The Interaction Between Migrants and Origin Households: Evidence from Linked Data

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Abstract
Economists' understanding of the effects of migration has been largely limited to what can be gleaned from separate surveys of migrants and their origin households. This is problematic when the interaction between the two parties affects patterns of resource allocation, above and beyond the direct effects of migration in income and household composition. Using a unique panel dataset from Bangladesh that includes linked data on migrants and origin households, we assess the cost of information asymmetries that arise with migration. Variation in migrant travel times is used to generate variation in the cost of communication between migrants and origin households. However, because migration, as well as the destination, may be chosen with information asymmetries in mind, two sets of instrumental variables are employed: lagged employment shocks at potential destinations and historical migrant networks.

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Introduction.

Migration, both inter- and intra-national, has been increasing rapidly. Roughly 214 million individuals currently live and work outside their country of birth, an increase of more than 20% over the previous decade, and international remittance flows to developing countries far exceed official aid flows (International Organization for Migration, 2010). Within countries, rural to urban migration has experienced similar growth, accounting for two-thirds of urban population growth in Bangladesh (Afsar, 2003) and roughly one-third of national income in China (Ong, 2004). These trends have important implications for economic development, and considerable effort has been devoted to estimating the impact of migration on migrants and origin households. However, our understanding of the effects of migration has been largely limited to what we can glean from separate surveys of migrants and their sending households. This is problematic when non-pecuniary linkages between the migrant and the origin household persist, as it implies that the interaction between the two parties has an effect on resource allocation, above and beyond the direct effects of migration on income and household composition. In this case, data on both parties is needed to establish a complete picture of migration and its implications for economic and social development.

This paper estimates the quantitative significance of non-pecuniary linkages between migrants and origin households. Outcomes of interest include remittances, business investments, household assets, children's education, and health. Previous studies have documented the existence of such linkages (*e.g.*, Chen, 2006; Ashraf *et. al.*, 2011) but have not been able to examine the behavior of both migrants and origin households simultaneously. We focus specifically on the effect of imperfect information, created by the change in residence patterns: individuals who do not live in the same household will face greater difficulty observing the

actions of other members. This creates the potential for non-cooperative behavior, such that individuals maximize their own utility, taking the actions of others as given, rather than cooperatively maximizing a joint household utility function. This may also create a welfare loss, to the extent that strategic and productive allocations diverge. I estimate production and profit functions to determine the degree to which imperfect information creates inefficiency in household investment portfolios.

Data are drawn from a unique panel, which includes linked data on migrants and their origin households, drawn initially from 14 villages around the country of Bangladesh. I outline a game-theoretic model in which the migrant can only imperfectly monitor the actions of his origin household and the origin household has imperfect information about the migrant's earnings. Testable implications are derived based on variation in the degree of asymmetric information or, equivalently, the inherent cost of monitoring. Empirically, variation in migrant destinations and travel times creates variation in the cost of communication between the migrant and the origin household. However, because migration, as well as the destination, may be chosen with potential information asymmetries in mind, I utilize migrant networks as an instrumental variable. Additionally, I control directly for elements of the migrant's underlying skill endowment, as proxied by height and cognitive ability.

This line of research has important implications for policy and program design. If household/family members are inclined to conceal information from one another, then the transparency of income sources becomes an important policy consideration as well. For example, proceeds from microloans and microenterprises would be relatively easy to conceal, whereas cash transfers from government agencies and NGOs would not. The channel through which program benefits are provided may have a separate effect on the allocation of resources within

the household, which has implications for both program design and implementation. At the macro level, policies that promote migration over longer distances (*e.g.*, to major cities vs. smaller urban centers, international vs. domestic) may exacerbate problems of imperfect information, and this should be factored in to any cost-benefit analysis of policy alternatives. Finally, this research will reveal the quantitative importance of collecting linked contemporaneous data, versus the standard practice of surveying migrants and origin households independently.

Data and Context.

Data are drawn from the Nutrition Survey of Rural Bangladesh, which was first conducted in 1981/82 across 14 villages in Bangladesh. The first follow-up was conducted in 2000/03 and tracked all respondents from 1981/82 still living in the country with an attrition rate of less than 2%. A third survey was completed in December 2008, again tracking all original 1981/82 respondents as well as all new respondents from 2000/03. The attrition rate was slightly higher this time, just over 4%, in part due to Cyclone Sidr, which devastated Bangladesh in November 2007. However, unlike the previous follow-up, and unlike most existing panel surveys, temporary migrants were also tracked, and survey modules were administered to them at their destinations, providing linked, contemporaneous data on migrants and their origin households. Unfortunately, given funding limitations, migrants living outside Bangladesh could not be tracked.

