Migration Experience, Aspirations and the Brain Drain

Theory and Empirical Evidence

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Abstract

We develop a theoretical model of human skill formation and emigration. Additionally to existing brain drain models, we partly endogenize the heterogeneity of the individuals, by introducing aspirations. We assume that the emigration of a household member will result in increased aspirations of those who stay behind. We find that this effect increases the average skill level in the society for a given migration rate. We show that the optimal migration rate, that maximizes the post-migration skill-rate of the population, is higher if we allow for the aspirations effect of migration. We use panel data from Indonesia to demonstrate that a *migration experience* has an aspirations increasing effect.

Our results suggest that there are potentially more countries than previously assumed which benefit from migration.

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1 Introduction

The question whether or not outmigration of skilled citizens is a curse or a blessing for developing countries has been of great concern in the recent past. Whereas older work like the one by Bhagwati and Hamada (1974) identifies the brain drain as one of the primary reasons for poverty and lacking growth in the third world, more recent articles show that the picture is not as bleak as previously imagined[1]. Mountford (1997), Beine et al. (2001) and Stark (2004) all have made the argument, that the possibility to migrate to a richer country where one can earn considerably higher wages, given the necessary skills, will serve as an incentive to invest in education. With this additional stimulus, it can be shown that some outmigration can actually increase the average skill level of the remaining population.

New empirical insight on aspirations formation[2] motivates us to augment the previous brain drain models. We use panel data from Indonesia to show that a *migration experience* has a beneficial effect on the aspirations of an individual. This insight is used to introduce a household dimension to a theoretical model of a brain drain. In our model, it is no longer only the aggregate probability to migrate that determines the education decision of an individual, but also the household's migration history. If an individual is found to have a *migration experience* in the family, the rise in aspirations will lead to a lower perceived cost of education and therefore increase the aggregate investment in education.

We find that introducing aspirations to our model increases the positive influence that migration has on skill formation. There are two reasons for this. First, migration increases the probability to know a migrant. The more migrants there are, the more likely it is to have a household member that has a *migration experience.* Thereby, a higher migration rate will increase the average aspirations level in the society, and through this, the average investment in education. Second, the higher aspirations magnify the original incentive effect of migration. The higher expected skill premium that a higher migration rate implies will be larger for aspiring individuals.

Taken together, these two effects lead to a higher optimal migration rate for every country. Furthermore, it increases the range of migration for which a country can be considered a net-winner of emigration. Our results suggest that omitting the household effect of emigration in empirical studies on the effect of emigration on the skill level of sending countries, will overstate the negative effect of outmigration. Beine et al. (2008) study which countries win and loose from emigration. We suppose that, depending on the size of the aspirations effect, some countries that were found to be net losers of emigration will actually be winners after all.

The remainder of this paper is structured as follows. In section 2 we will give a short overview about aspirations and their influence on economic behavior. In section 3 we present a theoretical model that investigates the implications of aspirations for the brain

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[1]For an extensive survey of the literature see Commander et al. (2004)

[2]Czaika and Vothknecht (2012) and Böhme (2012) both find that aspirations are higher for migrants.

drain. In section 4 we show empirical evidence on the influence that a *migration experience* has on aspirations. In section 5 we conclude.

2 The aspirations concept

An aspiring individual is someone that has a certain goal or dream that she is pursuing with conviction. An aspiring individual can generally be seen as someone who has a brighter vision of the future, compared to someone that is not. The notion of aspirations as a social capacity is still rather new to economics. Ray (2006) adapts the idea from anthropology, citing Appadurai (2004). Appadurai finds that aspirations do not form in a void, but that the contact and interaction with our peers is essential for the formation of aspirations. An individual will aspire to a level of wealth, education or social norms that she is confronted with in her immediate environment. The more diverse this social environment, the more likely it is that someone will find a desirable and attainable goal to aspire to. Appadurai argues that in cultures of absolute poverty, individuals will lack this *capacity to aspire*. The point he is making is that if all the peers of a poor individual are equally bad of, than she will not form the capacity to imagine herself better off.

Ray (2006) develops this idea and investigates the implications of such a *culture of poverty* in which the poor will accept their destiny. In this context he develops the concept of an *aspirations window*, which is composed of the people that influence an individuals aspirations. If this window is solely composed of other poor, an individual will be unaspiring because of her unawareness of the possibility of social and economic ascension. He proposes the idea that an individual that is aspiring towards an attainable better life, will put a certain amount of effort into the realization of this goal, whereas someone that is unaspiring will not. It is important that the *aspirations gap*, the distance between where an individual sees herself and the point she is aspiring too, must be of a reasonable size, in order to affect her behavior. A gap that is too small, as in absolute poor or segregated societies, will lead to frustration, since their is no goal worth pursuing. A gap that is larger than what is reasonably attainable[3] is also unlikely to affect an individuals behavior, since she will get fatalistic at the prospect of never being able to attain her goal. Figure 1 shows this relationship.

He further argues that this *aspirations failure* in absolute poor societies can be the cause for a self-sustaining poverty trap. The poor will not save or invest in education, because the improvement in their lives that this could bring about is not considered as an option. In the aggregate this will lead to a behavior that is not future-oriented and can for example lead to a lack of skilled human capital which in turn will be detrimental to growth. Dalton et al. (2011) take up the idea of Ray and develop a theoretical model for poverty traps, sustained by aspirations failure. They argue that policy needs to tackle the belief and aspirations formation of the poor, if it wants to be successful in fighting persisting poverty.

