A Theoretical Approach: Examining the Educated Unemployment Rate and International Skilled Migration of Developing Countries.


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**Introduction I.**

Educated individuals in an open global market that graduate from a less developed country (LDC) will decide to either immigrate to a developed country or remain in their home country. The argument in classic push-pull migration papers (Beine *et al*. 2003) explain that individuals will make decisions based off the expected net gain from either choice. However, the classic model, is an insufficient measure for an educated individuals' decision model. Using the educated unemployment rate (Gubert *et al*. 2009) and psychoactive costs (Grossmann and Stedalmann 2014) as novel factors in the decision making model, a more accurate model can be created. It is important to identify better individual decision models so that developmental economists can classify policies that may aid LDCs in retaining their educated capital.

LDCs are individual agents inside of a global economy. A way to categorize LDCs may exist in the creation of initial conditions. These conditions are identifiable components of an LDC, which are used to explain individual decision making, as well. Furthermore, initial conditions are applied to country specific factors that influence the rate of migration. For instance, they are used to describe the rates of change in wage gaps between a sending and receiving country, which is vital for the classic push-pull migration argument. Initial conditions are also utilized by clarifying a change in the educated unemployment rate over time. Unlike many papers to come before none have attempt to explain individual behaviors for migration using a binary condition for a LDC. This theoretical paper gives insight on a new methodology for examining individual behaviors in LDCs, through the use of the preceding arguments gives a developmental economist a more efficient tool kit in policy making and constructing empirical studies.

The paper is designed thus, section II is the relevant literature. Section III the theoretical model contains 5 sub-sections, section IIIa. The Standard Individual's Decision Model for Migration, section IIIb. An Addition to the Individuals' Decision Model for Migration, section IIIc. The Individuals' Decision Model with the Initial Condition Ad Hoc, section IIId. The Wage Gap and Equilibrating Forces from Initial Conditions, and section IIIe. Initial Conditions and the Impact on Educated Unemployment. Section IV are the results, which contain mirroring sections of III. Finally, section V is the conclusion and discussion of the paper and section VI is the bibliography.

**Section II. Relevant Literature**

This section will give a brief overview of the debate that has ensued over the effects of international migration, or brain drain, on the educated unemployed in developing countries. Fan and Stark (2006; 2007) are leading experts concerning this topic of international migration from developing countries and its implications for both the migrants and the remaining population. They examine the consequences of migration, educated unemployment and overeducation, the results of which can have significant losses for educated individuals. Specifically, Fan and Stark (2006; 2007) found as the probability of migration increases so do the cost of educated unemployment and overeducation. For example, Fan and Stark (2007) use a headcount transformed into an average loss formula to elicit a cost. They first find the rate of educated unemployment by dividing the number of the unemployed educated individuals in a home country by the proportion of the total number of individuals who remain that same country (Fan and Stark 2007). Thus, finding the total unemployment rate of the educated. Additionally they find the average loss from the unemployment rate among individuals to be the wage of an individual deciding to work a home country subtracted by the expected earnings they would earn

while working. Finally, defining this average loss in terms of the percentage of an individuals' average earnings in the absence of unemployment produces the cost of educated unemployment as a percentage (*ibid.*). As stated in the section above, Fan and Stark (2007) found as probability for migration increased to 10 percent, the average loss for these unemployment individuals increased to 10.45 percent. This illustrates that the increase in migration can cause negative externalities on the educated unemployed individuals who remain in that country. To find the average cost of overeducation, Fan and Stark (2007) divide the average net loss per individual by the net earnings from not acquiring an education. They deduce that from a 10 percent increase in the probability of migration there is a 15.60 percent cost from overeduction. This exemplifies that as migration increases there are negative costs that form out of the overeducation of individuals in a home country. Overall, from a 10 percent rise in migration there is a 26.05 percent cost to the individuals' average earnings.

Based on the work of Bhagwati and Hamada (1974), high foreign wage can increase the fixed wage rate of the educated in a home country by affecting people's psychology (Fan and Stark 2006) Bhagwati and Hamada (1974) explain the effect is contributed to a knowledge of international income-inequality in educated elites.  The educated elite in developing countries develop the notion that they should be receiving comparable salaries to elite groups in developed countries (Bhagwati and Hamada 1974). As a result, educated elites set salary levels and fixed wages higher, which in turn reduce the employment of educated labor because businesses cannot afford to hire as many employees for their revenue bracket (Bhagwati and Hamada 1974). However, since educated unemployment is not a serious problem in all the developing countries, Bhagwati and Hamada could not explain why a high foreign wage affects the psychology of people in some countries but not in others.

This other effect is explain through the preoccupation from one's personal networks rather than wage. Negrón (2012) reports that these personal networks determine the migration and non-migration of skilled and educated Jamaicans. In a survey of 62 Jamaican university students, she reported a combination of high crime rates and difficult job markets as important factors for the brain drain in Jamaica (Negrón 2012). For those not considering migration, Negrón (2012) found if gun control problems and related violence were not curbed by the government would then migrate for those not considering migration from Jamaica. In addition, if one's personal network provides informational, practical, and career and school support it encourages the intention to migrate (Negrón 2012).

Brain drain, the fraction of the educated workforce in a developing country that migrates to developed countries (Fan and Stark 2006), results in negative short-run and long-run effects on human capital stock (Carrington and Detragiache 1999). According to this argument, the migration of highly-educated laborers from developing countries lowers income levels and long-run economic growth rates in the developing world (Adams 2003). For instance, Grossmann and Stadelmann (2013) observed the estimated effects of an increase in the high-skilled migration rate on relative GDP and relative wages between the destination and source countries. They found that the effects brain drain are positive and significant. Specifically, the difference in wage between the destination and source countries was around 0.5 percent. The reason being, human capital is directly tied to output of source countries and with an abundant international transfer of such a resource, as in Jamaica, Tunisia, and El Salvador (Adams 2003), the welfare of those left behind would decline given that the social return to education exceeds its private return (Beine, Docquier, and Rapoport 2008).

In contrast to the conventional view, brain drain in a series of recent papers (Stark, Prskawetz, and Helmenstein 1997; Fan and Stark 2006; Fan and Stark 2007; Carrington and Detragiache 1999; Docquier, Lohest, and Marfouk 2007; Beine, Docquier, and Rapoport 2001; Beine, Docquier, and Rapoport 2008; Adams 2003) has been described with a counterbalancing positive effect, a brain gain. The argument is that brain drain can ultimately lead to an increase of human capital formation in the source country. As an example, Beine *et al*. (2008) find that doubling the migration propensity of the highly skilled individuals increases gross human capital formation by 5 percent. They argue that this is due to the fact that the return to education is higher abroad. In turn, migration prospects raise the expected return to human capital and induce more people to invest in education at home (Beine *et al.* 2008). Additionally, Fan and Stark (2007) further this analysis of brain gain through a dynamic framework which demonstrates that a higher level of human capital can prompt "take-off" of the economy and that will reduce the unemployment rate. To explain, brain drain is accompanied by a brain gain which results in a higher average level of human capital in the home country. The higher average of human capital, from the investment to education, can prompt a "take off" of the economy (Fan and Stark 2007). The "take off" takes the form on increased productivity and additional labor from a larger pool of educated human capital. In turn, this decreases the unemployment rate in the source country.

