The Dynamics of Social Networks in Philippine Poor Communities: From Giant Leaps to Small Steps[1)]

アジアでも有数な労働力供給源であるフィリピン。しかし国内の地方から都会への労働力移動も大きな問題を抱えている。

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Abstract This paper identifies a puzzle in Philippine rural-urban migration. This puzzle is termed as the Giant-Leap-And-Small-Step (GLASS) effect, and it refers to the ability of rural poor to migrate to the urban sector (giant leap), and to the inability of such migrants to remove themselves from the poor urban sector (small step). While the GLASS effect is based on micro observations, it is also found in a more macro level. This finding is evaluated from the perspective of theoretical explanations for rural-urban migration, where it is shown that the effect implies a further modification in existing theories. Using the insights from social network analysis, this paper attempts to provide an explanation of a puzzle observed in the study of poor communities in the urban and rural sectors of the Philippines. The paper discusses two case studies, covering urban/rural poor, and inter-regional migration for explaining this puzzle. Based on such case studies, a dynamic social network process is formulated to consistently link the three case studies. A crucial factor in these discussions is the presence of scale-free networks which arise from preferential attachment. Policy implications lie in either suppressing preferential attachment in poor urban sectors or promoting preferential attachment in rural poor sectors.

1. Urban-Rural Migration Theories and Statement of the GLASS Puzzle

The most basic economic theory of rural-urban migration is the Lewis (1954) model, which states that such migration is caused by the higher wages to be earned in the urban sector vis-à-vis the rural sector. Through its assumption of labor mobility and competitive labor markets, the Lewis model virtually assumed away the possibility of unemployment at the migration destination, at least in the long run. As migration takes place, wages in the origin (rural) would rise while wages in the destination (urban) would drop, until a point of equilibrium is reached wherein migration ceases.

The Lewis model has been superseded by the Harris-Todaro (1970) model, which explains rural-urban migration under the often-observed presence of persistently high unemployment rates in the destination. Such unemployment indicates that wages in the urban sector remains at a high level so as to create an excess supply of labor in the urban labor market. In the Harris-Todaro model, there is a non-zero probability for a migrant to be employed in the informal urban labor market, where the wages are lower than that in

the formal urban and rural labor markets. Migration, therefore, is effectively a lottery. Those who win the lottery are able to receive higher wages in the urban formal labor market, while the rest receive the very low wages of the urban informal labor market. The latter are not considered to be formally employed, and, hence, constitute the unemployed, as measured in the official unemployment rate.

The following stylized facts about rural and urban poor communities give rise to a certain puzzle.

   1.1. Most of the residents of urban poor communities are migrants or descendants of migrants from the rural (poor) sector

   1.2. Migrating from the rural to the urban sector is a very important decision and a non-trivial act to implement

   1.3. Most of the residents of urban poor communities appear not to graduate out of their community (see Nakanishi 2009B)

Why would migrants from the rural sector make little progress in extricating themselves from urban poor communities? This is puzzling considering that migrants (or their descendants) had in them the ability to take giant leaps, which actually enabled them to migrate between two very different sectors (rural and urban). But, having reached the urban sector, they find themselves limited to small steps, unable to make any significant movement as they had done in the past. This is what we refer to in this paper as the Giant-Leap and Small-Step (GLASS) puzzle.[2]

Even from the point of view of the Harris-Todaro model, the GLASS phenomenon is puzzling. The migrant labor takes a non-trivial leap of faith from a relatively safe origin towards a riskier destination. At every round of the lottery, wherein jobs are allocated to all seeking urban formal jobs, including fresh waves of migrants, the previous wave(s) of migrants have the same chance as the fresh wave to vie for and win in the lottery. In fact, we could argue that the old wave(s) of migrants would actually have a head start over the fresh wave in terms of adapting to the destination, and, therefore, would have a higher probability of gaining employment in the urban formal labor market vis-à-vis the fresh wave. This implies that there would be a regular pattern of replacement of people in the informal sector. This, however, does not agree with the observation mentioned in 1.3 above.

