Centre for Research and Analysis of Migration

CReAM

Discussion Paper Series

CDP No 17/11

Media Exposure and Internal Migration - Evidence from Indonesia

Lídia Farré and Francesco Fasani

Centre for Research and Analysis of Migration
Department of Economics, University College London
Drayton House, 30 Gordon Street, London WC1H 0AX

CReAM Discussion Paper No 17/11

Media Exposure and Internal Migration - Evidence from Indonesia

Lídia Farré* and Francesco Fasani†

* IAE-CSIC, IZA and Barcelona GSE
† IAE-CSIC, Barcelona GSE, MOVE-INSIDE and CReAM

Non-Technical Abstract

This paper investigates the impact of television on internal migration in Indonesia. We exploit the differential introduction of private television throughout the country and the variation in signal reception due to topography to estimate the causal effect of media exposure. Our estimates reveal important long and short run effects. An increase of one standard deviation in the number of private TV channels received in the area of residence reduces future inter-provincial migration by 1.7-2.7 percentage points, and all migration (inter and intra-provincial) by 4-7.4 percentage points. Short run effects are slightly smaller, but still sizeable and statistically significant. We also show that respondents less exposed to private TV are more likely to consider themselves among the poorest groups of the society. As we discuss in a stylized model of migration choice under imperfect information, these findings are consistent with Indonesia citizens over-estimating the net gains from internal migration.

Keywords: Information; Migration decisions; Television.

JEL Classification: J61, L82, O15.

Centre for Research and Analysis of Migration
Department of Economics, Drayton House, 30 Gordon Street, London WC1H 0AX
Telephone Number: +44 (0)20 7679 5888
Facsimile Number: +44 (0)20 7679 1068

Media Exposure and Internal Migration - Evidence from Indonesia*

Lídia Farré
IAE-CSIC, IZA and Barcelona GSE

Francesco Fasani
IAE-CSIC, Barcelona GSE, MOVE-INSIDE and CReAM

September 22, 2011

Abstract

This paper investigates the impact of television on internal migration in Indonesia. We exploit the differential introduction of private television throughout the country and the variation in signal reception due to topography to estimate the causal effect of media exposure. Our estimates reveal important long and short run effects. An increase of one standard deviation in the number of private TV channels received in the area of residence reduces future inter-provincial migration by 1.7-2.7 percentage points, and all migration (inter and intra-provincial) by 4-7.4 percentage points. Short run effects are slightly smaller, but still sizeable and statistically significant. We also show that respondents less exposed to private TV are more likely to consider themselves among the poorest groups of the society. As we discuss in a stylized model of migration choice under imperfect information, these findings are consistent with Indonesia citizens over-estimating the net gains from internal migration.

JEL: J61, L82, O15

Keywords: Information; Migration decisions; Television

*We would like to thank Christian Dustmann, Luca Flabbi, Luigi Minale, Benjamin Olken, Daniel Suryadarma and participants at the 4th International Conference on MIGRATION AND DEVELOPMENT at the Center for International Development (CID), Harvard Kennedy School. Corresponding author: F. Fasani, Institut d'Anàlisi Econòmica, IAE-CSIC, Campus UAB, 08193, Bellaterra, Barcelona, Spain Tel:(+34) 93 592 9779 *francesco.fasani@iae.csic.es*. The authors acknowledge the support of INSIDE-MOVE (Markets, Organizations and Votes in Economics), the Barcelona GSE Research Network and the Government of Catalonia. Farré also acknowledges the Spanish Ministry of Science (grant ECO2011-29663).

1 Introduction

The decision to migrate involves the comparison of income gains and other benefits associated to the move with its pecuniary and non-pecuniary costs. To estimate the expected returns of moving to alternative destinations, potential immigrants gather information from different sources. The role played by relatives and friends, previous migrants and networks abroad has been widely analyzed by economists (see, for example, Winters et al. 2001; Munshi 2003; Hanson and McIntosh 2008; McKenzie and Rapoport 2007 and 2010). By providing information on the migration process, facilitating the access to the job market and helping integration upon arrival, networks are crucial to individual migration decisions. Networks, therefore, are a source of information, but they may also directly reduce migration costs and influence employment outcomes at destination: disentangling the pure information effect from networks is far from straightforward (Carrington et al. 1996).

In order to isolate the role of information on migration decisions, we focus on an alternative popular source of information: exposure to television. The impact of media exposure on individual attitudes and behaviors has been studied in various economic fields. For instance, Della Vigna and Kaplan (2007) show that the introduction of the conservative Fox News channel in the cable programming had a positive effect on the vote share to the Republican party in the US. Also in the US, Gerber et al. (2009) find that receiving a free subscription of either the Washington Times or the Washington Post led to more support for the Democratic candidate and to an increase in 2006 voter turnout. There is also evidence that exposure to different news programs significantly affects the public opinion on illegal immigration (Facchini et al. 2009). Outside the US, Gentzkow and Shapiro (2004) find that television can affect attitudes towards the West in Muslim countries. Della Vigna et al. (2011) document that residents of Croatian villages exposed to the Serbian public radio are more likely to vote for extreme nationalist parties. In the developing world, Olken (2009) shows that TV decreases participation in social organizations in Indonesia, La Ferrara et al. (2007) find that exposure to soap operas in Brazil

reduces fertility, while Jensen and Oster (2009) relates the introduction of cable television to a women's status improvement in rural India.

Studying migration phenomena is essentially about understanding why people decide to move or not. Information on possible destination regions is a crucial input in these individual decisions. Which type of information potential migrants have access to? How do they use it in their decisional process? From which sources do they gather it? How do their decisions change if more/better information becomes available? These are all key research questions which need to be addressed. Individuals with limited information will make sub-optimal choices, with important consequences for their welfare. From a policy perspective, the fact that one could influence migration outcomes - and, therefore, individuals' welfare - just by intervening on the access to information has considerable implications. This is especially relevant because the (scarce) evidence we have on migrants' expectations in developing countries (McKenzie et al. 2009) shows how deeply inaccurate these can be.[1]

In standard migration decision models, individuals optimally choose to migrate if the expected gains from doing so - net of monetary and non-monetary costs - exceed the expected gains from staying in the original location (Sjaastad, 1962). However, net gains from migrating are subject to a substantial amount of uncertainty. The seminal paper by Harris and Todaro (1970) already considered the effect of uncertainty by incorporating a positive probability of remaining unemployed in the destination labor market, nonetheless agents still have perfect information on the expected gains from migrating. The theoretical literature has investigated different aspects of the relationship between information and migration. Katz and Stark (1987) analyze the effect of asymmetric information on migration, where the nature of the asymmetry comes from migrant workers being more informed about their skills than national employers.[2]

[1] Migration is not the only area where incomplete information may lead to sub-optimal individual decisions. A related literature has recently revealed the existence of significant gaps between perceived and actual returns to educational choices in developing countries (Attanasio and Kaufmann, 2009; Jensen, 2010).

[2] Different aspects of this information asymmetry have been investigated by the same authors (Katz and Stark, 1986; Stark, 1995).

Other authors have modeled the process of gathering information during the job search process in the new destination labor markets (Herzog et al. 1985; Vishwanath 1991; Daneshvary et al. 1992). Relatively few papers, instead, have looked at how information - or the lack of it - may influence actual moving decisions. Among these exceptions, Pessino (1991) proposes a migration model across geographically separated markets with uncertainty and imperfect information at destination, where agents learn by migrating. In Borjas and Bratsberg (1994), instead, basing initial migration decisions on erroneous information about opportunities at destination leads to return migration. On the empirical side, some authors have studied the type of information available to potential migrants and how they gather it. Banerjee B. (1984), for instance, analyzes rural-urban migration in India, while McKenzie et al. (2009) study expectations of Tonga citizens on labor market prospects in New Zealand. Only a couple of recent papers have considered the impact of access to media on migration. Aker et al. (2011) finds that access to mobile phone technology in Niger has a large positive effect on seasonal migration by increasing information about the labor market at destination. While Braga (2007) shows that the likelihood of migrating to Italy of Albanian citizens increases with the reception of Italian TV in their regions of origin.

The focus of our paper is on the effect of private television exposure on internal migration in Indonesia. This is an interesting case to analyze the impact of TV broadcasting thanks to a process of TV liberalization which was started in this country in the late 1980s. This process dramatically expanded the supply of TV broadcasting, from one single government-run television station - as it was until the last period of Suharto's regime - up to eleven national channels. The differential introduction of private television throughout the country and the variation in signal reception due to topography provide an exogenous source of variation to investigate the causal effect of media exposure on individual migration decisions.[3] There are

[3]The expansion of private television broadcasting in Indonesia was accompanied by a contemporaneous growth of private radio networks. As there are no detailed data on radio reception, we limit our analysis to the impact of television. Olken (2009) shows that TV and radio signal are strongly positively correlated. Thus,

several reasons to focus the analysis on internal migration. First, internal migration, as opposed to international, represent the bulk of geographical movements in Indonesia: in 2000 more than 10 percent of the population was living in a province different from that of birth (with intra-provincial migration being about two-three times larger), while in 2006 only an estimated 1.5 percent was living abroad.[4] Second, the population size and geographical extension of Indonesia makes it a suitable candidate to draw lessons on internal movements for comparable countries, such as India or China, where the issue has increasing policy relevance. Third, the longitudinal survey employed in the paper (the Indonesian Family Life Survey) is particularly suitable for analyzing internal migration: individuals are tracked down if they move within the country and full migration histories are carefully recorded. Finally, while it is clear that wider access to private TV networks increased the amount (and quality) of information regarding Indonesia, it is harder to establish whether the same happened for the information about foreign countries.[5] As we argue throughout the paper, analyzing internal migration allow us to establish a clear link between information availability and migration choices.

Would better informed individuals migrate more or less? As we show in our theoretical model (section 2), the answer depends on the type of mistakes they make in assessing net gains from migration. Indeed, if potential migrants over-estimate (under-estimate) their employment and life prospects in the destination region, wider access to information may decrease (increase) migration pressures. Our empirical results show a negative effect of television exposure on

even if data were available, it would be difficult to separately identify the two effects. Throughout the paper, we will always refer to television exposure because this is what we measure in the data, but one needs to bear in mind that part of the impact we observe on migration choices may possibly come from increased access to private radio broadcasting.

[4]Although the focus of the paper is on internal migration, we also investigate the impact of TV exposure on international migration.

[5]Having more access to television may on the one hand make individuals in origin countries more aware of conditions and opportunities in potential destination countries, but it may also convey distorted information - through feature films, TV series or soap operas. Some sociologists describe the relationship between media and migration in terms of a magnetic attraction of countries who "receive" Western television programs (and "send" migrants) and countries who "send" television programmes (and "receive" migrants in return). Mai (2004), for instance, analyzes the effects of foreign media on the migration projects of Albanians. His qualitative study reveals that exposure to Italian television provided Albanian young people with an utopian and misleading representation of Western societies.

propensity to internally migrate. In particular, individuals who, during their early teens, lived in areas with less television exposure, are more likely to move to a different region later in life than individuals who lived in areas with better reception. Similarly, we find evidence of a negative short term effect of TV exposure on migration decisions. Moreover, our estimates also indicate that individuals less exposed to television are systematically more likely to consider themselves among the poorest groups in the country. We address possible concerns of endogeneity of local TV exposure by an instrumental variable strategy and carefully test the robustness of our results. We conclude that wider access to media increases citizens information and allows them to make more accurate choices. Accordingly, the observed reduction in internal movements suggests that Indonesian citizens were over-estimating the net gains from migrating and that TV information helped them to bridge the gap between perceived and actual gains.[6]

In the following section, we briefly describe the characteristics of the television market in Indonesia and its migration history. Section 3 sketches a stylized migration model that incorporates the role of information in the migration decision. Section 4 discusses our identification strategy, while section 5 reports some descriptive evidence. Estimation results and robustness checks are presented in section 6 and 7. Finally, the last section provides some concluding remarks.

2 Television and Internal Migration in Indonesia

2.1 Television in Indonesia

The liberalization of the television market that took place in Indonesia during the 1990s represents an extremely interesting case-study to investigate the impact of media exposure on individual behavior. In the last few decades, the evolution of the media market in Indonesia

[6] An alternative interpretation of our results is that television access is associated with an increase in utility large enough as to reduce the incentives to migrate. The two explanations cannot be empirically distinguished. Although we can not rule out the amenity interpretation, throughout the paper we will argue that access to wider information has played a major role in affecting Indonesians' migration decisions.

was deeply linked to - and often determined by - the political events which repeatedly changed the system of government of the country and its degree of democracy.[7]

Until 1989 there was only one government-owned television station (TVRI, Televi Republik Indonesia): founded in 1962, it had finally started to broadcast throughout the entire archipelago only in 1976, after the launch of the first Indonesian communication satellite. TVRI was supervised by the Ministry of Information - that is, it was under the direct control of president Suharto - and its programmes were expected to contribute to the unity of the nation and to its growth, by supporting government's development policies as well as by promoting national cohesion, law and order. The editorial policy was not independent: the government imposed the so-called "SARA doctrine", which implied the prohibition of any mentioning in the media of sensitive issues such as ethnicity, religion, race, and social class (*Suku, Agama, Ras, Antargolongan*) (d'Haenens et al., 1999). Negative reporting was also actively discouraged.