The point made by Ray (2006) and Dalton et al. (2011) has been acknowledged by a

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[3]Imagine a child from a slum that is aspiring to the life of a stock broker of movie star she has heard of.
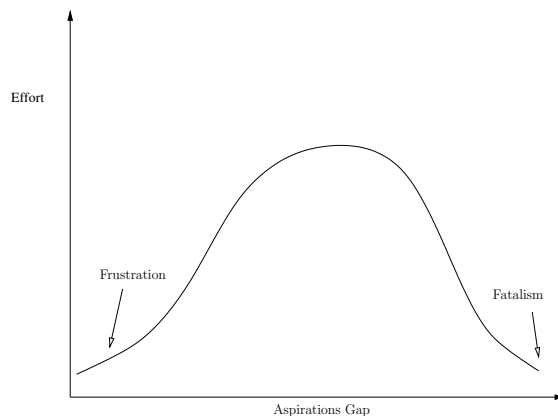
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Figure 1: Aspiration gap and corresponding effort

strand of recent literature whose focus is to find ways to increase the aspirations of the poor. Exposing poor individuals to successful role models from a similar social background is one mechanism that is found to have such an effect. Macours and Vakis (2008) find that the responsiveness to an asset transfer program increases if the test subjects were exposed to a female leader that also participated in that program. They argue that the proximity to the female leaders increases the aspirations of the test subjects, which in turn increases their investment and human skill accumulation behavior. In a study by Chiapa et al. (2012) participants in a Mexican anti-poverty program are found to have higher educational aspirations for their children. Additionally it is shown that children who are beneficiaries of the program are more aspiring if they are exposed to doctors and nurses. This suggests that the children include this highly-trained personal in their aspirations window.

A different approach that can be found in the literature is the enrollment of individuals in interventions that are designed to raise their self-efficacy. Krishnan and Krutikova (2010) evaluate a program that was specifically designed to foster the psychosocial skills of disadvantaged children in the slums of Bombay. In the course of the program, participating children are enrolled in activities that are meant to boost their non-cognitive abilities. The study finds that aspirations, as well as self-efficacy and self-esteem grow significantly as a result of the intervention. In a similar direction, Wydick et al. (2013) investigate the effects of international child-sponsorship programs on the schooling outcomes and job-prospects of the sponsored individuals. They find that the long-term enrollment and participation such a program has a significantly positive effect on children's aspirations, and through this on their aspirations.

All this literature shows that increasing aspirations is vital in order to help the poor to overcome their condition. We believe that we have identified an additional channel through which aspirations failure can be overcome: migration. We argue that migration, or the fact of knowing a migrant, will have a beneficial effect for the aspirations formation of an individual for several reasons. Migration allows an individual to broaden their

horizon and to meet new people. This is equivalent to a widening of the *aspirations window*. The more people an individual knows, the more likely she is to know someone that has a lifestyle that she considers worth aspiring to. Second, migration usually happens to a destination that is wealthier than the home of the migrants. This means that the migrant will probably be surrounded by individuals that have a lifestyle that is superior to the ones of her domestic peers. The migrant is then likely to aspire to these new social and economic norms that she discovers while being abroad.

Czaika and Vothknecht (2012) and Böhme (2012) both have done research that investigates the relationship between aspirations and migration. Both papers find a positive correlation between aspirations and migration. Böhme (2012) uses a survey from Moldova to show that migration increases the paternal aspirations of participants. However, since the data is cross-sectional and not longitudinal, the study can make significant claims about correlation, but causality remains unclear. Czaika and Vothknecht (2012) use panel data to show that aspiring individuals are more likely to migrate, but also that migrants are more aspiring ex-post migration. As before, causality remains unclear.

In section 4 we show, using fixed effects and instruments for migrations, that migration is likely to be causal to an increase in aspirations. In chapter 3 we will use this stylized fact to construct a theoretical model of a brain drain with aspirations formation.

3 Theoretical model

[4] Consider a small open economy where each individual is endowed with one efficiency unit of labor at her birth. Individuals differ in their ability, which is inversely related to their perceived cost for education c_i. During the two periods that each person lives, they can make two decisions: Whether to invest in education while young, and whether or not to emigrate while adult.

In period one, everyone can choose whether or not to invest in education, for which they have to pay the perceived cost c_i. If an individual has chosen education, her skill level will rise to $h > 1$ efficiency units of labor. In the second period, adults can emigrate to a higher wage destination with an exogenous probability. As is argued in Beine et al. (2008) and Docquier and Marfouk (2000), skilled workers are more likely to emigrate. We will adopt this assumption and normalize the probability that an unskilled individual emigrates to $\underline{p} = 0$. The emigration probability for skilled individuals is denoted by p and the same for all the educated. This is a reasonable assumption in our model, where only one education option exists. In a world where more than one education level can be achieved, it would be likely that the emigration probabilty is increasing in the skill level. This assumption also implicitly indicates that the ability level is unobservable for the visa authority, and that education can therefore be the only variable that influence the authority's choice.

