The Role of Community in Migration Dynamics

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March 8, 2007

Abstract

In this paper, I present a theorethical model that tries to investigate the observable hysteresis process in the migration dynamic. In the model the migration choice depends not only on the wage differential, but also on a U-shaped benefit function of a community of homogenous ethnic individuals, modelled according to the "*theory of clubs*". The theoretical results, based on real option theory, explain that the observable "jumps" in the migration flows could depend on, not only on exogenous shocks, but also on two endogenous variables: the number of co-ordinated immigrants and the dimension of the community. In fact, the migration choice is procrastinated until a critical mass of immigrants is reached and, moreover, some possible rigidities in the adjustment of the district dimension, as regards the optimal levels, can magnify the hysteresis process.

JEL Classification Numbers: F22, H49, O15, R23.

Keywords: Migration, Real Option, Theory of Clubs, Network Effect.

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1 Introduction

If we observe the migration phenomenon, it can be seen that, for some ethnic groups, the migration inflows are characterised by some gradual waves at the beginning of the process, followed by some sudden increasing migration rates (so-called "migration jumps[1]") and again by constant entry rates. What could be the causes for these particular dynamics? The economic literature on migration usually explains migration jumps referring to exogenous shocks, as big poverty shocks, or political choices and institutions: in fact a regularization could increase the number of immigrants. Nevertheless, even if these explanations are surely very important for migration study, they seem to not totally explain this peculiar irregularity in the migration wave. In fact, if we deplete the migration data from the regularizations, the jumps are still observable. Therefore, in order to give a more exhaustive analysis of migration, we should investigate in depth the structure of the classical theoretical model and add a further possible complementary explanation. In line with this assertion, the aim of the paper is devoted to combine classical theoretical models with the real option approach, trying to give a possible endogenous explanation to the phenomenon stressed.

Generally, in economic literature, migration depends on the wealth difference between two countries or two lands, because mainly "people migrate in order to increase their welfare" (Khwaja, 2002). Therefore, the wage differential between the host country and the country of origin is assumed as the main variable affecting migration (Todaro, 1969; Langley, 1974; Hart, 1975; Borjas, 1990, 1994; Dustmann, 2003), even if it is not sufficient to totally explain migrant behaviour: evidence seems to stress the focal role of community networks in the migrant's choice (Boyd, 1989; Bauer and Zimmermann, 1997; Winters *et al.*, 2001; Bauer *et al.*, 2002; Coniglio, 2003; Munshi, 2001, 2003; Heitmueller, 2003; Todaro, 1969; Harris-Todaro, 1970; Burda, 1995; Bencinverga and Smith, 1997). Moretti (1998), for example, with an alternative model to Todaro's, finds evidence that both the timing and the destination of migration could be explained by the presence of social networks in the host country. Another work (Bauer, Epstein and Gang, 2002) examines the relative importance and interaction of two alternative explanations of immigrant clustering: 1) network externalities and 2) herd behaviour. The same theme is studied in Epstein and Gang (2004), where the authors examine the roles "other people" play in influencing an individual's potential migration decision. In fact, the moment immigrants settle in a country, they have to acquire a place in that new society. This is true not only for physical needs such housing, but also in the social and cultural sense: in other words, the immigrants must integrate in the host country and they do it more easily through a community network.

Integration is the process by which immigrants become accepted into society, both as individuals and as groups. Therefore, the process of integration is not only taking place - as is often supposed - at the level of the *individual immigrant,* but also at the *collective level* of the immigrant group. In fact, when an immigrant enters a new society, she begins to build a group of people (or she enters a group if it is already exists), based on affinities, religions and the same way of life: this group is generally called "community". This aggregate of individuals that uses, like a family, the same goods, "*deriving mutual benefit sharing [...] production costs, the members' characteristics, or a good characterised by excludable benefits*", can be modelled by following economic theory of "club" (Sandler and Tschirhart, 1980; Buchanan, 1965; Berglas, 1976). Therefore, the

[1] Taking the cumulative function of some migration inflows, we can observe that it looks like a logistic funtion. I define as "jump" the sudden increase in the variation rate, in a given period.

first step of this paper consists in studying how the community, modelled as a club, combined with the wage gap, influence the individual's benefit function and therefore her decision to migrate.