However, Ngoma and Ismail (2013) find brain gain to be statistically insignificant in the long run. Specifically, they find a statistically insignificant coefficient for a brain gain effect. This means that brain gain does not increase human capital formation. The differences between Beine *et al*. (2008) and Ngoma and Ismail (2013) could be due to specification differences and unaccounted endogeneity. In essence, because Beine *et al.* (2008) made inaccurate inferences about the data, they produced a regression model that failed to factually depict the relationship

between skilled migration and human capital formation. Furthermore, Beine *et al.* (2008) was unable correctly identify variables to properly measure human capital formation, resulting in variables that were unaccounted for in the paper itself.

Ngoma and Ismail (2013) provide an extension of the Beine *et al.* (2008) article to clarify the misrepresented result. Ngoma and Ismail use migration rates by skill level as a proxy for brain drain instead of gross migration rates. Additionally, both secondary and tertiary school enrolments are also used as proxies for skilled human capital investment in migrants' source countries. They also use the square of skilled migration rates to identify the long-run effects of skilled migration rates of human capital investment in the source countries. The data set is extended by including 90 countries as opposed to 37 countries. Finally, geographic distance, colonial link and language proximity between skilled immigrants' countries and their destination are all added as instrumental variables for skilled migration rates. Unlike Beine *et al.* (2008), their results did not support that migration encourages investment in education of remaining. Instead, they found that skilled migration rates squared, which illustrate the incentive effects of brain gain, to be statistically insignificant (Ngoma and Ismail 2013). Specifically, in a regression of gross investment in human capital, Beine *et al.* (2008) find skilled migration rate to have a coefficient of 0.040, which is statistically significant. However, Ngoma and Ismail (2013) find that coefficient to be -0.00, which exemplifies its statistical insignificance.

Educated unemployment, a phenomenon in which a large fraction of the educated workforce that is unemployed occurs when educated individuals face the prospect of employment abroad. The reasons and opportunities that make international migration appealing lead many to forego the idea of working in their home country. Instead, people remain unemployed as a symptom of securing foreign employment (Fan and Stark 2006). Fan and Stark (2007) show that in the short

run international migration often results in educated unemployment. With some notable exceptions from Fan and Stark (2006 and 2007), "educated unemployment" has had little consideration in the field of development economics.

The first of their articles examines the effects of unemployment rates for educated individuals' migration. They argue that educated unemployment is caused by the opportunity to migrate internationally, that is, by the possibility of a brain drain (Fan and Stark 2006). The reason being, an individual's reservation wage in the labor market of the home country increases with the probability of working abroad. Workers who fail to line up employment abroad are less likely to immediately immerse themselves in work in their home country (*ibid.*). This gives them a higher chance of entering unemployment. Moreover, Fan and Stark (2006) theorize that in the absence of the option to migrate, the unemployment rate tends to decrease. With the integration of new brain gain literature into their model, they conclude that a developing country may end up with more educated individuals despite the brain drain and educated unemployment (*ibid.*). This is an important distinction their work makes in relation to the other literature on the brain gain versus brain drain debate.

The focus of the second article (Fan and Stark 2007) is the theory that allowing some educated individuals to work abroad results not only in brain drain and educated unemployment in the short-run for developing countries, but also as migration raises in the long-run the expected returns to higher education increase. These expected returns, explained by Fan and Stark (2007), occur as the probability of migration for the preceding period increases. Specifically, they theorize that as probability of the preceding period reaches 10 percent the proportion of the educated in the current period should rise to 51.26 percent (*ibid.*).Thus, a brain gain, in the short-run, can result in a higher average level of human capital in the home country

causing a "take-off" of the economy, which ultimately decreases the unemployment rate (*ibid.*). Furthermore, this "take-off" occurs only in the next generation. For example, India and Ireland from 1960 to 1980 were distinguished by their high rates of migration of skilled labor. These two countries experienced the lowest rates of economic growth out of all other countries (Summers and Heston, 1991) within that time period. By the early the 1990s, approximately one generation after their sustained economic stagnation, both countries underwent a period of rapid economic growth (Fan and Stark 2007).

Fan and Stark's theoretical work constructs a basis for further theoretical research. The question still remains as to how does educational unemployment influence an individuals' decision to migration? Alluding to the Bhagwati and Hamada (1974) and Negrón (2012), if there is another psychological condition that impacts migration patterns, other than higher wage, how does it influence individuals' decision? Examining the papers of Fan and Stark (2006; 2007) and Beine *et al.* (2008), could a country specific theoretical model can be formed that emphasizes the initial conditions of developing countries to determine long run positive correlation between educated unemployment and international migration? In addition, could it be used to explain migratory patterns of skilled individuals? This paper attempts to answer these questions.

**Section III. Theoretical Model**

This section provides an economic model of the individual in the classic push-pull wage argument for migration with the addition of educated unemployment and psychoactive and transaction costs. The argument constructs a model for decision making, which is influenced by the initial conditions of a source country. These conditions will ultimately lead to an equilibration of migration and will explain the relationship between education unemployment and skilled migration.

**Section IIIa. The Standard Individual's Decision Model for Migration**

Based on the work of Fan and Stark (2007), two countries exist in this model; country F (foreign - receiving) and country H (home - sending). There exists an individual $I$ in H who decides to invest in education. She attains a tertiary level of education making her a prime candidate for international migration. $I$ is subject to two options upon graduation. The first is the option to secure employment and migrate to country F. The second is the option to secure employment and settle in H.

If $I$ chooses to migrate, the decision is made to secure employment in F. To secure a job, $I$ invest all of her time looking for employment (Fan and Stark 2007). Since $I$ has no additional time, the time required to find employment in H, during this period she has no job and earns no wage (*ibid.*). After securing employment in F, $I$ migrates to receive the wage rate in country F.

$$w^f = w^f - w^h$$

Where $w^h$ is the wage rate of country H and the difference between the foreign wage and home wage is the gain from migration to country F. The gain from foreign wage is accompanied by a cost. This cost is manifested as psychoactive costs and transaction costs. For example, $I$'s transaction costs, TC, are travel, time, housing, and purchasing simple necessities for living. For the sake of consistency TC is constant for every individual migrating to F. Thus, $w^f$ is the gain of securing employment and migration and TC is its cost.

The second option is to settle and secure employment in country H. If $I$ decides to settle she no longer has the opportunity to receive $w^f$. Instead, she earns wage rate,

$$w^h = w^h - w^f$$

Where $w^h$ is the gain from settlement in H and is less than $w^f$ (Fan and Stark 2007). Unlike the first option, $I$ does not incur TC.

