Does the 'Melting Pot' still melt? Internet and Immigrants' Integration *

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Abstract

Does the Internet bring closer or further segregate immigrants and locals? This paper documents the effects of origin-country Internet expansion on immigrants' social integration at destination. In a model of migration and networking, individuals choose where to live, and how to allocate time between destination- and origin-country ties. An increase in origin-country connectivity is predicted to decrease immigrants' integration at destination. Using language proficiency and naturalization data from the ACS, I find that growing Internet access at the origins slows down the pace of immigrants' integration. Importantly, the effect is driven by lower-skilled immigrants, suggesting that the Internet can exacerbate the gaps between low- and high-skill immigrants. To establish the mechanisms of how new ICTs transform networking behavior of immigrants I rely on the American Time Use Survey, as well as data on international phone calls and Facebook usage. This paper adds to our understanding of how new ICTs transform the links between immigration, diversity, and social cohesion.

Keywords: Immigration, Integration, Internet, Social Networks, Time Use

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1 Introduction

We live in a time of rapid transformation in the modes and costs of long-distance communication. Half a century ago, cross-border communications were hardly possible, while 15-20 years ago, international calls were prohibitively expensive. Since then, thanks to a growing spread of the Internet[1] and the emergence of new ICTs like Skype and Facebook in mid-2000s, immigrants enjoy unprecedented opportunities to stay in touch with their home-country family, friends, and media. How does this transformation affect immigrants' integration into host countries? Do new ICTs bring closer or further segregate immigrants and locals? Does the process of migration itself adjust to a new communication reality? Local effects of the Internet on economic, political, and social dynamics are well explored in the recent literature[2]. However, the cross-border effects of the Internet on immigrants and host communities remain much less understood. This paper addresses this gap.

How can home-country Internet expansion affect immigrants? On the one hand, the Internet can lower psychological costs of migration, thereby improving immigrants' well-being and increasing their integration efforts and productivity. Additionally, origin-country Internet can improve immigrants' linguistic and job market match upon arrival, boosting subsequent integration. On the other hand, with good Internet at the origins, immigrants can substitute local ties with origin-country ties, remaining in their home-country online "bubbles", slowing down local social integration. Moreover, lower costs of separation from family and friends can change selection pattern, increasing the share of individuals highly attached to their homeland among the pool of immigrants. While there is anecdotal evidence on the workings of these mechanisms[3], we still lack systematic evidence on this matter.

This paper addresses these questions both theoretically and empirically, and evaluates the effect of home-country Internet on immigrants' integration. I build a simple model of migration and networking that illustrates some of the channels discussed above and gen-

[1] In the year 2000, according to the ITU data, the average share of population with access to the Internet among the non-OECD countries was just above 5%. For the OECD countries, the corresponding figure was 24%. By the year 2017, the coverage increased to 50% and 83% respectively.

[2] See Hjort and Poulsen (2019), Guriev et al. (2020), Manacorda et al. (2022), Adema et al. (2022), and reviews in Zhuravskaya et al. (2020) and Campante et al. (2022).

[3] Dekker and Engbersen (2014) show that immigrants rely heavily on online media to remain in touch with distant social ties. However, online media also helps establish new local ties to aid integration. Arat and Bilgili (2021) and Guo et al. (2022) find that Internet and online networks increase immigrants' subjective well-being and act as coping mechanisms. Miconi (2020) argues that immigrants' online networks are mostly co-national, and the use of social media brings little participation in local community or political life.

erates my main testable predictions. To test these predictions, I focus on the US as the main destination country, and estimate the effects of changing origin-country connectivity on immigrants' social integration - language use, naturalization, networking - using the data from the American Community Survey (ACS) and the American Time Use Survey (ATUS).

To begin with, I document several new stylized facts. First, more recent cohorts of immigrants, especially those arriving after 2006, display slower linguistic integration and slower naturalization dynamics than earlier cohorts. Second, using the Time Use data, I show that immigrants in the recent years have strongly decreased time on local socialization, especially outside of home, even more so than natives. In contrast, time allocated to calls and messages with family has increased. Third, using data from TeleGeography on the volume of traditional international calls, I show that growing Internet access at the origins decreased the usage of more expensive traditional technology, especially after Skype and Facebook started to spread in mid-2000s. Popularity of Facebook has responded to growing Internet access particularly strongly in major sending countries.

I then proceed to estimate the effects of growing origin-country Internet access on immigrants' integration using two strategies. First, using variation in origin-country Internet penetration at the time of migration, I find that immigrants who arrive with better origin-country Internet display slower linguistic integration. There results survive (i) zooming into smaller windows around origin-country Internet improvements, (ii) allowing for separate integration trends for each origin country, and (iii) comparison between immigrants with English as their native language and the rest (reassuringly, no effect on native speakers).

Second, to separate selection effects from subsequent networking effects, I focus on immigrants who arrived in the US before massive spread of Internet at the origins. I use data from Collins Bartholomew on the staggered roll-out of 3G/4G technology to estimate how a shock to origin-country connectivity post-migration affects integration paths. I still find that origin-country Internet slows down immigrants' integration. Quite naturally, the effects are stronger if Internet improvement happens in first several years post-arrival.

The effects of origin-country Internet are heterogeneous with respect to immigrants' characteristics. Most importantly, the negative effect of the Internet on integration is driven by lower-skilled immigrants (measured by English skill or by education level). Thus, growing origin-country connectedness increases integration gaps between lower- and higher-educated immigrants. Moreover, there are no effects of origin-country Internet on immigrants who arrived in the US before age 7 (consistent with Bleakley and Chin (2010)).

To assess the effects of home-country Internet on immigrants' networking behavior, I rely

on the American Time Use Survey (ATUS). I find that increasing Internet penetration at the origin increases immigrants' time on calls with family members, and decreases time devoted to communications and socialization locally. Moreover, spread of Facebook at the origins increases leisure time spent on computers. Overall, these results suggest that expanding origin-country connectivity decreases the pace of immigrants' social integration.

Related Literature

This paper contributes to several strands of research. First is the literature on immigrants integration. The early works of Borjas (1985, 1987) showed the importance of selection into migration and changes of cohort quality. Later, Borjas (2015) showed that recent cohorts of US immigrants experience slower rates of wage growth[4], partly because of slower growth of English proficiency. Dustmann and Fabbri (2003), Bleakley and Chin (2004, 2010), Heller and Mumma (2023), and Foged et al. (2022), among others, have further documented the importance of language skills for integration. I show how origin-country Internet access affects immigrants' language learning, as well as social and overall integration. Moreover, I show how the effects of the Internet differ between higher- vs. lower-skilled immigrants.

A related literature looks into the effects of co-ethnic networks. On the one hand, co-ethnics can provide information and support for integration: Biavaschi et al. (2021) find positive effects of co-ethnic networks on naturalization, and Martén et al. (2019) find a positive effect on labor market performance of refugees. On the other hand, co-ethnics can increase competition and slow down assimilation. Beaman (2011) shows that while older cohorts of refugees improve performance of newly settled, more recent cohorts have a negative effect. In Germany, Glitz (2014) finds that ethnic segregation is associated with lower economic integration, while Battisti et al. (2021) show that a higher local share of co-ethnics has a positive effect upon arrival, but a negative effect in the longer-run. In contrast to most of the literature, I look into access to origin-country networks. My results imply that physical proximity to co-ethnics becomes less important with the spread of the Internet.

Third, this paper contributes to a small but growing literature on immigration, information, and technology. In particular, Adema et al. (2022) demonstrate that the spread of 3G Internet increases migration intentions[5]. Barsbai et al. (2017, 2021) show that new VoIP technologies precipitate information flows between immigrants and their origins, and that

[4]Abramitzky et al. (2020) take a historical perspective and show that the pace of immigrants' assimilation is comparable between 1850-1913 (mostly Europe) and 1965-present (mostly Asia and Latin America).

[5]The reason is an increase in information. However, Farré and Fasani (2013) show that TV availability in Indonesia reduced internal migration, so more information does not always mean more migration.

information can act as a substitute for social networking of immigrants[6]. Blumenstock et al. (2023) have shown that while social networks provide both support and information to immigrants, the former is more important. What I add is how changes in opportunity to stay in touch with the origins affects immigrants' networking and integration.

Finally, this paper speaks to the literature on the effects of new ICTs. Gentzkow (2006) showed that the spread of TV in the US decreased voter turnout and political knowledge. However, Nieto (2023) finds that digital TV in the UK increased employment and improved education of students, by changing the allocation of time. Hjort and Poulsen (2019) find large positive effects of improved Internet access on labor markets in several Sub-Saharan African countries using the exogenous timing of connection to submarine cables. Geraci et al. (2022) show, however, that the diffusion of broadband Internet in the UK reduced offline networking and civic engagement, suggesting a substitution between online and offline ties. Guriev et al. (2020) and Manacorda et al. (2022) further show that the spread of mobile Internet decreased trust in government and increased support for populist parties. While all this literature examined local effects of the Internet or other technologies, I document cross-border effects of Internet: on immigrants' time use and social integration[7].

The rest of the paper is organized as follows. Section 2 proposes a simple model that links origin-country Internet to immigrants' integration and derives my main predictions. Section 3 describes the data and documents several new regularities about immigrants' integration, time use, and cross-border communications. Section 4 documents my main results: how origin-country Internet affects immigrants' integration. Section 5 explores effects heterogeneity and mechanisms. Section 6 concludes.

2 A model of migration, networking, and integration

This section presents a simple model of migration and social networking. The model describes the process of immigrants' selection into migration based on their individual 'social costs' of separation from family and friends. It then augments this Roy-type model with an endogenous choice between establishing new, destination-based social ties and maintaining existing ties at the origin. I present a simplified setting where social ties have solely intrinsic (non-monetary) value. Individuals decide whether to migrate based on the the balance

[6]The authors conduct and RCT in Philippines: increasing pre-arrival information about destination reduces post-arrival networking (the numbers of new friends and support received from organizations).

[7]Moreover, in the recent review of the effects of social media, Aridor et al. (2024), the authors do not discuss any papers dealing with the effects of social media on immigrants. This paper addresses this gap.

between net monetary gains from migration (set as exogenous in this simple version) and social costs of separation from the origin.

Denote by $N_{i,o}^f$ the number of close friends and family members that individual i has at the origin, and let s_o^f be the share of origin-country population (and of individual's circle, assuming it is representative[8]) that has access to cheap communication tools to stay in touch with individual i had he or she decided to emigrate. Consider the networking behavior of immigrant i when in destination country d. An immigrant allocates time between two types of connections: establishing local (destination-country) ties, $n_{i,d}^f$ and maintaining origin ties, $n_{i,o}^f$. Establishing each destination country tie costs p_d units of time which we normalize to 1, and maintaining each origin country connection costs p_o units of time[9]. Before the Internet and cheap communication tools are both available at the origin, $p_o \gg 1$. To simplify things, let's assume that in this case, immigrants are forced into a corner solution with $n_{i,o}^f = 0$.

After the Internet and cheap communication tools arrive, p_o drops, and maintaining origin ties becomes possible. However, this comes at a cost of local networking. More formally, with a Stone-Geary utility derived from social ties, immigrants solve the following problem:

$$\begin{aligned} \max_{n_{i,o}^f \geq 0, n_{i,d}^f \geq 0} \quad & U^f = \log(n_{i,o}^f) + \log(n_{i,d}^f + \bar{n}) \\ \text{s.t.} \quad & p_o \cdot n_{i,o}^f + n_{i,d}^f = T^f \ \ (BC) \\ & n_{i,o}^f \leq s_o^f \cdot N_{i,o}^f \ \ (CC) \end{aligned}$$

where T^f is the total amount of time an immigrant is willing to allocate to social interactions, locally or abroad[10], and $\bar{n} > 0$ is the weight put on origin-country ties - a cultural trait that we allow to vary both across and within countries.

