How are wages set in Beijing? *

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Abstract

China's export performance over the past fifteen years has been phenomenal. Is this performance going to last? Wages are rising rapidly but internal migration as well. Migration across provinces may increase competition in the labor markets of export-intensive provinces and allow firms to keep wages low for many years. We develop a wage equation from a New Economic Geography model to capture the upward pressure from demand and downward pressure from migration. Using panel data at the province level, we find that migration flows have slowed down Chinese wage increase over time by roughly 2.5% per year. On the other hand, the rise in wages due to increased access to national as well as international markets is of limited magnitude.

JEL Codes: F12, F15, R11, R12.

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1 Introduction

China's export performance over the past fifteen years has been phenomenal. Its share of world merchandise exports jumped from 1.8% in 1990 to 5% in 2004. Imports have also grown but China's trade balance is substantially positive. This imbalance is a matter of concern for its main trade partners. Between 2000 and 2004, exports to the USA, EU and Japan multiplied by factors of 2.4, 2.6 and 1.7 respectively.[1] These latest figures may aggravate the growing discontent among China's trading partners. According to the EU trade commissioner Peter Mandelson, "the EU's trade deficit with China is growing $20 million an hour," (June 12 2007, Wall Street Journal).

Low wages are one of the main reasons for Chinese success in capturing world export markets. However, some analysts assert that this advantage is only temporary, since wages are rising rapidly (Adams *et al.*, 2006; Lett and Banister, 2006).[2] This upward wage trend may erode the once unbeatable China price. On the other hand, we assert that a population in excess of one billion represents a large reservoir of labor. Migration across provinces may thus increase competition in the labor markets of export-intensive provinces, allowing firms to keep wages low for many years to come.[3]

This paper attempts to shed some empirical light on this debate. We estimate the maximum wage a firm can afford to pay given its *market access* to demand (both world

[1]Source: Authors' calculations using data from the World Trade Organization (www.wto.org/).

[2]Chinese wages in dollars increased by 15% per year in 2001 and 2002 (Adams *et al.*, 2006). Lett and Banister (2006) calculate that total hourly compensation costs of manufacturing employees in China increased by nearly 18% between 2002 and 2004. See also *China's competitiveness 'on the decline'*, Financial Times, March 22, 2006. Using our data set over the period 1996-2004, we confirm the upward trend in Chinese average real manufacturing wages (see Figure 1 in Appendix A).

[3]While hourly compensation costs in China's manufacturing sector have increased rapidly, Chinese average hourly manufacturing compensation in 2004 was only U.S.$0.67, about 3% of the American average wage of U.S.$22.87 (calculated using the commercial market exchange rate; see Lett and Banister, 2006).

and internal) and its *internal migrant labor supply.* The market access variable[4] reflects the demand each entity faces given its geographical position and that of its trading partners (Harris, 1954; Redding and Venables, 2004). Wages are predicted to be higher in more central locations, which face higher levels of demand, than in peripheral areas. There is some evidence to support this prediction in China (Lin, 2005), since wages in coastal provinces with good market access, such as Fujian, Guangdong and Shanghai, are twice as high as the national average wage.[5] Internal migrant labor supply represents the additional labor supply that each entity faces due to internal migration between provinces. Such migration is restricted through the *hukou* system of household registration and is costly for individuals. Provinces can impose various hurdles to obtaining the necessary registration (Au and Henderson, 2006). However, the system has progressively broken down due to more relaxed migration policies (Shen, 1999). The coastal provinces have even proposed its abolition in order to encourage labor migration from poorer regions.

To estimate the maximum wage a firm can afford to pay we build on New Economic Geography (NEG) models (Fujita *et al.*, 1999) and derive an econometric specification for wages. This economic structure makes it possible to estimate the effect of the market access on wages. The growing empirical NEG literature lends support to the hypothesis that regional wages depend positively on market access (Redding and Venables, 2004; Hanson, 2005). However, by focusing on demand factors, part of the literature has left labor supply factors to one side. For instance, Redding and Venables (2004), Head and

[4]The literature also refers to market potential (Harris, 1954; Hanson, 2005) or real market potential (Head and Mayer, 2006).

[5]Note that China implemented a labor contract system in the mid-1980s, which was energetically promoted in the 1990s. In 1993, the Chinese government began to reform the social security system, in particular piloting minimum wages. Currently all 31 of China's provinces, with the exception of the Tibet Autonomous Region, propose a minimum wage, with the highest levels being found in Shenzhen (600 Yuan = US$73), Shanghai (570 Yuan = US$69) and Beijing (495 Yuan = US$60).

Mayer (2006) and Breinlich (2007) explicitly assume that workers are immobile across regions.[6] Introducing labor mobility is a more realistic assumption but does not alter the literature's main result that income per capita is higher in places which enjoy better market access. Free migration will equalize real wages across regions . Consequently, firms in agglomerated regions, with greater market access will have to pay higher nominal wages, relative to outlying areas, in order to compensate for congestion costs (e.g. higher housing and land prices). This endogenous effect rules out the estimation of the *direct* impact of migration on wages. Thus, Hanson (2005) controls for the *indirect* impact of labor mobility, via the effect on the housing market, and finds that wages are associated with proximity to consumer markets.[7]

To evaluate the *direct* effect of migration on wages, we exploit a particular Chinese feature. Based on the migration restrictions observed in China (Au and Henderson, 2006), we assume that labor is immobile in the short-run. We then derive a short-run equilibrium à la Redding and Venables (2004) and depart from this equilibrium by assuming an immigrant labor supply shock.

Investigating the wage impact of such a shock brings our work squarely into the domain of labor economics. A number of recent papers have documented a negative effect of immigration on the wages of competing native workers, with mixed magnitudes (for example, Card, 2001, and Borjas, 2003). While most of the papers in this strand underline the importance of controlling for labor shifts and education, they mostly assume that

[6]Head and Mayer (2006) and Breinlich (2007) focus on Europe. Since migration between regions in different EU nations is fairly small, the immobility of labor seems a reasonable assumption. This hypothesis is much more of a concern in Redding and Venables (2004) who analyze cross-country variations in per capita income. However, even if international flows of people are actually large and growing, they remain smaller than international trade and capital flows (Freeman, 2006).

[7]Recently, Ottaviano and Pinelli (2006) extended the Redding and Venables (2004) model by introducing labor mobility à la Hanson (2005). However, their wage estimation does not explicitly control for the effect of labor mobility.

demand remains constant over time. We relax this assumption and control for varying market access, capturing the evolution of internal and world demand. To this end, we estimate a theoretical trade equation and construct a complete version of each Chinese province's market access. This consists of three parts: own provincial demand; national demand; and world market access.

Using a data set covering 29 Chinese provinces between 1997 and 2004, we investigate the relative impact of our constructed market access and internal migration variables on the average provincial manufacturing wage. We moreover control for various endogeneity issues via instrumental variables.

