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The Impact of Migration and Remittances on Rural Incomes in China

Alan de Brauw, J. Edward Taylor, and Scott Rozelle*

Paper Submitted for the 1999 American Agricultural Economics Association Annual Meetings
Nashville, August 8-11, 1999

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* Alan deBrauw is a graduate student, J. Edward Taylor is professor, and Scott Rozelle is associate professor in the Department of Agricultural and Resource Economics, University of California, Davis. Contact address is: Alan de Brauw, Department of Agricultural and Resource Economics, University of California, Davis 95616; debrauw@primal.ucdavis.edu. The authors would like to acknowledge the support of the International Development Research Center, the World Bank, and the Ford Foundation, Beijing, for providing support for the data collection and analysis. Rozelle and Taylor are members of the Giannini Foundation of Agricultural Economics.

The Impact of Migration and Remittances on Rural Incomes in China

The migration of labor out of agriculture is a prominent feature of economic development both historically and at present. The proportion of the labor force employed in agriculture declines as per-capita GDP increases. In present day China, the migration of agricultural labor into other sectors is an important feature of its rapidly developing economy. China's labor force is disproportionately employed in agriculture compared to other countries at similar levels of per-capita GDP. From this day forward, if China would follow the occupational migration pattern of other nations, a 10-percent increase in per-capita GNP could conservatively be expected to decrease the share of the workforce employed in agriculture by 3.1 percentage points (Taylor and Martin, forthcoming). China's recent rapid economic growth has been accompanied by a large increase in the number of people leaving agricultural work for other types of jobs (Rozelle, *et. al.*, 1999). A large portion of those seeking and finding off-farm work are migrants who leave their home area and settle in other parts of the country. But just as important, farmers are also turning to running their own businesses as a way of increasing family income.

As China continues to grow and urbanize, the flow of labor away from farms raises concerns about whether China's rural economy can meet the rising urban demand for food. Simultaneously, slow growth in incomes of those left in China's villages and rising disparities between urban and rural incomes prompts policy makers to become interested in the impact of rural migration on the welfare of those left behind. Chinese officials disagree about the answers to fundamental questions regarding the link between migration and development (World Bank, 1999). What factors motivate migrants to leave? What causes them to remit income back to their rural households? Do remittances compensate rural households and communities for their loss of labor to migration? Does participation in migration raise rural incomes? How does participation

in migration affect different rural income sources? Answers to these questions are vital for understanding the role that migration will play in meeting China's food needs and income objectives.

Most of the current literature offers little insight into these fundamental questions about China's migration for several reasons, but in particular because it focuses on selected impacts of migration in isolation of others. By contrast, the new economics of labor migration (NELM) stresses the complexity of migration as an economic institution, the interrelationship between migration's determinants and impacts, and migrants as members of rural households (Stark, 1991; Taylor and Martin). According to NELM, migration may have multiple and often counteracting impacts on the household production behavior and labor market participation.

In an earlier study (Rozelle, Taylor, de Brauw, 1999), we find that overall migration has a slightly negative impact on maize yields in Northeast Chinese villages, but, controlling for the loss of household labor due to the migrant's move out of the village, remittances from the migrant positively affect yields. Although this work demonstrates that migration can have multiple effects on yield response, it does not take into account the endogeneity of crop or activity choice. As rural families choose to participate in migration, they may alter their activity and crop-production mixes. The present paper extends our previous work by simultaneously examining the impacts of migration and remittances on the diversity of income activities characterizing rural household economies in Northeast China.

I. Productivity Effects and The New Economics of Labor Migration

Stark hypothesizes that migrants play the role of financial intermediaries, enabling rural households to overcome credit and risk constraints on their ability to achieve the transition from familial to commercial production. This hypothesis is illustrated in Figure 1. A household may

invest a fixed resource, \bar{T} (e.g., land or family labor), in either a low-productivity or high-productivity technology, f_i , for $i=0,1$ respectively. An array of household characteristics, Z_Y , shapes income productivity in each of these activities. PP represents the production possibility frontier (PPF). At relative prices p_1/p_0 , the household will specialize in the high-productivity technology, its output will be $Q^* = f_1(\bar{T}, Z_Y)$, and its income will be $Y^*=f_2(Q^*)$.

