is no evidence of a correlation between current year exports and past firm productivity (Table 4D). These results together are consistent with the learning-by-exporting hypothesis. That is, *ex-ante* productivity status does not matter in the (initial) exporting decisions (non-exporters); but, does matter in subsequent exporting decisions of previous exporters (continuous exporters and starters). In other words, past export experience improve firm productivity thereby enabling firms to remain competitive in foreign markets.

**Table 4A to Table 4D near here**

The share of new products in total output is statistically significant only among continuous exporters and non-exporters. Not surprising, to continue to be successful in foreign markets, firms need to continually devote resources to increase the relative importance of new products in their overall output portfolio. Likewise, for firms with no export experience, having new products are an entry prerequisite and the larger the share of new products in firms’ output, the more likely firms would be able to export. Moreover, the estimated Tobit marginal effects for non-exporters are economically large, a ten percentage point increase in new products share will almost double firms’ exports.

Only within industry-region spillover is statistically significant with a positive coefficient in all four regressions. As previously noted, this is one difference compared to studies using developed country firms such as Bernard and Jensen (2004). The presence of other exporters does not discourage firms from exporting. Comparing the coefficient estimates across the four groups show that continuous exporters are the least sensitive while non-exporters are the most sensitive to spillovers. Non-exporters potentially benefit most from other exporters in their industry and region of operation.

The results for R&D in the pooled regression are mostly due to non-exporters. Past R&D is statistically significant at the 1% level only in Table 4D. A one percentage point increase in R&D intensity will increase exports by close to 200%, all else equal. At first glance, this estimate seems extremely large; however, recall that very few of the firms in our sample have positive R&D. In particular, mean R&D intensity among non-exporters is 0.08%, compared with 0.13% for both continuous exporters and starters. This, combined with the result for new products share, suggest that the chance of successfully entering foreign markets for the first time is positively associated with sustained prior R&D investments that lead to new products and/or improved processes. These investments translate to sizeable exports where none have occurred before.

Recall that the two financial position measures are insignificant in the pooled regression. When firms are grouped according to past export experience, liquidity ratio is now statistically significant at the 5% level among starters and non-exporters (Table 4B and Table 4D). This is consistent with Berman and Héricourt’s (2010) argument that “sunk entry costs, i.e. the costs of entering the export market for the first time, and fixed continuing costs, i.e. the costs of maintaining an activity on the export market, are fundamentally different, and that the first set of costs is higher.” (p. 213) Finance matters only among starters and non-exporters. These firms need to overcome the sunk cost of entering foreign markets. Finance does not matter among continuous exporters. In other words, fixed continuing costs do not deter continuous exporters from servicing foreign markets. However, contrary to Berman and Héricourt’s (2010) findings, we find that firms with lower liquidity ratios have higher export propensities and intensities. That is, firms operating in China draw on their own internal funds if they are to sell abroad. According to Bellone et al. (2010), low liquidity need not indicate bad financial health. In fact, strong firm fundamentals (e.g., in-demand products to offer) can offset low liquidity. Besides, in an environment where external financing is not readily available or where financing decisions are based on non-market forces,[[23]](#footnote-23) firms have to rely on internal funds for various expansion decisions such as selling in foreign markets. Leverage has a positive coefficient in the Tobit regression for starters (Table 4B). New exporters with high leverage will export more. This seems to suggest that access to external funding is critical for export expansion among starters.

Finally, two patterns related to ownership structure are worth emphasizing here. First, among continuous exporters, no discernible difference in exports is observed among collectively- and privately-owned Chinese firms and SOEs (Table 4A); but, HKMT and foreign firms export more. Additionally, the coefficient estimates for firms with equity from HKMT is smaller than firms with foreign equity; and, the difference in the Tobit regressions is statistically significant at the 10% level. Thus, foreign firms in China tend to export more than HKMT firms. Second, among starters, foreign firms’ export propensity and intensity are higher compared to SOEs, and once again, no difference is observed across all Chinese-owned firms. Coefficient estimates for foreign firms are again larger than those for HKMT firms. However, this difference is statistically insignificant.

**IV. Concluding Remarks**

We contribute to the growing trade literature using micro level evidence. Data from close to 200,000 manufacturing firms operating in China show that firms’ export propensity and intensity increase with previous export experience, size, labor-skill intensity, new product introductions, and R&D intensity. Positive within-industry exporting spillovers are obtained. Export decisions also vary by ownership type. We find no evidence to support the “productivity paradox” found in past research. Indeed, exporting propensity and intensity are positively associated with firm productivity. Finally, we find no evidence that firm financial position is correlated with the decision to export or how much to export.