This paper contributes to the literature along several lines. Our NEG wage equation explains approximately 80 to 90% of the variation in average provincial wages. Our estimates suggest that provincial nominal wages increase by about 15% per year. This result is line with other estimates documenting that wages are rising rapidly in China (Adams *et al.*, 2006; Lett and Banister, 2006). However, we estimate that migration flows have slowed down Chinese wage increase over time by roughly 2.5% per year. With the further relaxation of migration restrictions, claimed by the export-intensive provinces, we may expect a higher migration effect in the future and a lesser erosion of the once unbeatable China price. On the other hand, we find that the rise in wages due to increased access to national as well as international markets is of limited magnitude.

The paper is organized as follows. In the next section we outline the theoretical framework from which the econometric specification used in the subsequent sections is derived. In section 3, we describe the data sources and discuss some estimation issues. In section 4, we investigate econometrically the respective contributions of market access and internal migration to the determination of wages in China. In section 5, we conclude and discuss some implications of our results.

2 Theoretical framework

The theoretical framework underlying the empirical analysis is based on a standard New Economic Geography model (Fujita *et al.*, 1999). We add worker skill heterogeneity across regions to this model, and propose a strategy to estimate the impact of migration on wages.

The economy is composed of $i = 1, \ldots, R$ regions and two sectors: an agricultural sector (A) and a manufacturing sector (M), which is interpreted as a composite of manufacturing and service activities.

2.1 Demand side

The agricultural sector produces an homogeneous agricultural good, under constant returns and perfect competition. The manufacturing sector produces a large variety of differentiated goods, under increasing returns and imperfect competition. Each consumer in region j shares the same Cobb-Douglas preferences for the consumption of both types of goods (A and M):

$$U_j = M_j^{\mu} A_j^{1-\mu}, \quad 0 < \mu < 1, \tag{1}$$

where μ denotes the expenditure share of manufactured goods. This latter, M_j, is defined by a constant-elasticity-of-substitution (CES) sub-utility function of v_i varieties:

$$M_j = \sum_{i=1}^{R} \left(v_i q_{ij}^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)}, \quad \sigma > 1, \tag{2}$$

where q_{ij} represents demand by consumers in region j for a variety produced in region i and $\sigma > 1$ is the elasticity of substitution. Given the expenditure of region j (E_j) and the *c.i.f* price of a variety produced in i and sold in j (p_{ij}), the standard two-stage budgeting procedure yields the following CES demand q_{ij}:

$$q_{ij} = \mu \; p_{ij}^{-\sigma} \; G_j^{\sigma-1} \; E_j, \tag{3}$$

where G_j is the CES price index for manufactured goods, defined over the c.i.f. prices:

$$G_j = \left[\sum_{i=1}^{R} v_i p_{ij}^{1-\sigma} \right]^{1/1-\sigma} . \tag{4}$$

2.2 Supply side

Transporting manufactured products from one region to another is costly. The iceberg transport technology assumes that p_{ij} is proportional to the mill price p_i and shipping costs T_{ij}, so that for every unit of good shipped abroad, only a fraction ($\frac{1}{T_{ij}}$) arrives. Thus, the demand for a variety produced in i and sold in j (Eq. 3) can be written as:

$$q_{ij} = \mu \; (p_i T_{ij})^{-\sigma} \; G_j^{\sigma-1} \; E_j. \tag{5}$$

To determine the total sales, q_i, of a representative firm in region i we sum sales across regions, given that total shipments to one region are T_{ij} times quantities consumed:

$$q_i = \mu \sum_{j=1}^{R} (p_i T_{ij})^{-\sigma} G_j^{\sigma-1} E_j T_{ij} = \mu p_i^{-\sigma} MA_i, \tag{6}$$

where

$$MA_i = \sum_{j=1}^{R} T_{ij}^{1-\sigma} G_j^{\sigma-1} E_j, \tag{7}$$

is the market access of exporting region i (Redding and Venables, 2004: p. 59). This is given by a trade cost (T_{ij}) and price index (G_j) weighted sum of the regional expenditures (E_j).

Each firm i has profits π_i, assuming that the only input is labor:

$$\pi_i = p_i q_i - w_i \ell_i, \tag{8}$$

where w_i and ℓ_i are the wage rate and the labor demand for manufacturing workers, respectively.[8] We follow Head and Mayer (2006) in taking workers' skill heterogeneity into account.[9] We assume that the labor requirement, ℓ, depends on both output, q, and the workers' education level, h, as follows:

$$\ell_i = (F + cq_i) \exp(-\rho h_i), \tag{9}$$

where F and c represent fixed and marginal requirements in "effective" (education-adjusted) labor units. The parameter ρ measures the return to education and shows the percentage increase in productivity due to an increase in the average enrollment rate in higher education institutions. Replacing (9) in (8) and maximizing profits yields the familiar mark-up pricing rule for varieties produced in region i:

$$p_i = \frac{\sigma}{\sigma - 1} \; w_i \; c \; \exp(-\rho h_i), \tag{10}$$

Given the pricing rule, profits are:

[8]Perfect competition in the agricultural sector implies marginal cost pricing, so that the price of the agricultural good p^A equals the wages of agricultural laborers w^A. We choose good A as the numeraire, so that $p^A = w^A = 1$.

[9]The importance of spatial differences in the skill composition of the work force as an explanation of spatial wage disparities is analyzed in detail in Combes *et al.* (2007).

$$\pi_i = w_i \left[cq_i \left(\frac{\exp(-\rho h_i)}{\sigma - 1} \right) - F \exp(-\rho h_i) \right]. \quad (11)$$

We assume that free entry and exit drive profits to zero. This condition implies that the equilibrium output of any firm is:

$$q^* = \frac{F(\sigma - 1)}{c}. \quad (12)$$

Using the demand function (6), the pricing rule (10) and equilibrium output (12), we calculate the manufacturing wage when firms break even:

$$w_i = \frac{\sigma - 1}{\sigma c \exp(-\rho h_i)} \left[\mu M A_i \frac{c}{F(\sigma - 1)} \right]^{1/\sigma}. \quad (13)$$

2.3 Deviation from the short-run equilibrium

Despite the lack of any explicit dynamics in the model, it is useful to consider wage equation (13) as a short-run equilibrium, taking as given the allocation of workers in each region.[10] This equilibrium is consistent with the existence of short-run frictions in labor mobility across Chinese provinces. Even if the volume of internal migration has been increasing in China due to more relaxed migration policies, the *hukou* system of household registration still restricts labor mobility across regions (Au and Henderson, 2006).[11] The associated equilibrium labor demand for workers in province i is given by:

$$\ell_i^* = \sigma F \exp(-\rho h_i). \quad (14)$$

We now aim to work out the direct effects of an immigrant labor supply shock on

[10]This assumption defines a Marshallian short-run equilibrium (see Krugman, 1991).

