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MULTINATIONALS AND THE CREATION OF CHINESE TRADE LINKAGES

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Multinationals and the Creation of Chinese Trade Linkages*

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Abstract:

This paper studies Chinese trade data from 1997 to 2003 to examine the relationship between multinational firm proximity and the formation of new export connections by private Chinese exporters. The results, which indicate that growth in the presence of multinational firms is positively associated with the formation of new trade by local Chinese firms, have a number of possible interpretations. However, further exploration suggests that information spillovers may drive this result, as the positive association due to own-industry multinational presence is particularly strong in contexts where information improvements may be the most helpful in fostering new trade relationships - new trade in differentiated products industries, and new trade by domestic enterprises in China's interior. In addition, the type of MNC contact is related to the future success of domestic exporters, as the strength of the effects are largest when the growth of foreign contacts are related to the expansion of foreign invested enterprises. Thus, it appears that a growing presence of multinational firms may enhance the export capabilities of local domestic firms.

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Introduction

Many countries actively promote foreign investment within their borders expecting to reap the benefits arising from the presence of multinational firms.¹ One particular benefit that economists have studied is how proximity to multinational firms affects local firms' export capabilities. For example, Aitken, Hanson and Harrison's (1997) work on Mexican firms suggests that proximity to multinational firms increased Mexican firms' export probabilities. However, while work on UK firms by Greenaway, Sousa and Wakelin (2004) and Chinese provinces by Ma (2004) also find a positive association between multinational presence and exporting probabilities or export volumes, a positive effect is not uncovered in all contexts.

The fact that multinational presence is not always associated with elevated export performance may not be surprising. As Aitken and Harrison (1999) point out, multinationals may have negative effects on local firms if the effects of intensified product market competition outweigh the spillover benefits of improved firm productivity among the local firms. Multinational firm activity might also harm local firms if the multinational firms' demands for workers and other factors drive up operating costs for local firms.

Most treatments of export spillovers from multinational firms study whether the export probabilities or export volumes of local firms are enhanced by proximity to multinational firms. In contrast, this paper examines another potential channel for export spillovers: whether proximity to multinational firms is associated with an expansion in the export relationships of host country exporters. This dimension of trade relationships

¹ Blomstrom and Kokko (1998), and Navaretti and Venables (2004), and Gorg and Greenaway (2004) provide comprehensive surveys of host country benefits and harms from multinational activity.

is important, since it addresses whether location near multinational firms enables local firms to increase the density of their trade networks, or the volume of their new transactions.

To study how the growing presence of multinational firms affected the creation of new Chinese trading relationships, this paper studies how the presence of multinational firms influenced the introduction of new HS8 product trades at the city level. Chinese trade between 1997 to 2003 provides an unusual opportunity to examine the relationship between multinational firm activities and the ability of local firms to increase their export connections. First, since the sample period includes China's entrance to the WTO, the increased certainty about the international treatment of China's exports may have resulted in a more rapid formation of trading relationships than is typical for countries that have already attained WTO membership. As a result, the data set is likely to provide an especially large number of new trade transactions that allow one to identify spillover effects from multinational firms. Second, since China managed to attract an unusually large volume of foreign investment in the 1990's and early 2000's, there is sizable variation in the evolution of multinational variables at the city-hS2 industry level, that again facilitates identification of spillover effects to exports.

The results indicate that private Chinese firms and entrepreneurs were indeed more likely to form new trading relationships, or to expand the number of traded products, when the number of proximate multinationals increased. This relationship is apparent whether multinational contacts are measured by the number or value of MNC export activities. Further examination of the MNC data reveal that proximity to the multinational activity was associated domestic trade expansion, when the form of the

multinational expansion involved increases in the trade of foreign invested enterprises or joint venture operations, rather than an expansion of outsourcing operations.

When the analysis includes multinational firm exports measured both by *size* and *presence*, the number of new trade relationships formed by local firms are positively related to the diversity of multinational export operations and negatively related to the volume of multinational export operations. The negative effect following from growth in the scale of multinational activities suggests that growth in multinational scale creates negative spillovers when they intensify product market competition, or create congestion in local input markets. Nonetheless, the net effect of growing multinational presence and scale is positively associated with increases in the value of new export transactions by local firms in Chinese cities.

The fine disaggregation of the data to the city-industry level allows one to identify these spillover effects. In this sense, this paper takes the approach of many other authors who improve their identification of spillovers from foreign investment, by specifying the types of multinational linkages, or by studying data disaggregated to the level at which the spillovers operate.²

This paper makes two contributions to the literature on international trade. First, while there is a well-established literature on the contributions of multinational firms to host economies, this paper is the first to examine how the presence of multinational firms contributes to the expansion of product and destination diversity of private exporters who are located in close proximity to the multinational firms. Such diversity is of interest, since there is a growing appreciation that increased export diversity may contribute to a

² See for example, Javorcik (2004), Kneller and Pisu (2005), Ruane and Sutherland (2004) or Keller and Yeaple (2003).

country's economic growth.³ In addition, this paper examines whether the presence of multinational firms affected the creation of trade relationships, as one would predict based on search models of trade. Since the observed effects are largest for differentiated goods and for trade growth in China's interior, they support that idea that multinationals, by acting as a conduit of information, facilitate international economic integration.

2. Multinational contacts and local Export Behavior

Improved access to accurate information can help explain developments in the global integration of labor and product markets. Thus, if the presence of multinational firms provides informational spillovers which enable local firms to learn more about market opportunities in foreign locations, contacts with multinational firms may enhance the export capabilities of local firms. To test this idea, and to motivate the empirical analysis, I reinterpret Rauch and Trindade's (2003) model of globalization to form predictions about the effects of multinational contacts on the formation of new export relationships by local Chinese firms and entrepreneurs.

