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ABSTRACT

Access to Imported Intermediates and Intra-Firm Wage Inequality

We use Chinese firm-level data from the World Bank Investment Climate Survey to examine the link between importing intermediates and intra-firm wage inequality. Our results show that intermediate input importers not only have a significant wage premium but also have a greater intra-firm wage dispersion than non-importing firms. This pattern is robust when we control for productivity and use trade costs as the instruments. We further investigate the mechanism of how importing intermediates might contribute to both inter-firm and intra-firm wage inequality. Our evidence is consistent with three important channels. First, imported intermediate inputs complement skilled labour. Second, intermediates importers are more likely to use performance pay. Third, imported inputs complement innovation and employee training.

JEL Classification: F16, F63, F66

Keywords: global production sharing, wage inequality, world bank investment climate survey

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1. INTRODUCTION

The distribution effect of globalization is a central topic of research on international trade and economic development (Winters, McCulloch & McKay, 2004; Goldberg & Pavcnik, 2007; Harrison, McLaren & McMillan, 2011). Recent globalization trends show rapid expansion of trade in intermediate inputs and global production sharing (Hummels, Ishii & Yi, 2001; Grossman & Rossi-Hansberg 2008; Antràs et al. 2012; Johnson & Noguera, 2012; Koopmans, Wang & Wei, 2014; Baldwin & Lopez-Gonzalez, 2015). According to the World Development Report (UNCTAD, 2014), approximately 60% of global trade consists of trade in intermediate inputs and services via global value chains (GVCs). On average, value-added trade contributes approximately 30% of the GDP of developing countries and 18% of the GDP of developed countries. To determine whether it is strategically beneficial to promote participation in GVCs, developing countries must carefully evaluate the effects of GVCs on both their economic growth and income distribution.

China provides an interesting setting to study the distribution effect of global production sharing. China has extensively participated in global GVCs and has become the hub in "Asian Factory," especially after World Trade Organization (WTO) accession (Baldwin & Lopez-Gonzalez, 2015). In the same period, however, China has also experienced a significant rise in income inequality. In this paper, we empirically examine the linkage between global production sharing and increasing wage inequality in China: how do imported intermediate inputs contribute to wage inequality between and within the firms?

Using Chinese firm-level data from the World Bank Investment Climate Survey,

we find a significant and positive association between imported intermediate inputs and wage inequality. First, there is significant and positive import wage premium that intermediates importers offer, an approximately 11% higher (log) wage than non-importers. Second, firms that import intermediate inputs exhibit greater intra-firm wage dispersion than non-importers. Intra-firm wage dispersion is about 46% higher in importers than in non-importers. To address the potential selection bias, we control for firm productivity and use the transport cost and custom efficiency as instruments. The findings are robust for different estimation strategies and alternative measures.

We further explore the channels by which importing intermediates may contribute to inter-firm and intra-firm wage inequality. Our evidence is consistent with three important channels: (1) access to imported inputs complements skilled labour; (2) compared with non-importers, firms that import intermediates are more likely to use performance-pay schemes; and (3) importers are more likely to invest in research and development (R&D) and provide employee training, as well as to make greater use of computers and Internet than non-importers.

Our study is related to a large body of literature on the link between heterogeneous firms' trading activities and intra-industry wage inequality. Most studies focus on the impact that trade liberalization has on skill premium and inter-firm wage inequality. Vertical integration and offshoring have long been recognized as important driving forces of increasing the skill premium (Feestra & Hanson, 1996, 1997, 1999; Hummels et al., 2014) and skill composition (Biscourp & Kramarz, 2007; Becker, Ekholm & Muendler, 2013). Exporting activities also contribute to intra-industry wage inequality. For example, Bernard & Jensen (1997)

show that increases in the skill premium can be attributed to an intra-industry reallocation of employees from firms with a low skill premium to firms with a high skill premium. The increased skill premium is largely due to the expansion of exporting firms. Verhoogen (2008) finds that shocks that encourage exporting activities increase the wage dispersion across firms in the same industry. Helpman, Itskhoki & Redding (2010) and Helpman et al. (2017) show both theoretically and empirically that wage inequality arises within sector–occupations and that trade liberalization increases wage dispersion between firms. Frias, Kaplan & Verhoogen (2009) argue that intra-industry wage changes are primarily explained by exporters' wage premiums, rather than skill premiums. Amiti & Davis (2012) show that output-tariff cuts reduce wages in domestically oriented firms, but increase wages offered by exporters. Input-tariff cuts increase wages in the importers of intermediate inputs but have no significant effects on firms that rely on domestic intermediates. However, few studies focus on the wage distribution within firms, and the link between globalization and intra-firm inequality is less clear. Our study contributes to the literature by investigating the impact and the mechanism through which firms' importing activities may affect both inter and intra-firm wage inequality.

Our study also contributes to recent research on the impacts of importing intermediate inputs in less developed countries. Most studies find that access to superior foreign inputs contributes to firm productivity (Amiti & Konings, 2007; Kasahara & Rodrigue, 2008, Topalova & Khandelwal, 2011; Halpern, Koren & Szeidl, 2015), increase domestic product scope (Goldberg et al., 2009, 2010) and promotes innovation activities (Boler, Moxnes & Ulltveit-Moe, 2015; Chen, Zhang & Zheng, 2017). Our study focuses on the distribution effects of imported inputs and suggests

that access to foreign inputs is positively associated with both inter- and intra-firm wage inequality.

Few studies have focused on the impacts of trade liberalization on intra-firm wage inequality in the case of China, mainly due to limited data. In particular, there is no firm-level information on the wages of skilled labour and unskilled labour. One exception is the work of Chen, Yu & Yu (2017). They use information on firm-level wage and skill composition and develop a Mincer-type approach to estimate the skill premium. They find that input trade liberalization increases the firm-level skill premium in China. In this paper, we use enterprise survey questions to construct four direct indicators of the intra-firm wage gap: (1) the wage gap between the highest salary and the lowest salary; (2) the wage gap between the general manager and mid-level managers; (3) the wage gap between mid-level managers and ordinary employees; and (4) the wage gap between temporary and permanent workers. We also investigate the mechanism through which importing activities affect intra-firm wage inequality. Our findings that imported intermediate inputs are positively associated with the intra-firm wage gap are consistent with Chen, Yu & Yu (2017).