When the connectivity constraint (CC) is non-binding, the solution to this problem requires an immigrant to spend $(n_{i,o}^f)^* = \frac{T^f + \bar{n}}{2p_o}$ units of time with the origin-country ties, and the remaining time establishing host country ties[11]. However, if origin-country connectivity s_o^f is low, the (CC) constraint becomes binding, so that $(n_{i,o}^f)^* = s_o^f \cdot N_{i,o}^f$. Combining the

[8]In reality, one can argue that immigrants may have a higher share of friends/family members online.

[9]It is easy reformulate the problem in terms of monetary costs of networking (after all, tools like Skype and Facebook cut monetary costs of ties to the origins). If prices of maintaining origin country ties go down, it requires less work time to get the wage to cover this price.

[10]In a more detailed version of the model, this variable is also endogenous, determined in the standard labor-leisure choice. E.g., assume that individuals derive utility from consumption and from social ties, and that utility is additively separable in consumption and social ties. Then, the problem of choosing an optimal mix of social ties can be solved separately, for a given level of time allocated to networking.

[11]Note that an immigrant spends positive amount of time on destination ties only if $\bar{n} < T^f$, i.e., if the origin-country attachment is relatively low compared to the time available for socialization. In a more

two conditions, the amount of time an immigrant spends on origin-country ties is given by

$$(n_{i,o}^f)^* = \min\{\frac{T^f + \bar{n}}{2p_o},\ s_o^f \cdot N_{i,o}^f\} \tag{1}$$

Thus, for low levels of origin-country connectivity s_o^f, an increase in connectivity increases time spent on origin-country ties. This comes at the cost of fewer host-country ties. When origin-country connectivity reaches a threshold level, further increases do not affect the allocation of networking between origin and destination ties[12]. Note that subsequent reductions in the costs of origin-country ties (e.., entrance of Skype or WhatsApp) continue to increase origin-country networking at the expense of destination networking. This allows us to formulate the first key result.

Proposition 1 (Network substitution effect of origin-country connectivity)**.**

1. *For relatively low levels of origin-country connectivity, an increase in s_o^f decreases local networking at destination, and increases time spent with origin country ties.*

2. *For relatively high levels of origin-country connectivity, an increase in s_o^f has no effect on time allocation between destination and origin ties. A decrease in costs of origin-country ties p_o increases(decreases) origin(destination)-country networking.*

Let's proceed to the second key insight of this simple model and consider how growing connectedness of sending countries affects the process of selection into migration. If individual i remains at the origin, let's assume for simplicity that it is too costly to establish meaningful ties with abroad, so $n_{i,d}^f = 0$[13]. All available time for social interactions is spent on local, origin-country ties, so $n_{i,o}^f = T^f/p_h = N_{i,o}^f$. This defines the number of origin-country friendships that we used above - naturally, it decreases with the costs of establishing local ties, but we treat this as a nuisance parameter.

Denote by $\Delta W_{o,d}$ the net monetary utility gain from migration (taking into account the moving costs). Denote by $\Delta V^f = V_o^f - V_d^f$ the difference between the 'social' utility level

elaborate framework, with endogenous labor-leisure choice, time available for networking may become low if the opportunity costs (wages) are large relative to an immigrant's endowment. This introduces another reason for why immigrants from relatively poorer backgrounds may lag behind in terms social integration.

[12]Of course, this model can naturally be extended to a version where, realistically and importantly, host-country ties have not only an intrinsic value but also a monetary payoff: more local networking increases labor market success. However, note that this effect would not negate the prediction that a growing connectivity of the origin country decreases local networking. The only thing that changes is the elasticity of this effect.

[13]In reality, Internet allows one to find friends or even romantic partners from abroad prior to migration, which can speed up subsequent integration. An extended model can allow for such pre-migration investments.

if person i decides to stay at the origin, V_o^f, and the 'social' utility level of person i decides to emigrate, V_d^f. Note that $V_o^f = \log(N_{i,o}^f) + \log(\bar{n})$, and that the value of V_d^f depends on whether the CC is binding or not.

Irrespective of whether the connectivity constraint is binding, it is easy to show that ΔV is increasing in $\bar{n}$. This means that social costs of migration are larger for individuals (or whole cultures) with a stronger sense of attachment to origin-country ties. Importantly, for low levels of origin-country connectivity (when the CC is binding), ΔV is decreasing in origin-country connectivity s_o^f: the more connected an origin country is, the lower social costs of migration are. Individual i from origin o migrates to destination d if and only if

$$\Delta W_{o,d} - \Delta V^f(s_o^f, \bar{n}) \geq 0. \tag{2}$$

Because $\Delta V^f(s_o^f, \bar{n})$ is increasing in $\bar{n}$ (attachment to origin-country ties) and decreasing in s_o^f (origin country connectivity), it is easy to show from (2) that the types of people who decide to emigrate are those with

$$\bar{n} \leq n(s_o^f), \tag{3}$$

with $n(s_o^f)$ increasing in s_o^f. This implies that growing connectivity at the origins increases immigration by people with a stronger sense of attachment to origin-country ties.

Proposition 2 (Cultural selection effect of origin-country connectivity)**.** *As origin-country connectivity s_o^f grows, the average value of $\bar{n}$ at destination increases, i.e., immigrants becomes more attached to the origin-country ties. This results in*

1. *lower average number of social ties immigrants have at destination*
2. *lower pace of integration for more recent cohorts of immigrants relative to earlier cohorts from the same origin country.*

This mechanism gives another reason why an increasing global connectivity can lower the pace of immigrants' social integration, especially those from relatively poorer countries. In Appendix B, I cite several interviews from Dekker and Engbersen (2014), where respondents express precisely the workings of mechanisms I modelled above.

3 Data and stylized facts

In this section, I describe the data, and document new regularities about (i) immigrants' social and economic integration, (ii) their time use as compared to natives, and (iii) modes of cross-border communications, and how they change with the spread of the Internet.

3.1 Social integration: linguistic skills and naturalization

To measure immigrants social integration, I use data from the American Community Survey (ACS), obtained via IPUMS-USA. I focus on English proficiency as the key integration outcome, and use naturalization rates as an additional outcome[14]. For my main analysis, I use the sample of immigrants aged 18 to 64, for whom English is not a native language[15], arriving from 1996 to 2019 (the period more relevant for the roll-out of the Internet coverage, and to limit the influence of the Post-Soviet mass migration). I model the baseline integration process is the following way, similar to Borjas (2015):

$$Y_{i,o,s,t,m} = \sum_{t=m+1}^{m+T} \beta_{t-m} \cdot \mathbb{1}[YSM = t-m] + X'_{i,o,s,t,m} + \phi_o + \tau_{s,t} + \theta_M + \varepsilon_{i,o,s,t,m} \qquad (4)$$

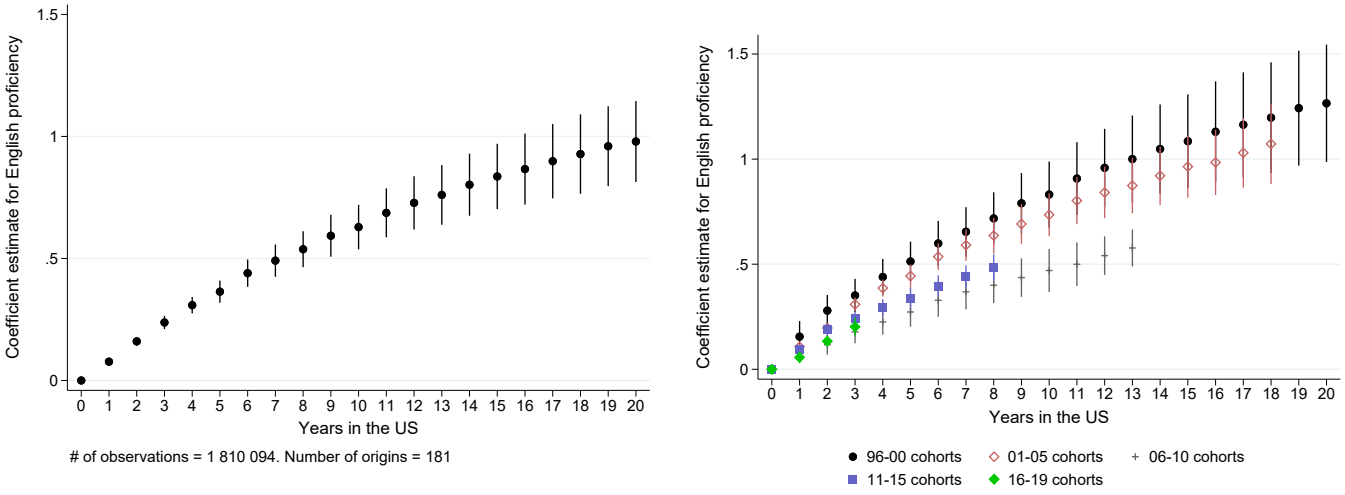
where $Y_{i,o,s,t,m}$ is integration outcome of immigrant i originating from country o, living in state s, observed in year t, who migrated to the US in year m. The model allows for state $\times$ year shocks $\tau_{s,t}$, fixed differences across origins, ϕ_o, and fixed differences across (bins of) immigration cohorts, θ_M. Individual controls $X'_{i,o,s,t,m}$ include gender, age, education, and marital status. Years since migration variable is captured by $YSM = t - m$. The key parameters of interest are β_{t-m} - the collection of time since migration FEs that together give the integration profile. I cluster standard errors at the level of country of origin.

Figure 1 shows the dynamics of linguistic skills dynamics with respect to years spent in the US for (a) the entire sample, and (b) broken down by arrival cohorts. One can clearly see that first 7 years after arrival display the fastest accumulation of linguistic skill and account for half of the long-term increase. Moreover, more recent (especially post-2006) cohorts have lower pace of leaning English. Even though later cohorts of immigrants arrive with better linguistic skills (not shown on the figure), they subsequently learn much slower, and eventually loose the race to earlier cohorts. Importantly, cohort differences in the pace of linguistic integration are mostly driven by less educated immigrants.

In Table 1, I document the same results using a less flexible, log-linear specification for years spent in the US. Columns (1)-(3) focus on English proficiency as an outcome, while column (4)-(6) use naturalization as an outcome. In all cases, I'm interested in how the pace of integration changes across pre- vs. post-2006 cohorts of immigrants. As one can clearly see, especially for low-skilled immigrants (column (2)), the pace of integration is significantly

[14]In progress in data analysis for two additional measures: inter-ethnic marriages and residence in co-national/ethnic enclaves, see also Bleakley and Chin (2010).

[15]One of the robustness checks involves estimating the effects of Internet expansion at the origins on English skills of immigrants coming from English-speaking countries (no effect).