For the most part, the above (pooled) results hold when firms are grouped by past export experience, with these three important exceptions: First, firm productivity matters only among continuous exporters and starters. This suggests that past export experience improve firm productivity, and this enables firms to remain competitive in foreign markets. Second, R&D and new product introductions are both critical to the exporting decisions of non-exporters. For successful first-time foreign market entry, prior investments on R&D are necessary. These investments expand firms’ product offerings and/or improve production processes thereby increasing competitiveness. Third, finance matters among non-exporters and starters, but not among continuous exporters. Therefore, sunk costs of entry do deter firms from exporting, but fixed continuing costs do not. And, unlike firms in developed countries, exporting firms in China have lower liquidity; thus, firms in China draw on internal funds for foreign market expansion.

Our findings have important implications given China’s stated medium- and long-term goal of improving the country’s science and technology (S&T) capacity by the end of this decade. To this end, the country has set an R&D spending target of 2.5% of GDP by 2020, up from 1.4% in 2006.[[24]](#footnote-24) Although very few of the firms included in our study conduct R&D, we find economically large export-R&D effect for non-exporters. Thus, one can imagine what these planned large investments in R&D will do to Chinese firms’ future competitiveness in the international marketplace. Deployed appropriately and efficiently, these investments do not only affect the firms conducting the R&D directly but may potentially benefit other firms via R&D spillovers. Our results suggest that these planned R&D investments will increase both the number of successful Chinese exporters (extensive margin) and the amount of exports among existing exporters (intensive margin). China’s medium- and long-term plan for S&T development also encourages firms to set-up R&D centers abroad and to enter foreign markets via greenfield FDI. Both strategies should complement Chinese firms’ current exporting success.

Our results also indicate that firm *ex ante* financial position matters among starters and non-exporters. Not surprising, in an environment where external financing is difficult to obtain either because its allocation is less reliant on firm fundamentals, or where credit standards are less transparent, expansion decisions rely on internal funding sources. China’s rapid growth to date is based on the success of its exporters despite difficulty in obtaining outside financing for expansion. To what extent current lending and financing environment can support China’s future growth remains to be seen. Recently, the Chinese government issued several notices making it easier for small enterprises to obtain outside financing (see China Banking Regulatory Commission (CBRC) Notice (2008) No. 62, CBRC Notice (2008) No. 82, and CBRC General Office Notice (2008) No. 71).[[25]](#footnote-25) CBRC Notice (2008) No. 82 encouraged banks to set up specific departments to handle loan applications from small enterprises and to streamline the loan application process. According to CBRC Notice (2008) No. 62 and CBRC General Office Notice (2008) No. 71, banks should focus more on companies involved in fields encouraged by the government, for instance, labor intensive firms, technology- and innovation- intensive firms, and environment-friendly firms. CBRC Notice (2008) No. 71 specifically discourages banks from treating small firms unfairly in the loan decision process. If these regulations are successful in expanding credit to small enterprises, these firms will find it easier to expand into foreign markets thereby adding to the number of successful Chinese exporters.

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|  |  |  |  |
| --- | --- | --- | --- |
| Table 1. Descriptive Statistics |  |  |  |
| Variable | Obs | Mean | Std. Dev. |
| Export status | 175,830 | 0.30 | 0.46 |
| Export share | 175,830 | 0.19 | 0.36 |
| Exports, 1000 yuan | 175,830 | 29,368.24 | 418,047.20 |
| Exported last year | 175,830 | 0.30 | 0.46 |
| Exported two years ago | 175,830 | 0.03 | 0.17 |
| Employment | 175,830 | 234.57 | 681.84 |
| Wages, 1000 yuan | 175,830 | 16.45 | 12.84 |
| Productivity | 175,830 | 2.50 | 1.07 |
| Productivity, revenue-based | 175,830 | 1.88 | 1.15 |
| Introduced new product | 175,830 | 0.086 | 0.28 |
| New product share | 175,830 | 0.034 | 0.15 |
| Spillover (Industry & Province) | 175,830 | 0.215 | 0.29 |
| Spillover (Industry) | 175,830 | 0.227 | 0.19 |
| Spillover (Province) | 175,830 | 0.224 | 0.19 |
| R&D intensity | 175,830 | 0.001 | 0.00 |
| Liquidity | 175,830 | 0.09 | 0.27 |
| Leverage | 175,830 | 0.93 | 0.60 |
| State-owned | 3,683 |  |  |
| Collective-owned | 10,386 |  |  |
| Private, shareholding | 29,558 |  |  |
| Private, personal capital | 88,630 |  |  |
| Hong Kong, Macao, Taiwan | 21,032 |  |  |
| Foreign-owned | 21,709 |  |  |
| Others | 832 |  |  |

Note: Export status, export share, and the amount of firm exports are for 2007.