For the purposes of this survey and paper, "temporary" migrants are defined as individuals who are "currently absent" for work purposes but still reported as members of the household. In practice, however, migration appears to be a long-term and perhaps permanent arrangement for the majority of these individuals. Approximately 86% of temporary migrants

report being away for the entire year preceding the survey, but a large proportion (99.5%) report visiting the origin household weekly, irrespective of travel cost or time. Of course, the small geographic area of Bangladesh facilitates easy travel within the country; 75% of migrants report being within four hours of their origin household and transportation costs roughly equivalent to (or less than) the average daily wage.

Model.

We conceptualize the negotiation between spouses as a game with two stages, as depicted in Figure 1. First, the migrant can choose to either fully pool the income earned at the destination with the origin household, or he may choose to conceal part of it. Based on his choice, the migrant then offers his spouse a contingent contract, in which her payment is based on her observed actions. Note that, as long as a cooperative agreement provides the migrant with weakly higher utility than the non-cooperative arrangement, it is in his interest to design the contract to be appealing to his spouse. The optimal contract, therefore, reflects the migrant's assessment of whether his spouse will choose to cooperate and the actions she will take if she does not cooperate. However, concealing a portion of his income will effectively reduce the migrant's bargaining power and thus shift the optimal contract in favor of the non-migrant. The trade-off, of course, is that the migrant retains the concealed portion of his income and may allocate it without engaging in any household bargaining.

The non-migrant can choose to either cooperate and follow the contract or to disregard the contract and play non-cooperatively. At the time that she makes her choice, the non-migrant does not know what action the migrant has taken, but she does have complete information about the structure of the game. Thus, her optimal response will reflect her beliefs about whether the

migrant will chose to conceal any income. These beliefs, in turn, depend on the contract offered by the migrant and characteristics of the migration episode that may affect the overall capacity for monitoring. At the end of the game, each player observes the choices of the other player. If the non-migrant chooses to cooperate, her actions are observed by the migrant with probability one. If, instead, she chooses to play non-cooperatively, her actions are revealed with probability $p < 1$. When non-cooperative behavior by the non-migrant is detected, she receives the punishment stipulated by the contract; otherwise, she receives the contracted reward. Similarly, if the migrant chooses to pool all of his income, the non-migrant observes this with probability one. If he chooses to conceal part of his income, his actions will be revealed to the non-migrant player with probability $q < 1$. After observing the migrant's actions, the non-migrant may adjust her actions as well. However, because some allocations cannot be reversed, both players have limited ability to "punish" their spouses ex post.

Empirical Specification.

Testable implications are derived based on variation in the degree of asymmetric information or, equivalently, the inherent cost of monitoring. Empirically, variation in migrant destinations and travel times creates variation in the cost of communication between the migrant and the origin household. However, because migration, as well as the destination, may be chosen with potential information asymmetries in mind, I utilize two sets of instrumental variables: lagged employment shocks at the destination (changes in industry-specific wages) and historical migrant networks (number of migrants originating from the same village). I utilize the interaction of these variables and control for the levels directly, as aggregate economic conditions and village out-migration may both have direct effects on the outcomes of interest.

Additionally, I control directly for elements of the migrant's underlying skill endowment, as proxied by height and cognitive ability (Wechsler Intelligence Scale).

For origin households, outcomes of interest include investments in health, schooling, housing structure, and private goods (clothing, toiletries, entertainment). An expenditure Y for household j in community k can be expressed as a function of household characteristics (H), characteristics of the migrant (C), and the implicit cost of monitoring, proxied by travel time and cost between the origin and the destination. Similarly, expenditures of the migrant (R), including remittances, are related to the characteristics of the migrant (C), characteristics of the origin household (H), and the implicit cost of monitoring, proxied by travel time and cost between the origin and the destination. Investments and remittances are additionally affected by unobserved characteristics of the household/individual that are fixed over time (υ), an unobserved community-level effect (η), and a mean-zero i.i.d. disturbance (ε).

$$Y_{jk} = \alpha + \beta \cdot H_{jk} + \phi \cdot C_{ijk} + \delta \cdot Monitoring_{jk} + \upsilon_{jk} + \eta_k + \varepsilon_{jk}$$

$$R_{ijk} = \alpha^M + \beta^M \cdot H_{jk} + \phi^M \cdot C_{ijk} + \delta^M \cdot Monitoring^M_{ijk} + \upsilon_{ijk} + \eta^M_k + \varepsilon^M_{ijk}$$

Control variables include: household demographic characteristics (number of members in specific age-sex categories; age, sex and education of the household head), productive assets, and the migrant's age, sex, education, marital status and relationship to the household head. Summary statistics are provided in Table 1.