2. Purpose and Outline of Paper

This paper attempts to clarify the GLASS puzzle in the hope of also coming up with policy implications that would enable rural-urban migration to further contribute to Shared Growth, using the insights from dynamic social network analysis. This analysis is motivated by the author's concern[3] that the Philippines is one of the East Asian countries that have not yet achieved Shared Growth, a phenomenon coined in the World Bank's 1993 East Asian Miracle Report to describe the so-called highly performing (East Asian) economies. This phenomenon is defined as a process of development which is able to achieve both efficiency and equitable distribution of income.

Migration is one of the strategies adopted by the rural poor to improve their wellbeing. Considering that most of the poor in the Philippines is in the rural sector, rural-urban migration could a priori contribute much to helping the country achieve Shared Growth. In this sense, the GLASS phenomenon could be considered as a mechanism of thwarting this strategy of migration, and ultimately, the country's ability to achieve Shared Growth.

The rest of the paper is organized as follows. Section 3 attempts a validation of the micro-derived GLASS puzzle to the macro-level. Section 4 discusses two arguments based on real-life data to clarify a dynamic mechanism that could explain the GLASS puzzle. Section 5 presents the outline of a dynamic social network process, which could be the basis of an agent-based simulation of the social network in future research. Section 6 concludes with some policy implications suggested by the giant-leap, small-step dynamic mechanism. We end with some concluding remarks in Section 7.

3. A Macro Validation of the GLASS Puzzle

While the GLASS puzzle was initially derived from micro observations of urban poor communities, the question comes to mind as to whether this puzzle could be found at a more macro level, given the available data on domestic migration in the Philippines. We use migration data from one province to another in the Philippines as a measure of the "giant leap" in the GLASS puzzle. A natural choice for an adequate indicator for the remaining part of the puzzle, the "small step", was the inter-city or inter-municipal migration data within the same region.

We observed that there is a negative correlation between the inter city/municipality and inter-province migration rates. Regions with higher inter-province migration rates tend to be associated with lower inter city/municipality migration rates. In other words, regions with high inter-province migration rates tend to be associated with low inter city/municipality migration rates. For example, the National Capital Region (NCR) has the highest inter-regional migration rate, but at the same time has the lowest inter-city/municipality migration rate.

Encouraged by this observation, we carried out a regression analysis, wherein we estimated the following specification

$Y = (a + DUM*b) X_1 + (c + DUM*d) X_2 + DUM*e$

where

Y = inter-province migration rate

X_1 = relative income divided by distance-squared

X_2 = inter city/municipality migration rate

DUM = dummy variable = 0 for 2000, and =1 for 1990

a, b, c, d, and e are constants to be estimated. The inclusion of distance-squared in the specification is suggested by the gravity model of immigration in Lewer and Van den Berg (2007).

Relative income is the average household income (in current prices)[4] for the destination region divided by the average of the average household income (in current prices) of the other remaining regions. Distance is the length of the line connecting the geographical center of the destination region to the geographical center of the remaining regions. The geographical center of each region is obtained as the weighted average of the geographical coordinates, defined in terms of longitude and latitude, of the capital of the member provinces of that region. The weights are the share of the area of each member province in the total area of the region. Distance-squared is simply distance raised to the second power.

The hypotheses being tested are as follows:

Hypothesis 1. As relative income increases, the inter-province migration rate also increases, due to migrants being attracted by the relatively higher income in the destination region.

Hypothesis 2. As distance-squared increases, the inter-province migration rate decreases, due to the higher cost of migration

Hypothesis 3. As inter-city/municipality migration rate increases, the inter-province migration rate decreases, due to the lower inter city/municipality migration rate in the other regions (as explained above)

It is to be noted that hypotheses 1 and 2 imply that the expected sign of the estimated (a + DUM*b) is positive, and that hypothesis 3 implies that the expected sign of the estimated (c + DUM*d) is negative.

