Neighborhood Effects and Durables Consumption: Evidence from Rural-Urban Migrants in China

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Abstract

Whether rural-urban migrants can survive in cities and blend into the mainstream culture is of great significance to the urbanization of China. Using panel data from the China Health and Nutrition Survey from 1993 to 2009, this paper is designed to search for evidence of neighborhood income and education effects on durables consumption among migrant households. Neighborhood effects in consumption may occur among neighbors through information sharing. Migrants' psychological factors, such as conformity and jealousy, can also result in peer pressure from neighbors. Based on the estimation results of the reduced form social interaction model, evidence of neighborhood effects is found in the ownership of air conditioners, cameras, microwave ovens and computers. Economically, the income effects from non-migrant neighbors are more influential, while the education effects within the circle of migrant households are dominant. These results have immediate policy relevance in understanding the consumption patterns of migrant workers in China.

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1. Introduction

Since 1978 when the Chinese government gradually relaxed the policy constraints on the movement of people, large numbers of surplus laborers who have long been confined to rural areas started to migrate out and seek equal job opportunities in cities. By the mid 1990s, the rural-urban migration has formed a unique historic phenomenon of China during the period of transition economy. In 2000, approximately 76 million rural laborers were employed in cities, accounting for almost 1/3 of the total employed (Cai, 2003). In 2002, the stock of rural registered migrants in cities is estimated to be at 81 or 84 million people according to two sources of official estimates (Cai *et al*., 2008). By 2005, migrant laborers in cities were over 100 million (Liu *et al*., 2005). In 2011, the total number of migrant workers nationwide reached 252.8 million, among which the population size of migration as a whole family is up to 32.8 million, 6.8% more than the number in the previous year.[1]

Essentially, rural laborers' migration releases Chinese peasants from lands and separates their registered identity and occupations. Attracted by the job opportunities created in industrialization and urban progress, rural laborers migrate into cities and transform their role from peasants to workers. However, restricted by the household registration system, their rural registered identity cannot be changed. Although these migrant laborers work in nonagricultural sectors and rely on wages as their main income source, they are hindered from becoming urban workers and residents in the real sense. Even

[1] The data comes from the 2011 Monitoring Report of Migrant Workers issued by National Bureau of Statistics of China.

though a high proportion of migrants have chosen to work in cities temporarily with the intention of returning home, a growing percentage wish to settle in cities and establish urban households (Knight *et al*., 2010). Particularly when a younger generation of migrant workers, who are less familiar with lands and villages, migrate into cities, they are unlikely to go back and restore their role of peasants as a whole. As a considerable number of migrants settle down in cities and finally adapt to urban life, the status quo of this special group of the Chinese workforce has drawn my interest.

A migrant worker from rural areas is able to stay in a city when she has a stable income. After that, she meets new friends in the city and gets to be involved into urban life gradually. Compared with her peasant peers, she may believe that her economic situation has significantly improved. However, as her role has transformed from a peasant to a worker, her reference group tends to become urban acquaintances instead of her rural peers. In order to be accepted by the city, she is more eager to act like urban residents in such aspects of her daily life as dining, clothing and recreation. Particularly, consumption is an essential part of the new environment they will learn from their urban peers.

In this study, I am interested in whether neighborhood effects in the consumption of household durables exist in rural-urban migrant households in China. On the one hand, migrant workers usually keep their original consumption habits inherited when they were in rural hometowns. Like most Chinese people, the older generation of migrant workers consumes less and saves more. A large share of their income earned in the city is remitted back to their hometowns. On the other hand, the traditional habits will likely be affected when they make contact with urban peers. Compared with migrant workers,

urban residents not only have a better grasp of the information about local goods, but also have more access to any ongoing fads and trends in the city. Therefore, neighborhood effects in consumption may occur among neighbors through the channel of information sharing. Furthermore, although living in the same neighborhood, migrant workers and urban residents are invisibly but strictly differentiated by their registered identity. Offered more job opportunities but deprived of much social welfare, migrant workers are attracted but meanwhile repelled by the city. Considering many psychological factors, such as conformity and jealousy, arising in these two competing processes, it is interesting to investigate the existence of neighborhood effects in consumption among different types of households.

This issue has immediate policy relevance. First, it is well known that economic growth in China relies heavily on investment while the ratio of consumption over GDP has been decreasing in the past few decades. Since migrant workers make up a considerable percentage of the workforce in the transition economy of China, their distinct identity has drawn interest about their consumption behaviors. Second, whether migrant workers can survive in cities both economically and mentally and finally blend into the mainstream culture is of great significance to the urbanization of China.

The paper is organized as follows. First, the household registration system of China is discussed in Section 2. Next, Section 3 contains a brief overview of the related literature. Section 4 develops the empirical framework. Section 5 describes the data. Section 6 discusses the results of my econometric model. Section 7 concludes.

2. The Household Registration System in China

The current household registration system in China was first introduced in the 1950s,

when the development of heavy industry was prioritized. Due to the capital intensive nature of heavy industry, the available job openings created in cities were not enough even to satisfy the demands of the urban labor force. The household registration system was established for two main reasons (Cai, 2010). First, it was intended to restrict rural laborers' large-scale migration from agricultural to nonagricultural industries, which meant that a rural registered identity was naturally associated with an agricultural occupation. Second, it was designed to guarantee the supply of basic necessities and minimum level of social welfare in cities. Accordingly, many other systems, like food supply, employment, and social welfare, were also introduced to support the household registration system and construct a complete residential management system.

The household registration system strictly categorizes national residents into urban and rural residents. One person's registered identity (either urban registered or rural registered) doesn't depend on her residential location or occupation, but on the registered identity of her parents (more specifically, the registered identity of her mother) when she was born. Furthermore, since the transformation of registered identity is only permitted under very special circumstances, the existence of the system actually deprives both types of residents of their rights to migrate freely. In one sense, the rural registered identity not only attaches to all rural born residents for their whole life but also applies to their offspring as well.

Generally speaking, the evolution of industry structure promotes the upgrading of employment structure in a country. In industrialization process followed by most developed countries, due to the absence of any similar division system in terms of household registration, as peasants migrated into cities and were employed in factories,

they realized the transformation of their identity from a peasant to an urban worker. On the country level, as the weight of the industrial sector and service sector in the national economy increased, the percentage of urban residents in the total population went up as well. However, in China, the latter process lagged far behind the former as a result of the strict isolation between urban and rural societies. Restricted by a series of systems in household registration, food supply, employment, education, medical care, and insurance, large numbers of rural workers were left in the countryside, worsening the existing dual social structure. By 1978, while the ratio of gross domestic product between industry and agriculture had evolved from 3:7 to 7:3, the population ratio between urban and rural residents had remained to be 2:8 (Han *et al.*, 1994).

The accumulation of surplus laborers resulted in low productivity and income levels in rural China. On the one hand, the income gap between rural and urban residents kept enlarging, peaking at 1:2.54 in 1993.[2] Within rural areas, the income gap across regions also widened. The Gini coefficient of peasants' income increased from 0.3 in 1983 to 0.33 in 1993. On the other hand, local township enterprises' ability to absorb the rural labor force was quite limited. In 1985, the total number employed was 370 million in rural China. However, only 18.8% were employed in township enterprises, while the remaining 300 million people were still engaged in agriculture. The surplus of rural workers was approximately estimated to account for 30% to 40% of total employment, which meant that there were about 100 to 150 million surplus rural workers (Taylor, 1993). When rural areas were no longer able to contain the surplus labor force, peasants naturally selected to migrate out. Since the 1980s, the Chinese government gradually

[2] In 1993, the income per capita of rural residents was 921 yuan, while the income per capita of urban residents was 2,337 yuan. Compared with the data in the previous year, while urban income increased by 10.2%, rural income increased by 3.2%. Before 1993, the highest level of rural to urban income ratio was 1:2.33 in 1978. The lowest level in history was 1:1.71 in 1984. The data in this section comes from Han *et al.* (1994).

relaxed the policy constraints on rural laborers' migration,[3] which enabled peasants to migrate across regions and seek nonagricultural openings in cities. In the first wave of rural-urban migration, peasants left lands but worked in local township enterprises. Afterwards, they left villages and migrated farther into urban areas temporarily. The final wave of migration in the 1990s surpassed the previous ones both in migration radius and employment fields, in which migration as a whole household took up an increasing proportion (Zhou, 2009). In the mid 1990s, the prosperity of manufacturing industry and urban construction in coastal regions created an enormous demand for rural labor. Accordingly, the scale of labor migration, both from rural to urban areas and from middle and western to eastern regions, expanded significantly, giving rise to a striking migration phenomenon nationwide.

However, at present the household registration system still plays two traditional roles (Cai, 2010). First, urban workers are definitely given more preference ceteris paribus when competing for the limited openings with migrant workers. As a result, most migrant workers are engaged in occupations which urban workers shun, for example, blue-collar workers in construction sites, waiters in catering, freight drivers, street vendors, and so on. Furthermore, because of frequent job transitions, migrant workers are more likely to be unemployed. In the labor market, although the segmentation between urban and migrant workers has been smoothed gradually, the extent of competition between them is still quite limited (Knight *et al*., 2008). In addition to the common discriminatory employment policy intended for migrant workers, Cai (2010) shows that based on their needs, local governments will alternatively carry out different

[3] Summarized by Cai (2010), since 1983, Chinese government has encouraged peasants to self-sell agricultural products. In 1984, peasants were encouraged to work in neighboring towns. In 1988 when the food coupon system had not been abolished, peasants were allowed to work in cities with basal ration. In the mid 1990s, the food coupon system was completely abolished, removing an important obstacle in population migration across regions.

policies to accept or exclude migrant workers. Whenever cities face high employment pressure, government will restrict migrant workers' chances of being employed in the city, even requiring them to go back to their hometowns by compulsory means.

Second, while urban workers can be incorporated into the system of social welfare and guaranteed minimum income, migrant workers are excluded institutionally. For example, migrants' children who are not registered locally are charged more for tuition. Also, although migrant workers are more vulnerable to injuries at work due to their high work intensity, social insurance is absent in most cases. In 2009, while 47.9% of urban workers are insured against work injuries, only 24.1% of migrant workers are covered by injury insurance. The contrast is more striking in medical insurance which is 52.7% versus 13.1%.[4] Consequently, migrants' living costs in cities, particular in housing, education, and medical care, increase substantially.

For now, instead of permanently settling down in cities, an absolute majority of migrant workers and their families holding rural registered identities choose to migrate between rural and urban areas by seasonal, economic and even policy cycle. Since 2000, the Chinese census has redefined "urban resident" as any resident who has lived for at least six months in a city regardless of her registered identity. As a result, most migrant workers can be categorized as urban residents in the census. However, the urbanization rate released according to this definition actually covers a wider range than real urban residents who are both urban registered and have access to urban social welfare.[5] On the one hand, policy improvements in the household registration system are being

4 The data comes from National Bureau of Statistics of China.

5 In 2009, the urbanization rate in China is reported to be 46.6%. However, the difference between the urbanization rate and the real urban resident rate can be as high as 12 percent as it is in 2007. The data comes from China Population and Employment Statistics Yearbook issued by National Bureau of Statistics of China.

constantly attempted by regional governments to promote the settlement of rural-urban migrant workers.[6] On the other hand, it cannot be denied that migrant workers' natural bonds with their rural hometowns cannot be cut off in a short period of time. Facing differences in registered identity, social status, and cultural norms between urban and rural residents, migrant workers need to make more efforts to establish their new social networks in urban areas in order to be finally blended into urban life.