[11]Amiti and Javorcik (2007) raise a similar point investigating the location of foreign firms in China.

wages, i.e. a reallocation of workers across provinces. To this end, we turn equation (14) around and express fixed requirements as:

$$F = \frac{\ell_i^*}{\sigma \exp(-\rho h_i)}. \quad (15)$$

Replacing (15) in the wage equation (13) gives:

$$w_i \;=\; (\sigma-1)^{\frac{\sigma-1}{\sigma}} (\mu M A_i)^{\frac{1}{\sigma}} [c\sigma \exp(-\rho h_i)]^{\frac{1-\sigma}{\sigma}} \ell_i^{*\,-\frac{1}{\sigma}}. \quad (16)$$

We take logs and rearrange equation (16):

$$\ln w_i = \alpha_0 + \alpha_1 \ln MA_i + \alpha_2 h_i + \alpha_3 \ln \ell_i^* + \epsilon_i, \quad (17)$$

where $\alpha_0 = \frac{\sigma-1}{\sigma}\ln(\sigma-1) + \frac{1}{\sigma}\ln\mu + \frac{1}{\sigma}\ln c\sigma$, $\alpha_1 = \frac{1}{\sigma}$, $\alpha_2 = \frac{\sigma-1}{\sigma}\rho$, and $\alpha_3 = -\frac{1}{\sigma}$. Estimating this equation, we expect, first, that the elasticity of substitution (σ) between traded goods will be greater than one and, second, that the elasticities of market access and labor supply will be equal in absolute value.

In order to depart from the preimmigration market equilibrium situation ℓ_i^* and investigate the direct effect of a reallocation of workers across provinces we draw on the labor economics literature. More precisely, we follow the methodology of Friedberg (2001) and Borjas (2003) regarding the effect of immigration on wages. They assume an exogenous influx of immigrant labor supply m_i in region i. The resulting rate of change of labor supply due to immigration is given by $m_i/\ell_i \approx \ln(\ell_i + m_i) - \ln(\ell_i)$. Using this, we can work out the direct effect of an exogenous inflow of immigrants by estimating the following equation:

$$\ln w_i = \alpha_0 + \alpha_1 \ln MA_i + \alpha_2 h_i + \alpha_3 \frac{m_i}{\ell_i} + \epsilon_i. \quad (18)$$

Equation (18) is a reduced-form wage specification relating the regional manufacturing wage to market access, educational attainment, an exogenous rate of change of labor supply due to immigration and the usual error term ϵ_i. The assumption of an exogenous influx of immigrant labor supply m_i is a convenient assumption. It avoids an explicit modeling of a labor supply function for migration. The migration decision is however expected to be driven by an income differential between the origin and destination provinces. Consequently, the exogeneity of our labor supply shock may be a concern. To deal with this problem we estimate equation (18) with an instrumental variable approach, as discussed below.

3 Data and estimation issues

Using equation (18), the core empirical part of this paper explains the variation in average provincial manufacturing wages in China. Before proceeding to the estimations, we first describe the data.

3.1 Data

We explain here how the dependent and independent variables are constructed. Appendix B.1 provides greater details regarding the data sources. Table 3 in Appendix C provides summary statistics for all of the variables.

3.1.1 Dependent variable

The dataset covers 29 Chinese provinces over the period 1997-2004.[12] Our dependent variable is the average annual nominal wage rate of manufacturing workers and staff. This is defined as the ratio of the total wage bill to the number of manufacturing workers and staff by province and year.

3.1.2 Explanatory variables

We detail here the construction of market access and immigrant labor supply (Appendix B.1 provides details about the other explanatory variables).

Construction of market access

Recall from equation (7) that the market access variable is defined as a trade cost and price index weighted sum of the regional expenditures. In order to compute a measure for the market access of province i, we follow a strategy, pioneered by Redding and Venables (2004), that exploits information from the estimation of bilateral trade. However, Redding and Venables (2004) simply assume that trade costs depend on bilateral distance. We instead allow for differentiated trade cost measures depending on whether trade occurs within province/country, between provinces or between countries.

Summing (Eq. 5) over all of the products produced in location i, we obtain the total value of the exports of i to j:

$$X_{ij} = \mu n_i (p_i T_{ij})^{1-\sigma} \; G_j^{\sigma-1} \; E_j = \mu sc_i \; \phi_{ij} \; mc_j, \tag{19}$$

[12] The entire country is divided into 27 provinces plus four province-status "super-cities" – Beijing, Chongqing, Shanghai and Tianjin. Our analysis covers all of the provinces apart from Tibet. Chongqing and Sichuan are considered together.

where n_i is the set of varieties produced in region i, $sc_i = n_i(p_i)^{1-\sigma}$ measures the "supply capacity" of the exporting region, $mc_j = G_j^{\sigma-1}E_j$ the "market capacity" of region j, and $\phi_{ij} = T_{ij}^{1-\sigma}$ the "freeness" of trade (Baldwin *et al.*, 2003).[13] Freeness of trade is assumed to depend on bilateral distances ($dist_{ij}$) and a series of dummy variables indicating whether provincial or foreign borders are crossed.

$$\phi_{ij} = dist_{ij}^{-\delta}\ exp\left[-\varphi B_{ij}^{f} - \varphi^*\ B_{ij}^{f*} + \psi Contig_{ij} - \vartheta\ B_{ij}^{c} + \xi\ B_{ij}^{i} + \zeta_{ij}\right], \qquad (20)$$

where $B_{ij}^{f} = 1$ if i and j are in two different countries with either i or j being China and 0 otherwise, $B_{ij}^{f*} = 1$ if i and j are in two different countries with neither i nor j being China and 0 otherwise, $Contig_{ij} = 1$ if the two different *countries* i and j are contiguous, and 0 otherwise, $B_{ij}^{c} = 1$ if i and j are two different Chinese provinces and 0 otherwise, and $B_{ij}^{i} = 1$ if $i = j$ denotes the same foreign country and 0 otherwise. The error ζ_{ij} captures the unmeasured determinants of trade freeness. Consequently, this specification allows the impediments to domestic trade to be different from the impediments to international trade (see Appendix D for details).

Substituting (20) into (19), capturing unobserved exporting ($\ln sc_i$) and importing ($\ln mc_j$) region characteristics à la Redding and Venables (2004) with exporting and importing fixed effects (cty_i and ptn_j) and taking logs yields the following trade regression:

$$\ln X_{ij} = \ln \mu + cty_i + ptn_j - \delta \ln dist_{ij} - \varphi B_{ij}^{f} - \varphi^*\ B_{ij}^{f*} + \psi Contig_{ij} - \vartheta\ B_{ij}^{c} + \xi\ B_{ij}^{i} + \zeta_{ij}. \quad (21)$$

Using our complete dataset of trade (see Appendix B.2 for details), we estimate equation (21) on a yearly basis from 1995 to 2002. The estimation of the gravity equation

[13] $\phi_{ij} \in [0, 1]$ equals 1 when trade is free and 0 when trade is eliminated due to high shipping costs and elasticity of substitution (σ).

in cross-section, for each year of the sample, with region fixed effects is recommended by trade theory. The yearly estimated coefficients of equation (21) are then used to construct predicted values for market access defined as $MA_i = \sum_{j=1}^{R} \phi_{ij} mc_j$.[14] Our estimated market access variable consists of three parts: local market access (intra-provincial demand); national market access (demand from other Chinese provinces); and world market access:

$$\begin{aligned}\widehat{MA}_i &= \widehat{\phi}_{ii} G_i^{\sigma-1} E_i + \sum_{j \in P} \widehat{\phi}_{ij} G_j^{\sigma-1} E_j + \sum_{j \in F} \widehat{\phi}_{ij} G_j^{\sigma-1} E_j \\ &= \exp(ptn_i) \times dist_{ii}^{-\widehat{\delta}} + \sum_{j \in P} \exp(ptn_j) \times dist_{ij}^{-\widehat{\delta}} \times \exp(\vartheta) \\ &+ \sum_{j \in F} \exp(ptn_j)^{\widehat{\lambda}} \times dist_{ij}^{-\widehat{\delta}} \times \exp(\widehat{\varphi} + \widehat{\psi} Contig_{ij}),\end{aligned} \quad (22)$$

where P and F stand for Chinese provinces and foreign countries, respectively. The results for various years are presented in Table 3 of Appendix D.

