Foreign Direct Investment, Intellectual Property Rights and Wage Inequality in China*

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ABSTRACT

This paper incorporates foreign direct investment and product differentiation in a general equilibrium trade model. The analysis shows that freer trade and FDI will upgrade China's technology, improve its skills of labor, and increase the competitiveness of local firms in the international market. At the same time, FDI in differentiate sectors will increase the relative wage of skilled labor to unskilled labor. The size of this rise will be affected by the degree of protection for intellectual property rights. These theoretical results are consistent with empirical evidence. The analysis provides insights in coordinating policies on foreign direct investment, labor market reform, and intellectual property rights protection.

JEL Classification: F23, J31, O34

Key words: wage inequality, FDI, product quality, intellectual property rights

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1 Introduction

Attracting foreign direct investment (FDI) has been a strategic economic policy adopted by China to upgrade technology and boost economic growth. FDI inflows into China have increased rapidly in the past three decades, especially into the 1990s. Since 1993, China has become the second largest FDI recipient after the United States (United Nations, 1999). Firms with FDI have contributed to over 40% of China's total trade since the mid-1990s.

With China's imminent accession to the World Trade Organization (WTO), FDI will penetrate more of the Chinese economy. Notwithstanding the benefits FDI can bring, what potential risks can such influxes of FDI impose on the domestic economy? What policies can help a host country reduce such risks and maximize the benefits, especially with large FDI inflows as in China's case? Moran (1998) synthesizes evidence drawn from a wealth of case studies to assess policies toward FDI in developing countries and economies in transition. He finds that there is indeed a large and vital role for host country authorities to play in designing policies to manage FDI inflows, and that the needed actions differ substantially from conventional wisdom.

This paper will focus on the effect of FDI on China's relative wage of skilled and unskilled labor, and explore the policy implications for China's labor market reform. This is particularly important as access to the Chinese market by foreign trade and investment under the WTO rules can bring dramatic changes to China's employment and division of labor. The significance of the impact of FDI on China's relative wages may be concealed by the relatively small share of foreign funded enterprises (FfEs) in China's total employment. But wages like all the other prices are set at the margin. FfEs can push up the wages even if their employment share is small.¹ Indeed, multinational firms are found to have contributed to increasing inequality in income distribution in China. Zhang and Zheng (1998) show that the GINI coefficient of the per capita wages in industrial sectors almost doubled between 1985 and 1995. One of the culprits identified for this increase in income inequality is the entering of multinationals.

Table 1 shows that the employment shares of the state-owned enterprises (SOEs) and collective-

¹Leamer (1994, 1998 and 2000) and Wood (1994 and 1995) demonstrate that wages are linked to prices rather than to volumes. Their empirical results show that trade can be the main cause of growing wage inequality between skilled and unskilled labor regardless of trade's insignificant contribution to total GDP.

owned enterprises (COEs) in urban areas have declined while that of the FFEs has increased since 1985. From 1985 to 1998, the average wage of the SOEs was on average 5% higher than the total average wage, that of the COEs was on average 23% lower, while that of the FFEs was on average 46% higher as shown in Table 2. These data demonstrate that FFEs have been successfully expanding their market shares by using higher wages to attract labor from other domestic firms.

The relationship between the amount of FDI and the average wage in each sector is, however, not monotonic as illustrated in Figure 1. This suggests that not all FDIs have the same effect on wages. To understand the variation, we can trace to the sources and patterns of China's FDI. Figure 2 shows that most FDI in the manufacturing sector from developing countries are relatively labor intensive while that from developed countries are relatively capital or technology intensive. Overall, developed countries invest mostly in technology or human capital intensive (high-tech) sectors, such as electronic and machinery, while developing countries invest mostly in labor intensive (low-tech) sectors, such as food and textiles (Chen, 1997a and 1997b; Zhang and Zheng, 1998).

Given these differences, a question is whether FDI in different sectors has different impacts on the relative wage of skilled and unskilled labor. Since most FDIs in China are export oriented as FDI provides a channel for foreign firms to exploit China's cheaper labor input, the traditional Heckscher-Ohlin-Samuelson model predicts that, as FDI induces more trade, the relative wage of unskilled labor to skilled labor in China (with a relatively abundant unskilled labor endowment) will increase. However, Figure 3 shows that the annual growth rate of real wages in those unskilled labor intensive sectors are actually slower than the other skilled labor intensive sectors with differentiated goods.

There has not been a completely satisfactory explanation of how FDI affects relative wages of skilled to unskilled labor. Feenstra and Hanson (1997 and 1999), Leamer (1998 and 2000), Krugman (2000), and Xu (2000) suggest that whether a factor or sector biased technical progress induced by FDI can change factor prices is ambiguous, depending on a country's size and whether the technical progress is global or national. Sector bias matters as long as the technical progress is non-identical across countries and factor bias is all that matters for a large economy if the technical progress is global and identical and the preferences are Cobb-Douglas.

As can be seen from Figure 2, many FDIs in China are in the differentiated sectors where quality as well as quantity matters. Thus, this paper extends the above analysis on the impact of technology on

relative wages for homogeneous goods to study how FDI induced technical progress can affect China's relative wages when there are product differentiation and when different quality varieties require different skill intensity of production. The paper will then discuss the role of intellectual property rights on FDI's impact on relative wages, which has not received much attention in the literature. Other related works will be discussed in the next section.

In sum, this paper develops a general equilibrium trade model with both horizontal and vertical product differentiation to demonstrate that FDI in differentiated sectors tends to increase the relative wage of skilled to unskilled labor rather than decrease it. This relative wage increase will be smaller if China enforces stricter protection of intellectual property rights. The theoretical findings from the model are used together with empirical evidence to analyze China's likely future relative wage changes, taking into consideration the difference in FDI sources. Policy implications are drawn for the integration of policies on FDI, intellectual property rights, and labor market reform.