All other variables are measured in 2006.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Table 2. Correlation Coefficients | |  |  |  |  |  |  |
| Variables |  | (1) | (2) | (3) | (4) | (5) | (6) |
| Employment | (1) | 1.00 |  |  |  |  |  |
| Wage | (2) | 0.04 | 1.00 |  |  |  |  |
| Productivity | (3) | 0.36 | 0.22 | 1.00 |  |  |  |
| Productivity, revenue-based | (4) | 0.17 | 0.10 | 0.25 | 1.00 |  |  |
| New product share | (5) | 0.10 | 0.08 | 0.07 | 0.03 | 1.00 |  |
| Spillover (Ind. & Prov.) | (6) | 0.23 | 0.12 | -0.07 | 0.08 | 0.04 | 1.00 |
| Spillover (Industry) | (7) | 0.21 | 0.05 | -0.09 | 0.10 | 0.04 | 0.61 |
| Spillover (Province) | (8) | 0.11 | 0.27 | -0.09 | 0.02 | 0.02 | 0.48 |
| R&D intensity | (9) | 0.11 | 0.11 | 0.09 | 0.03 | 0.21 | -0.02 |
| Liquidity ratio | (10) | -0.07 | 0.09 | 0.10 | 0.03 | 0.01 | 0.04 |
| Leverage ratio | (11) | 0.06 | -0.07 | -0.09 | -0.02 | -0.01 | -0.03 |
|  |  |  |  |  |  |  |  |
| Variables |  | (7) | (8) | (9) | (10) | (11) |  |
| Spillover (Industry) | (7) | 1.00 |  |  |  |  |  |
| Spillover (Province) | (8) | 0.31 | 1.00 |  |  |  |  |
| R&D intensity | (9) | 0.00 | 0.01 | 1.00 |  |  |  |
| Liquidity ratio | (10) | 0.05 | 0.06 | 0.03 | 1.00 |  |  |
| Leverage ratio | (11) | -0.04 | -0.04 | -0.02 | -0.88 | 1.00 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Table 3. Determinants of the Decision to Export (Probit) and How Much to Export (Tobit) in 2007 | | | | |
|  | Probit | | Tobit | |
|  | (1) | (2) | (3) | (4) |
| Exported last year | 2.695 | 2.695 | 23.193 | 23.193 |
|  | (0.012)\*\*\* | (0.012)\*\*\* | (0.064)\*\*\* | (0.064)\*\*\* |
| Exported two years ago | 0.919 | 0.919 | 10.169 | 10.170 |
|  | (0.022)\*\*\* | (0.022)\*\*\* | (0.193)\*\*\* | (0.193)\*\*\* |
| Log Employment | 0.195 | 0.197 | 1.262 | 1.271 |
|  | (0.007)\*\*\* | (0.007)\*\*\* | (0.031)\*\*\* | (0.031)\*\*\* |
| Log Wage | 0.119 | 0.119 | 0.856 | 0.856 |
|  | (0.013)\*\*\* | (0.013)\*\*\* | (0.064)\*\*\* | (0.064)\*\*\* |
| Productivity | 0.019 | 0.018 | 0.362 | 0.355 |
|  | (0.006)\*\*\* | (0.006)\*\*\* | (0.032)\*\*\* | (0.032)\*\*\* |
| New product share | 0.154 | 0.154 | 0.755 | 0.754 |
|  | (0.038)\*\*\* | (0.038)\*\*\* | (0.160)\*\*\* | (0.160)\*\*\* |
| Spillover (Industry & Province) | 1.273 | 1.273 | 6.516 | 6.518 |
|  | (0.026)\*\*\* | (0.026)\*\*\* | (0.117)\*\*\* | (0.117)\*\*\* |
| Spillover (Industry) | 0.135 | 0.134 | 1.040 | 1.036 |
|  | (0.048)\*\*\* | (0.048)\*\*\* | (0.221)\*\*\* | (0.221)\*\*\* |
| Spillover (Province) | 0.004 | 0.004 | -0.284 | -0.286 |
|  | (0.041) | (0.041) | (0.179) | (0.179) |
| R&D intensity | 5.675 | 5.626 | 27.437 | 27.214 |
|  | (1.171)\*\*\* | (1.170)\*\*\* | (5.477)\*\*\* | (5.476)\*\*\* |
| Liquidity ratio | -0.029 |  | -0.238 |  |
|  | (0.021) |  | (0.104)\*\* |  |
| Leverage ratio |  | 0.000 |  | 0.040 |
|  |  | (0.010) |  | (0.049) |
| Collective-owned | -0.093 | -0.095 | -0.552 | -0.560 |
|  | (0.048)\* | (0.047)\*\* | (0.287)\* | (0.287)\* |
| Private, shareholding | 0.095 | 0.094 | 0.746 | 0.745 |
|  | (0.042)\*\* | (0.042)\*\* | (0.255)\*\*\* | (0.255)\*\*\* |
| Private, personal capital | 0.103 | 0.103 | 0.791 | 0.794 |
|  | (0.042)\*\* | (0.042)\*\* | (0.251)\*\*\* | (0.251)\*\*\* |
| Hong Kong, Macao, Taiwan | 0.406 | 0.403 | 2.162 | 2.146 |
|  | (0.043)\*\*\* | (0.043)\*\*\* | (0.255)\*\*\* | (0.255)\*\*\* |
| Foreign-owned | 0.448 | 0.446 | 2.509 | 2.493 |
|  | (0.043)\*\*\* | (0.043)\*\*\* | (0.253)\*\*\* | (0.253)\*\*\* |
| Other | 0.055 | 0.054 | 0.382 | 0.381 |
|  | (0.090) | (0.090) | (0.561) | (0.560) |
| Constant | -3.532 | -3.538 | -23.265 | -23.346 |
|  | (0.079)\*\*\* | (0.080)\*\*\* | (0.436)\*\*\* | (0.437)\*\*\* |
|  |  |  |  |  |
| Pseudo R-squared | 0.7149 | 0.7149 | 0.3141 | 0.3141 |
| Prob > chi-square | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| left-censored observations |  |  | 122,264 | 122,264 |
| Correctly classified | 94.58% | 94.58% |  |  |
| Observations | 175,830 | 175,830 | 175,830 | 175,830 |

