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Labor Market Distortions,
Rural-Urban Inequality,
and the Opening
of People's Republic of China's
Economy

Thomas Hertel and Fan Zhai

November 2004



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THOMAS HERTEL AND FAN ZHAI

November 2004

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FOREWORD

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ABSTRACT

This paper evaluates the impact of some key factor market reforms on rural-urban inequality and income distribution, using a household-disaggregated, recursive dynamic computable general equilibrium (CGE) model of People's Republic of China. It also explores how these factor market reforms interact with product market reforms currently under way as part of the country's WTO accession process. The simulation results show that reforms in the rural land rental market and hukou system, as well as increasing off-farm labor mobility, would reduce the urban-rural income ratio dramatically. Furthermore, the combination of WTO accession and factor market reforms improves both efficiency and equality significantly.

I. INTRODUCTION

Over the last 50 years, there have been three peaks in regional inequality within People's Republic of China (PRC): the Great Famine of the 1950s, the Cultural Revolution of the late 1960s and the early 1970s, and most recently, the period of openness and global integration of the 1990s (Kanbur and Zhang 2001). The ratio of urban to rural incomes is now approaching three, which is extremely high by international standards (World Bank 1997). Despite this large income differential between rural and urban households, permanent migration in the PRC has been limited. This is due to a combination of both direct and indirect measures. The most important factor is the system of official registration called *hukou*, which households must have in order to legally reside in an urban area. Without this registration, access to urban amenities such as housing and education is limited and quite expensive. While highly skilled individuals and investors can purchase a "blue stamp hukou" (Chan and Zhang 1999) this avenue is not available to the vast majority of rural residents. In light of these barriers to moving the entire household to an urban area, rural-urban migration is largely a transitory phenomenon—and one that is occurring on a massive scale. Recent estimates put the number of "floating workers" (excluding commuters) at about 90 million or roughly 19 percent of the total rural labor force in 2001 (Fan and Qie 2002).

Concern about this increasing rural-urban disparity has been heightened in light of the PRC's current accession to the World Trade Organization (WTO). Most analyses suggest that accession will exacerbate inequalities by lowering barriers to grain imports and increasing opportunities for manufacturing exports as well as foreign investment in the urban-based services (Ianchovichina and Martin 2004). However, the degree to which this occurs will depend on the ease of movement of rural workers into the rapidly expanding urban and coastal economies. Higher rates of labor mobility will ensure that the benefits of WTO accession will be shared more widely. But this depends on how well the labor markets function.

In contrast to the more than two decades of product market reform in the PRC culminating in WTO accession, factor markets have received less attention until recently. This paper redresses this limitation first, by focusing on the factor markets where many barriers prevent a smoothly functioning market. However, unlike the recent paper by Whalley and Zhang (2004) on labor mobility and inequality in the PRC, the analysis is embedded in a disaggregated general equilibrium model, which permits assessment of the potential interactions between ongoing product market reform and prospective factor market reforms. The paper introduces novel approaches to the modeling of farm–nonfarm and rural-urban labor mobility in the PRC. These new specifications are supported by drawing on recent econometric estimates of the relevant transfer elasticities, as well as survey-based estimates of the current extent of labor market distortion. These estimates are incorporated into a computable general equilibrium (CGE) model with highly disaggregated households in both the rural and urban areas, based on newly available data from the Chinese National Bureau of Statistics. With this framework in hand, the paper sheds light on the question of how further opening up of the PRC economy is likely to affect rural-urban inequality. The distributional consequences of lessening some of the existing factor market distortions are also explored.

Recently, there have been a number of papers on the subject of the PRC's WTO accession and its impact on income distribution and poverty. Anderson, Huang, and Ianchovichina (2003) investigated the impact of the PRC's WTO accession on farmer incomes and on rural poverty using a global CGE model. They incorporated a broad flavor of the rigidities of the PRC's rural labor markets into the standard Global Trade Analysis Project model. However, their analysis was constrained by the use of a single representative household. At the other extreme, Chen and Ravallion (2004) applied the changes of commodities and factor prices implied by GTAP simulations for the PRC's WTO accession to a sample of 84,000 households from the PRC's household survey to analyze the implications of WTO accession. Their study offers a rich analysis of the potential incidence of accession, but it abstracts from households' responses to the ensuing price changes and it does not explicitly model the labor markets.

This paper represents a compromise between the global CGE analysis and detailed post-simulation analysis of household incidence. Using a household-disaggregated national CGE model, it finds that factor market reforms can go a long way toward addressing the maldistribution of income in the PRC. Furthermore, openness to trade does not have to induce income inequality in the PRC—if it is accompanied by these complementary reforms. Indeed, the combination of WTO accession and factor market reforms significantly improves both efficiency and equality.

This paper is organized as follows: the next section discusses recent estimates of the size of the rural-urban wage gap induced by the hukou system, as well as limitations in the land market that inhibit off-farm labor mobility. It also examines evidence on the current degree of labor mobility between the agriculture and nonfarm sectors. Next, a specification of a CGE model that explicitly incorporates these labor market distortions is presented, and a baseline scenario to 2007 is developed. This is the backdrop against which the PRC's labor market distortions and its accession to the WTO will be evaluated. Section V assesses the impact of reducing labor market barriers, as well as the PRC's WTO accession, on rural-urban inequality. The final section offers conclusions and suggestions for future research.

II. MODELING THE LABOR MARKET DISTORTIONS IN THE PRC

A. Empirical Evidence on Rural-Urban Wage Differences

As noted in the introduction, the presence of the hukou system has given rise to a huge floating labor force in the PRC. If workers cannot move permanently to the city with their family, then they must migrate temporarily if they wish to take advantage of the very significant wage differential that exists at present. For example, Zhao (1999a) documents an average annual wage gap between rural and urban work of Yuan 2,387.6 for unskilled rural workers of comparable background and ability in Sichuan Province in 1995. Zhao also finds that there is considerable evidence that these temporary migrants would prefer to stay at home—in the rural areas—and engage in nonfarm work, if that were available (Zhao 1999b). In her econometric analysis, she finds that only about 30 percent of the total rural-urban wage gap can be explained by the direct costs associated with migration (transportation, housing, cost of obtaining the necessary certificates). Much of the wage gap is due to social costs associated with migration including the disutility of being away from family, poor quality of housing, limited social services for migrants, danger of being robbed enroute

to and from work, and general uncertainty associated with being a nonregistered worker in an urban area. While these transactions costs are unobservable, they clearly represent a very significant burden on the migrants and their families.

If there were no barriers to the movement of labor between rural and urban areas, it can be expected that real wages would equalize for an individual worker with certain characteristics. Shi, Sicular, and Zhao (2002) explore the question of rural-urban inequality in greater detail for nine different provinces using the China Health and Nutrition Survey (CHNS). They begin by breaking the income differential into earnings and nonearnings components. Earnings are then broken into labor and nonlabor earnings. The former includes both wage earnings and earnings from self-employment, so the authors estimate a production function from which they are able to derive a shadow wage for labor. This permits them to come up with a comprehensive labor earnings differential between the rural and urban populations. They then control for differences in hours worked, which they find to be an important component of the total urban-rural income gap.

Having isolated the difference in hourly earnings between rural and urban households, Shi et al. (2002) control for differences in personal characteristics, as well as occupation. Once these differences are controlled for, the unexplained portion of this income gap falls to about 50 percent. They reason that the remaining 50 percent of this earnings differential must be either compensation for higher urban living costs, or the consequence of a labor market distortion. Once they have taken into account differences in living costs, the authors conclude that the apparent labor market distortion is about 42 percent of the rural-urban labor income differential and 48 percent of the hourly earnings differential. When applied to the average wage differential (2.15 yuan/hour = 3.43 yuan/hour urban – 1.28 yuan/hour rural), this amounts to an *ad valorem* rate of apparent taxation on rural wages of $81\% = 100\% * (.482 * 2.15) / 1.28$.

Clearly there may be other unobserved factors inducing this rural-urban wage differential, in which case estimation of the labor market distortion via subtraction of known factors is biased in the direction of overstating the hukou-related distortion. In fact, rural-urban wage differentials persist in market economies that do not have a household registration system. Therefore, it is useful to consider an alternative approach whereby one estimates the direct impact of household registration status on the observed wage difference among households. Shi (2002) takes this approach to the problem, using the same CHNS data set. He finds that only 28 percent of the rural-urban wage difference can be explained directly via the coefficient on the hukou registration variable. This is quite a bit less than the 48 percent left unexplained via the subtraction approach of Shi et al. (2002). For purposes of this paper's general equilibrium model, a larger (81 percent *ad valorem*) transaction tax distortion into the initial equilibrium data base is inserted. However, when it comes to modeling labor market reform, only a portion of this tax distortion that has been attributed to the hukou system directly in Shi's econometric analysis is removed.¹

¹ It is a difficult to compare these distortions across different studies, even though they use the same data base, so we key on the rural-urban wage differential. The portion of this differential that is not explained by occupation, education, and other personal characteristics is 58 percent in both the Shi (2002) and the Shi et al. (2002) studies. Shi et al. (2002) then deduct the cost of living component to reach their 48 percent estimate of the portion of the wage differential due to labor market distortions. In his regression analysis, Shi (2002) finds that 28 percent of the overall wage differential can be attributed directly to possession of an urban hukou. He does not control for living costs, but if we use the 48 percent figure from the other study, then we conclude that the hukou accounts for $0.28 / .48 = 0.58$ of the apparent labor market distortion.