To begin, consider a Chinese firm that is interested in initiating new product exports, or in expanding the locations to which it exports. In either case, since the formation of a new export relationship requires the Chinese manager to identify a foreign buyer the formation of the new trade relationship involves costly search. For example, while the Chinese firm can observe customer demand for radios in Britain, the Chinese firm requires further information if it is to learn whether it can profitably sell its variety of radios to British purchasers. Further, while the Chinese firm may possess enough

³ See Feenstra and Kee (2004). In addition, Kang (2004) demonstrates that since new product introductions represent an expansion in the diversity of products sold, they give a country the opportunity to expand its exports without depressing its terms of trade.

information to avoid introductions with the worst-suited, lowest-profit distribution partners, search can be modeled as yielding a single introduction within the Chinese firms' search range.⁴ The Chinese exporter forges an export relationship with the foreign buyer as long as the profits from the sales exceed the Chinese firm's reservation value, which is defined by outside opportunities in the Chinese market.

This form of search uncertainty in Rauch and Trindade's (2003) framework explains how North-South wage differentials may endure even when labor quality is identical across countries. In this reinterpretation of their model, search uncertainty can also explain why some profit-generating export transactions fail to commence. In particular, the Chinese firm may turn down a profitable foreign sales opportunity, if the Chinese firm has better sales opportunities in the Chinese market. In other cases, an ideal buyer may exist, but the failure of the search to reveal the potential partner, leaves profitable but undiscovered transactions unrealized. Finally, the sales associated with new partnerships may be small if the Chinese firm locates a viable buyer that is nonetheless inferior to the ideal, but undiscovered, partner.

Information-driven globalization can be represented as a reduction in search uncertainty, which enables firms to narrow their search, thus excluding a greater percentage of the least desirable matches. In the case of private Chinese firms or entrepreneurs, the expanding presence of multinational firms in China may have provided such information if observation of the product mix and product destinations of multinational firm exporters helped local firms learn about the types of products, and

⁴ To conceptualize search uncertainty, Rauch and Trindade consider a setting in which partners are evenly distributed on the unit circle, with the optimal partner located at position $1/2$. Search provides the random introduction to a partner in the range $[1/2-k/2, 1/2+k/2]$. Thus search uncertainty is parameterized by $k \in \{0 \leq k \leq 1\}$. If $k = 1$ the search is equivalent to a random draw from entire unit circle, while for $k = 0$ there is no informational uncertainty and the search is guaranteed to identify the ideal partner.

market locations where they could sell their products for the highest profit.⁵ Information spillovers may have also occurred if employees brought information about foreign market opportunities with them when they left the multinational firms to take a job with one of the local Chinese firms.⁶ Finally, local firms may have gained information due to the growing presence of multinational firms, even if they had no direct contact with multinational firms. For example, if the growing presence of multinational firms in a Chinese city drew an increasing number of trade agents to the city, the local Chinese firms may have gained information through the influx of agents who came to serve the new multinationals, rather than direct contact with multinational firms. Regardless of the mechanism, if the presence of multinational firms refines the search process, the expected probability of finding an acceptable match increases since the random draw originates from a narrower interval that is more tightly centered around the set of acceptable partner draws.

Nonetheless, while multinational firms may have brought informational spillovers that help facilitate the formation of export relationships by Chinese firms, increased multinational firm activity may have also brought other consequences that discouraged exporting by local Chinese firms. First, if multinational firms intensified competition in product markets, they may have reduced export opportunities for local firms. Second, if multinational expansion elevated demand for labor and factors in the Chinese cities where they operated, multinational firms may have increased local production costs, thus depressing the ability of local Chinese firms to export profitably. Overall, the net effect

⁵ The scope for learning spillovers is suggested by Brambilla's (2006) discovery that multinational firms introduced twice as many new product varieties as did domestic firms between 1998 and 2000.

⁶ Rodrik (2006) provides examples of such contacts in China.

of multinational presence will be influenced by the relative magnitude of the positive and negative spillover to local firm export capability.

To more directly test whether the association between multinational presence and the trade of local firms, exhibited evidence of informational spillovers, the regressions will test whether multinational presence was particularly helpful in information-dependent sectors.⁷

3. Estimation and Data

To estimate how multinational firm proximity affects export outcomes for Chinese exporters, I use the following regression specification:

$$(1) VNew_{hct} = \alpha + \beta_1 * OwnInd_MNC_{hc,t-1} + \beta_2 * OtherInd_MNC_{hc,t-1} + \gamma * X + \varepsilon_{hct}$$

The dependent variable, $VNew_{hct}$, is the value of new HS8 product trade transactions by private Chinese firms within an HS2 industry, where h represents the HS2 industry, c the Chinese city of origin, and t the year.

The key regressors of interest, $OwnInd_MNC_{hc,t-1}$ and $OtherInd_MNC_{hc,t-1}$, represent the level of multinational activity in the city, by multinationals in the same HS2 industry, and the effect of multinationals in other HS2 industries, respectively. In both cases, the level of multinational activity is measured by the export activities of MNCs, where the level of export activity is measured either by the value of MNC exports and or by the number of distinct MNC export transactions in the HS2 industry.

⁷ Information improvements may also increase transaction size. If uncertainty regarding partner reliability is uniform across partner introductions, Rauch and Watson (2003) demonstrate that the initial orders from suppliers that offer the highest potential profit (due to their low cost), will be larger. Besedes and Prusa (2006) find support for this idea in U.S. trade data. Similarly in this context, information gleaned due to multinational proximity might enable firms to learn more about buyer reliability.

The error term is assumed to have two components. The first, Ψ_{hc} is a city -HS2 industry fixed effect, while the second η_{hct} is an iid error term.

$$(2) \ \varepsilon_{hct} = \Psi_{hc} + \eta_{hct}$$

The inclusion of City-HS2 Industry fixed effects is especially important for this analysis, since it is easy to imagine that there are a number of unobserved, and potentially unobservable factors, that make some cities well-suited for the export of some industry outputs and not for others. Since city-industry fixed effects allow one to control for the general attractiveness of a city as location for the export of particular industry goods, they enable one to use time series variation in multinational activity in Chinese-cities to identify the effects of multinational firm presence on the creation of new export connections by local firms.⁸ In the regressions for new private export volumes, I do not use random effects, since the random effects approach fails the Hausman test.