Furthermore, the fact that the migration decision is in many cases at least partially irreversible, is a third element that may help to explain the presence of jumps in the migration flows. In this respect, Burda (1995), following a real option approach, implements Sjaastad's assumption (1962) that describes migration choice in terms of investment. Burda's results show that individuals prefer to wait before migrating, even if the present value of the wage differential is positive, because of the uncertainty and the sunk costs associated with migration [2]. Subsequently Khwaja (2002) and Anam *et al.* (2004), developed Burda's approach by describing the role of uncertainty in the migration decision. Another work that uses real option with respect to an argument that it is strictly related to migration is Feist's (1998) paper, in which the author analyses the option value of the low-skilled workers to escape to the unofficial sector if welfare benefits come too close to the net wage in the official sector.

In conclusion, assimilating the decision of each individual to migrate to a new country as a decision on an irreversible investment, I investigate the role played by community to help immigrants integrate in the host country. I do this by considering the opportunity that each immigrant becomes a member of a network (a community) of homogeneous individuals, located in the host country. The community helps the immigrants to obtain a higher wage or improve their labour condition if there are strong ties among the members ("positive network externalities")[3]. Nevertheless, if the number of immigrants continues to increase, labour competition as well as higher alienation[4] among immigrants inside the community, may reduce their net benefits ("negative network externalities" or "congestion costs"). In fact even though participation is typically associated with 'positive' socio-economic outcomes, social networks may also transmit 'negative' norms (Alesina and La Ferrara, 2000)[5]. These two counterbalancing effects determine an inverted U-shaped benefit function which follows directly by the theory of clubs (Sandler and Tschirhart, 1980) [6].

[2] Investment is defined as the act of incurring an immediate cost in the expectation of future payoff. However, when the immediate cost is sunk (at least partially) and there is uncertainty over future rewards, the timing of the investment decision becomes crucial (Dixit and Pindyck, 1994, p.3).

[3] The greater the size of the community, the higher the number of ties, the higher the flow of information on the job opportunities, and therefore the higher the probability of integrating.

[4] This is the case in which the members of the incumbent population discontinue their attraction of immigrants (see Heitmueller (2006)).

[5] For example, the so called 'culture of poverty and welfare' may find its roots in social networks propagating incentives to search for welfare rather than work. See in particular Cutler and Glaeser (1997) and Betrand, Luttmer and Mullainathan (1998) for empirical work on this important question.

[6] From a theoretical point of view, an U-shaped benefit function can be derived as combination of a "herd behaviour" and a network effect (see Bauer *et al.*, 2002) or follows directly by modelling the probability of each immigrant being totally integrated in the host country *à la* Bass (1969)(see Moretto and Vergalli, 2005).

1.1 Some supporting evidence

In the following table 1, I show, with respect to three periods, the average growth rates of some migration inflows in five European countries (Germany, Italy, Netherlands, Sweden and UK). The periods are specific for each ethnic group and are chosen in order to show, in the second period, the jumps in the migration dynamics, that I define as "a substantial high increase in the inflow growth rate". The data for Germany are taken from the Statistisches Bundesamt (Federal Statistical Office); for Italy are taken from the official national statistic database (ISTAT); for Netherlands are taken from the Statistics Netherlands (Centraal Bureau voor de Statistiek); for Sweden from the Statistics Sweden (Statistiska Centralbyrån) and for UK from the Home Office, Government of the United Kingdom.

Country	Inflow	Growth rate Period 1		Growth rate Period 2		Growth rate Period 3	
Germany							
	Argentina	1,23	1995-1999	2,09	2000-2003		
	China	1,28	1995-1999	3,21	2000-2002	2,87	2003
	Morocco	1,14	1995-2000	1,56	2001-2003		
	Vietnam	0,62	1995-1997	0,96	1998-2000	1,16	2001-2003
Italy							
	Albania	0,11	1994-1996	0,89	1997	0,12	1998-2003
	China	0,10	1994-1996	0,63	1997	0,07	1998-2003
	Philippines	0,06	1994-1996	0,24	1997	-0,03	1998-2003
	Romania	0,19	1994-1996	0,32	1997-2000	0,16	2001-2003
Netherlands							
	Carabbean	2,04	1996-2000	9,50	2001	1,07	2002
	China	1,33	1996-2000	3,24	2001-2002		
	South Africa	1,67	1996-1997	2,82	1998	2,19	1999-2002
	Suriname	1,41	1996-2000	2,70	2001-2002		
Sweden							
	Chile	0,88	1981-1985	2,71	1986-1989	0,46	1990-2001
	Ethiopia	0,81	1981-1985	4.01	1986-1992	0,93	1993-2001
	Iran	0,83	1981-1984	5,69	1985-1993	1,49	1994-2001
	Romania	1,75	1981-1985	6,41	1986-1992	1,93	1993-2001
UK							
	Iran	0,91	1992-1995	1,30	1996-2004		
	Pakistan	1,12	1992-1998	2,04	1999-2003	1,76	2004
	Philippines	1,01	1992-2002	5,08	2003-2004		
	Turkey	1,25	1992-1994	3,57	1995-2004		