However, the household may face a market constraint on investing in the high-productivity technology, such that $c(T_1) \leq K$, $c'(T_1) > 0$. In the case of a credit or liquidity constraint, $c(T_1)$ would denote the sunk cost of adopting the high-productivity strategy, and K would represent the household's available credit or liquidity for investing in this technology. Family migrants, M , could contribute to production, and therefore household income, by relaxing the credit constraint through remittances, R , or by easing the risk constraint through remittances or a willingness to remit in the event of an income shock.¹ The potential effect of migration on production constraints, however, is not always positive. Rural households may face a missing or imperfect labor market. By competing for scarce human capital, migration may tighten the constraint on investing in the high-productivity technology.

The NELM theory hypothesizes that $K=\theta(R,M)$. The constrained resource allocation to the high-productivity technology is $T_1^c = \phi(K)$, where $\phi_K > 0$. Constrained output under the high-productivity technology is $Q_1^c = f_1(T_1^c, Z_Y)$, and under the low-income technology it is $Q_0^c = f_0(\bar{T} - T_1^c, Z_Y)$. Constrained household income, Y^c , is given by

$$Y^c = g(Q_1^c, Q_0^c), \tag{1}$$

where $Y^c < Y^*$, the unconstrained income.

¹ Remittances also contribute directly to household income.

Because the signs of θ_R and θ_M both are indeterminate, the impact of migration on productivity is ambiguous. However, where capital, risk, and/or human capital constraints bind, these impacts are not likely to be zero as in the case of a perfect-markets, separable agricultural household model (e.g., Singh, Squire and Strauss, 1986). The finding of a significant impact of migration or remittances on any source of household income would be evidence in support of the new economics of migration. Positive impacts would suggest that migration complements productivity growth in the farm sector by relaxing credit or risk constraints, while negative impacts would suggest that increased migration exacerbates labor shortages.

Few tests of this NELM hypothesis have appeared in the literature; exceptions include Lucas (1987) and Taylor (1992). In the only study on China that indirectly examines these types of linkages, Benjamin and Brandt (1998) find evidence that participation in migration loosens risk constraints on household-farm investments. If migrants play the role of financial intermediaries, as these studies suggest, the *ex-ante* incentive to participate in migration may be large. However, the households' propensity to encourage members to migrate may be mitigated when there are other ways to finance household production investments or if the loss of labor to migration carries costs the household foregone farm yields or self-employed incomes.

II. Methods

If production is constrained and migration, M , and remittances, R , are important in shaping production constraints, the constrained vector of income sources, \mathbf{Y}^c , depends on M and R . Because migration and remittances may affect different types of household production in different ways, we define household income sources as farm income, Y_f , self-employed income,

Y_s , and other income, Y_o . The sum of these three income sources equals total household income.²

The core equation of our model, then, is:

$$Y^c = \gamma_0 + \gamma_1 M + \gamma_2 R + \gamma_3 Z_Y + \varepsilon_Y. \quad (2)$$

The null hypothesis associated with the new economics of migration is that neither migration nor remittances affect income; i.e., $\gamma_1, \gamma_2 = 0$. Remittances are produced by allocating family members to labor migration; given migration, they are shaped by human capital and household characteristics affecting migrants' success and/or motivations to remit:

$$R = \alpha_0 + \alpha_1 M + \alpha_2 Z_R + \varepsilon_R. \quad (3)$$

Migration is represented in reduced form as:

$$M = \beta_0 + \beta_1 Z_M + \varepsilon_M. \quad (4)$$

Equations (2) through (4) constitute a recursive system. However, migration and remittances are endogenously determined along with income sources (as in equation 2). To statistically control for this endogeneity, we need to find a set of instruments to identify these effects. We postulate that in addition to human capital variables, migration, M , is a function of networks. Given migration, motivations to remit, R , are complex. Here again, in addition to human capital variables, migrants may be influenced by some norm in the source village (which could be measured as the propensity for the average household in the village to remit).³

² In our sample of Chinese households (below), self-employed income includes income from all family self-employed activities, orchards, greenhouses, and fishponds. Other income includes all income not gained through farming, self-employed activities, or migration; major sources include off-farm wages and pensions.