The remainder of this paper is organized as follows. Section 2 introduces the data. Section 3 examines the link between importing intermediates and intra-firm wage dispersion. Section 4 explores various channels by which imported intermediate inputs may contribute to intra-firm wage inequality, and Section 5 concludes.

2. DATA AND SUMMARY STATISTICS

The data used are obtained from the Investment Climate Survey that was jointly conducted by the World Bank and China's National Bureau of Statistics in 2005. The survey covers 12,400 Chinese firms in 30 manufacturing industries and 120 cities.[1] Although certain information is available for the period 2002-2004, such as income, fixed assets and employment, responses to most of the survey questions are only available for 2004.

To identify each firm's trading status, we use the information obtained from two survey questions. In response to question A2, firms report their percentages of sales in different markets. We define a firm as an exporter if the firm sells to a foreign market. Survey question G3 asks firms to specify the average number of days necessary for customs clearance if they import raw materials or components. We define a firm as an importer of intermediate inputs if the firm answers this question. Approximately 35% of the firms in our sample reported that they use foreign intermediate inputs.[2]

To measure intra-firm wage inequality, the ideal indicators are the ratio of the

[1]For additional details on this dataset, please see www.enterprisesuveys.org/Data. We exclude observations that meet the following criteria: (a) the sum of the shares of sales in different markets is greater than 100%; (b) the sum of the shares of different wage components is greater than 100%; and (c) the share of workers educated to the college level and above is greater than 100%. Omitting the outliers reduces our sample to 11,709 firms.

[2] Because the World Bank survey provides no information on the value of imported inputs, we are unable to construct either a vertical specialization measure (Hummels et al., 2001) or an offshoring measure (Feenstra and Hanson, 1996).

standard deviation to the mean (the coefficient of variation) and the Gini index, which is calculated based on the entire wage distribution within a firm. Unfortunately, the information on wage distribution is usually available at the regional level (from household surveys), not at the firm level (from firm survey). The only possible way to access the within-firm wage distribution is to match the firm surveys and the household surveys, thereby obtaining matched employer-employee data. This is a rather challenging task given the limitations of Chinese data. First, the World Bank enterprises survey provides no firm ID information and thus cannot be matched with the household survey. Second, major Chinese household survey datasets, such as China Urban Household Surveys, do not provide information on the name of employers (firm ID). Third, even if we could match the firm surveys and the household surveys, the matched employee-employers sample would only cover a small proportion of wage distributions within a firm because the household surveys only cover a small and random sample of households (and individual workers) in certain regions. It would not be suitable to calculate the coefficient of variation or Gini index based on matched samples.

Without information on the entire wage distribution, we use another popular measure of wage inequality in the literature - "wage gap" measures (e.g., Katz and Murphy, 1992; Juhn, Murphy & Pierce1993; Han, Liu and Zhang, 2012). For example, Han, Liu and Zhang (2012) use Chinese Urban Household Survey data to study within-region wage inequality. They use the difference between the 90th and 10th percentiles of the log wage distribution to measure the overall wage inequality. They use the 90th-50th percentile wage gap to measure wage inequality in the upper half of the wage distribution and the 50th-10th percentile wage gap to measure wage

inequality in the lower half of the wage distribution. Following their approach, we construct four indicators of an intra-firm wage gap based on survey questions. First, the responses to question E6 provide information on the wage gap between the highest salary and the lowest salary in each firm.[3] Second, labour statistics (C1) provides information on the wage gap between permanent employees and temporary employees.[4] Third, question I51 asks each firm to specify the multiple by which the annual income of its general manager (GM) exceeds that of its mid-level managers. The wage gap falls into one of the following five intervals based on the extent to which the GM's income exceeds that of the firm's mid-level managers: (1) less than 2 times greater; (2) 2-3 times greater; (3) 3-4 times greater; (4) 4-6 times greater; or (5) more than 6 times greater. Fourth, question I52 asks each firm to specify the multiple by which the annual income of its mid-level managers exceeds that of its ordinary employees. The wage gap falls into one of five intervals based on

[3] The survey question is "How many times larger than the lowest salary is the highest salary?"

[4] One popular measure of intra-firm inequality is skill premium, which is usually defined as the wage ratio of skilled labor relative to unskilled labor. However, there is no direct measure of the firm-level skill premium in China because the Chinese industrial census provides no information on the wages for unskilled labor and skilled labor. In our study, the wage ratio of permanent employees relative to temporary employees might be closely related to the skill premium because temporary employees are usually unskilled workers. Permanent employees include both skilled and unskilled workers. The permanent to temporary wage ratio may be positively associated with the skill premium.

the extent to which the income of mid-level managers exceeds that of the firm's ordinary employees: (1) less than twice 2 times greater; (2) 2-3 times greater; (3) 3-4 times greater; (4) 4-6 times greater; or (5) more than 6 times greater.

With regard to other firm characteristics, the age of a firm is defined as the length of time (in years) between its establishment and 2004.The average wage is calculated as the weighted sum of the average wages of a firm's permanent workers and temporary workers. The size of a firm is defined as its total number of employees. Capital intensity is defined as the fixed assets per worker. Productivity is measured by total factor productivity (TFP). We use Levinsohn and Petrin's (2003) approach to estimate TFP separately for each industry, incorporating the input, output, and capital deflators suggested by Brandt et al. (2011) into the estimation. A firm's share of skilled labour is defined as the proportion of its employees educated to the college level and above. R&D intensity is measured by dividing R&D expenditure by total sales. A firm's share of trained employees is defined as the proportion of employees who have received formal training. The computer-user share is defined as the proportion of employees who regularly use computers. The Internet-sales share is defined as the proportion of sales revenue realized through the Internet and by e-mail. The information-technology (IT) training share is defined as the proportion of employees with IT training. The share of performance pay is defined as the proportion of performance-related pay (bonuses, piece-rate wages and time-based wages) within the total wage compensation.

[Table 1 about here]

The summary statistics for the firm characteristics are reported in Table 1. Columns 2 and 3 of Table 1 show significant differences in firm attributes between

importers and non-importers. All three indicators of intra-firm wage inequality exhibit a similar pattern. The intra-firm wage dispersion is significantly greater in intermediate importers than in non-importers. For example, the sample mean of the highest to lowest wage ratio is 3.2, which means that the highest wage is, on average, 3.2 times greater than the lowest wage. This wage gap is approximately 4.04 in firms that import intermediate inputs and only 2.75 in non-importers. With regard to other firm attributes, importers are older, larger, more capital-intensive, more productive and more skill-intensive than non-importers and also pay their employees higher wages. A greater number of employees in importing firms use computers and have received IT training than their counterparts in non-importers. Compared with non-importers, importing firms have a larger share of Internet-realized sales revenue and use more performance-pay schemes to motivate their employees.