3.2 Data

The primary data for this project are based on Chinese exports of products at the HS8 level of disaggregation, as reported in the Customs General Administration of the People's Republic of China for 1997-2003.⁹ In addition to information on the Chinese city-district of origin and country destination of these exports, these data include information on the ownership type of the transactions, which enables one to distinguish transactions that were controlled by foreign versus Chinese-owned entities. Finally, while a 4-digit code distinguishes the city origin of Chinese exports, there is a fifth digit

⁸ This method will identify multinational firm effects, as long as there are no shocks in the six year estimation window that cause the comparative advantage of cities to change in a fashion that brings in multinationals of particular industries, while also altering exporting incentives in those same industries.

⁹ These data were used under license to the CID at University of California, Davis.

in the geographic codes, which enables one to more finely distinguish the location of export within a city, thus identifying the activities of different exporters.

The dependent variable $VNew_{hct}$ is the value of new trade transactions for HS8 product exports within an HS2 industry h , from city c in year t . Since collection of these data at the HS8 level of disaggregation began in 1997, it is possible to generate count measures for new trade transactions for the years 1998 to 2003. New private transactions arose for two different reasons. First, new transactions developed when private firms in a city expanded the number of countries to which they exported their products. For example, if a city exported a particular HS8 product to Germany in 1999, and then was observed exporting the product to the U.S. in 2000 for the first time, this expansion in destinations was defined to be a new trade transaction.¹⁰ New trade is also generated when Chinese firms within a city started to export an HS8 product that had not been exported anywhere in the previous year. Table 1 presents summary statistics on the frequency of new private trades, and on the prevalence of multinational contacts. In the full sample, the average number of new trades created at the city-industry level was 6.55 per year. Of those new trades, 1.36 were new product exports, while the remainder represented trades to new country destinations, of products that were exported to other locations in the previous year.

After the new private transactions were identified, the transactions values for the new transactions were aggregated to form a balanced panel whose dimensions are city, HS2 industry and year. All city-industry pairs were included, as long as the city-industry had at least one non-zero observation for multinational activity or new trade during the

¹⁰ While new private trade transactions are defined with reference to the previous year, it is possible that such a connection existed in year $t-2$ or earlier. Further exploration of alternative definitions of *new* trade based on earlier years activities will become possible when the time dimension of the data panel expands.

sample period. As a result, the dependent variable $VNew_{hct}$ will grow from one year to the next if the size of newly introduced transactions grew in size and/or the number of new transactions increased. The majority of the results are based on the observation of new trade value. However, since new trade can increase due to expansion on different dimensions, I examine the frequency of new private transaction introductions in the robustness checks.

To capture the economic influence of multinational firms I create a set of variables that measure the activities of multinational firms. First, to measure multinational *presence*, I created a multinational variable that is a synthetic count of “firms” as defined by each unique combination of the geographic, regime-type, and firm-type identifiers in the data set.¹¹ Thus, $OwnInd_MNC$ is the count of “firms” providing HS8 products within an HS2 industry from city c . In the full sample, the average count of own-industry multinational contacts was 7.7. While the number of multinational contacts and the number of new trades for the average HS2-city observation are very similar, the value of new trades was considerably smaller than the value of established trade relationships. In this sample, the value of new private trade transactions was only 2.78% as large as the volume of trade by established multinational firms in the same HS2-city.

In addition, since it is possible that multinational contacts generate spillovers that extend across industry lines, as may be the case if they convey country-specific information about buyers that is helpful to Chinese sellers of all products, I also measure

¹¹ Feenstra and Hanson (2005) note that even though the operational identifier is HS8 product code for each transaction, once the data are broken down to the HS8 product- city- zone – ownership- processing regime level of disaggregation, this data set begins to provide information that is close in nature to that available in firm-level data sets.

multinational firm activity in other HS2 industries in the city, or OtherInd_MNC. In this case too, multinational *presence* in other industries is given by the other HS2 industry “firms” within a city. Finally since private Chinese firms may need time to react to information learned from multinational presence, each of these variables are lagged one period. The use of lags is also important to ensure that the multinational variables are predetermined relative to the dependent variable under study.

To provide an alternative measure of the economic activities of multinational firms, I also generated variables based on the *size* of exports emanating from multinationals within Chinese cities. In this case, the variable OwnInd_MNC is defined as the value of all exports of multinational firms from a Chinese city within an HS2 industry classification, while OtherInd_MNC is defined as the value of all exports of multinational firms from a Chinese city across all other HS2 industries.

Finally, the paper includes some measures of economic activity at the province or city level. In each case, these data were collected from multiple years of the *China Statistical Yearbook*.

3.3 Results

Equation (1), which examines how new trade volumes were related to the presence of multinational firms, is estimated both by OLS with a full set of HS2 industry and city dummies, and again by a panel regression that includes HS2-city fixed effects. The baseline estimates which are displayed in Table 2 establish two results. First, the estimates uniformly show that a growing *presence* of own-industry multinationals was associated with expanding volumes of new private trade. And second, the regressions

uncover a positive association between other-industry multinational activity and the value of new private trade. For each of these results, the positive association between multinational firm contact and the value of new private exports is observed whether multinational proximity is measured by the size or number of multinational export contacts.