As in Beine et al. (2008), we further assume that individuals are risk neutral and max-

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[4]The basic setup of this model follows Beine et al. (2008).

imize their lifetime income[5]. Since the wage rate at destination country w^* is strictly larger than the domestic wage rate w, an individual that is given the permission to emigrate will do so with certainty.

In the previous brain drain models, heterogeneity was introduced through inherent individual ability and budget constraints[6]. We introduce aspirations as an additional source of heterogeneity. We treat aspirations as a a binary variable that depends on the family background. If an individual has a family member that has emigrated, than her aspirations will increase by γ.[7] Otherwise, they are normalized to one. As mentioned before, empirical evidence suggests that increased aspirations will lead to higher educational attainments, which implies that they increase the effort that is put into education. We can imagine three possible ways of introducing aspirations to our model, such that they lead to an increase in education. First, one could think of an aspirations-induced change of preferences. Second, aspirations could lead to a higher valuation for future consumption, lowering the inter-temporal discount rate. Third, aspirations can lower the perceived cost for education. We chose the last option, since it allows us to work with the benchmark model by Beine et al. (2008) without altering the functional forms. We believe that our results are not driven by this choice, and that the other two options will lead to similar conclusions.

First we are going to look at the maximization problem for the non-aspiring individuals. They can choose whether or not to invest in education. Education causes an individual a perceived loss of c_i, which is inversely related to their unobservable inherent ability. c_i follows the cumulative distribution function $F(c_i)$ and the density function $f(c_i)$ and is defined on $\mathbb{R}_+$. If an individual chooses education, she earns $w - c_i$ in the first period. In the second period, her effective units of labor will have increased to $h > 1$. With probability p she will emigrate to a high-wage destination, in which case she will earn w^*h. In the case of non-migration, she will earn wh. If she refrains from education, her income is w in both periods[8]. A non-aspiring individual will thus choose education if

$$w - c_i + (1-p)hw + phw^* > w + w \tag{1}$$

A nonaspiring individual will therefore choose to invest in education as soon as her ability is such that the perceived costs for education are below the following benchmark:

$$c_i < \tilde{c} \equiv w(h-1) + ph(w^* - w) \tag{2}$$

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[5]For now, we assume that there is no inter-temporal discounting. However, we are currently working on a version of the model with discounting, in which higher aspirations lower the discount rate. This interpretation of aspirations seems to be closer to the actual definition of aspirations, since a more aspiring individual will give a higher weight to the future than non aspiring persons.

[6]We are, for now, refraining from including budget constraints in our model. An extension for the theoretical part, in which a *migration experience* not only raises aspirations, but also helps to overcome binding budget constraints is currently in the making.

[7]Since aspirations are a cultural variable that is determined on the household level, it is a reasonable assumption that all household members will adapt their aspirations as a result of the *migration experience* of their peer.

[8]We focus our analysis on the steady state, in which the wage rate remains stable.

It can easily be seen that a higher migration probability for skilled workers and a larger international wage gap will increase the benchmark of perceived costs for that an individual will choose education.

For those individuals who are aspiring as a result of a *migration experience* in the family, the education decision changes to

$$w - \frac{c_i}{1+\gamma} + (1-p)hw + phw^* > w + w \tag{3}$$

Aspirations decrease the perceived cost of education for any level of ability. The benchmark value for which an individual will choose education increases thus for aspiring individuals.

$$\begin{aligned} c_i < \tilde{c}_\gamma &\equiv (1+\gamma)\left(w(h-1) + ph(w^*-w)\right) \\ &= (1+\gamma)\tilde{c} \end{aligned} \tag{4}$$

This implies that some individuals who previously refrained from education will now change their minds due to an increase in their aspirations. What implications does this have for the brain-drain? We assume that a fraction π of the population has at least one family member that has a *migration experience* and are therefore aspiring. Imposing that there are no-binding budget constraints, which implies that every individual who chooses education over work can do so, the aggregate proportion of educated in the society *ex-ante* emigration can be expressed as

$$\begin{aligned} H_a &= (1-\pi)F(\tilde{c}) + \pi F((1+\gamma)\tilde{c}) \\ &= \int_0^{\tilde{c}} f(c_i)dc_i + \pi \int_{\tilde{c}}^{(1+\gamma)\tilde{c}} f(c_i)dc_i \end{aligned} \tag{5}$$

The probability of knowing someone that has a *migration experience* will depend on the previous period' s emigration rate p_{t-1}. In steady state, this rate remains constant. We can thus rewrite (5) as a function of p[9].

$$H_a(p) = \int_0^{\tilde{c}(p)} f(c_i)dc_i + gp \int_{\tilde{c}(p)}^{(1+\gamma)\tilde{c}(p)} f(c_i)dc_i \tag{6}$$

g is a factor that depends both on the average size of the *aspirations window* and the previous *ex-ante* emigration proportion of educated, since it is only the skilled individuals that will be allowed to emigrate[10].

It can easily be seen that this skill-adoption rate is increasing in p. The intuition for this is straightforward. The higher the steady-state emigration rate, the higher the expected returns to education. Additionally, a higher steady state emigration rate implies a higher average level of aspirations, which in turn increases the skill-rate of the society.