3. Literature Review

My study brings together two strands of literature. One discusses the identification of neighborhood effects in various empirical contexts and the other concerns two different views towards the existence of neighborhood effects in consumption.

3.1 Identification of Neighborhood Effects

The concept of social interactions is introduced when spillover effects, say the choices and behaviors of others, are incorporated into individuals' decision making. The definition of social interactions given by Durlauf *et al.* (2010) is stated as the interdependence among individuals whose preferences, beliefs, and constraints are a direct result of the influence of characteristics and choices of others.

In the empirical realm of social interactions, many interesting settings have been analyzed. For example, peer effects in classrooms and dormitories (Arcidiacono *et al.*, 2005; Sacerdote, 2001; Hoxby, 2001; Angrist *et al.*, 2004), social effects in spousal search (Drewianka, 2003), social interactions and crime rates (Glaeser *et al.*, 1996), social networks and employment information transmission (Ioannides *et al.*, 2004), social interactions in experimental settings (Graham, 2008; Duflo *et al.*, 2003; Kling *et*

6 For more information about specific policies, see Sun *et al.* (2011).

al., 2005; Falk *et al.*, 2006), and neighborhood effects on inner city poverty, conformist behavior, self-reported well-being, and child rearing (Kling *et al.*, 2005; Luttmer, 2005; Ginther *et al.*, 2000; Aaronson, 1998).

In particular, within the fields of urban, labor, and family economics, the focus of social interactions has been centered on neighborhood effects. Summarized by Durlauf (2004), at least two kinds of residential neighborhood effects are posited in the current literature. One reason for the justification of neighborhood effects, specifically in the U.S., results from local public financing of education. Poor neighborhoods affect children's education due to lack of resources. The other can be explored along the sociological and psychological lines (Blume *et al.*, 2001; Brock *et al.*, 2001; Manski, 2000), where role model and peer group influences are both understood to yield some kind of imitative behavior. In a nutshell, when making choices, one will prefer the action that is reflected by the behavior of others.

The interactions among neighbors may occur through several possible channels. First, considering the case where households face common constraints, interdependence with each other arises when the costs of a given behavior rely on others' decisions (Durlauf, 2004; Manski, 2000). For example, for a given household, the feasible resource bundles and time costs of web surfing depend on the number of neighbors who choose to engage in it at the same time.

Second, a family's preference ordering over the alternatives in the choice set depends on the actions chosen by its neighbors. In this sense, household decisions may be driven by a variety of psychological factors, such as conformism (Leibenstein, 1950; Jones, 1984),

altruism (Becker, 1981), and jealousy (Clark *et al.*, 1996). An example is the residential segregation model proposed by Schelling (1969, 1971). In this model, individuals are assumed to be indifferent to the racial composition of a neighborhood until the percentage of their neighbors of the same ethnicity drops below a certain threshold. The study finds that, due to the psychological reason of conformism, segregation forms spontaneously almost all the time without any necessary suggestions of racial discrimination.

Third, expectation interactions occur among agents that possess private information that is not directly available to others (Manski, 2000). To be specific, a household facing a decision will form an expectation of the outcomes of different actions. Before making the choice, it will draw lessons from observing the actions chosen and outcomes experienced by its neighbors. Nevertheless, the interdependence in information transmission may also affect individuals' judgment on the effects of available behaviors (Durlauf, 2004). For example, observing neighboring adults can lead children in disadvantaged communities to underestimate the economic returns to education (Streufert, 2000).

In the field of migration theory, Stark (1984) and Stark *et al*. (1989) believe that household members migrate not necessarily to increase the household's absolute well-being, but rather to improve the household's relative position with respect to a specific reference group. Initially, individuals engage in migration in order to improve their income position relative to that of their rural peers. Afterwards, migrants may be confronted with a fall in their relative position in the destination city despite an increase in absolute income. Knight *et al*. (2010) examine a sample of settled rural-urban

migrants living in urban households, finding that over time urban residents gradually become the reference group for migrants as longtime residents are shown to be more sensitive to the average urban income per capita in the destination city. When the new reference group is formed in the new surroundings, migrants begin to be interested in pairing themselves with their acquaintances in the neighboring environment in addition to their rural peers. However, at present, the studies of neighborhood effects on rural-urban migrant households are scarce. This research is among the first to link the literatures on rural-urban migration in China and on neighborhood effects particularly in terms of household consumption.

3.2 Neighborhood Effects in Consumption

The existence of neighborhood effects in consumption has long been debated by economists, where information economics and behavioral economics explore it in two directions.

First, since the interpersonal transmission of goods' information, say price and quality, can alleviate potential consumers' uncertainty about the intrinsic utility obtained upon purchase, individual household's consumption is subject to neighborhood effects through information sharing. A large volume of theoretical frameworks have been developed to model this behavior.

In static models, the actions of aggregate consumers are informative given that each consumer has private information and that equilibrium prices are sufficient statistics for one's private information (Grinblatt *et al.*, 2004). In dynamic settings, Bikhchandani *et al.* (1992) develop the information cascades model to explain conformity in

consumption decisions. As is shown in the model, in a choice situation with incomplete information, an agent facing competing products will rationally follow the decisions of her predecessors while disregarding her own private information. As a cascade starts, private information becomes useless and conformity lasts, even if the decisions of predecessors might be wrong. Similarly, Monzón (2012) develops a model where homogeneous rational agents, who can observe a private signal and exactly two other agents' preceding decisions, choose between two competing technologies. This study finds that although aggregate behavior does not necessarily reflect the true state of nature due to aggregate uncertainty, agents still refer to others' decisions and base their own choices partly on others' behaviors, as a result of which bad choices can be perpetuated. Cascade phenomena have been the subject of numerous experimental tests (Baddeley *et al.*, 2012; Anderson *et al.*, 1997; Grebe *et al.*, 2008; Kübler *et al.*, 2004; Oberhammer *et al*., 2002; Becker *et al.*, 1964).

In contrast with the theoretical work, empirical studies on information sharing in consumption among neighbors are quite limited. Grinblatt *et al.* (2004) carry out an empirical investigation into whether neighborhood effects exist in the consumption of automobiles. They find that a consumer's automobile purchase behavior is strongly influenced by the purchases of her neighbors. In their study, instead of emotional biases that lie behind the interpersonal influence in automobile consumption, it is some form of information sharing among neighbors that matters.

Second, according to the points of view of conspicuous consumption pioneered by Veblen (1899), consumers acquire luxury goods or services to display their economic power and social prestige. Furthermore, individual consumption depends not only on

her actual level of spending, but also the degree of relative spending as compared with others' (Duesenberry, 1949; Easterlin, 1974; Frank, 1985; Schor, 1998). Given the hypothesis of relative concern, behavioral economists believe that households can be driven by some psychological incentives to "keep up with the Joneses."

There is a large body of direct and indirect empirical evidences in support of the hypothesis that the level of happiness of an agent depends on her absolute as well as relative outcome standing. Ravina (2005) estimates Euler equations for a representative sample of U.S. credit-card account holders whose reference group is the other residents of their cities. The strength of external habit, captured by the fraction of the consumption of the reference group that enters the utility function, is 0.290, while the strength of household past consumption habit is 0.503. Using income measures to proxy for consumption, Luttmer (2005) finds that individuals' happiness falls with a decrease in their relative income in the neighborhood. Particularly, the positive relationship between people's utility and relative standing is found to be much stronger for groups of people who have above-average income than for the below-average counterparts (Dynan *et al.*, 2007). In other words, an agent will not care about her relative standing until she has attained a certain place within the whole income distribution.

Preference interdependence is an important determinant of consumer behavior (Kaptevn *et al.*, 1997). Introducing a theoretical framework where the outcomes of others can affect the preferences of a decision maker, Maccheroni *et al.* (2012) find that the extent to which the relative standings of peers' outcomes affects decision makers' preferences depends on their feelings of envy and pride. In their study, envy is defined as the negative emotion that agents experience when their outcomes fall below those of their

peers, while pride is defined as the positive counterpart. In a two period economy where agents have such social preferences, envy is shown to lead to conformism in consumption behavior and pride to diversity.

Within the economy of a life-cycle model made up of peer groups, Binder *et al.* (2001) examine how different forms of social interactions, say conformism, altruism, and jealousy, affect individual optimal consumption decisions and their economy-wide counterparts. The framework is designed under both homogeneous and disparate information, allowing for the potential presence of habit formation and prudence. The existence of the effects of social interactions on optimal consumption decisions is shown to depend critically on intertemporal rather than static settings. In other words, individuals adjust their lifetime consumption profiles to correspond to those of their peers.

Applying the framework of Manski's reflection problem to the case of dynamic models, Maurer *et al.* (2005) derive an extension of the life-cycle model that allows for consumption externalities. Using U.S. panel data from the Panel Study of Income Dynamics, they investigate whether the choice of optimal consumption profiles will be affected by the simultaneous decisions of households in the reference groups, which are constructed on the basis of age, education, gender, race and urbanity. However, although the results show strong predictable consumption co-movement within reference groups, the true peer effects vanish when the correlated effects are accounted for.

4. Model Development

4.1 Derivations of the Reduced Form Social Interaction Model

Let's consider a social interaction model, where household *i* maximizes a utility

function subject to its budget constraints. Borrowing notation from Blume *et al*. (2005), I can obtain a behavioral equation as follows:

$$w_{i,t} = k + cX_{i,t} + dY_{n(i),t} + Jm^{e}_{i,n(i),t} + \varepsilon_{i,t}, \quad (1)$$

where household *i*'s choice regarding durable goods' consumption in wave *t*, $w_{i,t}$, is a linear function of average durable goods' consumption in the population, *k*, of a vector of observable household characteristics that affect consumption, $X_{i,t}$, of a vector of contextual effects, $Y_{n(i),t}$, which describes household *i*'s neighborhood *n(i)*, and of household *i*'s forecast of the average neighborhood durable goods' consumption, $m^{e}_{i,n(i),t}$. The random error $\varepsilon_{i,t}$ is assumed to have zero expectation. By Manski's notation, d captures exogenous effects, while J captures endogenous effects.

