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## FDI and Job Creation in China

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## **FDI and Job Creation in China**

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# FDI and Job Creation in China\*

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## Abstract

This paper examines the effect of FDI on job creation in the Chinese manufacturing sector. As one of the world's largest recipients of FDI, China has arguably benefited from foreign multinational enterprises in various respects. However, one of the main challenges for China, and other developing countries, is job-creation, and the effect of FDI on job creation is uncertain. The effect depends on the amount of jobs created within foreign firms as well as the effect of FDI on job creation in domestic firms. We analyze FDI and job creation in China using a large sample of manufacturing firms for the period 1998-2004. Our results show that FDI has positive effects on employment growth. The positive effect of job creation in foreign firms is associated with their firm characteristics and, in particular, their access to export markets. There also seems to be a positive indirect effect on job creation in domestically owned firms, presumably caused by spillovers.

Keywords: China, Employment, Foreign Direct Investment, Job Creation

JEL codes: J21, J23, F23

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# 1 Introduction

Job creation is arguably one of the main challenges for developing countries. Improvements in human welfare that have a broad basis are difficult to achieve without a substantial increase in modern sector employment. Without such employment, people must continue to seek a meager existence in agriculture or the informal sector.

As an example, Asia Development Bank (2005) suggests there to be a need for creating at least 750 million new jobs in Asia over the next decade if the positive development with high economic growth and rapidly decreasing poverty rates is to continue. The figure can be compared to Asia's present labor force of 1.7 billion. Such a massive creation of new jobs is obviously a huge challenge and requires a broad set of policies. In the context of job creation, Felipe and Hasan (2006, p.7) argue for the need for industrial policy to "... promote diversification of production activities into new areas, facilitate restructuring of existing activities, and foster coordination between public and private entities to make all of this happen." It seems quite obvious that Foreign Direct Investment (FDI) and Multinational Enterprises (MNEs) could play an important role in such industrial change with their knowledge of markets, technologies and distribution channels (e.g. UNCTAD, 2007). It is also clear that FDI has greatly contributed to developing East Asia's growth and industrial development (e.g. Dobson and Chia, 1997). Despite its high empirical and policy relevance, the contribution of FDI to job creation in developing countries has been little explored so far.

This paper aims at examining the effect of FDI on job creation in China, based on firm-level information of the Chinese manufacturing sector during the period 1998-2004. We examine both a direct employment effect, i.e. jobs created in foreign MNEs, and an indirect employment effect, i.e. the effect of FDI on jobs created in domestically owned firms. As discussed above, there are reasons to expect that foreign MNEs can be important in job creation. However, the positive effect on jobs created within the foreign MNEs is not necessarily accompanied by a similar development in domestic firms. Two opposing effects on employment in domestic firms can be considered; a positive effect on suppliers and from various types of spillovers and a negative effect from increased competition.

For a preview of our results, we find that foreign firms have a comparably high growth in employment. This high growth is caused by favorable firm characteristics such as high capital intensities and productivity, and in particular by their access to export markets. Regarding the indirect effect, the empirical analysis finds positive effects of FDI on private domestically-owned firms, presumably because spillovers and learning or demonstration effects are more important than the competition effect.

The remainder of this paper is organized as follows. In Section 2, we provide a theoretical overview of potential channels through which FDI may affect job creation and discuss some previous studies. The dataset and descriptive statistics are presented in Section 3 and we perform the empirical analysis in Section 4. We then conclude in Section 5.

## 2 FDI and Job Creation

Economic growth in developing countries rests on a shift from agriculture and informal services and the ability of the manufacturing sector to absorb labor thus becomes a critical factor (Lewis, 1954). The total amount of people employed outside agriculture and the informal sector can presumably be affected by inflows of FDI. FDI might, for instance, increase the country's competitiveness by combining firm- and country-specific assets (e.g. Blonigen, 1997). This typically involves combining access to foreign markets and modern technology with a large supply of cheap labor. Such a combination of firm- and country-specific assets has frequently improved and expanded existing host-country industries, introduced production in new industries, and changed the comparative advantage of the host country (Lipsey, 2004; 2006).

In addition to introducing new industries and establishing new firms in the host country, inflows of FDI can increase employment through establishing linkages with domestic firms through purchases of locally produced goods and services. It is also possible that FDI introduces new and better quality inputs to be used in the production of upstream domestic firms, thus making them more competitive and enabling them to expand production and employment.

There is another effect, however, which suggests that inflows of FDI might decrease employment in domestic firms. This will happen if foreign firms increase the competition for domestic firms and force them to exit the market or downsize their workforce. It could be imagined that such a crowding-out effect is important when foreign MNEs do not only focus on export markets, but also target the domestic market.