The first step towards a partial liberalization of the media took place in 1986: in that year, the government adopted the Open Sky policy which allowed private television distribution through satellite dishes and cable networks. As a result, five private networks were created: RCTI (1987), SCTV (1989), TPI (1990), ANTV (1993), and Indosiar (1995). During these first few years, commercial television was only available to those who could afford the service, but in 1992 the government liberalized the television market, allowing commercial channels to offer free-to-air services that progressively covered the whole country (Kukuh, 2002). This first phase of deregulation was far from a complete liberalization: the licensing process was not transparent (as licenses were basically issued to Suhartos relatives or cronies), the government

[7]In 1950, one year after the recognition of its independency by the Netherlands, Indonesia adopted a parliamentary democracy system which lasted until 1957. President Sukarno - the leader of the Indonesian independence struggle - proclaimed martial law and established a presidential system (in 1959), turning the existing parliamentary democracy into a "guided democracy" (*Demokrasi Terpimpin*), a system which progressively became more and more autocratic. In 1965, general Suharto seized the power: he was appointed president and replaced Sukarno's "guided democracy" with his version of a dictatorial regime, the "New Order" (*Orde Baru*). The Asian financial crisis of 1997 - which dramatically hit the Indonesian economy - triggered a violent outburst of the lasting demand for democratic reform. Suharto's rule ended in 1998, when he was forced to resign by student protests and riots across the country. Indonesia then entered a constitutional reform process that defined its current system of government - a presidential republic - and the balance of powers within that. The first democratic elections were held in 1999.

maintained formal (and informal) control on programs content and private news production was not allowed (Hollander et al., 2009). Although the government did not block the emergence of commercial stations, a clear legal framework was not developed until 1996. During this period commercial stations operated in a twilight zone, circumventing the prohibition on news production by broadcasting news under the guise of so-called "information programmes". With the 1996 Broadcasting Act, private TV stations were officially authorized to broadcast their own news programmes. This decision formally broke the government monopoly in the production of television news, but all channels were still required to broadcast the 7.00 and 9.00 p.m. public TVRI network news and all the government messages (d'Haenens et al. 1999).

In the early 1990s, the increasing pressure from the Indonesian society for democratic reforms also included a strong demand for more information and, especially, for independent news. Private TV channels found themselves in the difficult position of finding a balance between pleasing the government's censorship and providing enough TV news to win audience shares (and advertising revenues) in an increasingly competitive environment. During the escalation of protests in 1998, while the public TVRI network was completely ignoring the events, commercial stations provided full coverage. After the resignation of Suharto (on May 21, 1998) private TV networks also played an active role in the transition to democracy. Hollander et al. (2009) argue that the switch of private TV from government direction towards a focus on the information needs of the society, may have actually boosted the process of reforms after Suharto's fall.

Between 2000 and 2002, five newcomers entered the market. Thus, today there are 11 television stations with license for nationwide broadcasting over the air. Those include the government-run channel (TVRI), three major networks (RCTI, SCTV, and Indosiar), one all-news station (Metro TV), and six minor networks (ANTV, GLOBALTV, LATIVI, TV7, TransTV and TPI). All the private channels (except for Metro TV) broadcast a similar combination of programs including news, entertainment and sports.

2.2 Internal Migration in Indonesia

With more than 230 million inhabitants in 2008, Indonesia is the fourth most populous country in the world. Census data reveal a sustained growth of the Indonesian population in the last few decades: the total population increased from 119 million in 1971 to 204 million in 2000 (Tirtosudarmo 2009). Indonesia is the world's largest archipelago, consisting of about 17 thousand islands which span more than 5,000 km eastward from Sabang in northern Sumatra to Merauke in Irian Jaya.

Internal migration in Indonesia is not a recent phenomenon. Already during the last period of the Dutch rule, the country had a highly geographically mobile population. According to the 1930 census, 11.5% of the total native population lived outside their district of birth, although only about half of them (5.6%) had moved beyond provincial borders. Internal migration in the early 20th century was also actively encouraged by the Dutch administration in order to relieve population pressure in Java and to support the expansion of plantations in other islands (Hardjono 1988; Tirtosudarmo 2009). After independence, the Indonesian government revived these colonization program under the name of "transmigration" plans: about 90 thousand households (420 thousand individuals) were moved during the period 1950-1968. Between 1969 and 1998 six transmigration policy plans ("*Repelita*") were implemented: by 1997, a cumulative total of approximately 1.4 million families, or 6.5 million people, had been shipped to the outer islands (Fearnside 1997; Tirtosudarmo 2009). After the economic crises of 1997, and the subsequent transition to democracy, transmigration programs were practically abandoned.

While the government was actively trying to relieve pressure on land resources in Java, free internal migration was not constrained in any way. Actually, it was constantly increasing - driven by the wage differentials between provinces and by the attractiveness of the Jakarta area - and generally flowing in the opposite direction with respect to the government transmigration policies.[8] In 1971, the size of inter-provincial migration was still similar to that of the colonial

[8]For instance, Fearnside (1997) estimates that transmigration programs during the 80s relieved at most 17 percent of the population growth in Java.

period (4.9%), while it increased to 7 percent in 1980, to 8.2 percent in 1990 and to 10.1 by 2000 (Hill et al. 2008; Tirtosudarmo 2009). In 2000, therefore, about 20 million people were living in a province different from that of birth.

International migration of Indonesian citizens, instead, is a relatively recent phenomenon which reached sizeable dimension only in the last two-three decades. The Indonesian Ministry of Labour estimates that in 2006 there were around 2.7 million Indonesians working overseas who went through official channels and another 800 thousand who went through informal ones (Ducanes and Abella 2009). According to these figures, roughly 1.5 percent of the Indonesian population was living and working abroad in 2006.

3 Theoretical framework: information, media and migration choices

In standard migration decision models, individuals optimally choose to move if the expected gains from doing so - net of monetary and non-monetary costs - exceed the gains from staying in the original location (Sjaastad, 1962). A crucial assumption in this approach is that individuals have sufficient information to correctly predicts these gains and costs. However, potential migrants may have a very imprecise idea of the level of earnings and probability of finding a job in labor markets where they have never been before, and they may fail to accurately account for all the direct and indirect costs associated to the move.

Lack of information in migrating decisions implies that, although individuals act rationally, they may take sub-optimal decisions. That is, if potential migrants tend to over-estimate (under-estimate) the net gains from migrating, there will be more (less) migration than optimal. Within this framework, we model access to information - TV exposure - as a factor that contributes to reduce the gap between expectations about the (net) gains from migration and the real ones. Starting from a standard Roy model applied to migration choices (Borjas, 1987),

we develop the simplest theoretical setup to illustrate the role of information in this context.

Suppose individuals originate in source region S and consider the possibility of moving to destination region D.[9] Potential migrants are assumed to be risk neutral. The log earnings distribution in the source and destination regions are:

$$w_j = \mu_j + \epsilon_j \quad \text{with} \quad j = S, D \tag{1}$$

where μ_j is the mean log earnings and ϵ_j is the individual return (i.e. ability) in region j. An individual migrates ($I = 1$) if earnings at destination are higher than (or equal to) those in the source region, net of a migration cost (π):

$$\mu_D + \epsilon_D - \pi \geq \mu_S + \epsilon_S. \tag{2}$$

This condition can be re-written as: $v \geq \Delta$, where $v = (\epsilon_D - \epsilon_S)$ and $\Delta = (\mu_S - \mu_D + \pi)$. Assuming that $v \sim N(0, \sigma_v^2)$, we have:

$$Pr(I = 1) = Pr(v \geq \Delta) = 1 - \Phi\left(\frac{\Delta}{\sigma_v}\right) \tag{3}$$

where Φ is the standard normal distribution function.

Now, suppose individuals do not know exactly their net earnings at destination. We model this possibility by including an additive error term (q) in the left hand side of inequality (2). We assume that this error term is constant in the population and equal to $\overline{q}$. It is positive if individuals over-estimate the net gain from migrating and negative if they under-estimate it. When taking their moving decisions, individuals ignore both the size and the sign of $\overline{q}$. An

[9] In our stylized setup, we consider only one potential destination. In the presence of several destinations, incomplete information leads to sub-optimal choices when individuals are not able to correctly rank the different alternatives. The implications of our simple model also hold in this context.

individual will then migrate ($I_q = 1$) if:

$$(\mu_D + \epsilon_D - \pi) + \overline{q} \geq \mu_S + \epsilon_S \tag{4}$$

This new condition can be re-written as: $v + \overline{q} \geq \Delta$. Given that $(v + \overline{q}) \sim N(\overline{q}, \sigma_v^2)$, we have:

$$Pr(I_q = 1) = Pr(v + \overline{q} \geq \Delta) = 1 - \Phi\left(\frac{\Delta - \overline{q}}{\sigma_v}\right). \tag{5}$$

The presence of the error term ($\overline{q}$) shifts the distribution of v to the left or the right, depending on whether $\overline{q}$ is positive (over-estimation) or negative (under-estimation). Thus, the probability of migrating will be higher (lower) if $\overline{q}$ is positive (negative). Indeed:

$$Pr(I_q = 1) \geq Pr(I = 1) \qquad \text{if} \qquad \frac{\Delta - \overline{q}}{\sigma_v} \leq \frac{\Delta}{\sigma_v} \tag{6}$$

which is always true for $\overline{q} \geq 0$, and never for $\overline{q} < 0$. Within this framework, individuals can be classified in four different groups. In the presence of over-estimated gains ($\overline{q} \geq 0$), there is more migration than it would otherwise be optimal: there are individuals for whom migration is always optimal (optimal migrants, OM) and others who would have not migrated had they not over-estimated the gains from doing so (sub-optimal migrants, SM). Those who decide to stay in spite of the over-estimated gain would have stayed in any case (optimal stayers, OS). When individuals under-estimate migration gains ($\overline{q} < 0$), instead, all migrants are optimal (OM), while among the stayers there are optimal stayers (OS) and sub-optimal stayers (SS). The latter group would have migrated in absence of the negative error $\overline{q}$.

We illustrate these four groups in figure 1. The vertical axis corresponds to the measure of individual ability (v), while on the horizontal one there is the error in predicting the gains from migration (q). The solid line with negative slope is given by $(\Delta - q)$ and it crosses the vertical axis at $v = \Delta$. All individuals with a value of v above this line migrate. Note that when $q = 0$, all migrants are optimal (i.e. all stayers are optimal). For positive values of q,

instead, the larger is q the larger is the number of people migrating: we have an increasing share of sub-optimal migrants (and a decreasing share of optimal stayers). The opposite is true for negative values of q: the more negative is q, the less people migrate, and the larger is the share of sub-optimal stayers (at the expenses of the share of optimal migrants). The shares of individuals in each group (OM, SM, OS and SS) are given by the following probabilities:

$$Pr(OM=1) = Pr(I_q=1; I=1) = Pr(v+\overline{q} \geq \Delta; v \geq \Delta) = \begin{cases} Pr(v \geq \Delta) & \text{if } \overline{q} > 0 \\ Pr(v \geq \Delta - \overline{q}) & \text{if } \overline{q} < 0 \end{cases} \tag{7}$$

$$Pr(SM=1) = Pr(I_q=1; I=0) = Pr(v+\overline{q} \geq \Delta; v < \Delta) = \begin{cases} Pr(\Delta - \overline{q} \leq v < \Delta) & \text{if } \overline{q} > 0 \\ 0 & \text{if } \overline{q} < 0 \end{cases} \tag{8}$$

$$Pr(OS=1) = Pr(I_q=0; I=0) = Pr(v+\overline{q} < \Delta; v < \Delta) = \begin{cases} Pr(v < \Delta - \overline{q}) & \text{if } \overline{q} > 0 \\ Pr(v < \Delta) & \text{if } \overline{q} < 0 \end{cases} \tag{9}$$

$$Pr(SS=1) = Pr(I_q=0; I=1) = Pr(v+\overline{q} < \Delta; v \geq \Delta) = \begin{cases} 0 & \text{if } \overline{q} > 0 \\ Pr(\Delta \leq v < \Delta - \overline{q}) & \text{if } \overline{q} < 0 \end{cases} \tag{10}$$

Now, suppose the error individuals make in assessing the net gains from migration negatively depends on the amount of information available. That is:

$$\overline{q_*} = \frac{\overline{q}}{i} \tag{11}$$

where $\overline{q}$ is the constant error term and i is the level of information individuals have access to, with $i \in [1, +\infty)$. We can now study how migration decisions respond to an increased availability of information. After replacing $\overline{q}$ with $\overline{q_*}$ in equations (7)-(10), it is straightforward to show that:

$$\frac{\partial Pr(OM=1)}{\partial i}\begin{cases} =0 & \text{if } \overline{q}>0 \\ >0 & \text{if } \overline{q}<0 \end{cases} \tag{12}$$

$$\frac{\partial Pr(SM=1)}{\partial i}\begin{cases} <0 & \text{if } \overline{q}>0 \\ =0 & \text{if } \overline{q}<0 \end{cases} \tag{13}$$

$$\frac{\partial Pr(OS=1)}{\partial i}\begin{cases} >0 & \text{if } \overline{q}>0 \\ =0 & \text{if } \overline{q}<0 \end{cases} \tag{14}$$

$$\frac{\partial Pr(SS=1)}{\partial i}\begin{cases} =0 & \text{if } \overline{q}>0 \\ <0 & \text{if } \overline{q}<0 \end{cases} \tag{15}$$

Therefore, if the gains were over-estimated ($\overline{q} \geq 0$), more information would reduce the number of sub-optimal migrants (SM), increasing the number of the optimal stayers (OS). On the contrary, with under-estimated gains ($\overline{q} < 0$), the number of sub-optimal stayers (SS) would fall, raising the number of optimal migrants (OM). Given that the total number of migrants is given by the sum of optimal and sub-optimal migrants, more information reduces (increases) the propensity to migrate in the presence of over- (under-) estimated gains from migration.

