Mobiles and Migration: Global Data on Immigrant Population and Mobile Subscriptions

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ABSTRACT

Expanding on recent findings on mobile phones as enablers of domestic labor mobility, this paper considers the relationship between immigrant population and mobile cellular subscriptions. Regression analysis shows that the immigrant proportion of a country's population significantly predicts mobile cellular subscriptions per 100 people, controlling for GDP ($p < .01$). Further, the model explains 24% of the variance in the dependent variable, compared to only 15% for GDP alone.

Categories and Subject Descriptors

K.4.4 [**Computers and Society**]: General.

General Terms

Design, Economics, Human Factors.

Keywords

Immigration, Mobile Subscriptions, Quantitative Analysis

1   INTRODUCTION

Around 3.1% of the world's population are migrants, living outside their country of birth or domicile [1]. By proportion, the global migrant population has been relatively stable in recent history. However, distribution between host countries is uneven. China, Indonesia and Vietnam have a migrant population of around 0.1%, compared with around 10% for France and the UK, and over 20% for Australia, Canada and Saudi Arabia [2]. In countries with large migrant populations – and particularly countries with low birth rates - migration is a major (often contentious) driver of population change.

Development research engages with migration in two main ways. The first is work on remittances, recognizing their importance to migrants' home countries. In 2010, remittances to developing countries were estimated at $325 billion, three times the total amount of development assistance those countries received [3]. At the same time, migrants are often economically, socially and legally vulnerable in their host countries, and a maybe a target group for development interventions to intended to mitigate these

multiple vulnerabilities.

Research on information and communications technologies (ICTs) and migration reflects the dual concern with migrants' situation in their host countries, and their links with home. The Internet provides a low-cost, immediate way to maintain existing ties across distance as well as opportunities to build new relationships in the host country [4]. Cheap international calls, including both operator products and prepaid calling cards that provide access to a voice-over-IP service, have been a site of innovation precisely because of the communication needs of transnational diasporas [5].

Mobile phones fulfill many the same communication functions as landline telephony, with text messaging in particular providing a low-cost way to keep in touch. Smartphones are increasingly Internet-enabled, providing access to chat apps that run over data networks as well as web browsing, games, and many other features useful for relationships over distance. Mobile money services are widely used in some countries, and serve both regional/domestic and international migrants as well as recipients without access to formal banking [6]. Mobile money transfer may also increase migrants' ability to remit to their own accounts in their home country, providing self-insurance through savings [7].

Further direct evidence of the relationship between mobiles and migration comes from a study by Aker, Clemens and Ksoll [8]. The authors find that providing rural people in impoverished regions of Niger with mobile phones resulted in increased seasonal migration, including both regional and international migration. They suggest this may be due to a reduction in job search costs (through social networks) and better ability to self-insure (through remittances sent back home).

The gap this paper addresses is macro-level quantitative analysis of the relationship between migration and mobile penetration. Macro-level analyses of the relationship between ICT adoption and GDP, as well as other variables in related to economic growth, are an established genre in work on the digital divide. Waverman, Meschi and Fuss [9] find that increased mobile penetration resulted in a corresponding increase in growth rates, while increased fixed line penetration did not. Furthermore, the magnitude of the effect was larger for developing countries. Other studies with economic growth as the dependent variable confirm this finding for mobiles [10], and find similarly for broadband penetration [11].

Other studies have investigated ICT penetration as the dependent variable. For developing countries, foreign direct investment and the quality of the education system (for mobile phones, primary education in particular) predict mobile and Internet penetration

[12]. Howard et Al [13] introduce an index that is the ratio between ICT penetration and a country's GDP as a way to identify countries where ICT penetration is higher or lower than expected given GDP, which Howard and Mazaheri [14] use to identify secondary influencing factors in the domain of policy and regulation. With the possible exception of primary education (through literacy), supply-side factors predominate. The question of whether the presence of a large population group with particular communication needs – such as migrants – can be related to ICT penetration interrogates the possibility of demand-side relationships.