2 The Theoretical Model

Markusen and Venables (1996 and 1997) first relate multinational investment to wage inequality by developing a firm-based general equilibrium trade model. Recent studies have developed international trade models of income distribution that depart from the assumption of exogenous technical change, and link economic openness to changes in factor prices through the acceleration of endogenous technical change. Examples include Dinopoulos and Segerstrom (1999), Dinopoulos, Syropoulos and Xu (1999), Feenstra and Hanson (1996a, 1996b and 1999) and Richardson (1995). This paper identifies and investigates a new trade-related mechanism of income distribution: one that relates a multinational firm's endogenous choice of product quality to factor prices.²

On the production side, this paper integrates the Heckscher-Ohlin-Samuelson model of multinationals and production differentiation in Helpman and Krugman (1985) with the Ricardian model of product

²In the literature of growth, technology, and income distribution, Grossman and Helpman (1991) provide a pioneering analysis of North-South trade, technology development and the welfare effect of imitation due to lack of intellectual property rights protection. They focus on the dynamic process of innovation and imitation of local firms. This paper focuses on the process of technology diffusion through foreign direct investment in sectors with differentiated goods and technologies.

and technology differentiation in Flam and Helpman (1987).³ This allows us to analyze a multinational firm's endogenous choice of quality and its consequent effect on relative wages of skilled and unskilled labor. On the consumption side, the paper takes the approach in Shaked and Sutton (1987) on product differentiation, where a product is both vertically (quality) and horizontally (characteristics) differentiated. A consumer chooses a variety with certain quality and price first and then chooses a brand closest to his/her most preferred characteristics.⁴

The structure of the model is as follows. There are two countries, China and the rest of the world, and two goods, X and Y . Good X is differentiated in both quality and characteristics as in Shaked and Sutton (1987). This models consumers' choices among goods of different qualities as well as goods with the same quality but different attributes. Since good X is differentiated, it is sold under monopolistic competition. The quality of the differentiated good is denoted by q and $q > 0$. There is no consumption when $q = 0$. Good Y is homogeneous and is sold in a perfectly competitive market.

There are two factors of production, labor and capital. In this paper, capital is broadly construed to include both physical capital and human capital (skilled labor) while labor restrictively refers to unskilled labor. The output of the homogeneous good, Y , is given by the following Cobb-Douglas production function:

$$Y = L_y^{1/2} K_y^{1/2} \quad (1)$$

where L_y is the labor input and K_y is the capital/skilled labor input in the Y -sector.

The output of the differentiated good, X , is given by the following Leontief production function:

$$X|_q = h \min\left\{\frac{K_x}{\lambda q}, L_x\right\} \quad (2)$$

where L_x is the labor input and K_x is the capital/skilled labor input in the X -sector. A higher h represents a Hicks-neutral technical improvement of labor and capital while a lower λ represents a skill-biased technical improvement. Both h and λ represent a sector biased technology improvement in the

³A compendium of the trade models under monopolistic competition can be found in Grossman (1992). Copeland and Kotwal (1996) and Murphy and Shleifer (1997) also apply the Ricardian model with product differentiation to analyze the pattern of trade between developed and developing countries.

⁴This approach assembles the properties in the case of "pure vertical" attributes as in Shaked and Sutton (1982 and 1983) and in the case of "pure horizontal" attributes as in Dixit and Norman (1980) and Dixit and Stiglitz (1977).

X -sector. This specification assumes that the capital-labor ratio increases with quality, q . There is also a fixed cost, F , associated with the production of good X .⁵

A consumer buys only one unit of the differentiated good and his utility increases with quality. A higher quality can be interpreted as a product with more and/or better features. Hence, two units of a product with identical features may not increase a consumer's utility. This explains a consumer's behavior of replacing his/her slower PC with a faster PC rather than buying another slower PC. Here, quality rather than quantity matters and different qualities may not even be substitutes. Thus, a consumer's choice within a good with different qualities differs from that among different homogeneous goods, where only quantity matters.

It is also assumed that each consumer has a preference ranking over some non-quality attributes of the product, which is independent of quality. Once the consumer chooses a particular quality at a given price, he/she chooses a brand with the non-quality attributes that is closest to his/her most preferred characteristics. For example, a consumer's preference over light or dark color becomes a concern only after the consumer decides the type of a computer to purchase. We further assume that consumers are uniformly distributed over a circle in the non-quality attributes space. Let d be the distance of a brand from a consumer's most preferred characteristics in the non-quality attributes space.

The consumer spends his/her remaining income on the homogeneous good and his/her utility increases with the consumption of the homogeneous good. It is also assumed that there is an envy effect, i.e. a consumer loses utility, α , if someone else is consuming a good with a higher quality. If $y - \alpha \cdot 1(q_i < \bar{q})$ represents a consumer's utility net of the envy effect, except for a distance term characterizing the horizontal differentiation among non-quality attributes, then a consumer's preference can be characterized by the following quasi-linear utility function between the homogeneous and the differentiated goods:

$$U = y + \sqrt{q_i} - \alpha \cdot 1(q_i < \bar{q}) - d_i^2 \quad (3)$$

where i indexes the quality of good X , y is the consumption of good Y , and $\bar{q}$ is the highest quality available in the market.

⁵Here, the quality of good X , q , is endogenously chosen and depends on h and λ . At a given technology indexed by h and λ , the technique used in the X -sector is indexed by its capital-labor intensity, λq . The effect of λ on the final capital-labor intensity in sector X is ambiguous as q can be a decreasing function of λ .

A consumer's utility increases with the consumption of good Y at a constant rate and the quality of good X at a decreasing rate, and decreases with envy and the distance away from the most preferred non-quality attribute. Naturally, some consumers have a higher α than others. For simplicity, it is assumed that there are only two types of consumers. β percent of them cares nothing about other's consumption so that their α is zero while the remaining $1 - \beta$ percent has an arbitrary positive α .

China and the rest of the world are assumed to differ only in their endowments of capital/skilled labor (K) and unskilled labor (L), and in their technology parameters, h and λ . Hereafter, all the corresponding variables for the rest of the world have an asterisk superscript. It is also assumed that China has a lower capital-labor endowment ratio (K/L) and a less advanced technology (a lower h and a higher λ) than the rest of the world.

In the following analysis, we consider the wage trajectory, first, from autarky to trade, and then, from pure goods trade to trade with foreign direct investment. We then consider the extent of China's compliance with intellectual property rights regulations and the sequential investment behavior by multinationals.

The entrance decision of a multinational firm is modeled in three periods. In period one, firms in each country choose whether they want to go multinational, and if so, what quality (q^m) they want to produce. In period two, all the multinational firms conduct research to develop the new variety with quality q^m , which combines the comparative advantages of both developed and developing countries. Suppose the probability of successfully developing such a new variety is s . If there is no intellectual property rights protection in China, then s is independent of the number (m) of multinational firms in the race to develop the new variety. Otherwise, s decreases with m . Also, the development uses γ units of capital/skilled labor and incurs a sunk cost of F^m that includes the R&D cost for a new variety. If γ is small, then each multinational firm has a negligible effect on factor prices. In period three, the successful firm(s) introduce(s) the new variety into the international market and compete for market share. Imitation takes place in this period only if intellectual property rights are not strictly enforced in China.