3. LINK BETWEEN INTERMEDIATES IMPORT AND INTRA-FIRM WAGE INEQUALITY

3.1. Baseline Results

Our study focuses on two dimensions of wage inequality: inter-firm and intra-firm wage inequality. To examine the link between importing intermediates and wage inequality, we estimate the following equation:

$$\begin{aligned} \mathrm{Y}_i = \beta_0 + \beta_1 Importer_i + \sum \alpha_j Ownership_{j,i} \\ + Z_i'\gamma + \sum \delta_m Region_{m,i} + \sum \theta_n Industry_{n,i} + \varepsilon_i \end{aligned} \quad (1)$$

where Y_i represents two outcome variables: (1) the logarithms of the average wage in firm i in the wage-level equation; (2) the ratio of the highest wage to the lowest

wage within firm i in the intra-firm wage gap equation. $Importer_i$ is a dummy variable that indicates that the firm imports intermediate inputs. Among the ownership variables are the share of state ownership, the share of collective ownership, the share of private ownership and the share of foreign ownership. The reference category is the share of corporation ownership. Z_i denotes other firm attributes, such as the logarithms of the firm age, size and capital-labour ratio.[5] $Region_{m,i}$ is a dummy variable that captures region-specific differentials; it has a value of 1 if firm *I* is located in province *m* and is 0 otherwise. $Industry_{n,i}$ is a dummy variable that captures industry-specific differentials and is equal to 1 if firm *I* operates in industry *n* and is 0 otherwise. ε_i is the error term.

[Table 2 about here]

The OLS results are reported in Table 2. Columns 1-3 report the results of the wage-level regression, and columns 4-6 report the results of the intra-firm wage gap regression. Column 1 in Table 2 suggests a significant and positive import wage premium. The coefficient of the importer dummy is 0.11, suggesting that the average wage level (log) in intermediates importers is 11% higher than that in non-importers. In terms of the ownership structure, multinational firms offer higher wages, followed by state and corporate owned firms. Private and collectively owned firms have the lowest wage level. For the other firm attributes, larger firms, more capital-intensive firms and younger firms have higher wage levels.

[5] These variables are defined in Section 2. We use the lagged values of the firm size and capital intensity to mitigate endogeneity concerns.

For intra-firm wage inequality, column 4 in Table 2 shows that the wage gap is significantly larger in firms that import intermediate inputs. The coefficient of the importer dummy is 0.46 and significant at the 1% level, which suggests that the highest-lowest wage ratio within importers is approximately 46% higher than that in non-importers. In terms of the ownership structure, the greatest wage dispersion is found in firms with foreign ownership, followed by those with private and corporate ownership. State-owned and collectively owned firms have the smallest intra-firm wage gaps. With regard to other firm attributes, larger firms, more capital-intensive firms and younger firms have higher levels of within-firm wage dispersion. These findings are consistent with previous studies (e.g., Acosta, Pablo, and Gasparini, 2007; Barthet al., 2012). Large firms have more heterogeneous workforces and offer a greater diversity of occupations or tasks than small firms. Young firms may adopt more flexible wage structures and payment schemes. Capital accumulation contributes to the wage gap between skilled labourers and unskilled labourers due to capital-skill complementarity.

The previous literature suggests that imported intermediates are associated with enhanced firm performance, whether through "selection into importing" or "learning by importing" (Amiti and Konings, 2007; Topalova and Khandelwal, 2011). For robustness checks, we add the lagged total factor productivity (TFP) to equation (1). The results are reported in column 2 and column 5 of Table 2. We estimate TFP separately for each industry using Levinsohn and Petrin's (2003) approach.[6] The

[6]As our data provide too few observations from the metal-products industry to estimate TFP, we exclude this industry from our analysis.

estimation results suggest that, first, firm productivity is positively correlated with both the wage level and within-firm wage dispersion. Second, after controlling for firm productivity, the estimated coefficients of the import dummy in both the wage level equation and intra-firm wage gap equation decrease slightly, but remain strongly significant.

Global production sharing involves both exporting and importing. Because there is significant overlap between exporters and importers in China, it is possible that the positive link between importing and wage inequality is due to exporting activities. To identify the interaction between exporting and importing, we classify firms into four categories: both exporters and importers, importers only, exporters only, and non-traders. In our sample, 27% of the firms are both exporters and importers, 8% are importers only and 11% are exporters only. We include three dummy variables (both exporters and importers, importers only, and exporters only) into the wage level equation and intra-firm wage gap equation. The reference category is non-traders.

The results are reported in columns 3 and 6 of Table 2. Column 3 in Table 2 suggests that the average wage levels in only-importers and both exporters and importers are significantly higher than that in non-traders. However, the wage difference between only-exporters and non-traders is only weakly significant. Column 6 in Table 2 shows a similar pattern: only-importers and both exporters and importers have significantly larger intra-firm wage gap than non-traders. These results are consistent with the baseline results that show that importing foreign inputs is positively associated with intra-firm wage inequality.

3.2 Identification: Instrumental Variables

One particular concern is that the decision to import intermediates occurs at the firm level and may be endogenous to wage inequality. We conduct an instrumental-variable estimation of this dummy endogenous variable model (Wooldridge, 2002). In the first stage, we use probit analysis to estimate a binary-response model and obtain the fitted probability of importing intermediate inputs. We use two instrumental variables, the port cost and customs-clearance time, which are important determinants of importation but exogenous to wage inequality. The port cost is defined as the cost of trucking a 20-foot container to a seaport. Customs-clearance time is defined as the number of days taken by customs to clear exports and imports. The data for both variables are compiled from the World Bank's Investment Climate Report (2006).

[Table 3 about here]

Columns 1 and 3 of Table 3 provides the first-stage probit results for the excluded instrumental variables and the control variables. The results suggest that the transport costs and customs-clearance time have significant and negative effects on importing decisions. With regard to the other variables, larger, more capital-intensive and more productive firms are more likely to import intermediates. Foreign firms are most likely to import intermediate inputs, and state-owned and collectively owned firms are the least likely to import intermediates.