Notes: Numbers in parentheses are robust standard errors. \*\*\*, \*\*, and \* significant at 1%, 5%, and 10% level.

Regressions include two-digit industry and province location qualitative indicators.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Table 4A. Determinants of the Decision to Export (Probit) and How Much to Export (Tobit) in 2007  Sample: Continuous Exporters | | | | |
|  | Probit | | Tobit | |
|  | (1) | (2) | (3) | (4) |
| Log Employment | 0.177 | 0.178 | 0.884 | 0.889 |
|  | (0.011)\*\*\* | (0.011)\*\*\* | (0.024)\*\*\* | (0.024)\*\*\* |
| Log Wage | 0.090 | 0.090 | 0.440 | 0.441 |
|  | (0.024)\*\*\* | (0.024)\*\*\* | (0.053)\*\*\* | (0.053)\*\*\* |
| Productivity | 0.023 | 0.022 | 0.465 | 0.461 |
|  | (0.011)\*\* | (0.011)\* | (0.026)\*\*\* | (0.026)\*\*\* |
| New product share | 0.119 | 0.119 | 0.315 | 0.314 |
|  | (0.059)\*\* | (0.059)\*\* | (0.109)\*\*\* | (0.109)\*\*\* |
| Spillover (Industry & Province) | 1.195 | 1.196 | 3.952 | 3.954 |
|  | (0.042)\*\*\* | (0.042)\*\*\* | (0.087)\*\*\* | (0.087)\*\*\* |
| Spillover (Industry) | -0.212 | -0.212 | -0.549 | -0.550 |
|  | (0.079)\*\*\* | (0.079)\*\*\* | (0.162)\*\*\* | (0.162)\*\*\* |
| Spillover (Province) | 0.067 | 0.067 | -0.142 | -0.144 |
|  | (0.067) | (0.067) | (0.132) | (0.132) |
| R&D intensity | 3.919 | 3.885 | 3.869 | 3.763 |
|  | (2.153)\* | (2.152)\* | (3.917) | (3.918) |
| Liquidity ratio | 0.042 |  | -0.033 |  |
|  | (0.038) |  | (0.084) |  |
| Leverage ratio |  | -0.032 |  | -0.039 |
|  |  | (0.018)\* |  | (0.042) |
| Collective-owned | -0.174 | -0.175 | -0.146 | -0.151 |
|  | (0.105)\* | (0.105)\* | (0.285) | (0.285) |
| Private, shareholding | -0.087 | -0.088 | 0.095 | 0.093 |
|  | (0.094) | (0.094) | (0.243) | (0.243) |
| Private, personal capital | -0.058 | -0.058 | 0.282 | 0.282 |
|  | (0.093) | (0.093) | (0.240) | (0.240) |
| Hong Kong, Macao, Taiwan | 0.171 | 0.168 | 0.764 | 0.752 |
|  | (0.094)\* | (0.094)\* | (0.239)\*\*\* | (0.239)\*\*\* |
| Foreign-owned | 0.145 | 0.143 | 0.854 | 0.842 |
|  | (0.093) | (0.093) | (0.237)\*\*\* | (0.237)\*\*\* |
| Other | -0.065 | -0.066 | 0.132 | 0.132 |
|  | (0.211) | (0.211) | (0.555) | (0.555) |
| Constant | -0.022 | 0.011 | 6.791 | 6.811 |
|  | (0.162) | (0.163) | (0.376)\*\*\* | (0.377)\*\*\* |
|  |  |  |  |  |
| Pseudo R-squared | 0.0938 | 0.0939 | 0.0265 | 0.0265 |
| Prob > chi-square | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| left-censored observations |  |  | 3,025 | 3,025 |
| Correctly classified | 93.58% | 93.58% |  |  |
| Observations | 47,091 | 47,091 | 47,091 | 47,091 |