B. Modeling Transaction Costs

The transaction cost associated with the unexplained wage differential is modeled explicitly as a burden that is assumed by temporary migrants. Of course these migrants are heterogeneous and the extent of the burden varies widely. Those individuals who are single and live close to the urban area in which they work are likely to experience minor inconvenience as a result of this temporary migration. They can be expected to be the first to migrate (*ceteris paribus*) in response to higher urban wages. On the other hand, some migrants have large families and come from a great distance. Their urban living conditions are often very poor and it is not uncommon for them to be robbed on the train when they are returning home for the holidays. For such individuals, the decision to migrate temporarily is likely to be a marginal one—and one that they may not choose to repeat. With this heterogeneous population in mind, we postulate a continuous transaction cost function that is increasing in the proportion of the rural population engaged in temporary work:

$$TIndCost = \gamma \cdot \left(\frac{L^{Mig}}{L^r} \right)^\delta \quad (1)$$

where $TIndCost$ is the ad valorem tax equivalent of the indirect transaction costs, L^{Mig} is the migrant rural workers, and L^r is the labor force in rural area. δ and γ are elasticity and shift parameters, respectively.

The transaction cost function in (1) has a simple, constant elasticity functional form, which begins at the origin and reaches the observed cost-of-living adjusted indirect tax rate of 81 percent of rural wages at the current level of temporary migration (about 70 million workers in our baseline scenario). We assume that further increases in temporary migration have only a modest impact on these transaction costs.² In addition to these indirect costs, the temporary migrant also incurs direct costs associated with the higher urban cost of living. Based on Shi et al. (2002), these are estimated to be 10 percent of the urban-rural wage gap and about 17 percent of the rural wage rate.

In our subsequent analysis, the direct and indirect transactions cost associated with the temporary migration of unskilled and semiskilled labor will play an important role.³ Any labor market reforms that reduce the transaction costs imposed on rural labor will increase the flow of workers to the city, thereby depressing urban wages and increasing rural wages. This will have the effect of reducing inequality. These transaction costs will also play an important role in the case of trade liberalization. Here, increases in the demand for unskilled labor in the urban areas will cause urban wages to rise, thereby drawing in more rural labor. However, this supply of rural labor will come at some cost—both in terms of higher transport and living costs for the worker, as well as the indirect transaction costs—since the additional workers are presumably being drawn from a greater distance or from less favorable family/social circumstances.

² We assume that a doubling of temporary migration would only increase the marginal cost of migration by 10 percent.

³ Skilled workers make up a very small portion of the rural labor force and typically are able to obtain hukou if they choose to move to the urban areas.

C. Off-farm Labor Mobility

In developed economies off-farm labor mobility is typically viewed as a function of the relative wages in the farm and nonfarm sectors. However, in the PRC, the off-farm labor supply decision is complicated by institutional factors that have been built into the system in order to keep the agricultural population in place (Zhao 1999b). In earlier years, the PRC government sought to make it costly for individuals to leave the rural areas by tying incomes to daily participation in collective work. More recently, the absence of well-defined land tenure has raised the opportunity cost of leaving the farm (Yang 1997). Households that cease to farm the land may lose the rights to it, so they have a strong incentive to continue some level of agricultural activity, even when profitability is quite low (Zhao 1999a). With only modest growth in rural, nonfarm activities, this seriously limits the ability of households to obtain off-farm work (Zhao 1999b).⁴

The off-farm labor supply of rural households in our model is described as the following decision problem. Following Zhao (1999b), we assume the returns to land are embodied in labor and thus constitute part of the farm labor income. Furthermore, the land input of individual rural households is assumed to be an increasing function of its farm labor input, due to the absence of clear property rights to the land. The rural household maximizes net returns to labor and land by allocating a fixed labor resource (ℓ) between farm (ℓ_f) and off-farm ℓ_o activities, subject to imperfect transformation possibilities between these two alternatives. Farm production technology is summarized by a production function,

$$y = f(\ell_f, k, n) \tag{2}$$

where ℓ_f , k and n stand for farm labor input, capital inputs, and land. The objective function for the household is written as follows:

$$\begin{aligned} \max \quad & pf(\ell_f, k, n) - rk + w\ell_o \\ \text{s.t.} \quad & n = g(\ell_f), \quad g_\ell(\ell_f) > 0 \\ & \bar{\ell} = \left[\alpha^{-1/\sigma} \ell_f^{1+1/\sigma} + \beta^{-1/\sigma} \ell_o^{1+1/\sigma} \right]^{\sigma/\sigma+1} \end{aligned} \tag{3}$$

where p is the price vector of agricultural products, r is the rental rate of capital, w is the average wage rate of nonfarm work, and σ is elasticity of transformation.

The first order conditions of the optimization problem are:

$$f_k(\ell_f, k, n) = r \tag{4}$$

$$\frac{\ell_f}{\ell_o} = \frac{\alpha}{\beta} \left[\frac{pf_\ell(\ell_f, k, n) + pf_n(\ell_f, k, n)g_\ell(\ell_f)}{w} \right]^\sigma \tag{5}$$

⁴ However, as noted by Parish, Zhe, and Li (1995), the rural labor market is looking more like a market all the time.

Equation (5) is of central importance in our analysis. It determines the allocation of household labor between farm and off-farm activities. This allocation is a function of the ratio of the shadow value of labor in agriculture, relative to the off-farm wage rate. Consider first the special case where: (i) there is no link between on-farm employment and the household's land endowment: $g_l(\ell_f) = 0$, and (b) $\sigma \rightarrow \infty$ such that farm and off-farm labor are perfectly transformable. Then equation (5) will ensure that $pf_\ell(\ell_f, k, n) = w$. This in turn implies an optimal allocation of labor between farm and nonfarm activities, provided the off-farm wage is also equated to the value marginal product of labor in the nonfarm industries. In practice, the empirical evidence (discussed below) suggests that the off-farm supply elasticity in response to a change in the relative return to labor is rather small in rural PRC. Therefore, even in the presence of a fully functioning land rental market, we do not expect an optimal allocation of labor between the farm and nonfarm sectors. There are many reasons for this imperfect mobility of labor, including education, experience, and simple geography, which can all serve to isolate farm households from the nonfarm labor market. These factors are hardly unique to the PRC, or even to developing countries for that matter, as imperfect off-farm mobility is also observed in the OECD countries (OECD 2001). Accordingly, we will not consider altering this feature of the labor market in our scenarios below.

Now relax the second assumption so that: $g_l(\ell_f) > 0$. This introduces a further distortion in the allocation of labor between the farm and nonfarm sectors. Indeed, even in the case of perfect labor mobility ($\sigma \rightarrow \infty$), a gap between the productivity of labor in agriculture and nonagriculture will emerge. This reflects the fact that the current land-rights system in the PRC has introduced an additional opportunity cost of leaving the farm, calculated here as the marginal value product of land, multiplied by the rate at which decreased presence on the farm reduces the household's land endowment. This has the effect of retaining extra workers in agriculture under our baseline analysis.⁵ (In the empirical model, we assume that the elasticity of land with respect to on-farm labor is unitary.) One of the scenarios that we will consider below is the introduction of a well-functioning land rental market through which rural households seeking work in the city can rent their land to other households, thereby separating their labor migration decision from the return to agricultural land. In this case, the supply of land facing the household is perfectly elastic and it adjusts the quantity of land employed up to the point where the value marginal product of land equals the market rental rate. Thus $g_l(\ell_f) = 0$ and the bracketed term on the right hand side of (5) simplifies to the ratio of the value marginal product of labor in agriculture to the nonfarm wage. This has important implications for the economy as a whole, as additional workers are released from agriculture and the labor market moves closer to the optimum as defined by $pf_\ell(\ell_f, k, n) = w$.

III. CGE MODEL

The CGE model used in this study has been developed at the Development Research Center of the State Council in Beijing with the explicit objective of modeling inequality and the rural-urban labor market. The model has its intellectual roots in the group of single-country, applied general equilibrium models used over the past two decades to analyze the impact of trade policy reform (Dervis et al. 1982, Shoven and Whalley 1992, de Melo and Tarr 1992). It began as a prototype

⁵ Since the lost land of off-farm labor could be farmed by the labor of other households, the total land supply is still fixed in our model.

CGE model developed for the Trade and Environment Program of the OECD Development Center in the mid-1990s (Beghin et al. 1994). However, since that time, significant modifications have been made to (i) capture the major features of the tax system in the PRC economy (Wang and Zhai 1998), (ii) differentiate the PRC's two separate trade regimes (Zhai and Li 2000), (iii) address demographic issues (Zhai and Wang 2002), as well as (iv) disaggregate the coastal economy (Li and Zhai 2002). A variety of policy issues have been examined using variants of this model, including the economywide implications of the PRC's WTO accession and the income distribution consequences of trade and tax reform (see Development Research Center 1998, and Wang and Zhai 1998). The model used in this study represents the latest advance in the evolution of this PRC CGE model. It is calibrated to the social accounting matrix compiled from the most recent I/O table of 1997, incorporates highly disaggregated households based on detailed household survey data, and introduces a novel approach to the modeling of rural-urban labor market linkages. A comprehensive algebraic description of the model is provided in the Appendix. Here, we focus on the main features of the model—especially those that are relevant for assessing the rural-urban distributional consequences of labor market distortions and trade liberalization.