³ The migration history of the village (a community-level measure of the proportion of the village labor force out-migrating in 1988) and the education level of the most educated person in the household are used to identify the migration equation (equation 4). The average remittances of all households in the village (a community-level variable that is a proxy for the local remittance norm) is used to identify the remittance equation (equation 3). A Wu-Hausman-Durbin test demonstrates that our instruments explain migration and remittances but are exogenous to each income source, at the 0.01 significance level.

The stochastic terms ε_i , $i=Y_f, Y_s, Y_o, R, M$, are assumed to be normally and independently distributed with variance σ_i^2 . However, it is likely that there is cross-equation correlation, since all of these activities may be subject to the same stochastic shocks. To account for contemporaneous correlation, we estimate the model using iterative three-stage least squares.⁴

The variables Z_i , $i=Y_f, Y_s, Y_o, R, M$, include household demographic, human capital, and physical capital variables. An extensive literature finds evidence of returns to schooling and other human capital in crop production (Jamison and Lau) and in migration (Taylor and Martin). Human capital measures include the education level, in years, and experience level of the household head. Given our household focus, we also include the years of education of the most educated person in the household.

Variables hypothesized to affect farm incomes in a constrained model include lagged agricultural assets and grain inventory, and the amount of land irrigated in the village. Self-employed income is thought to be affected by non-farm enterprise capital and inventory in the previous period. Village population, the proportion of village workforce in enterprises, and the percentage of GVP from industry are included in the income equations to control for differing village economic conditions. All equations include regional fixed-effects variables.

III. Data

Our empirical analysis is based on a survey of 787 farm households from 31 villages in Hebei and Liaoning Provinces in the northeast part of China, conducted by one of the authors (Rozelle) in summer 1995. The survey collected detailed information on household characteristics and wealth, agricultural production, and non-farm activities. Almost all of the households farmed;

⁴ We also estimated the model using procedures to correct for possible sample selectivity bias, and found the same general results.

404 of the households also generated income through self-employed activities. Many of the households had off-farm wages, pensions, or other sources of income; this income is classified as "other" for the purposes of this study.

Migrants were identified from the household survey as either children of the household head who left the household to work or household members who left the household to work for at least three months during the year. Of the 787 households in the survey, 134 sent at least one household member into the migrant labor force. Of the 134 migrant households, 97 received remittances from the household's migrants. Village-level variables were constructed using data from a community-level survey of the same 31 villages, conducted by the authors in 1996. These variables were used to capture many of the intrinsic economic differences between villages as well as the two instrumental variables discussed above.

IV. Findings

Table 1 reports our econometric results. The direct effect of migration on farm income is negative but insignificant. However, the effect on self-employed income is negative and significant (columns 3-4, row 1). Self-employment income falls sharply when a migrant leaves the household. The negative impact of migration on non-remittance income is consistent with a lost labor effect predicted by the NELM. When the worker endowed with the most human capital leaves the household, self-employed production suffers, at least in the short run. If there were no offsetting effects, policy makers monitoring the disparity between urban and rural incomes would have reason to be quite concerned.

However, our regression results also show that remittances have a significant, positive effect on both farm and self-employed income. An additional yuan remitted increases farm income by 2.02 yuan and self-employed income by 4.09 yuan (columns 3-4, row 2). Remittances are a

positive function of migration (column 2, row 1), so each additional migrant is associated with a 326 yuan increase in remittance income.⁵ Migration, therefore, has a significant, positive effect on both farm and self-employment income, through its injection of remittances into the household-farm economy. Such results should caution researchers and policy analysts from drawing implications from work that does not account for the complexities of migration and remittance effects on rural economies. Our results support the NELM hypothesis that migrant remittances loosen constraints on household production, in this case stimulating productivity. These results are remarkably consistent with our previous findings, that migration and remittances have nearly offsetting impacts on maize yields (Rozelle, Taylor, de Brauw).