In the second stage, we estimate equation (1) using the fitted probability of intermediates importation as the instrumental variable. The results are reported in Columns 2 and 4 of Table 3. The pattern is similar to that of the baseline results: access to imported intermediate inputs is positively associated with both the wage level and intra-firm wage dispersion. Compared with the OLS estimators, the

estimated effect of importation is much more pronounced in the two-stage least-squares (2SLS) model. The magnitude and significance of the coefficients of the other firm attributes are similar to those obtained using ordinary least-squares (OLS) regression.

3.3 Robustness Check: Alternative Measures of Intra-firm Wage Inequality

The indicator of inequality in our baseline study measures only intra-firm wage dispersion. As a robustness check, we use three alternative measures to capture the wage gap in different positions of the wage distribution: (1) the wage gap between permanent employees and temporary employees; (2) the wage gap between the general manager and mid-level managers; and (3) the wage gap between mid-level managers and ordinary employees.

[Table 4 about here]

Column 1 of Table 4 displays the OLS results for the determinant of the wage ratio of permanent employees relative to temporary employees. The estimated coefficient of the importer dummy is 0.11 and significant at the 1% level, indicating that the wage ratio is 11% higher in firms that import intermediates than in non-importers.

The results in Columns 2 and 3 of Table 4 describe the association between importation and wage gap between the GM and mid-level managers. As the dependent variable is an indicator of the interval, we use both an interval-regression model and an ordered logit model.[7] As managers' salaries are closely related to their

[7] The intervals are as follows: (1) 1-2 times greater; (2) 2-3 times greater; (3) 3-4 times greater; (4) 4-6 times greater; and (5) more than 6 times greater.

individual attributes, we also control for several characteristics of the GM. Educational attainment and the number of years for which the current GM has held the position are introduced into the models, along with a dummy variable indicating whether the GM was appointed by the government and a dummy variable indicating whether the GM's annual income is directly related to the company's performance.

The results of the interval regression are reported in Column 2. The coefficient of the importer dummy is about 0.25 and is significant at the 1% level. These results suggest that the predicted wage gap between a firm's general manager and its mid-level managers is about 25% higher in importers. Consistent with the benchmark results, ownership is found to have a significant effect on intra-firm wage inequality. State ownership and collective ownership are associated with the lowest levels of inequality, while foreign ownership is associated with the largest wage gap. Larger, younger more capital-intensive and more productive firms have a greater wage dispersion. Export status is not significantly related to wage inequality. The GM's educational attainment and the number of years for which he/she has held the position are only weakly correlated with the wage gap. However, performance pay plays a more significant role: the wage gap between a firm's GM and its mid-level managers is about 24% greater when the GM's compensation is directly related to the firm's performance. The estimated coefficient of the dummy variable indicating that the GM is appointed by the government is -0.20 and is significant at the 1% level, suggesting that the wage gap in firms with government-appointed general managers is approximately 20% smaller than that in firms whose general managers are not government appointed. To check the robustness of the results, we also report the

results of the ordered logit model in Column 3 of Table 2. The results of the logit model are consistent with those of the interval-regression model.

Columns 4 and 5 of Table 4 show the interval-regression and ordered-logit estimates of the wage gap between mid-level managers and ordinary workers. The pattern is similar to that of the wage gap between the GM and mid-level managers. Column 4 shows that the coefficient of the importer dummy is about 0.12, suggesting that the wage gap is about 12% higher in importers than in non-importers.

In summary, our analysis of various measures of wage inequality, using various estimation methods, provides robust evidence that firms importing intermediate inputs have higher wage levels and a greater intra-firm wage dispersion than non-importers. In the next section, we discuss the channels through which importing intermediates may contribute to inter-firm and intra-firm wage inequality.

4 MECHANISMS

4.1 Demand for Skilled Labour

It has long been recognized that an important channel by which global production sharing increases wage inequality is an increase in demand for skilled labour. The effect of offshoring on wage inequality is similar to that of within-industry skill-biased technological improvements. Feenstra and Hanson (1996) construct a theoretical model to show how offshoring may increase the demand for skilled labour in both developed and developing countries. The key idea is that during the reallocation of medium-level skill-intensive tasks from a skill-rich country to a skill-poor country, the labour demand in both countries becomes more skill intensive.

In the case of Mexico, Feenstra and Hanson (1997) find that the growth of foreign assembly plants is positively correlated with the demand for skilled labour. Feenstra and Hanson (1999) also report that 25% of the increase in skilled-labour wages in the U.S. can be explained by offshoring and 30% by technological improvements. Recent extensions of this strand of the literature concern the effects of trade on tasks with different levels of routineness. Compared with non-routine tasks, which are associated with high skill levels, routine tasks are more easily codified and transferred offshore. Ebenstein et al. (2009) find that the effects of offshoring on employment and wages depend on both the location of the offshored activity and the routineness of the tasks involved. Hummels et al. (2014) use matched data on Danish employers and employees to investigate the effects of offshoring and export decisions on workers' wages. They find that offshoring increases the wages available for skilled labour and reduces the wages of unskilled labourers, whereas exportation increases the wage level of all employees. Becker, Ekholm & Muendler (2013) use German multinational enterprises data to examine the link between offshoring and the onshore workforce composition. They find that offshoring is associated with a statistically significant shift towards more non-routine and more interactive tasks and a shift towards highly educated workers. Biscourp & Kramarz (2007) use French firm data to analyse the link between imports, exports, employment, and the skill structure. They find that there is a strong correlation between increasing imports and the destruction of production jobs. Kasahara, Liang & Rodrigue (2016) examine the impacts of importing intermediates on skill upgrading among Indonesian plants. They find that importing has substantially increased the relative demand for educated workers within each occupation.

[Table 5 about here]

To examine this skill upgrading channel, we first compare the skill composition of importers and non-importers. Skilled labourers are defined as employees educated at the college level or higher. Column 1 of Table 5 shows that the share of skilled labour is approximately 4% higher in the sampled importers than in non-importers, controlling for other firm attributes. State-owned firms are the most skill intensive, and private and collectively owned firms are the least skill intensive. Larger and older firms are less skill intensive, while more productive and more capital-intensive firms are more skill intensive. The exporters are less skill intensive than the non-exporters. Column 2 of Table 5 shows the link between importing intermediates and changes in the skill composition between 2002 and 2004. The results indicate a trend of skill upgrading among importers. Controlling for ownership and other firm attributes, the increase in the share of skilled labour is approximately 2% higher in importers than in non-importers, suggesting that access to foreign intermediate inputs complements skilled labour and shifts the demand toward skilled workers. This skill upgrading channel contributes to increasing the intra-firm wage dispersion.