(a) Baseline (b) By 5-year cohort bins

Figure 1: Linguistic Integration profiles

Table 1: Cohort-level differences in linguistic integration and naturalization rates

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	English Proficiency			Naturalized		
Log (Years in the US)	0.397***	0.149***	0.116***	0.217***	0.104**	0.272***
	(0.039)	(0.010)	(0.007)	(0.049)	(0.040)	(0.034)
Cohort post-2006	0.321***	0.076***	0.049***	0.085	0.017	0.146***
	(0.073)	(0.019)	(0.012)	(0.053)	(0.022)	(0.051)
Log (Years in the US) x Cohort post-2006	-0.171***	-0.039***	-0.033***	-0.077**	-0.025	-0.105***
	(0.033)	(0.008)	(0.005)	(0.037)	(0.021)	(0.036)
Observations	1,810,094	639,243	1,170,843	1,739,120	624,926	1,114,187
Adjusted R-squared	0.432	0.123	0.164	0.251	0.168	0.262
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
State x Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Full	Low skill	High skill	Full	Low skill	High skill

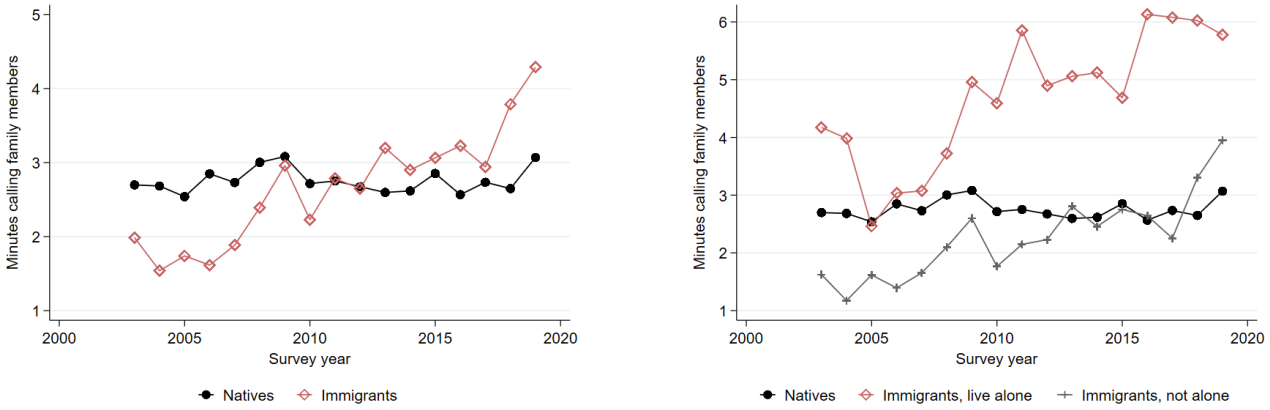
Outcome variable in columns (1)-(3) is the English Proficiency rated on a scale from 1 ("Does not speak English") to 4 ("Speaks very well"). Outcome variable in columns (4)-(6) is naturalization rate. Main explanatory variable is the Natural Log of years spent in the US – integration path. In each specification, Log (Years in the US) is interacted with the cohort of arrival: before 2006 vs. after (inclusive). Columns (2) and (5) restrict the sample to immigrants with lower English skill (level 1 or 2). Columns (3) and (6) restrict the sample to immigrants with higher English skill (level 3 or 4). Robust standard errors, clustered at the level of origin country in parentheses, *** p<0.01, ** p<0.05, * p<0.1

lower for post-2006 cohorts. Despite the fact that post-2006 cohorts enter with better English skills, this initial difference disappears in 5-7 years, and earlier cohorts overtake later ones from thereon. For naturalization, however, while later cohorts show slower integration, the effect mostly comes from high-skilled immigrants (column (6)) - potentially because good command of English is required to obtain US citizenship.

3.2 Networking patterns: American Time Use Data

To measure how much time immigrants allocate to origin-country connections, and how much - to local networking, I use the American Time Use Survey (ATUS) data. Specifically, I calculate time spent on (i) calls to family; (ii) computer use for social media, games, etc.; (iii) socialization and communication (talking, eating/drinking, partying, movies, sports, etc.), distinguishing with whom the activity takes place, e.g., friends and neighbors[16].

Figure 2 shows the dynamics of time devoted to family calls. Natives spend a constant amount of time on family calls. However, while starting at the lower level than natives, immigrants spend an increasing amount of time on family calls from 2006 onwards, and eventually overtake natives. As is shown on panel (b), this effect is driven by immigrants who live alone, so this increase is due to calls with family back at the origins[17].



(a) Baseline

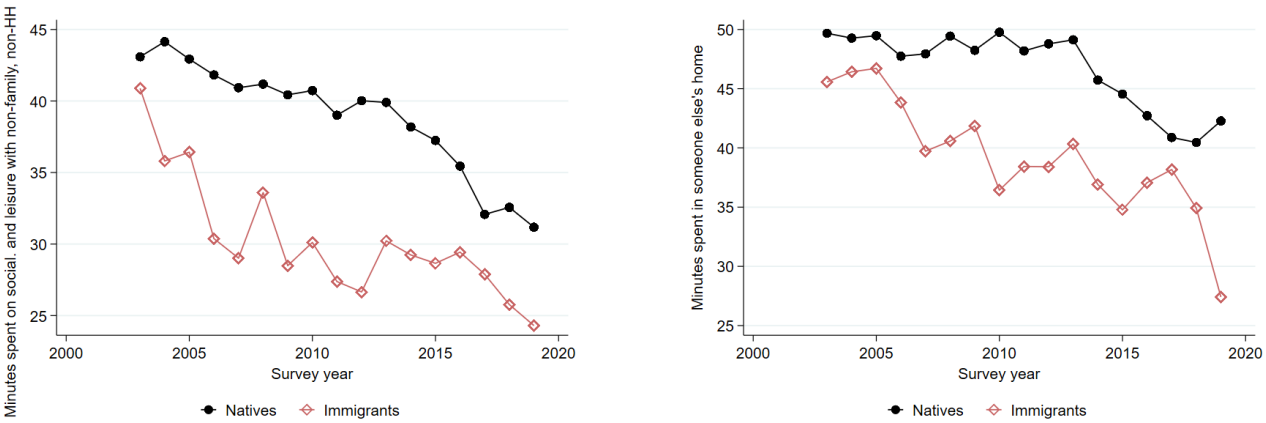
(b) By local HH composition

Figure 2: Calling family: dynamics for natives and immigrants

[16]For most people, around 8 hours go to work, and 8 to sleep, so time on socializing and networking can be considered as a share of the remaining 8 hours.

[17]Moreover, Figure A1 shows that immigrants increase time on computers and games by 30% after 2007 (natives showed similar increase, but from lower levels), so immigrants likely spend more time online. Naturally, the effect is driven by younger immigrants.

How does immigrants' local networking behavior changes over time? Using the ATUS dimensions on "with whom" and "where" the activity is conducted, I measure how much time immigrants spend outside of the household and in someone else's homes. Figure 3 reveals that from early 2000s to mid 2010s, immigrants decreased socialization with non-household members by more than a third. Natives decreased socialization with non-household members by a much smaller extent. For the time spent in someones else's homes, in 2019, immigrants were spending almost 50% less time on such activities as compared to 2003. Natives only followed suit after 2013. Moreover, Figure A3 shows that both immigrants and natives spend less and less time on socialization and communication activities (broadly defined), and attending/hosting events, which can affect the process of integration.



(a) Socializ-n and leisure with non-HH members (b) Time spent in someone else's homes

Figure 3: Local socialization, leisure, and networking: dynamics for natives and immigrants

Since natives also spend less time of local socialization, there are fewer and fewer opportunities for immigrants to get in touch with locals in a friendly atmosphere. This decreased supply of "local friends" can augment the direct effect of own networking on integration[18].

3.3 Internet penetration, new ICTs, and traditional calls

I use several sources of data to measure the modes of cross-border connectivity. First, I use data from the International Telecommunications Union (ITU) on the percentage of population with access to the Internet[19]. Second, I use data from TeleGeography on the

[18]In the process is analysis of other uses of time, such as (i) religious activities (where, with whom, etc.), (ii) time with children, (iii) education, and other dimensions relevant for the integration process.

[19]Figure A3a shows that in OECD countries, Internet usage grew from 0 to 40-50% in the matter of several years from late-1990s to mid-2000s. For example, in Germany, transition from under 10% to 50%

volume of non-Internet based (traditional) international calls between the US and each of the other countries in the World. Finally, I use data on the spread of new communication tools, such as Skype and Facebook.

Switch away from traditional calls

Before the Internet, the main mode of cross-border communication was through carrier-based phone calls. In the 1990s, the US international call prices averaged more than 1 dollar per minute, with some destinations at 3-5 dollars per minute (TeleGeography 2023). Once the Internet and cheaper VoIP (voice over IP) tools like Skype become available at the origins, do we see a decline in traditional calls? To test this empirically, I use data from TeleGeography on the volume of international phone calls between the US and all other countries[20]. I estimate the effect of origin-country Internet on the (natural log of) calls with the US, accounting for country and year FEs. I cluster SEs at the origin country level.

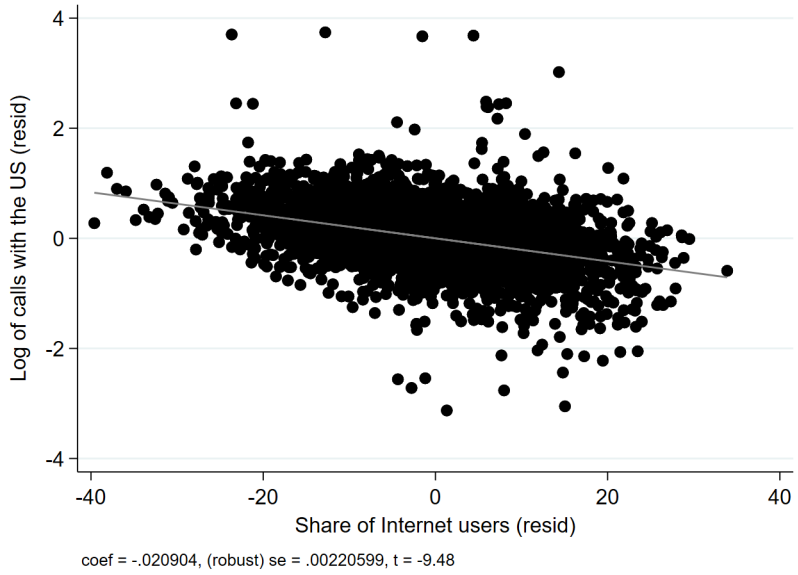


Figure 4: Log of calls with the US and spread of the Internet at the origins

Figure 4 reveals a very clear substitution pattern: across all countries, an increase in

tool only 4 years, with similar rapid expansion observed in other first adopters. In developing countries, Internet expanded later, but the process was as quick once good infrastructure arrived.

[20]Figure A3b shows that calls between the US and OECD countries plateaued after 2005, when these countries reached good Internet connectivity. In contrast, developing countries continued to see rapid growth in traditional calls up until 2012. Figures A4 and A5 show further that in countries with good Internet by mid-2000s, years 2005-2006 marked a sharp decline in traditional calls. For many of the late adopters, however, the decline in calls only happened when the Internet usage picked up.

Internet availability decreases reliance on traditional carrier calls to the US. Table 2 further shows that the effect of Internet is amplified by the growth of Skype's international calls market shareMoreover, we see that while reaching 25% and 50% thresholds has large negative effects on traditional calls, reaching 10% Internet is not sufficient, and the effect is zero. Finally, I test the dynamics of these effects of reaching 25% (or 50%) Internet penetration in an event study design, and report the results on Figure A6 in the Appendix.