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[9]For the sake of tractability, we assume a linear relationship between the steady state emigration rate and the probability of knowing an emigrant.

[10]We are currently working on an extension of the model for which g is endogenous in steady state.

The variable of interest, that determines whether a country experiences a net brain-drain or gain, is the *ex-post* skill proportion. This is calculated as

$$H_p(p) = \frac{(1-p)H_a(p)}{(1 - pH_a(p))} \tag{7}$$

Emigration causes a loss of skilled workers once they are educated. At the same time, the incentive to choose education depends positively on the emigration probability. It is clear that at a high enough emigration rate, the first effect will dominate. If all the skilled citizens leave a country, it doesn't make a difference whether the possibility to emigrate has a positive effect on their education decision. For low migration rates however, the second effect can dominate, and a positive emigration rate can actually be beneficial for the skilled human capital stock of the sending country. Beine et al. (2008) calculate the maximum emigration rate for which a country's post-emigration proportion of educated is just superior to the proportion under autarky. If the actual emigration rate is under this benchmark, a country can be seen as a net-winner of emigration.

We will demonstrate, using the assumption from Beine et al. (2008) that the perceived education costs are uniformly distributed, that this benchmark emigration rate will increase as a result of the aspirations effect.

Proposition 1. *Assuming that $c_i \sim U(0,1)$, the aspirations effect increases the range for which migration is considered to be better than autarky.*

$$H_{p,\gamma}(p_{0|\gamma=0}) > H_p(0) \tag{8}$$

where $p_0^{|\gamma=0}$ is the benchmark emigration rate without aspirations effect, for which the autarky skill-proportion equals the ex-post emigration skill-proportion.

What this proposition states, is that omitting the aspirations effect underestimates the range for which emigration improves the skill-proportion, compared to autarky. Evaluating the actual skill-proportion, i.e. the one that takes the aspirations-effect into account, at the emigration benchmark calculated by Beine et al. (2008) will give us a skill-proportion that is higher than under autarky.

Proof. With $c_i \sim U(0,1)$, and a modell without aspirations, Beine et al. (2008) calculate the emigration rate for which a country is indifferent between emigration and autarky as

$$p_{0|\gamma=0} = \frac{h(w^* - w) - w(h-1)(1 - w(h-1))}{h(w^* - w)(1 - w(h-1))} \tag{9}$$

We want to show that at this rate

$$H_{p,\gamma}(p_{0|\gamma=0}) > H_p(0)$$

$$\frac{(1 - p_{0|\gamma=0})H_{a,\gamma}(p_{0|\gamma=0})}{1 - p_{0|\gamma=0}H_{a,\gamma}(p_{0|\gamma=0})} > H_a(0) \tag{10}$$

$$\frac{(1 - p_{0|\gamma=0})(1 + gp\gamma)\left((w(h-1) + p_{0|\gamma=0}h(w^* - w)\right)}{1 - p_{0|\gamma=0}(1 + gp\gamma)\left((w(h-1) + p_{0|\gamma=0}h(w^* - w)\right)} > w(h-1)$$

Setting in (9) for $p_{0|\gamma=0}$ and rewriting, we obtain

$$g\gamma w(h-1) > 0 \tag{11}$$

which is fulfilled by the assumption that $h > 1$. Q.E.D.

$\square$

This demonstrates that accounting for the aspirations effect when quantifying which country has a net brain drain or gain, will potentially[11] increase the number of net winners.

What can we say about the effect on the optimal emigration rate? The derivative of H_p with respect to p is ambiguous and depends on the level of p. As argued above, a very high level of p will at some point deplete the stock of skilled individuals more than the incentive effect could ever make up for. For small p the incentive effect is likely to dominate. We can show that this incentive effect of emigration on skill accumulation is magnified by the aspirations effect[12].

$$\frac{dH_p}{dp} = \frac{\partial H_p}{\partial p} + \frac{\partial H_p}{\partial H_a}\frac{\partial H_a}{\partial p} + \frac{\partial H_p}{\partial H_a}\frac{\partial H_a}{\partial \tilde{c}}\frac{\partial \tilde{c}}{\partial p}$$

$$\tag{12}$$

$$= -\frac{H_a(1 - H_a)}{(1 - pH_a)^2} + \frac{(1 - p)}{(1 - pH_a)^2}\left(\frac{\partial H_a}{\partial p} + \frac{\partial H_a}{\partial \tilde{c}}\frac{\partial \tilde{c}}{\partial p}\right)$$

where $\left(\frac{\partial H_a}{\partial p} + \frac{\partial H_a}{\partial \tilde{c}}\frac{\partial \tilde{c}}{\partial p}\right)$ is

$$\left(\frac{\partial H_a}{\partial p} + \frac{\partial H_a}{\partial \tilde{c}}\frac{\partial \tilde{c}}{\partial p}\right) = g\left(F((1+\gamma)\tilde{c}) - F(\tilde{c})\right)$$

$$+ f(\tilde{c})h(w^* - w) + gph(w^* - w)\left((1+\gamma)f((1+\gamma)\tilde{c}) - f(\tilde{c})\right) \tag{13}$$

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[11]With a continuum of countries, it would definitely increase the number of net-winners at the margin. Since in reality there is a discrete number of countries, it depends on the actual size of the aspirations effect, whether or not it will shift some net-looser countries on the net-winner side.