Following Manski's original treatment, let

$$X_{n(i),t} = \mathrm{E}[X_{i,t}|n(i)], \quad (2)$$

and assume that households' expectations are exactly equal to what the model predicts on average:

$$m^{e}_{i,n(i),t} = \mathrm{E}\left[w_{i,t}\middle|n(i)\right] = m_{n(i),t}. \quad (3)$$

Assuming everyone has information about everything in the model, iterating out the exogenous variables in the conditional expectation yields the following equations:

$$\begin{aligned}
\mathrm{E}\left[w_{i,t}\middle|n(i)\right] &= \mathrm{E}_{\mathrm{X}}\left[\mathrm{E}\left(w_{i,t}\middle|X, n(i)\right)\right] \\
&= \mathrm{E}_{\mathrm{X}}[\mathrm{E}(k + cX_{i,t} + dY_{n(i),t} + Jm^{e}_{i,n(i),t} + \varepsilon_{i,t}|X, n(i))] \\
&= \mathrm{E}_{\mathrm{X}}[\mathrm{k} + c\mathrm{E}\left(X_{i,t}\middle|X, n(i)\right) + d\mathrm{E}(Y_{n(i),t}|X) + J\mathrm{E}(m^{e}_{i,n(i),t}|X)] \\
&= k + c\mathrm{E}\left[X_{i,t}\middle|n(i)\right] + dY_{n(i),t} + Jm^{e}_{i,n(i),t}. \quad (4)
\end{aligned}$$

Together with equation (2) and (3), I can get the following relationship:

$$m_{n(i),t} = \frac{1}{1-J}\left[k + cX_{n(i),t} + dY_{n(i),t}\right]. \quad (5)$$

Substituting back into the structural form in equation (1) yields the subsequent reduced form:

$$\mathrm{E}\left[w_{i,t}\middle|X, n(i)\right] = k + cX_{i,t} + dY_{n(i),t} + \frac{J}{1-J}\left[k + cX_{n(i),t} + dY_{n(i),t}\right]$$

$$= \frac{k}{1-J} + cX_{i,t} + \frac{cJ}{1-J}X_{n(i),t} + \frac{d}{1-J}Y_{n(i),t}.$$

Let $\beta_0 = \frac{k}{1-J}$, $\beta_1 = c$, $\beta_2 = \frac{cJ}{1-J}$, and $\beta_3 = \frac{d}{1-J}$, the reduced form in equation (6) finally can be written as follows:

$$w_{i,t} = \beta_0 + \beta_1 X_{i,t} + \beta_2 X_{n(i),t} + \beta_3 Y_{n(i),t} + \varepsilon_{i,t}. \qquad (7)$$

4.2 Empirical Framework

In my study, equation (8) will be estimated:

$$w_{i,t} = \beta_0 + \beta_1 X_{i,t} + \beta_2 X_{n(i),t} + \beta_3 Y_{n(i),t} + v_i + T_t + \varepsilon_{i,t}, \qquad (8)$$

where $w_{i,t}$ is a dummy variable indicating whether or not household *i* owns one specific kind of durable goods in survey wave *t*, the vector of $X_{i,t}$ includes household income per capita in real terms, the average formal years of education of all household members older than 21, the household head's age, gender, and employment status. $X_{n(i),t}$ captures the impacts of the mean of neighbors' characteristics on household *i*'s consumption. In this paper, I'm particularly interested in the effects of neighbors' average income level and education level on individual households' consumption choice. $Y_{n(i),t}$ includes a vector of community effects.

However, not all significant factors that affect household consumption are included in the model. For example, cultural conventions can affect household consumption to some extent, but they are difficult to measure and are generally not fully included in typical data sets. One way of capturing household-specific time-invariant factors

affecting household consumption is to directly control for individual household effects, v_i. Also included in the regression model are wave dummies, T_t, to allow for a shift in the intercept over time.

Since the dependent variable is a dummy variable, a logit model with fixed household effects will be initially estimated. In the logit fixed effects model, I will report the average marginal effects of neighbors' income or education level on the mean expected probability for a migrant household to own a specific kind of durable good. In the next step, regression results of an OLS fixed effects model will be reported for comparison. Further, considering that neighborhood effects can be captured in a nonlinear form, a model with a quadratic form controlling for fixed household effects will also be estimated. This nonlinear fixed effects model will include the linear term and squared term of neighbors' average income per capita or average formal years of education.

It is worthy to note that in the special case where neighborhood averages of household effects happens to be equal to contextual effects, i.e. $Y_{n(i),t} = X_{n(i),t} = \mathrm{E}[X_{i,t}|n(i)]$, Manski's reflection problem follows. In this case, repeating the same procedures in Section 4.1 leads me to arrive at the following equation:

$$w_{i,t} = \pi_0 + \pi_1 X_{i,t} + \pi_2 X_{n(i),t} + \varepsilon_{i,t}, \qquad (9)$$

where $\pi_0 = \frac{k}{1-J}$, $\pi_1 = c$, $\pi_2 = \frac{cJ+d}{1-J}$. However, when π_0, π_1, and π_2 are identified, recovering *k*, *c*, *d*, and *J* is not possible since the mapping from the structural form parameters into the reduced form parameters is not one-to-one. If $\pi_2 \neq 0$, either $cJ \neq 0$, or $d \neq 0$. That is, $\pi_2 \neq 0$ means that there is either an endogenous or a contextual effect, or both, on the outcome. The intuition behind the problem is simple. For example, if neighbors' average consumption is high whenever their average income is high,

neighbors' consumption effects cannot be properly distinguished from their income effects. However, part of neighbors' consumption effects come from the feedback from individual households' changing consumption and can further affect individual households, which is clearly different from neighbors' income effects. In my study, since neighbors' average of income level and education level belong in $Y_{n(i),t}$, the estimation results also suffer from the reflection problem. When the reduced form is identified, it is possible to identify the presence of social interactions, though I cannot distinguish the endogenous neighborhood effects from the exogenous ones.

In addition to the regression analysis above, I'm also interested in whether the neighborhood effects exist within the group of migrant households or across different types of households. The specification of neighbors is inspired by the studies of social comparison, in which the standards of reference groups are assumed to be actively chosen rather than exogenously determined. In the process of selecting reference groups, people use social information to set up their own comparison targets and serve the goals of "self-improvement" and "self-enhancement" (Wood *et al*., 1991; Falk *et al*., 2004). Festinger (1954) emphasized that people tend to compare themselves with peers of their own social group constructed by such basic characteristics as age, gender, education, and so on. Based on these points of view, in addition to the neighborhood confined by the geographic boundary given in the survey data, I will further specify household *i*'s reference group into migrant neighbors and non-migrant neighbors according to their household member compositions. Each type of households' average income level or education level is put together in one OLS fixed effects model, so that I can distinguish the neighborhood effects within the group of migrant neighbors from the effects across groups.

5. Data Description

This research uses data from the China Health and Nutrition Survey (CHNS),[7] provided by the Carolina Population Center and the National Institute of Nutrition and Food Safety. The first round of the CHNS data was collected in 1989. Seven additional unbalanced panels were collected in 1991, 1993, 1997, 2000, 2004, 2006 and 2009.[8] The survey uses a multistage, random cluster process to draw a sample in nine Chinese provinces.[9] In each province, the provincial capital and a lower income city are selected.[10] Within each city, on average four urban or suburban communities are selected randomly.[11] All individuals in each household are surveyed for all data. In addition, detailed community data is collected.[12]

A neighborhood can be thought of as a set of agents who are all capable of mutual

[7] We thank the National Institute of Nutrition and Food Safety, China Center for Disease Control and Prevention, Carolina Population Center, the University of North Carolina at Chapel Hill, the NIH (R01-HD30880, DK056350, and R01-HD38700) and the Fogarty International Center, NIH for financial support for the CHNS data collection and analysis files from 1989 to 2009 and both parties plus the China-Japan Friendship Hospital, Ministry of Health for support for CHNS 2009 and future surveys.

[8] Since the 1993 survey, all new households formed from sample households have been added. Since 1997, new households in original communities have also been added to replace households no longer participating in the study. Also since 1997, new communities in original provinces have been added to replace communities no longer participating. Heilongjiang was also added in 1997 when Liaoning was unable to participate. In the 2000 CHNS, newly formed households, replacement households, and replacement communities were again added, and Liaoning province returned to the study. Follow-up levels are high, but families that migrate from one community to a new one are not followed. Movement within the primary sampling units and some larger urban entities is attempted.

9 The study population is drawn from Chinese provinces of Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, and Shandong.

10 In Jiangsu and Hubei, other large cities rather than provincial capitals have to be selected.

11 In China, a community refers to an urban residential area. Every community has a community committee that administers the dwellers living in that community. Typically, 100 to 700 households are administered in one community, and the population size ranges from 2000 to 4000. In populated densely cities, the population size can be up to 4000 to 5000. The data comes from http://zh.wikipedia.org/wiki/%E5%B1%85%E6%B0%91%E5%A7%94%E5%91%98%E4%BC%9A.

12 The community survey collects detailed information on the community infrastructure, services, and demographic and economic environment from neighborhood officials, informants, visits to markets, and official records (Monda *et al*., 2007).

communication via the network (Durlauf, 2004). In my study, a neighborhood is constructed as a community unit, where a sample of approximately 20 households is drawn in the survey. Since 1993, CHNS provides information about household registration type information, *hukou*, of all surveyed individuals. Each household member is either rural registered or urban registered.[13] In addition, CHNS takes place in both rural sites and urban sites in China. Since I am interested in the impact of neighborhood effects on the consumption of Chinese migrant households, I only use the sample drawn from the urban sites where surveyed individuals are classified by their *hukou* status and occupations so that I can obtain an abundant sample size of rural to urban migrant households. Therefore, the final sample is restricted to the CHNS urban sample from 1993 to 2009. Table 1 reports the sample size of all participating cities, communities, households, and individuals of each survey wave.

Drawing information from twelve domains that characterize urban and rural sites, Jones-Smith *et al.* (2010) develop a multi-component scale from existing CHNS data to measure urban features in China. A maximum total of 10 points are allotted to each component, involving population size and density, type of occupations and percent employed in agriculture, number of markets, reliance on cash systems in markets, diversity of markets, infrastructure,[14] different social networks and culture, and average level and diversity in education and income. In my particular question of household consumption, poor infrastructure in the community, such as inconvenient transportation

13 I make up the missing *hukou* information according to the following principle: starting from any survey wave when the *hukou* information becomes available, if the individual is rural registered in that year, she is inferred to be rural registered in all the prior years. Instead, if she is urban registered in that survey wave, she is expected to keep urban registered in all the posterior years. The inference is based on the fact that in most cases the change of *hukou* identity only occurs in the single direction from rural to urban status.

14 For example, piped water, waste disposal, paved roads, communication systems, transportation and electricity.

or insufficient supply of water and electricity, can restrict household consumption of durable goods to a great extent. Table 2 provides the summary statistics of these community characteristics. These components are identified for each participating community in the CHNS data and will be controlled for community effects in my later estimations.

I first define urban households as families where every household member is both urban registered and works in nonagricultural occupations in that survey wave. [15] Next, for the remaining households, where at least one household member is either rural registered or works in agricultural sectors,[16] I need to further specify them into migrant households and peasant households.