An important implication of this model is that more information does not lead to unambiguous prediction about the number of migration movements one should observe in the data.[10] This depends on whether individuals are, on average, over- rather than under-estimating the returns from migrating (i.e. being more informed leads to less migration in the first case and to more in the second). Therefore, empirically establishing whether wider access to private television increases, rather than decreases, the propensity to migrate allows us to infer the type of error individuals are making when taking their decisions. We perform this exercise in the empirical part of the paper.

[10] A second important implication is that information increases welfare by reducing the number of sub-optimal choices. In the empirical part, we do not look at this aspect.

4 Empirical analysis

4.1 Empirical model

In our empirical exercise, we first take a long run perspective and analyze the effect of having been exposed to TV as an adolescent on the future migration behavior of Indonesian citizens (throughout the paper, we refer to this part of the analysis as *early exposure*). Given that most of the migration movements take place at a young age, they may be substantially influenced by expectations formed early in life. Having more or less access to television is likely to shape individuals' views on their country, their area of residence and on their relative position in society: these are all elements which will concur in determining future migration decisions. However, migration choices are not just the deterministic outcome of beliefs matured at a young age. Individuals may update their expectations when new information becomes available, and re-optimize their decisions. Hence, in the second part of the empirical analysis, we focus on these short run effects and estimate the contemporaneous relationship between TV exposure and migrating decisions (we refer to this part of the analysis as *current exposure*).

In both the short and long run analysis, we estimate the following empirical model:

$$mig_{ikp} = \alpha + \beta TV_{kp} + \mathbf{X}_{ikp}\gamma + \mathbf{Y}_{kp}\eta + \delta_p + u_{ikp} \tag{16}$$

where mig_{ikp} is a migration outcome for individual i, who lives in district (in Indonesian: *kabupaten*) k and province (in Indonesian: *propinsi*) p, at the time TV exposure is measured. In our analysis, the migration outcome is a dummy variable equal to 1 if the individual moves out from the district or province of initial residence. The main explanatory variable in equation 16 is TV_{kp} which measures the exposure to television broadcasting in district k and province p (i.e. the average number of private TV channels received in the area). As we clarify in the next section, the time period when TV exposure is measured varies depending on the type of analysis (i.e. short versus long run). The empirical model includes also a constant α, a matrix

of individual-level control variables $\mathbf{X}_{ikp}$ (gender, age, education, etc.), province fixed effects (δ_p) and an unobserved error term, u_{ikp}. In some specifications, we also include a matrix of district-level controls ($\mathbf{Y}_{kp}$).

4.2 Data

We employ two main datasets: the Indonesia Family Life Survey (IFLS), which provides individual data and migration histories, and the PODES (The Village Potential Statistics), which has information on TV reception at the village level.

The Indonesia Family Life Survey is an on-going longitudinal survey: it contains over 30,000 individuals living in 13 different provinces, representative of about 83% of the Indonesian population. Four waves have been conducted so far: in 1993 (IFLS1), in 1997-1998 (IFLS2), in 2000 (IFLS3) and in 2007-2008 (IFLS4). The design of this survey makes it particularly suitable for analyzing internal migration. Indeed, there has been a strong commitment to tracking and interviewing individuals who had moved, or split off, from the households where they were firstly interviewed. This commitment has led to very high re-interview rates.[11] Moreover, a substantial effort has been made to record the migration histories of each individual in the survey. At the time of the first interview, respondents are asked about any migration they undertook in the past, and in all subsequent waves they are asked to report any movement occurred in the span of time elapsed since the last interview. We use all the four ILFS waves in our analysis.

The information on TV reception comes from our second data source: the Village Potential Statistics (PODES). The PODES provides information about village characteristics for all Indonesia and it is surveyed in the context of the periodic censuses (Agriculture, Economy, Population). Detailed questions on reception of each of the existing 11 Indonesian TV channels

[11] In IFLS1, 7,224 households were interviewed and detailed individual-level data were collected from over 22,000 individuals. In IFLS2, 94% of IFLS1 households and 91% of IFLS1 targeted individuals were re-interviewed. In IFLS3, 95.3% of IFLS1 households were re-contacted and in IFLS4 the re-contact rate was 93.6%. Among IFLS1 dynasty households (any part of the original IFLS1 households) 87.6% were actually interviewed in all four waves and 3% died.

were introduced only in the PODES conducted in 2006.[12] For each TV channel, the head of the village is asked whether there is sufficient signal in the village as to clearly watch the programs. We obtain our measure of TV reception at the district level by averaging the information on the number of channels received in each village.[13]

In order to carry out our analysis of long and short run effects of TV exposure, we construct two distinct samples. We focus on the fourth wave of the survey (2007-2008) to investigate the long term impact. This wave contains information on about 20 thousand individuals aged 16 and older, which become 14,728 when we restrict the sample - as we do in most of our analysis - to those aged 45 or less.[14] For each individual we recover the residence at age 12 and at birth, and for those interviewed in more than one wave also the current residence at each interview. We then match each individual with the degree of TV reception in the district of residence where they lived as adolescents. We employ the information on TV reception from the PODES 2006 combined with that on the years when the different private TV channel were created, to reconstruct a measure of TV reception for each channel and district at any point in time. In the analysis we identify as internal migrants those respondents whose current residence in 2007-2008 - or current residence recorded in any of the previous waves of the survey - is different from that at age 12. We define two different dependent variables: one that includes both inter and intra-provincial migrations and one that considers only inter-provincial movements.

In the short run analysis, we employ the third and the fourth wave of the IFLS, and recover all movements that occurred between 2000 and 2007. Migration histories are available for about 11 thousand individuals aged 16 or older (reduced to 8,345 when we restrict the analysis

[12]Questions about TV reception were introduced for the first time in the PODES conducted in 2003. However, in that year the questions referred only to the public channel and to four of the private ones (TPI, RCTI, SCTV and Indosiar).

[13]We follow Olken (2009) and exclude from the analysis major cities such as Jakarta, Surabaya, and Medan, where private television broadcasting started well before than in the rest of the country. We also exclude the conflict-ridden provinces of Aceh, Maluku, East Timor, and Iran Jaya, where there are serious concerns about data quality in all Indonesian government surveys.

[14]We restrict the analysis to this age range as the bulk of migration movements occurs during this age span. In the robustness tests we remove this restriction and our main results remain unaffected. Individuals younger than 16 are not interviewed in the personal section of the IFLS survey, thus we do not have information on their migration trajectories.

to those aged 45 or less). To estimate the short run effect of TV exposure, we now match individuals with reception in the district of residence in 2000 and investigate its impact on subsequent migrating decisions. As in the long run analysis we analyze migration both at the inter and intra-provincial level. In this case, respondents are identified as internal migrants if they changed district and/or province of residence between 2000 and 2007-2008 (and stayed in the new residence for at least six months).

The Data Appendix A contains a detailed description of how we construct the measures of TV exposure and the migration variables in both the long and short run sample.

4.3 Identification strategy

The main parameter of interest in our analysis is the coefficient β in equation (16), which measure the impact of TV exposure on the individual propensity to migrate. If one had experimental data, with individuals randomly assigned to areas with different exposure to television, the β coefficient would identify the causal impact of media on migration outcomes. Our data are not experimental and, therefore, we need to carefully discuss under which conditions this parameter can be identified.

The first general concern is the endogeneity of individual choices in using media. Given the existing set of possibilities to access media, individuals choose whether to use them and, if so, which particular media and to which extent. Thus, a significant relationship between media usage and some individual outcome may simply result from some unobserved heterogeneity determining both variables. In our case, this would be a concern if, for instance, more entrepreneurial individuals used media more intensively and were also more likely to migrate. Moreover, access to media may simply proxy for some individual/household observable characteristic which is not fully captured in survey data. For example, wealthier households may be more likely to own a TV set and less likely to migrate. To overcome these concerns, we measure media exposure using TV reception in the area where the interviewees live, rather than as the

actual individual TV ownership or time spent watching TV.[15]

Still, TV reception in the region is not necessarily exogenous. An obvious concern is the presence of unobserved factors simultaneously affecting TV reception and migration patterns in different areas. For example, affluent areas may be more successful in attracting private TV broadcasters and, at the same time, present a lower out-migration rates. This will lead to a downward bias estimate of β. It is also possible that more remote areas have weaker TV signal and show lower migration rates due to the higher costs of moving away from there. In this case, the OLS estimate of β will present a positive bias. On the other hand, insofar as the variation in the number of channels across different areas purely responds to topographic accidents (i.e. mountains, valleys or flats) that have no direct impact on migration patterns, the OLS estimate of β will be unbiased.

In the empirical analysis, we combine three different strategies to investigate the potential endogeneity of TV reception and estimate its causal effect. First, we include province fixed effects in equation 16 to capture any time-invariant characteristics at the provincial level.[16] Second, we add a set of control variables at the district level to our empirical model in order to capture geographical, economic and demographic characteristics. Finally, we apply an instrumental variable strategy based on the Indonesia's mountainous terrain developed by Olken (2009). This strategy exploits the differences across districts in television reception that are due to the topography (i.e. mountains and curvature of earth) between the districts' reception points and the location of television transmitters. Indeed, the strength of TV signal negatively depends on (a) the distance between the TV transmitter and the reception area, and (b) the presence, and altitude, of mountains between the two points. Olken (2009) uses a physical model of electromagnetic signal propagation to predict the signal loss due to topography and

[15] Olken (2009) shows that each additional TV channel received is associated with about an 8% increase in time spent watching TV (with respect to its mean value).

[16] Although TV exposure is measured at the district level, district fixed effects can not be identified as the variation of TV exposure is almost exclusively cross-sectional in the long run sample and exclusively cross-sectional in the short run one.

distance between a geographical point and each of the television station transmitters throughout Indonesia. He computes the "predicted signal strength" ($TV - PSS$) each district will get by subtracting from each television station transmission power the signal loss calculated from the model. The "predicted signal strength" ($TV - PSS$) captures both the effects of topography as well as the fact that some reception points are closer to the transmission locations than others. Thus, in order to isolate the pure effect of topography, Olken (2009) uses the same signal propagation model and estimates the "free-space signal strength" ($TV - FSS$): this is the strength that would have been obtained if there was a direct line of sight between the transmitter and the receiver.[17] Including this latter variable ($TV - FSS$) as an additional control for the effect of distance in equation 16, and using the "predicted signal strength" ($TV - PSS$) as an instrument for the actual TV exposure, one can isolate the variation in signal strength that is due exclusively to topographical idiosyncrasies and the curvature of earth. The exclusion restriction for this instrumental variable strategy holds under the reasonable assumption that, once other district-level geographical variables (distance from the nearest city, distance from the nearest TV transmitter, altitude, etc.) are controlled for, topographical idiosyncrasies have no direct effect on migration decisions.

5 Descriptive evidence

Table 1 reports descriptive statistics for the two samples employed in the analysis. The upper part refers to the sample employed for the long term (*early exposure*) analysis. There are 14,728 individuals aged 16-45: 48 percent are male, and the average age is 29 years. Looking at schooling, 34 percent have received only a primary education, 55 percent have a secondary education and 10 percent went to college. About 14 percent of the sample resided in an urban area at age 12. There are about 4.5 thousand migrants in this sample, where migrants are all

[17] Note that Olken (2009) defines the $TV - PSS$ and $TV - FSS$ variable as the maximum signal strength between all transmitters and receiver points at the subdistrict level. Since we conduct the analysis at the district level, these variables are defined as district averages.

those individuals who moved inter or intra-provincially. While the share of males is substantially identical, migrants are slightly older and more educated than non-migrants. They also seem slightly less likely to live in urban areas at age 12. The lower part of table 1, instead, reports the values for the sample employed in the short term (*current exposure*) analysis. There are 8,345 individuals aged 45 or younger, their average characteristics are fairly similar to those in the previous sample and about a thousand of them are identified as migrants.