A. Modeling Household Behavior

In order to come to grips with the inequality question, it is critical that we disaggregate households to the maximum extent possible, subject to the limitations posed by survey sampling, computational constraints, and human capacity for analysis. It is particularly important to disaggregate households along those dimensions that are most important for analysis of labor market impacts. Thus, for example, one would not want to group together rural and urban households since they differ in their hukou status. Also, due to the segmentation in the rural labor market between agriculture and nonagriculture, we would like to keep these households separated as well, at least to the maximum extent possible. Therefore we disaggregate households receiving 95 percent or more of their income from agriculture. In the urban sample, we separate out those households that are specialized in wage and salaried labor, as they will likely be most affected by labor market reforms. We also disaggregate households that rely on transfer payments for 95 percent of their income. The remaining households are considered “diversified.” This gives us the grouping of 100 representative households in Table 1 = 20 vingtiles (income levels) for 2 rural and 3 urban strata, yielding a total of 40 rural and 60 urban household groups.

Households consume goods and services according to a preference structure determined by the Extended Linear Expenditure System (ELES). Through specification of a subsistence quantity of each good or service, this expenditure function generates nonhomothetic demands—whereby the larger the relative importance of subsistence consumption (e.g., it would be high for rice, and low for automobiles) the more income-inelastic the household's demand for that good.

Each household is endowed with three types of labor: skilled, semiskilled, and unskilled. These are distinguished by educational attainment of the worker⁶ with semiskilled workers having a middle or high school education, and skilled workers having an educational attainment beyond high

⁶ We would prefer to base this split on occupation—what they actually do—versus their potential as determined by education. However, the rural household survey does not support this type of labor split.

TABLE 1
PER CAPITA INCOME, BY LOCATION, STRATUM, AND VINGTILE (IN YUAN, 1997)

| VINGTILE (POOREST =1) | RURAL HOUSEHOLDS | | | URBAN HOUSEHOLDS | | | |
|-------------------------------------|------------------|---------|-------|------------------|-------|---------|-------|
| | AGR | DIVERSE | TOTAL | TRANSFER | LABOR | DIVERSE | TOTAL |
| 1 | 845 | 889 | 874 | 2903 | 2135 | 2454 | 2351 |
| 2 | 1049 | 998 | 1006 | 3995 | 3151 | 3054 | 3212 |
| 3 | 1156 | 1162 | 1161 | 4674 | 3790 | 3703 | 3827 |
| 4 | 1303 | 1301 | 1301 | 5273 | 3987 | 4250 | 4216 |
| 5 | 1433 | 1432 | 1432 | 5595 | 4513 | 4452 | 4608 |
| 6 | 1755 | 1551 | 1568 | 6280 | 4763 | 4528 | 4769 |
| 7 | 1675 | 1679 | 1678 | 6594 | 5237 | 4884 | 5155 |
| 8 | 1822 | 1811 | 1812 | 7794 | 5692 | 5370 | 5588 |
| 9 | 1947 | 1944 | 1944 | 8643 | 6096 | 5786 | 6045 |
| 10 | 2099 | 2095 | 2096 | 8142 | 6694 | 6334 | 6564 |
| 11 | 2240 | 2252 | 2251 | 8220 | 6866 | 6482 | 6718 |
| 12 | 2415 | 2411 | 2411 | 8946 | 7420 | 6901 | 7192 |
| 13 | 2602 | 2595 | 2595 | 10807 | 7686 | 7532 | 7671 |
| 14 | 2835 | 2818 | 2819 | 12973 | 8432 | 7974 | 8303 |
| 15 | 3031 | 3069 | 3066 | 10601 | 9120 | 8526 | 8799 |
| 16 | 3344 | 3353 | 3352 | 12925 | 9709 | 8727 | 9130 |
| 17 | 3708 | 3717 | 3717 | | 11152 | 9659 | 10240 |
| 18 | 4306 | 4258 | 4261 | 18821 | 12749 | 10985 | 11796 |
| 19 | 5171 | 5162 | 5163 | 15190 | 15134 | 13403 | 14125 |
| 20 | 9712 | 8345 | 8485 | | 21997 | 19659 | 20522 |
| Share of Population (percent) | 7.35 | 62.73 | 70.08 | 1.44 | 12.01 | 16.47 | 29.92 |

Note: AGR means agriculture-specialized.

Sources: *Rural and Urban Household Surveys 2000*, National Bureau of Statistics internal data.

school.⁷ Households are also endowed with profits from family-owned agriculture and nonagriculture enterprises, property income, and transfers. Agricultural profits represent returns to family labor, land, and capital. However, as noted above, the off-farm labor supply decision is a function of the combined return to labor and land in agriculture, owing to the absence of an effectively functioning land market in many rural areas.

Specification of the value of the off-farm labor supply elasticity draws on the econometric work of Sicular and Zhao (2004). Those authors report results from a household labor supply model estimated using labor survey data from the 1997 CHNS data set for nine central provinces. This survey measures the labor supply of individuals within each household to farm and nonfarm activities. Sicular and Zhao estimate the implicit wage for each individual in the sample if they were to work in agriculture or nonagricultural self-employment, and they also estimate the nonagriculture wage that this person could obtain. They then estimate labor supply equations for self-employed agricultural labor, self-employed nonagricultural labor, and wage labor. From these equations, it is possible to calculate elasticities of labor transfer from farm to nonfarm activities. They report

⁷ Since the rural survey only reports the highest educational attainment of the household we do not have endowment by worker. This biases the skill level of rural households upward. However, since the vast majority of rural households are unskilled, this is less of a problem in practice.

Table 2
AVERAGE EDUCATIONAL ATTAINMENT, BY LOCATION, STRATUM, AND VINGTILE

| VINGTILE (POOREST =1) | RURAL HOUSEHOLDS | | | URBAN HOUSEHOLDS | | | |
|--------------------------|------------------|---------|-------|------------------|-------|---------|-------|
| | AGR | DIVERSE | TOTAL | TRANSFER | LABOR | DIVERSE | TOTAL |
| 1 | 2.17 | 2.38 | 2.31 | 3.50 | 3.26 | 3.19 | 3.24 |
| 2 | 2.49 | 2.47 | 2.48 | 3.00 | 3.47 | 3.44 | 3.46 |
| 3 | 2.41 | 2.44 | 2.43 | 5.00 | 3.87 | 3.62 | 3.74 |
| 4 | 2.62 | 2.50 | 2.52 | | 3.54 | 3.51 | 3.53 |
| 5 | 2.55 | 2.48 | 2.49 | 4.00 | 3.81 | 3.85 | 3.83 |
| 6 | 2.50 | 2.54 | 2.54 | 3.00 | 3.96 | 3.58 | 3.77 |
| 7 | 2.49 | 2.59 | 2.59 | 5.00 | 3.88 | 3.83 | 3.86 |
| 8 | 2.59 | 2.64 | 2.64 | | 3.83 | 3.94 | 3.89 |
| 9 | 2.55 | 2.61 | 2.60 | | 4.13 | 3.92 | 4.01 |
| 10 | 2.60 | 2.68 | 2.67 | | 4.07 | 4.00 | 4.03 |
| 11 | 2.75 | 2.69 | 2.69 | | 4.05 | 4.08 | 4.06 |
| 12 | 2.60 | 2.68 | 2.67 | | 4.14 | 3.98 | 4.06 |
| 13 | 2.63 | 2.70 | 2.69 | | 4.30 | 4.06 | 4.17 |
| 14 | 2.73 | 2.66 | 2.66 | | 4.20 | 4.20 | 4.20 |
| 15 | 2.61 | 2.71 | 2.70 | | 4.24 | 4.14 | 4.18 |
| 16 | 2.67 | 2.76 | 2.76 | 3.00 | 4.34 | 4.14 | 4.21 |
| 17 | 2.66 | 2.78 | 2.77 | | 4.13 | 4.34 | 4.24 |
| 18 | 2.67 | 2.79 | 2.78 | | 4.36 | 4.35 | 4.36 |
| 19 | 2.72 | 2.83 | 2.82 | | 4.42 | 4.31 | 4.36 |
| 20 | 2.70 | 2.88 | 2.87 | | 4.62 | 4.28 | 4.42 |
| Overall Average | 2.52 | 2.65 | 2.63 | 3.67 | 4.05 | 3.99 | 4.01 |

Notes: Education attainment is calculated by assigning the number 1 to illiterate or semiliterate, 2 = primary school, 3 = middle school, 4 = high school, and 5 = higher educational attainment. AGR means agriculture-specialized.

Sources: *Rural and Urban Household Surveys 2000*, National Bureau of Statistics internal data.

a variety of elasticities in their paper.⁸ We adopt their estimate of 2.67. Thus, a 1 percent decrease in the return to farming, relative to the market wage, results in a 2.67 percent increase in off-farm labor supply.