Typically, migrant workers in China can fall into two possible situations. First, regardless of their *hukou* status, some suburban peasants are temporarily employed in neighboring cities and return to rural areas during the annual sowing or harvest season. This situation was particularly true in the early 1990s when the land expropriation policy was carried out in some edge cities in China. Suburban peasants were then forced to give up lands and turn to seek employment in nonagricultural industries in cities. Second, rural registered permanent residents (holding rural *hukou*) permanently leave rural areas and are employed in nonagricultural occupations in cities. Among these migrants, a considerable proportion of them have migrated across cities and even provinces. Compared with inland cities, coastal cities attract more migrants by creating

15 Rural registered residents can change their registered identity in several ways, such as attending college, purchasing property in cities, getting compensated in farm land requisition, etc. Therefore, residents who are urban registered in wave *t* could be rural registered in the previous survey waves.
16 All the adult household members are required to report their primary occupations in CHNS. Adults work in agricultural sectors can be peasants, fishermen, gardeners, hunters or live stock feeders.

more open positions and offering higher wages.

Based on the analysis above, for the former, I calculate the proportion of agricultural income in total individual income of each surveyed individual and treat those self-reported peasants as actual migrant workers when the agricultural proportion is less than one half. For the latter, I keep the sample of rural registered residents who work in nonagricultural occupations in the urban sites. Whenever at least one household member is labeled as a migrant worker, the household is marked as a migrant household. These households are differentiated from the remaining peasant households in the survey where adult household members not only work as suburban peasants but also rely on agricultural income as their main income source.

Figure 1 depicts the distributions of all migrant workers' primary occupation in the dataset. First, nearly 40% of migrant workers defined in my study are self-reported peasants. This group can represent migrant workers in the first situation as I described above, in which rural peasants voluntarily or passively leave lands seasonally and make use of their free time to earn extra money in nonagricultural sectors in cities. Since these migrant workers still rely on their agricultural income, it is reasonable for them to report their primary occupations as peasants in the survey. Next, among the remaining migrants, who completely leave rural settings and seek employment in cities, 16.2% are non-skilled workers and 13.5% are employed as service workers, such as housekeeper, cook, waiter, doorkeeper, and hairdresser. Figure 2 and Figure 3 present the contrast of the constitution between urban workers and migrant workers by type of work unit and employment position in occupations separately. In Figure 2, the contrast is particularly noteworthy in government and state owned enterprises, where migrant workers only

account for less than 1/5 of total workers. In Figure 3, urban workers are shown to outnumber migrant workers significantly in the subgroup of permanent employees. Horizontally, over one half (52.3%) of migrant workers living in cities are self-employed, 23.5% are permanent employees in enterprises, 9.1% are contract employees and 11.8% are only temporary employees.

Table 3 reports the summary statistics of each type of household in the sample. Several interesting characteristics show up in the table. First, the average income level of urban households is strikingly higher than that of the other two types of households. This is particularly consistent with the real settings. In China, while the annual average income per capita of urban workers increased from 762 yuan in 1980 to 29,229 yuan in 2008, the income level of migrant workers didn't proceed at the same speed. Take the Pearl River Delta in Guangzhou as an example, from 1992 to 2004, while the GDP of the province increased by more than 20% every year, the average salary of migrant workers only increased by 68 yuan (Yang, 2010). Second, migrant households are shown to be younger and more educated than peasant households. The young rural workforce has stronger incentives to change their economic situations since the more they invest into human capital when they are young, the more payoff they will gain later. Furthermore, since young people don't rely on fixed social circles as much as seniors do, the psychological costs of migration are comparatively lower. For the above two reasons, younger and more educated people tend to migrate more frequently (Gao, 2006). Third, while urban households are comparatively more affluent and educated than their migrant peers, they also tend to cluster with neighbors who share similar economic and educational situations with them. However, compared with peasant households, although migrant households are better off, they are shown to live in less affluent and

educated communities.

CHNS records a detailed list of household electrical appliances owned by each surveyed household. For each item, Table 4 displays the means and standard deviations of the number owned, the total cost spent, and the number of newly purchased items in the past twelve months. By each type of household, Table 5 shows the percentage of owners for each category of household electrical appliance in each survey wave.

In Table 5, overall, in each type of household, the percentage of durable goods holders keeps increasing by wave, which is particularly true for washing machines, refrigerators, air-conditioners, cameras, microwave ovens, and computers. Evidence of neighborhood effects is expected to be found in these categories, where frequent update of technology always results in superior and popular products in the market during the survey span.

By contrast, the opposite trend is captured in the ownership level of radios and tape recorders, videocassette recorders, black and white televisions, electric fans, and DVDs and VCDs. First of all, radios and tape recorders, videocassette recorders, and black and white televisions were fashionable among Chinese households from the 1980s to the early 1990s. Then, with the advent of more vivid and advanced recreation tools, these items gradually lost appeal as is shown in the decreasing percentage of owners particularly after 2000. By comparison, although the electric fan is shown to no longer be gaining popularity among urban households, the percentages of fan ownership among migrant and peasant households remain very high. Finally, due to the mature technology and affordable prices, DVDs and VCDs are prevalent even in rural households in China. Starting from 2004, the ownership level has kept steady around 55%

in migrant households. Considering the obsolete technology of the durable goods in these categories, I do not expect a significant neighborhood effect associated with these goods.

Horizontally, the percentage of urban owners of almost any kind of durable goods tends to be the highest among all the three types of households. Meanwhile, migrant households are better off than their peasant peers. In most categories, the difference between the percentages of migrant and urban owners narrowed with each survey wave. In retrospect, from the 1980s to the early 1990s, when Chinese rural households still held a low level of durable goods stocks, urban families' durables consumption experienced explosions and has been quickly saturated since then. From the 1990s, while rural households' consumption has begun to increase substantially in quantity, urban households have shifted their focus to goods' quality (Wang *et al.*, 2003). Therefore, although the income gap between rural and urban areas was further enlarged during this period, the difference in durable goods stocks level was diminished. However, as is shown in Table 5, exceptions are found for air conditioners, microwave ovens and computers. In these categories, goods are still too exclusive and fashionable to be satisfied by the budget constraints of most migrant households who have a low current income and instable income expectations. Another explanation by Wang *et al.* (2003) attributes the high durable goods stocks in urban households to their high savings rate because high-grade products' consumption is believed to depend on past income instead of current income.

6. Results

In this study, the sample households I focus on are the rural-urban migrant households

in China. Therefore, the sample is restricted to all the migrant households of each survey wave. In each regression, the dependent variable is a dummy variable indicating whether or not household *i* owns one specific kind of household electrical appliance in that survey wave. Neighbors' average household income per capita and formal years of education are the variables of most interest to me. Also controlled for are household characteristics, community characteristics, wave dummies and fixed household effects.

6.1 Evidence of Neighborhood Effects from All Neighbors

Table 6 and Table 7 report neighbors' income effects and education effects separately. In each table, neighborhood effects are estimated using a logit fixed effects model, an OLS fixed effects model and a nonlinear fixed effects model with quadratic form are reported together for comparison.

In Table 6, neighborhood income effects are identified in migrant households' ownership of refrigerators, air conditioners, microwave ovens and computers. First of all, as is shown in the estimation results of the logit fixed effects model where average marginal effects are reported, if neighborhood *n(i)*'s average household income per capita increases by 1,000 yuan, the mean expected probability of owning an air conditioner for a migrant household *i* increases by 0.043. Further, 1 percent increase in neighbors' average income results in 0.4 percentage point change in the probability of owning an air conditioner.[17] The results demonstrate that when making purchase decisions on air conditioners, migrant households can be affected by the presence of their wealthy neighbors. Indicated by the reduced form of social interactions model, the identified neighborhood income effects can either come from the fact that within the

17 For the method of calculating elasticity in a logit model, see Appendix 1.

neighborhood a high proportion of residents own air conditioners in their apartments, or come from certain contextual effects, for example, a high income level of neighbors, which constitute a common environment to every household in the neighborhood.

Next, in the nonlinear fixed effects model with quadratic form, more evidence of neighborhood income effects can be captured. For example, the F-test results show that, at the significance level of 1%, strong evidence of neighborhood income effects in the ownership of microwave ovens is identified. Further, the partial elasticity analysis demonstrates that the effects are economically significant. On average, each neighborhood's average income level increases by 11.2 thousand yuan over the survey span of 17 years with a standard deviation of 6.03. Considering the enhancement of average income level of each neighborhood during the survey span, I report the mean of each surveyed neighborhood's partial elasticity, which calculates the change in the percentage of migrant households that own a microwave oven as a result of the increase in neighbors' average income level over the survey span.[18] In the specific case of microwave ovens, the average partial elasticity can be as high as 180.3%. As is shown in Table 5, almost none of the surveyed migrant households owned a microwave oven in the early 1990s, while by 2009 almost one quarter of migrant households owned the product.

By comparison, the evidence of income effects is weaker in the ownership of refrigerators and computers. In the refrigerator column, the squared term of neighbors' average income is statistically negative at the significance level of 5%. The turning point occurs at the point of 13,589 yuan, which is close to the 84th percentile in the

18 For the method of calculating elasticity and partial elasticity in a nonlinear model with quadratic form, see Appendix 2.

distribution of neighbors' average income. Although for the majority of surveyed neighborhoods positive income effects exist in the ownership of refrigerators, they are economically insignificant, which is less than 1%.

In Table 7, the evidence of neighborhood education effects is mainly captured in the nonlinear fixed effects model with quadratic form. The F-test results demonstrate that, in the ownership of air conditioners, cameras, microwave ovens, and computers, at least one of the linear or the squared terms of neighbors' average education level is significant at the 5% level or even lower. Statistically, the evidence is particularly strong in the ownership of air conditioners and microwave ovens, where the significance level can be 0.1%. Further, the partial elasticity analysis shows that neighborhood education effects are also significant economically. Over the span of CHNS, neighborhood's average education level increases by 2.7 years on average. In Table 7, I also report the mean of partial elasticity of each neighborhood. Nearly in all the categories of household durable goods, the improvement of neighborhood education level during the 17 years can lead the percentages of migrant owners to increase by over 100%. Migrant households are probably affected by the education level of their neighbors through the channel of information sharing. Educated neighbors play the role of transmitting information, like price or quality, of certain kind of durable goods in the local market. Also, their consumption choice and tastes can reflect the ongoing trends and fads and thus influence other households' purchase decisions to a certain extent.