3 Autarky to Free Trade without FDI

For simplicity, we normalize the wage rate to one, i.e. $w = 1$. Under perfect competition, the price of good Y (p_y) is equal to its marginal cost of production, which can be derived from the Cobb-Douglas function. In an autarky equilibrium,

$$p_y = 2\sqrt{wr} = 2\sqrt{r} \quad (4)$$

where r is the rent payment to capital/skilled labor. If each consumer contributes one unit of labor and has an equal share of capital, then $I = \frac{wL+rK}{L}$ is a consumer's total income.⁶

In the differentiated good sector, each firm has the same marginal cost given by production function (2) to produce a given quality. Let p_q be the price of good X with quality q . To compete with producers of good Y , the price of good X with quality q has to satisfy the following condition due to the budget constraint:

$$\frac{I - p_q}{p_y} + \sqrt{q} \geq \frac{I}{p_y} \quad (5)$$

Rearranging the above condition shows that consumers will consume only good Y if the price of good X exceeds $p_y\sqrt{q}$.

To compete with firms producing the X -good with the same quality, firm i 's ($i \in [1, \dots, n]$) market share x_i satisfies $\frac{I - p_i}{p_y} + \sqrt{q} - (\frac{x_i}{2})^2 = \frac{I - p_j}{p_y} + \sqrt{q} - (\frac{L}{n} - \frac{x_i}{2})^2$, where p_j is the price charged by the other firms in a symmetric equilibrium with consumers uniformly distributed on the circle.⁷ Thus, firm i 's demand is given by the following:

$$x_i(p_i) = \begin{cases} \frac{p_j - p_i}{p_y \frac{L}{n}} + \frac{L}{n} & \text{if } p_i \leq p_y\sqrt{q} \\ 0 & \text{if } p_i > p_y\sqrt{q} \end{cases} \quad (6)$$

To maximize profit, firm i solves the following optimization problem:

$$\max_{p_i} \quad (p_i - c(q)) \left(\frac{p_j - p_i}{p_y \frac{L}{n}} + \frac{L}{n} \right) \quad (7)$$

$$s.t. \quad p_i \leq p_y\sqrt{q} \quad (8)$$

⁶This income distribution assumption is not crucial to the main results. We can show that most of the results in this paper are independent of capital distribution as a result of the utility function's quasi-linearity.

⁷It is later proved in Lemma 1 that only one quality is produced under autarky. However, if there were more than one quality, then we would replace L with the total demand for each quality.

where $c(q) = \frac{1}{h}(w + \lambda qr)$ is derived from production function (2). In a symmetric equilibrium, $p_i = p_j = p$ so that $x_i = x = \frac{L}{n}$. The solution to the above maximization problem becomes:

$$p = \begin{cases} p_y \sqrt{q} & \text{if } p_y (\frac{L}{n})^2 \geq p_y \sqrt{q} - c(q) \\ c(q) + p_y (\frac{L}{n})^2 & \text{if } p_y (\frac{L}{n})^2 < p_y \sqrt{q} - c(q) \end{cases} \quad (9)$$

Given this demand for each given quality and the zero-profit condition under free entry and exit to pin down n , Lemma 1 gives a firm's optimal quality as proved in the appendix.

Lemma 1 *Since all the monopolistic firms in each country have access to the same technology, they choose the same quality given by the following equation:*

$$\frac{p_y}{2\sqrt{q}} - \frac{\lambda r}{h} = 0 \quad (10)$$

Denote the price of good X as p_x and the quality as q . Together with the zero-profit condition $(p - c(q))(\frac{L}{n}) = F$, if $F^2 \geq \frac{(p_y \sqrt{q} - c(q))^3}{p_y}$, then the number of firms in the X -sector is small enough for each firm to charge a monopoly price in the absence of good Y . Thus, the price of good Y sets an upper bound, $p_y \sqrt{q}$, on the prices of good X . The equilibrium price, quality and number of firms in the X -sector are:

$$p_x = p_y \sqrt{q} \quad (11)$$

$$n = \frac{L}{F} (p_y \sqrt{q} - c(q)) \quad (12)$$

$$q = \left(\frac{h p_y}{2 \lambda r} \right)^2 \quad (13)$$

At $p_x = p_y \sqrt{q}$, both goods are produced and everybody consumes one unit of good X . Substituting equation (4) into (10), at autarky, the equilibrium total production (X), price (p_x) and quality level (q) for good X are given by the following equations:

$$X = L \quad (14)$$

$$p_x = p_y \sqrt{q} = \frac{2h}{\lambda} \quad (15)$$

$$q = \frac{h^2}{\lambda^2 r} = \frac{h^2}{\lambda^2} \left(\frac{w}{r} \right) \quad (16)$$

Finally, the following full employment conditions give the equilibrium rent and the total production of good Y .

$$\frac{1}{h} X + \left(\frac{w}{r} \right)^{-\frac{1}{2}} Y = L \quad (17)$$

$$\frac{\lambda q}{h}X + \left(\frac{w}{r}\right)^{\frac{1}{2}}Y = K \quad (18)$$

Proposition 1 summarizes the autarky equilibrium.

Proposition 1. *Let $k = \frac{K}{L}$, $x = \frac{X}{L}$, and $y = \frac{Y}{L}$. If $F \geq \frac{(\frac{h}{\lambda} - \frac{1}{h})^{3/2}}{\sqrt[4]{k}(1 + \frac{h}{\lambda} - \frac{1}{h})^{1/4}}$, then the autarky equilibrium is given by:*

$$w = 1, \quad r = \frac{1}{k}\left(1 + \frac{h}{\lambda} - \frac{1}{h}\right) \quad (19)$$

$$x = 1, \quad y = \frac{h-1}{h}\left(\frac{w}{r}\right)^{1/2} = \frac{h-1}{h}\sqrt{\frac{h\lambda}{h\lambda + h^2 - \lambda}}k \quad (20)$$

$$p_x = \frac{2h}{\lambda}, \quad p_y = \frac{2}{\sqrt{k}}\left(1 + \frac{h}{\lambda} - \frac{1}{h}\right)^{1/2} \quad (21)$$

$$q = \frac{h^3}{\lambda(h\lambda + h^2 - \lambda)}k \quad (22)$$

$$n = \left(\frac{h}{\lambda} - \frac{1}{h}\right)\frac{L}{F}, \quad I = w + rk = 2 + \frac{h}{\lambda} - \frac{1}{h} \quad (23)$$

If $h \leq 1$, then $y = 0$. If $h^2 < \lambda$, then $p_x < MC_x$ and $x = n = 0$. In the rest of the paper, we consider the case where $h^2 > 1 > \lambda > 0$ and $(h^*)^2 > 1 > \lambda^* > 0$ (A1) so that both goods are produced in autarky in both countries. For the wage to rent ratio to be lower in China than in the rest of the world due to their differences in both endowment and technology, we further assume $\frac{k^*}{k} > \frac{1 + \frac{h^*}{\lambda^*} - \frac{1}{h^*}}{1 + \frac{h}{\lambda} - \frac{1}{h}}$ (A2). If there are no multinational firms, then each monopolistic firm has to use the technologies and factors available in its own country. Under assumptions (A1) and (A2), the appendix proves the following proposition.