From the gains and cost of migration and settlement, the net gains of either can be derived. The net gains for migration can be stated as,

$$NG^f = w^f - TC$$

and the net gains for settlement are described as,

$$NG^h = w^h - TC$$

Net gains, wage rate and transaction costs, are factors that influence $I$'s decision to migrate, which is described as the probability of migration, $P^f$. Then the probability of migration must be equal to a function of the wage and TC from migration. Thus $P^f$ is,

$$P^f = f(w^f, TC)$$

Additionally, these factors are used to describe the probability of settlement in country H, $P^h$.

$$P^h = f(w^h, TC)$$

Since $I$ must either migrate or settle, these probabilities add to 1. The following can be stated about the probability of migration and settlement.,

$$P^f + P^h = 1$$

Or,

$$P^f = 1 - P^h$$

And vice versa. To explain, if the probability of migration is 80 percent, 0.80, than the probability to settle would be 20 percent, 0.20, indicating that $I$ migrates to F. On the other hand, if the probability of migration is 0.40, than the probability to settle would be 0.60, showing that $I$ settles in H.

**IIIb. An Addition to the Individuals' Decision Model for Migration**

Unlike the section above which provided a standard framework an individuals' decision to migration, section IIIb. includes two important factors that augment this standard model. The

first, is the incorporation of the educated unemployment rate to the gain of both options of migration and settlement. To explain, *I* examines country H and F's educated unemployment rate denoted $E_U^h$ and $E_U^f$. The level of educated unemployment determines *I*'s willingness to secure a job in either country. The second, in addition to TC, is the psychoactive cost of migration, PC. PC is formed by cultural assimilation, intolerance, disconnectedness with friends and loved ones, climate and geographic change, social anxieties, and political corruption (Negrón 2012). To state simply, PC is the accumulated cost to the psyche from the migration to F.

As stated above, the educated unemployment is factored into the gains for either option and is supplementary to the individuals' decision making model. The incorporation of $E_U$ is used to establish the average expected wage, $w_e$.

$$w_e(w, E_U) \rightarrow w_e(w_t, w_{E_U})$$

To clarify, the average expected wage is subject to the wage rate and the educated unemployment rate. The arrow indicates that average expected wage implies the average expected wage subject to wage rate over a period of time, $w_t$, and the average loss in wage due to educational unemployment, $w_{E_U}$. The following can be stated about average expected wage.

$$w_e(w_t, w_{E_U}) = w_t - w_t * E_U$$

$$w_e = w_t - w_t * E_U$$

To explain, $w_e$ is equal to the difference of wage rate, $w_t$, and the average loss of wage from educated unemployment, $w_t * E_U$. Assuming *ceteris paribus*, if wages increase from economic growth, then $w_e$ rises. On the other hand, if educated unemployment grew from an extraneous inflow of educated individuals, then $w_e$ falls. From $w_e$, the following specification can be made about the expected net gain from migration.

$$NW_e^f = w_e^f - w_e^h$$

And the subsequent is stated about the expected net gain from settlement.

$$NW_e^h = w_e^h - w_e^f$$

If $NW_e^f$ from migration is greater than $NW_e^h$ from settlement, than *I* will migrate to F and if the opposite is the case than *I* settles in H, costs excluded.

How these wages interact can be explained by the work of Bhagwati and Hamada (1974), which illustrates the existence of integrated markets between H and F, which influence wages in H. Which elicits the question of whether H can have government sanctioned barriers or integrated markets. H would implement one or the other for the following cases.

Case 1: Country F has erratic wage shifts due to economic instability. As a result, country H uses barriers to prevent wage shifts from occurring, which may destabilize the economy. Additionally, wage decreases in F and *I*'s $P_h$ increases raising the probability of settlement in H.

Case 2: Country H accumulates educated individuals from investments in education causing wages to decline as the rate of educated unemployed grows. In response, country F sees H's increase in educated unemployment and pulls from that pool of graduates by raising their wage rate.

Government sanctioned barriers allow for economic stability in H, promoting growth in their job market, and increase nationality. On the other hand, integrated markets allow F to change their wage rate in response to wage decreases in H. This not only lowers the inefficiencies of overeducation and unemployment in H, but also gives opportunity for potential brain gain through information inflow, remittances, and returnees.

Addressing the second addition to the individuals' decision model, PC is augmented to the total costs of migration. Now including TC and PC in the expected gain model (1), changes into a expected net gain structure for *I*. Where,

$$NG_e^f = w_e^f - (TC + PC)$$

is the expected net gain for migration to country F, which is described as the expected gains from migration minus the cost of migration And,

$$NG_e^h = w_e^h - (TC + PC)$$

is the expected net gain for settling in country H, which is described as the expected gains from settlement minus the cost of settlement. For all cases of settlement, cost is equal to 0 since $I$ is not undergoing migration. If $I$ is deciding to migrate she examines the following relation.

$$NW_e^f - (TC + PC) \gtrless NW_e^h \qquad (1)$$

Here, if the expected net gain from migration is larger than the expected net gain from settlement than $I$ choses to migrate. Additionally, if the expected net gain from settlement is higher than that of migration then $I$ remains in H. Much like the standard model, expected net gain is used to explain the probability for migration and settlement.

$$P^f = f(NW_e^f, TC, PC)$$

Since $I$ identifies the probability of migration using the expected net gain from migration, $P^f$ is equal to the function of expected gains, transaction costs, and psychoactive costs. Additionally,

$$P^h = f(NW_e^h, TC, PC)$$

Here $I$'s probability of settlement is based on the expected net gain from settlement. Therefore, $P^h$ is equal to the function of expected gains, transaction costs, and psychoactive costs, the costs of which are 0. Since $I$ must either migrate or settle, the probabilities add to 1.

$$P^f + P^h = 1$$

If the probability of migration is greater than the probability to remain at home then $I$ decides to migrate to F. On the other hand, if the probability to settle in H is higher than the probability of

migration then *I* secures employment and remains in H. Note that these probabilities are determined by the expected net gains of either migration or settlement.

Given that wage, educated unemployment, transaction costs, and psychoactive costs all influence P, by isolating each affect there can be a better understanding of how P changes. By the taking partial of P in respect to the individual factors, the influence of each is illuminated. Note, in this case P can either be the probability for migration or settlement.

$$\text{P} = f(w, E_U, TC, PC) \tag{2}$$

Here net gain is expanded to show both wage and educated unemployment, this way each factor have be examined separately. Taking the first partial of P with respect to wage, there is the following effect.

$$\frac{\partial \text{P}}{\partial w} > 0$$

Since $\frac{\partial \text{P}}{\partial w}$ is greater than 0 wage and P are positively correlated. To explain, if wage increases from an improving economy in H then the probability of settlement grows as the benefit from remaining at home increases. If it were to decline from an inflow of educated individuals, the probability of settlement falls as the benefit of remaining in H would depreciate giving *I* the incentive of migrating to F. By taking the partial derivative of P with respect to educated unemployment, there is the following effect.

$$\frac{\partial \text{P}}{\partial E_U} < 0$$

Here $\frac{\partial \text{P}}{\partial E_U}$ is less than 0, indicating educated unemployment and P are negatively correlated. The connection between $E_U$ and P is exemplified through the labor market model. Examining the classical labor market model, if educated unemployment increases there is a rightward movement along the demand curve because the quantity of laborers rises. If there are not enough jobs to

compensate the increase in quantity, wage declines and P drops. Therefore, educated

unemployment caused P to fall. For the next two factors $P^f$, the probability of migration, is used

instead of the general P. Taking the partial of P with respect to transaction costs, is described in

the following.