There are at least two different channels through which such crowding out can take place. First, MNEs have firm-specific advantages, which give them a competitive edge against their domestic competitors despite a comparatively poor knowledge of local conditions. Second, MNEs might also raise the wage levels and press up the wages of their domestic competitors (Lipseý and Sjöholm, 2004a). Such wage increases will deter job growth in domestic firms when their cost advantages are diminishing.

## 2.1 The Chinese Context

While the Chinese economy keeps growing at a rapid pace and FDI continues to flow into China, job creation is becoming one of the main economic challenges. One of the key reasons behind the job creation pressure is the large dismantling of state-owned enterprises. The Chinese labor force consists of a staggering 779 million people (National Bureau of Statistics, 2006, Table 5-1) and it is predicted to grow at an annual rate of 1.3 percent over the next few decades, putting a great deal of emphasis on the ability to generate enough employment opportunities (Chow et al., 1999, p. 483). The situation is further complicated by the large number of Chinese workers in the informal sector. At least 85 million Chinese are estimated to make a living in the informal sector (Cai et al., 2005). Bringing these people into modern sector employment would be tremendously beneficial for overall welfare in China.

Manufacturing seems to be the best possibility for modern sector employment expansion. The Chinese manufacturing sector is large, although the exact size is unknown and presumably underestimated in official statistics. For instance, Banister (2005) claims

that the official figures underestimate the number of workers in township and village enterprises and the number of unregistered workers and estimate manufacturing employment to about 100 million workers, or about twice the size of total G7 manufacturing employment. Unfortunately, there are signs of stagnating and even declining Chinese manufacturing employment. Official labor statistics put manufacturing employment at about 98 million in 1996 and about 83 million in 2002 (National Bureau of Statistics, 2006, Table 5-5). Banister's estimates show a similar declining trend. The lack of job creation in manufacturing is problematic in view of labor force growth and the large informal sector. One consequence is that China is experiencing rapidly increasing inequality, which to some extent is caused by stagnating incomes in agriculture and the informal sector and increasing incomes in the formal modern sector (Lindbeck, 2007).

## 2.2 Previous Studies

Few studies examine employment growth in foreign- and domestically-owned firms. One notable exception is Alvarez and Görg (2007) who examine growth in employment at a plant level in Chilean manufacturing between 1990 and 2000. Their results suggest no major differences between employment growth in multinational and non-multinational firms. The authors note that the results could be biased by a selection of only surviving plants. Adjusting this potential bias by a Heckman procedure does not change their results. Based on a sample of Chinese state-owned enterprises, for the period 1999 to 2003, Gong et al. (2006) examine the effect of privatization and foreign acquisition on employment. Their results suggest that domestic privatization leads to lower employment



growth while foreign acquisition increases employment, as compared to firms that remained state-owned.

There is also a literature that examines the employment effect of foreign acquisitions in terms of employment composition. Most of these papers examine the employment composition in developed countries (e.g. Almeida, 2003; Huttunen, 2005). One exception is Lipsey and Sjöholm (2002, pp. 10-11) which examines changes in employment in Indonesian plants after foreign acquisitions during the period 1975-1999. Foreign acquisitions were found to target relatively large domestic plants and the acquisitions were followed by different kinds of employment changes for blue- and white collar workers: the number of blue-collar workers increased by 38 percent from one year before the acquisition until two years after, whereas the number of white-collar workers declined by 27 percent.

While there are at least a few studies comparing employment growth in foreign- and domestically-owned firms, there are, to the best of our knowledge, no previous studies on how FDI affects employment in domestically owned firms. There is, however, a very large literature on how FDI affects domestic firms in other respects. It has, for instance, been shown that FDI can have both positive and negative effects on domestic firms' productivity (Görg and Greenaway, 2004; Lipsey and Sjöholm, 2005) and that it tends to increase exports and wages in domestic firms (Swenson, 2007; Lipsey and Sjöholm, 2004b).

### 3 Data and Descriptive Statistics

The data used in the paper has been compiled by the National Bureau of Statistics of China (NBS). The dataset is based on a census of large- and medium-sized enterprises and a representative sample of small enterprises with more than 10 employees and an annual turnover above 5 million RMB for the period 1998-2004. Depending on the year of calculation, the dataset covers 60-69 percent of total employment in the Chinese manufacturing sector in the investigated period.

The available firm-level economic variables include employment, wages, sales, value-added, export and fixed assets. The industry code at the four-digit level and a region code make it possible to aggregate the firm-level information up to the industry- and regional level. Using the ownership indicator, we create four different ownership categories: non-private domestic firms, private domestic firms, foreign firms and other firms. Non-private firms consist of state-owned enterprises and collective firms, entirely foreign-owned firms and joint ventures with foreign co-owners and other firms primarily consisting of shareholding enterprises. A more detailed classification is given in Table A1 in the appendix.