Using adjusted Philippine regional data for 1990 and 2000 in our Ordinary Least Square (OLS) analysis, it could be seen that X_1 including its dummy-modified version have the expected a priori signs. However, the t-statistics indicate that these estimates are not statistically significant. Hence, Hypotheses 1 and 2 cannot be accepted.

The best OLS estimation result, however, prove Hypothesis 3 above to be valid. All the estimates have the correct a priori signs and are statistically highly significant.

4. A Possible Explanation for the GLASS Puzzle

This section presents a possible explanation for the GLASS puzzle. We use a social network approach. This choice of approach is quite natural, considering that it was the approach used by Nakanishi for his analysis of urban poor communities in Metro Manila, from which this paper originally derived the GLASS puzzle.

4.1. Urban Poor Communities

A dynamic social network mechanism for explaining the GLASS puzzle is suggested in Toru Nakanishi's long-running study of a slum area in Malabon, Metro Manila.

Nakanishi (2008) gives a brief description of the study site as follows

> Our field of concern is a squatter area—Sitio Paz—which I have been studying since 1985 (Nakanishi 1990). This locality, the area of which is approximately 7,900 square metres, is situated in the fish pond belt along the Malabon River and the adjacent highway. The people surrounding this locality refer to it as *tambakan*, which means "dumping area" in Tagalog, because the land there is filled with waste material that was discarded during the 1960s. Some of the current residents have been living in this locality since the early 1960s. It is said that the first-comers were twenty households whose heads were born in Ilocos and Western Visayas regions. (p. 40)

It studies the social network in poor urban communities, wherein households and the kinship ties are taken as the nodes and links in a social network analysis framework. The kinship ties mainly refer to the *compadre* relationships typical of Filipino society.

One feature of such a network is that a small number of nodes (families), called hubs, possess a large number of relationships (in-degrees). Nakanishi (2009B) identifies five such hub families in his field study site. The formation of hubs over time has been attributed to a so-called Matthew Effect of Merton (1968), wherein the rich nodes get richer, in terms of links.

Barabasi and Albert (1999) propose a more concrete mechanism for the evolution of scale-free networks. They identified two basic principles that give rise to scale-free networks: growth and preferential attachment. Growth refers to the appearance of new nodes in a given set of nodes, in short, population growth. Preferential attachment refers to linking behavior of the new nodes, wherein, with some probability, the new nodes form their links with nodes that have a high number of existing links. In other words, the probability of a new node linking with a given node is proportional to the number of existing links the given node has.

The presence of a scale-free network in the cited urban poor community provides a ready explanation, based on dynamic social network analysis, of the second element of the puzzle. Urban poor community members appear to be limited to small steps due to existence of a scale-free network in the community, which makes more probable the connection of members of the community to the hub families. By implication, the probability is lower for the connection of members of the community to non-community members, which could allow exit from the poor community.

4.2. Rural Poor Communities

We cite the studies of Quisumbing, McNiven, and Godquin (2008) and Godquin and Quisumbing (2005) for our case study of rural poor communities. The common study area is located in Bukidnon, and covers an inter-temporal survey of the social networks in rural poor communities. A total of 448 households were surveyed in 1984-1985. In 1992, 352 of the original 448 households were re-interviewed. In the 2003/2004 survey, all original respondents still living in the survey area were interviewed, including up to two of their children (randomly selected) still living in the survey area. Children who have migrated elsewhere were also tracked down and interviewed.

The above studies on Bukidnon (hereafter, Bukidnon Study) could be taken to include an investigation of the inter-relationship among three social networks: formal, informal, and migration networks of poor communities in Bukidnon. There are five categories for the formal networks: production[5], credit[6], burial[7], religious[8], and civic[9]. The formal network links refers to the membership of households in the formal networks. Informal networks refer to unorganized networks that cover the following categories: care of the house, care of the children, family problem, economic loss, price, and technology. The informal network links refer to the number of households that one household could approach for assistance in each of the informal categories. Migrant networks refer to links formed by members of a household migrating to another area outside of Bukidnon.