Table 2: Effect of origin-country Internet and Skype on traditional calls with the US

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Log (non-Internet calls with the US)						
Internet coverage (%)	-0.021***	-0.016***					
	(0.002)	(0.002)					
Internet coverage (%) x Skype share		-0.015***					
		(0.004)					
Internet 50% reached			-0.569***	-0.390***			
			(0.071)	(0.080)			
Internet 50% reached x Skype share				-0.748***			
				(0.260)			
Internet 25% reached					-0.404***	-0.127**	
					(0.068)	(0.061)	
Internet 25% reached x Skype share						-1.681***	
						(0.260)	
Internet 10% reached							-0.028
							(0.063)
Observations	4,009	4,009	4,009	4,009	4,009	4,009	4,009
Adjusted R-squared	0.931	0.932	0.925	0.925	0.922	0.925	0.919
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Outcome variable is the Natural Log of international call minutes from the US to a given country. Main explanatory variable is the share of population with access to Internet. "Skype Share" stands for the international calls market share of Skype and changes over time. Columns (3)-(4) use an indicator variable for reaching 50% Internet coverage instead of a continuous variable. Columns (5)-(6) use a 25% threshold. Column (7) uses a 10% threshold. Robust standard errors, clustered at the level of origin country in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Switch towards new ICTs

Do immigrants switch to cheaper tools, such as Facebook or Skype, once origin-country Internet expands? While this surely is intuitive, I document this empirically using the data on Facebook's search popularity from Google Trends (GT). This data allows me to measure the intensity of searches for a given keyword - "Facebook" - by country and month over a period from early 2004 to today. The measures scraped from GT are made relative to the highest point across all countries and time periods (Turkey in November 2012). As Facebook's global reach expanded from 2007, it's GT Index grew until reaching its peak in early 2010s. Figure 5 shows the dynamics of Facebook's GT index, broken down by net emigration rates. Since Facebook can be used to stay in touch with those who left, we see

that countries with high emigration rates display 60% more interest in Facebook (at the peak) as compared to countries with the lowest emigration rates.

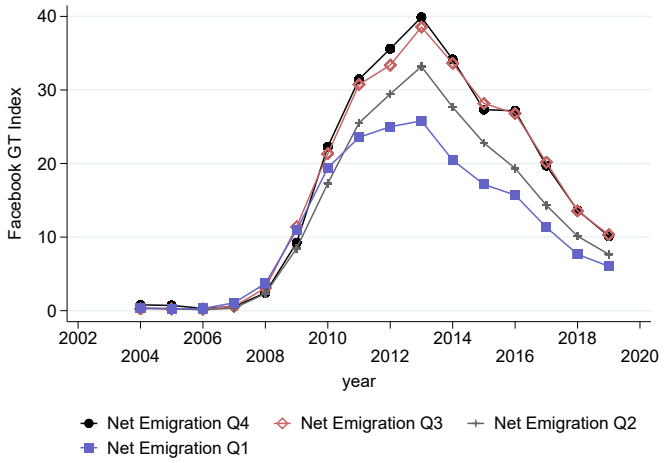
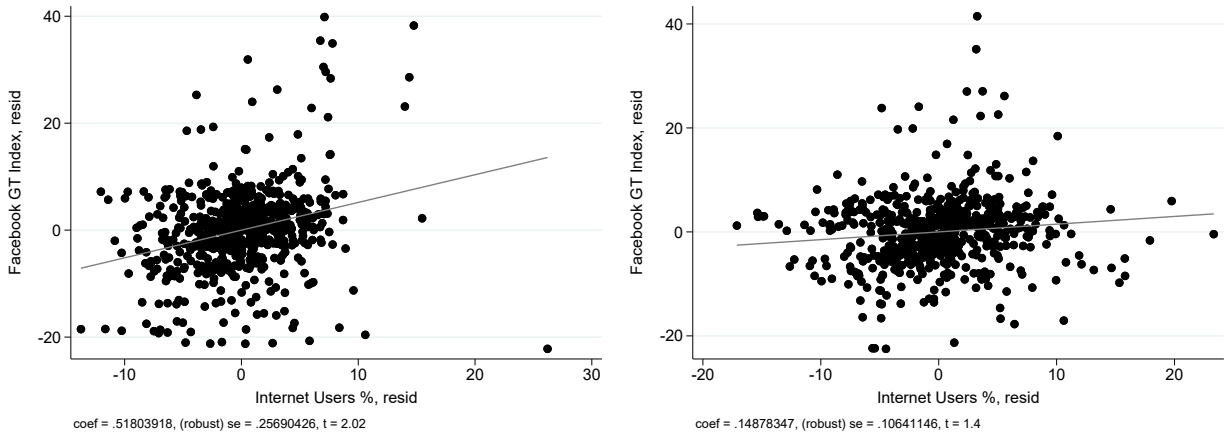


Figure 5: Dynamics of "Facebook" Google Trends Index, by Net Emigration groups

Moreover, on Figure 6 I document that Facebook usage across sending countries responds positively to growing Internet access (country and year FEs included). The effect of the Internet, however, is most pronounced for countries with relatively high net emigration. Overall, this data confirms a clear substitution effect in cross-border communications. Once a country gets good Internet access, traditional calls with the US decline, while new ICTs are used to stay in touch with those who left.



(a) High net emigration

(b) Low net emigration

Figure 6: Facebook usage and Internet access: by net emigration

4 Internet at the origins and the pace of integration

In this section, I first describe my empirical strategy, distinguishing between the effects of the home-country Internet (i) at the time of migration, and (ii) after migration. I then present my main findings and discuss robustness checks: alternative measures of Internet access (3G/4G roll-out), zooming into finer windows around connectivity shocks, and so on.

4.1 Empirical strategy

To establish the effect of home-country Internet access on immigrants' integration in the US, I use two empirical strategies. The first one exploits differences in origin-country Internet at the time of migration. I test whether immigrants arriving in the US after improved Internet access at the origins integrate slower than immigrants arriving before good Internet. I augment the baseline model in the following way (similar to, e.g., Battisti et al. (2021)):

$$Y_{i,o,s,t,m} = \sum_{t=m+1}^{m+20} \beta_{t-m} \cdot \mathbb{1}[YSM = t-m] \cdot Connect_{o,m} + X'_{i,o,s,t,m} + \phi_{o,M} + \tau_{s,t} + \varepsilon_{i,o,s,t,m} \quad (5)$$

where as before $Y_{i,o,s,t,m}$ is an integration outcome (e.g., language proficiency) of immigrant i, from origin country o, living in state s, who immigrated to the US in year m, and who is observed in year t. $Connect_{o,m}$ is a measure of origin-country Internet connectivity at the time of immigration. As before, model 5 includes state x time FEs, which absorb shocks common to all immigrants across time periods (e.g., changes in citizenship policy) and across locations (e.g., local labour market shocks). A collection of origin x migration cohort FEs captures differences in integration coming from changing characteristics of migrant cohorts, Borjas (1985, 2015). Moreover, in most demanding specifications, I allow for cohort-specific integration paths ($\theta_M \times YSM_{t,m}$), and even for origin-specific integration ($\phi_o \times YSM_{t,m}$). To account for the fact that origin country changes can affect new migration flows from the origins, Adema et al. (2022), I also control for the regional time-varying share of co-nationals.

To estimate model (5), I use several indicators of origin country Internet expansion. Since the most rapid period of Internet expansion happens between 25% and 50% of coverage in many countries, my first indicator variable takes the value of 1 when 50% of origin-country population have access to the Internet[21]. Alternatively, I split by the year when Internet coverage experiences biggest growth (often driven by the broadband cable connections).

[21]Results, however, are not very sensitive to moving the threshold of "good Internet" coverage, as long as the usage threshold is not too small (e.g., results are null for 1% or 10% threshold).

This strategy captures the combined effect of the Internet: (i) via selection into migration (better Internet at the origins can lower costs of migration, and affect who decides to move), and (ii) via subsequent integration after arrival. On Figure 7, I report the estimates of the 50% Internet indicator on observable characteristics of immigrants at arrival (0 or 1 years since arrival), including the standard set of origin/cohort/year/state FEs. Evidently, there are no significant differences between immigrants arriving before vs. after Internet reaches 50% at the origins. Similar balance is observed between immigrants arriving before vs. after sharp improvements in Internet access. Thus, concerns over Internet affecting educational or economic selection seem to be limited.

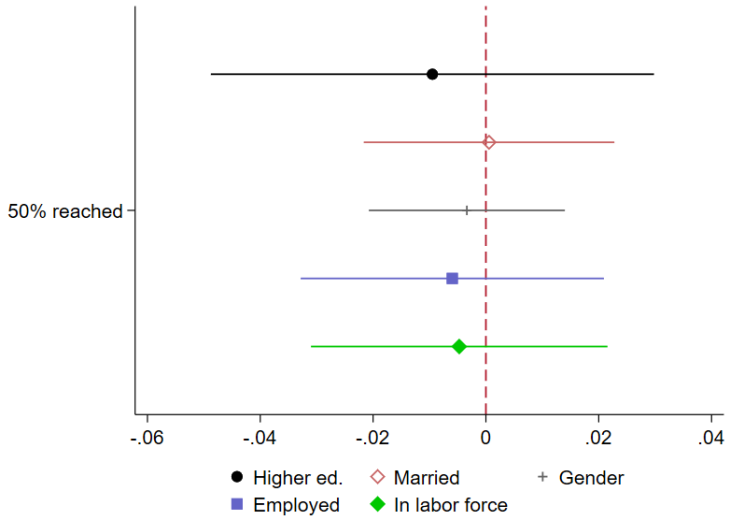


Figure 7: Balance between immigrants arriving with and w/o 50% Internet at the origins

To address remaining concerns over the changing composition of immigrant groups, I allow for separate integration profiles based on observable differences across immigrants. Finally, to make control and treatment units more comparable, I zoom into 5-year windows around the improvement in origin-country Internet - results remain qualitatively the same[22].

Internet improvements after migration

The second strategy uses sharp variations in origin-country Internet after migration. I focus on immigrants who arrived in the US before significant Internet expansion at the origins, and test the effects of subsequent Internet improvements on immigrant's integration path. This strategy allows me to compare immigrants who arrived just a few years before

[22]In the ongoing analysis, I identify likely "family migrants" (who were followers in the move). Selection effects are likely weaker here, but I still see a strong effect of Internet at arrival on subsequent integration.

big Internet expansion at the origins against similar immigrants who arrived several years before. The hypothesis is that Internet improvements after migration matter only if happen in the first several years in the US.

To exploit sharper changes in Internet access, I use data from Collins Bartholomew on the spread of 3G/4G technologies across the globe. Figure 8 shows (i) that 3G/4G coverage expanded very fast once available in a given country, and (ii) that the timing of this technology's roll-out varied a lot across sending countries. Thus, I limit the sample to immigrants who arrived in the US before having 3G technology at the origins. I then compare integration dynamics of those whose origin country got covered by 3G/4G technology shortly (1-4 years) after arrival to those whose origins experienced 3G/4G expansion 5-10 years after arrival. For example, I will be comparing the integration dynamics of immigrants coming to the US from Mexico in 2006 (6 years before 3G reached 50%) vs in 2010 (2 years before).