Table 1

For the sake of completeness, I give a look to the main immigrants reforms in the countries and periods considered[7] (see Boeri and Bucker, 2005):

- in Germany, two reforms in 2000 increased the generosity of the welfare system with respect to the immigrants: with the Nationality Law, a child born in Germany to non-German parents automatically acquires German citizenship at birth and the Ordinance 28/7/2000 introduces a residence permit for highly qualified foreign skilled workers of the information and communication technology (Green Card System);

- in Italy we had two regularization programs in 1995 and in 1998. In this case, in order to avoid that regularizations could affect the observed jumps, I have depleted the inflows data from the regularizations inflows quantified in the Istat database;

- in Netherlands the most important changes of the new Aliens Act (2001) concerned the asylum procedure. The law was characterized by control, security and restriction, rather than migration management. Therefore, the condition to immigrate was tightened;

- in Sweden "the fundamental principles of the 1975 integration policy still apply although the terminology has changed" (Westin, 2006): in this case the reform is stable in the period considered;

- in UK we had four reforms that tighten conditions to enter for migrants and asylum seekers (the Asylum and Immigration Act 1996; the Immigration and Asylum Act 1999; the Nationality, Immigration and Asylum Act 2002 and, finally, the Asylum and Immigration Act 2004).

The main observations from table 1 and the analysis of the reforms are the following:

- it is observable that, in some cases, the migration process does not proceed in a smooth manner, but it shows some sudden increses in the inflows growth rates;

- the observed jumps happen in different periods and sometimes are followed by a decrease in the growth rates;

- the immigration reforms in the countries and in the periods considered are not homogeneous with respect the generosity of the welfare system for the immigrants: in two cases (UK and Netherlands) the reforms tighten the condition two immigrate, in one case (Sweden) the policy does not substantially change among the years and in the last two cases (Germany and Italy), favors/facilitates the immigration. Nevertheless for Germany the reform does not directly affect immigration of the period considered and for Italy, the data are deplated from the regularizations and still show migration jumps.

[7] Source: Fondazione Rodolfo Benedetti Documentation Centre, http://www.frdb.org.

Summing up these observations, the migration inflows show some jumps only partially explained by exogenous shocks even because the jumps happen in different periods. Therefore it is as if a mass of individuals is waiting for something to happen in order to decide to migrate. Which is the reason why do they wait before taking their decision to migrate? What are they waiting for? And why do they move in a mass? What might happen if each individual chose to move to a host country with regards to other immigrants? What might happen if in the host country there existed a community of other homogeneous individuals that helped her to increase her benefits? I will try to answer to these questions by verifying if the characteristic of investment and the role of ethnic groups, behind any migration decision, can explain the migration jumps observed in table 1.

I proceed in the following manner: in Sections 2 and 3, I explain the model. Sections 4 and 5 show the main results, namely the optimal migration strategy in the presence of positive and negative externalities. Finally, Section 6 summarises the conclusions.

2 The model

This section presents a continuous-time model of migration, where the differential benefits of migration, including the wage differential, evolves in a stochastic manner over time and there is ongoing uncertainty[8].

We can summarise our assumptions in the following manner:

1. There exist two countries: the country of origin where each potential migrant takes her decision and the host country.

2. At any time t each individual is free to decide to migrate to a new country. Individuals discount the future benefits at the interest rate ρ.

3. All immigrants are identical, are infinitely-lived, or choose vicariously for their descendants who will remain in the receiving country forever[9]. Their size dn is infinitesimally small with respect to the total number of inhabitants.

4. Each individual enters a new country undertaking a single irreversible investment which requires an initial sunk cost K[10].