Proposition 2. *If $F \geq \frac{(\frac{h}{\lambda} - \frac{1}{h})^{3/2}}{\sqrt[4]{k}(1 + (\frac{h}{\lambda} - \frac{1}{h})(\beta + \beta^* \frac{L^*}{L}))^{1/4}}$ and $F^* \geq \frac{(\frac{h^*}{\lambda^*} - \frac{1}{h^*})^{3/2}}{\sqrt[4]{k^*}(1 + (\frac{h^*}{\lambda^*} - \frac{1}{h^*})(\beta + \beta^* \frac{L^*}{L}))^{1/4}}$, the free trade equilibrium commodity and factor prices and qualities are given by the following equations:*

$$w = 1, \quad w^* = \frac{r}{r^*} \quad (24)$$

$$r = \frac{1}{k}\left(1 + \left(\frac{h}{\lambda} - \frac{1}{h}\right)(\beta + \beta^* \frac{L^*}{L})\right) \quad (25)$$

$$\frac{r^*}{w^*} = \frac{1}{k^*}\left(1 + \left(\frac{h^*}{\lambda^*} - \frac{1}{h^*}\right)((1 - \beta^*) + (1 - \beta)\frac{L}{L^*})\right) \quad (26)$$

$$p_x = \frac{2h}{\lambda}, \quad p_{x^*} = \frac{2h^*}{\lambda^*}w^*, \quad p_y = p_{y^*} = 2\sqrt{r} \quad (27)$$

$$q = \frac{h^2}{\lambda^2}\left(\frac{w}{r}\right), \quad q^* = \left(\frac{h^*}{\lambda^*}\right)^2\left(\frac{w^*}{r^*}\right) \quad (28)$$

For the relative wage of skilled labor to fall as China moves from autarky to free trade, we assume $\beta^* L^* < (1 - \beta)L$ (A3). In the absence of FDI, quality and technology differentiation by itself still lead to results consistent with the Stolper-Samuelson theorem. Clearly, the Stolper-Samuelson theorem also holds if FDI is in low-tech sectors with homogeneous goods and technologies to profit from China's relatively cheaper unskilled labor. To analyze the wage effect of FDI in high-tech sectors, we finally assume $\beta \frac{L+L^*}{L^*} + \beta^* \frac{L+L^*}{L} > 1 + \frac{L}{L^*} > 2$ (A4) so that the quality produced in China increases moving from autarky to free trade, but, is still lower than that in the rest of the world.

4 Free Trade with FDI

Helpman (1984 and 1985) and Helpman and Krugman (1985) point out that a multinational firm can locate different stages of production in different countries to capture gains from factor price differentials between countries. Applying Helpman's approach to this case, a multinational firm can apply the technology, indexed by h^* and λ^* , in a developed country to a production plant in China. As in Helpman (1984 and 1985), a multinational firm would produce a new variety with a quality in between the two existing varieties so that the multinational firm would compete with the local firms for the low-type consumers with $\alpha = 0$.

Recall the assumptions in section 2 that the multinational firm has to employ γ units of capital/skilled labor to conduct research to develop such a variety, which combines the advantage of a more advanced technology with that of a cheaper labor force in China. As the wage to rent ratio is lower in China, a multinational firm always locates its research lab for a new variety in a developed country and its production site in China. The local plant produces the new variety while the foreign plant undertakes R&D for developing the new medium-quality variety. The multinational firm(s) who has(have) successfully developed the new medium quality variety would compete for the low-type consumers. This competition depends on how strictly intellectual property rights are enforced in China.

4.1 Strict Protection of Intellectual Property Rights

Suppose intellectual property rights are strictly enforced in China so that once a multinational firm introduces a new variety into the market, no other firms can produce a brand of the same quality even with a different non-quality attribute. This will make the first multinational firm of a successfully developed new variety, q^m , a monopolist in the market of brands with quality q^m . With this monopoly power, the multinational firm can have a relatively larger market share than the other local firms. As a result, when the multinational firm chooses its price p^m , market share X^m , and quality q^m to maximize its profit, the multinational firm would take into consideration the effect of its output level, X^m , on the equilibrium factor prices in China. The appendix proves that the multinational firm chooses a higher quality, which leads to a higher relative return to the skilled labor. The final equilibrium is characterized in the following Proposition.

Proposition 3. *With strict protection of intellectual property rights and assumptions (A1) to (A4), a multinational firm can take over the whole market for the low-type consumers and drive all the local firms out of market. The equilibrium in China is captured by the following equations with $w = 1$ and $n = 1$.*

$$r = \frac{1}{k} \left(1 + \left(\frac{h^*}{\lambda^*} - \frac{1}{h^*} \right) \left(\beta + \beta^* \frac{L^*}{L} \right) \right) \quad (29)$$

$$x^m = \beta + \beta^* \frac{L^*}{L} \quad (30)$$

$$p^m = \frac{2h^*}{\lambda^*} \quad (31)$$

$$q^m = \left(\frac{h^*}{\lambda^*} \right)^2 \frac{w}{r} \quad (32)$$

FDI increases both the relative return to skilled labor and the quality of China's exports and terms of trade. With FDI in a differentiated sector, contrary to the case of free trade or FDI in homogeneous sectors, the relative wage of skilled labor in China can be higher under trade than under autarky if the technology of the FDI source country is much more advanced than that in China, i.e. $(\frac{h^}{\lambda^*} - \frac{1}{h^*})(\beta + \beta^* \frac{L^*}{L}) > \frac{h}{\lambda} - \frac{1}{h}$.*

Finally, we examine the first period when firms decide whether they want to go multinational and enter the race of developing a new variety with quality q^m determined by equations (29) to (32).

Given its probability of success, s , a multinational firm has an incentive to develop the above variety if and only if its expected profit is positive, or at least non-negative, as its expected profit is zero if it produces either the high-quality variety in the rest of the world or the low-quality variety in China under monopolistic competition. Substituting equations (29) to (32) into the firm's profit function, the following condition gives the number of multinational firms (m) who are willing to compete for introducing the new medium-quality variety, *ex ante*. *Ex post*, only the first firm succeeds and becomes a monopolist.

$$s(m)\left(\frac{h^*}{\lambda^*} - \frac{1}{h^*}\right)(\beta + \beta^* \frac{L^*}{L}) - \gamma r^* - F^m = 0 \quad (33)$$

The above condition suggests that the more advanced the foreign technology (h^* and/or λ^*), the lower the sunk cost of developing a new variety (F^m), the less the capital requirement for developing a new variety (γ), and the lower the rent in the rest of the world (r^*) determined by equation (26), the larger are the number of multinational firms in the race of developing the new medium-quality variety and the more likely is the appearance of such a new variety. Thus, we are more likely to observe a rise of the relative return to capital/skilled labor in China even though this does not happen during the movement from autarky to free trade without multinationals.