#### **Table 1 about here**

Table 1 shows some descriptive statistics of the Chinese manufacturing sector by ownership. The number of private firms is, by far, the largest ownership category: about 10,000 private firms in 1998 increased more than tenfold to over 112,000 in 2004. This is truly a remarkable development and a reflection of the dynamic private sector growth in

China. According to officials at the National Bureau of Statistics, some of the increase is caused by an improved coverage of the sample survey on small firms, however. Foreign firms and firms with other ownership categories have also increased by about 30 and 300 percent, respectively. The number of foreign firms is more than 55,000 in 2004, only second to private-domestic firms. In contrast to the dynamic development in the private and foreign sectors, the number of non-private domestic firms has declined by more than 50 percent and amounts to 36,000 firms in 2004.

Comparing characteristics of firms by different kinds of ownership, we see that foreign firms are relatively capital intensive with high levels of productivity and wages. They are of about the same size as non-private domestic firms and other firms and substantially larger than private domestic firms. The main difference between foreign and domestic firms is the export orientation: about half of the production in foreign firms is exported.

The figures suggest that foreign firms are important as employers. However, from the descriptive statistics, we cannot draw the conclusion that they are important creators of new jobs. The reason is that the above figures might be caused by foreign firms acquiring domestic firms with little changes in total employment. One possibility would be to examine the effect of takeovers on employment, but the data does not allow for such an analysis since the identification code of a firm changes after a takeover. Instead, in table 2, we look at employment growth in firms of different ownership over the periods 1998-2001 and 2001-2004. Only firms present in both years are included.

**Table 2 about here**

The figures show that employment growth in non-private domestic firms has been negative in both periods: firms present in both 1998 and 2001 saw their labor force decline by 14 percent and the corresponding figure for firms present in both 2001 and 2004 is 17 percent. The category “other firms” also shows negative employment growth in the first period and a positive but small growth in the second period. Private firms, domestic as well as foreign ones, show positive growth in both periods. In the first period, private-domestic firms increased their labor force by 19 percent, almost twice as much as the increase in foreign firms. The situation changed in the second period when foreign firms increased their labor force by more than 24 percent, i.e. slightly more than private-domestic firms. To sum up, both private-domestic and foreign firms have increased their number of employees by two-digit figures in both periods.

Some of the observed differences in employment growth between ownership groups could be caused by differences in the sector distribution of firms. Therefore, we show the development in the five largest sectors in Table 2. The previous results seem to hold at a more disaggregated level: employment has declined in non-private domestic firms and increased, with some exceptions, in private-domestic and foreign owned firms.

## **4 Empirical Analysis**

### **4.1 Direct effects of FDI**

There is clearly a substantial difference in the ability of different types of firms to create jobs. The above figures show that employment growth has been high in foreign-owned

firms, even higher in private domestic firms and negative in non-private firms. This pattern is relatively stable when disaggregating to the industry level and the difference in performance cannot simply be explained by firms with different ownership being active in different sectors of the economy. To shed some light on the underlying causes of employment growth, we model employment growth as a function of firm characteristics, industry characteristics, regional characteristics and conditions at the macro level. This set of variables captures much of the diversity of the Chinese economy, both across industries and regions. Controlling for the differences in the environment faced by firms allows us to estimate the effect of firm-specific characteristic on job growth. The data on small firms is unfortunately quite limited and in order to retain the small (by Chinese standards!) firms in the empirical analysis, we are forced to limit the number of variables in the estimated model. Regional and industry dummies proxies for (near) time invariant regional and industry specific characteristics and time dummies capture time varying economy wide factors. Since some of the firm characteristics are time invariant (notably ownership), we do not include firm-specific effects in the model. Many of the firm-specific variables are likely to be endogenous in a model for employment and we use the first lag of these variables to protect against endogeneity bias. More specifically, the basic model we estimate is given by

$$\Delta \ln X_{it} = \ln X_{it} - \ln X_{it-1} = \alpha + \lambda Firm_t + \sum \beta_w Ownership + \sum \beta_t Year\_dummy + \sum \beta_{ind} Ind\_dummy_j + \sum \beta_R Reg\_dummy + \varepsilon_{it}, \quad (1)$$

where  $i$  is index for firms,  $j$  is index for industries and  $t$  is index for year. The variables included in the model are:

$X_{it}$ :	Employment.
$Firm_{it}$ :	A vector of lagged firm characteristics, i.e. firm size measured by employment, the export share of total sales, labor productivity, average wage and capital intensity (see Table A2 in the appendix).
$Ownership_i$ :	Ownership dummy variables indicating the four ownership categories defined in the previous section.
$Year_t$ :	Year dummy variables.
$Industry_j$ :	Industry dummy variables at the four-digit level.
$Reg\_dummy$ :	Regional dummy variables at the two-digit province-level.

The firm-specific variables control for the most important factors influencing firm performance. Lagged firm size will capture the effect of employment in the previous year on employment growth and export share controls for the importance of access to international markets. Labor productivity and capital intensity control for the efficiency-related factors and the average wage can indirectly capture skill differences between employees.