4.2 Performance Pay

The previous literature suggests that performance pay contributes to wage inequality. Performance-pay schemes reward and compensate highly efficient workers for their greater ability and effort. The resulting wage premium matches the unobservable-productivity gap (Parent, 1999). Seiler (1984) examines the effect of incentives on wages in U.S. establishments and finds that the earnings of incentivized employees are more dispersed than the earnings of other employees.

Lazear (2000) finds that performance-pay schemes significantly increase the variance in output among individual employees. Belfield and Marsden (2003) study wage inequality in U.K. establishments and find a positive association between performance pay and the wage dispersion. Lemieux, MacLeod and Parent (2009) investigate the dynamic wage structure of U.S. industries and find that the "growing incidence of performance pay accounts for 25% of the growth in male wage inequality between the late 1970s and early 1990s."

The high levels of wage and the large within-firm wage dispersion of intermediates importers may be partly due to the greater tendency of such firms to use performance-pay schemes to motivate their employees. To investigate this channel, we test the link between importing intermediates and the use of performance pay. Survey question E3 provides details of employees' wage composition for both permanent workers and temporary workers. Employees' wage compensations include five components: (1) a fixed salary; (2) performance awards or bonuses; (3) piece-rate wages; (4) time-based wages; and (5) other non-fixed pay. Based on this information, we use two measures of performance pay. First, we use performance awards as a direct measure of performance pay. In our sample, approximately 58% of firms provide performance awards for permanent workers and approximately 27% of firms provide performance awards for temporary workers[8]. Second, we measure performance pay according the non-fixed

8 The sample sizes of performance awards for permanent workers and temporary workers are different because approximately 30% of firms hire no temporary workers.

compensation, which includes performance awards, piece-rate wages, time-based wages and other non-fixed pay. In our sample, approximately 90% of firms report a positive non-fixed compensation for permanent workers and approximately 89% of firms report a positive non-fixed compensation for temporary workers.

[Table 6 about here]

We use the logit model to examine the factors that determine the probability of a firm's use of a performance-pay scheme. The estimation results are reported in Table 6. Columns 1 and 2 of Table 6 report the results for performance awards, and columns 3 and 4 report the results for non-fixed compensations. The patterns are similar for both measures of performance pay. The results suggest that importers are more likely to use performance-pay schemes than non-importers. With regard to differences in ownership, state-owned enterprises, collectively owned firms and foreign firms are less likely to use performance pay than domestic joint ventures. Larger, more capital intensive and more productive firms are more likely to use performance pay. The link between exporting and the use of performance pay is positive but less significant. This evidence supports the hypothesis that globally involved firms are more likely to use performance pay.

4.3 Innovation, Employee Training and Computer Use

Innovation is an important channel through which global production sharing may contribute to wage inequality. Integration into a global production chain may encourage firms to invest in research and development (R&D) and adopt advanced technology. Innovation and technological improvements complement skilled labour, resulting in both an increasing wage level and widening within-firm wage gap.

Employee training is another potential source of intra-firm wage inequality. Since Mincer's seminal research (1958, 1962), the relationship between training and wages has received extensive study. On-the-job training provides employees with access to firm-specific human capital and thereby improves their productivity (and wage level). However, the uneven distribution of training opportunities and intensities across different types of tasks and groups of workers may contribute to intra-firm wage inequality. For example, if skilled labourers who carry out complex tasks receive more training than unskilled labourers undertaking routine tasks, employee training will increase the wage gap. Almeida-Santos, Chzhen and Mumford (2010) estimate the wage returns of training for British employees and find that training is positively associated with wage dispersion.

[Table 7 about here]

First, we examine the link between global production sharing and R&D investment. The results of the logit model are reported in Column 1 of Table 7. The results suggest that intermediate importers are more likely to invest in R&D than domestic non-traders. With regard to different ownership categories, private firms and domestic joint ventures are more likely to invest in R&D than state-owned firms and foreign firms. Larger, more capital-intensive, and more productive firms are more likely to invest in innovation. Column 2 of Table 7 reports the results of the Tobit model for the determinants of the R&D intensity. A similar pattern is found: the importation of intermediates is positively associated with R&D investment. This finding is consistent with Chen, Zhang & Zheng (2017), who show that importing intermediates tends to increase importing firms' R&D intensity.

Second, we estimate the effects of importing intermediates on employee training. Column 3 of Table 7 displays the results of the logit model. The dependent variable is a dummy variable indicating whether a firm offers formal training or not. The information for this variable comes from survey question E1: "Has the company provided training for its employees in the past two years?" The results indicate that importers are more likely to provide training than non-importers. Larger, more capital-intensive, and more productive firms are more likely to provide employee training. The results of the Tobit model are reported in Column 4 of Table 7. The dependent variable is the percentage of employees who received formal training in 2004 (survey question E102), and this variable is left-censored at 0. The results are consistent with the evidence provided by the logit model showing that importers have a larger share of trained employees than non-importers.

Third, we examine the link between the importation of intermediates and the use of computers and Internet. We use three variables to measure computer use: (1) the proportion of employees who use computers regularly (survey question F5); (2) the proportion of employees who have received IT training (survey question F7); and (3) the proportion of sales revenue realized through the Internet and e-mail (survey question F5). The estimation results for the three indicators are reported in Columns 5, 6 and 7. The positive association between access to foreign intermediates and computer use is robust for different measures of computer use. For the ratio of computer users to total employees, the estimated coefficient of the importer dummy is 0.039, which is both statistically and economically significant. The share of employees who regularly use computers is about 4% higher in firms that import foreign inputs than in non-importers. The share of employees who have received IT

training is about 6% higher in firms that import intermediates than in non-importers. The share of sales revenue realized through the Internet and by e-mail is about 7% higher in the importers than in firms using only domestic inputs.

4.4 Other Channels

There are other potential channels through which global production sharing may contribute to wage inequality. In the previous section, we identify the systematic difference in the skill composition between importers and non-importers. However, other heterogeneous aspects of the labour-force composition may also be important sources of wage inequality. For example, the gender wage gap is an important source of wage inequality. Chen et al. (2013) report that Chinese firms involved in global production sharing are more likely than domestic non-traders to hire female employees and that the gender wage gap is significantly larger in globally engaged firms.