Map 1 shows that coastal provinces had greater market access and higher nominal wages in manufacturing in 2002. One exception is Shandong province, with high market access and below median wages.

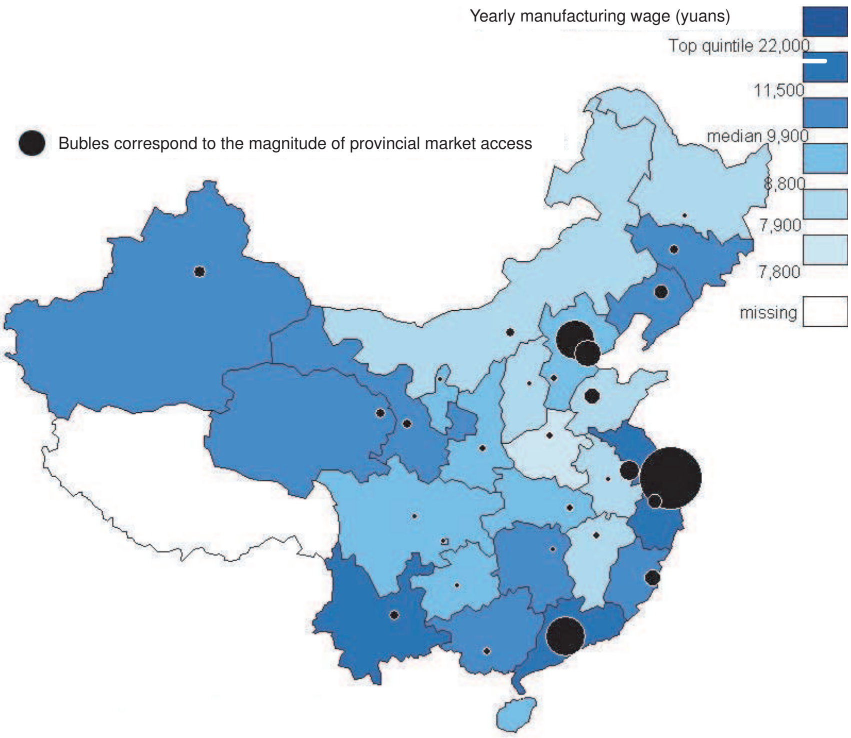
Immigrant share

The rate of change of labor supply resulting from immigration is given by the internal migration share ($\frac{m_i}{\ell_i}$). We rely on the annual Sample Survey on Population Changes to compute this share as the number of non-residents divided by the population.[15] We actually assume that the number of non-residents in a province is a good proxy for im-

[14]Equation (21) also allows us to construct empirical predictions for supplier access, SA_j, defined as $SA_j = \sum_i \phi_{ij} sc_i$. However, since market access and supplier access variables tend to be highly correlated (see Amiti and Javorcik, 2007, in the Chinese context), we follow most of the NEG literature and concentrate on market access forces.

[15]The results remain unchanged if we use the number of permanent residents in a province as a proxy for ℓ_i; these are available upon request. Permanent residents are defined as the population "residing in township, towns and street communities with permanent household registration there", i.e. in province i.

Map 1: Nominal manufacturing wages and constructed market access in China (2002)



migrant labor supply (m_i). Non-residents in a province are defined as the population living in "township, towns and street communities with permanent household registration elsewhere, [and] having been away from that place for less than one year".

3.2 Estimation issues

A first estimation issue refers to the use of average annual earnings per worker to measure wages. In fact, "cross-region variation in worker characteristics may reflect regional characteristics that are constant over the sample period" (Hanson, 2005). However, as in Hanson (1996), we are not able to control directly for fixed provincial effects by including dummy variables for provinces, as this would introduce perfect multicollinearity into the regressions. First-differencing is another way to eliminate province effects from the regression but it is not without problems either, as it may exacerbate potential problems with noise (Altonji, 1986) or measurement errors in the data (Griliches and Hausman, 1986). We thus estimate Eq. (18) in levels with additional controls. These latter help to mitigate omitted variable bias. We thus account for the province-status of "super-cities" (*municipality*),[16] the number of Special Economic Zones (*SEZ*),[17] the features of the coastal and Western provinces compared to interior regions[18] and a set of year-specific intercepts.[19] This specification fits the data well and explains a large part of the variance in provincial wages.

A second estimation issue relates to the endogeneity of the immigration shock. As mentioned above, we use an instrumental variable approach. The reliability of this method lies on the identification of instruments which are correlated with the inflow of immigrants but uncorrelated with the error term, i.e. with the unobserved component of wages. One first exogenous source of variation in migrant flows may be found in climate variables (see Roback, 1982). We argue that unfavorable climate conditions in the province of origin may augment potential migrants' probability of departure. We consider two complementary climate dimensions: annual *temperature* and annual *precipitation* in major cities. Using the 1990 Census (National Bureau of Statistics of China, 1991), we compute an annual weighted average of climate conditions in the province of origin j for each of these dimensions. The weight is the share of province of origin j in the total immigration re-

[16]The three province-status cities (Beijing, Shanghai and Tianjin) may exhibit specific features such as smaller surface areas, more developed transport infrastructure, and greater proximity to administrative power. $Municipality_i$ is a binary variable which equals one if i is one of the three province-status cities.

[17]Three SEZ were opened in 1980 in Guangdong province and one in Fujian province in 1981. These open areas adopted preferential policies and played the role of windows in developing the foreign-oriented economy, generating foreign exchange via exports and importing advanced technology. SEZ_i is computed as the number of Special Economic Zones in the province (and equals 0, 1, 2 or 3).

[18]$Coastal_i$ is a binary variable which equals one if i is a coastal province, and $West_i$ is a binary variable which equals one if i is a Western province.