To compare the effects of multinational contact as measured by *size* with the effects of multinational contact as measured by *presence*, columns (3) and (6) in Table 2 include both measures of multinational contact. The new estimates indicate that the volume of new private exports is positively related to the *presence* of multinational firms, and negatively related to the *size* of local multinational firm export value. The dichotomous effect of multinational exposure suggests that the presence of multinational contacts may be helpful in generating information spillovers, while the size of multinational contacts may exert a negative influence due to the role of large multinational operations in intensifying product market competition, or in creating congestion in local factor markets. Nonetheless, evaluated at the average level of multinational *size* and *presence* in the sample, the results suggest that proximity with multinationals was associated with growth in private exports.

The controls in the baseline regression are all highly significant.¹² When specification (1) is estimated by OLS, the F-tests for the joint significance of the industry and for the city fixed effects are significant at the one-percent level. In addition, the time trend and the gross value of industrial output (GVIO) at the provincial level are similarly significant.

¹² Since this significance carries through the entire paper, the control variables are not discussed after this specification.

The last control for provincial economic activity, or GVIO, is perhaps the most important, since it allows one to conclude that the positive association between the expansion of multinational firm activity and the subsequent expansion of new trade value is driven by more than a simple increase general economic activity or productive opportunities at the provincial level.¹³ However, since the regression measures how city-level changes in multinational presence are related to changes in city-level trade, we repeat the baseline regression in Table 3 using city-level GVIO, rather than the provincial measure. In so doing, the number of observations declines, since these data are only available for 31 cities. Notably, replacing provincial GVIO with city GVIO has no effect on the general results: the coefficient magnitudes for own-industry multinational contact in Table 3 are very similar to those in Table 2. If anything, the coefficients on multinational *presence* are somewhat larger than they were in the original regression.¹⁴ The only other change in table 3 relates to the fixed-effects estimates which measure effects related to the *size* of multinational contacts. The positive association between the size of other-industry multinational activity and the value of trade transactions disappears when local economic activity is represented by city-level GVIO. (Compare column (5) in Table 2 with column (5) in Table 3.) Thus, Table 2 results on the relationship between new trade and the size of other-industry multinational contact may simply reflect city-level economic activity, of which, multinational firm exports are one component. In sum, Table 3 shows that while growing levels of provincial or city GVIO assist new private

¹³ Amiti and Javorcik (2005) find that multinational location decisions are influenced by market and supplier access. However, if provincial GVIO is generally correlated with developments on these dimensions, the coefficients on the multinational firm variables suggest that multinationals change the economic opportunities for domestic firms.

¹⁴ This change does not appear to be due to the differences in the samples. Estimation of Table 2's specification with provincial GVIO, if limited to the subsample of data for which city GVIO is available, yields results that are very similar to those reported in Table 2.

trade creation, there appears to be an additional increase in new trade creation which is associated with a growing presence of own-industry multinational firms.

Information spillovers could explain the positive association between the growing activity of multinational firms and the subsequent increase in new local exports. However, if information spillovers are behind this relationship, industries where information is especially important should be particularly affected by the growth in multinational firm activities. To test for differential sensitivity based on information needs, Table 4 tests whether the positive association between multinational firms and the growth of new private trade was larger in differentiated goods industries.¹⁵ This prediction is distinct from the result we would expect if evolving, and unmeasured, differences comparative advantage at the local level drive the positive association between new private trades and changes in multinational presence. Under this alternative, we might predict a lower association between multinational presence and the growth of new trade in differentiated goods, if differentiated goods depend less on natural location-based sources of comparative advantage such as unmeasured differences in endowments.

The results in Table 4 show that the positive association between the growth of multinational firm activity and the expansion in new private trade was especially large in differentiated goods industries. For example, column (1) indicates that an increase in own-industry multinational activity, when measured by the count of multinational

¹⁵ Rauch (1999) argues that search costs for differentiated goods will exceed those of homogenous or reference-priced goods, since information is not easily collected and compared in differentiated goods industries. I generate a dummy variable for differentiated goods that is based on Rauch's (1999) conservative classification. HS2 industries were classified as "differentiated" if the modal product in the industry was differentiated. While there is some heterogeneity in the product classifications within HS2 industries, most industries were almost exclusively populated by either differentiated or non-differentiated industry sub-categories. The results do not change if Rauch's liberal classification is used instead.

contacts, was associated with an expansion in trade volumes that was twice as large for differentiated goods industries. This finding is echoed in column (5), when multinational firm contact measured by the size of own-industry multinational trade flows.

As before, we may be concerned that the positive association between multinational firm growth and domestic trade expansion reflects general economic growth effects rather than the special benefits arising from multinational contact. To deal with this issue, columns (2) and (6) replace provincial GVIO with city-level GVIO to provide a more accurate measure of local growth. Once this change is made, the positive association between own-industry multinational contacts and new private trade is observed for differentiated goods sectors only.

Geographic location in China is another factor which may have influenced the informational needs of private Chinese firms. In particular, the exceptional economic growth of China's coastal provinces, and the resulting economic gap between China's coastal and interior provinces, may imply that firms in China's interior stood to gain more from an improvement in information-rich contacts. Thus, Table 4 also tests whether contact with multinationals was associated with equivalently large effects on the value of new export transactions introduced in China's coastal and interior provinces. Comparing column (3) with column (4), or column (7) with column (8), shows that the benefit of own-industry MNC presence in differentiated goods is observed for China's interior provinces, while the effect is absent in the coastal regions of China. This suggests that informational spillovers in differentiated goods sectors may have been especially important in facilitating the development of trades in China's interior.

Another way to analyze the informational content of multinational firm contact is to distinguish between alternative forms of multinational activity. Chinese trade data record whether multinational export transactions were conducted by foreign invested enterprises (FIEs), joint ventures or outsourcing firms. Since FIE activity implies that foreign firms set up a subsidiary and have a greater local presence that may span a greater number of tasks in the firm's production process, FIE operations may provide informational spillovers that are particularly rich. If so, increases in FIE presence are predicted to have a stronger positive association with increases in local private exports than would a similar increases in outsourcing or joint venture operations. To see if this was the case, the own-industry multinational contact variable was divided into its constituent components.