5. The wage differential for each migrant, called x, follows a geometric diffusion process:

[8] This assumption (i.e. assumption 5) is perfectly in line with the real option literature applied to migration choice. See, Burda (1995), Khwaja (2002) and Anam *et al.* (2004).

[9] It is possible to show that the "*sudden death*" formulation is a very natural generalisation of the infinite-life case (Dixit and Pindyck, 1993, p. 205).

[10] In economic literature the fixed costs represent travel costs and some psychological costs, like broken family or friend ties (see Burda, 1995; Bencinverga and Smith, 1997; Moretto and Vergalli, 2005).

$$dx = \alpha x dt + \sigma x dw \tag{1}$$

with $x_0 = x$ and $\alpha, \sigma > 0$. The component dw is a Wiener disturbance defined as $dw(t) = \varepsilon(t)\sqrt{dt}$, where $\varepsilon(t) \sim N(0,1)$ is a white noise stochastic process (see Cox and Miller, 1965). The Wiener component dw is therefore normally distributed with zero expected value and variance equal to: $dw \sim N(0, dt)$. From these assumptions and from the (1) we know that $E[dw] = 0$; $E[dx] = \alpha x dt$.

6. In the host country there is a community of ethnically homogeneous individuals. Each individual becomes a member (finding a job) instantaneously when she enters the host country.

7. The community net benefit function for each member is U-shaped with regards to the number of members and it is separable in the differential wage x and with respect to the number n of homogeneous immigrants belonging to the community. It corresponds to the following equation:

$$U(x, n) = x + \theta u(n) \tag{2}$$

where θ is a scale factor and the function $u(n)$ is twice continuously differentiable in n; it is increasing over the interval $[0, \overline{n})$ and decreasing thereafter[11]: that is, if we assume that the positive network effect dominates the negative one in the initial phases of migration, there may be a threshold $\overline{n}$ when more immigration is no longer desirable from the perspective of previous migrants. The theory of clubs helps us to obtain easily the benefit function, as it is showed in sections 3 and 3.1. Furthermore, we also assume that at zero and at some finite number of members N, the benefits fall to zero (i.e. $\theta u(n) = 0$, and $\theta u(N) = 0$)[12].

3 Ethnic community and the theory of clubs

I assume that an ethnic community can be modelised as a "club", in the light of theory of clubs' definitions. In fact, a community generally arises for mutal economic benefits and its members have generally the same characteristics, the same way of life and, sometimes, follow the same religion: all these affinities form strong ties that can push the individuals to help one another to share the cost of housing[13] or the costs of structures, like churches or cultural centres. This

[11] That is, the community net benefit function is two-edged (Bauer *et al.*, 2002): on the one hand, a larger network increases the utility of immigrants due to less alienation; at the same time, the benefit decreses for raising congestion costs, growing negative sentiments over the course of immigration on the side of incumbents (Heitmueller, 2006).

[12] These theoretical results can be also explained by using a typical representation of theory of clubs taken by Sandler and Tschirhart (1980).

[13] As shown in the Ares2000_Onlus report, www.ares2000.net.

assertion is in line with McGuire (1972, 1974), Sandler and Tschirthart (1980), Bauer and Zimmermann (1997) and also with Locher (2001). Nevertheless, clubs involve sharing and this fact often leads to a partial rivalry of benefits as larger memberships crowd one another, causing a detraction in the quality of services received. This implies that a high number of members could induce increasing congestion costs, e.g. crowded houses or competition on the labour market[14]. The parallelism between community and theory of clubs is also confirmed by an extension of Buchanan and Goetz (1972) on the Tiebout model (1956)[15]. The trade-off between cost sharing and congestion is at the centre of collective good models that follow Buchanan (1965) and Tiebout (1956) and it guarantees a U-shaped average cost of provision and hence a unique minimum average cost, as shown by Edwards (1992).

3.1 The benefit function

Following this parallelism between theory of clubs and community, I define now the benefit function (2). Let us assume that the migrant is already in the host country: she belongs to her ethnic community in a district where there are different local public goods (G), such as churches, cultural centres and houses belonging to a group of homogeneous individuals. To describe the sum of buildings belonging to the community, as a public good, we follow the considerations of Edwards[16].

Let us assume for simplicity that the individual utility function is a quasi linear function, that is:

$$U\left(y, g\left(G, n\right)\right) = y + g\left(G, n\right) \tag{3}$$

Where y is the members consumption of the private good, G is her consumption of the club good, and n is the membership size. Since the utilisation rate of the club good is the same for all members, we have $g_i = G$ for all members, where g_i is the i^{th} member's utilisation rate of the club facility, and G is the size of the club facility.