Table 8 and Table 9 replicate the same regression procedures in the previous tables for another set of durable goods, including radios and tape recorders, videocassette recorders, black and white televisions, electric fans, and DVDs and VCDs. In Section 5,

I explained that I don't expect to find significant neighborhood effects in this set of household durable goods, either because of their obsolete technology or because of their role as a necessity instead of a luxury in daily life. However, one exception is radios and tape recorders, where both neighborhood income effects and neighborhood education effects show up. While migrant households' purchase decision of a radio or tape recorder can be positively affected by their neighbors' income level, the education effects are negative. The results can be explained by the characteristics of radios and tape recorders themselves and the inferior economic situations of rural- urban migrant workers in China. Compared with other acoustic products, a radio or tape recorder is cheap enough that most migrant households can afford it. Meanwhile, it is indeed on the way out particularly when the technology of other products is being updated so quickly nowadays. Educated and knowledgeable neighbors can transmit the information about other feasible consumption choices that may decrease a migrant household's interest in radios and tape recorders. In addition, negative neighbors' education effects are also detected in black and white televisions. Consistent with my initial expectation, higher neighbors' education level leads a lower proportion of migrant households in the neighborhood to own an outdated household electrical appliance.

Finally, on the basis of my previous attempts in the nonlinear fixed effects model with quadratic form, interaction terms are added to the model. First, neighbors' average income level interacted with individual household *i*'s education level is included in the regression of neighborhood income effects. Next, neighbors' average education level interacted with individual household *i*'s income level is put into the model of neighborhood education effects. The results are presented in Table 10. In most cases, the interaction term itself is significantly positive, showing that the neighborhood effects

can be strengthened by higher individual households' income or education level. Meanwhile, by comparison, the presence of interaction terms doesn't change the previous regression results to a great extent.

6.2 Robustness Check and Specification of Reference Group

Based on the evidence of the significant impact of neighborhood effects on migrant households' ownership of radios and tape recorders, air conditioners, microwave ovens, cameras and computers as identified in the previous section, all neighbors are further specified into migrant and non-migrant neighbors according to the household registration status of each household member. The average income per capita of each group of neighbors is put together into one OLS fixed effects model, so that I can distinguish which is the main reference group for a migrant household when making consumption decisions. In other words, I'm interested in whether rural to urban migrant workers will compare themselves with their migrant peers that are in similar social and economic situations, or will try to keep up with non-migrant neighbors who have fixed residences, stable occupations, complete social welfare and good income expectations in the city.

Table 11 reports the estimation results of the income effects from specified neighbors, in which I only list the durable goods that have already been identified to be subject to some neighborhood income effects in my previous analysis. Three groups of F-test results are reported in all. First of all, in order to check the robustness of my estimation results in Table 6 and Table 8, the linear term and the squared term of both migrant households and non-migrant households' average income per capita are excluded. The estimation results for the durable goods of each category remain significant and robust

in Table 11 except for refrigerators. Similar to the F-test results in Table 6, neighbors' income effects on the ownership of refrigerators are shown to be quite weak and even turn insignificant in the robustness check. Considering that refrigerators can be treated as necessities in daily life, it is not unreasonable that most families don't necessarily take into account the income level of their neighbors when planning to purchase a refrigerator.

Next, the linear term and the squared term of only migrant households' average income per capita are excluded. Then, the linear and the quadratic term of non-migrant counterparts are excluded. The two separate exclusion tests results are reported together to demonstrate that, in the ownership of radios and tape recorders, and computers, neighborhood income effects mainly come from non-migrant neighbors, while in the ownership of air conditioners and microwave ovens both migrant and non-migrant neighbors' income effects are statistically significant at the 1% level. Furthermore, compared with the income pressure from migrant neighbors, non-migrant neighbors' income effects are also more significant economically. As is shown in the partial elasticity analysis, the income effects from non-migrant neighbors more than double those from migrant neighbors.

In the social comparison model presented by Falk *et el*. (2004), the reference groups chosen by people are believed to serve the goals of self-improvement and self-enhancement.[19] As predicted by their model, the reference standards increase in individuals' abilities and thus people tend to compare themselves to similar others.

[19] Self-enhancement describes the fact that comparing to others who are inferior often makes people feel better, while self-improvement refers to the fact that people can improve their performance if they set themselves high goals or compare with high reference standards (Falk, *et al*. 2004). For more information, refer to Falk *et el*. (2004).

However, in my study, migrant households pair themselves with non-migrant neighbors in terms of household income level to an even greater extent. My findings are similar to Knight *et al*.'s study, where some evidence suggests that over time urban residents gradually become the reference group for migrants as long rural-urban settlers are shown to be more sensitive to the average urban income per capita in the destination city. In the CHNS, overall 85% of households have been surveyed in at least five of seven waves (Popkin *et al*., 2010). Therefore, I believe that the majority of migrant households defined in this study are also long-settlers in the city, and for that reason they compare themselves with non-migrant local residents as well as with other migrants. Knight *et al*. also find that Chinese migrants have higher aspirations relative to their current income and thus have feelings of relative deprivation. Therefore, another explanation is that, motivated by the goal of self-improvement, migrant households compare themselves with a reference group of people who perform better or are more fortunate (Wood *et al*., 1991).

Based on the estimation results in Table 7 and Table 9, neighborhood education effects with specified neighbors are analyzed as well in Table 12. First of all, the neighborhood education effects on migrant households' ownership of air conditioners, cameras, microwave ovens, and computers are confirmed to be significant and robust at the level of 10%. Consistent with the F-test results in Table 7, the education effects are particularly strong in air conditioner and microwave oven ownership. Compared with cameras and computers, although air conditioners and microwave ovens can be treated as necessities in urban households, they are still fresh to most migrant households. In rural China, most families dwell in a spacious and open environment, where the usage of air conditioners is not only unaffordable but inefficient. Also, the traditional cooking

ways in the countryside are still prevalent that microwave ovens have not been introduced widely to rural families as a convenient machine. It is not until after rural-urban migration that migrant households start to get access to these fashionable products by means of information transmission among neighbors in the city.

Next, the F-test results show that, in the ownership of computers, the education effects primarily come from migrant neighbors. By comparison, in the cases of air conditioner and microwave ovens, both migrant and non-migrant neighbors' education effects are statistically significant. Economically, compared with non-migrant neighbors' education effects, the migrant counterparts are also more significant as is indicated by the partial elasticity analysis. Therefore, although after urban settlement migrant households have gradually formed their new reference groups in terms of household income per capita, they still refer to the group of migrants for information sharing. One possibility is that these migrants deliberately select their residential neighborhoods where pioneering peers from their hometowns already reside. Therefore, the social network established within a community is actually the circle of migrant acquaintances who have already known each other before migration. Another possibility is that despite different backgrounds before migration, the similar economic and social status quo result in a common cultural identity for all the migrants. Migrant households are thus more willing to imitate the behaviors of those comparable peers.

7. Discussion and Conclusion

In the context of rural-urban migration in China, this paper is designed to detect the evidence of neighborhood effects on migrant households' ownership of durable goods. Using the panel data from the China Health and Nutrition Survey from 1993 to 2009,

this study estimates the reduced form social interaction model. For a list of eleven kinds of durable goods, OLS, logit and nonlinear models with fixed household effects are all attempted and reported for comparison. Even though in this study I am not attempting to solve Manski's reflection problem, some evidence of neighborhood income and education effects are captured.

First of all, the estimation results suggest that migrant households take into account their neighbors' income and education level when making purchase decisions on household electrical appliances, such as air conditioners, microwave ovens, cameras, and computers. Next, all neighbors are further specified into migrant neighbors and non-migrant neighbors. Economically, the income effects from non-migrant neighbors are more influential, while the education effects within the circle of migrant households are dominant. Finally, the peer neighbors' effects can be strengthened by an individual migrant household's income or education level.

My results on neighborhood effects have possibly important policy implications. They suggest that, for now, although migrant households wish to keep up with the income level of non-migrant households in urban neighborhoods, their information sharing network is still mainly built among migrant households. To promote the urbanization of migrant households of China, some restrictions on the household registration system will have to be relaxed. The differences in registered identity actually set up a hurdle between local residents and migrant workers both institutionally and psychologically, which deters the incorporation of migrant households into local social network.

Appendices

Appendix 1

The elasticity in a logit model is calculated by the following formula:

$$\eta(x_i) = \frac{x_i}{y_i} \cdot \frac{\partial \Pr(x_i)}{\partial x}, \tag{1}$$

where $\Pr(z) = \frac{e^z}{1+e^z}$.

First,

$$\frac{\Pr(z)}{1-\Pr(z)} = \frac{\frac{e^z}{1+e^z}}{\frac{1}{1+e^z}} = e^z. \tag{2}$$

Assuming that $z = \beta_0 + \beta_1 x_i + \varepsilon_i$, and taking the natural logarithms of equation (2) gives the logit model:

$$\ln\left(\frac{\Pr(x_i)}{1-\Pr(x_i)}\right) = \beta_0 + \beta_1 x_i + \varepsilon_i. \tag{3}$$

Taking derivative with respect to *x* on both sides of equation (2) gives the following equation:

$$\frac{\partial(\ln\left(\frac{\Pr(x_i)}{1-\Pr(x_i)}\right))}{\partial x} = \beta_1. \tag{4}$$

Next, we get:

$$\frac{1-\Pr(x_i)}{\Pr(x_i)} \cdot \frac{(1-\Pr(x_i))\frac{\partial \Pr(x_i)}{\partial x} + \Pr(x_i)\frac{\partial \Pr(x_i)}{\partial x}}{(1-\Pr(x_i))^2} = \beta_1. \tag{5}$$

After steps of simplification, we get:

$$\frac{\partial \Pr(x_i)}{\partial x} = \beta_1 \Pr(x_i)\,(1 - \Pr(x_i)). \tag{6}$$

Therefore, $\eta(x_i) = \frac{x_i}{y_i} \cdot \beta_1 \Pr(x_i)\,(1 - \Pr(x_i))$. The elasticity measures the percentage point change in the probability due to a 1 percent increase of x. If I report the elasticity at the mean of *x* and the mean of *y*, then:

$$\eta(\bar{x}) = \frac{\bar{x}}{\bar{y}} \cdot \beta_1 \Pr\left(\bar{x}\right)\left(1 - \Pr\left(\bar{x}\right)\right), \quad (7)$$

where $\Pr\left(\bar{x}\right) = \frac{e^{\beta_0+\beta_1 \bar{x}}}{1+e^{\beta_0+\beta_1 \bar{x}}}$, $\bar{x}$ is the mean of neighbors' average income level, and $\bar{y}$ indicates the mean of appliance ownership level.