### **Table 3 about here**

The OLS estimates for our preferred specification are displayed in column (4) of Table 3, and columns (1) through (3) show more parsimonious specifications. The dummy variable for “other” firms is omitted as the reference category. The export share is a

particularly interesting explanatory variable since it measures a firm's ability to overcome the constraints of the domestic market and is closely related to whether the firm is foreign owned. To further investigate the effect of the export share, we include interaction terms with the ownership dummies to measure the differential effect of the export share.

The negative coefficient of  $-0.016$  on the ownership dummy for non-private domestic firms implies that employment growth is 1.6 percent lower than in the reference group. The dummy variable for foreign firms also has a negative and significant coefficient, which suggests employment growth to be 4.5 percent lower than the reference group, while private firms have 0.4 percent higher employment growth. This is in stark contrast with the summary statistics in Table 2 and column (1) of Table 3 where both foreign and private firms display considerably higher job growth than "other" firms, while non-private firms experience a considerable decrease in employment. In other words, being foreign owned or privately held does not in itself cause higher job growth. Instead, these firms display higher job growth because they differ in other firm characteristics.

Turning to the other firm characteristics, we find positive and significant coefficient estimates except for the firm size variable. Large firms grow relatively slowly but firms with high labor productivity, high wages and high capital intensities grow relatively fast. The results are in accordance with most previous studies. It might be particularly interesting to note that high capital intensity leads to high employment growth which runs against the commonly held perception that labor intensive technology generates more employment opportunities. One possible explanation is that capital

intensive technology leads to higher quality or lower prices of products and thereby a stronger growth in employment.

The coefficient on export share is significant and positive. It implies a relatively strong effect on employment growth, i.e. on average, if export intensity increases by 1 percent, it will generate an increase in employment growth by 4.9 percent for the reference category “other” firms. The interaction terms show a significantly higher effect of 8 percent for foreign firms, while non-private and private domestic firms do not differ significantly from the “other” firms. It thus appears that foreign firms are considerably more adept at leveraging their access to foreign markets and turning this into job growth.

One methodological problem is, as previously said, that our panel is unbalanced. We only have information on surviving firms and ownership might, for instance, affect the likelihood of survival. The OLS estimates might thus suffer from selection bias. In addition, firm exit implies a job growth of  $-100\%$  for that firm and period. While it is possible to include this in the data set, it would lead to huge outliers which can distort the results by themselves. We correct for these problems using the Heckman two-step procedure where firm survival and employment growth, conditional on survival, are modeled as two separate processes. In the first step, we estimate a probit model for firm survival, the selection equation, as

$$\hat{P}(Survival) = \Phi(Z_{i,t})$$

$$Z_{i,t} = \alpha + \lambda Firm_{i,t} + \sum \beta_w Ownership_i + \sum \beta_i Year\_dummy + \sum \beta_{ind} Ind\_dummy_j + \sum \beta_R Reg\_dummy \quad (2)$$



The firm control variables included in the selection equation are firm size, capital intensity, export share and average wage. We also control for the ownership-, year-, regional- and industry (at the two-digit level) specific effects by including dummy variables. Column (5) of Table 3 reports the estimates of the selection equation. It is noteworthy that foreign firms have a significantly higher survival probability than “other” firms and that both private and non-private domestic firms have a significantly lower survival probability. The estimated coefficients for the remaining variables, with the exception of capital intensity, have the expected sign and are significant. Turning to the equation for employment growth in column (6), the significant coefficients of the Mills ratio and the implied estimate of the correlation between equations of 0.29 confirm that it is necessary to correct for the sample selection effect. Nevertheless, the Heckman two-step estimates are very similar to the OLS estimates in column (4). The only notable difference is that the positive coefficient on the ownership dummy variable of private firms is no longer significant. Recall, however, that these estimates are conditional on firm survival and do not take account of the employment effect of failing firms. The marginal effects,  $\frac{\partial E(y)}{\partial x_i}$ , reported in column (7) account for this by also considering the effect on the survival probability of a change in an explanatory variable. The marginal effects are calculated at the sample means of the explanatory variables and reflect a step change from 0 to 1, rather than the derivative for the ownership dummies. The marginal effects are once more close to our other estimates and there is no change in the qualitative conclusions.

## 4.2 Indirect effect of FDI

The above discussion focuses on employment within foreign firms. There are, as previously said, reasons to expect that the entry of foreign firms can have positive as well as negative effects on employment in domestic firms. Positive effects could be caused by the support of linkage industries or demonstration effects and negative effects could be caused by increased competition.

We try to identify this indirect effect by relating the FDI intensity (measured by the share of production by foreign firms) of a sector to employment growth in domestic firms. It should be noted that there are several potential problems with this approach. First, the definition of a sector is important. The more narrowly-defined is the industry classification we choose, the more weight will be put on the competition effect and the less on the linkage effect. Therefore, we try with industry classifications at both two- and four-digit levels of the Chinese industry classification, which is similar to the industry classification in ISIC Rev.3. The two-digit classification includes 29 industries and the four-digit classification includes 477 industries.