Following the lead obtained from the urban poor community case study above, we attempt to draw the implication of the Bukidnon Study to scale-free networks. The Bukidnon Study suggests the lack of scale-free networks in the poor communities in the rural sector.

Firstly, Quisumbing, McNiven, and Godquin (2008) find that the number of links to formal networks is not related to the number of links in the informal network. This would suggest that there is no systematic link between formal and informal networks in the rural poor communities being studied. Formal and informal networks are neither complements nor substitutes to each other. This would further suggest the lack of a preferential attachment type of networking behavior over time, which would have been indicated by a substitute relationship between the formal and informal networks. In such a relationship, one type of network would be growing at the expense of the other type of network. Neither is there a complementary relationship, wherein both types of network would be growing, implying the lack of a preference for one type of network. Ultimately, therefore, the social network in the rural poor community, as far as these two types of net-

work are concerned, may be considered to be random or absent preferential attachment.

Secondly, Quisumbing, McNiven, and Godquin (2008), however, found a substitute relationship between informal and migrant networks. Households that had migrant networks tend to have lower links in their informal networks. This would further suggest the lack of preferential attachment in the informal networks of the poor rural communities.

Here we find an explanation for the first element of the GLASS puzzle. The absence of scale-free networks in the rural poor communities actually enables its members to make that giant leap of migrating to the urban sector.

5. A Dynamic Social Network Process

Based on the empirical investigations in the previous section, we formulate a simple dynamic social network process. The purpose of this formulation is to link the two case studies in a consistent way. This formulation could also be the basis of future simulations designed to investigate the statistical and emergent features of such a process.

A schematic diagram of the formulated process is given in Fig. 1. For simplicity, we assume three basic zones labeled according to the level of preferential attachment, i.e., high, low, and none. Each basic zone is linked to sub-zones, indicated by the smaller circles proximate to each of the basic zone. Each basic zone represents a first destination of migrants. Each sub-zone represents the more affluent zones of each zone. The size of the circles roughly represents population size. We assume that the majority of the population is in the less affluent zone. For simplicity, we assume no population differences among the three basic zones or among the three sub-zones.

The arrows indicate the average flow of migrants from one zone (basic and sub) to another. For simplicity, we assume that migration initiates from a basic zone ends once a migrant reaches a sub-zone. Preferential attachment determines the average flow of migrants. A high preferential attachment acts as

a deterrent to migration. The sizes of the arrows roughly indicate the volume of migration, which are represented by the letters H, L, and N.

This simple model tells the GLASS story this way. The no-preferential-attachment zone represents the predominantly poor rural sector like Bukidnon, which, as discussed above, tends not to have scale-free networks, and, therefore, tends to have no (or at least, minimal) preferential attachment. Migration from the no-preferential-attachment zone is largely random to its sub-zone, and the two other basic zones. The high-preferential-attachment zone represents the poor urban sector like Metro Manila, which, as discussed above, tends to have scale-free networks, and, therefore, tends to have high preferential attachment.

Migrants from one basic zone to another are considered to take a giant leap to another basic zone. Having migrated there, however, the migrants, to a greater degree, are constrained from further migrating to the more affluent sub-zone by the preferential attachment that characterizes both possible basic zone destinations. They are, so to speak, come to be limited to small steps.

It can also be seen that average flow of migrants

to the high preferential zone tends to be most voluminous. This is mainly due to the lower preferential attachment in the low-preferential-attachment and no-preferential attachment zones, which enables the release of a larger flow of migrants into the high-preferential-attachment zone. Conversely, the no-preferential-attachment zone should be getting the least amount of migration. This is mainly due to the higher preferential attachment in the high-preferential-attachment and low-preferential-attachment zones, which constrains the outflow of migrants from these zones. By extrapolation, the low-preferential-attachment zone would be getting a mid-range amount of migrations.

This could be proven more rigorously by noting that $N > L > H$. The total inflow to the high-preferential-attachment zone is $N + L$, to the low-preferential-attachment zone is $H + N$, and to the no-preferential-attachment zone is $H + L$. Now, $N + L > H + L$, since $N > H$. $N + L > H + N$, since $L > H$. $H + N > H + L$, since $N > L$.