[19]We also introduced the distance to Hong Kong as an additional regressor to check if market access is related to the export-processing trade with Hong Kong. The estimated coefficient on this variable turned to be statistically insignificant in all of the regressions. These results are available upon request.

ceived by province i (termed "$immigration_{ij}$") between 1985 and 1990.[20] More precisely, each instrument relating to destination province i is calculated as:

$$Imig_{climate_i^t} = \sum_{j \neq i} climate_j^t \frac{immigration_{ij}}{\sum_{j \neq i} immigration_{ij}},$$

with *climate* referring either to temperature ($Imig_{temp_i^t}$) or rainfall ($Imig^t_{rain_i}$) data. To ensure the exogeneity of these indicators, we exclude information from province i in their calculation. We also introduce the annual averages of temperature and precipitation of the major cities in province i as additional control variables in the wage equation: this ensures that the instruments are not simply proxying the climate conditions in the destination province. Since we do not have any *a priori* ideas about the appropriate specification of the relationship between climate and immigrant share in the destination population, we allow for a quadratic relationship in the instrumental equation. A second source of exogeneity refers to geography. The surface area of the destination province, measured in square kilometers, may influence the extent of immigration; this is employed as our third instrument.

A third estimation issue relates to the market access variable, which appears on the right-hand side of the estimated equation (18). This represents a weighted sum of regional expenditures. However, these expenditures themselves depend on income, and therefore on wages, raising the issue of reverse causality. A positive shock to w_i will increase E_i and thus MA_i (Head and Mayer, 2006).[21] To deal with this problem, we first follow Redding and Venables (2004) and lag the market access variable by two years to avoid

[20] Such bilateral measures of immigration are build from census data and only available every five years.

[21] This will be all the more problematic since $\phi_{ij} < \phi_{ii}$. In the case of extremely high inter-provincial and international transport costs ($\phi_{ij} = 0$, $\forall\ i \neq j$), only local expenditure enters MA_i.

contemporaneous shocks that affect both the left- and right-hand side variables. We then appeal to an instrumental variable strategy. The literature so far has attempted to resolve this simultaneity problem by picking out variations in market access which result from geographic variables. While Redding and Venables (2004) use the distance to the nearest central place (Brussels, New York City, or Tokyo), Head and Mayer (2006) use measures of "centrality" of locations obtained by dividing the surface of the globe into approximately 11,700 squares. Both measures can reasonably be assumed to be exogenous to potential wage shocks since they do not include any information on regional market size. However, they do have the disadvantage of being time invariant, and as such only explain the cross-section dimension of market access. Our aim is to account for both the within and cross-sectional dimensions in our sample. We therefore follow a different approach and rely on an instrument for demand in location i at time t which is based on the weighted average of the yearly variations in the nominal exchange rate (NER) of importing partners. This instrument for the market access of Chinese province i is calculated as:

$$I_{ma_{ti}} = \sum_j \Delta NER_{tij} \frac{1}{dist_{ij}},$$

with ΔNER being the first difference in the nominal exchange rate between partner j's currency and the Chinese Yuan. The variation in NER_{ij} is weighted by the distance of country i to j ($dist_{ij}$)[22]. Since bilateral exchange rates are similar across Chinese provinces, the instrumentation strategy relies entirely on the heterogeneity of import partners across Chinese provinces. We thus argue that a nominal devaluation (appreciation) of country j's currency vis-à-vis the Chinese Yuan translates into a fall (rise) in j's

[22] Our results are robust to the use of a different weight, defined as the share of country j in the exports of province i to j in 1995.

demand (market capacity) for products from China. The impact of that change differs across Chinese provinces depending on an exogenous factor: the distance to partner j.

4 Estimation results

We now proceed to the estimation of the wage equation derived in section 2.3. We run Eq. (18) for 29 provinces over the period 1997-2004. Table 1 reports the results of this baseline specification. Our NEG wage equation fits quite well the data by explaining approximately 80 to 90% of the variation in average provincial wages.

Column (1) reports the results from the OLS estimation of Eq. (18) without the immigrant share but with additional controls and a two-year lagged measure of market access (as discussed in section 3 above we later instrument for the market access).[23] It is useful to interpret the size of the estimated coefficients. Holding other factors constant, a 10% increase in market access raises wages by about 1% on average. In addition, a one-point increase in students enrolled in institutions of higher education as a percentage of the population raises wages roughly by 28%. All of the additional controls enter positively and significantly, highlighting the wage premium accruing to the three province-status "super-cities", the two provinces hosting SEZs and the coastal and Western provinces compared to interior regions.[24] The estimated coefficients on the Year dummies are significant and increase over time, showing the influence of common upward pressure on wages (see below).

[23]Since the predicted values of market access are generated from a previous trade regression, we check the sensitivity of our results using bootstrap techniques: the results remained unchanged. The bootstrapped standard errors (500 replications) are available upon request.

[24]The wage differential between Western and interior provinces may be explained by the employment opportunities in industries offering high wages and salaries in Western China, such as oil and gas companies, as well as border trade companies with Central Asian countries. Note, however, that this difference is not robust to the instrumental variable estimates in Cols. 2-6.

Table 1: Manufacturing wage equation

	Dependent Variable: ln(Manufacturing wage)					
Column:	(1)	(2)	(3)	(4)	(5)	(6)
Method:	OLS	IV	IV	IV	IV	IV
Lagged ln(Market Access)[a]	0.10	0.16	0.16	0.15	0.16	0.25
	(0.01)***	(0.03)***	(0.03)***	(0.02)***	(0.03)***	(0.07)***
Higher-Education Ratio	0.28	1.12	0.72	0.66	0.77	0.83
	(0.10)***	(0.40)***	(0.27)***	(0.25)***	(0.29)***	(0.31)**
Immigrant Share		-0.04	-0.03	-0.03	-0.03	-0.04
		(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.01)***
Population			-0.00	-0.00	-0.00	-0.00
			(0.00)***	(0.00)***	(0.00)***	(0.00)**
Municipality-dummy	0.30	0.48	0.38	0.38	0.37	0.20
	(0.05)***	(0.09)***	(0.07)***	(0.07)***	(0.07)***	(0.15)
Special Economic Zones	0.06	0.10	0.08	0.08	0.08	0.04
	(0.02)***	(0.03)***	(0.02)***	(0.02)***	(0.02)***	(0.04)
Coast dummy	0.06	0.02	0.01	0.02	-0.01	-0.07
	(0.02)***	(0.04)	(0.03)	(0.03)	(0.04)	(0.07)
West dummy	0.12	0.04	0.05	0.06	0.05	0.01
	(0.02)***	(0.05)	(0.04)	(0.04)	(0.04)	(0.06)
Rain		0.01	0.01	0.01	0.01	0.01
		(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***
Temperature		-0.32	-0.06	0.01	0.11	0.55
		(0.31)	(0.27)	(0.26)	(0.29)	(0.45)
Year 1998 [b]	0.17***	0.17***	0.17***	0.17***	0.17***	0.18***
Year 1999	0.28***	0.29***	0.29***	0.29***	0.29***	0.31***
Year 2000	0.41***	0.70***	0.63***	0.61***	0.64***	0.73***
Year 2001	0.49***	0.67***	0.63***	0.62***	0.64***	0.69***
Year 2002	0.59***	0.69***	0.67***	0.66***	0.67***	0.71***
Year 2003	0.72***	0.81***	0.80***	0.80***	0.80***	0.84***
Year 2004	0.84***	0.94***	0.93***	0.93***	0.93***	0.97***
No. of Observations	232	232	232	232	232	232
Adj. R-squared	0.92	0.80	0.87	0.87	0.86	0.79
Durbin-Wu-Hausman test		17.01	18.07	18.00	18.05	29.90
[*p − value*]		[0.00]***	[0.00]***	[0.00]***	[0.00]***	[0.00]***
Hansen J-Statistic		5.94	3.74	4.25	3.51	0.59
[*p − value*]		[0.20]	[0.44]	[0.37]	[0.47]	[0.96]
Stock-Wright S-Statistic		22.27	24.14	24.14	24.14	23.99
[*p − value*]		[0.00]***	[0.00]***	[0.00]***	[0.00]***	[0.00]***
Shea Partial R^2 (1st-stage) (in %)						
Immigrant Share		3.31	6.16	6.79	5.67	6.38
Population			73.29	70.50	76.30	46.72
Lagged ln(Market Access)						8.42