Crucial to the identification of internal migrants is a careful analysis of how administrative divisions and geographical coding evolved over time. Otherwise, one runs the risk of incorrectly identify as migrants individuals who never moved but lived in areas whose name or code changed over time, or were split/merged in smaller/larger geographical units. When the IFLS survey started in 1993 there were 27 provinces in Indonesia and the IFLS covered only in 13 of them. However, these provinces hosted the bulk of the Indonesian population (the survey was representative of an 83% of the population). Moreover, if individuals moved outside these 13 provinces an effort was made to re-contact them at their new destinations. Over the years the administrative division of Indonesia has substantially changed. As a result of consecutive subdivisions, in 2000 there were 6 new provinces, and the IFLS covered 19 out of a total of 33. Provinces are divided into districts (*kabupaten*) that have their own local government and legislative body, and can decide about the provision of public schools and public health facilities. There were 502 districts (*kabupaten*) in Indonesia in 2000, and 223 were included in the IFLS survey. Each district is divided into subdistricts (*kecamatan*) and then into villages (*Desa*). In 2000, there were 6,543 subdistricts and 75,244 villages. The *early exposure* sample contains individuals living in 18 different provinces at age 12 and 161 districts (table 2). The smaller *current exposure* sample includes individuals residing in 2000 in 11 different provinces and in 135 districts (table 2).

Our focus is on inter and intra-provincial migration as we think that the information obtained through media exposure is only relevant for destinations that are relatively far away. For movements within the same district or subdistrict, individuals can get information from

neighbors or just by visiting the place. Table 3 reports some descriptive evidence on internal migration rates. About 30 percent of the individuals in the *early exposure* sample have migrated inter or intra-provincially with respect to the district of residence at age 12, with the subset which migrated to another province being 11 percent. The *current exposure* sample shows an analogous pattern, although the migration rates are all sizeably lower: about 12 percent of the sample migrated inter or intra-provincially since 2000, and 5.5 percent changed province of residence.[18] In both samples, the propensity to migrate is fairly similar for male and female, and clearly increases with the level of education.

Where do these migrants come from and where do they go? Table 2 reports the distribution of respondents across provinces according to the original residence (i.e. residence at age 12 for the *early exposure* sample and current residence in 2000 for the *current exposure* one) and to the residence in 2007/2008. The bulk of our sample resides in the three provinces of Jawa Barat, Jawa Tengah and Jawa Timur, each of which hosts 15-20 percent of the respondents. About 7-10 percent of the interviewees reside, instead, in each of the two provinces of Bali and Nusa Tenggara Barat. In developing countries internal movements are generally thought to occur from rural to urban areas. Table 4, instead, shows that the majority of people in our sample move across rural areas (42 percent in the *early exposure* sample and 51 percent in the *current exposure* one), while a smaller, but still considerable, fraction migrate form rural to urban areas (38 percent in the *early exposure* sample and 30 percent in the *current exposure* one). A sizeable number of respondents move from urban to rural areas (respectively, 12 and 7 percent) and across urban areas (respectively, 7 and 11 percent).

Finally, we look at our measure of TV reception. For each of the 11 channels that operate in Indonesia in 2006, table 5 reports the year of establishment (or first year on air) and descriptive statistics for the two samples we use in the empirical analysis. In particular, the table reports the average TV exposure at the district level by TV network. TV exposure for each TV channel

[18]The lower migration rates in the *current exposure* sample is the obvious consequence of the different time span considered in the two samples: the long-run one looks at migratory movements occurred between the age 12 and the years 2007-2008, while the short-run one looks only at the period from 2000 to 2007-08.

is measured as the fraction of villages in the district having a clear reception of that particular network. For instance, in the *early exposure* sample respondents lived as adolescents in districts where, in average, 44 percent of the villages had good reception of the public network TVRI. As for all the other networks, the average reception of TVRI increases (to 88 percent) when looking at the *current exposure* sample.[19] The bottom part of the table reports descriptive statistics for the main explanatory variables employed in the analysis. The $(TV - private)$ variable is obtained by summing up the average reception in each district of each private TV network. It provides the average number of private channels received in the district and it varies between 0 and 10. In the *early exposure* sample, respondents lived in districts receiving in average 1.23 private channels, with some districts having zero reception and others receiving up to 8.4 channels. In the *current exposure* sample, instead, the average number of private channels increases to 6.2, there are district receiving all the ten channels and others having no reception. The variable $(TV - all)$ gives the number of channels - public and private - received in each district, and it is obtained by adding the reception of the public network TVRI to the private channel variable $(TV - private)$.

6 Estimation results

6.1 TV reception and district characteristics

We start our empirical analysis addressing the possibility that TV reception may be capturing some characteristics of the local areas that may also produce a direct effect on migration patterns. In doing so, we estimate the following regression:

$$TV_{kp} = \mu_0 + \mathbf{X}_{kp}\lambda + \delta_p + \varepsilon_{kp} \tag{17}$$

[19]Note that in the *current exposure* sample the values of TV reception are equal to those measured in the PODES 2006, while in the *early exposure* they are obtained through the interpolation described in the Data Appendix A and therefore the values are all lower.

where the dependent variable is the average number of channels received by the villages within each district k in province p. As explained before, TV reception is measured in 2006 by the PODES survey. The regression includes a a vector of district characteristic controls $\mathbf{X}_{kp}$, which capture both geographical features (distance in km to the province capital, time and economic cost of this trip, elevation with respect to the sea level) and measures of the economic and demographic composition of the local area (number of schools, log of total population, percentage of households living in slums, percentage of households with at least one member that has attended university, percentage of poor households, percentage of villages within the district where the main activity is agriculture, industry or trade).[20] Finally, δ_p is a province fixed effect and ε_{kp} is an idiosyncratic error term.

The OLS estimates of equation 17 are presented in table 6. After controlling for province fixed effects, the number of TV channels received in each district is only correlated with the distance to the province capital: the negative coefficient implies that the number of channels received increases with proximity to the capital. None of the other controls - capturing geographical, demographic and economic features of the districts - influence TV reception.

This preliminary analysis provides us with two relevant insights. First, TV reception at the district level is not simply proxying for the level of economic development in the area (which is likely to be an important determinant of migratory flows). Second, proximity to the province capital affects TV reception and it is also likely to directly affect migration (by reducing moving costs): omitting adequate measures of geographical remoteness of the different districts could potentially bias our estimates. Hence, in all our specifications, we will condition on distance from the nearest TV transmitter - which is usually located in the nearest town or city - by including the "free-space signal strength" variable ($TV - FSS$) described in section 4.3. Moreover, in our preferred specification, we will always add district controls to capture altitude, location and remoteness of the districts.

[20] All the controls are measured using the third wave of the IFLS collected in 2000. We have the full set of controls for 110 districts.

6.2 Long and short run effects of TV exposure

Our main results for the long run analysis of *early TV exposure* are reported in table 7. The table shows the estimation results for alternative specifications of equation (16). The first half of the table (columns 1-6) looks at both inter and intra-provincial migration, while the second half (columns 7-12) focuses only on inter-provincial movements. All the standard errors are clustered by district to allow for any possible correlation in the unobservables of individuals who lived in the same district at age 12.

Apart from the measure of TV exposure at the district level ($TV - private$), our baseline specification (columns 1, 4, 7 and 10) includes the predicted "free-space signal strength variable" ($TV - FSS$), a dummy for male respondent, a set of year of birth dummies and dummies for the province of origin (i.e. province of residence at age 12). In columns 2, 5, 8 and 11, we add four education dummies (primary, secondary, college and other education). In order to further examine the possibility that TV exposure is capturing some omitted characteristics of the local area that may have an effect on migration, we also include a set of district-level controls (columns 3, 6, 9 and 12). These are measured at the very beginning of the liberalization period using the first wave of the IFLS in 1993 and are the following: average distance to the province capital (in km); number of schools; average altitude; a coastal district dummy; the share of villages where primary activity is agriculture, industry or trade; number of households; and the share of houses with cement walls.[21] The inclusion of these additional controls do not alter the estimated coefficient on TV exposure. This implies that our results are not trivially driven by omitted district variables affecting both migration patterns and TV reception.

All the specifications reveal strong evidence of early exposure to TV playing a significant role in reducing future propensity to migrate. The OLS estimates of inter and intra-provincial migration (columns 1-3), indicate that having been exposed to one more TV channel as an adolsecent reduces the propensity to migrate by about 2.2-2.3 percentage points. Similar re-

[21] Note that due to missing values, the inclusion of these additional variables reduces the sample from 14,728 observations to 12,834.

sults are obtained for the propensity to migrate to a different province (columns 7-9), though the coefficient is about half in size: exposure to one more TV channel reduces the probability of inter-provincial migration by about 0.9-1 percentage points. Estimated coefficients are remarkably stable across alternative specifications.

To address any further concern regarding the presence of endogeneity, we then implement our IV strategy. The potentially endogenous TV reception variable, $(TV - private)$, is instrumented using the "predicted signal strength" variable, $(TV - PSS)$, as constructed by Olken (2009). In all regressions we also include the "predicted free-space signal strength" measure $(TV - FSS)$, which controls for the mere effect of distance to the nearest TV transmitter. Once this latter variable is included in the estimation, the instrument captures only the variation in signal reception due to differences in the mountainous terrain between transmitter and receiving points.[22] Table 8 shows first stage estimates of the IV strategy for the *early exposure* analysis (columns 1-3). In all specifications, the instrument $(TV - PSS)$ is significant at any conventional level. At the bottom of the table, we report the F-statistic of the excluded instrument. It oscillates between 220 and 280, well above the conventional threshold of 10 for strong instruments. Therefore, there should be no concerns about potential biases in the second stage due to the use of weak instruments. The second stage results for inter and intra-provincial migration (columns 4-6) and for inter-provincial migration only (columns 10-12) are presented in table 7. In all cases the estimated IV coefficient on TV exposure are negative, strongly significant and larger in magnitude than the OLS. According to these estimates, the exposure to one additional private TV channel reduces inter-provincial migration by 1.4-1.5 percentage point, and all migration movements by 3.7-4.0 percentage points.

A few conclusions can be drawn from this set of estimates. First, we find clear empirical

[22] In the analysis on *early exposure*, the measure of private TV exposure varies cross-sectionally but also with the cohort of birth: older cohorts have zero - or close to zero - exposure and younger cohorts have progressively more exposure. We have therefore interacted the "predicted signal strength" variable, $(TV - PSS)$, with a dummy which is equal one after 1992 (i.e. after the TV liberalization). In each district, therefore, the instrument is zero until 1992 and then constant from 1993 onwards. Our results are robust to the choice of any year in the neighborhood of 1992.

evidence that being exposed to more private TV channel has caused a reduction in the future propensity to migrate towards other areas of the country. Second, the comparison between OLS and IV estimates indicates that OLS estimates are upward biased. As discussed in section 4.3, OLS estimates would present a positive bias if we failed to fully control for the remoteness of the districts: isolated areas may have lower TV signal and lower migration rates (due to the higher cost of moving away). The inclusion of our measures of distance and the average elevation of the district may not be entirely capturing the degree or remoteness of the areas. On the contrary, we can rule out the hypothesis that local level of development is driving both TV reception and migration outcomes: if wealthier areas have stronger TV signal and lower emigration rates, our OLS estimates should be downward biased. Finally, a closer look at the difference between OLS and IV estimates allows us to discuss the extent of endogeneity in our estimations. The IV coefficients are about 1.4-1.7 times the OLS ones and the standard errors increase by about the same factor. In the absence of endogeneity, OLS and IV estimates should differ only by sampling error. To formally test the presence of endogeneity we perform the regression-based version of the Hausman test, which is asymptotically equivalent to the original version of the Hausman test, but it allows to easily obtain a fully robust statistic (Wooldridge, 2002). Accordingly, we include the residuals of the first-stage regression as an additional control in equation (16) and test whether the coefficient on these residuals (i.e. the control function) is statistically significant. The estimated coefficient on the control function, and its associated standard errors, are displayed in the last two rows of columns 4-6 and 10-12 of table 7. The test shows weak evidence of endogeneity: the residuals are significant at the 10 percent level in two cases and not significant in the other four. Therefore, we cannot clearly reject the exogeneity of TV exposure. This will be a consistent finding throughout our empirical analysis and it implies that one can give a causal interpretation to the OLS estimates. The exogeneity of TV exposure is not a particularly surprising finding. First of all, we are using a measure of TV exposure which is orthogonal to individual decisions such as those regarding TV ownership or time spent watching TV. Moreover, once we control for distance to the province capital, distance from

the nearest TV transmitter (through the $TV - FSS$ variable) and altitude, the variation in topography between transmitting and receiving locations is what ultimately drives the district differences in TV reception. It is not unreasonable to think that these differences in topography are substantially as good as random.[23]

After estimating the long run impact of TV exposure on migration decisions, we examine its contemporaneous effect, using the *current exposure* sample described in section 4.2. Table 9 reports OLS and IV estimates of the propensity to migrate at the inter and intra-provincial level (columns 1-6) and at the provincial level only (columns 7-12). The estimating equation and specifications (baseline, with education dummies, with district controls) are identical to those used to assess the long run effect, and the table follows exactly the same structure as table 7.[24] The OLS estimates of the short run impact on inter and intra-provincial migration of TV exposure are negative and highly significant (column 1-3). In particular, exposure to one additional private channel decreases the chances of migrating during the next few years by 0.7-1.2 percentage point. This is fully consistent with the previous results in the long run analysis. When the dependent variable is migration across provinces (column 7-9), the estimated effect is still negative and highly significant but smaller in magnitude: exposure to one additional private TV channel increases the propensity to migrate by 0.6 to 0.8 percentage points.