4.2 Weak Protection of Intellectual Property Rights

If the intellectual property rights protection in China do not restrict firms to produce products of the same quality, then once the first multinational firm introduces the new variety to the market, other multinational and local firms can imitate the variety with the same quality. Suppose the cost for a local firm to grasp the more advanced technology h^* and λ^* by imitating the new variety is φ units of capital or skilled labor. If φ is much smaller than γ , then the local firms will not be driven out of the market, but will employ domestic skilled and unskilled labor to produce goods with quality q^m determined by equation (32), but with different attributes, and sell at price p^m determined by equation (31). The zero-profit condition is $(\frac{h^*}{\lambda^*} - \frac{1}{h^*})\frac{\beta + \beta^* \frac{L^*}{L}}{n} - \varphi r = 0$ where $\beta + \beta^* \frac{L^*}{L}$ is the total demand of this medium-quality variety. The full employment conditions become:

$$\frac{1}{h^*}(\beta + \beta^* \frac{L^*}{L}) + (\frac{w}{r})^{-\frac{1}{2}} y = 1 \quad (34)$$

$$\frac{\lambda^*}{h^*} q^m (\beta + \beta^* \frac{L^*}{L}) + (\frac{w}{r})^{\frac{1}{2}} y + \varphi n = k \quad (35)$$

Following the derivations in section 3, substituting $q^m = (\frac{h^*}{\lambda^*})^2 \frac{w}{r}$ and $n = (\frac{h^*}{\lambda^*} - \frac{1}{h^*}) \frac{\beta + \beta^* \frac{L^*}{L}}{\varphi} \frac{w}{r}$ into the above equations gives

$$r = \frac{1}{k} (1 + 2(\frac{h^*}{\lambda^*} - \frac{1}{h^*})(\beta + \beta^* \frac{L^*}{L})) \quad (36)$$

Proposition 4. *With weak protection of intellectual property rights and assumptions (A1) to (A4), a multinational firm cannot take over the whole market of the low-type consumers and the local firms will stay in the market by imitating the product of the multinational firm. If $F \geq \frac{(\frac{h^*}{\lambda^*} - \frac{1}{h^*})^{3/2}}{\sqrt{2} \sqrt[4]{r}}$, then the trade equilibrium is still captured by equations (24) to (28), except that r is determined by equation (36) rather than (25). Thus, like in the case with strict protection of intellectual property rights, trade with FDI in a differentiated sector increases the relative return to skilled labor, China's relatively scarce factor, although this cannot happen when there is only trade but no FDI in sectors of vertically differentiated goods produced with different techniques.*

Comparing equation (36) with (29), the relative return to capital or skilled labor in China is higher without than with intellectual property rights protection although the new variety has a lower quality and hence use a more labor intensive production technique. This is because skilled labor is employed in the product imitation process by local firms in order for them to stay competitively in the international market. From equation (36), this result holds regardless of how many units of labor each local firm uses in the imitation process because φ only affects the number of survival local firms. This further confirms that factor or commodity prices are set at the margin and are not so much affected by sales volume.

4.3 Intellectual Property Rights and Wage Inequality

We now compare the equilibrium quality and factor prices under strict and weak intellectual property rights protection in China. In the initial development stage, since a multinational firm's probability to succeed (s) is decreasing in the number of firms in the race (m) under strict intellectual property rights protection and is independent of m under weak intellectual property rights protection, the probability to receive a positive payoff from innovating a new variety is lower under stricter intellectual property rights. Hence, the initial incentive and the likelihood of developing a new medium-quality variety is lower with stricter intellectual property rights protection.

Once a new quality is introduced to the market, intellectual property rights still play a significant role in sales and future quality development. In the case with weak intellectual property rights protection, local firms would be able to stay in the market and employ local capital/skilled labor to imitate the quality produced by the first multinational firm. Equations (29) and (36) show that stricter intellectual property rights protection not only delays the rise of relative wage of skilled labor but also slows it down once it starts to rise. This result holds even if each firm uses little skilled labor in imitation.

In sum, stricter intellectual property rights protection in China protects inventor's profits, but delays the quality upgrade in China. Since the relative wage of skilled labor to unskilled labor is lower with stricter intellectual property rights protection as discussed above, intellectual property rights also ensure a bigger improvement in China's export quality and terms of trade in the long-run with less adverse income distribution impact on unskilled labor. Therefore, intellectual property rights protection helps China to gradually upgrade its output and become more competitive in the international market with less cost imposed on China's unskilled labor.

However, there are also several short falls for a stricter intellectual property rights protection. First, the speed of this quality upgrade in China and the technology spillover from FDI in the short-run is slower under stricter intellectual property rights protection although it protects the long-term incentives for technology transfer from developed to developing countries. Second, stricter intellectual property rights protection restricts the number of varieties produced by local producers and hence may induce more imports as China reduces its tariff to join the WTO. The competition between local producers and foreign firms via FDI are much more intense.

On the other hand, as characterize in the Chinese word, "Wei Ji" (challenge), no risk no opportunity, this to live or to die situation for local firms can also be the exact incentive China needs to discipline a lot of its SOEs to fight against corruption and to excel in R&D. Although China does not have a relative advantage in extensive R&D that requires a lot skilled labor and capital, China can definitely compete in R&D in industries, such as software and information science, which require people with great skills and talent but not in large numbers. Indeed, China is showing great potentials in those industries and many foreign investors have already been attracted to China to build research labs.

4.4 Empirical Evidence

The pattern of FDI in China shows that investments from developed countries are mostly in high-tech sectors with vertically differentiated goods (mostly capital/technology intensive), while investments from developing countries are mostly in low-tech sectors with homogeneous or horizontally differentiated goods (mostly labor intensive). The theoretical findings of this paper show that, first, FDI can affect the relative wages regardless of its small share in GDP. Second, FDI in high-tech sectors will increase the relative wage of skilled to unskilled labor. To test these results, we ideally need a data set of wages by occupation, and apply rigorous cross-sector empirical analysis to take into consideration all factors affecting relative wages. However, the following stylized facts can also provide support to our theoretical results.

Figure 3 depicts the annual growth of average real wages across sectors after adjusting for inflation. As the growth of real wages in the real estate management and manufacturing sectors went through a cycle of up in the early 1990s, down in the mid-1990s, and up again in the late 1990s, the wage in the agricultural and mining sectors followed a similar but lagged cycle. It appears that sectors with larger FDI shares (manufacturing and real estate management) led the wage growth cycle. Moreover, Figure 4 shows that this cycle coincides with the growth rate of FDI in the 1990s after adjusting for inflation. Among the factors that contribute to real wage growth, FDI is clearly related to wage increases in FDI concentrated sectors, either capital/technology intensive sectors (real estate management) or labor intensive sectors (part of manufacturing). Such wage increases also appear to spread to other sectors (agriculture and mining). The upward pressure on overall wage growth brought about by FDI is evident.