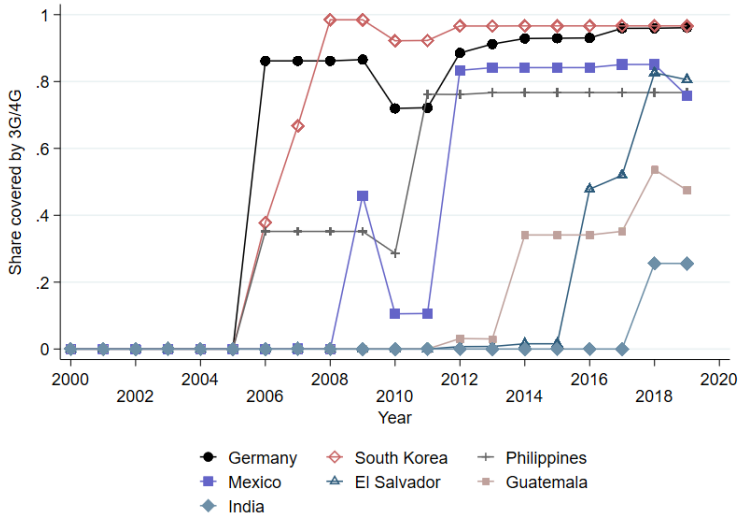


Figure 8: The dynamics of 3G/4G Internet expansion, several countries

4.2 Internet at the time of migration: effects on language learning and naturalization

Table 3 reports the effects of origin-country Internet at arrival with a simple specification where I use the log of years since arrival. First, note that in all columns, there is a positive effect of log-years in the US on both integration outcomes (English proficiency and naturalization). In column (1), I introduce origin-country Internet coverage upon arrival, and show that on average, having better origin-country Internet makes immigrants less proficient

in English. Column (2) shows that the origin-country Internet slows down the integration path. Column (3) uses a 50% threshold instead, and finds similar results. Cohorts arriving with good Internet at the origins arrive with better English, but lose the advantage in 3-4 years. Columns (4)-(6) replicate the analysis for naturalization rates: better home-country Internet slows down immigrants' naturalization.

Table 3: Effect of origin-country Internet at arrival on English learning and naturalization

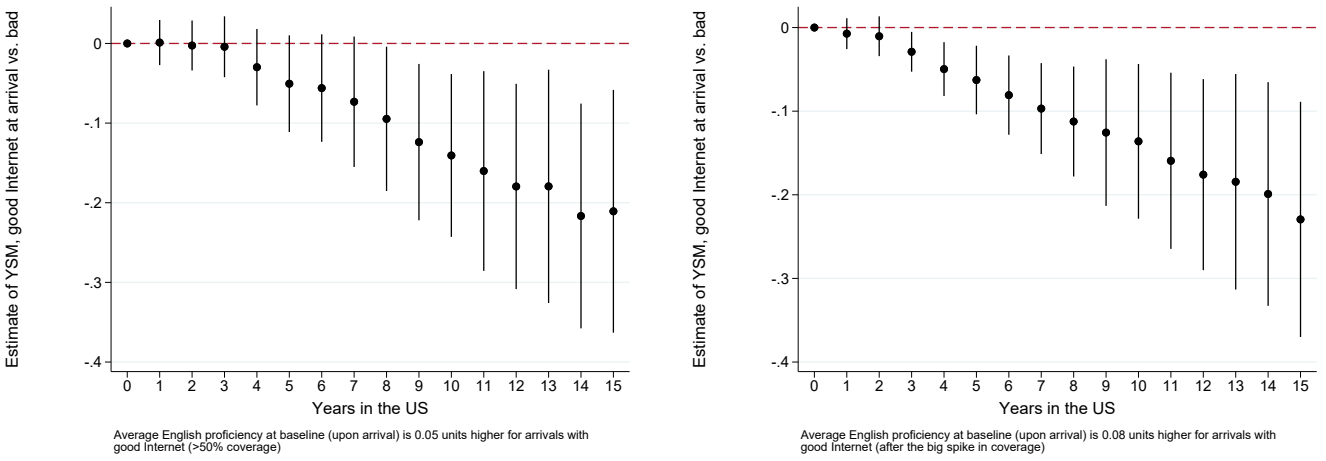
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	English Proficiency			Naturalized		
Log (Yrs in the US)	0.206***	0.253***	0.256***	0.024***	0.081***	0.079***
	(0.013)	(0.038)	(0.023)	(0.007)	(0.017)	(0.015)
Internet coverage (% pop)	-0.005***	-0.002		-0.007***	-0.003***	
	(0.001)	(0.002)		(0.001)	(0.001)	
Log (Yrs in the US) x Internet coverage		-0.001*			-0.002***	
		(0.001)			(0.000)	
Internet 50% reached			0.105**			0.034
			(0.045)			(0.031)
Log (Yrs in the US) x Internet 50% reached			-0.095***			-0.068***
			(0.033)			(0.026)
Observations	1,560,117	1,560,117	1,560,117	1,502,018	1,502,018	1,502,018
Adjusted R-squared	0.438	0.438	0.438	0.238	0.240	0.236
Origin x Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
State x Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Outcome variable in columns (1)-(3) is English Proficiency rated on a scale from 1 ("Does not speak English") to 4 ("Speaks very well"). Outcome variable in columns (4)-(6) is naturalization rate. Main explanatory variable is the Natural Log of years spent in the US – integration path. Columns (2) and (5) interact the Log of Years in the US with origin-country Internet coverage at arrival (share of population with Internet access). Columns (3) and (6) interact the Log of Years in the US with an indicator variable for 50% Internet coverage at the origins (at arrival). Robust standard errors, clustered at the level of origin country in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Figure 10 estimates a fully flexible specification from equation (5). It shows differences in linguistic integration paths between cohorts of immigrants arriving with good Internet (50% coverage (panel (a)) and a big increase in coverage (panel (b)) and those arriving with poor Internet coverage. Clearly, immigrants arriving with better Internet at the origins show slower English proficiency growth. Even though "more connected" cohorts arrive with slightly better starting level of English, they loose the advantage after 5-6 years.

There are similar (but weaker) effects of origin-country Internet upon arrival on subsequent naturalization rates. As Figure A7 demonstrates, in the first 6-7 years after migration, cohorts with better origin-country Internet experience about 5 p.p. slower growth to naturalization rates. Note, however, that obtaining citizenship in the US requires a good command of English, so we can reasonably expect the effects to be concentrated in the upper part of the linguistic skill distribution (to be confirmed in Section 5).

An important placebo check is that much lower Internet penetration at the origins should not affect patterns of networking and integration at destination. And indeed, having 1%



(a) Differences by 50% coverage (b) Before vs. after big increase in coverage

Figure 9: Linguistic integration, differences by origin-country Internet at the time of arrival

or 10% Internet coverage at the origins at the time of migration makes no difference for subsequent integration path[23].

4.2.1 Addressing selection and other robustness checks

Even though we found balance across treatment groups in important observables (Fig. 7), I allow for separate integration profiles for people with different education levels and marriage statuses: the main effects remain almost intact. In addition, I zoom into smaller time windows (+/-5 years) around the chosen Internet cut-off, and still find similar effects for more comparable groups, see Figure A8 in the Appendix[24]. Importantly, difference upon arrival disappears for these more comparable groups.

To make comparisons between integration paths only within (and not across) origin-country groups with different development levels, I allow for separate integration paths for immigrants from OECD and non-OECD countries. Moreover, to make comparisons only within arrival cohorts, I include a set of $\Theta_M \times YSM_{t,m}$ FEs. Such specifications yield even stronger negative effect of origin-country Internet on immigrants integration, Figure A9. Immigrants from OECD countries integrate faster, so previous results were underestimating the negative effects of origin-country Internet.

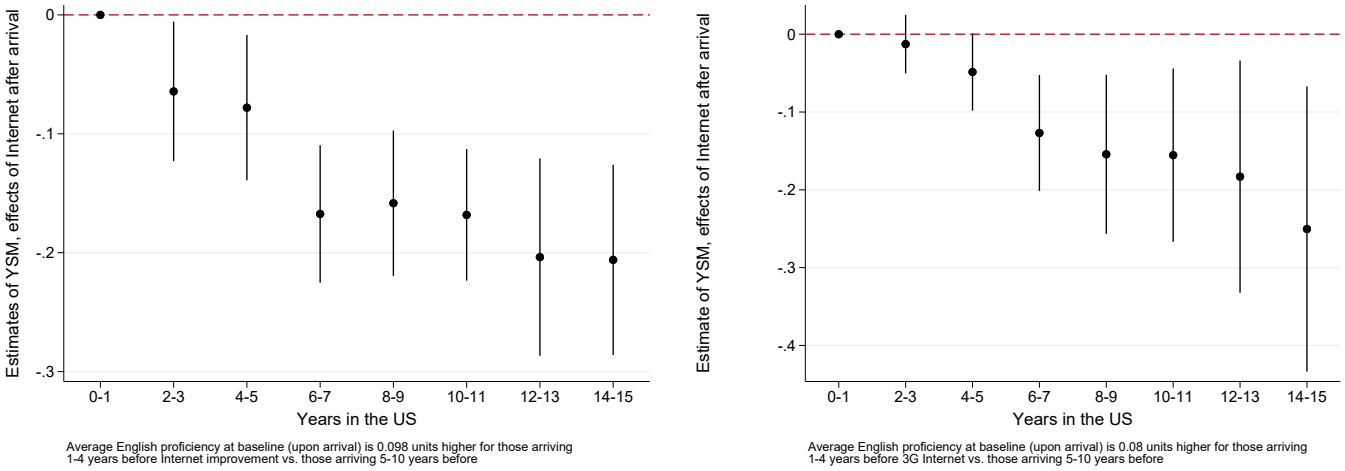
[23]Using the 50% threshold matters as strongly as 40% threshold, and more than a 25% threshold.

[24]I bin YSM into pairs, as the sample size drops by a factor of 6 when I limit the sample to narrow windows around Internet expansions.

4.3 Internet improvements after migration

To partial out selection effects that origin-country Internet can exert of the intensity and composition of migration flows to the US, I focus on Internet improvements after migration. First, using the Internet coverage data from the ITU, I limit my sample to immigrants who arrived in the US before origin-country had reached 25% coverage. I then compare immigrants whose origins reached 50% connectivity shortly after (1-4 years) to those whose origins only reached good Internet 5-10 years after their arrival.

Figure 10a bins years since migration into pairs (a smaller sample in this exercise) and shows that immigrants arriving with little Internet at the origins, but experiencing a rapid expansion in their first few years show significantly slower integration profiles. The control group are immigrants who arrived 5-10 years before Internet expansion. Thus, at least part of the effect found before is due to Internet changing immigrants' behavior post-migration.



(a) 50% Internet 1-4 years post-migration (b) 50% 3G/4G Internet 1-4 years post-migration

Figure 10: Linguistic integration: effect of Internet improvement after migration

While a more gradual roll-out of the overall Internet access (ITU data above) can still pose concerns over confounding factors or selection into migration, a quicker roll-out of 3G/4G technologies represents sharper connectivity shocks at the origins. I thus limit the sample to immigrants who arrived in the US when zero 3G/4G coverage was available at the origins. On this sample, Figure 10b shows that immigrants whose origin countries received 3G/4G technology 1-4 years after migration, show a much slower integration path[25]. Note that the

[25]Allowing for separate integration dynamics across OECD vs. non-OECD countries, as well as across different migration cohorts Θ_M, does not change the results.

negative effect of 3G/4G Internet on integration path kicks in only after 4 years have passed since migration, so there are no pre-trends before 3G Internet shock at the origins.