Let us now comment on the IV estimates. First-stage estimates are reported in table 8 (columns 4-6). In all specifications, the instrument ($TV - PSS$) is highly significant and one can clearly reject the null of weak instruments (the F-statistic varies between 27 and 40). The second stage estimates are reported in table 9, columns 4-6 (inter and intra-provincial migra-

[23] Our findings regarding the exogeneity of TV exposure are consistent with those in Olken (2009), who finds IV results very similar to the OLS ones.

[24] In this case, the included district level controls are measured in 2000 using IFLS3 data. These controls are: distance in km to the province capital, time and economic cost of this trip, elevation with respect to the sea level, number of schools, log of total population, share of households living in slums, share of households with at least one member that has attended university, share of poor households, and the share of villages within the district where the main activity is agriculture, industry or trade. Note that the sample size is reduced by about 2,100 observation when the district controls are included in estimation. However, when we estimate the model without the district controls on this restricted sample the results remain unaffected.

tion) and 10-12 (inter-provincial migration). In our preferred specification (column 6, which includes district level controls), an additional private TV channel decreases (inter and intra-provincial) migration by almost 1.6 percentage points (rather than by 1.2 percentage points, as implied by the OLS estimate). For inter-provincial migration the gap between OLS and IV estimates is even smaller, but the latter are never significant. Given that the standard errors of the IV estimates are (at least) twice as large as those of the OLS ones, it is not surprising that the IV coefficients lose significance. Similarly to the results for the long run analysis, we do not observe strong evidence of endogeneity in the $TV - private$ variable: in the latter two rows of table 9, columns (4-6 and 10-12), the regression-based Hausman test fails to reject the exogeneity of TV exposure in all cases.[25] In the absence of endogeneity, OLS and IV estimates are both consistent, but OLS estimates are more efficient and should be preferred.

How large are the estimated effects? In the *early exposure* sample the variable measuring exposure to private TV channels has mean equal to 1.23 with a standard deviation of 1.85 (table 5). According to our long term estimates, an increase of a one standard deviation in the number of private TV channels received will reduce inter-provincial migration by 1.7-2.7 percentage points, and all migration movements (inter and intra-provincial) by 4-7.4 percentage points. This increase in TV exposure represents a reduction in all migration movements (inter and intra-provincial) of about 8-16 percent of its standard deviation (which is 0.46; see table 3) and a reduction in inter-provincial movements of only about 5-8 percent of its standard deviation (which is 0.31; see table 3). Short run effects are also sizeable. In the *current exposure* sample, the measure of private TV exposure has mean 6.2 and standard deviation 3.3. Therefore, a one standard deviation increase in TV exposure would imply a reduction for inter and intra-provincial migration of about 7-16 percent of its standard deviation, and for

[25]This is clearly the case for the estimates of inter and intra-provincial migration, where both OLS and IV estimates are negative and highly significant. However we are slightly more cautious in interpreting the results for inter-provincial migration. In this case the IV estimate is not significant at conventional levels and thus it may be that the true effect of TV exposure on inter-provincial migration is actually zero.

inter-provincial migration of 7-11 percent. All these effects are far from negligible.

6.3 Robustness tests

After establishing our main result - exposure to private TV causally reduces the propensity to internally migrate of Indonesian citizens - we perform a number of additional tests to assess the robustness of our estimates. Here, we also have a look at some other dimensions of the migratory decisions.

International migrants. The negative effect of TV exposure on internal migration could be, at least partially, explained by an increased tendency to migrate internationally. If access to private TV networks increased the propensity to migrate abroad and if the individuals moving abroad would have, otherwise, migrated within Indonesia, one could observe a drop in internal migration following an expansion in TV exposure. The IFLS survey allows us to identify (some of the) international migrants: it collects information on the new residence of individuals who were interviewed in any of the four waves and then moved out of Indonesia.[26] We identify 375 international migrants in the *early exposure* sample (2.8 percent of the sample) and 190 in the *current exposure* one (2.9 percent), and add them to our main estimating samples. We then estimate equation 16 using as a dependent variable an indicator that identifies international migrants from individuals who remained in Indonesia (no matter whether they internally moved or not). Table 10 reports OLS and IV estimation results for both the *early exposure* and *current exposure* sample. There is no evidence of any significant impact of "early exposure" (column 1 and 2). As for the short run effect, the OLS estimate (column 3) suggests a small and negative effect of TV exposure on international migration (-0.003). This coefficient is about one fourth of that estimated for inter- and intra-provincial migration (one half for inter-provincial migration) and it is significant only at the 10 percent level. When the private TV exposure variable is

[26]Respondents who moved abroad are not tracked down and, therefore, they leave the sample. However, some information is still collected by interviewing other household members. Thought there are inherent data problems in performing this kind of empirical analysis (i.e. high attrition rates and misleading information reported by family members) we think it is worth revising this evidence.

instrumented, the coefficient becomes positive and not significantly different from zero. In this case, the Hausman test marginally rejects the exogeneity of TV exposure, $(TV - private)$, suggesting that one should relay more on the IV estimates. From this evidence we conclude that there does not seem to be a significant impact of TV exposure on the decision to migrate abroad. In particular, one does not find any significant positive coefficient on TV exposure: the reduction in internal migration we have observed in the previous section cannot be simply explained by an increased in the propensity to move abroad.

Return migrants. Having access to more information should allow individuals to make better migration choices. If a fraction of the return migrants are individuals who over-estimated the gains from migration and who, once they found out their mistake, returned to their original residence (Borjas and Bartsberg, 1996), we may observe less return migration among the individuals who had more access to TV (i.e. were more informed). On the other hand, being able to better choose both the destination and the timing for migration, should speed up the economic assimilation of migrants. That is, if they have some sort of target-saving behavior, better informed migrants may manage to meet their target quicker and return back home earlier.[27] Therefore, the predictions about the effect of information on return migration are theoretically ambiguous. We test this on our data, using the *early exposure* sample, which covers a larger span of time and allows more individuals to return. In this sample, about 8 percent of the inter-provincial migrants returned to their province of initial residence, and 5 percent of the internal migrants returned to the district of origin. We restrict the sample only to internal migrants and estimate equation 16 using as a dependent variable an indicator that identifies return migrants. In unreported regressions, we do not find any significant relationship between being a return migrant and TV exposure.[28]

To conclude, we perform a few standard robustness checks. First, we check the implications

[27]Target-saving behavior could be created by preferences for consumption and/or higher purchasing power in the home country (Dustmann, 2001; Dustmann and Weiss, 2007)

[28]Estimation results can be provided upon request.

of our age restriction (i.e. age comprised between 16 and 45) by conducting the analysis without the age constraint (i.e. age ≥ 16). The results are reported in table A 1. By removing this constraint the number of observations increases to 18.7 thousand in the *early exposure* sample, (columns 1-6), and to 9.7 thousand in the *current exposure* one, (columns 7-12). A comparison with the tables 7 and 9 shows that including older people in the analysis does not alter our results.

Next, we examine whether the impact of TV exposure on migration choices vary by gender, age or level of education, by estimating equation 16 including interactions of private TV reception with all these demographic characteristics. We do not find any clear evidence of heterogeneous effects.

Finally, in table A 2, the measure of exposure to private TV channels, $(TV - private)$, is replaced by a measure which also includes the public TVRI network, $(TV - all)$. The inclusion of exposure to public TV - on top of that to private channels - produces negligible changes in the estimated coefficients. In unreported regressions, we split the private TV networks variable into major networks (Indosiar, RCTI and SCTV) and minor ones (Anteve, Global TV, Lativi, Metro TV, TPI, Trans TV and TV7-Trans 7). Our results show that both types of networks significantly reduce the propensity to internally migrate.[29]

7 Discussion and further results

Our results show that higher exposure to private TV broadcasting has reduced the propensity to migrate of Indonesian citizens both in the short and in the long run. The size of the effect is non-negligible and has a causal interpretation.

The theoretical framework presented in section 3 produces an ambiguous prediction regarding the sign of the relationship between information and migration. In that framework, information makes individuals more able to accurately predict the benefits and costs associated

[29]Estimation results can be provided upon request.

to geographical movements. Then, if individuals are over- rather than under-estimating the net gains from migration, more information should lead to, respectively, less, rather than more, willingness to migrate. The empirical evidence in the previous section uncovers a negative relationship between TV exposure and migration, suggesting that individuals were on average over-estimating the benefits (and/or underestimating the cost) of moving somewhere else within the country.

The IFLS allows us to further explore this aspect thanks to a set of questions designed to record respondents' perceptions about their relative position in the income distribution. If individuals think to be relatively poorer than they actually are, they may be more willing to migrate somewhere else to improve their situation (Stark and Taylor, 1991). In this context, more TV exposure may allow individuals to better assess their position in society and reduce migration pressures. To test this conjecture we focus on the following question: *"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?"*. The estimation results are presented in Table 11. The empirical model is that in equation (16) where the dependent variable is replaced by an indicator that takes value 1 if the individual reports to be in the first or second step of the income ladder (i.e. among the poorest) and 0 otherwise.[30] In an extended specification, we also include, as additional controls, individual labor market status and monthly wage (columns 2 and 4).[31]

Table 11 reports the results based on the *early exposure* sample.[32] Both OLS and IV estimates are negative and strongly significant. As before, IV coefficients are larger but not remarkably different from the OLS ones, and we find mixed evidence of endogeneity in our regressions. According to these estimates, individuals more exposed to private TV are less likely to see themselves at the bottom end of the income distribution. This is the case even

[30]In our sample, roughly 30 percent of the respondents place themselves in the bottom part of the income distribution.

[31]Similar results are obtained if the dependent variable is a categorical indicator taking values from 1 (the first step) to 6 (the sixth step).

[32]Results from the *current exposure* sample are qualitatively very similar and can be provided upon request.

when we compare individuals with same employment status and monthly wage. More precisely, one additional private TV channel reduces the probability of reporting to be among the poorest group by 2.6 percentage points. We interpret this finding as evidence that individuals with less TV reception have less information about the prevailing income distribution in the country and tend to under-estimate their position on it.[33]

Why should citizens with less access to private TV networks be systematically less informed about their relative position on the income distribution? This may be a general finding in countries - such as Indonesia - undergoing periods of sustained growth and fast urbanization. In a context of rapid change, citizens may be induced to think that moving somewhere else within the country would increase their economic status, even if they do not have all the relevant information to asses whether this is likely to happen or not. Receiving more information on potential destinations, could then curb their "migratory enthusiasm": if their expectations were somehow inflated, this may lead to a reduction in the propensity to migrate. Comparable evidence from similar countries, such as India or China, would help assessing the generality of our results. On the other hand, our findings may be strictly related to the Indonesian case. Indeed, before the TV liberalization process, Indonesian citizens had only access to the public TV channel. This channel was under the strict control of the government, who placed severe restrictions on news production and on the discussion of sensitive matters which could undermine the image of national prosperity and cohesion. In order to maintain popular support, all regimes have a strong interest in presenting the country under a much better light than the actual reality is: this was clearly the case under Suharto's rule (see section 2.1). In this context, the role played by the expansion of private TV channels in providing Indonesian citizens with better information and true reporting on their country may have been crucial also in shaping their internal migration decisions.

[33] An alternative interpretation of our results could be that having more access to TV broadcasting also increases utility. Indeed, television may have reduced the sense of exclusion from the rest of the Indonesian society among those living in relatively remote areas. If individuals who feel more included also feel less deprived, they may place themselves in a higher position in the income ladder. We find this explanation more speculative and far less convincing than the one based on the information channel.

8 Conclusions

Although the empirical evidence is still scarce (see Braga 2007 for one of the few exceptions), there is a widespread perception that access to Western media, movies and TV series may increase the willingness to migrate abroad of citizens in developing countries. Exposure to foreign media may foster individuals' economic aspirations, modify comparison groups and create false expectations about life in other countries.[34] However, it is less clear what one should expect about the relationship between increased access to media and internal migration.