Each member attempts to maximise utility subject to a resource constraint,

$$x = y + C\left(G, n\right)/n \tag{4}$$

where:

[14] An idea of congestion costs in a host country is introduced by Coniglio (2003).

[15] According to these statements, if the total cost of using a common good is the sum of average cost plus congestion cost, when the number of users (i.e. the size of the community) increases, there is an initial fall in costs (an increase in net benefit) and a subsequent rise in integration costs when the congestion effect becomes greater.

[16] "*there also exist collective solutions (. . .) among these are clubs, public provision and informal sharing arrangements (roommates)*"

$$\partial g/\partial G > 0; \partial g/\partial n < 0$$
$$\partial C/\partial G > 0; \partial C/\partial n > 0$$

x is the wage differential $x = x_h - x_o$, respectively between the wage of the host country (h) and the wage of the country of origin (o). Simplifying our analysis, we assume that x_o is equal to zero; the price of the private good is unity, and $C(\bullet)$ is the club's cost[17].

It is possible to demonstrate that, for a given level of G (i.e. in an instant t), the migrant's utility function (3), can be reduced to the equation (2)[18].

Let us rearrange figure 10.1 of Cornes and Sandler (1986, page 169) in figure *1*. It shows the function $u(n)$ as the vertical difference between the gross benefit function and the costs[19] per member: the resultant bold line in quadrant II, is the net benefit per person associated with changing membership size, when the district size is fixed at G_1, G_2, G^* units.

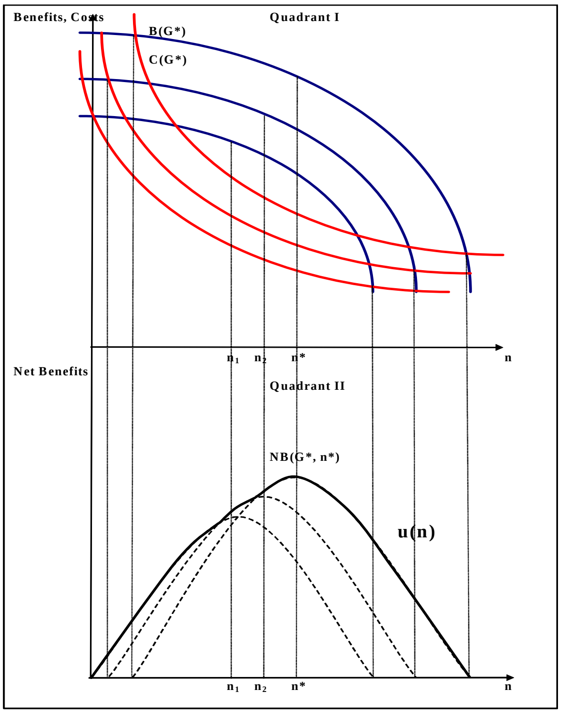

Figure 1: Benefit function

[17] Superscripts are dropped, from now on, whenever members are homogeneous.

[18] See Vergalli (2005) for a more detailed demonstration.

[19] The cost curves depict the cost per member when a facility of a given size is shared by a varying number of members. The shape of the benefit curves indicates that *camaraderie* is eventually overpowered by crowding, and at that point the benefit per person begins to decline.

Starting at the initial instant t of the migrant's choice, our assumption is that she knows the number of members of the community and the size of the district G_1. Her entry modifies the optimal couple (i.e. the dimension of the district and the optimal value of the number of the community's members): a new level of members needs a greater dimension of the club; this fact pushes the curves upwards and identifies a new optimal couple. This process continues until a new stable equilibrium is reached. Nevertheless, because of the instantaneity of the process that descends directly by the theory of clubs, the only curve observable by the migrant is the envelope of the family of functions, i.e. the bold line in the quadrant II. The result is a U-shaped function[20] which corresponds to the increment of benefits that each migrant could obtain if she entered the community[21].