Another potential source of wage dispersion is the occupation-specific wage premium. Recent studies of trade and wage inequality emphasize the varying effects of global production sharing on different occupations or tasks. For example, Grossman and Rossi-Hansberg (2008) argue that routine tasks are more easily codified and communicated than their less routine counterparts and are thus more likely to be offshored to low wage countries.[9] Ebenstein et al. (2009) find that the

[9] Autor et al. (2003) define "routine tasks" as "tasks that can be expressed using procedural or 'rules-based' logic, that is codified in a fully specified sequence of logical programming commands that designate unambiguously what actions the machine will perform and in what sequence at each contingency to achieve the

expansion of offshore activities in low-wage locations reduces the wages offered for routine tasks, but increases the wages earned for non-routine tasks.

Labour-market frictions may play important roles in the distribution effects of globalization (e.g., Davidson, Matusz and Shevchenko, 2008; Helpman, Itskhoki and Redding, 2010). The key insight is that labour allocation is subject to search and match frictions. Even workers who carry out ex ante identical tasks may receive different wages due to match outcomes. Globalization may have a significant effect on assortative matching and thus generate wage inequalities among similar workers. The effects of globalization may vary across workers with different skills. For example, Krishna, Poole and Senses (2012) examine the effects of trade liberalization on the wage dispersion in Brazil and find that skilled labourers experience a greater wage dispersion than unskilled labourers as a result of trade liberalization. These channels, however, are not identified in our study due to data limitations.

5 CONCLUSION

Using Chinese firm-level data from the 2005 Investment Climate Survey conducted by the World Bank, we investigate the link between access to foreign intermediate inputs and wage inequality. Our study suggests that intermediates importers have a significant and positive wage premium and greater intra-firm wage dispersion than non-importers. To explain this pattern, we explore three key channels through which importing intermediates may contribute to both inter-firm and intra-firm wage inequality: (1) access to imported inputs complements skilled labour; (2) firms that

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desired result."

import intermediates are more likely to offer performance pay; and (3) access to imported inputs complements innovation and employee training. We also discuss other potential sources of wage inequality, such as workforce heterogeneity, occupation-specific premiums, and worker-firm or worker-task matching mechanisms.

Our study has significant policy implications. Global production sharing both challenges and provides opportunities for economic development. With the rapid extension of GVCs, many developing countries are actively promoting GVC participation in pursuit of benefits, such as the opportunity for industrial upgrading. However, it is important to evaluate the distribution effects of promoting GVC participation. The results of our study suggest that global production sharing has a negative effect on the income distribution and shed light on a variety of possible reasons for this effect.

China has experienced significant trade liberalization and has become thoroughly integrated into the global economy, especially since its accession to the WTO. Trade and FDI are widely recognized as two engines of China's rapid growth. However, domestic income inequality has substantially increased, drawing heightened attention to the distribution effects of globalization. Several researchers have used urban household surveys to explore the role of globalization in shaping the wage inequality in China and found a positive relationship between trade openness and wage disparity (e.g., Hering and Poncet, 2010; Han, Liu and Zhang, 2012). Our firm-level study provides in-depth insights into various channels through which globalization may contribute to intra-firm wage inequality.

Due to data limitations, we do not control for worker heterogeneity, and thus,

future studies using matched employer-employee data would be good complements to this study. Updating more recent data and investigating the dynamic effects of importing intermediates on intra-firm wage inequality would also be interesting avenues for future work.

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TABLE 1
SUMMARY STATISTICS

Characteristics	Total	Importers	Non-importers
	(1)	(2)	(3)
Highest to lowest wage ratio	3.20	4.04	2.75
	(3.05)	(3.93)	(2.32)
GM to mid-level manager wage	2.17	2.6	1.94
gap	(1.24]	(1.32)	(1.13]
Mid-level manager to worker	1.64	2.00	1.45
wage gap	(0.89)	(1.03)	(0.74)
Firm age	12.8	13.5	12.5
	(13.7)	(14.5)	(3.25)
Average wage	103982	132525	88603
	(71422)	(91248)	(1852)
Total employment	951	1884	449
	(7295)	(12159)	(229)
Capital labour ratio	79.3	104.0	66.0
	(74.2)	(82.1)	(65.9)
Productivity	155	209	127
	(161)	(179)	(143)
Share of skilled labour	0.18	0.23	0.16
	(0.18)	(0.19)	(0.16)
R&D intensity	0.16	0.24	0.12
	(3.74)	(4.45)	(3.30)
Share of trained employees	0.40	0.46	0.36
	(0.36)	(0.37)	(0.35)
Share of computer users	0.17	0.22	0.14
	(0.19)	(0.21)	(0.18)
Share of Internet sales	0.12	0.16	0.09
	(0.21)	(0.24)	(0.19)
Share of IT training	0.08	0.14	0.05
	(0.20)	(0.26)	(0.15)
Share of performance pay	0.38	0.40	0.37
	(0.31)	(0.31)	(0.31)
Observations	11709	4100	7609

Note: This table displays the mean statistics for the firm characteristics. The standard deviations are reported in brackets. The data source is the Investment Climate Survey conducted by the World Bank in China in 2005.