The second related issue is how the geographic distinction of a market should be defined. This is an important issue in such a large country as China. As an example, will a foreign firm in Shanghai use suppliers from the Guangdong province and increase competition for firms in the Guangdong province? There are no theoretical answers to this question and, once more, we adopt a pragmatic approach and use two different geographic classifications, at the national and the regional level, which divide the 31 provinces of China into 3 regions: east, mid and west.

Taking our previous model (1) as the starting point, we add the FDI intensity and the Herfindahl index as a measure of the competitive pressure as explanatory variables. The ownership dummies and the interactions with the export share are dropped since we estimate the model separately for the subsamples of domestic private and non-private firms. The model for employment growth is thus

$$\Delta \ln X_{it} = \ln X_{it} - \ln X_{it-1} = \alpha + \lambda Firm_{it} + \delta Industry_{jt} + \sum \beta_i Year\_dummy + \sum \beta_{ind} Ind\_dummy_j + \sum \beta_R Reg\_dummy + \varepsilon_{it} \quad (3)$$

where  $Industry_{jt}$  represents the FDI intensity and the Herfindahl index at the two- or four-digit industry-level for the relevant region or at the national level. For the estimates of the Heckman sample selection model, we make similar modifications to the selection equation but do not add the FDI intensity or the Herfindahl index.

The results are shown in Table 4 for private firms and Table 5 for non-private firms. For clarity, we have only included the coefficients on the FDI intensity and the Herfindahl index. The coefficients on the other included control variables only changed marginally as compared to the previously shown results in Table 3.<sup>1</sup>

The OLS estimates show that FDI tends to increase employment growth in domestic private firms (Table 4) within the same two-digit industry at the national level, while competition, as measured by the Herfindahl index, does not yield any significant effect. There are no signs of a geographic effect of FDI at a two-digit level. The effect of FDI seems even more robust at a four-digit level of industry aggregation where the

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<sup>1</sup> The complete results are available from the authors upon request.

coefficient for FDI is positive and statistically significant at both the national and the regional level whereas the Herfindahl index is insignificant at the four-digit level. The estimated effects are smaller when controlling for unobserved heterogeneity across firms by including fixed firm effect and FDI intensity is only significant at the national level.

There is a distinct possibility that the lagged FDI intensity is endogenous, i.e. that foreign firms invest in certain industry sectors or regions in anticipation of a favorable development. To control for the possible endogeneity, we also estimate equation (3) with instrumental variables using instruments calculated at the industry and regional level. Specifically, we instrument the FDI intensity with the R&D and import intensities for the industry sector (four or two digit) at the national or regional level as well as the industry's and region's share of total patent applications, share of government S&T funding and the share of foreign S&T funding (A more detailed variable definition can be found in Appendix A2).<sup>2</sup> The IV estimates for private firms are reported in the third block of Table 4. Correcting for the possible endogeneity of FDI, the effect of the FDI intensity is no longer significant although we still find a positive effect except at the regional four-digit level.<sup>3</sup> We also test the null hypothesis that the lagged FDI intensity is exogenous and fail to reject this at the 5% level except at the national two-digit level.

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<sup>2</sup> Naturally, it can also be argued that the FDI variables are endogenous in the model (1) used to assess the direct effects of FDI on employment growth. The paucity of data on small firms prevents us from constructing appropriate firm-level instruments that can be used with equation (1). When the FDI intensity is measured at the industry/regional level, our data allows for the construction of instruments at the industry/regional level and we take advantage of this to assess the endogeneity of FDI.

<sup>3</sup> The Sargan test of the overidentifying restrictions rejects the validity of some of the instruments for some combinations of industry and regional classifications; the R&D intensity is dropped for the national two-digit level and the R&D intensity and the patent share are dropped for the regional two-digit level.

Finally, in the Heckman two-step estimation, the results are similar to the OLS estimates and the statistically significant coefficients on Mills ratio suggest that it is necessary to correct the sample selection bias caused by attrition. The marginal effects, taking account of the possibility that firms might cease to exist, are very close to the two-step estimates due to the high probability of survival.

To sum up, FDI seems to increase employment in private-domestic firms within the same sector. The results are stronger at the four-digit level than at the two-digit level. This is surprising in view of the previous discussion. We would expect the negative competition effect on employment to be relatively important at the four-digit level and the positive linkage effect to be relatively important at the two-digit level. The result leads us to the much studied and debated issue of spillovers from FDI to domestic firms. The positive effect within narrowly defined industries is consistent with the existence of such spillovers. Swenson (2007) finds evidence of such spillovers in terms of export behavior in China. She argues that this is caused by information on foreign markets and technologies flowing from foreign to domestic firms. Such flows could stem from demonstration effects or job turnover when employees in foreign firms join domestic competitors. It is also worthwhile to mention the literature on spillovers in China that looks at productivity in domestic firms. There are several such studies, and some of them find a positive effect of FDI on the productivity of domestic firms (See e.g. Cheung and Lin, 2003, Hale and Long 2007). It is plausible that more productive firms will grow faster, as is seen in our econometric results.