$$\frac{\partial P^f}{\partial TC} < 0$$

$\frac{\partial P^f}{\partial TC}$ is less than 0, which shows a negative correlation between transaction costs and the

probability of migration. To illustrate, transaction costs are relatively high for most individuals in

developing countries. Travel expenses, purchasing a home, and purchasing basic amenities

restrict the migration pattern for individuals. Although TC remains constant, it still retains a

negative impact on P. Finally, by taking the partial derivative of P with respect to PC, a joint

result occurs.

$$\frac{\partial P^f}{\partial PC} < 0$$

And,

$$\frac{\partial P^h}{\partial PC} > 0$$

In in the first partial, $\frac{\partial P^f}{\partial PC}$ is less than 0, indicating that psychoactive costs and the probability of

migration have a negative correlation. To show this relationship imagine $I$ is married with kids,

her psychoactive costs are much higher than those who do not have a family. For $I$, her PC

causes her probability for migration to decrease. On the other hand, $\frac{\partial P^h}{\partial PC}$ is greater than 0,

showing that psychoactive costs and the probability for settlement have a positive correlation. To

explain using the same example, $I$'s PC is high from having a family. The increase in

psychoactive costs decreases the probability to migrate. By using the formula $P^h = 1 - P^f$, as

the probability of migration falls the probability to settle rises. Therefore, PC has a positive correlation with $P^h$.

Constructing a theoretical framework from (1) and (2) this paper proposes two examples that offer conditions for migration to F or settlement in H by *I*.

**Proposition 1:** *I is a graduate from country H. She will receive a higher wage after migration to country F, given the property $w_e^f > w_e^h$. Country F has growing job market that is capable of adjusting to an increase in supply. Therefore, it has a low educated unemployment rate. Additionally, not only are I's transactions costs decreased because a firm she reached out to is paying for her first years stay, but also her psychoactive costs are lower due to high crime rates and political corruption in H.*

**Proof 1:** On the consideration of (1) and (2) *I* has the following decisions:

$$NW_e^f - (TC + PC) > \downarrow NW_e^h$$

To which the following can be stated,

$$f(w, E_U, TC, PC) > f(w, \uparrow E_U, TC, PC)$$

and,

$$P_f > P_h$$

For *I* the probability of migration to country F is greater than for country H. Meaning she will secure employment abroad in F since the benefit of migration exceeds the cost of staying in H.

**Proposition 2:** *I is a graduate in country H with the same conditions in **Proposition 1**. Except relaxed policy changes in migration in F have caused the educated unemployment rate in F too raise much higher than H. Additionally, the costs of travel are expensive, and I has many relatives in H that she is not willing to leave.*

**Proof 2:** Using the formulas present in (1) and (2) *I* makes the following decisions.

$$\downarrow NW_e^f - (\uparrow TC + \uparrow PC) < NW_e^h$$

Therefore the following can be stated,

$$f(w, \uparrow E_U, \uparrow TC, \uparrow PC) < f(w, E_U, TC, PC)$$

and,

$$P_f < P_h$$

This relationship illustrates $I$'s probability to migrate is higher for country H than F. Indicating that $I$ does not migrate abroad and instead settles and secures employment in H. Since cost rises from the increase in average loss to wage from $E_U$, the increase in transaction costs from travel expenses, and the increase in psychoactive costs from the connection to loved ones it exceeds the benefit from wages in F.

## IIIc. The Individuals' Decision Model with the Initial Condition Ad Hoc

Given the argument above from $I's$ decision model for migration and the work of Fan and Stark (2006; 2007) and Beine *et al.* (2008), there exists an ad hoc based on the initial conditions of country H, which influence $I$'s decision to migrate. Before introducing how these initial conditions influence $I$, the following assumption must be made. The initial conditions can be $(HK, ISM)$. Where $HK$ is human capital measured in school enrollment rate and $ISM$ is the international skilled migration rate or the rate in which tertiary level students leave country H. H has a constant level of human capital and a binary level of international skilled migration in the beginning of an observable period. International skilled migration can either be high or low. It also has the potential for changing from individual decisions over a generational period. Additionally, human capital is either consistently high or low either of which influences $I$'s decision to migrate.

The assumptions in the preceding give a basis for the ad hoc in this section. The following function provides the initial conditions of H: $(HK_H, ISM_H)$, $(HK_H, ISM_L)$, $(HK_L, ISM_H)$, or $(HK_L, ISM_L)$. Each level of $HK$ and $ISM$ gives a different incentive for the individual on whether or not to migrate.

For example, if H has $(HK_H, ISM_H)$, indicating that it has high human capital and high international skilled migration, this demonstrates that H is able to produce educated individuals, but is unable to retain them upon graduation. Most like China, these initial conditions make it difficult for $I$ to settle in H since most of her peers are migrating to F. China is a powerhouse in producing educated individuals, however, the political and social restrictions placed on educated individuals make it difficult to focus in certain areas of study. In turn, this lowers psychoactive costs since $I$ has positive gains from migration by working with peers and in area of interest abroad. Due to the decrease in PC the following relationship exists.

$$f(w, E_U, TC, PC \downarrow) > f(w, E_U, TC, PC)$$

and,

$$P_f > P_h$$

Here the relationship described illustrates the probability to migrate to F is greater than settlement in H. Furthermore, the benefit from migration is larger than the cost due to job freedom and peer to peer interactions in F. High human capital and high international skilled migration lower psychoactive costs increasing $I$'s incentive to migrate to F.

On the other hand, if H has $(HK_H, ISM_L)$, then it not only has institutions to educate their youth, but also policies and programs to the retain educated individuals. These initial conditions illustrate transitional countries which have institutional structure to do both. For example, the Russian Federation, which only in the last year has grown unstable, was able to produce

educated individuals and keep them. To explain, educated individuals have a tendency to congregate increasing the establishment of societies, companies, and government program. When the establishment of institutions increase, there is an augmentation in settlement from raised psychoactive costs. Existing institutions can provide international connections, jobs, and $I$ can keep their same cultural and linguistic background. Psychoactive costs increase upon this consideration, which provides the following relationship.

$$f(w, E_U, TC, PC \uparrow) < f(w, E_U, \text{TC}, \text{PC})$$

and,

$$P_f < P_h$$

This relationship describes the probability of settlement in H is greater than the probability of migration in F. To explain, costs for migration raise as existing institutions pull $I$ to H leaving the benefit smaller than the overall cost of migration. In turn, high human capital and low international skilled migration the increase PC causing $I$ to settle in H.