In this paper, we show that having better media coverage of one's own country does not necessarily increase the incentives to internally migrate. More information leads to more accurate migration choices. Hence, the final effect on migration depends on whether individuals were under rather than over-estimating the potential gains from migrating. We uncover a strong negative effect of TV exposure on the propensity to internally migrate, thus suggesting that Indonesian citizens, prior to the expansion of private TV broadcasting, were too optimistic in assessing the potential gains from moving.

In order to estimate the causal effect of media exposure, we exploit the differential introduction of private television throughout Indonesia and the variation in signal reception due to topography. We address possible concerns of endogeneity of local TV exposure by an instrumental variable strategy and carefully test the robustness of our results. Our estimates reveal important long and short run effects of private TV broadcasting. In particular, an increase of one standard deviation in the number of private TV channels received in an area would reduce inter-provincial migration by 1.7-2.7 percentage points, and all migration movements (inter and intra-provincial) by 4-7.4 percentage points. Short-run effects are slightly smaller, but still sizeable and significant. We also show that respondents less exposed to private TV are systematically more likely to consider themselves among the poorest groups of the Indonesian

[34] *"The most obvious transformation of our life was the arrival of television, which shows us with total intimacy how other people live. Where people once compared themselves with the people round the corner, they can now compare themselves with anyone they like, up to J.R. in Dallas. It would be astonishing if such comparisons were not unsettling."* (Layard, 2003; p.15).

society. As we discuss in a stylized model of migration choice under imperfect information, these findings are consistent with Indonesia citizens over-estimating the net gains from internal migration.

The main policy implication of our findings is that increasing access to information in developing countries not only can help citizens make better migration choices - improving their welfare - but it can also reduce migratory pressures. This has important implications for countries such as China, where the government is extremely concerned about the size of internal migration: providing more information could be an alternative to restrictive measures on geographical movements.

References

[1] Aker, J., Clemens, M. and Ksoll, C., 2011. Mobiles and mobility: The Effect of Mobile Phones on Migration in Niger. mimeo.

[2] Attanasio, O. and Kaufmann, K., 2009. Educational Choices, Subjective Expectations, and Credit Constraints. NBER Working Papers 15087.

[3] Banerjee B., 1984. Information flow, expectations and job search: Rural-to-urban migration process in India. Journal of Development Economics. 15(1-3), 239-257.

[4] Braga, M., 2007. Dreaming Another Life. The Role of Foreign Media in Migration Decisions. Evidence from Albania. mimeo.

[5] Borjas, G. J., 1987. Self-Selection and the Earnings of Immigrants. American Economic Review. 77(4), 531-553.

[6] Borjas, G.J. and Bratsberg, B., 1996. Who Leaves? The Outmigration of the Foreign-Born. The Review of Economics and Statistics. 78(1), 165-176.

[7] Carrington,W.J., Detragiache, E. and Vishwanath, T., 1996. Migration with Endogenous Moving Costs. The American Economic Review. 86(4), 909-930.

[8] Daneshvary N., Herzog, H.W., Hofler, R.A., and Schlottmann, A.M., 1992. Job Search and Immigrant Assimilation: An Earnings Frontier Approach. The Review of Economics and Statistics. 74(3), 482-492.

[9] Della Vigna, S., Enikolopov, R., Mironova, V., Petrova, M. and Zhuravskaya, E., 2011. Unintended media effects in a conflict environment: Serbian radio and Croatian nationalism. NBER Working Paper No. 16989.

[10] Della Vigna, S., Kaplan, E., 2007. The Fox News Effect: Media Bias and Voting. Quarterly Journal of Economics. 122, 1187-1234.

[11] d'Haenens, L., Gazali, E. and Verelst, C., 1999. Indonesian Television News-Making Before and After Suharto. International Communication Gazette. 61(2), 127-152.

[12] Ducanes, G. and Abella, M., 2009. Prospects for future outward migration flows: China and Southeast Asia. ILO/EU - Asian Programme on the Governance of Labour Migration - WP No. 24.

[13] Dustmann, C., 2001. Return decisions of immigrants, in: S. Djajic (ed.), International Migration: Trends and Policy and Economic Impact. London: Routledge, pp. 228-250.

[14] Dustmann, C. and Weiss, Y., 2007. Return Migration: Theory and Empirical Evidence from the UK. British Journal of Industrial Relations. 45(2), 236-256.

[15] Facchini, G., Mayda, M., Puglisi, R., 2009. Illegal immigration and media exposure: Evidence on individual attitudes. CEPR Discussion Papers 7593.

[16] Fearnside P.M., 1997. Transmigration in Indonesia: Lessons from Its Environmental and Social Impacts. Environmental Management. 21(4), 553-570.

[17] Gentzkow, M. and Shapiro, J., 2004. Media, Education and Anti-Americanism in the Muslim World. Journal of Economic Perspectives. 18, 117-133.

[18] Gerber, A., Karlan, D. and Bergan, D., 2009. Does the media matter? A field experiment measuring the effect of newspapers on voting behavior and political opinions. American Economic Journal: Applied Economics. 1(2), 35-52.

[19] Gilbert, A. and Koser, K., 2006. Coming to the UK: What do Asylum-Seekers Know About the UK before Arrival? Journal of Ethnic and Migration Studies. 32(7), 1209-1225.

[20] Hardjono, J., 1988. The Indonesian Transmigration Program in Historical Perspective. International Migratio. 26(4), 427-439.

[21] Hill, H., Resosudarmo, B.P. and Vidyattama, Y., 2008. Indonesia'S Changing Economic Geography. Bulletin of Indonesian Economic Studies. 44(3), 407-435.

[22] Hanson, G. H. and McIntosh, C., 2010. The Great Mexican Emigration. The Review of Economics and Statistics. 92(4), 798-810.

[23] Harris, J.R. and Todaro, M.P., 1970. Migration, Unemployment and Development: A Two-Sector Analysis. American Economic Review. 60(1), 126–142.

[24] Herzog, H.W., Hofler, R.A. and Schlottmann, A.M., 1985. Life on the Frontier: Migrant Information, Earnings and Past Mobility. The Review of Economics and Statistics. 67(3), 373-382.

[25] Hollander, E., d'Haenens, L., Bardoel, J., 2009. Television performance in Indonesia: steering between civil society, state and market. Asian Journal of Communication. 19(1), 39-58.

[26] Jensen R. and Oster, E., 2009. The Power of TV: Cable Television and Women's Status in India. Quaterly Journal of Economics. 124(3), 1057-1094.

[27] Jensen, R., 2010. The (Perceived) Returns to Education and the Demand for Schooling. The Quarterly Journal of Economics. 125(2), 515-548.

[28] Katz, E. and Stark, O., 1986. Labor mobility under asymmetric information with moving and signalling costs. Economics Letters. 21(1), 89-94.

[29] Katz, E. and Stark, O. 1987. International Migration under Asymmetric Information. The Economic Journal. 97(387), 718-726.

[30] Kukuh, S., 2002. Indonesian television and the dynamics of transition, in Russell Hiang-Khng Heng (ed), Media Fortunes, Changing Times, Institute of Southeast Asian Studies.

[31] La Ferrara, E., Chong, A., Duryea, S., 2007. Soap operas and fertility: Evidence from Brazil. CEPR Discussion Paper No. DP6785.

[32] Layard, R., 2003. Happiness: has social science got a clue. Lionel Robbins Memorial Lectures 2002/03, London School of Economics - lecture 2.

[33] Mai, N., 2004. 'Looking for a More Modern Life ...': the Role of Italian Television in the Albanian Migration to Italy. Westminster Papers in Communication and Culture. 1(1), 3-22.

[34] McKenzie, D., Gibson, J. and Stillman, S., 2007. A land of milk and honey with streets paved with gold: Do emigrants have over-optimistic expectations about incomes abroad? CReAM working paper.

[35] McKenzie, D. and Rapoport, H., 2007. Network effects and the dynamics of migration and inequality: Theory and evidence from Mexico. Journal of Development Economics, Elsevier. 84(1), 1-24.

[36] McKenzie, D. and Rapoport, H., 2010. Self-Selection Patterns in Mexico-U.S. Migration: The Role of Migration Networks. The Review of Economics and Statistics. 92(4), 811-821.

[37] Munshi, K., 2003. Networks in the Modern Economy: Mexican Migrants in the US Labor Market. Quarterly Journal of Economics. 118, 549-599.

[38] Olken, B., 2009. Do Television and Radio Destroy Social Capital? Evidence from Indonesian Villages. American Economic Journal: Applied Economics. 1(4), 1-33.

[39] Pessino C., 1991. Sequential migration theory and evidence from Peru. Journal of Development Economics. 36(1), 55-87.

[40] Sjaastad, L. A., 1962. Costs and Returns of Human Migration. Journal of Political Economy. 70(5), 80-93.

[41] Stark, O., 1995. Return and Dynamics: The Path of Labor Migration When Workers Differ in Their Skills and Information Is Asymmetric. Scandinavian Journal of Economics. 97(1), 55-71.

[42] Stark, O., Taylor, J.E., 1991. Migration incentives, migration types: the role of relative deprivation. Economic Journal. 101(408), 1163-1178.

[43] Tirtosudarmo, R., 2009. Mobility and Human Development in Indonesia. Human Development Research Paper (HDRP) Series. 19(2009).

[44] Vishwanath, T., 1991. Information flow, job search, and migration. Journal of Development Economics. 36(2), 313-335.

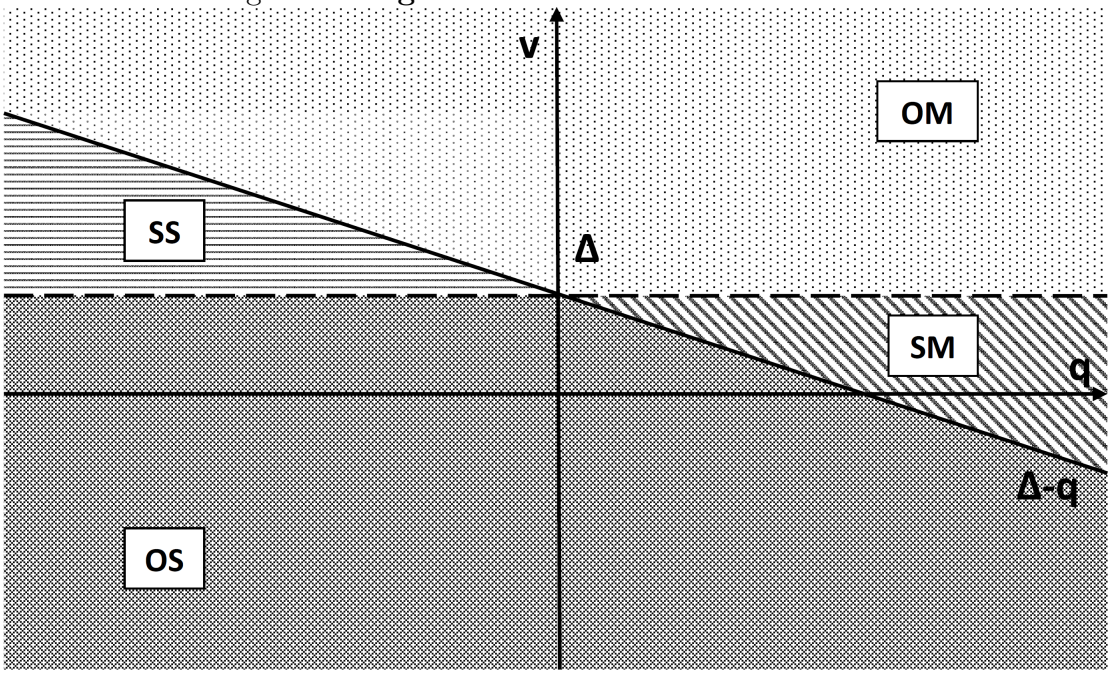
[45] Van Lottum, J. and Marks, J., 2010. The Determinants of Internal migration in a Developing Country: Quantitative Evidence from Indonesia, 1930-2000. mimeo.

[46] Winters, P., de Janvry, A. and Sadoulet, E., 2001. Family and Community Networks in Mexico-U.S. Migration. The Journal of Human Resources. 36(1), 159-184.

[47] Wooldridge J.M., 2002. Econometric analysis of cross section and panel data, The MIT press.

Figures

Figure 1: **Migration choices and information**



Notes. OM: Optimal Migrants; SM: Sub-Optimal Migrants; SS: Sub-Optimal Stayers; OS: Optimal Stayers.