To calculate the total effect of migration on household incomes, we can take the total derivative of household income with respect to migration, using the chain rule:

$$\frac{dY}{dM} = \frac{\partial R}{\partial M} + \sum_j \left(\frac{\partial Y_j}{\partial M} + \frac{\partial Y_j}{\partial R} \frac{\partial R}{\partial M} \right), \quad (5)$$

where j=farm, self-employed, and other. Calculating the above derivative using significant coefficients for an average household with both farm and self-employed income, the total effect of migration on household income is negative (-5970 yuan). However, for households without self-employment income, the total effect of migration on household income is significant and positive (984 yuan). When considered in per-capita terms, the negative effect on self-employed income is dampened somewhat, although it still exists.⁶

There are several possible explanations for households' participation in migration despite a negative impact on total income. Most likely, households that participate in migration invest

⁵ The coefficients on M and R are insignificant for "other" income (column 5, rows 1-2), indicating that migration mainly affects farming and self-employed incomes.

⁶ For a hypothetical household with four members prior to migration, and the mean per-capita income of 3448 yuan, the household will experience a 27.3% decline in per-capita income.

remittances in capital for self-employed activities, potentially to realize these incomes when the migrants return in a few years. This explanation would be consistent with observations by Feng (1999), who finds that migrants in Shanghai plan to return home after an average of four years. In developed countries, individuals often invest money and labor in unprofitable enterprises, provided that they perceive a promise of high future returns. A fundamental difference between developed-country and rural Chinese “investors” is that, lacking access to credit, the latter must first allocate labor to migration in order to obtain capital to invest in self-employment activities. The collection of future longitudinal data, which we are planning, is essential to test the hypothesis that, in rural China, as elsewhere (Lucas; Taylor), migration has positive long-term effects on non-remittance incomes and productivity in rural areas.

Other findings are consistent with the NELM hypothesis. Controlling for wealth, the coefficient on land per capita in the migration equation is positive. In rural China, given imperfections in land and capital markets, households with more land are likely to be more capital constrained in crop production. The proxy variable for wealth, the value of all non-productive assets, has a negative effect on migration, which is consistent with the hypothesis that wealthy households are able to overcome liquidity and risk constraints on production without participating in migration. Capital endowments positively affect both farm and self-employed income, both on the household and village level. Households with more agricultural assets and more irrigated land tend to have higher farm incomes; wealthier households, and households in wealthier villages, as measured by the industrial share of GVP, tend to have higher self-employed incomes. Finally, households in villages with stronger migration networks tend to send more migrants, and remittances tend to be larger in villages with larger remittance norms, as we would expect.

V. Conclusions

In this paper we have explored the complex linkages among migration, remittances, farm incomes, and self-employed incomes in rural China. Although migration appears to negatively affect self-employed incomes through labor constraints, remittances offset some of this negative impact on self-employed income, and have a positive impact on farm income. Migration significantly increases income in households without self-employment, but has a negative impact on total income in households with both farm and self-employed income. These households are most likely investing remittances in self-employed activities that may not be profitable in the short run to realize higher incomes in the near future. Imperfections in capital or insurance markets (or institutions) provide households with a motivation to migrate as part of a dynamic strategy to invest in new non-agricultural ventures.

In the case of Northeast China, the policy tension facing national leaders is whether or not the resulting rise in welfare of farm households, an increasingly important national objective, is sufficient to offset falling grain production. Even if migration contributes to falling grain production, as our previous work indicates, migration is positively affecting incomes for households without self-employed activities, and it may be a catalyst for income growth in self-employed activities in the longer run. Households face a labor constraint when their members migrate from the village, and they face a capital constraint, which likely encourages them to participate in migration in order to expand their businesses. Providing households with credit by reforming the formal rural credit system or encouraging development of informal credit institutions could increase households' self-employed production efficiency and keep them from sending migrants out into the labor force primarily to finance these activities.