Because migrant destinations may be selected with potential information asymmetries in mind, I treat travel times and cost as endogenous. For instrumental variables, I use the physical distance between the migrant's origin and destination, and migrant networks and average wages, relative to the origin, in the destination district and the districts containing the six largest cities in Bangladesh. But, because migrant networks and economic conditions at potential destinations

may directly effect outcomes, I use the interaction of the two and control for the levels directly [in progress]. For a subset of migrants, I also have data on endowments in the form of anthropometry (height, weight) as well as cognitive ability (Weschler Intelligence Scale and Ravens Progressive Matrices) and control for these directly.

Results.

To verify that trip time and cost do indeed affect monitoring activities, I first look at their effect on trips between the origin and the destination, taken by both the migrant and members of the origin household. Table 2 shows the effect of travel costs, implicit and explicit, on the probability that the migrant visits the origin household, and vice versa, at least once per month. As expected, greater travel costs significantly reduce the frequency of visits: an additional hour of travel time reduces the probability of monthly visits by 4.2 and 1.5 percentage points, for the migrant and origin household respectively, which is large given that less than 35% (8%) of migrants (origin households) visit monthly. Interestingly, the use of instrumental variables has almost no effect on the point estimates, suggesting that, once a destination has been selected, the intensity of monitoring does not seem to be affected by unobserved factors such as the propensity for strategic behavior or moral hazard.

Next, we see that travel costs, particularly direct costs, increase remittances from the migrant. Because migrants who have selected more costly destinations are likely to do so for higher earnings, total remittances are scaled by the earnings of the migrant. Still, the positive relationship may, in part, reflect transaction costs, with more "distant" migrants committing larger amounts of money each time a transfer is made, in order to minimize the number of transactions. However, the dependent variable is calculated over the previous twelve month

period and should, therefore, allow differences in remittance levels, as a proportion of total earnings, to become evident, even allowing differences in transaction costs. Conversely, travel costs reduce the proportion of income the migrant spends on entertainment (movies, sports, cigarettes, betel), perhaps to increase remittances to the origin households. These results are consistent with migrants utilizing remittances to incentivize "good" expenditures by origin households, particularly when the direct costs of monitoring, via visits, are high.

Turning to expenditures by the origin household, we find that travel costs decrease the proportion of household expenditures devoted to private goods, specifically entertainment, personal items (toiletries, etc.) and female clothing (Table 4). However, travel costs have no significant effect on investments such as education, health and housing (Table 5). Thus, the relationship between travel costs and expenditures, via remittances, cannot be explained by a simple income effect. Rather, the relationship between travel costs and expenditure on private goods is consistent with greater incentives provided by the migrant, in order to elicit expenditure on goods desired by the migrant, rather than private goods for members of the origin household. Additionally, comparison of the OLS and instrumental variables estimates suggests an upward bias for private goods. That is, migrants who select more "distant" destinations seem to anticipate non-cooperative behavior or engage in more monitoring of their origin households.

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Figure 1. Basic Game with Potential for Two-Sided Non-Cooperative Behavior, Extensive Form