2 RESEARCH DESIGN

This paper investigates the relationship between migration and mobile penetration at country level, using data from the World Development Report 2013 – Jobs [2] as well as mobile penetration and gross domestic product (GDP) data from the World Bank World Development Indicators database [15].Specifically, the following hypothesis is tested:

- **H1:** Migrant population significantly predicts mobile penetration, controlling for GDP.

In other words, it is hypothesized that countries with a larger migrant population (as a share of total population) will have a correspondingly higher mobile penetration rate than other countries with similar GDP. This relationship is tested using ordinary least-squares (OLS) regression. Two models are developed, with Model 1 using only GDP as a predictor, and Model 2 adding the immigrant population variable.

2.1 Variables

The variables used in the regression model are listed in Table 1. The source for the data on GDP per capita (2011) and mobile penetration (2011) is the World Band World Development Indicators databse [15]. Data on immigrant population (2010) is from the World Development Report 2013 – Jobs [2]. In all cases, data from the most recent year available was used.

Table 1. Variables used in regression

Variable	Mean	Std. Dev.	Valid Cases
Mobile penetration (per 100 pop.), 2011	95.54398	43.23626	191
GDP per capita, US$, 2011	14560.85	23161.01	183
Immigrants per 100 pop., 2010	6.304545	8.691152	154

The mobile penetration variable requires some explanation. Although the measure is mobile subscriptions per 100 population, it is common in some countries – particularly those where prepaid services are the norm – for one person to have multiple SIM cards providing access to different networks. This is done to take advantage of different promotions offered by the networks. If this practice is widespread, there may actually be more active mobile numbers than the total population, and mobile penetration will be greater than 100%.

3 RESULTS

Results from the regression analysis are shown in Table 2. In Model 1, GDP was used as the sole predictor of mobile

Table 2: Regression results

	Model 1	Model 2
GDP	0.000708 [***]	0.000731 [***]
Immigrant Population		1.08 [**]
R^2	0.15	0.24
BIC	1779	1444

[*] $p < .05$ [**] $p < .01$ [***] $p < .001$

penetration. Model 2 adds the immigrant population variable. Data from 145 countries was included, with the remainder being removed because of missing values for one or more variables.

BIC was calculated for each model. Model 2, which includes the immigrant population variable, is BIC-best. Model 2 accounts for 24% of the variance in the dependent variable, compared to 15% for Model 1 with GDP alone. In both models, all variables are significant – GDP at $p < .001$, immigrant population at $p < .01$.

The magnitude of the immigrant population coefficient indicates that for every additional percentage point immigrants comprise of a country's population, a 1% increase in mobile penetration is predicted by the model. For GDP per capita, an increase of $1000 would correspond to a 0.73% increase in mobile penetration.

4 DISCUSSION

The significance and magnitude of the relationship between immigrant population and mobile penetration merits further investigation into mobile use by immigrant populations. Given the way the mobile penetration variable is defined – mobile subscriptions per 100 population, with several countries having figures greater than 100 – a higher prevalence of multiple network subscriptions per person is one possible explanation. It may also be that immigrants – particularly where their legal status in the host country is tenuous or their stay is seasonal or transient – make less use of fixed-line infrastructure such as landlines phones and broadband Internet, and correspondingly more use of mobile phones. Finally, value-added services such as domestic or international remittances using m-banking are often targeted at this market, and may mean more immigrant mobile subscribers on one or multiple networks.

At the same time, there are limits to what can be learnt from a country-level regression using indicator data. Further quantitative comparison between immigrant and non-immigrant populations could be used to confirm (or question) the findings presented here. This is particularly relevant for those countries that were excluded because of missing data, or for whom indicator values are suspected to be inaccurate. Explanatory research could focus on both how immigrant populations negotiate the mobile communications landscape in their host country, and how services offered to them are designed.

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