B. Modeling Production, Exports, and Imports

When it comes to modeling trade liberalization, an important characteristic of our CGE model is the explicit treatment of two separate foreign trading regimes. One is the export processing regime, which receives duty-free imports and is therefore extremely open, with considerable foreign

⁸ Due to the variety of labor supply elasticities in response to the three different wages in their model, the authors obtain a variety of labor transfer elasticities, depending on the “thought experiment” being conducted. These are asymmetric, with the response to a change in shadow wages differing from the response of labor supply to a change in the market wage. However, this response is treated as symmetric in our model. This makes it difficult to choose the correct parameter for our analysis. We focus on the transfer of labor from agriculture to market wage employment in response to a change in returns to agriculture, since this transfer accounts for the bulk of the labor flow in our analysis. In a companion paper to this study that focuses exclusively on the PRC’s WTO accession (Hertel, Zhai, and Wang 2004), a sensitivity analysis was conducted with low labor transfer elasticity of 0.6. The most important consequence of this alternative simulation is that the poorest agricultural households no longer gain from WTO accession at the lowest value for this elasticity.

investment. The other sector is the ordinary trade regime. Since the 1990s, processing exports have grown rapidly as a result of their preferential treatment. They now account for more than half of the PRC's total exports. Obviously, any analysis of external trade and the impact of changes in trade policy must have an explicit treatment of this dualistic foreign trading regime in the model.

Trade is modeled using the Armington assumption for import demand, and a constant elasticity of transformation for export supply. Thus, the PRC's products are assumed to be differentiated from foreign products, and exports from the PRC are treated as different products from those sold on the domestic market. The small country assumption is assumed for imports and so world import prices are exogenous in terms of foreign currency. Exports are demanded according to constant-elasticity demand curves, the price elasticities of which are high but less than infinite. Therefore the terms of trade for the PRC are endogenous in our simulation.

Production in each of the sectors of the economy is modeled using nested constant elasticity of substitution functions, and constant returns to scale is assumed. Sectors differentiate between rural and urban labor that substitute imperfectly between them. This is an indirect means of building into the model a geographic flavor—since some sectors will be located largely in urban areas, while others will be predominantly in rural areas. By limiting the substitutability of rural and urban labor in each sector, we are able to proxy the economic effect of geographically distributed production activity. Thus, if trade liberalization boosts the demand for goods that are predominantly produced in urban areas, then urban wages will rise, relative to rural wages, and migration will be encouraged. Of course we would ideally model the geographic distribution of industrial activity, but unfortunately the data do not exist to support this type of split.

All commodity and nonlabor factor markets are assumed to clear at market prices. With the exception of the farm/nonfarm labor supply decision, labor is assumed to be mobile across sectors, but rural-urban migration is subjected to the direct and indirect transaction costs discussed above, so the unskilled and semiskilled rural wages are equated to the comparable urban wages, less transaction costs. Capital is assumed to be partially mobile, reflecting differences in the marketability of capital goods across sectors.

In order to look at the impacts of labor mobility over time, the model has a simple recursive dynamic structure. Dynamics in the model originate from accumulation of productive factors and productivity changes. The model is benchmarked on the PRC's 1997 data and is solved for subsequent years from 1998 to 2007. We turn now to the details of the baseline scenario.

IV. BASE CASE PROJECTIONS AND SIMULATION DESIGN

A. Base Case Scenario

Our base case scenario is purposely defined as being without the PRC's WTO accession. This is because we seek to explore separately the impact of labor market distortions and WTO accession, thereafter examining how this recent opening of the economy interacts with existing labor market distortions. In the base case, GDP grows at an average rate of about 7.8 percent, and life expectancy rises from 70.3 to 74.0 years of age. Urban and rural fertility rates also rise. Both of these factors give rise to a larger population in 2007 (1.34 billion), with a commensurate increase in the labor force that grows at about 1.2 percent per year. In contrast, the capital stock grows at a 10 percent

annual rate, leading to substantial capital deepening. Total factor productivity represents the difference between the GDP projections and the growth rate supported by the accumulation of labor and capital. This ranges from 1.7 to 2.9 percent over the projection period. The baseline scenario also shows a substantial increase in openness of the economy, relative to 1997, with exports' share in GDP rising by four percentage points and imports share in GDP rising by about seven percentage points. The current account surplus declines over the baseline period to about 40 percent of its 1997 level.

The baseline scenario also shows a narrowing of the urban/rural income ratio, falling from 3.03 to 2.57 as the urban labor force grows by about 56 million people, or nearly one-third, whereas rural labor grows by only 25 million, from a base of 460 million in 1997. As a result, the rural share in the overall labor force falls from 71.7 to 67.2 percent. Of this total rural labor force, the share of agricultural employment also falls as a result of off-farm migration.

In the absence of WTO accession, it is necessary to make some hypothetical assumptions in constructing the base case scenario. Quota growth rates for those imports subject to quantitative restrictions (grains, cotton, wool, sugar, petroleum, and autos) are assumed to be 3 percent per year.⁹ Export quotas on textiles and apparel are assumed to grow at annual rates of 5.7 and 6.0 percent, respectively.¹⁰ All tax rates are held constant over the baseline.

B. Experimental Design

Against this backdrop, we consider a sequence of alternative scenarios in order to explore the relationship between ongoing economic growth, factor market distortions, further opening of the economy to world trade, and rural-urban inequality. With one exception, these scenarios are treated in a cumulative fashion, so that the second scenario includes the first as well as the second modification; the third includes one, two, and three, and so on. As a consequence, we will need to distinguish between *incremental* and *cumulative* effects. The first two modifications that we consider relate to the functioning of the labor market, while the third incremental scenario pertains to the impact of further opening the PRC's economy to trade. In order to assess the interactions between labor market and product market reforms, we also conduct a fourth (noncumulative) experiment in which WTO accession is implemented in the absence of labor market reforms.

In the first scenario, we examine the impact of a relaxation of the hukou system such that the ad valorem tax equivalent of the indirect transactions costs are reduced from 81 to 34 percent at current levels of migration. As noted previously, this is the portion of the observed differential in wages that has been directly attributed to possession of a hukou (Shi 2002).¹¹ This is done through shock the share parameter α in equation (1). We label this scenario TRANS and focus on the difference between rural-urban inequality, and a variety of other variables of interest, in 2007 with and without the reduced transaction costs.

⁹ This assumption keeps the self-sufficiency ratio of grain constant at base year level over the baseline.

¹⁰ In order to facilitate our analysis of the interaction between labor market reforms and WTO accession, we endeavor to have a common accession experiment both with and without labor market reforms. Therefore, the path of quota rents observed in the absence of labor market reforms is imposed on the various labor market reform scenarios.

¹¹ As noted previously, the full size of the differential is obtained by controlling for observed differences between rural and urban wages, but this may well be due to other factors.

TABLE 3
SUMMARY OF BASELINE CALIBRATION

| | 1997 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Exogenous Specified Variables | | | | | | | | | |
| GDP Growth Rate (percent) | | 8.1 | 7.3 | 7.6 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 |
| Life expectancy | 70.3 | 71.8 | 72.0 | 72.2 | 73.2 | 73.4 | 73.6 | 73.8 | 74.0 |
| Total Fertility Rate | | | | | | | | | |
| Urban | 1.40 | 1.45 | 1.48 | 1.5 | 1.52 | 1.55 | 1.57 | 1.59 | 1.62 |
| Rural | 2.01 | 1.95 | 1.97 | 1.99 | 2.01 | 2.02 | 2.04 | 2.06 | 2.07 |
| Calibrated Results | | | | | | | | | |
| Macroeconomic Trends | | | | | | | | | |
| Growth rate (percent) | | | | | | | | | |
| Total absorption | | 11.02 | 8.53 | 8.29 | 8.45 | 8.39 | 8.34 | 8.29 | 8.25 |
| Labor force | | 1.23 | 1.21 | 1.17 | 1.15 | 1.17 | 1.16 | 1.15 | 1.15 |
| Capital stock | | 10.08 | 10.51 | 10.45 | 10.28 | 10.18 | 10.08 | 9.98 | 9.88 |
| TFP | | 2.87 | 1.74 | 2.16 | 2.43 | 2.44 | 2.49 | 2.53 | 2.56 |
| Ratio to GDP (percent) | | | | | | | | | |
| Private consumption | 44.3 | 47.0 | 47.3 | 47.4 | 47.4 | 47.4 | 47.5 | 47.6 | 47.6 |
| Investment | 32.7 | 34.1 | 35.2 | 35.9 | 36.7 | 37.4 | 38.1 | 38.8 | 39.4 |
| Export | 21.7 | 25.5 | 25.7 | 25.7 | 25.7 | 25.7 | 25.7 | 25.6 | 25.6 |
| Import | 16.3 | 22.9 | 23.5 | 23.7 | 23.8 | 24.0 | 24.1 | 24.2 | 24.2 |
| Urban/rural per capital income ratio | 3.03 | 2.77 | 2.74 | 2.71 | 2.68 | 2.65 | 2.63 | 2.60 | 2.58 |
| Population and labor force | | | | | | | | | |
| Population (million) | 1236.3 | 1269.9 | 1280.5 | 1290.8 | 1301.0 | 1311.5 | 1321.9 | 1332.4 | 1343.0 |
| Urban | 369.9 | 397.5 | 407.2 | 416.9 | 426.6 | 436.5 | 446.4 | 456.4 | 466.5 |
| Rural | 866.4 | 872.4 | 873.3 | 873.9 | 874.3 | 875.0 | 875.5 | 876.0 | 876.4 |
| Labor force (million) | 640.7 | 665.6 | 673.6 | 681.5 | 689.4 | 697.4 | 705.5 | 713.6 | 721.8 |
| Urban | 181.1 | 196.9 | 202.5 | 208.2 | 213.8 | 219.5 | 225.3 | 231.2 | 237.2 |
| Rural | 459.6 | 468.7 | 471.1 | 473.4 | 475.6 | 477.9 | 480.2 | 482.4 | 484.6 |
| Grain self-sufficiency rate (percent) | 99.5 | 98.5 | 98.4 | 98.4 | 98.3 | 98.2 | 98.1 | 98.0 | 98.0 |
| Share of rural labor force (percent) | 71.7 | 70.4 | 69.9 | 69.5 | 69.0 | 68.5 | 68.1 | 67.6 | 67.2 |
| Share of agricultural employment in total rural labor force (percent) | 72.0 | 71.9 | 71.6 | 71.6 | 71.2 | 71.0 | 70.9 | 70.7 | 70.7 |

Source: Authors' calculation.