Next we turn our attention to the effect of FDI on employment growth in non-private firms. The results are shown in Table 5 and differ substantially from those in

Table 4. We find no signs of a positive effect of the lagged FDI intensity. The estimates are in general small and insignificant. The only significant estimates are the fixed effect estimates at the regional two-digit level and the IV estimates<sup>4</sup> at the regional two-digit level and the national four-digit level, which are all negative. It should perhaps not come as a surprise that foreign firms have a positive effect on private firms, but impose a potential negative competition effect on non-private firms. The latter are still to a large extent operating outside normal market economic restrictions and the presence of FDI leads to slower growth, and even contraction of employment in non-private firms.

## 5 Concluding remarks

FDI is considered to be one of the key driving forces behind the spectacular economic growth in China in the last two decades. However, academic research and public policy discussions tend to ignore the effect of FDI on job creation. This is unfortunate, considering the large importance of job creation in developing countries. This paper contributes to this issue by providing empirical results on the effect of FDI on job creation in China, based on a large firm-level data set for the period 1998-2004.

The descriptive statistics suggest that both FDI and private domestic firms have relatively high employment growth, as compared to non-private domestic firms. The

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<sup>4</sup> The exogeneity of the lagged FDI intensity is rejected for the regional two-digit level and the national four-digit level. The exogeneity of the import intensity is rejected and this instrument is dropped for the national two-digit level.

cross-ownership comparison also shows that FDI firms, in general, have more advantageous firm characteristics as compared to firms with other kinds of ownership.

It is important to distinguish between the sources of favorable employment growth. Is it a pure ownership effect and/or an outcome of other firm characteristics that may yield a positive effect of employment growth? In the first step econometric analysis, we investigate the direct ownership effect and find that employment growth is strongly correlated with firm characteristics such as high productivity, capital intensity and wage. Furthermore, the higher export share, as a proxy for access to international markets, gives foreign firms additional competitive advantages as compared to domestic firms.

In the second empirical analysis, we look into the indirect effect of FDI in terms of spillovers and competition. From a theoretical point of view, the effect of FDI on job creation can be both positive and negative, depending on the strength of the spillover effect and competition, which are simultaneously at work. Interestingly, we find that the spillover effect of FDI seems more important than the competition effect, in particular on private domestic firms and even at a highly disaggregated industry level. In contrast, such a positive indirect effect of FDI is not observed among non-private domestic firms.

Based on the empirical analysis, we conclude that FDI has contributed to job creation in the Chinese manufacturing sector through its access to international markets and other firm characteristics which favor growth in employment and through positive effects on employment in private-domestic firms.

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**Table 1. Firm characteristics by ownership**

Firm characteristics	Domestic Non-private		Foreign		Domestic Private		Other	
	1998	2004	1998	2004	1998	2004	1998	2004
Number of firms	85543	36268	23817	55248	9974	112856	10341	43379
Average employment per firm, headcount	352	281	304	309	150	127	497	320
Export as a share of sales (%)	7.9	7.0	45.9	48.3	13.1	13.4	9.6	9.4
Average annual wage per employee, 1000 Yuan	6.5	11.3	12.0	16.6	6.8	10.6	7.5	12.1
Value added per employee, 1000 Yuan	114.5	249.5	259.6	369.1	209.1	283.8	168.6	306.5
Fixed assets (capital ) per employee, 1000 Yuan	42.3	67.2	106.5	104.6	41.3	51.3	55.2	78.8

Note: The nominal values of fixed assets and value-added are deflated by producer price index (PPI) at the three-digit industry level and wage is deflated by an annual consumer price index (CPI).