More importantly, available data can show further that the wage increase for skilled labor outpace that for unskilled labor. Figure 5 clearly shows that the average nominal wage gap between the relatively differentiated or capital/skilled labor intensive sectors (electric/gas and real estate) and the relatively homogeneous or unskilled labor intensive sectors (agriculture and mining) widened over the years from 1990 to 1998. This implies that, while other factors may have affected wage inequality, large FDI inflows to the relatively differentiated sectors have unmistakably contributed to the increase of the relative wage of skilled labor employed in these sectors. Figure 5 also shows that the average nominal wage gap widened as well between the real estate management sector representing a high skill intensive

and differentiated sector and the manufacturing sector that has both differentiated and homogeneous products. All of these confirm that, as export oriented FDI flows to differentiated high-tech sectors, the wage inequality of skilled to unskilled labor will increase rather than decrease under freer trade.

5 Conclusions and Policy Implications

This paper develops a general equilibrium trade model and shows that the relative wage of skilled labor to unskilled labor in China will increase as China opens up more market and attracts more FDI into high-tech sectors. This extends the standard Stolper-Samuelson theory with homogeneous products and technologies, which predicts that the relative wage of skilled labor to unskilled labor can only decrease in the absence of product differentiation. As more FDI flows into the Chinese economy, especially to sectors such as telecommunication, information technology, and banking and financial services as included in China's recent WTO agreements with the US and EU, the gap between skilled and unskilled labor is likely to increase in the future.

There is, however, no reason to fear the wage gap. Technology diffusion and quality upgrade increase the demand for skilled labor and change division of labor. As China integrates further into the global economy and moves from exporting labor intensive to increasingly more skill/capital intensive goods, this trend of relative wage increase for skilled labor is only to continue. It is important though that we understand the impact of FDI impact on wages, so that we can minimize the negative effect, and maximize the benefits associated with FDI.

The theoretic results of this paper demonstrate that FDI can upgrade technology, improve the skills of China's work force, enhance the product quality of local industries, and increase their competitiveness in international markets. China stands to gain from FDI inflows. But often authorities offer more incentives to high tech FDI in differentiated sectors, which will increase wage inequality between skilled and unskilled labor. One policy implication can be drawn from the analysis in the paper is that elimination of special treatment of FDI in those sectors will help reduce the negative impact on income distribution and provide a level playing ground for stable long term FDI.

Given the upward pressure on wages and the competition for labor brought about by FDI, it is also

important to reform the labor market and wage system to empower domestic firms with more autonomy in hiring and firing workers and in setting wages, so that domestic firms are not disadvantaged in competition. Given the mounting unemployment problem, reforms of SOEs have been understandably cautious, especially with regard to labor and wage decisions. But delaying the reform process can only stall problems for the future. Experience of the private sector in recent years proves that market economy is the source of growth and employment.

The analysis in this paper also provides insights in the role of intellectual property rights protection on FDI and wage inequality. The results show that stricter intellectual property rights protection will deliver higher qualities for China's exports and hence lead to better terms of trade, and at the same time, will slow the rise of relative wages of skilled labor, and protect the welfare of unskilled labor. The trade-off is that stricter intellectual property rights protection is likely to expose domestic firms to more competition from FFEs and greater danger of losing market shares to FFEs. However, technology diffusion by FDI can also spur local firms to develop newer and better products. Strengthening the protection of intellectual property rights should clearly be an integral part of China's FDI policy.

Appendix

1. Proof of Lemma 1.

Suppose $\bar{q}$ is the highest quality available in the market. A lower quality q is available in the market if and only if

$$\frac{I - p_q}{p_y} + \sqrt{q} - \alpha \geq \frac{I}{p_y} \quad (\text{A.1})$$

$$\frac{I - p_{\bar{q}}}{p_y} + \sqrt{\bar{q}} \geq \frac{I - p_q}{p_y} + \sqrt{q} - \alpha \quad (\text{A.2})$$

where $p_{\bar{q}}$ is the price of good X with quality $\bar{q}$.

Under these conditions, a consumer with $\alpha = 0$ consumes one unit of the low-quality good while a consumer with $\alpha > 0$ consumes one unit of the high-quality good. Let n_l be the number of firms producing the low-quality variety and n_h be that for the high-quality variety. If $p_y(\frac{\beta L}{n_l})^2 \geq p_y\sqrt{q} - c(q)$ and $p_y(\frac{(1-\beta)L}{n_h})^2 \geq p_y\sqrt{\bar{q}} - c(\bar{q})$ so that the price of good Y sets an upper bound for the prices of both varieties of good X ,⁸ then from equation (9) in the main text,

$$p_q = p_y(\sqrt{q} - \alpha) \quad (\text{A.3})$$

$$p_{\bar{q}} = p_y\sqrt{\bar{q}} \quad (\text{A.4})$$

For a given w, r, p_y and production function (2), these two types of firms solve, respectively, the following profit maximization problems:

$$\max_q [p_y(\sqrt{q} - \alpha) - \frac{1}{h}(w + \lambda qr)] \frac{\beta L}{n_l} - F \quad (\text{A.5})$$

$$\max_{\bar{q}} [p_y\sqrt{\bar{q}} - \frac{1}{h}(w + \lambda \bar{q}r)] \frac{(1-\beta)L}{n_h} - F \quad (\text{A.6})$$

If each firm ignores its effect on the number of firms in the market, then the first order conditions for the two types of firms are:

$$\frac{p_y}{2\sqrt{q}} - \frac{\lambda r}{h} = 0 \quad \text{and} \quad \frac{p_y}{2\sqrt{\bar{q}}} - \frac{\lambda r}{h} = 0 \quad (\text{A.7})$$

Hence, $q = \bar{q}$ so that there is only one variety produced in autarky. $\square$

2. Proof of Proposition 2.

Under the assumptions in section 3 and the Cobb-Douglas technology in the Y -sector, if the price for good Y is equalized through free trade, then equation (4) implies that the factor prices under perfect competition must

⁸We will check whether these conditions are satisfied after we solve for q and $\bar{q}$. If these conditions do not hold, then each firm would have enough monopoly power to charge the same mark-up over its marginal cost regardless of its quality so that they can produce whatever quality they want.

satisfy the following condition:

$$wr = w^*r^* \quad (\text{A.8})$$

We continue to normalize the local wage rate to one so that $r = r^*$ if and only if $w^* = w = 1$.