See notes in Table 3.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Table 4B. Determinants of the Decision to Export (Probit) and How Much to Export (Tobit) in 2007  Sample: Starters | | | | |
|  | Probit | | Tobit | |
|  | (1) | (2) | (3) | (4) |
| Log Employment | 0.119 | 0.122 | 1.154 | 1.179 |
|  | (0.021)\*\*\* | (0.021)\*\*\* | (0.143)\*\*\* | (0.142)\*\*\* |
| Log Wage | 0.097 | 0.097 | 0.743 | 0.748 |
|  | (0.040)\*\* | (0.040)\*\* | (0.281)\*\*\* | (0.281)\*\*\* |
| Productivity | 0.043 | 0.041 | 0.645 | 0.628 |
|  | (0.019)\*\* | (0.019)\*\* | (0.139)\*\*\* | (0.139)\*\*\* |
| New product share | -0.105 | -0.107 | -0.669 | -0.674 |
|  | (0.091) | (0.091) | (0.668) | (0.668) |
| Spillover (Industry & Province) | 1.270 | 1.270 | 9.931 | 9.929 |
|  | (0.090)\*\*\* | (0.090)\*\*\* | (0.540)\*\*\* | (0.540)\*\*\* |
| Spillover (Industry) | -0.026 | -0.029 | -0.313 | -0.335 |
|  | (0.146) | (0.146) | (0.995) | (0.995) |
| Spillover (Province) | 0.194 | 0.192 | 0.719 | 0.705 |
|  | (0.134) | (0.134) | (0.871) | (0.872) |
| R&D intensity | 3.889 | 3.852 | 17.764 | 17.395 |
|  | (3.455) | (3.451) | (23.037) | (23.038) |
| Liquidity ratio | -0.144 |  | -1.238 |  |
|  | (0.068)\*\* |  | (0.475)\*\*\* |  |
| Leverage ratio |  | 0.055 |  | 0.470 |
|  |  | (0.031)\* |  | (0.218)\*\* |
| Collective-owned | 0.048 | 0.048 | 0.731 | 0.732 |
|  | (0.179) | (0.179) | (1.483) | (1.483) |
| Private, shareholding | 0.264 | 0.264 | 2.316 | 2.317 |
|  | (0.152)\* | (0.152)\* | (1.271)\* | (1.271)\* |
| Private, personal capital | 0.194 | 0.196 | 1.845 | 1.860 |
|  | (0.150) | (0.150) | (1.257) | (1.257) |
| Hong Kong, Macao, Taiwan | 0.431 | 0.427 | 3.610 | 3.580 |
|  | (0.154)\*\*\* | (0.154)\*\*\* | (1.271)\*\*\* | (1.271)\*\*\* |
| Foreign-owned | 0.502 | 0.498 | 4.096 | 4.072 |
|  | (0.153)\*\*\* | (0.153)\*\*\* | (1.261)\*\*\* | (1.261)\*\*\* |
| Other | 0.738 | 0.738 | 5.399 | 5.406 |
|  | (0.413)\* | (0.413)\* | (2.467)\*\* | (2.469)\*\* |
| Constant | -1.083 | -1.159 | -5.180 | -5.846 |
|  | (0.268)\*\*\* | (0.269)\*\*\* | (2.061)\*\* | (2.070)\*\*\* |
|  |  |  |  |  |
| Pseudo R2 | 0.0773 | 0.0771 | 0.0202 | 0.0202 |
| Prob > chi2 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| left-censored observations |  |  | 1,767 | 1,767 |
| Correctly classified | 73.52% | 73.55% |  |  |
| Observations | 6,394 | 6,394 | 6,394 | 6,394 |

See notes in Table 3.