[12]Except for very uncommon and extreme distributions of ability

The first term of (13) is strictly increasing in both γ, the magnitude of the aspirations increase that a *migration experience* induces, and g, the factor that influences the likelihood of knowing a migrant. The second term is increasing in γ, if the distribution of ability is such that $\frac{f((1+\gamma)\tilde{c})}{(1+\gamma)\tilde{c}} > -f'((1+\gamma)\tilde{c})$. It is increasing in g if $(1+\gamma)f((1+\gamma)\tilde{c}) > f(\tilde{c})$. This is only not fulfilled for rather uncommon ability distributions, where the density of ability is decreasing sharply. This would imply that there are a lot more geniuses in the population, with very low perceived education costs, than common people and almost no individuals of low ability. As soon as we assume a more common ability distribution, the second term will be increasing in g and γ[13].

The optimal emigration rate is therefore increasing in aspirations and the probability to know an emigrant. The *aspirations effect* works in two ways. The negative effect of emigration is weakened because it increases the probability to know an emigrant, which increases the aggregate percentage of aspiring individuals. Second, for a given number of aspiring individuals, there will be more individuals who choose education than before, because aspirations lower the benchmark.

4 Empirical evidence

The previous empirical studies that we are aware of, did either not have panel data to control for pre-emigration aspirations[14] or they did not fully exploit the panel structure to credibly establish causality[15]. We use panel data from Indonesia and use a fixed effects estimator to regress the *change* in aspirations on the *migration experience*. Our results suggest that a *migration experience* leads to a significant increase in aspirations. Additionally to this, to make the claim that migration is causal for aspirations, we run an IV-regression on aspiration, using inter-regional growth differences as instrument for migration.

4.1 Data and descriptive statistics

We use data from the Indonesian Family Life Survey (IFLS), a panel household survey that is representative of around 80% of the Indonesian population[16]. As Czaika and Vothknecht (2012) we use the third and the fourth wave (compiled in 2000 and 2007) of

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[13]For example, the uniform distribution used by both Mountford (1997) and Beine et al. (2008) fulfills these weak requirements. Depending on the mean of the function and the parameters of the distribution, a log-normal distribution will also fulfill these conditions.

[14]See Böhme (2012)

[15]Czaika and Vothknecht (2012) investigate the relationship between aspirations and migration. Their exploratory analysis also used the IFLS and discovered a significant correlation between migration and the aspiration gap. Their analysis offers interesting insights but is not able to establish causality. We follow up on their analysis and extend it by focusing on the problem of endogeneity to evaluate the causal effect of migration on aspirations.

[16]See Strauss et al. (2009)

the survey for our study[17]. This provides us with a sample of around 20,000 individuals in 12,900 households in each wave. The survey covers a broad field of questions of socioeconomic interest.

Most importantly for us, the survey keeps track of the internal migration behavior of all household members aged 15 years or more. There is however almost no recorded international migration. We believe that our point, that a *migration experience* has an aspirations-increasing effect remains valid, even if we can only show it for internal migration. We argue as follows: Internal migration, as well as international migration, will confront the migrant with a new socioeconomic environment. Since the destination of a migrant is typically more prospering than the origin, the migrant will revise her own goals and ambitions upwards, increasing her aspirations. The cultural gap will be even larger for international migration. Therefore, if we can show that internal migration has a significant effect on aspirations, the relation should also hold for international migration and might even be stronger.

Table 1: *Descripive statisitics for both waves*

	2000			2007		
	Obs.	Mean	Std Dev.	Obs.	Mean	Std Dev.
Household Level						
HH Size	4,922	6.886	5.481	4,922	6.872	5.468
Number of Children	4,922	2.741	2.463	4,922	1.750	1.634
Household Migration Prevalence	4,922	0.178	-	4,922	0.417	-
Migrant Level						
Age	1,261	29.291	11.929	4,065	34.064	11.378
Gender	1,261	0.459		4,065	0.492	
Education						
No education	1,261	0.037	-	4,065	0.022	-
Elementary	1,261	0.266	-	4,065	0.226	-
Junior High School	1,261	0.157	-	4,065	0.157	-
Senior High School	1,261	0.319	-	4,065	0.327	-
College	1,261	0.071	-	4,065	0.067	-
University	1,261	0.088	-	4,065	0.122	-
Individual Aspirations						
Current relative wellbeing						
All	20,513	2.899	0.780	24,094	2.850	0.811
Migrant	1,260	2.927	0.755	4,061	2.875	0.787
Non-Migrant	11,488	2.891	0.792	15,088	2.833	0.819
Aspiration Gap						
All	19,952	0.335	0.603	22,775	0.667	0.762
Migrant	1,223	0.418	0.617	3,789	0.772	0.771
Non-Migrant	11,222	0.317	0.598	14,260	0.594	0.737

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[17]We neglect the previous waves, since they did not include questions on the participants' aspirations.