Notes: Heteroscedastic-consistent standard errors in parentheses, with ***, ** and * denoting significance at the 1, 5% and 10% levels, respectively. [a]Market access is two-year lagged to abstract from contemporaneous shocks that affect both left- and right-hand side variables. [b]To save space, we do not report the constant and the standard errors of the year dummies. Standard errors vary between 0.03 and 0.09 and are available upon request. Col. (1) estimates Eq. (18) without the immigrant share but with additional controls. Columns (2) to (6) include the immigrant share, defined as non-residents over population in cols. (2), (3) and (6), as female non-residents over population in col. (4), and as male non-residents over population in col. (5). Instrumented variables (depending on the specification): *Immigrant Share*, *Population*, two-years lagged *ln(Market Access)*. Instruments (depending on the specification): *area*, *climate* variables ($Imig_{temp}$ and $Imig_{rain}$) and their square, two-year lagged *population* and two-year lagged *Ima*. See the text for more details.

In columns (2) to (6), we include immigrant share. These estimations are based on instrumental variables (IV), which allows us to control for any simultaneity between wages and immigration. As described above, we appeal to three different instruments.

The small p-value of the Durbin-Wu-Hausman test, in all of the IV estimations, confirms that the OLS estimator is not consistent and that IV techniques are preferred. As a precondition for the reliability of the procedure, we check the validity of our instruments via the Hansen test of overidentifying restrictions. The resulting insignificant test statistic indicates that the orthogonality of the instruments to the error term cannot be rejected, so that our instruments are appropriate. Both test statistics are reported at the bottom of the results in Table 1. The Shea partial R^2 is a measure of instrument relevance and takes into account the collinearity between the endogenous variables (Shea, 1997). The Shea R^2 is fairly low in specification (2), but this was expected since the endogenous migration variable is already well explained by the instruments included, i.e. the exogenous variables of the second stage regression.[25] Moreover, we include the Stock and Wright (2000) statistic that provides weak-instrument robust inference for testing the significance of the endogenous regressors. We reject the null hypothesis that the coefficients of the excluded instruments are jointly equal to zero.

Before elaborating on the negative impact of the immigrant share estimate, we check the sensitivity of our results in columns (3) to (6). In column (3), we follow Borjas (2003) and address the interpretation problem that a rise in the immigrant share can represent either an increase in the number of non-residents or a fall in population. We thus add the province's population level as a regressor and the two-year lagged value of population

[25] This might raise concerns about multicollinearity, but the auxiliary R^2 of the first stage regression, with or without the excluded instruments, is lower than the overall R^2 of the second stage.

as an additional instrument. Controlling for this size variable does not much change the results.

Current international migration is different from past mass migration, when immigrants were disproportionately men (Freeman, 2006). As in current international migration, nearly half of the current immigrants in China are women (see Table 3 in Appendix C). Our results still hold if we take this new trend into account and redefine the immigrant share as female non-residents over population in column (4), and as male non-residents over population in column (5).

In the last column of Table 1, we address the simultaneity problem of market access and wages via instrumental variables, as detailed above. The high p-value of the Hansen test of overidentifying restrictions indicates that our instrumentation is appropriate. It is worth noting that the estimate on market access is now much higher (column 6).

The estimates confirm the positive influence of market access and education on wages. The structural derivation of our market access variable from theory provides us with a theoretical interpretation of its coefficient: this figure corresponds to $1/\sigma$, with σ being a measure of product differentiation. Our estimates of the elasticity of substitution between traded goods are greater than unity and range between 4 and 6.7, depending on the IV specification used. This is consistent with theory and roughly in line with recent estimates in the NEG (Hanson, 2005) and international trade literatures (Head and Ries, 2001). Hanson's (2005) estimates of σ range in value between 4.9 and 7.6. Our results also underline that an increase in the immigrant share, defined as non-residents over population, imposes downward pressure on the destination region's wage. The effect is statistically and economically highly significant. On average, a one-point increase in the immigrant share induces a fall in average wages by approximately 4% (col. 6). As a consequence, in the context of high immigration flows, a manufacturing firm, given its access to markets and other regional characteristics, can afford to pay lower wages.

To help with the interpretation of the results, and to compare the effects of market access and internal migration on wages, we compute standardized (beta) coefficients from the estimates in Table 1. These are the regression coefficients obtained by standardizing all variables to have a mean of 0 and standard deviation of 1. The results are reported in Table 2.

Table 2: Manufacturing wage equation - Standardized coefficients

Dependent Variable:	ln(Manufacturing wage)				
Column:[a]	(2)	(3)	(4)	(5)	(6)
Method:	IV	IV	IV	IV	IV
Lagged Ln(Market Access)[b] [I]	0.554	0.538	0.523	0.549	0.844
	(0.106)***	(0.084)***	(0.079)***	(0.088)***	(0.252)***
Immigrant Share [II]	-0.612	-0.447	-0.421	-0.462	-0.607
	(0.231)***	(0.143)***	(0.134)***	(0.151)***	(0.222)***
No. of Observations	232	232	232	232	232
Wald Statistic (H_0: I+II=0)	0.14	1.04	1.40	0.86	2.48
$[p-value]$	0.704	0.309	0.236	0.354	0.115

Notes: [a]The column numbers refer to the corresponding columns in Table 1. [b]Market access is two-year lagged. Beta coefficients are computed using estimates of Table 1. Heteroscedastic-consistent standard errors in parentheses. See the text for details.

The estimates are now easily comparable in terms of a standard deviation increase. In all regressions, we note that a one standard-deviation increase in immigrant share, proxying for internal migrant labor supply, offsets a one standard-deviation increase in market access. The bottom of Table 2 presents the p-value of the Wald statistic, showing that the difference between the two parameter estimates is always statistically insignificant. This result holds even though the beta coefficient on immigrant share drops (cols. 3 to 5) and that on market access increases (col. 6). This finding is consistent with theory, since in absolute value the estimate on labor supply is roughly equal to the estimate on market access.