Table 4C. Determinants of the Decision to Export (Probit) and How Much to Export (Tobit) in 2007

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sample: Switchers |  |  |  |  |
|  | Probit | | Tobit | |
|  | (1) | (2) | (3) | (4) |
| Log Employment | 0.174 | 0.174 | 3.046 | 3.041 |
|  | (0.024)\*\*\* | (0.024)\*\*\* | (0.388)\*\*\* | (0.387)\*\*\* |
| Log Wage | 0.069 | 0.070 | 1.401 | 1.415 |
|  | (0.043) | (0.043) | (0.709)\*\* | (0.709)\*\* |
| Productivity | 0.012 | 0.012 | 0.397 | 0.407 |
|  | (0.022) | (0.022) | (0.367) | (0.367) |
| New product share | 0.077 | 0.074 | 1.403 | 1.328 |
|  | (0.141) | (0.141) | (2.413) | (2.412) |
| Spillover (Industry & Province) | 1.339 | 1.340 | 22.546 | 22.554 |
|  | (0.087)\*\*\* | (0.087)\*\*\* | (1.312)\*\*\* | (1.312)\*\*\* |
| Spillover (Industry) | -0.130 | -0.129 | -1.820 | -1.822 |
|  | (0.165) | (0.165) | (2.704) | (2.705) |
| Spillover (Province) | -0.267 | -0.268 | -4.943 | -4.959 |
|  | (0.144)\* | (0.144)\* | (2.318)\*\* | (2.318)\*\* |
| R&D intensity | 8.553 | 8.530 | 131.978 | 131.328 |
|  | (4.449)\* | (4.445)\* | (69.800)\* | (69.721)\* |
| Liquidity ratio | -0.076 |  | -1.343 |  |
|  | (0.073) |  | (1.220) |  |
| Leverage ratio |  | 0.049 |  | 0.836 |
|  |  | (0.033) |  | (0.545) |
| Collective-owned | 0.363 | 0.366 | 6.499 | 6.534 |
|  | (0.214)\* | (0.215)\* | (3.887)\* | (3.890)\* |
| Private, shareholding | 0.537 | 0.540 | 9.711 | 9.755 |
|  | (0.198)\*\*\* | (0.198)\*\*\* | (3.592)\*\*\* | (3.596)\*\*\* |
| Private, personal capital | 0.530 | 0.532 | 9.558 | 9.585 |
|  | (0.194)\*\*\* | (0.194)\*\*\* | (3.538)\*\*\* | (3.541)\*\*\* |
| Hong Kong, Macao, Taiwan | 0.882 | 0.885 | 15.366 | 15.387 |
|  | (0.198)\*\*\* | (0.198)\*\*\* | (3.575)\*\*\* | (3.578)\*\*\* |
| Foreign-owned | 0.885 | 0.887 | 15.503 | 15.529 |
|  | (0.197)\*\*\* | (0.197)\*\*\* | (3.569)\*\*\* | (3.572)\*\*\* |
| Other | 0.201 | 0.203 | 3.822 | 3.863 |
|  | (0.338) | (0.338) | (6.072) | (6.062) |
| Constant | -2.548 | -2.604 | -44.682 | -45.628 |
|  | (0.334)\*\*\* | (0.337)\*\*\* | (5.735)\*\*\* | (5.779)\*\*\* |
|  |  |  |  |  |
| Pseudo R-squared | 0.1284 | 0.1286 | 0.0504 | 0.0505 |
| Prob > chi-square | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| left-censored observations |  |  | 3,750 | 3,750 |
| Correctly classified | 75.48% | 75.44% |  |  |
| Observations | 5,195 | 5,195 | 5,195 | 5,195 |

See notes in Table 3.

Table 4D. Determinants of the Decision to Export (Probit) and How Much to Export (Tobit) in 2007