Individuals were defined as having a *migration experience* in the last observation period, if they had lived in a different village for more than 6 months. Given this definition, the national migration prevalence stands at around 17.3 % in 2000 and at 24.9% in 2007, as can be seen in table 1. In 2000 migrants are on average 29 years old and mostly male. Almost one third of all migrants had finished senior high school. Most migrants only travel short distances. The average distance to destination is at around 150 km (2000) and 105 km (2007). Although there are only few instances where this is the case, we decided to keep only migrants that moved for reasons related to labor or education, i.e. we exclude marriage induced migration and whole household migration.

Aspirations can be measured in several ways, since the concept can be cultural or economic. A question concerning the desired years of schooling for an individual's offspring is a type of aspirations measure, as is the commitment to a certain saving behavior. The IFLS provides us with a set of questions that allow us to construct a measure for the economic *aspirations gap*. Participants were asked to asses their subjective current economic well-being, relative to the rest of society, on a 6 step ladder.

> *Please imagine a six-step ladder where on the bottom (the first step), stand the poorest people, and on the highest step (the sixth step), stand the richest people.*
> *On which step are you today ?*

They were also asked where on this ladder they see themselves in the near future.

> *On which step do you expect to be in one/five years from now?*

This forward looking evaluation of the respondents' future is equivalent with what is generally considered as aspirations. The difference between the forward looking evaluation and the assessment of her current situation is the aspiration gap our analysis focuses on. Table 1 shows the aspiration gaps of both migrants and non-migrants. In our sample, migrants have slightly higher aspiration gaps than non-migrants.

It must be noted that between 2000 and 2007 a small adjustment of the aspiration question was undertaken. The authors of the IFLS changed the horizon of the aspiration from one year to five years. The modification of the question is unfortunate for comparisons in the level of the *aspirations gap*. It can be seen that there is an increase in the mean *aspirations gap* for all groups from 2000 to 2007. The change in the time horizon is a probable explanation for this. However, for our purposes it does not pose a problem, since the fixed effects estimation that we perform measures the difference in the change in the *aspirations gap*, not the level. The adjustment of the question would only be problematic if migrants understood the question differently than non-migrants, i.e. they process the changed horizon of the question systematically different. However there is no reason to believe that this systematic bias is plausible.

4.2 Empirical strategy

We explore the influence of migration on aspirations both at the individual as well as at the household level. Our standard estimation equation looks as follows:

$$A_{ijt} = \alpha + \beta_1 M_{ijt} + \beta_2 C_{ijt} + \varepsilon_{ijt} \tag{14}$$

where A_{ijt} is the aspiration gap of individual i, in household j at time t. M_{ijt} is a binary migration indicator and C_{ijt} is a vector of individual characteristics such as age, gender and education. We first approach the data with simple OLS to explore the basic relationship between aspirations and migration. The central problem in this setup is the endogeneity of migration. More precisely, unobserved characteristics of the individual might be driving both her aspiration gap as well as her decision to migrate. However, we have the big advantage to be able to control for unobserved fixed characteristics by differencing the two waves of the IFLS. We limit our analysis to households that had no migrants before 2000. This allows us to isolate the change in migration status.

The fixed effects estimation helps us to establish not only correlation between migration and aspirations, but also causality. The correlation between aspirations and migration is likely to go in both directions. More aspiring individuals are forward looking and are ready to act in order to shape their own future. Migration is one way to achieve this. Therefore, migrants are likely to have higher aspirations at the time they decide to emigrate. Controlling for the initial pre-migration aspirations gap in 2000 allows us to cancel out this channel of correlation. A significantly positive fixed effects estimator thus suggests that migrants, compared to non-migrants, have a higher increase in their aspirations gap as a result of their *migration experience*.

The fixed effects approach only nets out fixed individual effects. It might also be the case that migration is driven by unobserved variable factors such as changes in the environment of the individual. We therefore also employ an instrumented variable strategy. Following previous contributions in the literature we concentrate on the economic development at the destinations, i.e. we use a measure of growth at the regency level to capture the pull effect of better economic prospects at a different geographical location. As suggested by Sutton et al. (2007) and Henderson et al. (2012), night lights as captured by satellites are a promising instrument to represent the economic growth of geographic areas. We calculate the mean light intensity of all 481 Indonesian regencies and weight them with the historical migration network of each community.

$$IV_{ijmt} = \frac{1}{R} \sum_{n=1}^{R} (N_{mnt} \cdot L_{mnt}) \tag{15}$$

The instrumental variable therefore consists of the average of light intensity L_{mnt} weighted by the number of migrants N_{mnt} in village m from region n for all regions R in Indonesia. The number of migrants is calculated based on the Indonesian censuses between 1980 and 1990. We also employ a second instrument that captures the economic development in the regency the migrant is from. We use the standard deviation, the maximum and

the minimum of light intensity to represent the distribution of economic development in each regency. Figure 2 illustrates the instrument.