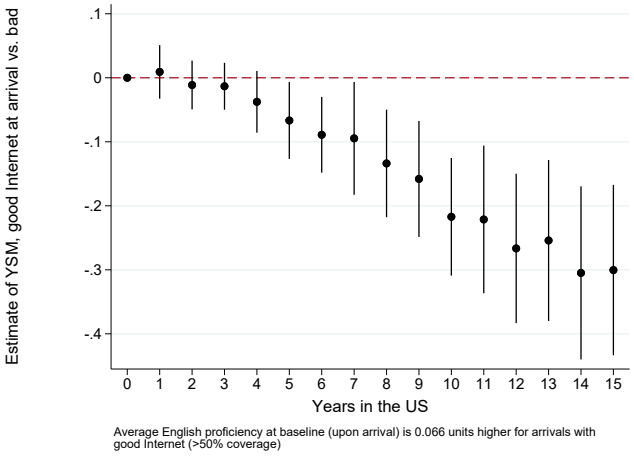
In a similar vein, I compare immigrants whose origins received good 3G coverage 5-8 years after arrival in the US to those where 3G coverage expanded only 9-12 years post-arrival. Figure A10 shows that there is no difference between such immigrant groups in the first 4-5 years since migration, but the difference kicks in afterwards.

5 Heterogeneous Effects and Mechanisms

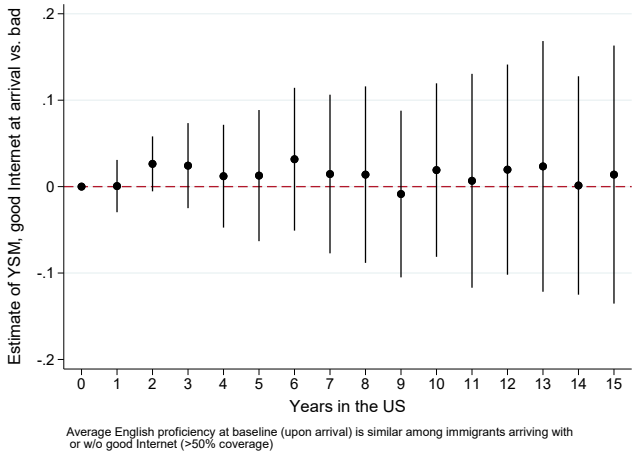
5.1 HTE of origin-country Internet

There are several important HTEs of origin-country Internet on immigrants' integration.

Education and language skill I document that the bulk of the effect found in Section 4 is driven by the less-educated immigrants. Figure 11 shows a very strong negative effect of origin-country Internet on immigrants with lower education levels: high school (or less) and college dropouts. There is no effect of home-country Internet on immigrants with completed tertiary education. Thus, the expansion of Internet at the origins can increase already large gaps between low- and high-skilled immigrants[26].



(a) College dropouts, high school, or less



(b) College or higher

Figure 11: Effects of origin-country Internet: differences across education levels

[26]Similar heterogeneity is observed when dividing immigrants by English skill level (the negative effect comes from the lower end of the skill distribution), see Figure A11.

To partial out selection effects, I replicate the analysis of Section 4.3: I limit the sample to those who arrived before 3G/4G Internet was available at the origins, and estimate the effects of origin-country getting good 3G/4G coverage 1-4 years after migration. Figure A12 confirms that the effect is driven by lower-educated immigrants.

Age at migration It has been documented before (Bleakley and Chin (2010)) that early arrival years for immigrant children can improve language learning and help subsequent integration (intermarriage, out-of-enclave residence, etc.). Thus, I hypothesize that origin-country Internet differences should not affect the Integration of immigrants who arrived as young children (before age 7). And indeed, there are no differences stemming from origin-country Internet at arrival for those arriving as young children, see Figure A13.

Native-speaking immigrants If most of the effect of origin-country Internet comes through immigrants' language acquisition, we should not expect to see any effect on immigrants from English-speaking countries. And indeed, when estimating the effect of origin-country Internet on naturalization rates of immigrants from English-speaking countries, I do not find any significant relationship.

5.2 Changes in Time Use

Does growing Internet access at the origins transform how immigrants spend their time on socializing locally vs. sticking to their old ties? Using the American Time Use Survey (ATUS) data, I document that once an origin country gets sufficiently good Internet (strongest results with 25% indicator), immigrants' decrease networking at destination, but increase time spent on calls to their families and online communications.

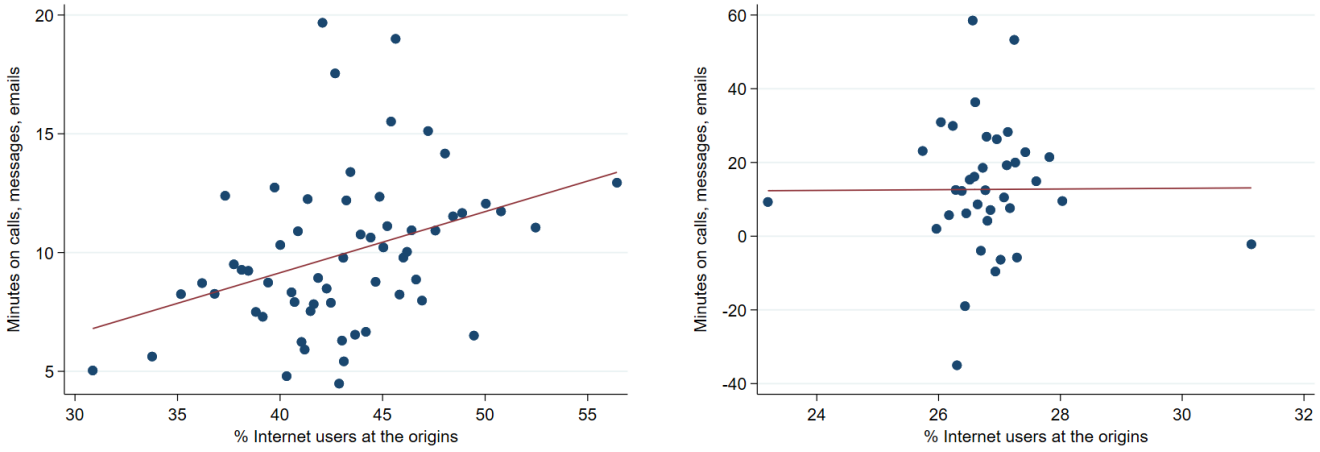
Panel A of Table 4 focuses on relatively recent immigrants (who arrived in the post-Skype era, after 2003). Columns (1)-(2) show that once origin-country reached 25% Internet, immigrants increase their calls to family and overall communications (mails, emails, messages, etc.). The effects are also quantitatively large. Columns (3)-(8) show that various measures of local networking from the ATUS data decline with origin-country Internet access. For example, column (4) shows that a broad measure of time spent on socialization and communication with others in years with good origin-country Internet is 15 minutes less than in years with poor origin-country Internet. This is also a large effect quantitatively. Likewise, origin-country Internet reduces time spent on socialization outside of home, time in others' homes, etc. Importantly, Panel B shows that for immigrants who arrived in the US before 2003, all these effects are absent.

Table 4: Effect of origin-country Internet at arrival on English learning and naturalization

VARIABLES	(1) Calls, mail/email	(2) Calls family	(3) Leisure, soc.. and comm.	(4) Soc. and comm.	(5) Soc. out of home	(6) Time other homes	(7) Attend-host events	(8) Org., civic, relig.
Panel A: 2003+ migrants								
Internet 25% reached	4.758**	2.827***	-31.500**	-15.190**	-17.780***	-11.230*	-2.359	-5.919
	(1.922)	(0.789)	(14.438)	(6.882)	(5.322)	(6.175)	(2.441)	(4.299)
Constant	3.613	-0.210	246.669***	68.461***	65.488***	51.039***	6.537**	7.612
	(2.926)	(1.268)	(18.457)	(6.753)	(8.839)	(9.413)	(2.769)	(6.780)
Observations	4,052	4,052	4,052	4,052	4,052	4,052	4,052	4,052
Adjusted R-squared	0.072	0.045	0.048	0.007	0.004	0.013	0.018	0.023
Panel B: 2003- migrants								
Internet 25% reached	1.029	0.171	-9.175*	-1.140	-1.361	-0.445	-0.946	0.775
	(0.838)	(0.369)	(5.139)	(2.616)	(2.564)	(2.437)	(1.124)	(1.597)
Constant	-3.767**	-0.960**	188.907***	53.782***	58.994***	44.073***	10.844***	5.888**
	(1.878)	(0.477)	(14.892)	(3.495)	(3.857)	(5.763)	(1.111)	(2.917)
Observations	21,501	21,501	21,501	21,501	21,501	21,501	21,501	21,501
Adjusted R-squared	0.040	0.032	0.099	0.003	0.009	0.008	0.008	0.021
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State x Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Outcome variables in each column stand for the total amount of time per day (in minutes) spent on a given activity. Column (1) – calls, messages, emails, etc. Column (2) – calls to the family. Column (3) – overall time on leisure, socialization and communication. Column (4) – socialization and communication. Column (5) – socialization outside of home. Column (6) – time spent in others' homes. Column (7) – attending and hosting events. Column (8) – time on organizational, civic and religious activities. Panel A focuses on immigrants who arrived in the US after 2003. Panel B focuses on immigrants who arrived before 2003. Robust standard errors, clustered at the level of origin country in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

The strongest effects of origin-country Internet on communications and calls to family are observed for the years after signficant spread of new ICTs (such as Skype and Facebook). Figure 12 shows that the effect of home-country Internet on telephone calls, messages and emails by immigrants is driven by post-2008 years, when, as discussed above, Skype began to dominate the market for international calls and Facebook grew in popularity (see Section 3.3). All the effects reported above are stronger for younger people.



(a) Post-2008 years

(b) Pre-2008 years

Figure 12: Binscatter: effects of origin-country Internet on calls/messages/emails. With origin and state x year FEs.

Finally, I also find that immigrants' use of computers for leisure increases sharply with the spread of Facebook in their countries of origin. Figure 13 shows that, conditional on origin and state × year FEs, an increase in Facebook usage[27] at the origins increases leisure time immigrants spend on computers. As before, this effect is driven by immigrants who arrived after 2003. The effect of Facebook is stronger than that of simple Internet access.

[27]The measure of Facebook usage here is based on the Google Trends data introduced in Section 3.3. I extend the GT Index with its maximum value for each country for all years past the year of pick popularity (as Facebook usage does not decline, but simply grows slower afterwards).

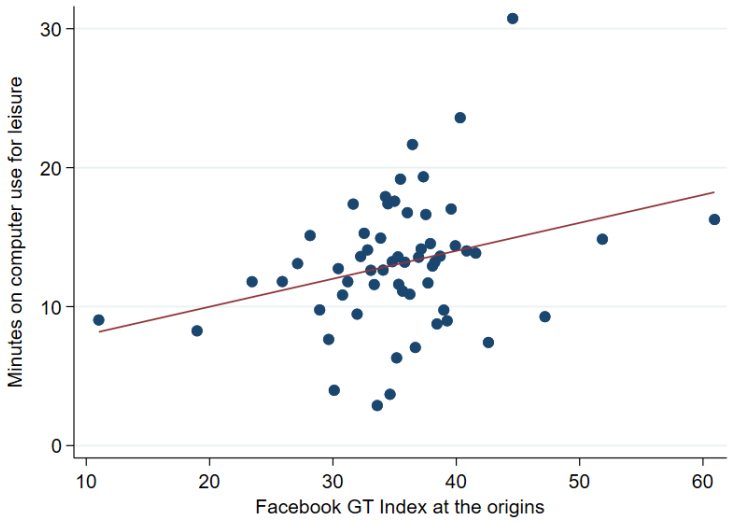


Figure 13: Binscatter: effects of origin-country facebook usage on computer leisure time. With origin and state x year FEs.

6 Conclusion

A common belief is that globalization and digitization decrease communication barriers, fasten integration, and make individuals more "global" or less "ethnic". Moreover, the conventional wisdom suggests that immigrants from better connected countries have an advantage in integration. This paper explores a potential other side of the Internet effects. I find that (i) reduced cross-border communication barriers can actually slow down the process of immigrants' integration; and that (ii) people coming from better connected countries can be worse off in terms of integration.