4 Main Results

Let us define in which manner each immigrant takes herdecision to migrate: by the hypotheses 1-7 showed above and assuming $\theta_0 = \theta$ and $n_0 = n$, the value of migrating to the host country is:

$$V(x,n) = \max_{\tau_i} E_0 \left\{ \int_0^{\infty} e^{-\rho t} \left[x(t) + \theta u \left[n(t) \right] \right] dt - \sum_{\tau_i} J_{[\tau_i = t]} K \right\} \tag{5}$$

where $J_{[\tau_i=t]}$ is the indicator function that assumes the values one or zero depending on whether the argument is true or false, and the expectation is taken considering that the number of immigrants may change over time by new entry. The solution of equation (5) is obtainable by using the real option theory[22] and gives the optimal threshold for each immigrant. The threshold level describes the optiomal ceiling that the shock should cross in order to migrate. It is defined in the following results and described in figure 2.

Result 1 *The optimal entry choice for each migrant, characterised by a mass of other migrants $n \geq \overline{n}$, is described by the upward-sloping curve (Figure 2):*

$$\begin{aligned} x^*(n) &= \frac{\beta_1}{\beta_1 - 1} \cdot (\rho - \alpha) \cdot \left[K - \frac{\theta u(n)}{\rho} \right]; \qquad (6) \\ \text{for } n &\in [n^*, m] \;\; \text{with } \frac{\beta_1}{\beta_1 - 1} > 1 \end{aligned}$$

[20] That is the envelope of the family of the U-shaped functions.

[21] The same result can also be easily derived from the U-shaped cost curve used by McGuire (1974, Fig. 1b, page 118).

[22] The demonstration is available by asking to the author.

where $\rho > \alpha$ and $\beta_1 > 1$ is the positive root of the auxiliary quadratic equation $\Psi(\beta) = \frac{1}{2}\sigma^2\beta(\beta-1) + \alpha\beta - \rho = 0$.

Result 2 *The candidate choice for a mass of individuals $n < \overline{n}$ is described by the following flat curve starting at $x^*(\overline{n})$ defined by (Figure 2):*

$$x^*(\overline{n}) = \frac{\beta_1}{\beta_1 - 1} \cdot (\rho - \alpha) \cdot \left[K - \frac{\theta u(\overline{n})}{\rho}\right]; \quad (7)$$

$$\text{for } n \in [0, \overline{n}] \text{ with } \frac{\beta_1}{\beta_1 - 1} > 1$$

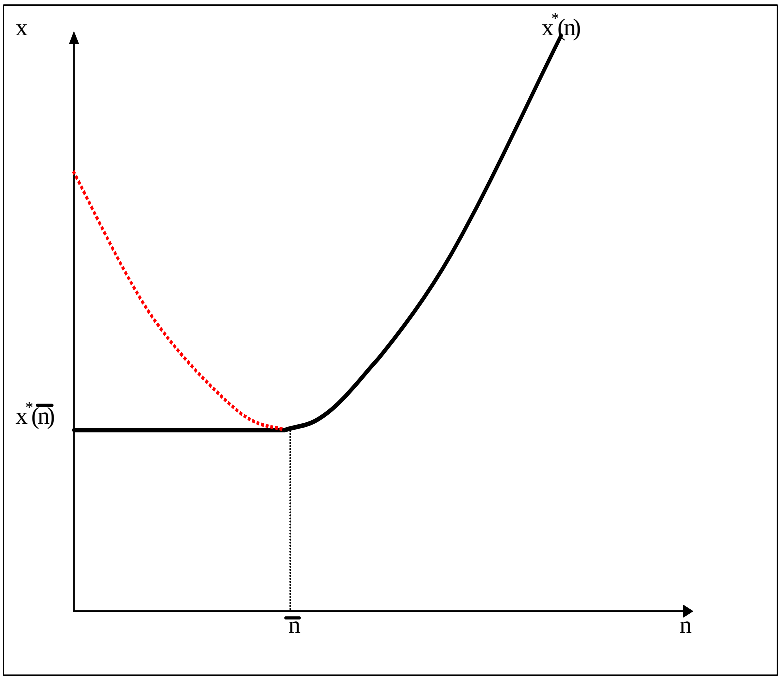

Figure 2: Optimal Choice

In fact, in the case of negative externalities, i.e. for $n \in [\overline{n}, N)$, if the differential wage x climbs to a trigger level x^*, migration will become feasible but, at the moment of entry, the total benefit declines along the function $u(n)$ due to congestion effects: we have a *reflecting barrier.* The differential wage continues to move stochastically until a new entry episode occurs and the flow hits the optimal number $\overline{n}$. This case is a setting of competitive equilibrium in which every migrant is "*totally myopic in the matter of other migrant's entry decision*" (Dixit and Pindyck, 1993, p. 291). In this way the "*optimal competitive equilibrium policy need not take account of the effect of entry*" (Moretto, 2003, p. 8) and the wage level $\overset{\circ}{x}$ that triggers entry by the single migrant in isolation, is the same as that of the migrant who correctly anticipates the other migrants' strategies x^*[23].