On the other hand, when H has $(HK_L, ISM_H)$, it has a smaller amount of institutions to educate and cannot maintain the population of educated when they graduate, giving $I$ incentive to migrate. For example, transitional countries (Turkmenistan, Georgia, Tajikistan, Azerbaijan, Belarus, Montenegro, and Kyrgyzstan) have relatively low human capital considering their educational systems' are smaller than the Russian Federation's or China's. The main issue with some transitional countries is the lack of opportunity for graduates. For $I$, psychoactive costs decrease as the lack of institutions push those educated towards countries with more opportunities at their skill level. The following illustrates migration probability decisions for individuals in H.

$$f(w, E_U, TC, PC \downarrow) > f(w, E_U, \text{TC}, \text{PC})$$

and,

$$P_f > P_h$$

To explain, the probability of migration is larger than the probability of settlement in H. The lack of job opportunities in H decreases the cost making benefit greater than cost for migration. As a result, low human capital and high international skilled migration decreases the psychoactive cost increasing causing F to migrate.

If H has $(HK_L, ISM_L)$, then it has inadequate facilities to accommodate educated individuals. However, H is able to retain their graduates through institutional incentives or otherwise. For example, Beine *et al.* states in his paper (2008) that countries gain from having low human capital and low international skilled migration. This initial condition gives educated individuals the opportunity to start their own businesses, programs, and developmental groups. Thus, it allows them to continue practicing their cultural traditions and keep personal connections with their loved ones. These concepts increase the psychoactive costs of migration, giving the subsequent decision for individuals in H.

$$f(w, E_U, TC, PC \uparrow) < f(w, E_U, TC, PC)$$

and,

$$P_f < P_h$$

Here the relationship described is the probability for migration is less than the probability of settlement in H. Indicating that establishing institutions and practicing culture increases the cost of migration making it larger than its benefit. Overall, low human capital and low international skilled migration increases psychoactive costs causing $I$ to settle in H.

**IIId. The Wage Gap and Equilibrating Forces from Initial Conditions**

Initial conditions of H imply an equilibrating force that drives wages rates in H and F

closer to together, which ultimately gives no incentive to migrate to F. The wage gap is the difference between wage rate F and H denoted,

$$Wage\ Gap = (NW_e^f - (TC + PC)) - NW_e^h$$

Once wage gap equals 0 then the market is equilibrated, holding TC and PC constant. The rate at which this wage gap narrows depends on the same initial conditions.

The explanation for a narrowing wage gap is based off the classical model of labor market. Take a market that is in constant disequilibrium from barriers to wage change, keeping wages above equilibrium in H, which incentivize *I* to settle in H. On the other hand, wages are below equilibrium in F created by the inflow of migrants, as well as, natives looking for employment. However, when H decides to have integrated markets, wage will fluctuate as the supply of labor changes. The supply of labor does not change when *I* migrates to F immediately, since she was never employed or unemployed in H's economy. But when *I* migrates the supply of labor increases in F, which decreases the wage rate and narrows the wage gap. It is important to note that changes in F occur much slower than in H since the stock of human capital is larger than in H. Much like a market of price takers where price takers have very little influence. Nevertheless, wage in F is low enough that *I*, depending on local wage, educated unemployment rate, TC, and PC, will not migrate and instead secure a job in H. Then wage will supply of labor increases in H decreasing the wage rate. If low enough, people migrate again to F. Migration is equilibrated when the wage gap is equal to 0, indicating the probability of migration is greater for settlement in H for all individuals.

However, the rate at which each country reaches equilibrium differs based on the existing initial condition. To explain, in an H with $(HK_H, ISM_H)$ the gap narrows at a relatively quick rate. International skilled migration is high making the rate of change of the gap faster. The

reason being, the larger inflow of capital into country F's labor market causes a faster shift in the supply curve. Since human capital is high in H the impact on the wage in H has smaller affects when individuals enter the market in H. For instance, in China's economy, when individuals enter the market there are relatively small improvements in the economy over time since its pool of educated individuals working is relatively high. Nevertheless, the equilibration for the wage gap occurs relatively quickly as impacts on wage are small in both H and F.

In an H with $(HK_L, ISM_H)$ this gap closes the faster than the above since the effects of settlement would be greater. Narrowing of the wage gap occurs faster due to low human capital. In explanation, since settlement is relatively small, as explained in section IIIc., wage remains relatively constant while wage is reducing in F at about the same rate as in the above. Therefore, the wage gap narrows at a quicker pace than $(HK_H, ISM_H)$.

In H's with low international skilled migration it indicates that the market is close to equilibrium or there are psychoactive costs, which are preventing the economy from ever reaching equilibrium. For instance, in an H with $(HK_H, ISM_L)$, the wage gap narrows slowly. Since H has high human capital, the impact of settlement is minor. Also international skilled migration is low which indicates a reduced influence on F, which is already very small. Given these conditions, the rate at which the wage gap closes is slow. In addition, the wage gap in an H that has $(HK_L, ISM_L)$, equilibrates at a slower rate. Both human capital and international skilled migration are low, which indicates not only is the effect settlement has on wage rate in H is relatively high, but also the amount of migrants to F is small. In turn, this reduces the wage gap rate since wage in H is decreasing, as well as, wage in F is slowly reducing.

**IIIe. Initial Conditions and the Impact on Educated Unemployment**

The initial conditions also provide changes in the educated unemployment rate over a period of time. That period of time, Fan and Stark (2006; 2007) state, is a generational period. This generational period takes place over a 20 year span of time. The following propositions give insight on how initial conditions affect this change over time.

The first proposition illustrates the beneficial effects of international skilled migration on developed countries in the educated unemployment rate in the sending country. This theory coincides with the current literature (Stark, Prskawetz, and Helmenstein 1997; Fan and Stark 2006; Fan and Stark 2007; Carrington and Detragiache 1999; Docquier, Lohest, and Marfouk 2007; Beine, Docquier, and Rapoport 2001; Beine, Docquier, and Rapoport 2008; Adams 2003) on brain gain and human capital formation.

**Proposition 3:** *Country H has $(HK_L, ISM_L)$. These initial conditions increase human capital over the long-run. From I's decision and many others to migrate over the past generation country H is seen to have a large increase in international skilled migration. Over this generational period, information inflow, remittances, and returning migrants from country F have caused many younger individuals to invest in education. The higher amount of educated individuals signifies an increase in human capital. Country H increases its expenditure education as response to the raise in demand for schooling. More importantly, this increase promotes job growth as potential entrepreneurs enter the market as they look towards more educated individuals for employment. Job growth, as well as investment in education causes a "take-off" in economic performance decreasing the educated unemployment rate in country H.*

**Proof 3:** The assumption is low human capital and low international skilled migration give way to *beneficial brain drain effects* (Beine et al. 2008). Giving the implication,

$$\text{When } (HK_L, ISM_L) \text{ then } -\left(\frac{\partial E_U}{\partial t}\right)$$

The initial condition of low international skilled migration and low human capital implies that the educated unemployment rate decreases over time.

The second proposition constructs the argument for the conventional view of harmful brain drain and its correlation with the educated unemployment rate in developing countries. In short, this theory will draw on the literature (Grossmann and Stadelmann 2013; Carrington and Detragiache 1999; Negrón 2012) outlining the impact of skilled immigration and the negative outcome on the source country's economy.