This migration volume profile is precisely similar to that seen in the inter-regional migration case study above. The higher the preferential attachment in the zones, as indicated by the inter city/municipality
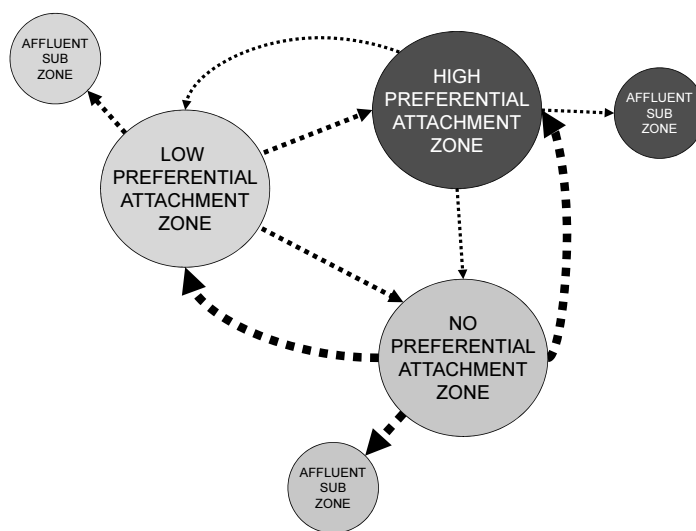

Fig. 1 A Simple Dynamic Social Network Process

migration rates, the lower the inter-province migration rates.

6. Discussion of Results[10)]

6.1. Towards an Understanding of the Preferential Attachment Behavior

In view of the results above, preferential attachment appears to be a crucial element in the dynamics of social networks in poor urban and rural communities, especially in offering an explanation for the GLASS puzzle. The presence of scale-free social networks, which in part is due to preferential attachment, has a gravitational effect which constrains outward migration (small steps). On the other hand, the virtual non-existence of scale-free networks allows a higher rate of outward migration (giant leaps).

The very good result of the regression analysis further buttresses the proof for the existence of the GLASS effect. It shows that there is a statistically significant but negative relationship between inter-province migration rates and inter-city/municipality migration rates. This effect was established while controlling for other factors such as relative income and distance, which were also shown to be important in explaining inter-province migration rates.

The GLASS phenomenon, however, poses a very important social problem. It deflects an important strategy of the poor to improve their situation, and, therefore, does not directly contribute to Shared Growth. Ultimately, it deals the whole country a severe blow in terms of inefficient use of its human resources.

In order to attenuate the GLASS phenomenon, two steps could be taken. One is the dismantling or suppression of scale-free networks in the urban migration destinations for the poor. Another is the stimulation of the formation of scale-free networks in the rural migration origins of the poor.

Suppression of free-scale networks would enable the poor migrants to the urban sector to move on to the more affluent sub-zone. Nakanishi (2009A, 2009B) attributes the poverty trap in the poor urban sector to the confluence of two factors. One is propinquity, which is marriage within the same income class, and another one is homogamy, which is marriage among those who are geographically proximate. Homogamy and propinquity find their roots in chronic poverty, through social exclusion and narrow behavioral sphere, respectively. This suggests that there are environmental factors in the urban sector that could contribute to the poor resorting to preferential attachment. Removal of such environmental factors may help suppress the formation of free-scale networks in the urban poor sectors.

Another approach to suppression is implied more directly by the term preferential attachment. The term commonly refers to a type of behavior, which, therefore, could be subject to reconditioning. The urban poor should be encouraged to avoid preferential attachment. This is particularly true in the case where the environmental factors mentioned above are not that binding. But, even if these factors were binding, the process of reforming such environmental factors could be initiated by a determined decision of the urban poor to refrain from preferential attachment.