In the second scenario (LAND), we consider the impact of relaxing one of the important barriers to off-farm labor mobility—the absence of well-defined property rights for agricultural land. As noted above, this leads to the retention of additional labor in the farm sector in the baseline scenario. Specifically, we consider the implications of introducing land reform in 2003, such that farm households only consider the ratio of the marginal value product of their labor in agriculture and nonfarm rural wages in deciding where to work. This contrasts with the baseline scenario in which farm households include the returns to land in their decision to work on-farm or off-farm, since leaving the farm means forgoing farm land (recall equation 5).

Finally, we add the further opening of the PRC's economy to world trade through WTO accession. The WTO accession scenario is described in detail in Table 4. Import tariffs are reduced gradually and the sectoral reduction rates are aggregated from Harmonized Commodity Description and Coding

TABLE 4
SUMMARY OF EXPERIMENTS

| EXPERIMENT | DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|-------------------------------------|-----------------------|-------------------------------------|------|-------|------|-------|-------|------|------|-------|------|--------|-------|-----|------|-------|-----|---------------|-------|------|-------|-------|-----|
| Base Case | <ul style="list-style-type: none"> - Real GDP exogenous - TFP growth rate - Agricultural sector exogenous - Other sectors endogenous - 3% growth rate of import quota for goods subjected to quantitative restriction (rice, wheat, corn, cotton, wool, vegetable oil, sugar, petroleum refining, automobiles) - Exogenous export quota growth for textile and apparel textile: 5.7%; apparel: 6.0% (annual average) - All tax rates are fixed at its base year level - Balance of payment gradually declines to 40% of its base year level in 2007 | | | | | | | | | | | | | | | | | | | | | | | | |
| TRANS: Relaxation of the Hukou System | <ul style="list-style-type: none"> - Cut the indirect transactions costs from 81 to 34 percent of nonfarm rural wage | | | | | | | | | | | | | | | | | | | | | | | | |
| LAND: Introducing Land Reform | <ul style="list-style-type: none"> - Farm households do not include the returns to land in their temporal migration decision | | | | | | | | | | | | | | | | | | | | | | | | |
| WTO: WTO Accession | <p>Tariff reduction</p> <ul style="list-style-type: none"> - An average 60% cut from the 2001 tariff level during 2002-2007 <p>Agricultural trade liberalization</p> <ul style="list-style-type: none"> - Quota restriction (10 billion yuan, 1997) <table style="margin-left: 40px; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Initial quota in 2001</th> <th style="text-align: center;">Annual percent growth rate of quota</th> </tr> </thead> <tbody> <tr> <td>Rice</td> <td style="text-align: center;">1.073</td> <td style="text-align: center;">26.4</td> </tr> <tr> <td>Wheat</td> <td style="text-align: center;">1.252</td> <td style="text-align: center;">10.5</td> </tr> <tr> <td>Corn</td> <td style="text-align: center;">0.374</td> <td style="text-align: center;">18.0</td> </tr> <tr> <td>Cotton</td> <td style="text-align: center;">1.153</td> <td style="text-align: center;">4.5</td> </tr> <tr> <td>Wool</td> <td style="text-align: center;">0.665</td> <td style="text-align: center;">6.5</td> </tr> <tr> <td>Vegetable Oil</td> <td style="text-align: center;">3.706</td> <td style="text-align: center;">27.0</td> </tr> <tr> <td>Sugar</td> <td style="text-align: center;">0.408</td> <td style="text-align: center;">7.6</td> </tr> </tbody> </table> <ul style="list-style-type: none"> - Tariff cut for other agricultural goods - Elimination of export subsidies for corn and cotton <p>Phase-out of MFA</p> <ul style="list-style-type: none"> - Acceleration of MFA quota growth rate from 2002-2004 - Zero export tax of textile and apparel in 2005 | | Initial quota in 2001 | Annual percent growth rate of quota | Rice | 1.073 | 26.4 | Wheat | 1.252 | 10.5 | Corn | 0.374 | 18.0 | Cotton | 1.153 | 4.5 | Wool | 0.665 | 6.5 | Vegetable Oil | 3.706 | 27.0 | Sugar | 0.408 | 7.6 |
| | Initial quota in 2001 | Annual percent growth rate of quota | | | | | | | | | | | | | | | | | | | | | | | |
| Rice | 1.073 | 26.4 | | | | | | | | | | | | | | | | | | | | | | | |
| Wheat | 1.252 | 10.5 | | | | | | | | | | | | | | | | | | | | | | | |
| Corn | 0.374 | 18.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Cotton | 1.153 | 4.5 | | | | | | | | | | | | | | | | | | | | | | | |
| Wool | 0.665 | 6.5 | | | | | | | | | | | | | | | | | | | | | | | |
| Vegetable Oil | 3.706 | 27.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Sugar | 0.408 | 7.6 | | | | | | | | | | | | | | | | | | | | | | | |
| WTO-L | TRANS + LAND + WTO | | | | | | | | | | | | | | | | | | | | | | | | |

System (HS) tariff schedules for the period of 2002-2007 and weighted by 1997 ordinary trade data. The quota control system is introduced for rice, wheat, corn, cotton, wool, vegetable oil, and sugar and the growth rate of their quotas is accelerated during the simulation period. Textile and clothing quotas on exports to North America and European markets are phased out completely by 2007. Following Francois and Spinanger (2004), we model the impact of service sector liberalization as halving the barriers to services trade. We also introduce a 20 percent productivity boost for the automobile sector to reflect the efficiency gain from industrial restructuring and realization of economic scale in this sector after the PRC's WTO accession (Francois and Spinanger 2004). As noted above, we implement this accession scenario in two different ways: first, in conjunction with labor market reforms (WTO-L) and second, in their absence (WTO). By comparing these two outcomes we are able to assess the potential interaction between labor and product market reforms.

V. SIMULATION RESULTS

A. Labor Market Reforms

1. Aggregate Results

The aggregate results from these simulations are reported in Table 5. We begin by focusing on the factor market reforms. Here, we are interested in the extent to which these reforms have comparable qualitative effects on key macroeconomic variables. To the extent that these effects are the same, the relative size of each of their incremental impacts is explored, as a means of assessing the relative importance of each of these factor market distortions.

Table 5 shows labor migration. It is evident that both factor market reforms serve to increase migration from the relatively low-productivity agricultural sector, to the higher-productivity nonagricultural sectors; and from the rural to the urban economies. In the case of land reform, 10.7 million additional workers leave agriculture when they are permitted to rent their land out, as opposed to simply leaving it behind (LAND scenario in Table 5). These individuals migrate to the off-farm rural labor market, which in turn precipitates an additional 7.9 million temporary rural migrants moving to the urban sector in order to equalize rural and urban wages, net of transaction costs. The high ratio of rural-urban to off-farm migration indicates that the rural nonfarm economy has a limited capacity to absorb these additional workers. The release of workers from agriculture tends to depress wages in the rural, nonfarm economy, where wages fall by 8.9 percent in the case of land reform. (All price changes are relative to the numeraire, which is foreign exchange.) This wage drop plays a role in dampening out-migration from agriculture.

Urban unskilled wages are linked to rural wages via the equilibrium condition that the rural wage plus transaction costs for the marginal migrant must equal the urban wage. Recall that specification of transaction costs is increasing in total migration under the hypothesis that the new migrants had not previously pursued urban employment due to an excess of costs over expected benefits. Therefore, their migration results in higher indirect transaction costs at the margin. However, with rural wages falling and the transaction costs rising in both relative and absolute terms, the decline in urban wages is smaller than that for rural wages.