Given the autarky equilibrium in China captured by equations (19) to (23) and that in the rest of the world by replacing h by h^* , λ by λ^* , and k by k^* in equations (19) to (23), China has a comparative advantage in producing the X -good with a lower quality while the rest of the world has a comparative advantage in producing a higher quality X -good and good Y . In the international market, there will be inter-industry trade for good Y and intra-industry trade for good X with different qualities. China imports good Y and the high-quality X -good while it exports the low-quality X -good.

By assumption, β percent of China's labor force and β^* percent of the rest of the world's labor force has $\alpha = 0$ while the rest has $\alpha > 0$. Following the discussions in the previous section, if the competition with good Y sets an upper bound for the prices of good X , i.e. $F^2 \geq \frac{(p_y\sqrt{q}-c(q))^3}{p_y}$ and $(F^*)^2 \geq \frac{(p_y\sqrt{q^*}-c(q^*))^3}{p_y}$, then firms in China charge a price of $p_x = p_y\sqrt{q}$ with a total demand of $\beta L + \beta^* L^*$ while firms in the rest of the world charge a price p_x^* with a total demand of $(1 - \beta)L + (1 - \beta^*)L^*$, where p_x^* satisfies $\frac{(I-p_x^*)}{p_y} + \sqrt{q^*} = \frac{(I-p_x)}{p_y} + \sqrt{q} - \alpha$.⁹ In the absence of any intellectual property rights, each firm in the China and the rest of the world, respectively, chooses a quality to maximize its profit as follows.

$$q = \arg \max_q (p_y\sqrt{q} - \frac{1}{h}(w + \lambda qr)) \frac{\beta L + \beta^* L^*}{n} - F \quad (\text{A.9})$$

$$q^* = \arg \max_{q^*} (p_y\sqrt{q^*} - \frac{1}{h^*}(w^* + \lambda^* q^* r^*)) \frac{(1 - \beta)L + (1 - \beta^*)L^*}{n^*} - F^* \quad (\text{A.10})$$

where p_y is given by equation (4). The full employment conditions in each country are:

$$\frac{1}{h}(\beta L + \beta^* L^*) + (\frac{w}{r})^{-\frac{1}{2}} Y = L \quad (\text{A.11})$$

$$\frac{\lambda q}{h}(\beta L + \beta^* L^*) + (\frac{w}{r})^{\frac{1}{2}} Y = K \quad (\text{A.12})$$

$$\frac{1}{h^*}((1 - \beta)L + (1 - \beta^*)L^*) + (\frac{w^*}{r^*})^{-\frac{1}{2}} Y^* = L^* \quad (\text{A.13})$$

$$\frac{\lambda^* q^*}{h^*}((1 - \beta)L + (1 - \beta^*)L^*) + (\frac{w^*}{r^*})^{\frac{1}{2}} Y^* = K^* \quad (\text{A.14})$$

If $F \geq \frac{(\frac{h}{\lambda} - \frac{1}{h})^{3/2}}{\frac{\sqrt{2}}{\sqrt{k}}(1 + (\frac{h}{\lambda} - \frac{1}{h})(\beta + \beta^* \frac{L^*}{L}))^{1/4}}$ and $F^* \geq \frac{(\frac{h^*}{\lambda^*} - \frac{1}{h^*})^{3/2}}{\frac{\sqrt{2}}{\sqrt{k^*}}(1 + (\frac{h^*}{\lambda^*} - \frac{1}{h^*})(\beta + \beta^* \frac{L^*}{L^*}))^{1/4}}$, then following the derivations in the

⁹If firms in both countries sell the same quality, then we should replace each firm's demand by $\frac{L+L^*}{n+n^*}$. However, the first order conditions (A.9) and (A.10) would suggest that firms in different countries would deviate and sell varieties with different qualities. Given their endowment and technology differences, home firms cannot drive out foreign firms in the high-quality market, neither can foreign firms drive out home firms in the low-quality market. Thus, in a stable equilibrium, firms in different countries produce varieties with different qualities while firms within a country produce varieties with the same quality.

autarky case, the free trade equilibrium is characterized by the following equations:

$$w = 1, \quad w^* = \frac{r}{r^*} \quad (\text{A.15})$$

$$r = \frac{1}{k} \left(1 + \left(\frac{h}{\lambda} - \frac{1}{h} \right) (\beta + \beta^* \frac{L^*}{L}) \right) \quad (\text{A.16})$$

$$\frac{r^*}{w^*} = \frac{1}{k^*} \left(1 + \left(\frac{h^*}{\lambda^*} - \frac{1}{h^*} \right) ((1 - \beta^*) + (1 - \beta) \frac{L}{L^*}) \right) \quad (\text{A.17})$$

$$x = \beta + \beta^* \frac{L^*}{L}, \quad x^* = (1 - \beta) \frac{L}{L^*} + (1 - \beta^*) \quad (\text{A.18})$$

$$y = \frac{h-1}{h} \left(\frac{w}{r} \right)^{1/2}, \quad y^* = \frac{h^*-1}{h^*} \left(\frac{w^*}{r^*} \right)^{1/2} \quad (\text{A.19})$$

$$p_x = \frac{2h}{\lambda}, \quad p_{x^*} = \frac{2h^*}{\lambda^*} w^* \quad (\text{A.20})$$

$$p_y = p_{y^*} = 2\sqrt{r} \quad (\text{A.21})$$

$$q = \frac{h^2}{\lambda^2} \left(\frac{w}{r} \right), \quad q^* = \left(\frac{h^*}{\lambda^*} \right)^2 \left(\frac{w^*}{r^*} \right) \quad (\text{A.22})$$

$$n = \left(\frac{h}{\lambda} - \frac{1}{h} \right) \frac{\beta L + \beta^* L^*}{F} \quad (\text{A.23})$$

$$n^* = \left(\left(\frac{h^*}{\lambda^*} - \frac{1}{h^*} \right) w^* \right) \frac{(1 - \beta)L + (1 - \beta^*)L^*}{F^*} \quad (\text{A.24})$$

$$I = w + rk, \quad I^* = w^* + r^* k^* \quad (\text{A.25})$$

□

3. Proof of Proposition 3.

Let $x^m = \frac{X^m}{L}$. Given x^m , q^m and $q = \frac{h^2}{\lambda^2} \left(\frac{w}{r} \right)$, the full employment conditions for China become the following:

$$\frac{1}{h} \left(\beta + \beta^* \frac{L^*}{L} \right) + \left(\frac{1}{h^*} - \frac{1}{h} \right) x^m + \left(\frac{w}{r} \right)^{-\frac{1}{2}} y = 1 \quad (\text{A.26})$$

$$\frac{h}{\lambda} \left(\beta + \beta^* \frac{L^*}{L} \right) \frac{w}{r} + \left(\frac{\lambda^*}{h^*} q^m - \frac{h}{\lambda} \frac{w}{r} \right) x^m + \left(\frac{w}{r} \right)^{\frac{1}{2}} y = k \quad (\text{A.27})$$