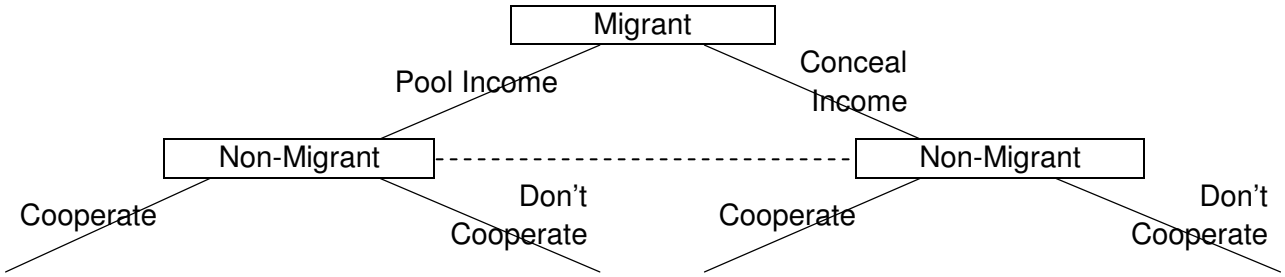

Table 1. Summary Statistics		
	Mean	Std. Dev.
Migrant Characteristics		
Trip Time (hours)	4.27	(3.35)
Trip Cost (1000 taka)	8.39	(14.72)
Months Away	11.11	(4.80)
Female (%)	0.09	(0.29)
Child of Head (%)	0.61	(0.49)
Spouse of Head (%)	0.28	(0.45)
Age	27.02	(10.58)
Married (%)	0.43	(0.50)
Years of School	6.50	(3.99)
Household Characteristics		
Males 0-5	0.37	(0.64)
Females 0-5	0.40	(0.72)
Males 6-16	0.75	(0.89)
Females 6-16	0.66	(0.81)
Females 26-54	1.01	(0.64)
Males 55+	0.39	(0.50)
Females 55+	0.29	(0.47)
Household Size	6.61	(3.22)
Head Age	48.83	(12.82)
Head Years of Schooling	4.57	(4.38)
Value of Productive Assets (taka)	524	(1157)
Value of Livestock (taka)	13549	(20279)
Value of Owned Land (taka)	601636	(946067)
Number of Observations	865	

Table 2. Effect of Travel Costs on Visits								
	Migrant Visits Hh Monthly				Hh Visits Migrant Monthly			
	OLS		IV		OLS		IV	
Travel Time	-0.0423	***	-0.0452	***	-0.0148	***	-0.0207	***
	(0.0043)		(0.0071)		(0.0026)		(0.0043)	
Cost of Trip	-0.0136	***	-0.0107	***	-0.0021	***	-0.0014	*
	(0.0010)		(0.0013)		(0.0006)		(0.0008)	
Sample Mean	0.346				0.072			
	(0.476)				(0.258)			
Observations	861		861		861		861	
R-squared	0.303		0.296		0.128		0.122	
Instruments include distance to destination, migrant networks.								
Controls include household demographics, migrant age, sex, education, relation to head.								

Table 3. Effect of Travel Costs on Migrant Expenditures								
	Annual Remittances[a]				Entertainment Expenditure[a]			
	OLS		IV		OLS		IV	
Travel Time	-0.1560		0.4740		-0.0006		-0.0119	*
	(0.2740)		(0.4140)		(0.0044)		(0.0066)	
Cost of Trip	0.1460	**	0.1880	**	-0.0039	**	-0.0019	
	(0.0644)		(0.0789)		(0.0016)		(0.0018)	
Sample Mean	34.64				0.098			
	(26.14)				(0.2350)			
Observations	726		726		316		316	
R-squared	0.189		0.182		0.115		0.093	
[a]As a percentage of total annual income.								
Instruments include distance to destination, migrant networks.								
Controls include household demographics, migrant age, sex, education, relation to head.								

Table 4. Effect of Travel Costs on Private Goods												
	Entertainment Expenditure[a]				Personal Goods Expenditure[a]				Female Clothing Expenditure[a]			
	OLS		IV		OLS		IV		OLS		IV	
Travel Time	-0.0321	**	-0.0726	***	-0.0112		-0.00801		0.0754		0.0302	
	0.0147		0.0242		0.0263		0.0431		0.0525		0.0861	
Cost of Trip	-0.0173	***	-0.00952	**	0.00688		-0.00067		0.0219	*	0.00886	
	0.0035		0.00439		0.00626		0.0078		0.0125		0.0156	
Sample Mean	1.226				1.327				7.383			
	(1.435)				(2.444)				(5.285)			
Observations	861		861		861		861		861		861	
R-squared	0.105		0.093		0.014		0.013		0.153		0.151	
Instruments include distance to destination, migrant networks.												
Controls include household demographics, migrant age, sex, education, relation to head.												

Table 5. Effect of Travel Costs on Investments												
	Education Expenditure[a]				Health Expenditure[a]				Housing Expenditure[a]			
	OLS		IV		OLS		IV		OLS		IV	
Travel Time	-0.0268		0.233		-0.0351		-0.122		-0.0398		-0.0538	
	0.113		0.186		0.157		0.257		0.166		0.211	
Cost of Trip	-0.0443	*	-0.042		0.0262		0.0392		0.022		0.0573	
	0.0269		0.0337		0.0374		0.0466		0.0818		0.0897	
Sample Mean	8.415				15.418				1.357			
	(11.471)				(14.744)				(7.802)			
Observations	861		861		861		861		270		270	
R-squared	0.169		0.163		0.03		0.029		0.093		0.093	
[a]As a percentage of total annual expenditures												
Instruments include distance to destination, migrant networks.												
Controls include household demographics, migrant age, sex, education, relation to head.												