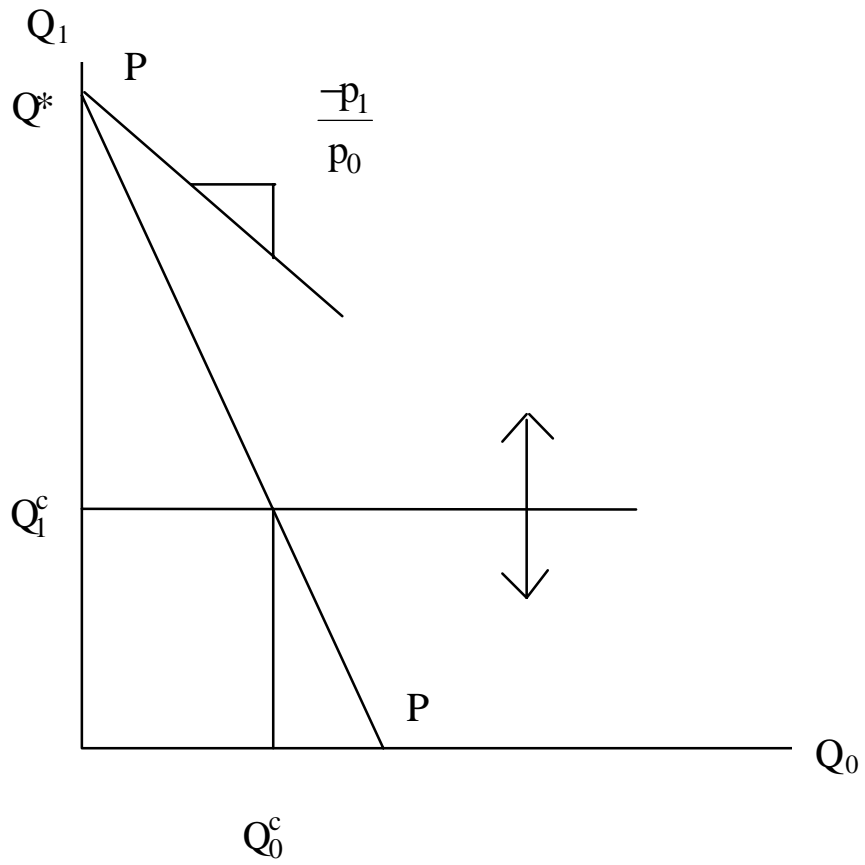
Table 1

Estimated Effects of Migration and Remittances on Income Sources, using Iterated 3SLS

Explanatory Variables	(1) Number of Migrants	(2) Remittances	(3) Farm Income	(4) Self-Employed Income	(5) Wage and Other Income
Number of Migrants		326 (1.74)#	-1879.5 (1.32)	-8288.3 (3.16)**	939.7 (0.81)
Remittances			2.02 (2.25)*	4.09 (2.36)*	-0.63 (0.81)
Household Human Capital and Characteristics					
Experience of Head	0.0069 (3.50)**		-43.99 (2.11)*	-3.85 (0.08)	54.6 (2.63)*
Education of Head	0.033 (3.32)**		-85.9 (0.97)	-111.3 (0.56)	354.5 (3.87)**
Most Educated in Household	0. ()				
Household Size	0.21 (10.09)**		798.4 (3.51)**	1680.1 (4.02)**	334.8 (1.81)#
Young Dependents	-0.25 (8.52)**	-69 (1.17)			
Elderly Dependents	-0.092 (2.81)**	41 (0.69)			
Household Capital Variables					
Value, Non-Productive Assets (1000 yuan)	-0.18 (3.60)**	-2.0 (0.16)	-0.065 (1.24)	0.52 (4.53)**	0.21 (4.15)**
Land per Capita	0.023 (2.72)**	7.65 (0.37)	905.2 (10.22)**	-189.1 (0.99)	-33.4 (0.40)
Agricultural Assets, Lagged			0.126 (1.72)#		
Grain Stocks, Lagged			0.58 (1.46)		
Non-Farm Enterprise Capital, Lagged				0.19 (10.8)**	
Non-Farm Inventory, Lagged				0.22 (3.95)**	
Village Characteristics					
Migration Network	0.68 (2.27)*				
Mean Village Remittance		0.55 (3.28)**			
Percentage Village Workforce, Enterprises			-14279 (4.50)**	-5134 (0.70)	4823 (1.41)
Village Population			-0.65 (2.33)*	-0.15 (0.24)	-0.19 (0.62)
Percentage GVP, Industry			28.8 (3.51)**	44.3 (2.40)*	29.9 (3.41)**
Area Irrigated, Village			39.1 (7.07)**		

Notes: t-statistics in parenthesis. #- denotes significance at the 10 percent level, *- denotes significance at the 5 percent level, **- denotes significance at the 1 percent level. Provincial fixed effects are not reported.

Figure 1. Migration Effects on Production



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