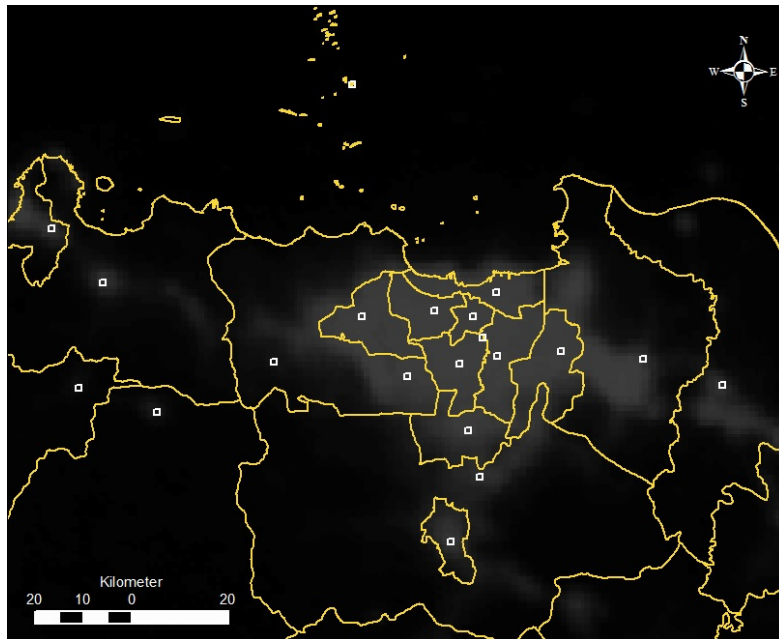The intuition for the instruments approach is the following. The higher the difference in

Figure 2: Light dispersion around Jakarta

economic activity between the home of a migrant and the other regions, the more likely she is to migrate, since migration will have a bigger impact on her expected income.

Since our IVs are built on historical migration networks it is important to underline that there was a partly random element to the initial distribution of these migrants. First, due to the forced migration in form of the Transmigration program that has been in place in Indonesia since 1902, the distribution can be assumed to be partly exogenous[18]. Second, even within the Transmigration program that moved more than a quarter of a million people per year a random element can be found. The program provided free farm land and housing in the periphery of Indonesia, as well as free transport and free food and fertilizer for the first year. But most importantly, the free farm land was allocated by lot[19]. This implies that the productivity and quality of farmland was independent of the families characteristics.

Since our identification strategy is based on the assumption that change in economic activity in other parts of Indonesia is exogenous and does affect aspirations only through the migration of an individual, it is worth discussing the core presumption of our exclusion restriction. One could argue that the national economic outlook has a direct impact on aspirations of the citizens. However, it seems far fetched to assume that migrants have the resources to closely monitor the national economic development. Although they

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[18]See Hugo (2006)
[19]See Kebschull (1986)

might be affected by their direct environment this should not be a problem when using a weighted average of national changes. To evaluate this assertion we will explore the effect of the instrument at different levels of distance to the locality of the migrant.

4.3 Results

Table 2: *The Effect of Migration (OLS and IV)*

		(1)	(2)	(3)
			Aspiration Gap	
		2000	2007	FE
OLS	Coeff	0.017*	0.032**	0.105***
	SE	0.010	0.013	0.023
IV	2SLS Coeff	0.450*	0.482**	0.245
	2SLS SE	0.269	0.206	0.820
	CD F	10.35	27.64	2.49
	95% CLR conf set	[0.065, 1.164]	[0.380, 1.417]	-
	CLR test p-value	0.026	0.000	
	Sample Size	19477	22766	27292

Notes: Authors calculation based IFLS3 and IFLS4. Robust standard errors in parentheses; ***$p < 0.01$,** $p < 0.05$,* $p < 0.1$; Standard errors clustered at the household level; Instruments are district-level. Additional controls include current level of aspirations, age, gender, education. Columns (1) and (2) include province level dummies. "CD F" denotes Cragg-Donald Wald F statistic- H0 for CLR test ($\alpha = 0.05$): $\beta_{mig} = 0$.

As can be seen in table 2, the sign on the OLS estimates for both waves is significant and positive. This suggests, that there is a significantly positive correlation between the *aspirations gap* and migration. More importantly though, the sign on the fixed effects OLS estimator is also significantly positive. This means that even if we control for the *aspirations gap* prior to migration, we find that migration has a significantly positive effect on the aspirations. Migrants experience a significantly higher increase in their *aspirations gap* than non-migrants. This supports the main assumption of our theoretical model, that there exists a beneficial effect of a *migration experience* on aspirations.

The IV estimation also gives us positive and significant values for the parameters of the two waves. The coefficients are throughout larger than their uninstrumented counterparts. Unfortunately it is not possible to directly identify the compliers that react on the instrument and consequently drive this local average treatment effect.

With respect to the statistical strength of the instruments we conduct various tests. We report these test in Table 1. First, the first stage F-Test is well above the critical value proposed by Stock and Yogo (2005). This suggests that our instruments are not weak. However, we also calculate the CLR confidence interval as suggested by Andrews et al. (2006). The intervals would still be statistically correct despite possibly weak instruments. The CLR intervals reported consistently show that the effect of migration on aspirations is positive.

One possible reason for the insignificant coefficient of our fixed effects IV estimation is the current configuration of the estimation procedure. While the identification in the

cross-sectional IV is based only on the growth of economic activity, the fixed effects IV runs through the change of the growth in economic activity at the destinations. Since these changes are likely to be minuscule only very little variation is present to identify the change in migration behavior. In future estimations we will adjust this aspect. Notwithstanding the large standard error in the fixed effects IV, one should note that the coefficient is still positive. The IV estimator is also positive when we include the fixed effects. Unfortunately, this is slightly not significant for any conservative confidence-interval.