As the results in Table 5 show, two primary differences arise when one distinguishes between alternative types of multinational activity. First, the positive association between new private trade and own-industry multinational contact is greatest for contacts with foreign-invested enterprises. In Panel A, where multinational contacts are measured by multinational counts, joint venture contacts are also found to have a positive association in some cases, though the FIE coefficients are larger and statistically distinct. In contrast, when multinational contact is measured by the volume of multinational exports (Panel B), FIE activity still has the largest positive association with new private trade, though own-industry outsourcing presence is at times found to have a positive association which is similar in magnitude to the effects of FIE expansion. Second, the association between the value of new private trade and the growth of multinational activity remains strongest for differentiated goods sectors (compare column

(3) with column (4), or column (7) with column (8)). This further supports the idea that growing multinational firm activity helped spur trade in those sectors where information was most vital to the creation of new trading relationships.

3.4 Robustness Checks

A primary concern in interpreting the correlation between changes in multinational activity and the subsequent changes in new private trade is that there may have been other economic determinants that were changing during the six-year estimation window that simultaneously altered multinational activity as well as new private exports. As a result, the first set of robustness checks estimates alternative specifications which include additional measures of economic activity. If the correlation between multinational firm activity and new trade was driven by underlying changes in the economic environment, we would expect that changing the controls for provincial economic activity would affect the estimated coefficients on multinational firm proximity.

Table 6 presents some representative regressions. Notably, while the coefficients on the measures of provincial economic activity change from specification to specification (for example, the sign on provincial GDP changes if population is taken out of the regression), the inclusion of extra provincial economic controls has no apparent effect on the coefficients describing the relationship between multinational firm activity and new private trades.

We might still be concerned that unmeasured growth in economic opportunities at the city-industry level drives the positive association between multinational presence and new trade relationships. For example, one might note that the number of multinational

firms increased in Jiangsu in 2002, and that in 2003, the number of new trade connections in Jiangsu increased as well. While this set of events is consistent with the presence of spillovers, it could also arise if the multinationals came to Jiangsu in 2002 to produce and export digital cameras, and the private entrepreneurs started exporting digital cameras in 2003 too because Jiangsu gained valuable infrastructure that made it the best location for both multinational and private Chinese to produce and export consumer electronics products. Thus, to address whether there were city-industry-year shocks that were beneficial to Chinese and foreign exporters, the second robustness check adds the count of new contemporaneous own-industry trade relationships formed by multinational firms as an explanatory variable in column (3), and the value of new own-industry multinational trade in column (4). If unmeasured shocks at the city-year level made some cities more attractive for all types of activities, while information spillovers were non-existent, the coefficient on the measures of new multinational trade transactions should be positive, while the coefficients on previous period multinational firm activity should lose significance. However, while the new regressions uncover a strong correlation between the value of new private trade and the contemporaneous increase in own-industry multinational trade, the magnitude of the originally estimated multinational coefficients are not changed by inclusion of these new variables.

As a third robustness check, the original transactions data are re-aggregated to create a panel of data whose dimensions are province, HS2 industry and year.¹⁶ The regressions for the provincial-level regressions are reported in columns (5) and (6) of Table 6. When the regressions are run at the provincial level, all of the qualitative results

¹⁶ Since the new dependent variables are created by summing across city values within a province, they are based on the assumption that, even at the HS8 level of product disaggregation, plants in different cities produce somewhat different outputs

remain. Notably, the estimated effects of own-industry contact increase a bit in magnitude, which suggests that own-industry spillovers may operate at the provincial level.¹⁷

To provide further insight into the results, Table 7 examines two alternate dependent variables: the count of new private trade transactions and the count of new private product trade transactions. If the reallocation of economic activity in China, as in the U.S., reflects product switching, then the ability to introduce new product trades, rather than initial entry to exporting, may be of particular importance.¹⁸ Since the dependent variable is now a count measure, the new regressions are estimated using negative binomial methods. As before, all variables are measured at the city-HS2 level of aggregation. For example, the count variable for new private trade transactions is the count of all new trade transactions at the HS8 level emanating from a particular city, aggregated to the city-HS2 industry level.

The count regressions in Table 7 show that the number of new private trade transactions increases when own-industry and other-industry multinational presence increases. Further, if an interaction between MNC presence and differentiated industry is added, we learn that the effects of own-industry contact are associated with a reduced number of new product introductions, which may indicate competitive effects. This implies that own-industry contact may reduce new trade introductions, while informational spillovers improve the size or quality of trades that are introduced. In contrast, the presence of other-industry multinational presence is associated with both an

¹⁷ This suggests that the original city regressions could be augmented to include measures of own- and other-industry multinational contact at the province-level (that is not already included in the city measures). However, the estimated coefficient on provincial MNC activity outside the city is generally insignificant.

¹⁸ See Bernard, Redding and Schott (2006) for evidence on firm-level product switching.

increase in the number of trade transactions as well as an increase in the number of new product trades introduced – an effect that is especially large for differentiated goods sectors.

The final regressions in Table 7 add multinational product diversity as a regressor. In this context, multinational product diversity, which is measured at the city level is the count of distinct HS8 products exported by multinational firms in the city within an HS2 industry. Regressions which include measures of MNC product diversity are reported in columns (5) and (10) of Table 7. When these regressors are added, they are found to be negatively associated with new transaction creation by private Chinese firms. The negative effect may reflect increased competition in product markets. In particular, if multinational firms already offer a full range of products in the HS2, there is less room for a private entrepreneur to enter the product space for the industry. When the regression controls for MNC product diversity, the coefficient on own-industry multinational activity rises. This it appears that when Chinese firms had good products not already offered by MNCs their ability to export was enhanced when local multinationals increased their awareness of destinations to which they could export.

4. Discussion

Development economists are particularly interested in learning whether the activities of multinational firms enhance economic outcomes for local firms and economies. While China's remarkable growth means that China's growth prospects may be of less concern than the growth outcomes in other developing locations, the results from this analysis suggest that growth in multinational firm activities may help local

firms in developing countries to increase their export engagement with the global economy.