In particular, the main finding is that increased home-country Internet access lowers the pace of immigrants' social integration, as measured by English proficiency and naturalization. Importantly, these effects are most pronounced for low-skilled immigrants, implying that home-country Internet can further widen the gaps between low- and high-skilled immigrants.

One question remaining open for policy is how to address the fact that new communication technologies can lock immigrants in their origin-country "bubbles"? Future research should address potential ways to utilize the Internet and new online communication technologies to foster, not restrict, immigrants' integration.

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Appendix

A. Additional Figures and Tables

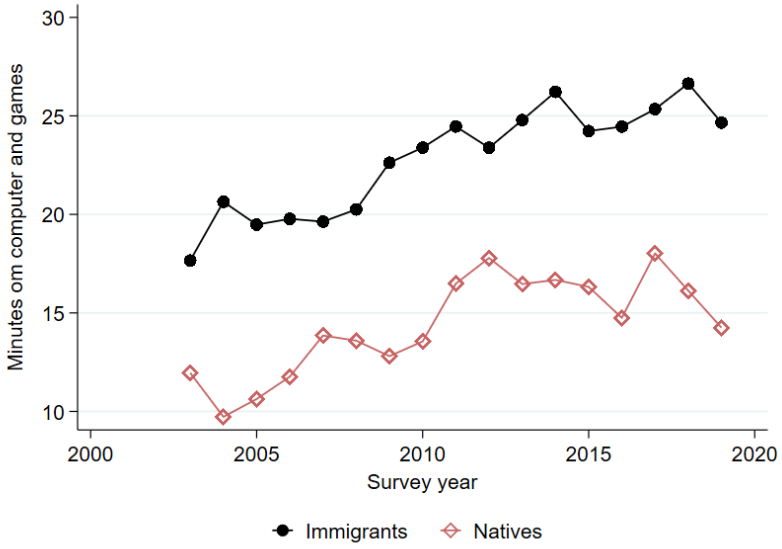
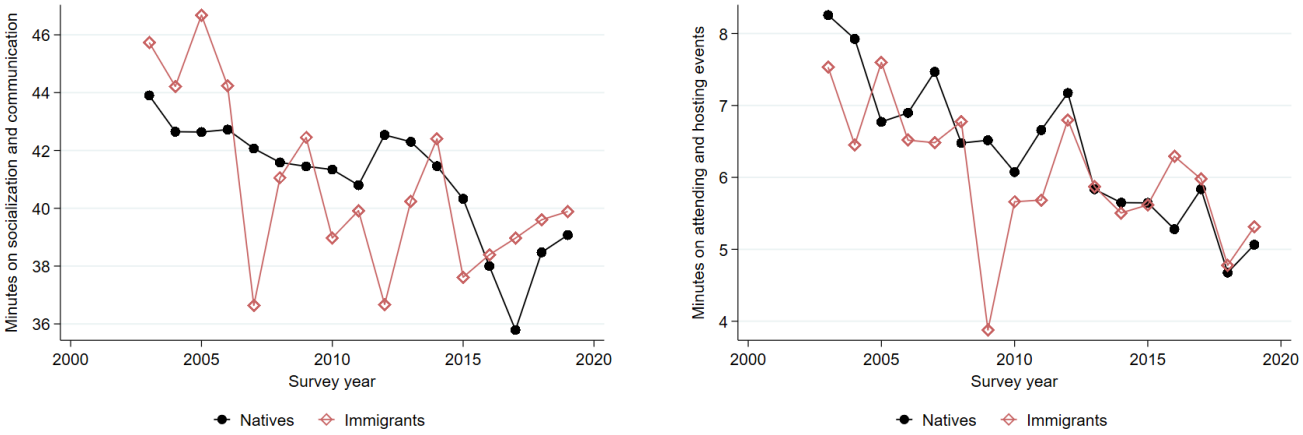
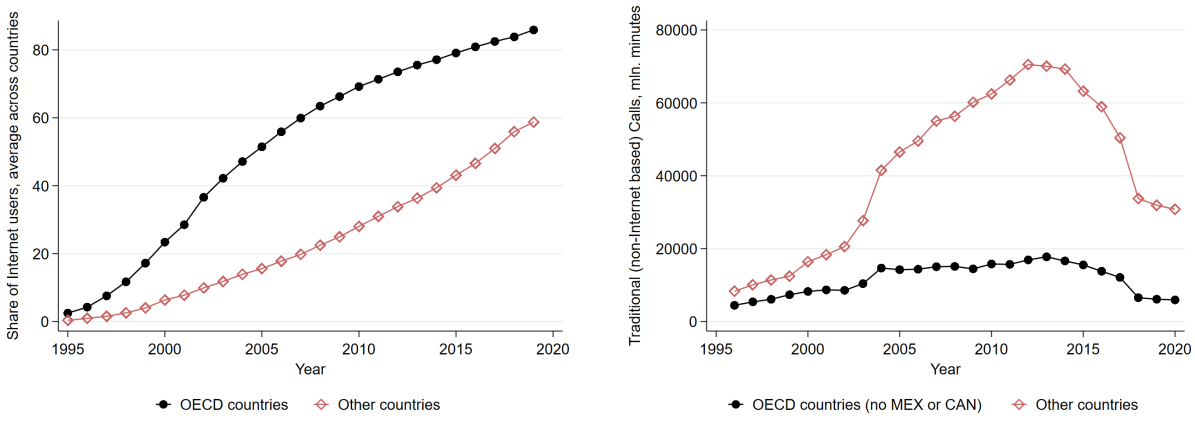


Figure A1: Time spent on computer and games, immigrants and natives



(a) Time on socialization and communication (b) Time attending and hosting events