**Proposition 4:** *Country H has $(HK_H, ISM_L)$. These properties give H a disadvantage for a having a potential for economic growth in the next generational period. Even though there is low international skilled migration and human capital formation remains high. Just like in* **Proposition 3** *I and other educated persons migrate to country F. However, there is a counteracting force that preventing the educated from getting job. This barrier can be explained by high stock of human capital and the job market of a developing country. High human capital floods the job market to the extent that educated individuals have trouble securing jobs since there are not many in the first place. Unfortunately, individuals from this country have a high PC, which discourages them from migrating. This increase in educated unemployment exemplifies a decrease in economic performance. Throughout a generational period the educated unemployment rate gives little or even negative economic growth to H, which plummets output.*

**Proof 4:** The assumptions is low human capital and high international skilled migration results in *harmful brain drain effects* (Grossmann and Stadelmann 2013; Carrington and Detragiache 1999). Which gives the following implication,

$$\text{When } (HK_L, ISM_L) \text{ then } + \left( \frac{\partial E_U}{\partial t} \right)$$

The initial condition of high international skilled migration and low human capital, which implies that the educated unemployment rate increases over time.

The third and last proposition expresses the case where the relationship between skilled migration and educated unemployment results in statistical insignificance. (Ngoma and Ismail 2013)

**Proposition 5:** *Ignoring the constraints for country H, there is no production of human capital from international skilled migration. This indicates that the educated unemployment rate is unchanged and economic performance is stagnant.*

**Proof 5:** Neither human capital nor international skilled migration should have an influence on the educated unemployment rate in H. The statistical insignificance that Ngoma and Ismail (2013) illustrates that for all values of human capital and international skilled migration, there is no effect on the educated unemployment rate over time. Therefore, no matter the initial conditions for H there is no implied significant impact on educated unemployment rate.

**IIIf. Theoretical Summary**

Table 1 illustrates the predictions suggested in section III. Examining this table, it is clearly shown that the initial conditions in country H explain for shifts in PC, the narrowing rate of the wage gap, the probability of migration, and the educated unemployment rate. The subsequent effects should give incite on the direct impacts of the ad hoc in migration theory. All theoretical results were derived from section III.

*Table 1. Initial Conditions and its Subsequent Effects*

| Initial Conditions for country H | Effect on psychoactive costs | Effect on the wage gap | Probability of migration to F | Effect on educated unemployment rate |
|---|---|---|---|---|
| $(HK_H ISM_H)$ | Decrease | Quick | Increase | N/a |
| $(HK_H ISM_L)$ | Increase | Quick | Decrease | Positive |
| $(HK_L ISM_H)$ | Decrease | Slow | Increase | N/a |
| $(HK_L ISM_L)$ | Increase | Slow | Decrease | Negative |

Source: Section III. Theoretical Model

## IV. Analytical Model

The argument thus far has presented that the standard individual decision model for migration is an insufficient explanation. Instead, the educated unemployment rate and psychoactive costs are better theoretical measurements for migration as they contain important endogenic factors that have statistically significant results on decision making. An additional argument presents the idea that individual decisions are influenced by the initial conditions of a source country. The purpose of initial conditions are not only to better categorize developing countries, but also ameliorate the explanation on how individuals react to certain levels of human capital and international skilled migration. The third argument is the incorporation of initial conditions, which better explain the wage gap. That is, the rate at which the wages, in a sending and receiving country, get closer together. However, relevant literature has contrary results to the theoretical model presented above. The final argument presented is that initial conditions can explain the change in educated unemployment over a generational period of time. Considering there is fairly little information on educated unemployment, figure 3 is used to make claims on potential changes in this

**IVa. Results - The Addition to the Individuals' Decision Model for Migration**

Based on Gubert *et al.* (2009), unemployment, in a cross-section analysis of total bilateral expatriation rates in 2000, was found to have positive correlation with migration within a 1% significance effect. Indicating that individuals in developing countries are making the decision to migrate, with a consideration of the unemployment rate. To claim that educational unemployment is a part or the main part of this considered is not a stretch. However, unemployment is not fully explained by a less developed countries (LCDs) lack of institutions or poor job market (Gubert *et al.* 2009). Some educated individuals may migrate to LCDs with generous welfare policies to help in the transition in geographic location. Nonetheless, Gubert *et al.* (2009) illustrates that the individuals' decision is influenced by the positive correlation between unemployment and migration. Therefore, in order to construct an accurate model of decision making for migration, educated unemployment should be included.

As explained psychoactive cost is an incentive for the individual to either migrate or remain at home based on personal affect. In Grossmann and Stadelmann (2013), their results show that having the common language of the receive country has a positive correlation with wages. Specifically, it has a coefficient of 0.1294 and a statistical significance below a 1% significance level, which clarifies the described positive correlation. They believe this occurs when a skilled immigrant must settle for a lower paying job due to language problems in the destination country (*ibid.*). The effect of which deters potential migrants from participating in migration since expected wage decreases, evidence that psychoactive costs increase for individuals who do not speak the common language. Based on the findings in Gubert *el at.* (2009), low degrees of political rights give incentives for migration. In a panel data analysis of yearly emigration rate from 1990-2002, they found if a source country has low political rights there is a positive correlation with emigration rate (*ibid.*). They describe this correlation by

stating political instability and corrupt government can not only give incentive for migration, but also encourages apathy in governments when individuals migration, since such persons could cause social unrest (*ibid.*). Therefore, supporting that a decline in political rights causes psychoactive costs to decrease, since educated individuals' have more incentives migration. In all, the inclusion of psychoactive cost in the individual decision model for migration is imperative, considering it has a direct relationship with the incentives for migration.

**IVb. Results - The Individuals' Decision Model with the Initial Condition Ad Hoc**

Since it is easiest to describe the influence of initial conditions with a real life example, the LDC Cabo Verde is used as pragmatic support to push this argument forward. Cabo Verde's initial conditions are $(HK_L, ISM_H)$ and referring to Table 1 it is stated that the following conditions decrease psychoactive costs and increase the rate of migration to F for the individual. Based on the Worldbank data, in figure 1, over 80% of all educated individuals who graduated from Cado Verde's universities migrated to an OECD country. Indicating that international skilled migration is high. Alternately, the school enrollment rate for tertiary level individuals was less than 2%. Showing that Cabo Verde has a low stock of human capital. Since the amount of students enrolled is very small, any migration out of the country causes massive increases in emigration rates taken in 2000. Now by examining the predictions in table 1, certain effects on individual decision making under these initial conditions can be argued. For instance, since Cabo Verde has $(HK_L, ISM_H)$ psychoactive costs decrease and the probability for migration should increase. Although the level of education is rising and output is increasing in Cabo Verde, there is a lack in opportunities for educated individuals ("Cape Verde - A Success Story." African Development Bank (2012)). The impact on the individuals' psyche is negative since there is no

potential for using acquired skills through education. Therefore, the psychoactive costs of migration decrease and the probability for migration increases.