Appendix 2

In a nonlinear model with quadratic form, suppose that

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_1^2 + \beta_3 x_2 \ldots + \beta_{k+1} x_k + \varepsilon_i. \quad (1)$$

First, consider the mean of $x_1 = \bar{x}$ and $y = \bar{y}$, the elasticity of *y* with respect to x_1 is calculated by the following formula:

$$\frac{\partial y}{\partial x_1} \cdot \frac{\bar{x}}{\bar{y}}. \quad (2)$$

Taking derivative with respect to x_1 on both sides of equation (1) gives:

$$\frac{\partial y}{\partial x_1} = \beta_1 + 2\beta_2 x_1. \quad (3)$$

Therefore, the elasticity of a nonlinear model with quadratic form is given as:

$$\frac{\partial y}{\partial x_1} \cdot \frac{\bar{x}}{\bar{y}} = (\beta_1 + 2\beta_2 \bar{x}) \frac{\bar{x}}{\bar{y}} \quad (4)$$

Second, consider a change in x_1 of Δx, the partial elasticity of *y* with respect to x_1 is calculated by the following formula:

$$\frac{\mathrm{E}\left[y \middle| x_1 = \bar{X} + \Delta x, x_2, \ldots x_k\right] - \mathrm{E}\left[y \middle| x_1 = \bar{X}, x_2, \ldots x_k\right]}{\bar{y}} \cdot 100\%. \quad (5)$$

In equation (1), a change in x_1 of Δx gives:

$$y = \beta_0 + \beta_1 (x_1 + \Delta x) + \beta_2 (x_1 + \Delta x)^2 + \beta_3 x_2 \ldots + \beta_{k+1} x_k + \varepsilon_i. \quad (6)$$

Subtracting equation (1) from equation (4) gives:

$$\Delta y = \beta_1 \cdot \Delta x + \beta_2 (2x_1 \cdot \Delta x + \Delta x^2). \quad (7)$$

Therefore, the partial elasticity calculated at the mean of *x* and *y* is given as follows:

$$\frac{\Delta y}{\bar{y}} \cdot 100\% = [\beta_1 \cdot \Delta x + \beta_2 (2\bar{x} \cdot \Delta x + \Delta x^2)] / \bar{y} \cdot 100\% \quad (8)$$

where, in the specific context of this study, Δx is the increase of neighborhood average income level over the survey span from 1993 to 2009, $\bar{x}$ is the mean of neighbors' average income level, and $\bar{y}$ is the mean of ownership level of a certain kind of durable goods. I calculate the partial elasticity by equation (8) for each surveyed neighborhood, and then take the average of each neighborhood's partial elasticity. The same method applies to the analysis of neighborhood education effects.

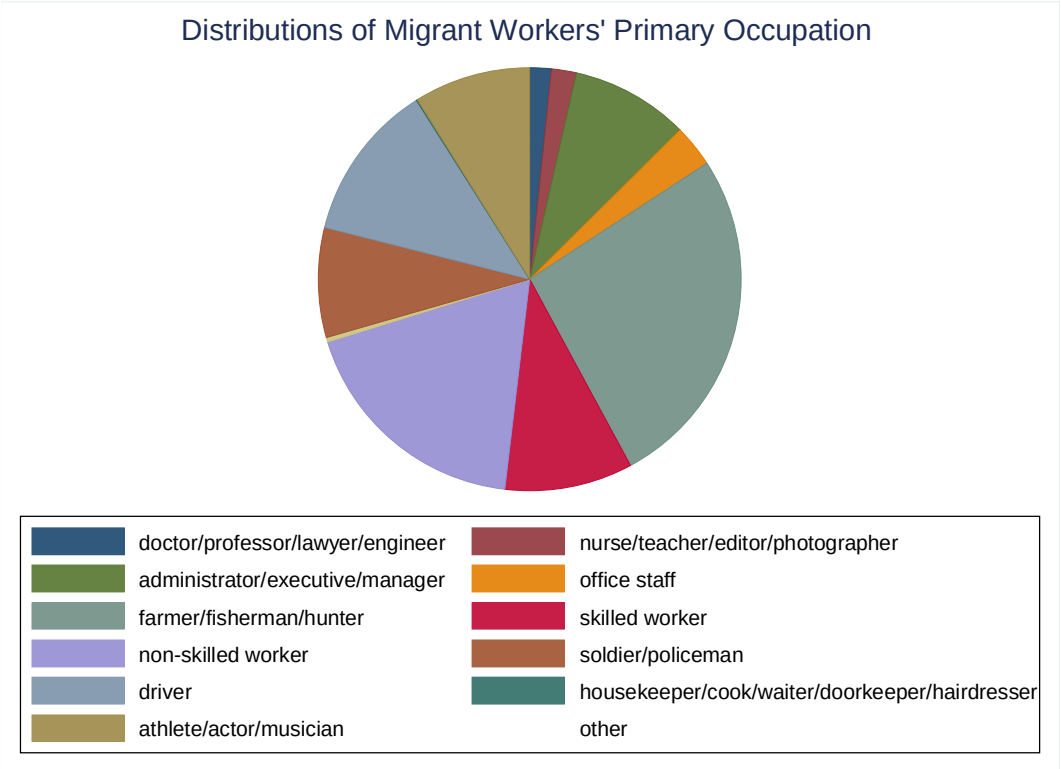

Figure 1 Distributions of Migrant Workers' Primary Occupation

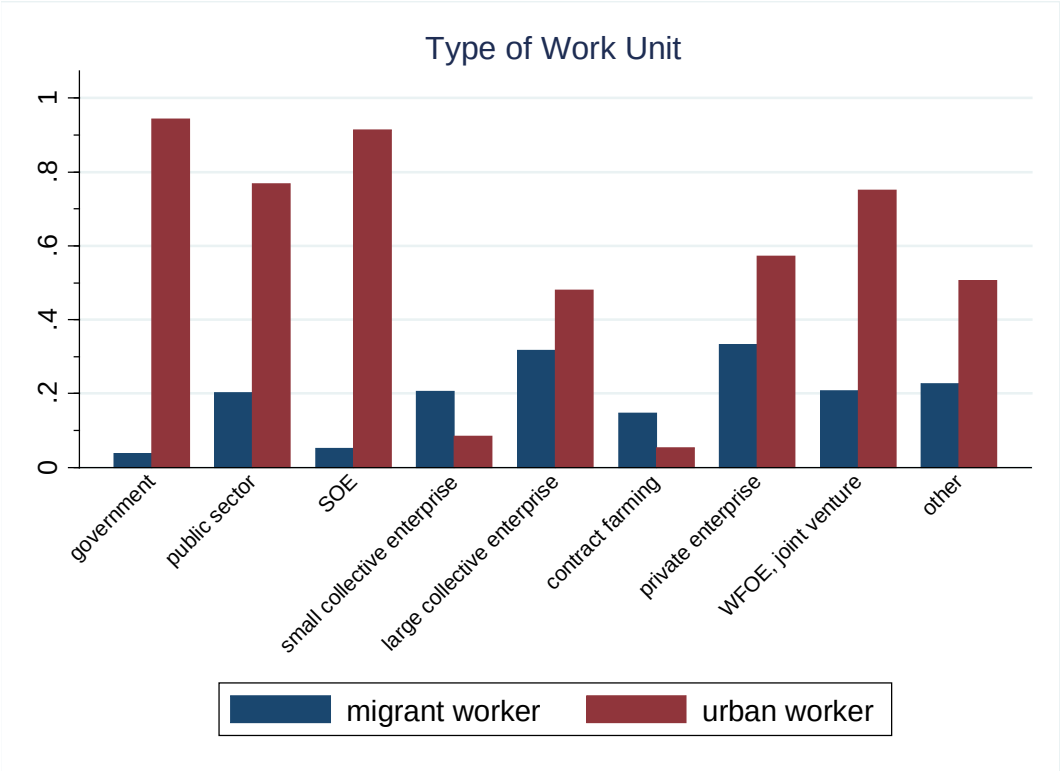

Figure 2 Type of Work Unit

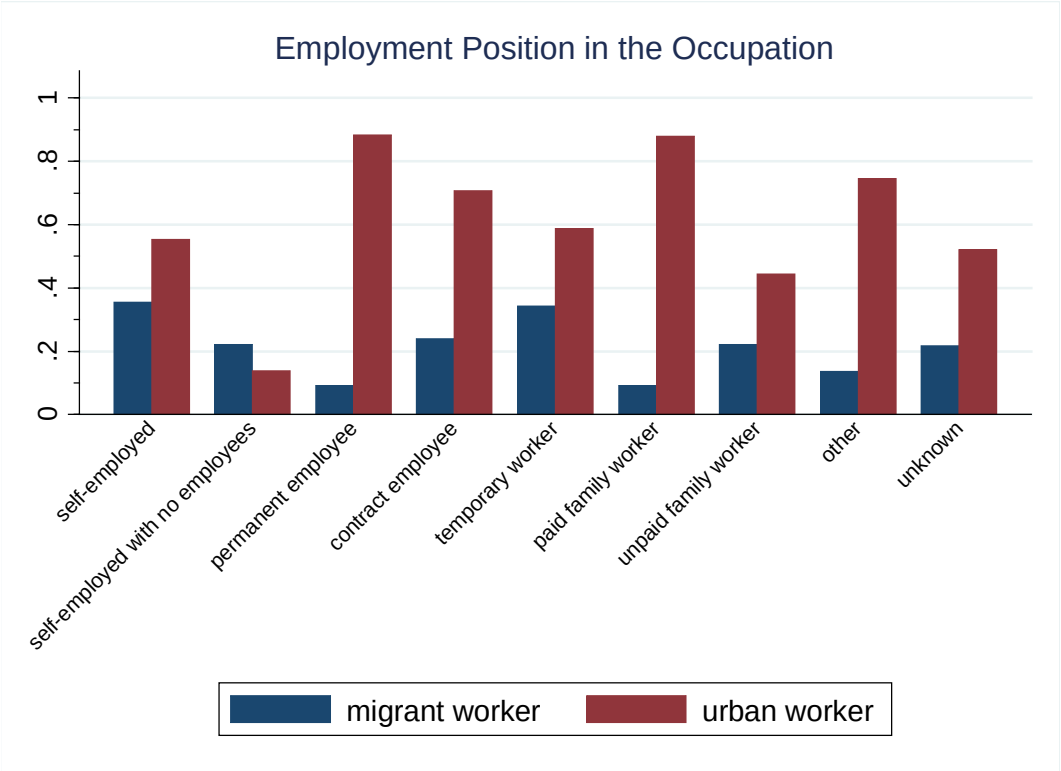

Figure 3 Employment Position in the Occupation

Table 1 Sample Size by Survey Wave

wave	# of cities	# of communities	# of households	# of individuals
2009	18	73	1,435	5,168
2006	18	73	1,430	5,190
2004	18	73	1,441	2,818
2000	18	73	1,396	5,029
1997	16	64	1,277	4,789
1993	16	61	1,052	4,235