Since $w = 1$, solving for the factor prices gives

$$r = \frac{1 + \left(\frac{h}{\lambda} - \frac{1}{h} \right) (\beta + \beta^* \frac{L^*}{L}) - \left(\frac{h}{\lambda} - \frac{1}{h} + \frac{1}{h^*} \right) x^m}{k - \frac{\lambda^*}{h^*} q^m x^m} \quad (\text{A.28})$$

Equation (A.28) shows that a larger market share, x^m , can increase the relative return to capital or skilled labor as the multinational firm uses a more capital intensive technique to produce a higher quality than the other firms in China. It can also decrease the relative return as the multinational firm also uses a more advanced technology that saves the use of both capital and labor. The relative return to unskilled labor falls if the quality is sufficiently high so that the former effect dominates the latter. Also, $\frac{dr}{dq^m} = r \frac{\lambda^* x^m}{h^* k - \lambda^* q^m x^m} > 0$ so that the multinational firm can cause the rent to rise by choosing a higher quality.

Competing with the existing firms, the multinational firm has to charge a price p^m so that $\frac{I - p^m}{p_y} + \sqrt{q^m} \geq$

$\min(\frac{I}{p_y}, \frac{I-p_x}{p_y} + \sqrt{q})$. Given $p_x = p_y\sqrt{q}$, the multinational firm solves the following maximization problem:

$$\max_{p^m, q^m, x^m} \quad (p^m - \frac{1}{h^*}(w + \lambda^* q^m r))x^m - \gamma r^* - F^m \quad (\text{A.29})$$

$$s.t. \quad p^m \leq p_y\sqrt{q^m} = 2\sqrt{rq^m} \text{ and } x^m \leq \beta + \beta^* \frac{L^*}{L} \quad (\text{A.30})$$

It is easy to check that both constraints are binding and the first order condition for q^m is

$$\frac{\sqrt{r}}{\sqrt{q^m}} + \frac{\sqrt{q^m}}{\sqrt{r}} \frac{dr}{dq^m} - \frac{\lambda^*}{h^*} (r + q^m \frac{dr}{dq^m}) = 0 \quad (\text{A.31})$$

Since $r + q^m \frac{dr}{dq^m} > 0$, dividing both side of the above condition by $r + q^m \frac{dr}{dq^m}$ gives

$$q^m = (\frac{h^*}{\lambda^*})^2 \frac{w}{r} \quad (\text{A.32})$$

$$p^m = \frac{2h^*}{\lambda^*} \quad (\text{A.33})$$

$$x^m = \beta + \beta^* \frac{L^*}{L} \quad (\text{A.34})$$

Substituting the above equations into equation (A.28) gives

$$r = \frac{1}{k} (1 + (\frac{h^*}{\lambda^*} - \frac{1}{h^*})(\beta + \beta^* \frac{L^*}{L})) \quad (\text{A.35})$$

□

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Table 1: Number of Staff and Workers by Ownership (10,000 persons)

Year	Total	Urban						
		Sub- Total	State-owned		Urban Collective Owned		Foreign Funded*	
			Number	% in Urban	Number	% in Urban	Number	% in Urban
1985	49873	12808	8990	70.19	3324	25.95	6	0.05
1986	51282	13293	9333	70.21	3421	25.74	12	0.09
1987	52783	13783	9654	70.04	3488	25.31	21	0.15
1988	54334	14627	9984	68.26	3527	24.11	31	0.21
1989	55329	14390	10108	70.24	3502	24.34	47	0.33
1990	63909	16616	10346	62.27	3549	21.36	66	0.40
1991	64799	16977	10664	62.81	3628	21.37	165	0.97
1992	65554	17241	10889	63.16	3621	21.00	221	1.28
1993	66373	17589	10920	62.08	3393	19.29	452	2.57
1994	67199	18413	11214	60.90	3285	17.84	698	3.79
1995	67947	19093	11261	58.98	3147	16.48	830	4.35
1996	68850	19815	11244	56.74	3016	15.22	903	4.56
1997	69600	20207	11044	54.65	2883	14.27	1049	5.19
1998	69957	20678	9058	43.81	1963	9.49	1481	7.16

* Including employments in firms funded by foreign entrepreneurs and by entrepreneurs from Hong Kong, Macao & Taiwan, and share holding firms by these entrepreneurs.

Source: China Statistical Yearbook 1986 to 1999.

Table 2: Average Wage of Staff and Workers by Ownership (Yuan)

Year	National	State-owned		Collective Owned		Foreign Funded*	
	Average	Wage	Δ to national	Wage	Δ to national	Wage	Δ to national
1985	1148	1213	5.66%	967	-15.77%	1896	65.14%
1986	1329	1414	6.40%	1092	-17.83%	1862	40.07%
1987	1459	1546	5.96%	1207	-17.27%	2004	37.36%
1988	1747	1853	6.07%	1426	-18.37%	2165	23.95%
1989	1935	2055	6.20%	1557	-19.53%	2504	29.42%
1990	2140	2284	6.73%	1681	-21.45%	2746	28.33%
1991	2340	2477	5.85%	1866	-20.26%	5237	123.78%
1992	2711	2878	6.16%	2109	-22.21%	4495	65.79%
1993	3371	3532	4.78%	2592	-23.11%	5205	54.41%
1994	4538	4797	5.71%	3245	-28.49%	6423	41.53%
1995	5500	5625	2.27%	3931	-28.53%	7572	37.67%
1996	6210	6280	1.13%	4302	-30.72%	8368	34.74%
1997	6470	6747	4.28%	4512	-30.26%	8894	37.47%
1998	7479	7668	2.53%	5331	-28.72%	9297	24.30%

* Including wages in firms funded by foreign entrepreneurs and by entrepreneurs from Hong Kong, Macao & Taiwan, and share holding firms by these entrepreneurs. Average wages are higher for firms funded by foreign entrepreneurs only.

Source: China Statistical Yearbook 1986 to 1999.

Figure 1: Average Nominal Wage and Share in Total FDI by Sector 1998

Source: Calculated from China Statistics Yearbook 1998 and 1999.

Figure 2: Sectoral Composition of the Largest FFEs in Manufacturing by Country Group

Source: Calculated from Huang, Xie and Chen (1994).

Figure 3: Annual Growth of Real Average Wage

Source: Calculated from China Statistics Yearbook 1998 and 1999.

Figure 4: Annual Growth of Real Average Wage and FDI

Source: Calculated from China Statistics Yearbook 1998 and 1999.

Figure 5: Average Nominal Wage by Sector

Source: Calculated from China Statistics Yearbook 1998 and 1999.