From a policy perspective, it is important to ask how large the implied effects of increased multinational firm activity are. Based on the actual change in multinational presence (size) between 1997 and 2002 the coefficient estimates in columns (4) and (5) of Table 2 imply that growth in the presence of own-industry multinational firms was associated with a 2.8% (2.5) increase in new private export value between 1998 and 2003. Similarly the coefficients in column (1) of Table 7 imply that the growth in MNC activities between 1997 and 2002 was associated with a 2.6% increase in the number of trade transactions, while the coefficients column (2) of Table 7 imply that the same increase in MNC activities was associated with a 15.9% increase in new product trades by private Chinese firms.

While most of the analyses in this paper also find a positive association between other industry multinational contacts and the growth in private firm exports, the correlation may be influenced by both information and other factors. First, one potential benefit of multinational firms is the creation or strengthening of supply or purchasing networks. If multinational networks enable local firms to purchase a more diverse set of higher quality inputs this benefit may assist local firms in their efforts to initiate new projects and export abroad. Further, if increased multinational activity helps to prod local governments into providing infrastructure, or deregulation that is beneficial to all firms, expansion in the scale of multinational export operations will improve the operating environment for local firms as well. However, the fact that expansion in the *size* of multinational export operations is negatively correlated with new export transactions by

private Chinese firms, once the *presence* of multinational contacts is controlled for, suggests that multinational firm activity brings negative externalities due to competition, or its effects on factor prices in local markets.

Finally, it is also interesting to ask whether exposure to multinational firms helps Chinese firms to move more quickly in the product cycle. If so, this may be yet another channel of multinational firm spillovers that has helped speed China's growth.¹⁹

¹⁹ Feenstra and Rose (2000) use a semi-parametric procedure to rank countries based on their sequence of U.S. trade relationships as indicated by the time when they first export different products to the U.S. In suggestive regressions, Feenstra and Rose show that countries that were more highly ranked, as being at the forefront of product cycle introductions, grew more rapidly than less favorably ranked countries.

5.0 Conclusion

This paper studies how the presence of multinational firms contributed to the formation of private Chinese export transactions between 1997 and 2003. The evidence, which is based on the activities of multinational firms at the fine industry-city level shows that an expanded presence of multinational firms was associated with an elevated creation of trading relationships, and that the effect of multinational presence was especially high when the multinationals were in the same industry.

The fact that the association between own-industry multinationals and new exports is especially strong in cases where information was the most important – differentiated goods industries, and for firms in China’s interior – suggests that information is part of the story. This interpretation is further supported by the fact that the effects are strongest for contacts with multinational FIEs, that are arguably the most information-rich form of contact. Taken together, the results suggest that multinationals, since they act as a conduit of information, help local firms to integrate and further engage in the international economy.

Table 1: Summary Statistics

	Full Sample		Differentiated Good Industries		Homogenous Good Industries	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Count of All New HS8 Trade Connections – City/HS2/Yr	6.55	43.9	8.25	52.0	3.60	11.1
Count of All New Trade in HS8 Products – City/HS2/Yr	1.36	4.95	1.59	5.56	.966	.302
Multinational Contacts:						
Foreign Invested Enterprises (FIEs)	5.49	22.8	6.89	27.5	3.04	9.85
Joint Ventures	.75	5.04	.95	6.10	.402	2.38
Outsourcing	1.46	9.70	1.91	11.9	.671	3.49

Table 2: The Effect of Multinationals on the Value of All New Trade Connections						
	(1)	(2)	(3)	(4)	(5)	(6)
HS2 MNC presence in City	.511 ^a (.008)		1.967 ^a (.033)	.081 ^a (.010)		.140 ^a (.046)
MNC presence in City in other HS2s	.312 ^a (.023)		.609 ^a (.070)	.412 ^a (.020)		.968 ^a (.063)
HS2 MNC export value in City		.112 ^a (.002)	-.400 ^a (.008)		.022 ^a (.003)	-.018 ^a (.008)
MNC export value in City in other HS2s		.084 ^a (.007)	-.098 ^a (.022)		.101 ^a (.006)	-.180 ^a (.019)
Gross Value of Industrial Output in Province	1.233 ^a (.161)	1.286 ^a (.161)	1.171 ^a (.160)	1.298 ^a (.139)	1.333 ^a (.139)	1.263 ^a (.139)
Year	1.269 ^a (.027)	1.276 ^a (.027)	1.276 ^a (.027)	1.283 ^a (.023)	1.289 ^a (.024)	1.285 ^a (.032)
City Effects	Yes	Yes	Yes	-	-	-
HS2 Industry Effects	Yes	Yes	Yes	-	-	-
City-HS2 FE	-	-	-	Yes	Yes	Yes
R ²	.397	.392	.410	.159	.148	.163
Observations	130,002	130,002	130,002	130,002	130,002	130,002

Notes: Standard Errors in (). The superscripts ^a, ^b, and ^c denote statistical significance at the 1%, 5% and 10% levels. Dependent variable is the value of new trade transactions, at the HS2 city level. Aside from year, all variables are in logs.