Table 2 Community Characteristics: Summary Statistics

	1993	1997	2000	2004	2006	2009
Population density	5.83	5.55	5.70	5.79	5.76	5.96
	(1.31)	(1.58)	(1.61)	(1.65)	(1.61)	(1.53)
Sanitation	5.22	5.71	6.02	6.49	6.72	6.90
	(3.23)	(3.30)	(3.20)	(3.02)	(2.95)	(2.90)
Housing	4.17	5.30	6.02	6.62	6.99	7.63
	(2.56)	(2.73)	(2.67)	(2.51)	(2.33)	(2.02)
Transportation	5.06	5.30	5.72	5.90	5.82	5.97
infrastructure	(2.63)	(2.67)	(2.47)	(2.40)	(2.57)	(2.18)
Health	5.57	5.71	5.64	5.31	5.03	5.97
infrastructure	(2.21)	(2.17)	(2.23)	(2.33)	(2.40)	(2.57)
Traditional	4.41	5.12	6.00	5.10	4.86	4.85
markets	(3.26)	(3.46)	(3.48)	(3.67)	(3.90)	(3.47)
Economic activity	2.94	4.16	4.71	5.93	6.53	6.70
	(1.78)	(3.04)	(3.25)	(3.29)	(3.10)	(3.24)
Diversity	3.99	4.23	4.57	4.73	5.18	5.45
	(1.00)	(0.97)	(1.17)	(1.21)	(1.28)	(1.13)
Modern markets	4.27	4.20	4.76	4.76	4.60	4.38
	(3.09)	(3.25)	(3.33)	(3.02)	(2.92)	(2.89)
Social services	-	-	1.72	3.01	3.20	3.74
	-	-	(1.10)	(2.60)	(2.74)	(3.17)
Observations	188	192	217	216	218	218

Notes: Population density: total population of the community divided by community area, from official records. Sanitation: proportion of households with treated water and prevalence of households without excreta present outside the home. Housing: average number of days a week that electricity is available to the community, percent of community with indoor tap water, percent of community with flush toilets, and percent of community that cooks with gas. Transportation infrastructure: most common type of road, distance to bus stop, and distance to train stop. (Distance is categorized as (1) within community, (2) $\leq$1 km from community, and (3) $\geq$1 km from community). Health infrastructure: number and type of health facilities in or nearby ($\leq$12 km) the community and number of pharmacies in community. Traditional markets: distance to the market three categories; (1) within the boundaries of the community, (2) within the city but not in this community, or (3) not within the city/village/ town); number of days of operation for eight different types of market (including food and fuel markets). Economic activity: typical daily wage for ordinary male worker (reported by community official) and percent of the population engaged in nonagricultural work. Diversity: variation in community education level and variation in community income level. Modern markets: number of supermarkets, cafes, internet cafes, indoor restaurants, outdoor fixed and mobile eateries, bakeries, ice cream parlors, fast food restaurants, fruit and vegetable stands, bars within the community boundaries. Social services: provision of preschool for children under 3 years old, availability of (offered in community) commercial medical insurance, free medical insurance, and/or insurance for women and children.

Table 3 Household Characteristics: Summary Statistics

	Peasant Household	Migrant Household	Urban Household
2009	228	279	976
2007	235	295	964
2004	269	286	982
2000	201	178	895
1997	194	224	771
1993	161	231	602
Household income	5.37	6.96	10.26
per capita	(7.17)	(7.45)	(10.79)
Formal years	6.17	7.04	9.39
of education	(3.19)	(2.87)	(4.06)
Age	52.01	47.81	55.51
	(13.03)	(11.76)	(13.81)
Employment Status	0.61	0.80	0.46
	(0.49)	(0.40)	(0.50)
Male	0.80	0.83	0.72
	(0.40)	(0.38)	(0.45)
Neighbors' income	6.49	6.45	10.12
	(3.92)	(3.55)	(6.32)
Neighbors' education	6.67	6.58	9.08
	(1.65)	(1.69)	(2.59)

Notes: Urban households are defined as households where each household member is neither rural registered nor a peasant. Migrant households include all households in two situations: First, at least one household member holds rural registered identity but works in non-agricultural sectors in cities; second, at least household member's agricultural income proportion in total individual income is less than 50% despite that her self-reported primary occupation is a peasant. The remaining households are defined as peasant households. Table 3 reports the means and standard deviations of household characteristics. *Household income per capita* is inflated to 2009. *Formal years of education* are calculated based on the average formal years of education of any household members who are older than 21. *Age*, *employment status* and *male* collect the information of household head. Particularly, *employment status* is equal to 1 when the household head is being employed, otherwise 0; *male*=1 when the household head is male, otherwise 0. *Neighbors' income* is calculated by the formula as (the sum of income per capita of each household in one community–household income per capita)/ (neighborhood size-1), and *neighbors' education* is calculated by the formula as (the sum of average formal years of education of each household in one community–household education level)/ (neighborhood size -1).

Table 4 Household Electrical Appliances Characteristics: Summary Statistics

Durables	the # owned	the total value (yuan)	the # newly purchased
Washing machine	0.73	793.78	0.06
	(0.44)	(958.44)	(0.25)
Refrigerator	0.65	1589.5	0.06
	(0.48)	(1284.95)	(0.24)
Air conditioner	0.27	3579.08	0.05
	(0.44)	(4814.65)	(0.25)
Camera	0.25	997.66	0.02
	(0.43)	(1893.89)	(0.17)
Microwave oven	0.24	574.58	0.02
	(0.43)	(797.60)	(0.15)
Computer	0.20	4119.1	0.03
	(0.40)	(4135.82)	(0.21)
Radio, tape recorder	0.50	407.33	0.04
	(0.50)	(1054.32)	(0.23)
Videocassette recorder	0.09	1950.30	0.01
	(0.29)	(1895.17)	(0.11)
Black and white TV	0.20	366.51	0.01
	(0.40)	(503.50)	(0.09)
Electric fan	0.80	247.29	0.11
	(0.40)	(346.44)	(0.43)
DVD/VCD	0.45	666.49	0.12
	(0.51)	(764.06)	(0.35)

Notes: The table reports the means and standard deviations of the number, the total value of worth and the newly purchased number of each kind household electrical appliance of the sample households. The original survey questions are “Does your household own this appliance?”, “How many are owned”, “How many were purchased during the past 12 months”, and “What is the total value of all these appliances? (yuan)” In the last question , if the answer is unknown, -9999 is recorded. In this study, the missing or unknown value of one specific kind of electrical appliance is made up based on the mean value of the goods obtained in the survey sample that year.

Table 5 The Percentage of Households that Own One Specific Kind of Household Electrical Appliance

	Washing Machine	Fridge	Air Conditioner	Camera	Microwave Oven	Computer	Radio, Tape Recorder	Videocassette Recorder	Black and white TV	Electric Fan	DVD/VCD
Peasant Household											
1993	35.40	14.91	1.24	5.59	0.62	-	43.48	1.86	45.34	72.67	-
1997	45.36	20.62	3.61	7.73	0.52	0.00	48.97	5.67	46.39	58.25	-
2000	50.25	27.86	2.99	5.47	1.00	1.00	44.78	3.98	32.84	64.68	16.92
2004	51.67	33.09	14.13	9.67	8.92	4.83	38.29	5.20	18.96	66.91	39.03
2006	60.00	39.57	20.00	13.62	14.47	12.34	33.62	7.23	9.79	73.19	39.57
2009	67.98	60.53	20.18	14.04	20.61	23.25	-	2.19	-	73.68	41.67
Migrant Household											
1993	49.10	22.58	2.87	8.60	0.00	-	51.25	10.04	58.42	74.91	-
1997	52.54	32.88	6.10	11.19	1.36	1.36	57.97	7.80	43.39	75.93	-
2000	58.04	43.36	9.44	11.54	5.24	2.80	50.00	6.99	28.67	74.83	32.52
2004	71.35	48.31	20.79	16.85	15.73	10.11	40.45	2.81	16.85	76.40	57.87
2006	75.00	53.13	31.25	16.52	22.77	20.09	26.34	5.80	7.14	78.57	54.46
2009	76.19	68.40	27.27	15.15	23.81	32.90	-	3.03	-	80.52	53.68
Urban Household											
1993	74.92	63.46	3.99	26.41	1.83	-	73.42	11.46	38.04	87.04	-
1997	75.75	71.85	15.30	25.94	6.23	4.15	67.06	19.20	22.05	84.70	-
2000	81.90	79.89	27.60	32.63	18.21	10.06	58.77	14.19	11.84	86.15	39.55
2004	80.65	79.23	41.04	32.48	41.55	23.83	42.57	8.55	4.18	83.30	48.78
2006	83.51	82.47	43.88	34.23	45.75	29.98	34.96	7.05	2.80	82.78	50.21
2009	87.40	89.55	54.82	34.84	58.61	47.13	-	8.30	-	79.82	47.34

Notes: The table reports, for peasant households, migrant households, and urban households separately, the percentage of surveyed families that own one specific kind of household electrical appliance in each survey wave.

Table 6 Neighbors' Income Effects with Fixed Household Effects: All Neighbors

	Washing Machine	Fridge	Air Conditioner	Camera	Microwave Oven	Computer
Logit Model	-0.004	0.002	0.043***	0.004	-0.003	0.007
	(0.015)	(0.011)	(0.015)	(0.019)	(0.048)	(0.012)
N	441	560	332	265	221	307
OLS Model	-0.010	0.008	0.009*	0.002	0.003	-0.005
	(0.007)	(0.007)	(0.005)	(0.005)	(0.005)	(0.006)
N	1,436	1,435	1,435	1,435	1,434	1,158
Nonlinear Model						
inc	-0.001	0.042**	0.005	-0.010	-0.047***	-0.048***
	(0.016)	(0.017)	(0.013)	(0.013)	(0.012)	(0.017)
inc^2	0.000	-0.002**	0.000	0.001	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
F-test (*p*-value)	0.3005	0.0436	0.2466	0.5921	0.0000	0.0167
Elasticity	-0.062	0.323	0.312	-0.142	-1.065	-1.187
Partial elasticity	-0.212	-0.010	0.722	0.424	1.803	0.465
N	1436	1435	1435	1435	1434	1158

Notes: The dependent variable is a dummy variable indicating whether or not the household owns one specific kind of household electrical appliances in that survey wave. In each regression also controlled are household characteristics, including household income per capita, average formal years of education, the age, gender and employment status of the household head, community characteristics, including population density, housing, transportation infrastructure, health infrastructure, traditional markets, economic activity, diversity, social services and neighborhood average employment status, wave dummies, household dummies as well as neighbors' average formal years of education. In the logit model, average marginal effects are reported. The *elasticity* row reports the change of percentage of migrant durables' holders caused by 1 percentage change of neighbors' average income level. The *partial elasticity* row reports the mean of each neighborhood's change of percentage of migrant durables' holders as a result of the change of neighborhood income level over the survey span from 1993 to 2009.