Taken together, these results give us strong support that a *migration experience* increases aspirations. This was the key assumption for our theoretical modell. We therefore believe that the predictions of our theoretical model are valid, and that the aggregate net-brain drain is lower than previously estimated.

4.4 Counterfactual simulation

We performed a numerical simulation, assuming a uniform distribution for the perceived education cost, for different magnitudes of the aspirations effect to get an idea of the quantitative implications[20].
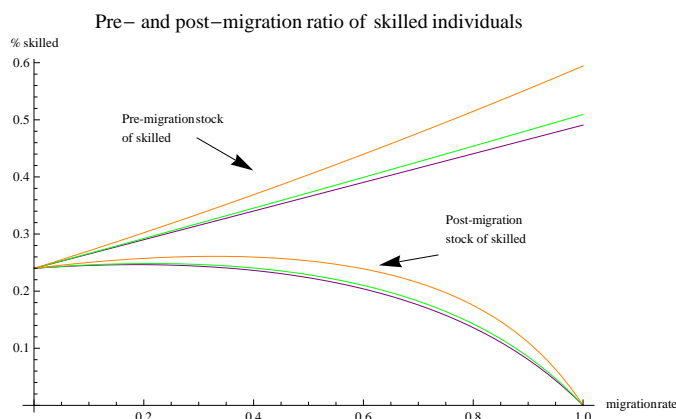

Figure 3: Effect of aspirations on the pre and post-emigration skill proportion

$$\gamma_1 = 0, \ \gamma_2 = 0.1, \ \gamma_3 = 0.7$$

Figure 3 depicts the pre- and post-emigration proportion of skilled individuals. As expected, a higher aspirations effect results in more investment in education, which in turn increases the post-emigration human capital. Figure 4 shows the derivative of the post-emigration skill rate with respect to the emigration rate. The intersection of the

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[20]g was calibrated such that it is equal to the pre-emigration proportion of skilled individuals. This was done in order to account for the fact that a higher steady state skill rate increases the likelihood of knowing a skilled emigrant.
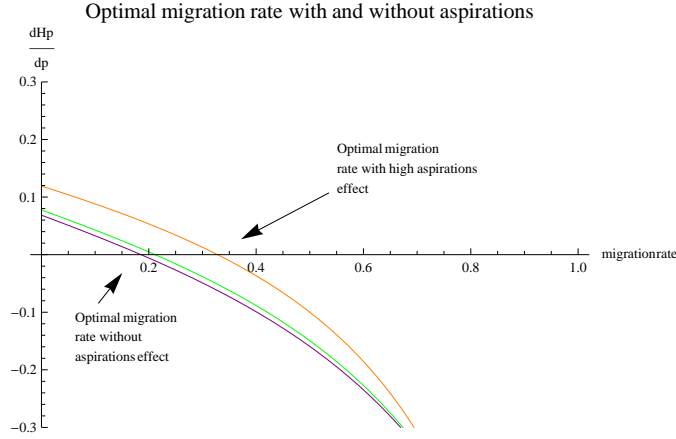
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Figure 4: Effect of aspirations on optimal emigration rate

$$\gamma_1 = 0, \ \gamma_2 = 0.1, \ \gamma_3 = 0.7$$

graphs with the x-axis identifies the optimal emigration rate, which maximizes the *ex-post* skill proportion. It can be seen that already a small aspirations effect of 0.1 increases the optimal emigration rate considerably. In this example from 18% to over 20%. Not even doubling the aspirations from one to 1.7 almost doubles the optimal migration rate. As we have seen in the empirical part, aspirations are a somewhat blurry concept, that is hard to quantify. The examples above are therefore only meant to clarify the possible implications that aspirations could have for the brain drain. However, the results suggest that the effect is sizable even for small aspirations increases due to a *migration experience*.

5 Conclusion

The brain drain literature of the recent past has been arguing, that a small amount of emigration might actually be beneficial for the sending country, since it increases the incentives to invest in education. However, this literature has only focused on the incentive effect of the aggregate emigration probability.

In this paper we propose that the positive incentive effect of emigration is even stronger than previously assumed, because of spillovers on the household level. We consider the positive *aspiration effect* that emigration has on the remaining household members.

In the empirical part of this paper, we show that there is a significant relationship between migration and aspirations. Having lived and worked in a different location for a while changes the goals and values that an individuals aspires to.

We take this stylized fact and build a theoretical brain drain model around it. We find that an aspirations effect will increase the range of the skilled emigration rate, for which

a country benefits from skilled emigration. Furthermore, the optimal emigration rate is found to be increasing in aspirations for most distributions of ability.

These first insights about the relationship between aspirations and the brain drain provide a promising starting point for further research. First and foremost, more panel data on the relationship between migration, aspirations and education is needed in order to quantify the actual impact of the *aspirations effect* on the overall brain drain. Since aspirations are still a somewhat blurry concept that can be measured in several dimensions, it is important to develop reliable survey questions to measure aspirations such that they can be compared quantitatively across cultures and across time.

Second, studies which calculate the net brain drain for different countries, should incorporate the *aspirations effect*. This would help to gain knowledge how the brain drain develops in the long run if the intergenerational linkages discussed in this study are taken into account.

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