Table 3: The Effect of Multinationals on the Value of All New Trade Connections						
	(1)	(2)	(3)	(4)	(5)	(6)
HS2 MNC presence in City	.664 ^a (.026)		2.237 ^a (.092)	.095 ^a (.034)		.467 ^a (.131)
MNC presence in City in other HS2s	.902 ^a (.043)		2.846 ^a (.133)	.338 ^a (.084)		3.132 ^a (.261)
HS2 MNC export value in City		.162 ^a (.007)	-.458 ^a (.025)		.018 ^b (.009)	-.107 ^a (.034)
MNC export value in City in other HS2s		.332 ^a (.019)	-.953 ^a (.057)		.006 (.031)	-1.103 ^a (.097)
Gross Value Industrial Output in City	.640 ^a (.079)	1.617 ^a (.071)	-.890 ^a (.107)	-1.0972 ^a (.185)	-1.132 ^a (.186)	-1.233 ^a (.185)
Year	1.708 ^a (.038)	1.467 ^a (.038)	2.134 ^a (.043)	2.211 ^a (.055)	2.244 ^a (.055)	2.269 ^a (.055)
City Effects	Yes	Yes	Yes	-	-	-
HS2 Industry Effects	Yes	Yes	Yes	-	-	-
City-HS2 FE	-	-	-	Yes	Yes	Yes
R ²	.416	.392	.441	.139	.088	.259
Observations	15,762	15,762	15,762	15,762	15,762	15,762

Notes: Standard Errors in (. The superscripts ^a, ^b, and ^c denote statistical significance at the 1%, 5% and 10% levels. Dependent variable is the value of new trade transactions, at the HS2 city level. Aside from year, all variables are in logs.

Table 4: Product Differentiation and the Effect of Multinationals on New Trade

Panel A: MNC Contact Measured by the Count of MNC Contacts				
	(1)	(2)	(3)	(4)
	<i>All China</i>	<i>All China</i>	<i>Coast</i>	<i>Interior</i>
HS2 MNC City presence	.050 ^a (.017)	.010 (.052)	.040 ^c (.022)	.047 ^c (.027)
HS2 MNC City presence*Differentiated	.051 ^b (.022)	.145 ^b (.069)	.004 (.028)	.095 ^b (.033)
MNC City presence - other HS2s	.312 ^a (.034)	.338 ^b (.142)	1.029 ^a (.162)	.269 ^a (.036)
MNC City presence - other HS2s*Differentiated	.155 ^a (.042)	-.009 (.174)	.494 ^a (.195)	.137 ^a (.044)
Gross Value Industrial Output*	1.297 ^a (.139)	-1.094 ^a (.185)	7.230 ^a (.359)	.123 (.161)
Year	1.283 ^a (.023)	2.211 ^a (.055)	.196 ^a (.061)	1.482 ^a (.026)
R ²	.167	.140	.096	.153
Observations	130,002	15,762	78,282	51,720
Panel B: MNC Contact Measured by the Value of MNC Contacts				
	(5)	(6)	(7)	(8)
	<i>All China</i>	<i>All China</i>	<i>Coast</i>	<i>Interior</i>
HS2 MNC City presence	.012 ^a (.004)	-.006 (.013)	.011 ^c (.006)	.011 ^c (.007)
HS2 MNC City presence*Differentiated	.017 ^a (.006)	.043 ^b (.018)	.003 (.007)	.028 ^b (.009)
MNC City presence - other HS2s	.064 ^a (.010)	.006 (.052)	.089 ^a (.065)	.063 ^a (.011)
MNC City presence - other HS2s*Differentiated	.0572 ^a (.013)	-.003 (.064)	.411 ^a (.084)	.048 ^a (.013)
Gross Value Industrial Output*	1.331 ^a (.139)	-1.131 ^a (.185)	7.914 ^a (.352)	.119 (.161)
Year	1.290 ^a (.023)	2.244 ^a (.055)	.113 ^a (.060)	1.491 ^a (.026)
R ²	.153	.091	.075	.145
Observations	130,002	15,762	78,282	51,720

Notes: Each regression includes HS2-City fixed effects. Standard Errors in (). The superscripts ^a, ^b, and ^c denote statistical significance at the 1%, 5% and 10% levels. Dependent variable is the value of new trade transactions at the HS2-city level. Aside from year, all variables are in logs. The gross value of industrial output is measured by provincial values, except for columns (2) and (6) which use the city values of industrial output. Beijing, Tianjin, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan are defined as “Coast”, while all other provinces are “Interior”.

Table 5: The Effect of MNC Type on New Trade

Panel A: MNC Contact Measured by the Count of MNC Contacts				
	(1)	(2)	(3)	(4)
	<i>Full Sample</i>	<i>Full Sample</i>	<i>Diff Goods</i>	<i>Hom Goods</i>
HS2 City presence – FIEs	.081 ^a (.011)	.148 ^a (.033)	.094 ^a (.014)	.057 ^a (.018)
HS2 City presence – Outsourcing	.008 (.015)	-.101 ^a (.037)	.023 (.018)	-.025 (.026)
HS2 City presence – Joint Venture	.040 ^b (.019)	.027 (.049)	.051 ^b (.024)	.017 (.033)
City MNC Activity in other HS2s	.415 ^a (.020)	.355 ^a (.084)	.456 ^a (.025)	.335 ^a (.031)
Gross Value Industrial Output	1.296 ^a (.139)	-1.093 ^a (.185)	1.089 ^a (.166)	1.770 ^a (.255)
Year	1.282 ^a (.023)	2.187 ^a (.055)	1.384 ^a (.028)	1.150 ^a (.042)
R ²	.162	.133	.185	.121
Observations	130,002	15,762	82,548	47,454
Panel B: MNC Contact Measured by the Value of MNC Contacts				
	(5)	(6)	(7)	(8)
	<i>Full Sample</i>	<i>Full Sample</i>	<i>Diff Goods</i>	<i>Hom Goods</i>
HS2 City presence- FIEs	.028 ^a (.003)	.039 ^a (.008)	.031 ^a (.003)	.023 ^a (.004)
HS2 City presence – Outsourcing	.035 ^a (.004)	-.004 (.008)	.038 ^a (.004)	.026 ^a (.006)
HS2 City presence – Joint Venture	.007 (.006)	.004 (.014)	.010 (.007)	.002 (.010)
City MNC Activity in other HS2s	.101 ^a (.006)	.003 (.031)	.118 ^a (.008)	.070 ^a (.010)
Gross Value Industrial Output	1.315 ^a (.139)	-1.129 ^a (.185)	1.101 ^a (.166)	1.798 ^a (.255)
Year	1.289 ^a (.023)	2.229 ^a (.055)	1.355 ^a (.028)	1.157 ^a (.042)
R ²	.172	.104	.190	.133
Observations	130,002	15,762	82,548	47,454

Notes: Each regression includes HS2-City fixed effects. Standard Errors in (). The superscripts ^a, ^b, and ^c denote statistical significance at the 1%, 5% and 10% levels. The dependent variable is the value of new trade transactions at the HS2-city level. Aside from year, all variables are in logs. The gross value of industrial output is measured by provincial values, except for columns (2) and (6), which use city value of industrial output. Differentiated goods are defined by Rauch's conservative definition of differentiated goods.