TABLE 5
IMPLICATIONS OF THE PRC'S REFORMS IN 2007 (PERCENT CHANGE RELATIVE TO BASELINE)

| | INCREMENTAL EFFECTS | | | | CUMULATIVE LABOR MARKET REFORMS | CUMULATIVE LABOR AND WTO REFORMS |
|---|----------------------|--------|-------------|--------|--|---|
| | LABOR MARKET REFORMS | | WTO REFORMS | | | |
| | TRANS | LAND | WTO | WTO-L | | |
| Macroeconomic Variables | | | | | | |
| Welfare (EV) | 1.3 | 0.5 | 0.7 | 0.6 | 1.8 | 2.4 |
| GDP | 1.4 | 0.6 | 0.6 | 0.5 | 2.1 | 2.6 |
| Consumption | 1.6 | -0.6 | 1.0 | 1.0 | 1.0 | 2.0 |
| Investment | 2.7 | 2.0 | 0.4 | 0.3 | 4.8 | 5.1 |
| Exports | 1.8 | 1.5 | 14.9 | 15.1 | 3.3 | 18.9 |
| Imports | 1.6 | 1.2 | 14.2 | 14.3 | 2.8 | 17.6 |
| Factor Prices | | | | | | |
| Capital returns | -0.4 | -0.4 | -0.5 | -0.4 | -0.8 | -1.2 |
| Unskilled wages | | | | | | |
| Urban | -9.8 | -8.4 | -0.3 | -0.3 | -17.3 | -17.6 |
| Rural nonagricultural | 12.3 | -8.9 | -0.3 | -0.3 | 2.3 | 2.0 |
| Agricultural | 2.8 | -12.5 | -0.8 | -0.8 | -10.0 | -10.8 |
| without land return | 4.0 | 19.4 | 0.2 | -0.8 | 24.2 | 23.2 |
| Semiskilled wages | | | | | | |
| Urban | -4.5 | -2.7 | 0.4 | 0.4 | -7.1 | -6.7 |
| Rural nonagricultural | 18.5 | -3.2 | 0.3 | 0.4 | 14.7 | 15.2 |
| Agricultural | 7.3 | -7.3 | -0.3 | -0.3 | -0.5 | -0.8 |
| without land return | 9.8 | 20.7 | 0.8 | -0.3 | 32.5 | 32.1 |
| Skilled wages | | | | | | |
| Urban | 3.2 | 1.1 | 1.0 | 0.9 | 4.3 | 5.2 |
| Rural nonagricultural | 3.2 | 1.1 | 1.0 | 0.9 | 4.3 | 5.2 |
| Agricultural | 3.3 | -1.7 | 0.3 | 0.1 | 1.6 | 1.7 |
| without land return | 4.0 | 16.7 | 1.0 | 0.1 | 21.4 | 21.6 |
| Inequality Measurement^a | | | | | | |
| Urban/rural income ratio | -0.169 | -0.150 | 0.013 | 0.028 | -0.319 | -0.291 |
| Gini | -0.014 | -0.011 | 0.001 | 0.002 | -0.025 | -0.023 |
| Urban | 0.005 | 0.005 | 0.000 | 0.000 | 0.011 | 0.011 |
| Rural | 0.002 | 0.000 | 0.000 | -0.000 | 0.003 | 0.002 |
| Transaction Costs | | | | | | |
| Unskilled | -47.3 | -6.8 | 0.1 | 0.1 | -50.9 | -50.9 |
| Semiskilled | -43.6 | -1.5 | 0.6 | 0.6 | -44.5 | -44.2 |
| Labor Migration (millions) | | | | | | |
| Off-farm labor | 3.1 | 10.1 | 1.6 | 1.5 | 13.2 | 14.7 |
| Rural-Urban | 26.8 | 7.9 | 1.2 | 1.3 | 34.7 | 36.0 |
| Unskilled | 9.1 | 2.7 | 0.3 | 0.4 | 11.7 | 12.1 |
| Semiskilled | 17.8 | 5.0 | 0.9 | 0.9 | 22.7 | 23.6 |
| Skilled | 0.0 | 0.2 | 0.1 | 0.1 | 0.2 | 0.3 |
| Labor Migration (percent) | | | | | | |
| Off-farm labor | 2.2 | 7.0 | 1.1 | 1.0 | 9.3 | 10.4 |
| Rural-Urban | 38.1 | 8.1 | 1.8 | 1.3 | 49.3 | 51.2 |
| Unskilled | 31.4 | 7.1 | 1.1 | 1.0 | 40.6 | 42.0 |
| Semiskilled | 49.4 | 9.3 | 2.4 | 1.5 | 63.3 | 65.7 |
| Skilled | -0.2 | 3.9 | 1.1 | 1.1 | 3.7 | 4.8 |

^aChange of original value, not percent change.

Source: Simulation results.

Off-farm, semi-skilled wages fall by a lesser amount than their unskilled counterparts. While the agricultural labor force accounts for two-thirds of the total unskilled labor force in the PRC, it accounts for less than half of the semi-skilled labor force. So the additional release of workers from farming has less of an impact on wages for this worker category. As a result, semiskilled labor shows the largest absolute as well as percentage increases in migration. Skilled wages actually rise, as there is almost no skilled labor employed in the agricultural sector, and the ensuing increase in nonagricultural activity, relative to the baseline, boosts the demand for skilled workers, who are also not subject to hukou restrictions.

While the LAND reform scenario focuses on the barriers to off-farm mobility of labor, the TRANS scenario focuses on rural-urban migration. When the transaction costs associated with temporary migration are reduced due to elimination of the hukou system, rural-urban migration expands by 26.8 million workers. Since the transaction costs associated with temporary rural-urban migration operate like a tax on rural labor, the first effect of their reduction is to increase the supply of rural labor to the urban economy, thereby boosting rural wages and depressing urban wages. This represents a redistribution of the rents associated with the hukou system from urban to rural households. In addition, by raising rural wages, this hukou reform scenario also draws some additional labor out of agriculture, although this aspect of migration (3.1 million workers) is much more modest than under the LAND scenario.

Consistent with the empirical evidence (e.g., Wang and Kalirajan 2002), the simulation results suggest that economic efficiency could be improved through institutional reform in the factor markets aimed at improving rural-urban labor mobility. Aggregate GDP, as well as economic welfare, measured by the sum of the Equivalent Variations (EV) for all households, rise in both factor market reform scenarios. This is due to the fact that these reforms result in the movement of labor from relatively low productivity sectors (agriculture and rural nonfarm employment), into higher productivity activities (rural nonfarm work and urban employment, respectively). This tends to boost all of the macroeconomic aggregates, with the exception of consumption in the LAND scenario. In this case, the higher agricultural and food prices result in higher composite consumption price, relative to that of investment goods, thereby leading to a decline in real aggregate consumption.

The question of income distribution is central to this paper and several measures of inequality are reported (Table 5). The first is the urban-rural income ratio. This declines in all the labor market reform scenarios, as income is redistributed from urban to rural households. In the case of the transaction cost scenario, for example, this ratio declines from 2.59 to 2.42, which amounts to 0.17 points. The decline for LAND is comparable (0.150 points). When combined, these measures result in a very substantial decline in rural-urban inequality, bringing the projected 2007 urban-rural income ratio down from 2.59 to 2.27.

The second measure that Table 5 reports is the absolute change in several Gini coefficients. Since rural households benefit relative to urban households, and rural households are much poorer than their urban counterparts, it is hardly surprising that the national Gini coefficient for the PRC also falls under the two labor reform scenarios. On the other hand, the Gini coefficients *within* the urban and rural populations show a slight increase in inequality. This is most pronounced in the urban areas, where the low-income, unskilled labor-dependent urban households are hurt most by labor market reforms. In order to better understand what is driving these changes in urban and rural inequality, we turn to Table 6, which reports the change in welfare for representative households across the income spectrum in each of the five strata.

2. Disaggregate Results

The first set of results in Table 6 reports the impact of hukou reform (reduced transaction costs) on disaggregated household groups in urban and rural areas. It is clear from this table that the largest benefits accrue to the diversified rural households. These are the households supplying temporary migrant labor to urban areas. They bear the direct burden of the associated transaction costs. When the hukou system is reformed, they are the ones who benefit most directly. The agriculture-specialized households also benefit from the rise in rural wages—although their welfare gains are somewhat less, as these wages gains are incompletely transmitted from the nonfarm to farm sectors. While the benefits from hukou reform are spread relatively evenly across income levels within each of the rural strata, the higher income households—both within the diversified and agricultural strata—tend to experience larger proportionate gains, thereby contributing to the increase in the Gini coefficient within the rural sector.

Turning to the urban households in Table 6, we see welfare losses for all but the richest labor-specialized households. They suffer from the influx of additional unskilled and semi-skilled rural migrants. The impacts on the transfer-specialized households is quite small and of mixed signs. Overall, the urban index of income inequality worsens somewhat. However, the increases in the within-sector Gini indexes for the rural and urban sectors are overwhelmed by the reduction in between-sector, rural-urban inequality, so that the national Gini index for the country falls by 0.014. This is a substantial movement in an index that is generally quite robust to policy reforms.

The next set of results in Table 6 report the disaggregated household impacts of land reform. In contrast to the previous experiment, we now see the largest gains accruing to the agriculture-specialized, rural households. These are the households that are currently constrained to remain active on the farm if they wish to retain rights to their land. By permitting some of these households to rent the land and migrate to the city if they wish to do so, land market reform raises the shadow value of the labor remaining in agriculture very substantially across all income levels. The diversified rural households also gain, with some of the highest gains coming at the lowest income levels, where households are more heavily reliant on income from agriculture. Overall, the rural Gini index is hardly changed (Table 5).

Urban household welfare falls across the board in this experiment and it falls most for the poorest households. This is due to the large boost to rural-urban migration of unskilled and semi-skilled labor (recall Table 5) as well as the increase in food prices following the reduction in agricultural labor force. As a consequence the urban Gini index rises. However, from the point of view of overall inequality in the PRC, the main consequence of this experiment is to redistribute income from urban to rural households and this lowers the Gini index by 0.011.