If instead we consider the migrant's benefit function along the increasing part, that is $n \in [0, \overline{n})$, any potential entrant is subject to positive externalities, so their value of entering depends on the number of migrants already entered the community. Thus the timing of the decision is influenced by the decisions of the others: the single entrant cannot claim to be the last to enter the community[24]. Therefore, the higher the number of members the greater the benefits that the individual obtains if she enters. The network benefits make the individual face a choice between no entry and agreement. However, as all individuals are subject to the same stochastic shock, two equilibrium patterns are possible: either the community remains locked-in at the initial size, sustained by self-fulfilling pessimistic expectations (infinite delay), or a mass of individuals simultaneously rushes to enter. Excluding the former[25], we have the following:

Proposition 1 *If the benefit function of belonging to an ethnic community is U-shaped, all the immigrants wait until the threshold level reaches the maximum. At* $x^*(\overline{n})$ *they co-ordinate migration together, causing a "jump" in the migration dynamic.*

Therefore, in aggregate,

Proposition 2 *the effect of a community is the reduction of the migration costs through the network system: this fact implies a lower threshold level that triggers the entry.*

Proof. Proposition 1 and 2 descend directly from result 1 and 2. ■

[23] The myopic behaviour implies that:

1. the migrant is ignoring that future entry by other migrants will reduce her net benefits. Other things equal, this would make entry more attractive for the migrant that behaves myopically;
2. she ignores the fact that the prospect of future entry by other migrants reduces the option value of waiting. In fact, pretending to be the last to enter the host country, she thinks that she still has a valuable option to wait before making an irreversible decision. Other things equal, this makes the decision to enter less attractive. The two effects offset each other, allowing the migrant to act as she were in isolation.

[24] Leahy's results cannot be extended to this case.

[25] We exclude the former by using subgame-perfectness arguments (see Moretto (2003)).

5 Graphic Solution

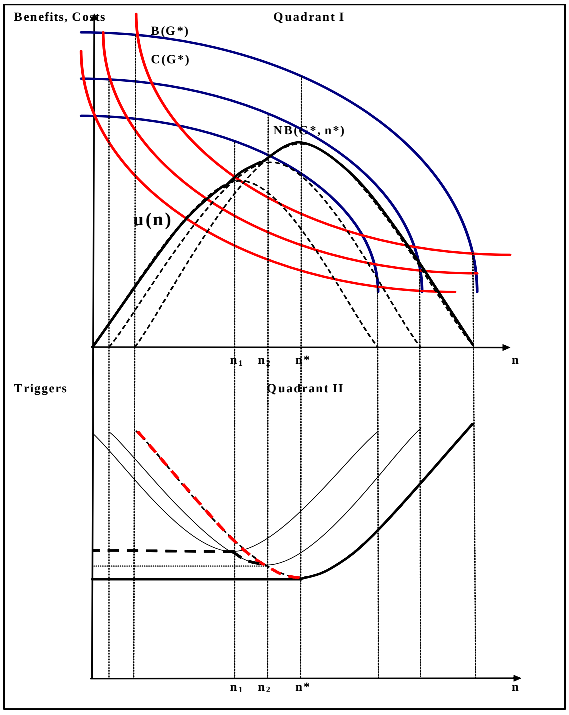

Figure 3: Optimal trigger

In figure 3 we extend figure 1, by adding the optimal trigger levels in quadrant II. Let us start in the instant t with a given dimension G_1 of the district. According to the theory of clubs[26] the process of convergence continues until the optimal couple $(G^*, \overline{n})$ is reached instantaneously: this fact implies that the migrant's optimal policy moves along the envelope curve of the different threshold levels for different community dimensions, i.e. the lowest U-shaped curve (the bold black and red line[27] in quadrant II). Nevertheless, when the network effect prevails (see result 2), the optimal policy consists of waiting until $\overline{n}$ individuals are co-ordinated to enter: this implies that the optimal differential wage perceived by each migrant is the flat bold black line in quadrant II. How can change our model if the adjustment of the district size is not instantaneous? Some possible scenarios:

1. The dimension of the district changes very slowly when immigrants enter:

[26] In Cornes and Sandler: "*the community [club] desires a membership n_1 when the dimension of the district is G_1; however, a larger district size G_2 is required to maximise average net benefits (in quadrant I) when membership is n_1*".