Tables

Table 1: **Descriptive statistics**

"Early exposure" sample							
		All		**Migrants**		**Non migrants**	
		mean (%)	**std dev**	**mean (%)**	**std dev**	**mean (%)**	**std dev**
male		0.48	*0.50*	0.47	*0.50*	0.48	*0.50*
age		29.00	*8.56*	30.83	*7.75*	28.20	*8.77*
education	**primary**	0.34	*0.47*	0.29	*0.46*	0.36	*0.48*
	secondary	0.55	*0.50*	0.53	*0.50*	0.56	*0.50*
	college	0.10	*0.30*	0.16	*0.37*	0.07	*0.26*
residence at age 12: urban		0.14	*0.35*	0.12	*0.32*	0.15	*0.36*
Observations		14728		4493		10235	
"Current exposure" sample							
		All		**Migrants**		**Non migrants**	
		mean (%)	**std dev**	**mean (%)**	**std dev**	**mean (%)**	**std dev**
male		0.46	*0.50*	0.54	*0.50*	0.45	*0.50*
age		29.39	*8.48*	23.12	*7.05*	30.26	*8.30*
education	**primary**	0.47	*0.50*	0.24	*0.43*	0.51	*0.50*
	secondary	0.46	*0.50*	0.63	*0.48*	0.43	*0.50*
	college	0.07	*0.26*	0.13	*0.33*	0.06	*0.25*
residence in 2000: urban		0.12	*0.32*	0.16	*0.37*	0.11	*0.31*
Observations		8345		1018		7327	

Notes. *The* "early exposure" *sample is employed in the first part of the analysis to investigate the long term effect of TV exposure, while the* "current exposure" *sample is employed for the short term analysis. Both samples are restricted to individuals aged 16 to 45. Migrants are those respondents who moved to another province or to another district within the same province.*

Table 2: **Provinces of residence**

province code	province name	"Early exposure" sample Residence at age 12 (%)	"Early exposure" sample Residence 2007/08 (%)	"Current exposure" sample Residence 2000 (%)	"Current exposure" sample Residence 2007/08 (%)
12	**SUMATERA UTARA**	*5.43*	*4.88*	*4.10*	*3.98*
13	**SUMATERA BARAT**	*0.06*	*0.29*	-	*0.07*
14	**RIAU**	*0.30*	*0.74*	*0.35*	*0.38*
15	**JAMBI**	*0.11*	-	-	-
16	**SUMATERA SELATAN**	*6.05*	*6.04*	*5.39*	*5.28*
17	**BENGKULU**	*0.04*	-	-	-
18	**LAMPUNG**	*4.84*	*4.98*	*4.70*	*4.70*
31	**DKI JAKARTA**	-	*3.16*	-	*0.81*
32	**JAWA BARAT**	*20.30*	*20.67*	*16.21*	*16.41*
33	**JAWA TENGAH**	*17.04*	*13.72*	*16.49*	*15.84*
34	**DI YOGYAKARTA**	*5.81*	*5.83*	*7.42*	*7.13*
35	**JAWA TIMUR**	*17.87*	*16.97*	*20.37*	*20.40*
51	**BALI**	*6.58*	*6.74*	*8.51*	*8.51*
52	**NUSA TENGGARA BARAT**	*9.41*	*9.25*	*10.05*	*9.98*
53	**NUSA TENGGARA TIMUR**	*0.03*	-	-	-
61	**KALIMANTAN BARAT**	-	*0.01*	-	-
62	**KALIMANTAN TENGAH**	-	*0.03*	-	-
63	**KALIMANTAN SELATAN**	-	*0.50*	-	*0.05*
64	**KALIMANTAN TIMUR**	*0.01*	*0.15*	-	*0.16*
72	**SULAWESI TENGAH**	*0.02*	-	-	-
73	**SULAWESI SELATAN**	*6.06*	*6.02*	*6.41*	*6.30*
74	**SULAWESI TENGGARA**	*0.03*	-	-	-
	Total	*100*	*100*	*100*	*100*
	Observations	14728		8345	

Notes. *The* "early exposure" *sample is employed in the first part of the analysis to investigate the long term effect of TV exposure, while the* "current exposure" *sample is employed for the short term analysis. Both samples are restricted to individuals aged 16 to 45. Residence in 2007-2008 is recorded in IFLS4 and residence in 2000 in IFLS3.*

Table 3: **Migration rates**

		Inter and intra-provincial migration		Inter-provincial migration		Obs.
		mean (%)	std dev	mean (%)	std dev	
"Early exposure" sample						
all sample		30.5	*46.0*	11.0	*31.3*	14738
by gender:	**male**	29.9	*45.8*	11.0	*31.3*	7719
	female	31.1	*46.3*	11.0	*31.2*	7019
by education:	**primary**	26.7	*44.2*	7.7	*26.7*	4856
	secondary	29.8	*45.7*	12.0	*32.5*	7856
	college or more	50.1	*50.0*	17.9	*38.3*	1429
"Current exposure" sample						
		Inter and intra-provincial migration		**Inter-provincial migration**		**Obs.**
		mean (%)	**std dev**	**mean (%)**	**std dev**	
all sample		12.2	*32.7*	5.5	*22.8*	8345
by gender:	**male**	14.4	*35.2*	6.9	*25.4*	3816
	female	10.3	*30.4*	4.2	*20.2*	4529
by education:	**primary**	6.6	*24.8*	2.5	*15.7*	3675
	secondary	17.9	*38.3*	8.7	*28.1*	3557
	college or more	22.4	*41.8*	9.5	*29.4*	566

Notes. *The* "early exposure" *sample is employed in the first part of the analysis to investigate the long term effect of TV exposure, while the* "current exposure" *sample is employed for the short term analysis. Both samples are restricted to individuals aged 16 to 45. Inter and intra-provincial migration refers to movements across provinces and across districts within the same province; inter-provincial migration refers only to movements across provinces.*

Table 4: **Type of internal migration movements**

Migration movement type	**"Early exposure" sample (%)**	**"Current exposure" sample (%)**
rural → rural	*42.28*	*51.43*
rural → urban	*38.50*	*30.37*
urban → rural	*12.20*	*6.80*
urban → urban	*7.02*	*11.40*
Total	*100*	*100*
# migratory movements	6423	912

Notes. *The* "early exposure" *sample is employed in the first part of the analysis to investigate the long term effect of TV exposure, while the* "current exposure" *sample is employed for the short term analysis. Both samples are restricted to individuals aged 16 to 45. Each migratory movement observed in the data is classified in each of the four categories (rural-rural; rural-urban; urban-rural; urban-urban) depending on whether the districts of origin and that of destination are urban or rural.*

Table 5: **Descriptive statistics: TV reception, by TV network**

TV network	Year of establishment/first on air	"Early exposure" sample				"Current exposure" sample			
		Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Public network:									
TVRI	**1962**	0.44	*0.26*	0	0.95	0.88	0.16	0.09	1
Major private networks:									
Indosiar	**1995**	0.14	*0.24*	0	0.88	0.76	0.35	0	1
RCTI	**1987**	0.25	*0.29*	0	0.93	0.78	0.34	0	1
SCTV	**1989**	0.22	*0.28*	0	0.92	0.77	0.34	0	1
Minor private networks:									
ANTV	**1993**	0.14	*0.23*	0	0.89	0.63	0.37	0	1
GLOBALTV	**2001**	0.03	*0.11*	0	0.75	0.40	0.37	0	1
LATIVI	**2001**	0.04	*0.12*	0	0.75	0.44	0.41	0	1
Metro TV	**2000**	0.13	*0.22*	0	0.89	0.58	0.38	0	1
TPI	**1990**	0.18	*0.25*	0	0.91	0.67	0.35	0	1
TransTV	**2001**	0.05	*0.14*	0	0.75	0.63	0.39	0	1
TV7 (Trans 7)	**2001**	0.04	*0.13*	0	0.75	0.53	0.41	0	1
TV - private	**-**	1.23	*1.85*	0	8.40	6.18	3.27	0	10
TV - all	**-**	1.67	*2.06*	0	9.35	7.06	3.38	0.18	11
Observations		14728				8345			

Notes. *The* "early exposure" *sample is employed in the first part of the analysis to investigate the long term effect of TV exposure, while the* "current exposure" *sample is employed for the short term analysis. Both samples are restricted to individuals aged 16 to 45. Information on year of establishment (of first year on air) are taken from Hollander et al. (2009). Each variable measures the average fraction of villages in each district where there was a clear reception of the TV channel.*

Table 6: **TV reception and district characteristics**

	TV - private
	1
Hours trip to province capital (avg)	-0.065
	[0.193]
Km to province capital (avg)	-0.018***
	[0.005]
Trip cost to province capital (avg)	0.000
	[0.000]
Altitude (avg)	-0.000
	[0.000]
Number of schools	0.043
	[0.047]
Ln (total population)	-0.547
	[0.365]
HHs living in slums (%)	0.024
	[0.024]
HHs with a member college-educated (%)	-0.010
	[0.021]
Poor HHs (%)	0.007
	[0.010]
Primary activity: agriculture (%)	-0.096
	[0.681]
Primary activity: industry (%)	1.401
	[1.101]
Primary activity: trade (%)	1.197
	[0.819]
Province fixed effects	X
Observations	110
R-squared	0.791

Notes. *The table reports OLS estimates of district TV reception on district level controls. The dependent variable is the average number of private TV channels received in the villages within each district (measured by PODES 2006). District level controls are measured using the IFLS3 survey (2000). Robust standard errors in square brackets: * significant at 10%, ** significant at 5%, *** significant at 1%.*

Table 7: **Main regressions: "early exposure" sample**

	Inter and intra-provincial migration						Inter provincial migration					
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
	OLS	**OLS**	**OLS**	**IV**	**IV**	**IV**	**OLS**	**OLS**	**OLS**	**IV**	**IV**	**IV**
TV - private	-0.022**	-0.023**	-0.022**	-0.037**	-0.040***	-0.039**	-0.010***	-0.010***	-0.009***	-0.014***	-0.014***	-0.015***
	[0.010]	[0.010]	[0.009]	[0.015]	[0.015]	[0.015]	[0.003]	[0.003]	[0.003]	[0.005]	[0.005]	[0.005]
TV - FSS	-0.002	-0.003	-0.011**	-0.001	-0.002	-0.010*	0.000	0.000	0.002	0.001	0.000	0.003
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.001]	[0.001]	[0.003]	[0.001]	[0.001]	[0.003]
Individual controls	X	X	X	X	X	X	X	X	X	X	X	X
Education dummies		X	X		X	X		X	X		X	X
District controls			X			X			X			X
Province dummies	X	X	X	X	X	X	X	X	X	X	X	X
Observations	14,728	14,308	12,834	14,728	14,308	12,834	14,728	14,308	12,834	14,728	14,308	12,834
R-squared	0.108	0.136	0.151				0.080	0.091	0.059			
IV: F-statistic				276.7	274.0	219.4				276.7	274.0	219.4
IV: Endogeneity test				0.03	0.032*	0.032*				0.007	0.008	0.012
				[0.019]	[0.019]	[0.019]				[0.007]	[0.007]	[0.007]

Notes. *The* "early exposure" *sample is employed to investigate the long term effect of TV exposure. The sample is restricted to individuals aged 16 to 45. OLS and IV estimates of inter and intra-provincial migration are reported. Migrants are those respondents who moved to another province or to another district within the same province with respect to their residence at age 12. Inter and intra-provincial migration includes movements across provinces and across districts within the same province; inter-provincial migration includes only movements across provinces. In IV regressions, the number of private TV channels received in each district ($TV-private$) is treated as endogenous and the instrument is the "predicted signal strength" variable ($TV-PSS$). The first stage results are reported in table 8, columns (1-3). Other controls: a) $TV-FSS$: "free-space signal strength"; b) individual controls: male dummy, year of birth dummies; c) education dummies: primary, secondary, college and other education; d) district controls: average distance from province capital measured in km; average altitude; a coastal district dummy; number of schools; share of villages where primary activity is agriculture, industry or trade; number of households; share of houses with cement walls; e) province dummies: province of residence at age 12. Robust standard errors in square brackets are clustered by district (161 districts in the sample): * significant at 10%, ** significant at 5%, *** significant at 1%.*

Table 8: **First stage regressions: "TV private"**

	"Early exposure"			"Current exposure"		
	1	**2**	**3**	**4**	**5**	**6**
	OLS	**OLS**	**OLS**	**OLS**	**OLS**	**OLS**
TV - PSS	0.041***	0.041***	0.041***	0.056***	0.056***	0.048***
	[0.002]	[0.002]	[0.003]	[0.009]	[0.009]	[0.009]
TV - FSS	X	X	X	X	X	X
Individual controls	X	X	X	X	X	X
Education dummies		X	X		X	X
District controls			X			X
Province dummies	X	X	X	X	X	X
Observations	14,728	14,308	12,834	8,345	7,798	6,198
R-squared	0.881	0.881	0.894	0.846	0.843	0.882
Fstat:	276.7	274.0	219.4	39.84	39.87	27.06
Fstat pvalue:	0.00	0.00	0.00	0.00	0.00	0.00

Notes. *The* "early exposure" *sample is employed in the first part of the analysis to investigate the long term effect of TV exposure, while the* "current exposure" *sample is employed for the short term analysis. Both samples are restricted to individuals aged 16 to 45. The table reports first stage estimates of the IV estimation conducted in table 7 and 9. The dependent variable is the number of private TV channels received in each district (TV − private). The "predicted signal strength" variable (TV-PSS) is the variable employed as instrument. Other controls in columns 1-3 are as in table 7, and in columns 4-6 as in table 9. Robust standard errors in square brackets are clustered by district (161 districts in the* early exposure *sample; 135 districts in the* current exposure *sample): * significant at 10%, ** significant at 5%, *** significant at 1%.*