3. Cumulative Effects of Labor Market Reforms

The combined impact of both factor market reforms on the macroeconomic performance of the PRC economy in 2007 is also reported in Table 5. From these results, it is clear that such reforms could be potentially quite significant. Overall GDP is 2.1 percent higher and aggregate welfare, measured by the summation of household EVs is 1.8 percent greater in 2007. Most striking is the impact on relative rural and urban incomes. In 2007, the ratio of urban to rural incomes drops from 2.59 in the baseline to 2.27 in the labor market reform scenario.

TABLE 6
INCREMENTAL HOUSEHOLD IMPACTS OF LABOR MARKET REFORMS
(EV AS PERCENT OF HOUSEHOLDS INCOME, 2007)

| VINGTILE (POOREST =1) | URBAN | | | RURAL | |
|--------------------------|----------------------|-------------------|-------------|-------------------------|-------------|
| | TRANSFER-SPECIALIZED | LABOR-SPECIALIZED | DIVERSIFIED | AGRICULTURE-SPECIALIZED | DIVERSIFIED |
| Scenario: TRANS | | | | | |
| 1 | -1.20 | -5.36 | -4.76 | 3.11 | 4.98 |
| 2 | -1.03 | -4.57 | -4.08 | 3.54 | 5.31 |
| 3 | -0.94 | -3.20 | -3.69 | 3.78 | 5.42 |
| 4 | -0.90 | -4.31 | -3.90 | 3.97 | 5.44 |
| 5 | -0.91 | -3.54 | -3.06 | 3.96 | 5.57 |
| 6 | -0.76 | -2.80 | -3.65 | 4.09 | 5.81 |
| 7 | -0.68 | -2.70 | -2.91 | 4.27 | 5.73 |
| 8 | -0.46 | -3.06 | -2.82 | 4.07 | 5.95 |
| 9 | -0.66 | -2.20 | -2.59 | 4.00 | 6.03 |
| 10 | -0.77 | -1.93 | -2.23 | 3.97 | 6.36 |
| 11 | -0.66 | -2.11 | -2.15 | 4.02 | 6.35 |
| 12 | -0.45 | -1.86 | -2.16 | 4.26 | 6.34 |
| 13 | -0.65 | -1.27 | -2.09 | 4.18 | 6.19 |
| 14 | -0.46 | -1.88 | -1.65 | 4.52 | 6.33 |
| 15 | -0.61 | -1.53 | -1.63 | 4.03 | 6.51 |
| 16 | -0.63 | -0.94 | -1.94 | 4.31 | 6.43 |
| 17 | | -1.90 | -1.28 | 4.64 | 6.91 |
| 18 | 0.00 | -1.05 | -0.89 | 4.43 | 6.61 |
| 19 | -0.32 | -0.73 | -1.36 | 4.30 | 6.57 |
| 20 | 0.00 | 0.07 | -0.79 | 4.59 | 6.46 |
| Scenario: LAND | | | | | |
| 1 | -2.76 | -5.95 | -5.48 | 6.76 | 1.47 |
| 2 | -3.00 | -5.13 | -4.80 | 7.69 | 1.76 |
| 3 | -2.73 | -4.34 | -4.71 | 8.07 | 2.01 |
| 4 | -2.78 | -4.97 | -4.77 | 8.69 | 1.76 |
| 5 | -2.94 | -4.42 | -4.09 | 8.49 | 1.86 |
| 6 | -2.63 | -3.95 | -4.54 | 8.70 | 1.42 |
| 7 | -2.61 | -3.83 | -4.05 | 9.31 | 1.20 |
| 8 | -1.62 | -3.95 | -3.89 | 8.95 | 1.30 |
| 9 | -2.28 | -3.46 | -3.80 | 8.79 | 1.26 |
| 10 | -2.45 | -3.40 | -3.50 | 8.62 | 0.53 |
| 11 | -2.29 | -3.35 | -3.39 | 8.79 | 0.73 |
| 12 | -1.88 | -3.13 | -3.39 | 9.31 | 0.39 |
| 13 | -2.07 | -2.86 | -3.22 | 9.18 | 0.80 |
| 14 | -1.91 | -3.07 | -2.92 | 10.03 | 1.03 |
| 15 | -1.80 | -2.89 | -2.83 | 8.59 | 0.34 |
| 16 | -1.66 | -2.60 | -2.85 | 9.37 | 0.62 |
| 17 | | -2.91 | -2.49 | 10.33 | 0.44 |
| 18 | -0.40 | -2.27 | -2.25 | 9.61 | 0.43 |
| 19 | -1.18 | -2.13 | -2.23 | 9.13 | 1.03 |
| 20 | 0.00 | -1.49 | -1.27 | 10.15 | 2.67 |

Source: Simulation results.

Figures 1 and 2 show the cumulative effect of labor market reform on disaggregate urban and rural household welfare. Here, the potential redistribution of welfare is quite striking. The equivalent variation for agriculture-specialized rural households is between 10 and 16 percent of initial income. Other rural households also benefit significantly from these reforms. In contrast, urban household welfare falls by as much as 11 percent of initial income for the poorest urban households (apart from those reliant on transfer payments, which are somewhat insulated from these reforms). It is clear that the main impact of the restrictive factor market policies has been to boost urban household welfare at the expense of rural household welfare—particularly those employed in agriculture.

FIGURE 1
CUMULATIVE IMPACT OF LABOR MARKET REFORMS ON URBAN HOUSEHOLDS

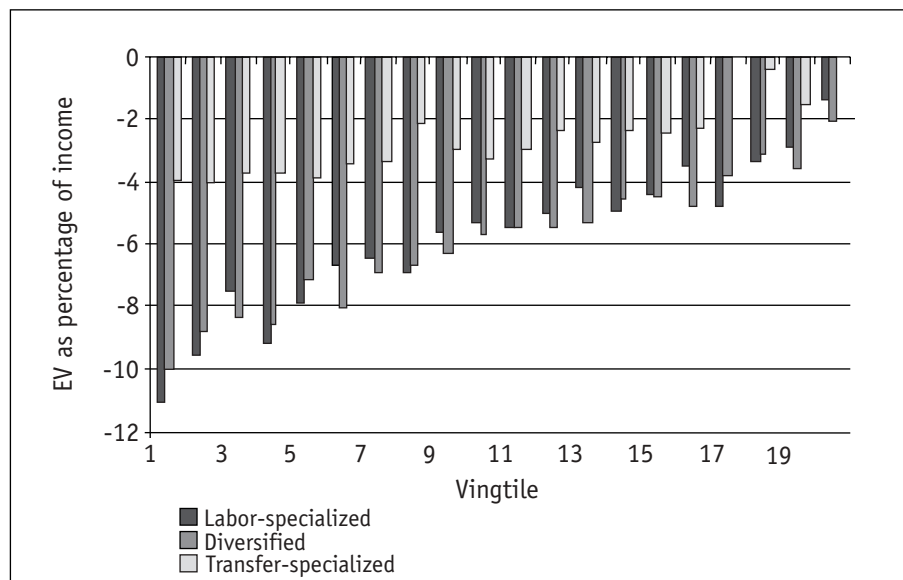
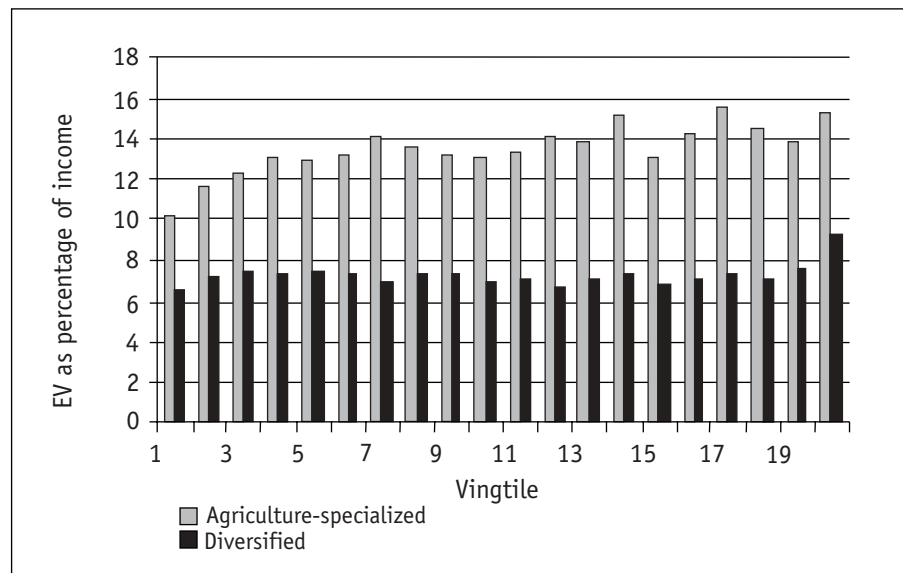


FIGURE 2
CUMULATIVE IMPACT OF LABOR MARKET REFORMS ON RURAL HOUSEHOLDS



B. Impacts of WTO Accession and Interactions with Labor Market Reforms

Turning to the issue of product market reform, more specifically the PRC's accession to the WTO, to assess the way in which labor market reforms might interact with WTO accession, we perform two experiments. The first involves WTO accession in the absence of labor market reforms (experiment WTO), while the second evaluates the impact in the presence of labor market reforms (WTO-L). The macroeconomic results from this experiment are reported in Table 5 as well, in terms of deviations from the baseline simulation in the year 2007 when WTO accession is scheduled to be complete.