Sample: Non-exporters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Probit | | Tobit | |
|  | (1) | (2) | (3) | (4) |
| Log Employment | 0.212 | 0.215 | 6.646 | 6.721 |
|  | (0.010)\*\*\* | (0.010)\*\*\* | (0.299)\*\*\* | (0.298)\*\*\* |
| Log Wage | 0.140 | 0.140 | 4.387 | 4.386 |
|  | (0.017)\*\*\* | (0.017)\*\*\* | (0.538)\*\*\* | (0.538)\*\*\* |
| Productivity | 0.007 | 0.005 | 0.289 | 0.227 |
|  | (0.010) | (0.010) | (0.297) | (0.296) |
| New product share | 0.310 | 0.309 | 9.572 | 9.567 |
|  | (0.053)\*\*\* | (0.053)\*\*\* | (1.615)\*\*\* | (1.615)\*\*\* |
| Spillover (Industry & Province) | 1.081 | 1.081 | 33.934 | 33.945 |
|  | (0.042)\*\*\* | (0.042)\*\*\* | (1.267)\*\*\* | (1.267)\*\*\* |
| Spillover (Industry) | 0.459 | 0.458 | 14.246 | 14.206 |
|  | (0.069)\*\*\* | (0.069)\*\*\* | (2.129)\*\*\* | (2.128)\*\*\* |
| Spillover (Province) | -0.066 | -0.067 | -2.159 | -2.170 |
|  | (0.062) | (0.062) | (1.919) | (1.919) |
| R&D intensity | 5.993 | 5.892 | 182.159 | 179.099 |
|  | (1.584)\*\*\* | (1.583)\*\*\* | (48.427)\*\*\* | (48.416)\*\*\* |
| Liquidity ratio | -0.060 |  | -1.826 |  |
|  | (0.030)\*\* |  | (0.921)\*\* |  |
| Leverage ratio |  | 0.006 |  | 0.191 |
|  |  | (0.013) |  | (0.407) |
| Collective-owned | -0.124 | -0.127 | -3.880 | -3.956 |
|  | (0.071)\* | (0.071)\* | (2.210)\* | (2.209)\* |
| Private, shareholding | 0.129 | 0.129 | 4.067 | 4.071 |
|  | (0.061)\*\* | (0.061)\*\* | (1.903)\*\* | (1.903)\*\* |
| Private, personal capital | 0.164 | 0.165 | 5.106 | 5.141 |
|  | (0.060)\*\*\* | (0.060)\*\*\* | (1.865)\*\*\* | (1.865)\*\*\* |
| Hong Kong, Macao, Taiwan | 0.512 | 0.509 | 15.879 | 15.783 |
|  | (0.063)\*\*\* | (0.063)\*\*\* | (1.965)\*\*\* | (1.964)\*\*\* |
| Foreign-owned | 0.621 | 0.618 | 19.233 | 19.151 |
|  | (0.063)\*\*\* | (0.063)\*\*\* | (1.953)\*\*\* | (1.952)\*\*\* |
| Other | 0.014 | 0.014 | 0.557 | 0.529 |
|  | (0.132) | (0.133) | (4.130) | (4.131) |
| Constant | -3.860 | -3.876 | -121.339 | -121.836 |
|  | (0.115)\*\*\* | (0.115)\*\*\* | (3.524)\*\*\* | (3.536)\*\*\* |
|  |  |  |  |  |
| Pseudo R-squared | 0.1238 | 0.1237 | 0.0695 | 0.0694 |
| Prob > chi-square | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| left-censored observations |  |  | 113,722 | 113,722 |
| Correctly classified | 97.07% | 97.07% |  |  |
| Observations | 117,150 | 117,150 | 117,150 | 117,150 |

See notes in Table 3.