Table 9: **Main regressions: "current exposure" sample**

	Inter and intra-provincial migration						Inter provincial migration					
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
	OLS	**OLS**	**OLS**	**IV**	**IV**	**IV**	**OLS**	**OLS**	**OLS**	**IV**	**IV**	**IV**
TV - private	-0.007**	-0.009***	-0.012***	-0.013**	-0.014**	-0.016**	-0.006***	-0.007***	-0.008***	-0.005	-0.005	-0.005
	[0.003]	[0.003]	[0.003]	[0.006]	[0.006]	[0.007]	[0.002]	[0.002]	[0.002]	[0.004]	[0.004]	[0.005]
TV - FSS	0.001	0.001	-0.001	0.003	0.003	0.000	0.003***	0.003***	0.002	0.002	0.002	0.001
	[0.001]	[0.001]	[0.002]	[0.002]	[0.002]	[0.003]	[0.001]	[0.001]	[0.001]	[0.002]	[0.002]	[0.002]
Individual controls	X	X	X	X	X	X	X	X	X	X	X	X
Education dummies		X	X		X	X		X	X		X	X
District controls			X			X			X			X
Province dummies	X	X	X	X	X	X	X	X	X	X	X	X
Observations	8,345	7,798	6,198	8,345	7,798	6,198	8,345	7,798	6,198	8,345	7,798	6,198
R-squared	0.180	0.182	0.176				0.106	0.108	0.108			
IV: F-statistic				39.84	39.87	27.06				39.84	39.87	27.06
IV: Endogeneity test				0.007	0.006	0.004				-0.002	-0.002	-0.004
				[0.008]	[0.008]	[0.008]				[0.005]	[0.005]	[0.006]

Notes. *The* "current exposure" *sample is employed to measure the short term effect of TV exposure. The sample is restricted to individuals aged 16 to 45. OLS and IV estimates of inter and intra-provincial migration are reported. Migrants are those respondents who moved to another province or to another district within the same province between 2000 and 2007-2008 (and stayed in the new residence more than 6 months). Inter and intra-provincial migration includes movements across provinces and across districts within the same province; inter-provincial migration includes only movements across provinces. In IV regressions, the number of private TV channels received in each district ($TV - private$) is treated as endogenous and instrumented using the "predicted signal strength" variable ($TV - PSS$). The first stage results are reported in table 8, columns (4-6). Other controls: a) $TV - FSS$: "free-space signal strength"; b) individual controls: male dummy, year of birth dummies and marital status; c) education dummies: primary, secondary, college and other education; d) district controls: average distance in km to the province capital; average time and economic cost of traveling to the province capital; average elevation with respect to the sea level; number of schools; log of total population; share of households living in slums; share of households with at least one member that has attended university; share of poor households; share of villages within the district where main activity is agriculture, industry or trade; e) province dummies: province of residence in 2000. Robust standard errors in square brackets are clustered by district (135 districts): * significant at 10%, ** significant at 5%, *** significant at 1%.*

Table 10: **Robustness checks: International Migrants**

	"Early exposure"		**"Current exposure"**	
	1	**2**	**3**	**4**
	OLS	**IV**	**OLS**	**IV**
TV - private	0.002	0.000	-0.003*	0.006
	[0.002]	[0.003]	[0.002]	[0.005]
Other controls	X	X	X	X
Observations	13,209	13,209	6,388	6,388
R-squared	0.031		0.041	
IV: F-statistic		231.6		27.10
IV: Endogeneity test		0.003		-0.012*
		[0.005]		[0.007]
Share of international migrants	2.8%		2.9%	

Notes. *The* "early exposure" *sample is employed in the first part of the analysis to investigate the long term effect of TV exposure, while the* "current exposure" *sample is employed for the short term analysis. Both samples are restricted to individuals aged 16 to 45. The dependent variable is an indicator for international migrants. In IV regressions, the number of private TV channels received in each district ($TV - private$) is treated as endogenous and the instrument is the "predicted signal strength" variable ($TV - PSS$). The additional controls included are those in Tables 7 (for the "early exposure" sample) and in Table 9 (for the "current exposure" sample). Robust standard errors in square brackets are clustered by district (161 districts in the* early exposure *sample; 135 districts in the* current exposure *sample): * significant at 10%, ** significant at 5%, *** significant at 1%.*

Table 11: **Self-reported poverty and private TV exposure**

	1 **OLS**	**2** **OLS**	**3** **IV**	**4** **IV**
TV - private	-0.023***	-0.018**	-0.034***	-0.026***
	[0.007]	[0.007]	[0.010]	[0.010]
Labor market controls		X		X
Other controls	X	X	X	X
Observations	12,838	8,862	12,838	8,862
R-squared	0.093	0.106		
IV: F-statistic			219.7	202.6
IV: Endogeneity test			0.022**	0.015
			[0.011]	[0.012]

Notes.*The* "early exposure" *sample is employed to investigate the long term effect of TV exposure. The sample is restricted to individuals aged 16 to 45. The table reports OLS and IV estimates of self-reported position in the income distribution. The dependent variable is an indicator that takes value 1 if the respondent reports being in the first or the second step of the income distribution ladder (i.e. among the poorest) and 0 otherwise. In IV regressions, the number of private TV channels received in each district ($TV - private$) is treated as endogenous and instrumented using the "predicted signal strength" variable ($TV - PSS$). Labor market controls includes the individual labor market status and monthly wage. Other controls: a) $TV - FSS$: "free-space signal strength"; b) individual controls: male dummy, year of birth dummies; c) education dummies: primary, secondary, college and other education; d) district controls: average distance from province capital measured in km; average altitude; a coastal district dummy; number of schools; share of villages where primary activity is agriculture, industry or trade; number of households; share of houses with cement walls; e) province dummies: province of residence at age 12. Robust standard errors in square brackets are clustered by district (161 districts): * significant at 10%, ** significant at 5%, *** significant at 1%.*

Appendix A - Data Appendix

To analyze the long term impact of TV we match individuals with the degree of TV reception in the district of residence where they lived as adolescents. The main challenge with measuring early TV exposure is that information on TV reception is only available from the PODES 2006 and that there are no available records on how TV reception evolved over time in different areas. Therefore, we need to make a few assumptions to reconstruct the development of TV reception.

In Indonesia, the television sector was gradually liberalized from the late 1980s onwards, and we know in which year each channel was founded and started broadcasting (table 5). Therefore, for each district and each channel, we set TV reception of private channels equal to zero until the year when they started broadcasting and then we assume that it increased linearly from zero up to the level seized in 2006 by the PODES survey. Similarly, given that the public TV channel (TVRI) started broadcasting at the national level through the satellite in 1976, we compute the linear interpolation between a zero value in 1975 up to the 2006 level measured by the PODES. In this way we obtain, for each year and district, the average number of channels which was possible to receive with clear signal. Using this information, we construct two main measures: one only for private channels ($TV - private$) and one which also includes the public network ($TV - all$). We then match each individual with our measure of TV reception in the district of residence at age 12 and average it over the six years when the individual was aged 10-16.[35] In this way, individuals who were residing in the same district as adolescents will have a different TV exposure only if they were born in different years. In particular, individuals who were aged 10-16 before the first private network was created (1987) had zero exposure to private TV channels, while younger cohorts will have a higher level of "early exposure" than older cohorts from the same district of origin. In this way, we not only exploit the cross-sectional variation in signal reception due to geography, but also the time variation that is due to the natural experiment related to the TV liberalization process.

In analyzing the long term effect of TV exposure, we identify as internal migrants those respondents whose current residence in 2007-2008 - or current residence recorded in any of the previous waves of the survey - is different from that at age 12.[36] The dependent variable in our analysis is then an indicator variable that takes value one if the respondent, at a certain point in life, moved out from the area where she was living when she was 12 years old.[37] We then define two variables: one that includes both inter and intra-provincial migrations and one only for inter-provincial movements. The first category includes individuals who changed district of residence with respect to age 12 (either moving within the same province or to a different one), while the second one includes only those who moved across provinces.

To investigate the short run effects of media exposure we match individuals with reception

[35] Experimenting with different age ranges for the "early exposure" does not significantly change our results.

[36] For less than two percent of the respondents in our sample, the residence at age 12 is missing while the information on the residence at birth is recorded. For this subset of individuals we imputed the residence at age 12 equal to that at birth. In unreported regressions, we drop these observations from the sample: results remain unchanged.

[37] Note that our measure of internal migrant also includes return migrants, that is, those who changed residence throughout the waves but then returned to the "original" one.

in the district of residence in 2000 and investigate its impact on migration decisions that occurred between 2000 and 2007-2008. As discussed above, TV reception is only available from the PODES 2006. Given that in this part of the analysis we only exploit the cross-sectional variation, we assume that the geographical distribution of TV reception in 2000 is the same as in 2006. As before we analyzes migration at the inter and intra-provincial level. In this case, respondents are identified as internal migrants if they changed district and/or province of residence between 2000 and 2007-2008 (and stayed in the new residence for at least six months).

Appendix B - Tables

Table A 1: **Robustness checks: Full Sample**

	"Early exposure" sample						"Current exposure" sample					
	Inter and intra-provincial migration			Inter provincial migration			Inter and intra-provincial migration			Inter provincial migration		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
	OLS	**OLS**	**IV**	**OLS**	**OLS**	**IV**	**OLS**	**OLS**	**IV**	**OLS**	**OLS**	**IV**
TV - private	-0.026**	-0.027**	-0.044**	-0.012***	-0.011***	-0.016***	-0.007**	-0.011***	-0.015**	-0.005***	-0.006***	-0.004
	[0.010]	[0.010]	[0.017]	[0.003]	[0.003]	[0.005]	[0.003]	[0.003]	[0.006]	[0.002]	[0.002]	[0.004]
District controls		X	X		X	X		X	X		X	X
Other controls	X	X	X	X	X	X	X	X	X	X	X	X
Observations	18,698	16,659	16,659	18,698	16,659	16,659	9,713	7,802	7,802	9,713	7,802	7,802
R-squared	0.152	0.164		0.090	0.058		0.184	0.177	0.177	0.110	0.107	
IV: F-statistic			222.6			222.6			24.37			24.37
IV: Endogeneity test			0.035			0.011			0.006			-0.003
			[0.022]			[0.007]			[0.007]			[0.005]

Notes. *The* "early exposure" *sample is employed in the first part of the analysis to investigate the long term effect of TV exposure, while the* "current exposure" *sample is employed for the short term analysis. Both samples include individuals aged 16 or more. The dependent variable is an indicator for international migrants. In IV regressions, the number of private TV channels received in each district ($TV - private$) is treated as endogenous and the instrument is the "predicted signal strength" variable ($TV - PSS$). The additional controls included are those in Tables 7 for the* "early exposure" *sample, and in Table 9 for the* "current exposure" *sample. Robust standard errors in square brackets are clustered by district (161 districts in the* "early exposure" *sample; 135 districts in the* "current exposure" *sample): * significant at 10%, ** significant at 5%, *** significant at 1%.*

Table A 2: **Robustness checks: All TV channels**

	"Early exposure" sample				"Current exposure" sample			
	Inter and intra-provincial migration		Inter provincial migration		Inter and intra-provincial migration		Inter provincial migration	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	OLS	**IV**	**OLS**	**IV**	**OLS**	**IV**	**OLS**	**IV**
TV - all	-0.022**	-0.037**	-0.009***	-0.014***	-0.012***	-0.015**	-0.008***	-0.005
	[0.009]	[0.015]	[0.003]	[0.005]	[0.003]	[0.007]	[0.002]	[0.004]
Other controls	X	X	X	X	X	X	X	X
Observations	12,834	12,834	12,834	12,834	6,198	6,198	6,198	6,198
R-squared	0.151		0.059		0.176	0.176	0.108	
IV: F-statistic		240.1		240.1		30.74		30.74
IV: Endogeneity test		0.03*		0.011		0.00404		-0.004
		[0.018]		[0.007]		0.00803		[0.005]

Notes. *The* "early exposure" *sample is employed in the first part of the analysis to investigate the long term effect of TV exposure, while the* "current exposure" *sample is employed for the short term analysis. Both samples are restricted to individuals aged 16 to 45. The main explanatory variable (TV − all) includes the eleven private channels and the public network, TVRI. This variable is treated as endogenous and instrumented using the "predicted signal strength" variable (TV − PSS). The additional controls included are those in Tables 7 for the* early exposure *sample, and in Table* "current exposure" *one. Robust standard errors in square brackets are clustered by district (161 districts in the* early exposure *sample; 135 districts in the* "current exposure" *sample): * significant at 10%, ** significant at 5%, *** significant at 1%.*