**Table 2. Employment and employment growth by ownership and sector**

		Firms existing both 1998 and 2001				Firms existing both 2001 and 2004			
	Ownership	Number of firms	Employment 1998	Employment 2001	Growth 1998-2001	Number of firms	Employment 2001	Employment 2004	Growth 2001-2004
Total	Domestic non-private	31919	14762545	12658873	-14.3%	15987	7319868	6062059	-17.2%
	Foreign	13939	4739187	5237500	10.5%	18903	6529004	8118380	24.3%
	Domestic private	3963	631799	751690	19.0%	15064	2384847	2870745	20.4%
	Other	4130	2606045	2428156	-6.8%	8094	4392152	4463280	1.6%
Textile	Domestic non-private	1737	1277583	1119767	-12.4%	737	480768	424221	-11.8%
	Foreign	1028	313019	336074	7.4%	1298	413289	463078	12.0%
	Domestic private	380	74581	85246	14.3%	1574	304234	356902	17.3%
	Other	300	342707	310397	-9.4%	543	550788	522171	-5.2%
Non-metallic metal	Domestic non-private	3737	1346829	1161815	-13.7%	1819	543249	459812	-15.4%
	Foreign	616	163115	179139	9.8%	762	204599	228771	11.8%
	Domestic private	328	70821	69975	-1.2%	1298	251423	270135	7.4%
	Other	457	269502	242837	-9.9%	806	391785	373013	-4.8%
Ferrous metal	Domestic non-private	754	1490880	1306723	-12.4%	350	991916	825911	-16.7%
	Foreign	100	44066	45582	3.4%	98	38455	45807	19.1%
	Domestic private	103	19371	23179	19.7%	297	46884	71722	53.0%
	Other	94	125866	115351	-8.4%	146	276716	305914	10.6%
Transport equipment	Domestic non-private	1817	1641486	1411438	-14.0%	969	853789	633780	-25.8%
	Foreign	393	214113	209314	-2.2%	509	223419	276305	23.7%
	Domestic private	136	25348	32937	29.9%	523	100284	136222	35.8%
	Other	197	146664	119849	-18.3%	372	206784	232341	12.4%
Computer, tele-com equipment	Domestic non-private	404	321963	259482	-19.4%	195	151497	130371	-13.9%
	Foreign	900	493094	599365	21.6%	1171	786394	1145731	45.7%
	Domestic private	57	14461	16091	11.3%	188	33237	43366	30.5%
	Other	107	80712	78275	-3.0%	229	187571	200413	6.8%

**Table 3. Determinants of employment growth**

	OLS estimates				Heckman two-step estimates		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	Emp. growth	Emp. growth	Emp. growth	Emp. growth	Survival	Emp. growth	Marginal effects
Non-private (dummy)	-0.033*** (0.002)	-0.017*** (0.002)	-0.016*** (0.002)	-0.016*** (0.002)	-0.094*** (0.010)	-0.017*** (0.002)	-0.018
Foreign (dummy)	0.037*** (0.002)	-0.020*** (0.002)	-0.035*** (0.002)	-0.045*** (0.002)	0.122*** (0.012)	-0.044*** (0.002)	-0.042
Private (dummy)	0.032*** (0.002)	0.005** (0.002)	0.004** (0.002)	0.004** (0.002)	-0.115*** (0.010)	0.003 (0.002)	0.001
Lagged firm size (employment)	-	-0.061*** (0.001)	-0.063*** (0.002)	-0.063*** (0.001)	-	-0.062* (0.001)	-0.061
Lagged firm size (sales)	-	-	-	-	0.172*** (0.002)	-	-0.002
Lagged Export share	-	-	0.062*** (0.007)	0.049*** (0.005)	0.166*** (0.011)	0.051*** (0.005)	0.053
Lagged labor productivity	-	0.059*** (0.001)	0.059*** (0.001)	0.059*** (0.001)	-	0.061*** (0.001)	0.060
Lagged Average wage	-	0.095*** (0.001)	0.094*** (0.001)	0.094*** (0.001)	0.076*** (0.004)	0.095*** (0.001)	0.096
Lagged Capital intensity	-	0.024*** (0.001)	0.025*** (0.001)	0.025*** (0.001)	-0.001 (0.002)	0.025*** (0.0004)	0.025
Lagged export share X Domestic dummy	-	-	-	-0.009 (0.006)	-	-0.009 (0.006)	-0.009
Lagged export share X Foreign dummy	-	-	-	0.031*** (0.006)	-	0.031*** (0.006)	0.031
Lagged export share X private dummy	-	-	-	0.002 (0.006)	-	0.003 (0.006)	0.003
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	-
Industry dummy (four-digit)	Yes	Yes	Yes	Yes	-	Yes	-
Industry dummy (two-digit)					Yes	-	-
Regional dummy (two-digit)	Yes	Yes	Yes	Yes	Yes	Yes	-
No of Obs.	646195	640581	640579	640579	673652	640579	-
R2	0.01	0.11	0.11	0.11	-	-	-
Mills ratio	-	-	-	-	-	-0.078*** (0.014)	-

Note: Robust standard errors within brackets. \* - significant at a 10 percent level; \*\* - significant at a five percent level; \*\*\* - significant at a one percent level.