1. See World Trade Organization’s (WTO) Trade Profiles. China is also the second largest importer with an 8% share in 2009, up from a 3% share in 2000. The country’s share in world trade (exports plus imports) is about 4% in 2000, this increased to 9% in 2009. To put these rates in historical perspective, according to Keller et al. (2010), China’s share in world trade in 1913-1938 is about 2%. [↑](#footnote-ref-1)
2. This literature essentially looks at the *ex ante* characteristics of exporting firms. A related literature studies the *ex post* characteristics of exporting firms *vis-à-vis* non-exporters. The second strand is referred to as learning-by-exporting. Exporters gain new knowledge when they enter foreign markets thereby increasing their productivity. For the most part, the evidence in favor of learning-by-exporting is mixed. Some studies find productivity improvements among exporters, but a number of studies do not find such improvements (e.g., Bernard and Jensen, 1999). Bernard et al. (2007) and Wagner (2007) survey the literature. [↑](#footnote-ref-2)
3. This also provides a baseline for understanding Chinese firms’ R&D investment at the adoption of the *National Medium- and Long-Term Program for Science and Technology Development* (2006-2020) by China’s State Council in 2006. [↑](#footnote-ref-3)
4. Melitz (2003) provides a theoretical framework for empirical analysis at the firm level. He introduced firm heterogeneity in international trade models. In essence, Melitz’s model makes the following predictions: Firms with high marginal costs would exit; firms with intermediate marginal costs would service the domestic market; and, firms with the lowest marginal costs would service the domestic market and enter foreign markets as well. [↑](#footnote-ref-4)
5. Our estimates are at the four-digit industry level. See China’s Industrial Classification and Codes for National Economic Activities (ICCNEA). ICCNEA is based on ISIC Rev. 3. [↑](#footnote-ref-5)
6. Productivity estimations are implemented in Stata, see Petrin et al. (2004). [↑](#footnote-ref-6)
7. Unfortunately, the dataset does not contain information on how much of new product output are exported. [↑](#footnote-ref-7)
8. New products include completely new products or products that have undergone significant improvements in structure, materials, techniques, etc. Also, new products refer to firms’ vantage point and not the market’s. It is possible the products are already available in the marketplace. [↑](#footnote-ref-8)
9. According to Amiti and Weinstein (2009), exporters are typically not paid two to six months after shipment if they do not secure trade finance from financial institutions. And, survey data show that only 19% of all trade transactions in the last quarter of 2007 were on cash-in-advance basis. [↑](#footnote-ref-9)
10. The authors find that firms’ *ex post* financial health is positively correlated with exports. [↑](#footnote-ref-10)
11. Following Greenaway et al. (2007), we define liquidity ratio as current assets less current liabilities over total assets, and leverage ratio as current liability over current assets. [↑](#footnote-ref-11)
12. In other words, a negative relationship between the propensity to export and liquidity and leverage ratios cannot be ruled out. This is because high liquidity may be indicative of cash hoarding because of firm inability to access external funds while high leverage may be indicative of default risk. Therefore, high liquidity and leverage ratios may lower the propensity to enter foreign markets. [↑](#footnote-ref-12)
13. These indicators are based on firms’ recorded registration type in the database. [↑](#footnote-ref-13)
14. Data from the US Bureau of Economic Analysis (BEA) show that between 2000 and 2008, about 70% of the goods sold by majority-owned Chinese affiliates of US firms are to the local Chinese market (see BEA’s interactive data facility for US direct investment abroad). Thus, US FDI in China is market-oriented rather than exporting-oriented. [↑](#footnote-ref-14)
15. For brevity, province refers to provinces (e.g., Fujian), autonomous regions (e.g., Inner Mongolia), and municipalities (e.g., Beijing). Beverage and Tobacco manufacturing were combined into one industry due to limited data. Likewise, data from the following provinces are combined: Qinghai with Tibet; Henan with Shanxi; and Hainan with Guangdong. [↑](#footnote-ref-15)
16. Deflators are obtained from the China Statistical Yearbook, NBS (2007). [↑](#footnote-ref-16)
17. In 2007, the average exchange rate was 7.6058 yuan/US$1. Note that we only have firms’ total exports and do not have the product or destination breakdowns of these exports. [↑](#footnote-ref-17)
18. We should note that all spillover measures and productivity estimates are based on all manufacturing firms in the database (not just our sample) after all data were checked for consistency. [↑](#footnote-ref-18)
19. For brevity, detailed summary of our data are not included in Table 1 but are available on request. [↑](#footnote-ref-19)
20. Estimates using revenue in productivity calculations and a qualitative indicator for new product introductions are available from the authors upon request. [↑](#footnote-ref-20)
21. Marginal effects are tabulated at the mean values of the regressors. We do not report them here but they are available from the authors upon request. [↑](#footnote-ref-21)
22. Unfortunately, detailed breakdown of foreign equity sources are not available in our dataset so we cannot be more definitive in our explanation. [↑](#footnote-ref-22)
23. Claessens and Tzioumis (2006) provide evidence that 75% of firms surveyed in China report that financing is a major obstacle to doing business. Additionally, a survey conducted by Xie and Lu (2003) indicates that Chinese companies pay about 40,000 yuan to obtain a million yuan bank loan (rent-seeking cost); guanxi relationships among loan managers and firms are important (see e.g., Zhang and Shao, 2007); and, about 60% of the loans made by state-owned banks are to state-owned companies (see Sjöholm and Lundin, 2010). [↑](#footnote-ref-23)
24. See China State Council (2006) and National Science Board (2010) respectively. [↑](#footnote-ref-24)
25. China Banking Regulatory Commission Notice (2008) No. 62: CBRC Notice on strictly implementing the "Promote Firm and Economic Growth, and Prevention of Loan Risk and Inflation Policy” to further improve financial services to small enterprises. CBRC General Office Notice (2008) No. 71: CBRC General Office Notice on further improving financial services to small enterprises under tight monetary policy. CBRC Notice (2008) No. 82: CBRC Guideline to commercial banks on setting up specific financial services to small enterprises. [↑](#footnote-ref-25)