Table 7 Neighbors' Education Effects with Fixed Household Effects: All Neighbors

	Washing Machine	Fridge	Air Conditioner	Camera	Microwave Oven	Computer
Logit Model	0.067	0.036	-0.086*	0.087	0.098	-0.099**
	(0.054)	(0.045)	(0.050)	(0.084)	(1.300)	(0.046)
N	441	560	332	265	221	307
OLS Model	-0.014	0.027	0.015	0.039*	0.024	0.013
	(0.029)	(0.029)	(0.023)	(0.023)	(0.021)	(0.030)
N	1,436	1,435	1,435	1,435	1,434	1,158
Nonlinear Model						
edu	0.090	0.160**	-0.302***	-0.082	-0.194***	-0.293***
	(0.078)	(0.080)	(0.061)	(0.063)	(0.057)	(0.093)
edu^2	-0.007	-0.009*	0.022***	0.008**	0.015***	0.020***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)
F-test (*p*-value)	0.3173	0.1345	0.0000	0.0355	0.0002	0.0025
Elasticity	-0.068	0.560	-0.352	1.544	0.522	-1.188
Partial elasticity	-0.123	0.038	1.031	1.115	1.384	0.891
N	1,436	1,435	1,435	1,435	1,434	1,158

Notes: The dependent variable is a dummy variable indicating whether or not the household owns one specific kind of household electrical appliances in that survey wave. In each regression also controlled are household characteristics, including household income per capita, average formal years of education, the age, gender and employment status of the household head, community characteristics, including population density, housing, transportation infrastructure, health infrastructure, traditional markets, economic activity, diversity, social services and neighborhood average employment status, wave dummies, household dummies as well as neighbors' average income per capita. In the logit model, average marginal effects are reported. The *elasticity* row reports the change of percentage of migrant durables' holders caused by 1 percentage change of neighbors' average education level. The *partial elasticity* row reports the mean of each neighborhood's change of percentage of migrant durables' holders as a result of the change of neighborhood education level over the survey span from 1993 to 2009.

Table 8 Neighbors' Income Effects with Fixed Household Effects: All Neighbors

	Radio, Tape Recorder	Videocassette Recorder	Black and white TV	Electric Fan	DVD/VCD
Logit Model	0.001	0.003	0.001	-0.005	0.006
	(0.015)	(0.028)	(0.019)	(0.017)	(0.016)
N	583	155	478	340	342
OLS Model	0.004	0.001	0.010	-0.005	0.002
	(0.012)	(0.004)	(0.010)	(0.006)	(0.011)
N	1209	1436	1208	1437	878
Nonlinear Model					
inc	-0.073***	0.007	-0.008	0.008	-0.029
	(0.025)	(0.010)	(0.021)	(0.015)	(0.033)
inc^2	0.004***	-0.000	0.001	-0.001	0.001
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
F-test (*p*-value)	0.0027	0.7705	0.3984	0.4360	0.5880
Elasticity	-0.283	0.339	0.082	-0.000	-0.148
Partial elasticity	0.916	-0.169	0.587	-0.128	0.218
N	1209	1436	1208	1437	878

Notes: The dependent variable is a dummy variable indicating whether or not the household owns one specific kind of household electrical appliances in that survey wave. In each regression also controlled are household characteristics, including household income per capita, average formal years of education, the age, gender and employment status of the household head, community characteristics, including population density, housing, transportation infrastructure, health infrastructure, traditional markets, economic activity, diversity, social services and neighborhood average employment status, wave dummies, household dummies as well as neighbors' average formal years of education. In the logit model, average marginal effects are reported. The *elasticity* row reports the change of percentage of migrant durables' holders caused by 1 percentage change of neighbors' average income level. The *partial elasticity* row reports the mean of each neighborhood's change of percentage of migrant durables' holders as a result of the change of neighborhood income level over the survey span from 1993 to 2009.

Table 9 Neighbors' Education Effects with Fixed Household Effects: All Neighbors

	Radio, Tape Recorder	Videocassette Recorder	Black and white TV	Electric Fan	DVD/VCD
Logit Model	0.000	0.113	-0.200***	-0.022	0.009
	(0.070)	(0.163)	(0.072)	(0.081)	(0.076)
N	583	155	478	340	342
OLS Model	-0.005	0.019	-0.095**	-0.019	-0.008
	(0.052)	(0.018)	(0.043)	(0.026)	(0.055)
N	1209	1436	1208	1437	878
Nonlinear Model					
edu	0.243**	0.002	-0.053	0.116	-0.019
	(0.119)	(0.049)	(0.100)	(0.072)	(0.256)
edu^2	-0.019**	0.001	-0.003	-0.009**	0.001
	(0.008)	(0.003)	(0.007)	(0.005)	(0.016)
F-test (*p*-value)	0.0709	0.5351	0.0819	0.1016	0.9894
Elasticity	-0.066	1.834	-1.900	-0.082	-0.126
Partial elasticity	-0.378	0.908	-0.857	-0.141	-0.038
N	1209	1436	1208	1437	878

Notes: The dependent variable is a dummy variable indicating whether or not the household owns one specific kind of household electrical appliances in that survey wave. In each regression also controlled are household characteristics, including household income per capita, average formal years of education, the age, gender and employment status of the household head, community characteristics, including population density, housing, transportation infrastructure, health infrastructure, traditional markets, economic activity, diversity, social services and neighborhood average employment status, wave dummies, household dummies as well as neighbors' average income per capita. In the logit model, average marginal effects are reported. The *elasticity* row reports the change of percentage of migrant durables' holders caused by 1 percentage change of neighbors' average education level. The *partial elasticity* row reports the mean of each neighborhood's change of percentage of migrant durables' holders as a result of the change of neighborhood education level over the survey span from 1993 to 2009.

Table 10 Neighborhood Effects: Interaction Term

	Washing Machine	Fridge	Air Conditioner	Camera	Microwave Oven	Computer
ainc	-0.006	0.018	-0.019	-0.031**	-0.074***	-0.083***
	(0.018)	(0.019)	(0.014)	(0.015)	(0.013)	(0.019)
ainc^2	-0.001	-0.002***	0.000	0.000	0.002***	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ainc*hhedu	0.001	0.004***	0.004***	0.004***	0.005***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
hhedu	0.008	-0.019	-0.014	-0.007	-0.025***	-0.040***
	(0.013)	(0.013)	(0.010)	(0.010)	(0.009)	(0.014)
N	1,437	1,436	1,436	1,436	1,435	1,159
aedu	0.093	0.160**	-0.278***	-0.107*	-0.172***	-0.318***
	(0.079)	(0.081)	(0.061)	(0.064)	(0.058)	(0.095)
aedu^2	-0.008	-0.009*	0.019***	0.011***	0.013***	0.023***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)
aedu*hhinc	0.000	0.000	0.002***	-0.002**	0.002***	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
hhinc	0.002	0.004	-0.014**	0.012**	-0.012**	0.014*
	(0.007)	(0.008)	(0.006)	(0.006)	(0.005)	(0.008)
N	1,437	1,436	1,436	1,436	1,435	1,159

Notes: This table reports the estimation results of an OLS fixed effects model. The dependent variable is a dummy variable indicating whether or not the household owns one specific kind of household electrical appliances in that survey wave. In each regression also controlled are household characteristics, including household income per capita, average formal years of education, the age, gender and employment status of the household head, community characteristics, including population density, housing, transportation infrastructure, health infrastructure, traditional markets, economic activity, diversity, social services and neighborhood average employment status, wave dummies, household dummies.

Table 11 Neighbors' Income Effects: Specified Neighbors

	Radio and Tape Recorder	Refrigerator	Air Conditioner	Microwave Oven	Computer
mig_inc	0.008	0.021*	0.003	-0.021**	-0.007
	(0.023)	(0.013)	(0.010)	(0.009)	(0.013)
mig_inc^2	0.000	-0.001	0.000	0.001***	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
non-mig_inc	-0.060***	0.012	0.014	-0.014	-0.034***
	(0.020)	(0.013)	(0.010)	(0.009)	(0.012)
$non\text{-}mig\_inc^2$	0.004***	-0.000	0.000	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
F-test (*p*-value)	0.0108	0.2660	0.0000	0.0000	0.028
Migrant neighbors					
F-test (*p*-value)	0.7524	0.2480	0.0094	0.0028	0.8321
Partial elasticity	0.109	0.027	0.532	0.525	-0.068
Non-migrant neighbors					
F-test (*p*-value)	0.0023	0.2796	0.0000	0.0000	0.0107
Partial elasticity	0.737	0.144	1.316	2.273	1.227
Observations	1209	1436	1436	1435	1159

Notes: This table reports the estimation results from OLS model with fixed household effects. The dependent variable is a dummy variable indicating whether or not the household owns one kind of household electrical appliances in that survey wave. In each regression also controlled are household characteristics, including household income per capita, average formal years of education, the age, gender and employment status of the household head, community characteristics, including population density, housing, transportation infrastructure, health infrastructure, traditional markets, economic activity, diversity, social services and neighborhood average employment status, wave dummies and household dummies. Three groups of F-test results are reported. First of all, the linear term and the squared term of both migrant households and non-migrant households' average income per capita are excluded. Second, the linear terms and the squared term of migrant households' average income per capita are excluded. Finally, the linear terms and the squared term of non-migrant households' average income per capita are excluded. The *elasticity* row reports the change of percentage of migrant durables' holders caused by 1 percentage change of neighbors' average income level. The *partial elasticity* row reports the mean of each neighborhood's change of percentage of migrant durables' holders as a result of the change of neighborhood income level over the survey span from 1993 to 2009.

Table 12 Neighbors' Education Effects: Specified Neighbors

	Radio and Tape Recorder	Air Conditioner	Camera	Microwave Oven	Computer
mig_edu	0.116	-0.173***	-0.020	-0.054	-0.230***
	(0.115)	(0.056)	(0.059)	(0.053)	(0.077)
mig_edu^2	-0.007	0.012***	0.003	0.005	0.016***
	(0.007)	(0.004)	(0.004)	(0.003)	(0.005)
non-mig_edu	0.026	0.014	-0.050*	0.007	0.045
	(0.053)	(0.027)	(0.028)	(0.026)	(0.051)
non-mig_edu^2	-0.001	0.002	0.004	0.002	-0.003
	(0.005)	(0.002)	(0.002)	(0.002)	(0.004)
F-test (*p*-value)	0.6876	0.0000	0.0584	0.0038	0.0164
Migrant neighbors					
F-test (*p*-value)	0.5622	0.0023	0.3045	0.0361	0.0037
Partial elasticity	-0.076	1.126	0.607	1.225	1.697
Non-migrant neighbors					
F-test (*p*-value)	0. 7517	0.0008	0.1986	0.0081	0.5618
Partial elasticity	0.037	0.675	0.142	0.792	0.064
Observations	1209	1436	1436	1435	1159

Notes: This table reports the estimation results from OLS model with fixed household effects. The dependent variable is a dummy variable indicating whether or not the household owns one kind of household electrical appliances in that survey wave. In each regression also controlled are household characteristics, including household income per capita, average formal years of educsation, the age, gender and employment status of the household head, community characteristics, including population density, housing, transportation infrastructure, health infrastructure, traditional markets, economic activity, diversity, social services and neighborhood average employment status, wave dummies and household dummies. Three groups of F-test results are reported. First of all, the linear term and the squared term of both migrant households and non-migrant households' average formal years of education are excluded. Second, the linear terms and the squared term of migrant households' average formal years of education are excluded. Finally, the linear terms and the squared term of non-migrant households' average formal years of education are excluded. The *elasticity* row reports the change of percentage of migrant durables' holders caused by 1 percentage change of neighbors' average education level. The *partial elasticity* row reports the mean of each neighborhood's change of percentage of migrant durables' holders as a result of the change of neighborhood education level over the survey span from 1993 to 2009.

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