The results in column (6), controlling for the endogeneity of migration and market access, are our preferred estimates. They suggest that both migration and market access are statistically and economically highly significant. Another interesting result emerges. Based on the estimated year dummies, we find, holding other factors constant, that provincial wages increased on average by about 15% per year between 1997 and 2004.[26] This trend is common to all provinces and may be explained by common shocks like total factor productivity growth[27], the national rise in service-sector prices[28] and social security reforms increasing minimum wages.

5 Conclusion and discussion

This paper has examined the importance of economic geography and migration in explaining the spatial structure of wages in China. Our econometric specification relates wages to a transport-cost weighted sum of demand in surrounding locations and to migratory inflows. We estimate the maximum wage a firm can afford to pay, given market access and immigrant labor supply. The data come from a sample of 29 Chinese provinces between 1997 and 2004. We moreover control for various endogeneity issues via instrumental variables.

Overall our results highlight that rapidly increasing wages in China correspond to a

[26]To calculate this average, we first-difference the year dummy estimates and then compute the geometric mean of the antilog-transformed differences.
[27]Recent estimates suggest that China's total factor productivity grew at an annual rate of 4% over the period 1993-2004 (Bosworth and Collins, 2006).
[28]Recall from Eq. (7) that we control for the manufacturing price index.

common national trend. Since total factor productivity growth appears to explain only one third of this trend, the China price has increased over the period. In the meantime, we find that migration flows have slowed down Chinese wage increase. On average the immigrant share has increased from 5 to 9% between 1997 and 2004. Given a one-point increase in the immigrant share, average wages fall by approximately 4%; this more intense internal migration has thus slowed down wage growth by 16% in total (2.5% per year). It is however possible that the further relaxation of migration restrictions, claimed by the export-intensive provinces, will lead to a different scenario. In the extreme case where the average migrant share triples to reach 30% (the value for Beijing in 2004), the downward pressure on wages could be as great as 80%. In that case, the China price will remain unbeatable.

Average provincial access to national and international markets has shown less movement. It has grown, but at a much lower rate (a little less than 20%) on average, producing a wage rise of 5%, given a market elasticity of 0.25. The wage impact of market access is thus three times smaller in magnitude than the effect of migration (and of the opposite sign). Market access appears so far to have played a limited role. However, this not a much surprising finding since agglomeration effects take time to materalize.

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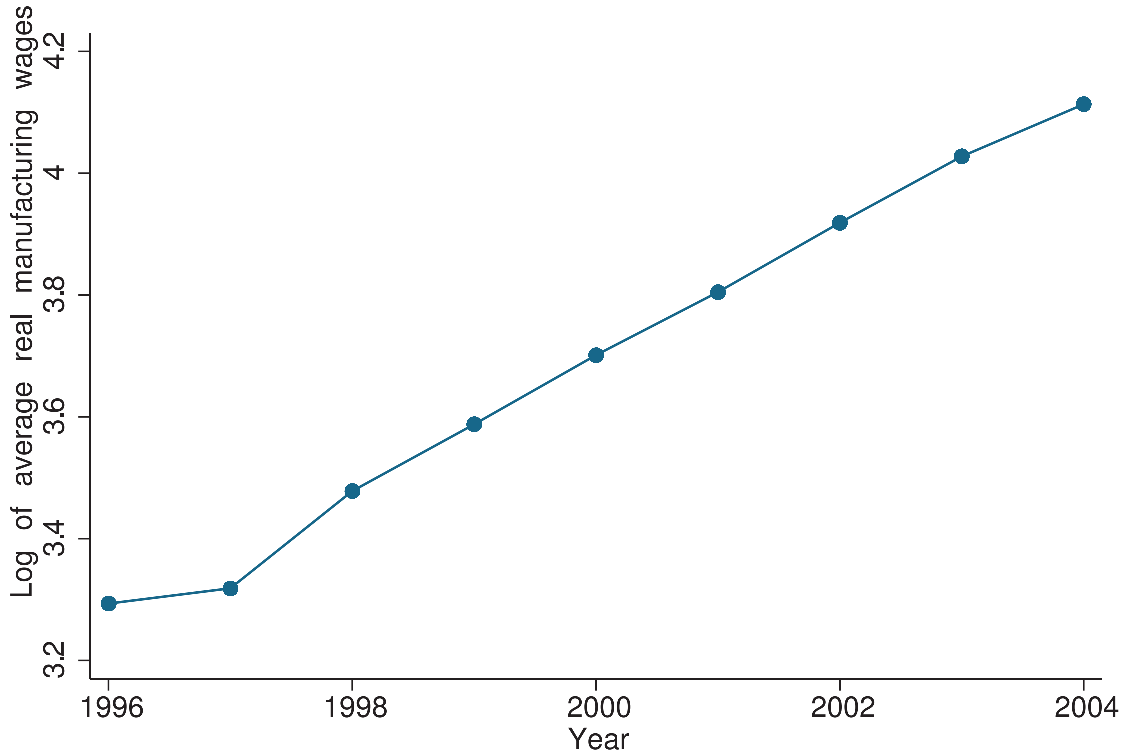
Appendix A: Wage growth

Figure 1: Manufacturing wage growth (1996-2004)



Appendix B: Data descriptions and sources

This appendix describes the data sources and explains the construction of the indicators used in the estimations.

B.1. Province-level data

The wage equation relies on various indicators constructed using the China Statistical Yearbooks which provide data on average nominal wages for formal employees, population, climate and migration. All of these economic indicators are provided at the provincial level, including province-status municipalities.

The education variable is calculated as the ratio of the number of students enrolled in institutions of higher education to the population. Institutions of higher education refer to establishments which have been set up according to government evaluation and approval procedures, enrolling high-school graduates and providing higher-education courses and training for senior professionals. They include full-time universities, colleges, and higher/further education institutes.

B.2. Trade data

Various data sources have been used to estimate the trade equation on both international and intra-national trade flows for China and its foreign partners.

B.2.1. International Data

International trade flows are expressed in current USD and come from IMF Direction of Trade Statistics (DOTS).

Internal trade flows are expressed in current USD and are calculated as the difference between domestic primary and secondary sector production minus exports.

Production data for OECD countries come from the OECD STAN database. For other countries, the ratios of industry and agriculture output as a percentage of GDP are extracted from Datastream. These are then multiplied by country GDP (in current USD) from World Development Indicators 2005.

B.2.2. Chinese Data

The provincial foreign trade data are obtained from the Customs General Administration database, which records the value of all import and export transactions which pass via Customs. Provincial imports and exports are decomposed into those concerning up to 230 international partners. This database has previously been discussed by Lin (2005) and Feenstra, Hai, Woo and Yao (1998).

The exchange rate is the average exchange rate of the Yuan against the US dollar in the China Exchange Market. This comes from the China Statistical Yearbook.

Production data for Chinese provinces are calculated as the sum of industrial and agricultural output. Output in Yuan are converted into current USD using the annual exchange rate. All statistics come from China Statistical Yearbooks.