**Table 4. The effect of FDI on employment in private domestic firms**

		National level two-digit	Regional level two-digit	National level four-digit	Regional level four-digit
OLS	Herfindahl (lagged)	-1.245** (0.589)	-0.554** (0.213)	0.049 (0.057)	-0.013 (0.030)
	FDI intensity (lagged)	0.066** (0.024)	0.040 (0.050)	0.078*** (0.016)	0.057*** (0.013)
Fixed Effect	Herfindahl (lagged)	-0.619 (0.853)	-0.546* (0.286)	0.035 (0.058)	0.031 (0.035)
	FDI intensity (lagged)	0.052* (0.031)	-0.024 (0.051)	0.046** (0.019)	0.008 (0.018)
IV	Herfindahl (lagged)	-2.956** (1.495)	-0.619** (0.162)	0.134 (0.141)	-0.076* (0.041)
	FDI intensity (lagged)	0.336 (0.268)	0.265 (0.163)	0.859 (0.540)	-0.019 (0.181)
Heckman two-step	Herfindahl (lagged)	-1.092 (0.796)	-0.538** (0.172)	0.047 (0.058)	-0.014 (0.029)
	Marginal effect	-1.063	-0.524	0.046	-0.013
	FDI intensity (lagged)	0.066** (0.026)	0.043 (0.037)	0.078*** (0.017)	0.058*** (0.014)
	Marginal effect	0.065	0.042	0.076	0.056
	Mills ratio	0.604*** (0.066)	0.603*** (0.066)	0.605*** (0.066)	0.605*** (0.066)

Note: Robust standard errors within brackets. \* - significant at a 10 percent level; \*\* - significant at a five percent level; \*\*\* - significant at a one percent level.

**Table 5. The effect of FDI on employment in non-private domestic firms**

		National level two-digit	Regional level two-digit	National level four-digit	Regional level four-digit
OLS	Herfindahl (lagged)	0.633 (0.419)	-0.068 (0.072)	0.020 (0.037)	-0.039* (0.016)
	FDI intensity (lagged)	0.000 (0.035)	0.009 (0.023)	-0.003 (0.15)	0.006 (0.010)
Fixed Effect	Herfindahl (lagged)	0.840 (0.616)	-0.139 (0.170)	0.042 (0.043)	0.015 (0.022)
	FDI intensity (lagged)	-0.007 (0.026)	-0.063* (0.037)	0.009 (0.015)	0.007 (0.013)
IV	Herfindahl (lagged)	1.190* (0.687)	-0.082 (0.077)	-0.045 (0.057)	-0.062** (0.025)
	FDI intensity (lagged)	-0.054 (0.130)	-0.211** (0.087)	-0.610** (0.281)	-0.191 (0.121)
Heckman two-step	Herfindahl (lagged)	0.643 (0.521)	-0.068 (0.075)	0.020 (0.037)	-0.030** (0.014)
	FDI intensity (lagged)	0.001 (0.020)	0.011 (0.020)	-0.002 (0.012)	0.006 (0.008)
	Mills ratio	0.077*** (0.019)	0.077*** (0.019)	0.077*** (0.019)	0.078*** (0.019)

Note: Robust standard errors within brackets. \* - significant at a 10 percent level; \*\* - significant at a five percent level; \*\*\* - significant at a one percent level.

## APPENDIX

### Appendix A1: Ownership classification

Ownership	Code	Definition
Non-private	110	State-owned enterprises
	120	Collective-owned enterprises
	130	Shareholding cooperatives
	141	Stated-owned, jointly operated enterprises
	142	Collective-owned, jointly operated enterprises
	151	Wholly stated-owned enterprises
Private	171	Wholly private-owned enterprises
	172	Private-cooperative enterprises
	173	Private limited liability enterprises
	174	Private shareholding enterprises
Foreign	210	Overseas joint venture
	220	Overseas cooperative
	230	Wholly overseas owned enterprises
	310	Foreign joint venture
	320	Foreign cooperative
	330	Wholly foreign-owned enterprises
Other	143	State-collective jointly operated enterprises
	149	Other jointly operated enterprises
	159	Other limited liability enterprises
	160	Shareholding limited enterprises
	190	Other enterprises

## Appendix A2: Construction of variables

Variable name	Definition
Firm level variables	
Employment growth	$\log(\text{number of employees})_t - \log(\text{number of employees})_{t-1}$
Firm size	$\log(\text{number of employees})$
Labor productivity	$\log(\text{real value-added} / \text{number of employees})$
Average wage	$\log(\text{real annual wage bill} / \text{number of employees})$
Capital intensity	$\log(\text{real capital stock} / \text{number of employees})$
Export share	Export /total sales
Industry/regional-level variables	
FDI intensity	The share of sales by FDI firms in total sales at the four-digit or two –digit industry levels
Herfindahl index	$\sum_{i=1}^N S_i^2$ , where $S_i$ is the market share, in terms of sales of the $i^{\text{th}}$ firm in industry $j$ at the four-digit or two-digit level
R&D intensity	R&D expenditure to sales ratio at the industry/regional level
Technology import intensity	Technology import expenditure to sales ratio at the industry/regional level
Patent share	The industry/region's share of total patent applications
Government S&T funding	The industry/region's share of total government S&T funding
Foreign S&T funding	The industry/regions share of total foreign S&T funding