On the other hand, stimulation of scale-free networks in the rural origins of poor migrants would contribute to restraining outward migration. This at first glance may appear to be depriving the rural poor of the opportunity to improve their lot. But, given the giant-leap, small-step phenomenon, this policy might actually be a way to prevent much suffering for prospective migrants.

One ready way of achieving such stimulation of scale-free networks is to create hubs in the rural sector, which becomes the object of preferential attachment by the poor rural members. In this regard, Quisumbing, McNiven, and Godquin (2008) indicate that the activation of formal and informal networks in the rural sector could be helpful. Although much politicized in the past, agricultural cooperatives could contribution to the creation of such hubs in the rural sector, which at the same time could contribute to growth if implemented properly.

6.2. Modifying the Harris-Todaro Model

Our social network explanation of urban-rural migration suggests that the Harris-Todaro model may not be very effective in explaining such migration, at least in the case of the Philippines. A higher preferential attachment implies lower labor mobility, which could contribute to a lower probability of winning the job allocation lottery. In which case, migration flows should drop, as implied in a Harris-Todaro framework. This appears not to be the case in the Philippines where it has been shown that lower labor mobility is associated with higher inter-provincial migration flows.

This incongruence between the Harris-Todaro model and the reality of inter-regional migration in the Philippines is further supported by the relationship between regional unemployment rates and the inter-city/municipality migration rates in the Philippines. There is a strong inverse relationship between the regional unemployment and inter-city/municipality migration rates. The causality is, of course, not clear, but it is quite conceivable that high unemployment could contribute to low labor mobility, as workers would be lacking the resources to be more mobile. On the other hand, lack of labor mobility could also contribute to higher unemployment because workers are restricted in terms of the breadth of their social networks.

In the Harris-Todaro framework, a higher unemployment would be associated with a lower probability of getting employed in the urban formal sector, ceteris paribus. This would then reduce the incentive for workers to migrate from the rural sector. In our analysis, however, a higher unemployment would be associated with lower relative labor mobility, and, therefore, higher in-migration flows from regions with higher relative labor mobility.

7. Concluding Remarks

Our allusion, albeit in reversed form, to the historical words of the first lunar landing ("That's one small step for [a] man, a giant leap for mankind") to describe the GLASS puzzle has proven to be appropriate. Behind that small first step on the low-gravity lunar surface is the story of a giant leap to the moon, as the lunar vehicle, with all the force it could muster, tore away from earth's strong gravitational pull.

In this paper, the gravity of the social network kind also played an important, although, opposite role. Poor rural migrants could easily tear away from the low-gravity pull of their hometowns and head for the high-gravity urban sector, where they experience more constraint in their migratory movements. Our policy recommendations also do not propose fighting against gravity but to weaken it where it is overly strong, and to strengthen it where it is overly weak.

Footnotes

1) This paper is based on a paper presented at the 13th Shared Growth Seminar organized by the Sekiguchi Global Research Association, and held on December 17, 2010, at the UP School of Labor and Industrial Relations

2) Neil Amstrong was broadcasted to have said "That's one small step for [a] man, one giant leap for mankind" after making the first step that any man has on the moon (July 21, 1969). As we shall show below, the reference to man's first lunar landing actually proves be insightful.

3) Shared growth is the main theme of the research of the author (for example, see Maquito and Carbonel (2010A), Maquito and Hirakawa (2010B))

4) Data for the average household incomes for each region was taken from the National Statistics Office database.

5) Includes farmers' associations and market vendors

6) Includes credit cooperatives (41% of the credit groups), rotating savings and credit associations (11% of credit groups) referred to as *paluwagan* or *hulugan*, and an arrangement called *sosyo* (49%), wherein members contribute money that they can lend out during the year at the market interest rate (5 to 10% monthly), usually to group members.

7) Members contribute time or money to help out other members whose close relatives died.

8) Largest of which is the parish community (55%); includes Knights of Columbus, and Couples for Christ

9) Consisting of women's group (56%), village youth associations (20%), school committees (12%), and village officials (12%)

10) For a fuller discussion of the results, see Maquito (2012, forthcoming).

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