Provincial input-output tables[29] provide the decomposition of provincial output, and the international and domestic trade of tradable goods. These are available for 28 provinces, with data missing for Tibet, Hainan and Chongqing.

[29]Most Chinese provinces produced square input-output tables for 1997. A few of these are published in provincial statistical yearbooks. We obtained access to the final-demand columns of these matrices from the input-output division of China's National Bureau of Statistics. Our estimations assume that the share of domestic trade flows (that is between each province and the rest of China) in the total provincial trade is constant over time.

Appendix C: Summary statistics

Table 3: Summary Statistics, 1995-2004

	Obs	Mean	St. Dev.	Minimum	Maximum
Dependent Variable:					
Manufacturing Wage	232	9,431	3,714	3,903	27,456
ln(Manufacturing Wage)	232	9.08	0.36	8.27	10.22
Regressors:					
Market Access[a]	232	0.01	0.02	0.0007	0.18
ln(Market Access)[a]	232	-5.51	1.23	-7.22	-1.72
Education	232	0.06	0.07	0.01	0.37
Municipality	232	0.10	0.30	0	1
Special Economic Zones	232	0.14	0.57	0	3
Coast	232	0.38	0.49	0	1
West	232	0.28	0.45	0	1
Rain	232	8.86	5.30	1.34	26.79
Temperature	232	0.14	0.05	-0.78	0.25
Migration (Tens of thousands):					
Non-Residents (1)	232	336.8	299	12.64	2,530
Female non-Residents (2)	232	165.8	146	6.58	1,262
Male non-Residents (3)	232	171	154	5.96	1,268
Population (4)	232	4,324	2,804	482.30	11,847
Immigrant Share defined as:					
(1)/(4)	232	8.69	6.12	1.30	34.18
(2)/(4)	232	8.67	6.42	1.20	36.07
(3)/(4)	232	8.70	5.83	1.40	32.11
Instruments:					
Area	232	289,423	353,202	5,970	1,646,900
$Imig_{temp}$	232	15.53	2.33	10.25	21.18
$Imig_{rain}$	232	958	257	512	1,959
Population[a]	232	4,254	2,769	481	11,780
Ima[a]	232	0.035	0.007	0.023	0.054

Notes: [a]Two-year lagged values.

Appendix D: Construction of market access

Bilateral trade flow data

To obtain market potential measures for each region we rely on different types of relationships: intra-provincial flows, inter-provincial flows, international flows of Chinese provinces, and international flows of foreign countries, as well as the intra-national flows of foreign countries. We thus rely on a number of different data sources to cover (i) intra-provincial (or intra-national), (ii) inter-provincial and (iii) international flows. See Appendix B.2. for details.

(i) Intra-provincial flows or foreign intra-national flows, i.e. exports to itself, are computed following Wei (1996) as domestic production minus exports.

(ii) Inter-provincial trade is computed as trade flows between provinces.

(iii) International flows comprise trade of provinces with around 200 foreign countries, as well as trade between foreign countries.

These measures are all merged into one single dataset which allows us to calculate the market capacities of provinces and foreign countries based on their exports to all destinations (both domestic and international).

Freeness of trade

The freeness of trade (ϕ_{ij}) is assumed to depend on bilateral distances ($dist_{ij}$) and a series of dummy variables indicating whether provincial or foreign borders are crossed.

$$\phi_{ij} = dist_{ij}^{-\delta} \; exp\left[-\varphi B_{ij}^{f} - \varphi^{*} \; B_{ij}^{f*} + \psi Contig_{ij} - \vartheta \; B_{ij}^{c} + \xi \; B_{ij}^{i} + \zeta_{ij}\right],$$

We distinguish several different cases, according to whether i and j are provinces or foreign countries. This equation literally says that we allow for differentiated transport costs depending on whether trade occurs between a Chinese province and foreign countries ($-\delta \ln dist_{ij} - \varphi + \psi Contig_{ij}$), between two foreign countries ($-\delta \ln dist_{ij} - \varphi^{*} + \psi Contig_{ij}$), between a Chinese province and the rest of China ($-\delta \ln dist_{ij} + \vartheta$), within foreign countries ($-\delta \ln dist_{ij} + \xi$) and within Chinese provinces ($-\delta \ln dist_{ij}$). In the last two cases, only internal distance affects trade freeness. The accessibility of a Chinese province or a foreign country to itself is modeled as the average distance between producers and consumers in a stylized representation of regional geography, which yields $\phi_{ii} = distance_{ii}^{-\delta} = (2/3\sqrt{area_{ii}/\pi})^{-\delta}$, where δ is the estimate of distance in the trade equation.

Note that being neighbors dampens the contiguity effect ($Contig_{ij} = 1$ for pairs of partners which are contiguous) and that ζ_{ij} captures the unmeasured determinants of trade freeness, and is assumed to be an independent and zero-mean residual.

Composition of market access

Table 4 shows the estimation results regarding the trade equation (21). Importer and exporter fixed effects are included in the regression so that the border effect within foreign countries ($-\delta \ln dist_{ij} + \xi$) is captured by their fixed effects. The reference category in the regression is within Chinese-province trade.

The elasticity of distance and the impact of contiguity are in line with those in the related literature. We also confirm that the border effect inside China is important (Poncet, 2003). Furthermore, we find that impediments to trade are greater between China and the rest of the world than between the countries included in our sample (which are mostly members of the WTO and are therefore much more integrated into the world economy than was China in the 1990s). To capture part of the large border effects, we can introduce additional controls. However, this strategy will not much affect the predicted values for market access. On the one hand, the border effects would be reduced, but on the other hand, the value of market access would be predicted taking into account these new controls, capturing part of the border effects.

Changes in market access

Figure 2 plots provincial market access as a function of their average log wage. This is carried out separately for the two extreme years of our available data (1995 and 2002). We observe higher levels of market access for high-wage provinces which is in line with the theoretical prediction of NEG models.

Table 4: Trade equation estimates

	Dependent Variable: Ln(Exports)		
Columns	(1)	(2)	(3)
	1995	1999	2002
Exporter fixed effects	yes	yes	yes
Importer fixed effects	yes	yes	yes
Ln(Distance)	-1.24	-1.28	-1.34
	(0.02)***	(0.02)***	(0.02)***
Chinese	-4.72	-4.79	-3.94
Border Effect (B_{ij}^{f})	(0.28)***	(0.31)***	(0.33)***
Foreign country	-2.82	-2.77	-2.28
Border Effect (B_{ij}^{f*})	(0.28)***	(0.30)***	(0.32)***
Contiguity	1.60	1.57	1.56
	(0.10)***	(0.11)***	(0.11)***
Provincial	-1.77	-3.05	-2.52
Border Effect (B_{ij}^{c})	(0.56)***	(0.61)***	(0.65)***
No. of Observations	21 442	24 143	23 146
R-squared	0.38	0.40	0.40

Heteroskedastic-consistent standard errors in parentheses, with ***, ** and * denoting significance at the 1, 5 and 10% levels.

Figure 2: Market access and average manufacturing wage (1995 and 2002)