TABLE 2
Importing Intermediates and Wage Inequality: OLS

	Inter-firm Wage Inequality			Intra-firm Wage Inequality		
	Log (wage)			Highest to lowest wage ratio		
	(1)	(2)	(3)	(4)	(5)	(6)
Importer	0.111***	0.085***		0.460***	0.404***	
	(12.42)	(9.67)		(6.30)	(5.44)	
State share	0.005	0.030**	0.031**	-0.468***	-0.408***	-0.402***
	(0.36)	(2.17)	(2.217)	(-4.72)	(-4.08)	(-4.02)
Collective	-0.102***	-0.092***	-0.091***	-0.387***	-0.356***	-0.345***
share	(-6.540)	(-6.08)	(-5.94)	(-4.17)	(-3.79)	(-3.67)
Private share	-0.104***	-0.093***	-0.091***	-0.069	-0.030	-0.028
	(-10.99)	(-9.78)	(-9.73)	(-0.88)	(-0.38)	(-0.36)
Foreign share	0.042***	0.036**	0.039**	0.448***	0.433***	0.427***
	(2.619)	(2.33)	(2.52)	(3.10)	(2.97)	(2.92)
Lagged firm	0.047***	0.025***	0.026***	0.330***	0.293***	0.288***
size	(15.75)	(8.20)	(8.21)	(13.91)	(11.85)	(11.49)
Firm age	-0.020***	-0.013***	-0.013***	-0.113***	-0.100***	-0.101***
	(-4.526)	(-3.02)	(-3.03)	(-3.43)	(-3.03)	(-3.04)
Lagged capital	0.067***	0.059***	0.059***	0.169***	0.154***	0.154***
labour ratio	(21.69)	(18.65)	(18.53)	(8.69)	(7.86)	(7.86)
Lagged TFP		0.091***	0.091***		0.177***	0.175***
		(24.17)	(24.11)		(7.16)	(7.09)
Both importers			0.075***			0.434***
& exporters			(7.48)			(5.07)
Importers only			0.127***			0.486***
			(8.81)			(3.90)
Exporters only			0.020*			0.171*
			(1.93)			(1.94)
Industry	Yes	YES	YES	YES	YES	YES
Region	Yes	YES	YES	YES	YES	YES
R-square	0.419	0.461	0.462	0.105	0.108	0.109
Observations	11,689	11,481	11,481	11,689	11,481	11,481

Note: Columns 1, 2 and 3 show the OLS results for the estimation of the wage-level equation. Columns 4, 5 and 6 display the OLS results for the estimation of the wage-gap equation. Robust t-values are reported in brackets. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

TABLE 3
Importing Intermediates and Wage Inequality: 2SLS

	Inter-firm Wage Inequality		Intra-firm Wage Inequality	
	First stage	Second stage	First stage	Second stage
	(1)	(2)	(3)	(4)
Importer		0.546***		1.142***
		(12.41)		(3.53)
State share	-0.228***	0.058***	-0.228***	-0.363***
	(-4.20)	(3.94)	(-4.20)	(-3.36)
Collective share	-0.355***	-0.052***	-0.355***	-0.291**
	(-5.07)	(-3.02)	(-5.07)	(-2.31)
Private share	-0.048	-0.081***	-0.048	-0.012
	(-1.13)	(-7.22)	(-1.13)	(-0.15)
Foreign share	1.24***	-0.140***	1.24***	0.152
	(20.86)	(-6.15)	(20.86)	(0.91)
Lagged firm size	0.323***	-0.015***	0.323***	0.229***
	(26.79)	(-3.05)	(26.79)	(6.41)
Firm age	0.003	-0.014***	0.003	-0.103***
	(0.17)	(-3.01)	(0.17)	(-2.95)
Lagged capital	0.155***	0.041***	0.155***	0.125***
labour ratio	(13.50)	(12.37)	(13.50)	(5.11)
Lagged TFP	0.143***	0.074***	0.143***	0.149***
	(10.40)	(19.25)	(10.40)	(5.26)
Port cost	-0.166***		-0.166***	
	(-4.58)		(-4.58)	
Clearance time	-0.014***		-0.014***	
	(-3.60)		(-3.60)	
Industry	YES	YES	YES	YES
Region	YES	YES	YES	YES
R-square	0.320	0.326	0.320	0.100
Observations	11,481	11,481	11,481	11,481

Note: This table displays the results of the two-stage least-square estimation. Columns 1-2 show the 2SLS results for the wage-level equation, and Columns 3-4 show the 2SLS results for the wage-gap equation. Robust t-values or z-values are reported in brackets. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

TABLE 4
Robustness: Alternative Measures of Intra-firm Wage Inequality

	Permanent to temporary wage ratio	General manager to mid–level manager wage gap		Mid-level manager to ordinary employee wage gap	
	OLS	Interval	Ologit	Interval	Ologit
	(1)	(2)	(3)	(4)	(5)
Importer	0.110***	0.245***	0.307***	0.115***	0.304***
	(5.26)	(6.30)	(6.30)	(4.91)	(5.82)
State share	0.0257	-0.200***	-0.400***	-0.135***	-0.457***
	(0.75)	(-4.17)	(-5.75)	(-4.51)	(-6.09)
Collective share	-0.0823***	-0.224***	-0.443***	-0.050	-0.400***
	(-2.84)	(-4.56)	(-5.35)	(-1.43)	(-4.07)
Private share	-0.126***	0.139***	0.118**	0.051**	0.056
	(-6.59)	(3.54)	(2.22)	(2.16)	(0.96)
Foreign share	0.112***	1.015***	1.116***	0.544***	0.969***
	(2.97)	(15.14)	(14.36)	(12.94)	(12.28)
Lagged firm size	0.003	0.125***	0.188***	0.119***	0.312***
	(0.37)	(10.42)	(11.92)	(15.91)	(18.36)
Firm age	-0.024***	-0.038**	-0.064***	-0.035***	-0.122***
	(-2.60)	(-2.33)	(-2.81)	(-3.55)	(-4.98)
Lagged capital	0.054***	0.071***	0.109***	0.052***	0.153***
labour ratio	(8.09)	(6.92)	(7.70)	(8.15)	(9.66)
Lagged TFP	0.108***	0.058***	0.093***	0.051***	0.152***
	(12.86)	(4.58)	(5.42)	(6.66)	(8.15)
Exporter	-0.013	-0.013	0.007	0.030	0.072
	(-0.65)	(-0.36)	(0.15)	(1.34)	(1.45)
GM college		-0.133***	-0.116*		
		(-3.15)	(-1.95)		
GM master		-0.012	0.050		
		(-0.208)	(0.67)		
GM year		0.035*	0.052**		
		(1.88)	(2.15)		
GM performance		0.242***	0.516***		
		(8.45)	(12.67)		
GM government		-0.201***	-0.381***		
		(-5.11)	(-6.16)		
Industry	Yes	YES	YES	YES	YES
Region	Yes	YES	YES	YES	YES
R-square	0.20	–	0.07	–	0.11
Observations	11,480	11,411	11,411	11,481	11,481

Note: This table shows the results of the estimation of wage-gap equation. Column 1 displays the OLS results for the permanent to temporary wage ratio. Columns 2 and 3 provide the interval regressions and ordered logit estimates for the wage gap between the general manager and mid-level managers.