Table 6: The Effect of Multinationals on Trade Connections – Robustness Checks						
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent Variable</i>	Value of New Exports - City	Value of New Exports - City	Value of New Exports - City	Value of New Exports - City	Value of New Exports - Province	Value of New Exports - Province
HS2 MNC City presence – Count Measure	.078 ^a (.010)		.076 ^a (.010)		.103 ^a (.013)	
MNC City presence in other HS2s – Count measure	.395 ^a (.020)		.378 ^a (.020)		.702 ^a (.016)	
HS2 MNC City presence – Value Measure		.021 ^a (.003)		.020 ^a (.003)		.045 ^a (.005)
MNC City presence in other HS2s – Value measure		.096 ^a (.006)		.093 ^a (.006)		.324 ^a (.007)
Gross Value of Industrial Output in Province	.403 ^a (.153)	.421 ^a (.154)	.396 ^a (.153)	.412 ^a (.153)	-2.081 ^a (.108)	-1.998 ^a (.108)
GDP	7.066 ^a (.487)	7.190 ^a (.487)	6.956 ^a (.486)	7.089 ^a (.487)	-11.062 ^a (.344)	-11.391 ^a (.344)
Population	-7.827 ^a (.559)	-7.977 ^a (.487)	-7.742 ^a (.558)	-7.889 ^a (.558)	5.392 ^a (.395)	5.537 ^a (.395)
Wage	2.595 ^a (.410)	2.701 ^a (.411)	2.502 ^a (.410)	2.627 ^a (.411)	7.093 ^a (.290)	7.372 ^a (.289)
Year	.431 ^a (.064)	.410 ^a (.062)	.444 ^a (.064)	.428 ^a (.064)	2.201 ^a (.045)	2.185 ^a (.045)
Increase in MNC Trade in HS2			[Count] .082 ^a (.007)	[Value] .035 ^a (.003)		
City-HS2 FE	Yes	Yes	Yes	Yes	Yes	Yes
R ²	.053	.046	.061	.046	.028	.039
Observations	130,002	130,002	130,002	130,002	16,014	16,014

Notes: Standard Errors in (.). The superscripts ^a, ^b, and ^c denote statistical significance at the 1%, 5% and 10% levels. The dependent variable is the value of new trade transactions at the HS2-city level. Aside from year, all variables are in logs.

Table 7: The Effect of Multinationals on New Trade on New Trade Transactions					
Panel A: Dependent Variable - Count of all New Private Transactions					
	(1)	(2)	(3)	(4)	(5)
HS2 MNC City presence	.147 ^a (.003)	.178 ^a (.052)	.149 ^c (.004)	.184 ^a (.027)	.475 ^a (.022)
HS2 MNC City presence*Differentiated			-.006 (.005)	-.012 (.012)	
MNC City presence - other HS2s	.148 ^a (.005)	.064 ^b (.026)	.135 ^a (.005)	.052 ^b (.026)	.144 ^a (.005)
MNC City presence - other HS2s*Differentiated			.021 ^a (.003)	.019 ^a (.006)	
MNC Product Diversity in HS2					-.342 ^a (.022)
Gross Value Industrial Output*	-.662 ^a (.059)	-.089 ^b (.036)	-.664 ^a (.059)	-.089 ^b (.036)	-.696 ^a (.059)
Year	.637 ^a (.011)	.524 ^a (.011)	.637 ^a (.011)	.524 ^a (.011)	.641 ^a (.011)
Log-Likelihood	-171,245	-32,642	-171,221	-32,687	-171,130
Observations	130,002	15,762	130,002	15,762	130,002
Panel B: Dependent Variable - Count of all New Private Product Transactions					
	(6)	(7)	(8)	(9)	(10)
HS2 MNC City presence	.156 ^a (.003)	.205 ^a (.007)	.164 ^a (.004)	.227 ^a (.027)	.349 ^a (.024)
HS2 MNC City presence*Differentiated			-.015 ^a (.005)	-.037 ^a (.012)	
MNC City presence - other HS2s	.129 ^a (.005)	.104 ^a (.027)	.117 ^a (.005)	.098 ^a (.027)	.126 ^a (.005)
MNC City presence - other HS2s*Differentiated			.021 ^a (.003)	.012 ^a (.006)	
MNC Product Diversity in HS2					-.203 ^a (.024)
Gross Value Industrial Output*	-1.834 ^a (.067)	-.286 ^a (.038)	-1.835 ^a (.067)	-.286 ^a (.038)	-1.849 ^a (.067)
Year	.708 ^a (.012)	.392 ^a (.012)	.708 ^a (.012)	.392 ^a (.012)	.709 ^a (.012)
Log-Likelihood	-131,284	-24,371	-131,256	-24,366	-131,250
Observations	130,002	15,762	130,002	15,762	130,002

Notes: Standard Errors in (.). The superscripts ^a, ^b, and ^c denote statistical significance at the 1%, 5% and 10% levels. Each regression estimated by negative-binomial including HS2-City random effects. Aside from year, all independent variables are in logs. * The gross value of industrial output is measured by provincial values, except for columns (2), (4), (6) and (8), where the city value is used.

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