Continuing this argument, Georgia's initial conditions are $(HK_H, ISM_L)$, which is illustrated in figure 1. In 2000, the gross tertiary enrollment rate was 38%, indicating a high human capital initial condition. The high human capital is explained by Georgia's link to the USSR, which understood the importance of educational institutions.  Furthermore, figure 1 exemplifies that Georgia has a 2% emigration rate of educated individual, showing that international skilled migration is low. Unfortunately, the initial conditions cannot explain individual decisions in Georgia. From 1992-1996 there were difficult political and economic conditions, which drove out Georgians from the country ("International Migration from Countries with Economies in Transition: 1980-1999." Population Division Department. United Nations Secretariat 2002). In 1996 there were a reported 288,600 that fled to the Russain Federation, and other parts of Europe (*ibid.*). At the end of 2000, 272,100 Georgians remains displaced many of whom were educated individuals (*ibid.*). This diaspora may explain the small emigration rate from Georgia in 2000.

Examining this argument further, El Salvador has $(HK_H, ISM_H)$ as its initial conditions, as seen in figure 1. In 2000, since the gross tertiary enrollment rate was 21%, above the 11% threshold, the stock of human capital is high. In the case of international skilled migration, the emigration rate is 32%, which shows there is an incentive to migrate abroad. Looking at table 1, the initial conditions of El Salvador, $(HK_H, ISM_H)$, should result in a decrease in psychoactive costs and thus increase in the probability of migration. The resulting decrease is seen through the established social networks between El Salvador and the United States (MenjÃvar 2000). MenjÃvar (2000) states that immigration ties allow substantially reduce the costs, financial and

psychological, of migration. Thus exemplifying how the psychological costs of migration decrease for individuals in El Salvador causing the probability of migration to increase.

To finish this argument, India has $(HK_L, ISM_L)$ its initial conditions as seen in figure 1. In 2000 the emigration rate for educated individuals was 4% indicating a low international skilled migration rate. However, India has an incredibly high population size, which skew the level of human capital. Much like the population tax from developmental economics, population is negatively impacting the ratio of educated individuals since the number of individuals that should have a tertiary education is much higher than other countries, like Georgia. The gross tertiary school emigration rate was 9% showing that it is less than the 11% threshold, therefore, showing that the stock of human capital is low. Given these conditions, examining table 1, psychoactive costs increase and the probability of migration decreases. Khadria (2001) explains that India is one of the main exporters of skilled and unskilled labor, which is ameliorated by substantial international social networking and connections. Thus dampening the potential cost to psyche from migration. This decreases psychoactive costs and increases the probability for migration abroad. However, these effects do not correlate with the initial conditions suggested by the casual empiricism. Ultimately, not supporting the initial condition ad hoc.

 Overall, the existence for initial conditions are not entirely supported by relevant literature and pragmatic examples, but there are certain countries that contour its predicted affects and can be explained through other scholarly mediums as well.

**IVc. Results - Wage Gap and Equilibrating Force from Initial Conditions**

Contrary to the belief that labor markets create wage gaps between a LDC and OECD, it is the differences in factor endowments. Based on the work in Clemens (2010), labor markets can be less competitive in some countries than others. Some workers produce nontradables or z-

goods, which can be a large portion of their output (Clemens 2010). Workers in different countries have altering level of ability, in formal or tacit training, which changes how individuals enter the labor force (*ibid.*). Additionally, some individuals who enter the labor market are shirkers decreasing the productivity in a market and differs on the field of work.

These factors that change the behavior of labor markets indicate the real measure of the wage gap cannot be identified using expected wage. Instead, focusing on market failures and examining all sides of productivity gives a better representation of the wage gap between two countries. Looking to minimizing market failures and using proper measurement tools can give a potential equilibration model for the wage gap. Overall, using the labor market model to explain the wage gap is inaccurate. Instead, real life occurrences must be accounted for to fully clarify changes in the wage gap between labor sending and receiving countries.

**IVd. Results - Initial Conditions and the Impact on Educated Unemployment**

Figure 2 illustrates a correlation between educated unemployment and the initial conditions, under the assumption that the identifying conditions in section IVb. are correct. If India has the initial conditions $(HK_L, ISM_L)$, as stated in section IVe., examining table 1 there is a negative result on educational unemployment over a period of time. Upon closer inspection of figure 2, there is an incline in educated unemployment from the mid-1980s up until the late 2000s. However, in 2010 the educated unemployment drops, which confirms the prediction in table 1. But, was this drop actually caused by these initial conditions or was it the increase in opportunities provided by a profiting tech labor market? If Georgia has $(HK_H, ISM_L)$, as stated in IVe., observing table 1 there is a positive correlation with educated unemployment rate over time. Examining figure 2 in depth, the trendline illustrates that educational unemployment is increasing over time from the mid-1980s to the late 2000s. Unlike India there is no drop in 2010

instead the educated unemployment rate continues to rise. Thus showing, through casual empiricism, that the initial condition for high human capital and low international skilled migration causes increasing educated unemployment over time. In sum, the potential effects of initial conditions on the educated unemployment rate is supported.

## V. Conclusion

The topic presented in this paper acts as an ad hoc to the classical push-pull migration. It is found that the addition of unemployment and psychoactive costs in the individual decision making model for migration is supported by the relevant literature and pragmatic examples. However, using initial conditions to explain educated individuals' movements between countries is unconvincing. The likely culprit skewing initial conditions is the uniqueness of countries, which causes difficulties standardizing a set of countries. Additionally, the simplification of wage gap with the use of initial conditions establishes an inaccurate model that would be better suited for theoretical use than real life application. On the other hand, the possible use for initial conditions explaining long term fluctuations in educated unemployment is supported with casual empiricism .It is important to keep testing the norms of economics. By questioning the classic push-pull model for migration, this paper has illuminated the argument that other factors influence individual decision making. Including these factors in the classical model will better describe their individual behaviors. For future studies, finding enhanced methods of classifying countries through pragmatic devices may aid in explaining potential migration decision making for individuals.