Let us begin with the changes in factor prices, where skilled wages rise more than semiskilled wages, which in turn rise more than unskilled wages that actually fall, relative to the numeraire (price of foreign exchange). The relatively greater increase in skilled wages is fueled by the tendency for the manufacturing and services sectors to expand at the expense of agriculture. The former sectors are relatively intensive in the use of skilled and semiskilled labor, thereby boosting wages for these factors, relative to unskilled wages. The decline in agricultural profitability and the accompanying expansion of urban activity gives rise to additional out-migration from agriculture, along with increased temporary migration of 1.2 million workers (experiment WTO) so that the rural wage is once again equated to the urban wage, less the direct and indirect costs associated with migration. In the case of WTO-L, the migration response is greater (1.3 million workers), due to the lesser transaction costs and the higher degree of labor mobility out of agriculture.

Turning to the real GDP and welfare effects of WTO accession, in the absence of labor market reform, these both increase by 0.6 and 0.7 percent respectively, while consumption increases by more, and investment by less than this amount. The reduction in trade barriers gives a substantial boost to trade in the PRC, with both exports and imports rising by 15 percent. By reducing the distortion between world prices and domestic prices, it is hardly surprising that accession boosts welfare. However, there is a secondary welfare increase that comes from the interaction of accession with the existing factor market distortions. In the absence of factor market reforms, labor productivity in agriculture is much lower than that in nonagriculture rural industry, which is in turn lower than urban labor productivity. Therefore, any policy action that shifts some labor from the low productivity activities into higher productivity sectors will benefit aggregate efficiency. This is a classic second best effect and is moderated when factor market reforms precede WTO accession.

In the WTO-L scenario, the productivity differential across sectors is smaller, and so the second best effect is also smaller. Consequently, the GDP and welfare gains are smaller under WTO-L (0.5 and 0.6 percent respectively) than under the WTO scenario. Of course the *combined impact* of factor market reforms and WTO accession give far greater gains than WTO accession alone. As this is more nearly a first-best outcome, many distortions still remain.

Table 7 reports the disaggregated household impacts of the two WTO accession scenarios. These results show that the incremental effects of WTO accession in the presence of factor market reforms tend to benefit the urban households more, and the rural households somewhat less, than WTO accession in the absence of such reforms. However, such interaction effects are overwhelmed by the direct effect of factor market reforms on rural-urban inequality. This can be seen in the final column of Table 5, which reports the cumulative effect of WTO accession and labor market reforms together, relative to the baseline in 2007. In spite of the modest boost to the urban/rural income ratio following WTO accession, this measure of inequality drops dramatically when combined with factor market reforms.

TABLE 7
INCREMENTAL HOUSEHOLD IMPACTS OF WTO ACCESSION IN THE ABSENCE OF AND IN THE PRESENCE
OF LABOR MARKET REFORMS IN THE PRC
(EV AS PERCENT OF HOUSEHOLD INCOME, 2007)

| VINGTILE (POOREST =1) | URBAN | | | RURAL | |
|--------------------------|----------------------|-------------------|-------------|-------------------------|-------------|
| | TRANSFER-SPECIALIZED | LABOR-SPECIALIZED | DIVERSIFIED | AGRICULTURE-SPECIALIZED | DIVERSIFIED |
| Scenario: WTO-L | | | | | |
| 1 | 0.15 | 1.61 | 1.42 | 0.07 | 0.28 |
| 2 | 0.01 | 1.74 | 1.59 | 0.01 | 0.28 |
| 3 | 0.03 | 1.83 | 1.60 | -0.12 | 0.30 |
| 4 | -0.04 | 1.82 | 1.45 | -0.20 | 0.30 |
| 5 | -0.05 | 1.76 | 1.55 | -0.12 | 0.30 |
| 6 | 0.01 | 1.84 | 1.38 | -0.15 | 0.34 |
| 7 | 0.00 | 1.90 | 1.61 | -0.22 | 0.38 |
| 8 | 0.00 | 1.88 | 1.68 | 0.00 | 0.34 |
| 9 | 0.00 | 1.94 | 1.58 | -0.13 | 0.32 |
| 10 | -0.14 | 2.07 | 1.58 | -0.08 | 0.40 |
| 11 | -0.06 | 1.94 | 1.53 | -0.18 | 0.36 |
| 12 | -0.06 | 1.95 | 1.53 | -0.17 | 0.38 |
| 13 | -0.04 | 1.96 | 1.52 | -0.19 | 0.35 |
| 14 | 0.53 | 1.94 | 1.46 | -0.16 | 0.38 |
| 15 | 0.00 | 2.02 | 1.56 | -0.18 | 0.41 |
| 16 | 0.03 | 1.95 | 1.44 | 0.13 | 0.38 |
| 17 | | 1.83 | 1.32 | 0.18 | 0.46 |
| 18 | 0.14 | 1.85 | 1.43 | 0.04 | 0.35 |
| 19 | -0.14 | 1.93 | 1.21 | -0.16 | 0.30 |
| 20 | 0.00 | 1.86 | 0.67 | -0.15 | 0.24 |
| Scenario: WTO | | | | | |
| 1 | -0.16 | 1.21 | 1.03 | 0.49 | 0.45 |
| 2 | -0.39 | 1.38 | 1.23 | 0.49 | 0.49 |
| 3 | -0.33 | 1.48 | 1.25 | 0.40 | 0.52 |
| 4 | -0.42 | 1.46 | 1.08 | 0.36 | 0.50 |
| 5 | -0.47 | 1.42 | 1.22 | 0.43 | 0.52 |
| 6 | -0.36 | 1.53 | 1.02 | 0.42 | 0.53 |
| 7 | -0.38 | 1.59 | 1.28 | 0.39 | 0.56 |
| 8 | -0.22 | 1.58 | 1.36 | 0.59 | 0.53 |
| 9 | -0.32 | 1.65 | 1.26 | 0.44 | 0.51 |
| 10 | -0.49 | 1.79 | 1.27 | 0.48 | 0.54 |
| 11 | -0.39 | 1.66 | 1.23 | 0.39 | 0.53 |
| 12 | -0.34 | 1.68 | 1.23 | 0.44 | 0.52 |
| 13 | -0.32 | 1.71 | 1.23 | 0.42 | 0.52 |
| 14 | 0.31 | 1.67 | 1.18 | 0.50 | 0.56 |
| 15 | -0.24 | 1.77 | 1.29 | 0.39 | 0.55 |
| 16 | -0.18 | 1.70 | 1.17 | 0.73 | 0.54 |
| 17 | | 1.58 | 1.06 | 0.86 | 0.61 |
| 18 | 0.07 | 1.63 | 1.18 | 0.70 | 0.51 |
| 19 | -0.33 | 1.71 | 0.97 | 0.46 | 0.50 |
| 20 | 0.00 | 1.67 | 0.47 | 0.55 | 0.52 |

Source: Simulation results.

VI. CONCLUSIONS

This paper has utilized a household-disaggregated, recursively dynamic CGE model of the PRC economy to evaluate the impact of two key factor market distortions in the PRC on rural-urban inequality and income distribution. The factor market imperfections considered include: (i) the hukou system of rural and urban household registration that has supported significant differences in rural and urban wages and has contributed to the existence of nearly 100 million temporary migrant workers in the PRC, and (ii) the absence of a fully functioning land market that would permit existing land owners to rent their land to others and migrate to the city if they found wages there to be more attractive. The paper also explored how these factor market reforms interact with product market reforms currently under way as part of the PRC's WTO accession process.

Creation of a fully functioning land market has a significant impact on rural-urban inequality. This reform permits agricultural households to focus solely on the differential between farm and nonfarm returns to labor in determining whether to work on- or off-farm. This gives rise to an additional 10 million people moving out of agriculture by 2007 and it lends a significant boost to the incomes of those remaining in agriculture. This off-farm migration also contributes to a significant rise in rural-urban migration, thereby lowering urban wages particularly for unskilled workers. As a consequence, rural-urban inequality declines significantly as does the PRC's national Gini coefficient.

Hukou reform is found to have the most significant impact on aggregate economic activity as well as income distribution. We model this as a reduction in the indirect transaction costs currently incurred by temporary migrants. Whereas land market reform primarily benefits the agricultural households, this reform's primary beneficiaries are the rural households currently sending temporary migrants to the city. By reducing the implicit tax on temporary migrants, hukou reform boosts their welfare and contributes to increased rural-urban migration. The combined effect of both factor market reforms is to reduce the urban-rural income ratio dramatically, from 2.59 in 2007 under the baseline scenario to 2.27.

Finally, this paper offered some insight into the potential interactions between labor market reforms and WTO accession. A significant portion of the aggregate gains under WTO accession comes about by moving labor out of agriculture and into relatively higher productivity activities in the manufacturing and service sectors. By reducing this productivity differential across sectors, labor market reforms dilute the gains under WTO accession. When viewed as a combined policy package, however, the value of these reforms is much greater than those available only under WTO accession. Furthermore, rather than increasing inequality in the PRC, the combined impact of WTO accession and labor market reforms significantly reduces rural-urban income inequality. This is an important outcome in an economy currently experiencing historic levels of rural-urban inequality.

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