Columns 4 and 5 show the interval-regression estimates and ordered logit estimates for the wage gap between mid-level managers and ordinary workers. Robust t-values or z-values are reported in brackets. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

TABLE 5
Importing Intermediates and Demand for Skilled Labour

	Share of skilled labour	Change in share of skilled labour between 2002 and 2004
	Tobit	OLS
	(1)	(2)
Importer	0.043***	0.017**
	(9.93)	(2.22)
State share	0.015**	0.004
	(2.42)	(0.55)
Collective share	-0.058***	-0.019**
	(-9.70)	(-2.57)
Private share	-0.026***	-0.003
	(-5.95)	(-1.02)
Foreign share	-0.010	-0.011***
	(-1.46)	(-3.06)
Lagged firm size	-0.007***	-0.001
	(-5.02)	(-0.58)
Firm age	-0.004**	-0.001
	(-2.38)	(-0.79)
Lagged capital labour ratio	0.019***	0.005*
	(14.79)	(1.75)
Lagged TFP	0.031***	0.012**
	(18.52)	(2.55)
Exporter	-0.010**	-0.002
	(-2.48)	(-0.89)
Initial share of skilled labour		-0.298*
		(-1.66)
Industry	YES	YES
Region	YES	YES
R-square	–	0.25
Observations	11,481	11,481

Note: This table displays the estimates for skilled-labour demand. Column 1 provides the marginal effects of the share of skilled labour obtained using the Tobit model. Column 2 displays the OLS estimates for the change in the share of skilled labour from 2002 to 2004. Robust t-values or z-values are reported in brackets. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

TABLE 6
Importing Intermediates and the Use of Performance Pay

	Performance Awards		Non-fixed Compensation	
	Permanent Workers	Temporary Workers	Permanent Workers	Temporary Workers
	(1)	(2)	(3)	(4)
Importer	0.316***	0.178**	0.289***	0.086
	(5.48)	(2.35)	(2.84)	(0.74)
State share	-0.181**	-0.040	-0.709***	-0.291*
	(-2.30)	(-0.37)	(-5.53)	(-1.93)
Collective share	-0.341***	-0.371***	-0.305**	-0.262
	(-3.81)	(-2.90)	(-2.12)	(-1.57)
Private share	-0.240***	-0.288***	-0.140	0.077
	(-3.94)	(-3.66)	(-1.33)	(0.66)
Foreign share	-0.537***	-0.104	-0.973***	-0.498***
	(-6.12)	(-0.93)	(-7.04)	(-3.06)
Lagged firm size	0.207***	0.019	0.328***	0.070**
	(11.87)	(0.83)	(10.98)	(2.04)
Firm age	-0.029	-0.036	-0.011	-0.090*
	(-1.11)	(-1.01)	(-0.25)	(-1.73)
Lagged capital labour ratio	0.127***	0.051**	0.089***	-0.155***
	(8.03)	(2.41)	(3.74)	(-4.78)
Lagged TFP	0.155***	0.077***	0.055*	-0.100***
	(8.05)	(3.01)	(1.84)	(-2.77)
Exporter	0.020	0.020	0.153	0.256**
	(0.37)	(0.27)	(1.63)	(2.27)
Industry	YES	YES	YES	YES
Region	YES	YES	YES	YES
Pseudo R-square	0.07	0.03	0.09	0.07
Observations	11,481	7401	11,481	7387

Note: This table shows the results of logit model for the use of performance pay. Columns 1 and 2 display the results for the performance awards. Columns 3 and 4 report the results for the non-fixed compensation. Robust z-values are reported in brackets. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

TABLE 7
Importing Intermediates, Innovation, Employee Training and Computer Use

	R&D investment		Employee training		Computer-user share	IT-training share	IT-sales share
	Logit	Tobit	Logit	Tobit	Tobit	Tobit	Tobit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Importer	0.370***	0.033***	0.256***	0.028**	0.039***	0.059***	0.069***
	(5.95)	(5.31)	(2.78)	(2.43)	(7.87)	(7.10)	(6.30)
State share	-0.441***	-0.031***	-0.389***	-0.018	0.013*	-0.039***	-0.078***
	(-5.28)	(-4.09)	(-2.94)	(-1.12)	(1.84)	(-3.49)	(-5.13)
Collective share	-0.631***	-0.070***	-0.240*	-0.053***	-0.052***	-0.066***	-0.063***
	(-6.61)	(-6.61)	(-1.82)	(-2.90)	(-7.54)	(-4.88)	(-3.54)
Private share	-0.066	-0.013*	-0.211**	-0.010	-0.028***	-0.019**	0.015
	(-1.03)	(-1.95)	(-2.21)	(-0.86)	(-5.43)	(-2.12)	(1.29)
Foreign share	-1.516***	-0.110***	-0.474***	0.019	0.010	-0.012	0.000
	(-15.88)	(-10.64)	(-3.39)	(1.07)	(1.25)	(-0.90)	(0.01)
Lagged firm size	0.382***	0.012***	0.467***	0.050***	-0.013***	0.015***	-0.000
	(20.44)	(6.27)	(16.12)	(14.16)	(-8.01)	(5.68)	(-0.12)
Firm age	-0.036	-0.008***	-0.144***	-0.037***	-0.010***	-0.017***	-0.013***
	(-1.32)	(-3.00)	(-3.44)	(-7.26)	(-4.74)	(-4.80)	(-2.74)
Lagged capital labour	0.122***	-0.023***	0.223***	0.037***	0.023***	0.025***	-0.004
ratio	(7.29)	(-10.17)	(9.61)	(11.43)	(15.44)	(10.44)	(-1.16)
Lagged TFP	0.110***	0.034***	0.259***	0.035***	0.034***	0.035***	0.010**
	(5.42)	(13.50)	(8.80)	(8.61)	(18.35)	(11.32)	(2.39
Exporter	0.438***	0.026***	0.079	0.010	-0.006	0.019**	0.191***
	(7.57)	(4.49)	(0.91)	(0.96)	(-1.17)	(2.42)	(18.27)

Industry	YES	YES	YES	YES	YES	YES	YES
Region	YES	YES	YES	YES	YES	YES	YES
Pseudo R-square	0.16	0.33	0.15	0.09	0.15	0.14	0.13
Observations	11481	11480	11481	11481	11481	11481	11481

Note: This table displays estimates for innovation, training and computer use. Columns 1 and 2 show the marginal effects of R&D investment, calculated using the logit model and the Tobit model. Columns 3 and 4 display the marginal effects of employee training, calculated using the logit model and the Tobit model. Columns 6, 7 and 8 display the marginal effects obtained using the Tobit model for the different measures of computer use. Robust z-values are reported in brackets. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.