[27] It is worth noting that the red line corresponds to the optimal policy of one migrant as if she were the last to enter the community, or as if there were a forced order for the entry.

in this case, if the equilibrium is far from the optimal couple, the new level of members requires an increase of the variable G. The migration dynamic should evolve according to the following path: an initial mass of entries, followed by an individual entry (due to the crowding effect and the myopic behaviour of the migrant). The subsequent increase of the district size continues the process of convergence until the optimal couple is reached. Therefore, the migrant entry process should follow the dotted line shown in *quadrant II* of figure 3. This non-instantaneous process could imply two types of effects:

(a) the hysteresis phenomenon is amplified by the slowness of the development of the district: migrants wait until the number of members reaches the level $\overline{n}$;

(b) immigrants are short-sighted and they are not able to correctly forecast the optimal couple $(G^{*}, \overline{n})$. In this case, a group could start when the trigger reaches the level corresponding to the first horizontal dotted-line, because they do not forecast an increasing level of G. Subsequently, with the entry of this group of immigrants, the dimension of the district will increase at a higher level of G, reducing the threshold. The explicit migration dynamic should be represented by some jumps of lower and lower magnitudo with a decreasing threshold;

2. The goverment is able to control the district size by imposing some limits to the urbanisation of a peculiar area. In this case, let us assume that the government thinks that a bound is required and publically declares that the dimension of the districts will be fixed at a given level $G\prime$. This action should reduce the number of migrants, because of a lower G respect to the optimal level. But is this policy credible? And do the potential immigrants really believe in this declaration? If immigrants believe the government, the entry dynamics will follow the dotted line in quadrant II. However, generally the government increases the permits for buildings if the migration inflows increase. In this case, if migrants perfectly forecast the optimal path (i.e. no bounds on the district size), the entry dynamic will be the bold black line[28].

Therefore, the final:

Proposition 3 *The static nature of the evolution of the district*[29] *can strengthen the hysteresis phenomenon of migration choice.*

Proof. It descends directly from result 1 and 2. ■

[28] Another hypothesis could be that migrants believe the government only once. When they realise that the government is a "liar", they will perfectly forecast the optimal path. According to this explanation, the dynamic decision will follow the dotted line until this touches the bold black line and it will follow the bold black line, thereafter.

[29] that is fixed to a given G^{*}. This fact is an implicit consequence of assumption 7.

6 Conclusions

Real option theory suggests that migration may be delayed beyond the Marshallian trigger since the option value of waiting may be sufficiently positive in the face of uncertainty. Intuition, as is well known from the pioneering work of Dixit and Pindyck (1993), is that waiting may resolve uncertainty and thus enable avoidance of the downside risk of an irreversible investment. Burda (1995) was the first to use real option theory to explain slow rates of migration from East to West Germany despite a large wage differential. Subsequent works (Khwaja, 2002; Anam *et al.*, 2004) have developed this approach describing the role of uncertainty in the migration decision. In this work, I present a model where each individual can choose to migrate to a host country depending on the wage differential and an externality stemming from the community of individuals, in the light of recent literature showing that the role of the community is important for the migration decision (Moretti, 1998; Bauer *et al.*, 2004). In our model, the decision to migrate depends not only on the wage differential, but also on a U-shaped function modelled according to the "*theory of clubs*". By studying the Real Option Theory (Bartolini, 1995; Leahy, 1995; Moretto, 2003) in depth, it is possible to implement Burda's model by assuming co-ordination among migrants to migrate. The theoretical results are able to give an endogenous explanation to the observable "jumps" in the migration flows and to describe how the trigger of entry can change depending on the dimension of the district. In fact, given a particular shape of the community benefit function, the optimal entry policy consists in co-ordinating migration altogether, when the benefit received reaches the maximum level: this explains the observable mass of immigrants entering a host country. The analysis of the results also sheds light on the dynamics of the districts' development: some possible rigidities in the adjustment of the district dimension, as regards the optimal levels, could magnify the hysteresis process.

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