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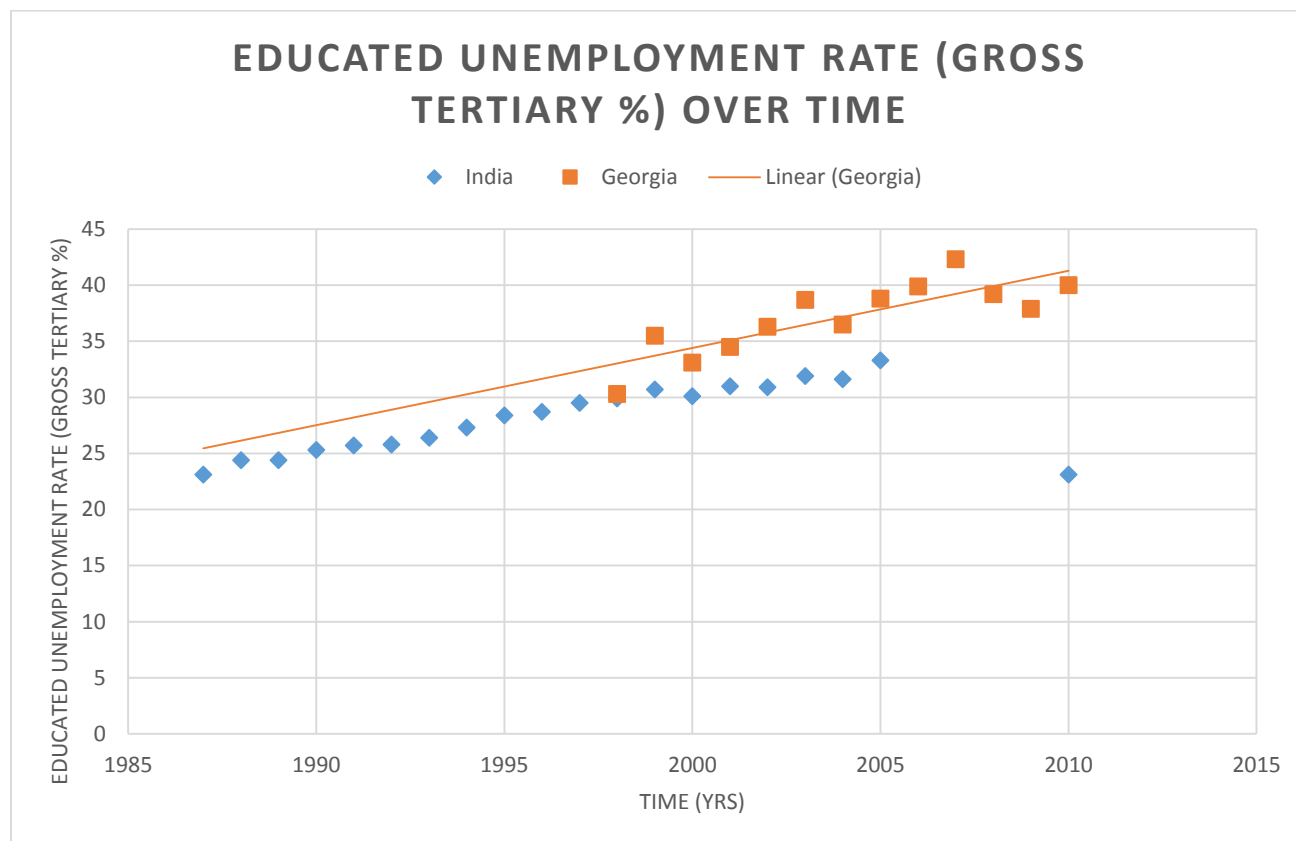
*Figure 1. The Initial Conditions Indicator an Expletive of Classification*
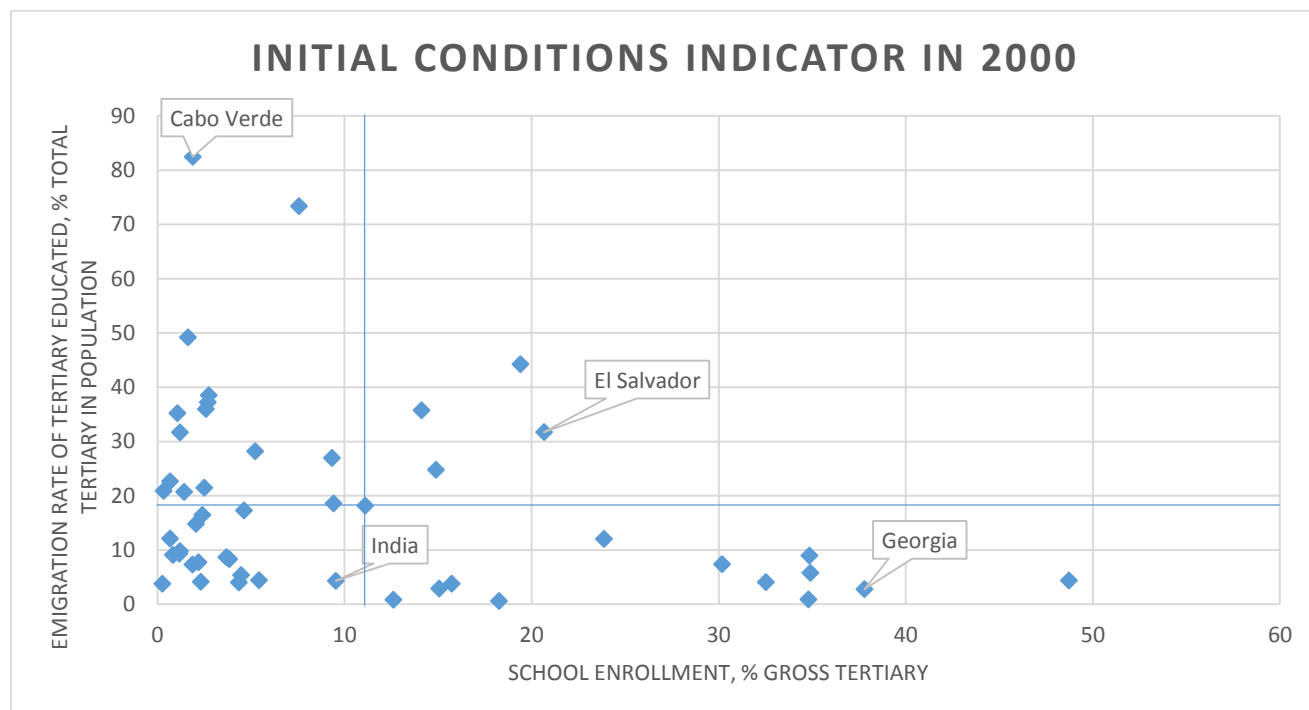


Source: Worldbank Indicators

In figure 1 the emigration rate of tertiary educated is on the y-axis and school enrollment in percentage gross tertiary is on the x-axis. The point which extends two lines can be identified as the cross-sectional threshold point for levels of human capital and international skilled migration. That average point has an 18% emigration rate and 11% enrollment rate. Countries above the 18% threshold have high levels of ISM, for countries below low levels of ISM. Countries to the right of the 11% threshold have high levels of HK, and to the left of it have low HK. The upper left hand corner identifies countries having $(HK_L ISM_H)$ for initial conditions. The upper right hand corner illustrates countries that have $(HK_H, ISM_H)$. The lower right hand corner countries have $(HK_H, ISM_L)$. Finally, the lower left hand corner indicates countries that have $(HK_L, ISM_L)$. Cabo Verde, India, El Salvador, and Georgia are used in the results section of this paper.

*Figure 2. Educated Unemployment over Time for India and Georgia*



EDUCATED UNEMPLOYMENT RATE (GROSS TERTIARY %) OVER TIME

Source Worldbank Indicators

Figure 2 illustrates the correlation between time and the educated unemployment rates of India and Georgia. Under the assumption that India has $(HK_L, ISM_L)$ for initial conditions indicates that there is a negative correlation between $(HK_L, ISM_L)$ and educated unemployment over time. Additionally, given Georgia has $(HK_H, ISM_L)$ shows that there is a positive correlation between $(HK_H, ISM_L)$ and educated unemployment over time.