Figure A2: Local socialization, communication, and attending/hosting events



(a) Internet access

(b) Traditional calls with the US

Figure A3: Internet access and traditional calls: OECD vs. other countries

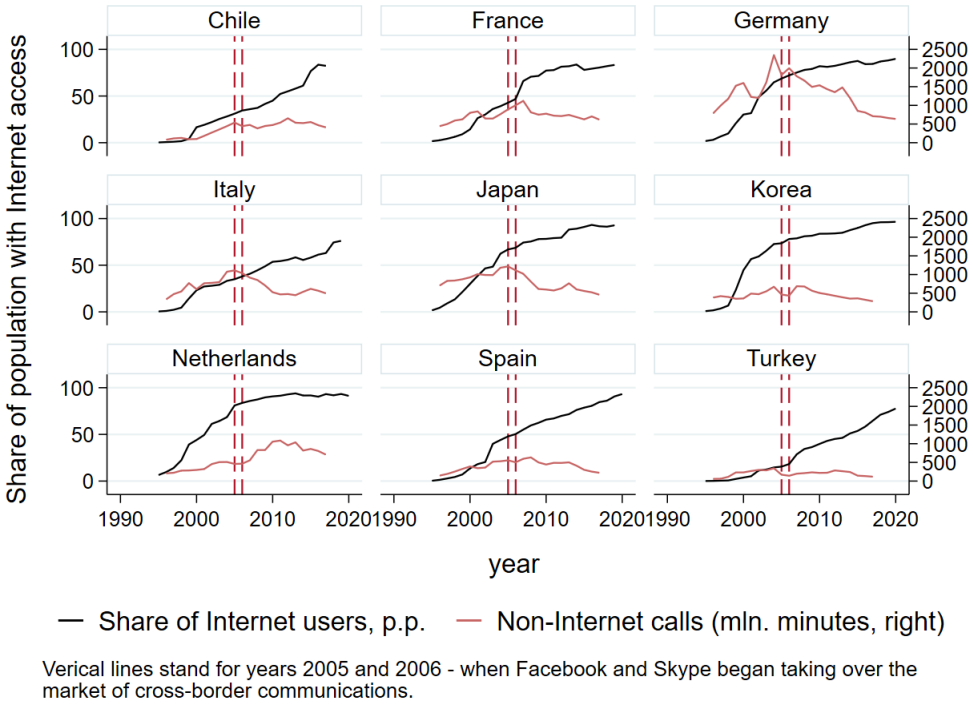


Figure A4: Calls with the US and Internet penetration, first adopters

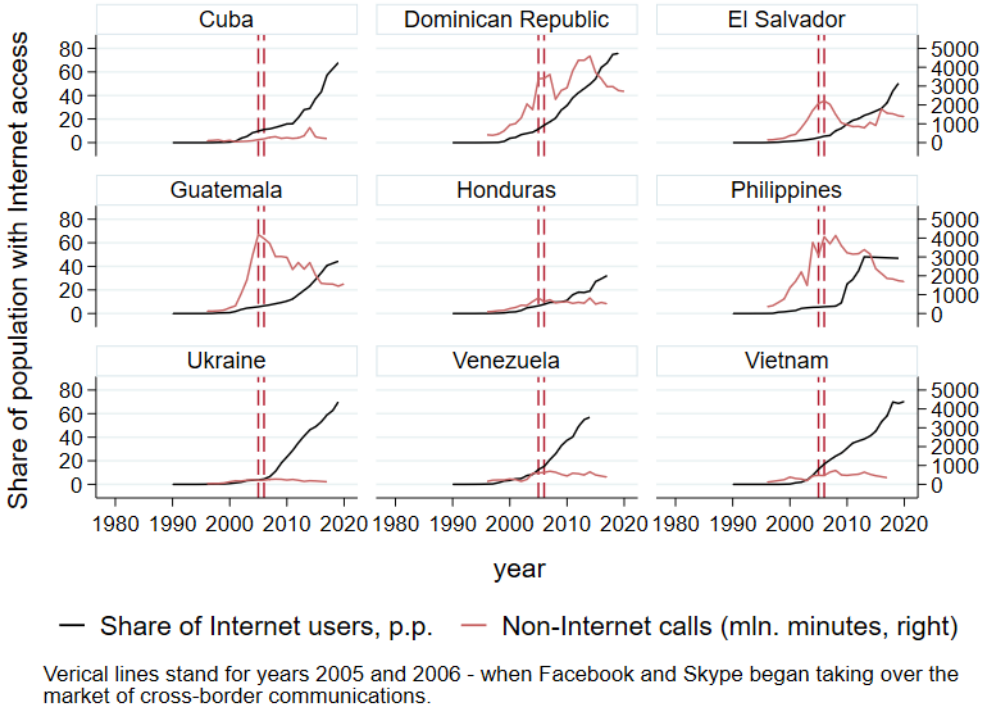


Figure A5: Calls with the US and Internet penetration, followers

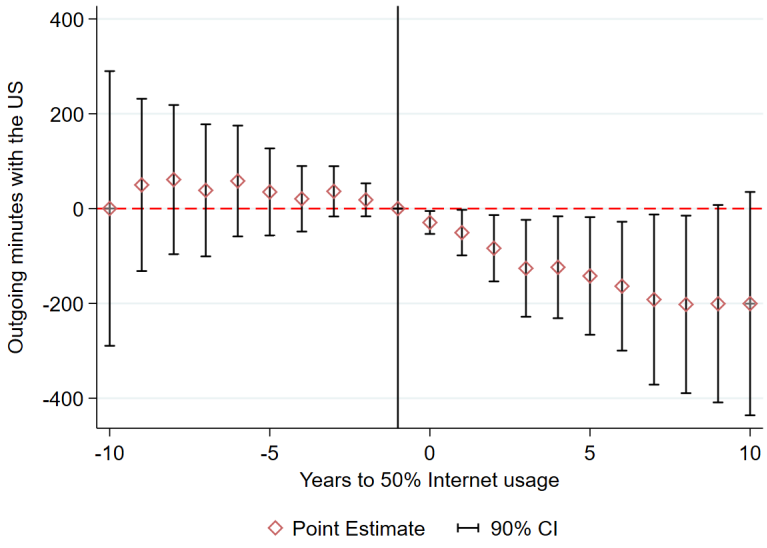
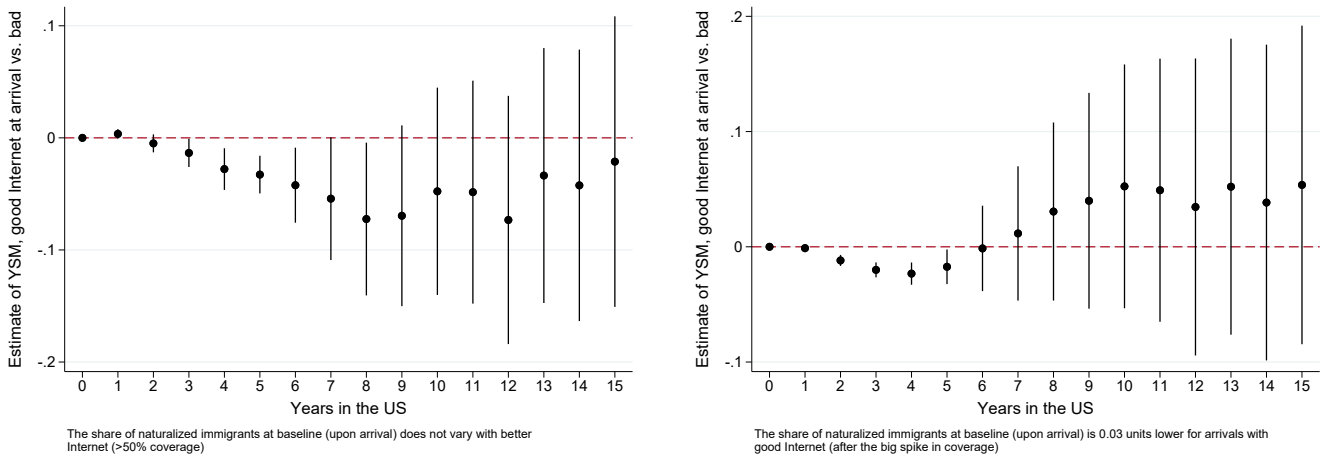


Figure A6: Calls with the US and Internet penetration: event study



(a) Differences by 50% coverage (b) Before vs. after big increase in coverage

Figure A7: Naturalization rates, differences by origin-country Internet at the time of arrival

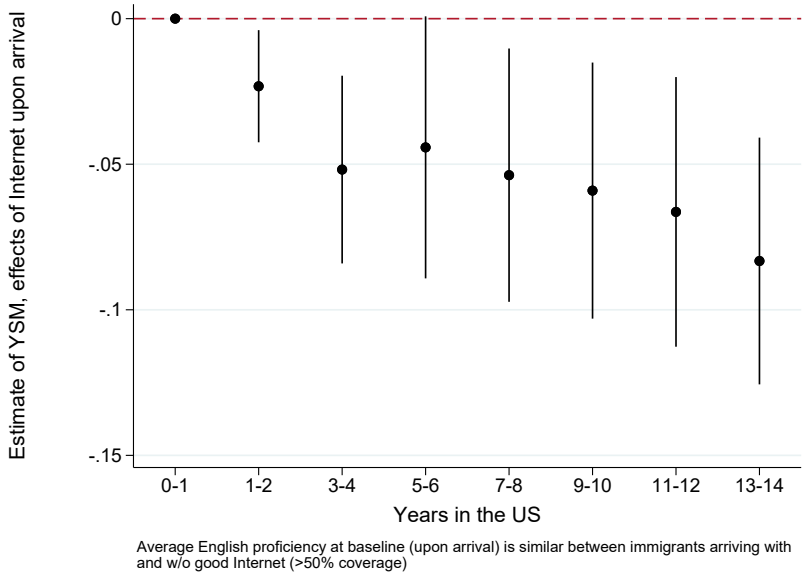


Figure A8: Linguistic integration, difference by origin-country Internet at arrival (5-year window)

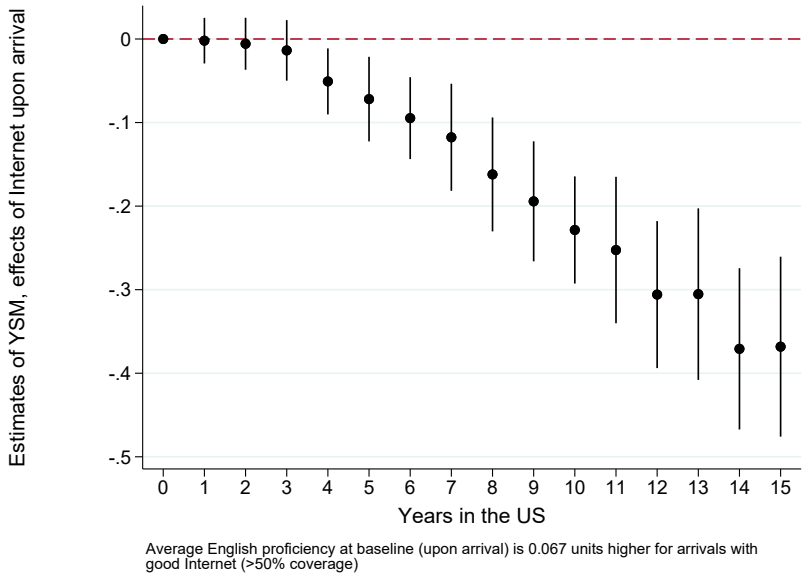


Figure A9: Difference by origin-country Internet at arrival, allowing different integration paths: (i) OECD/not, and (ii) by arrival cohort bins

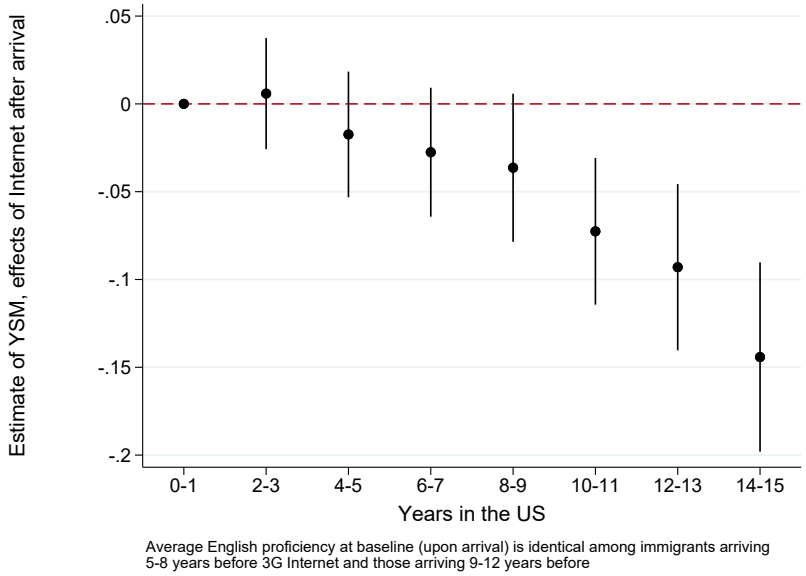
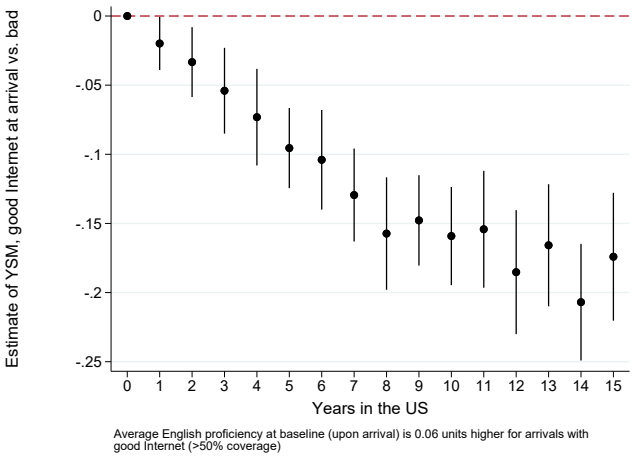
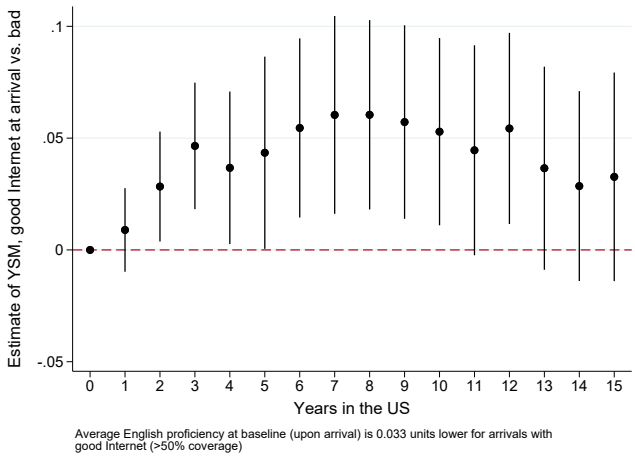


Figure A10: Linguistic integration: effect of 3G Internet shocks 5-8 years after migration

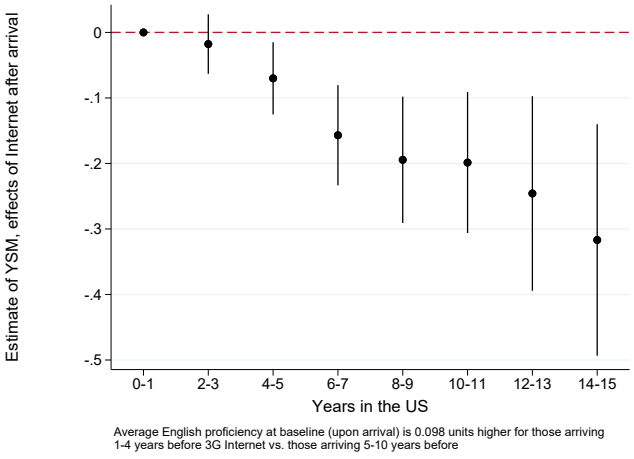


(a) Low English proficiency

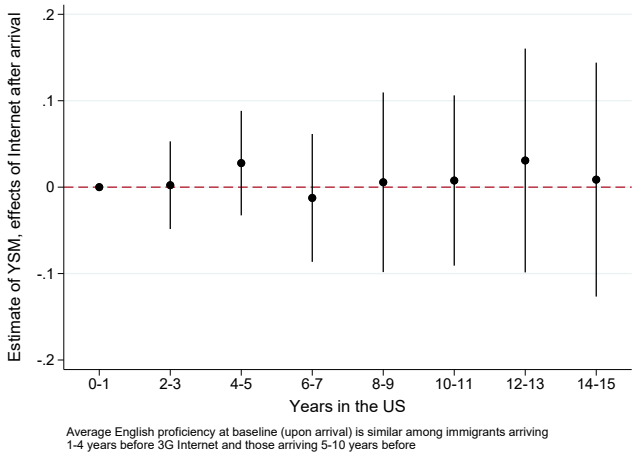


(b) High English proficiency

Figure A11: Effects of origin-country Internet: differences across English sill levels



(a) High school and college dropouts



(b) College or higher

Figure A12: Effects of origin-country 3G-Internet post-migration: differences by education

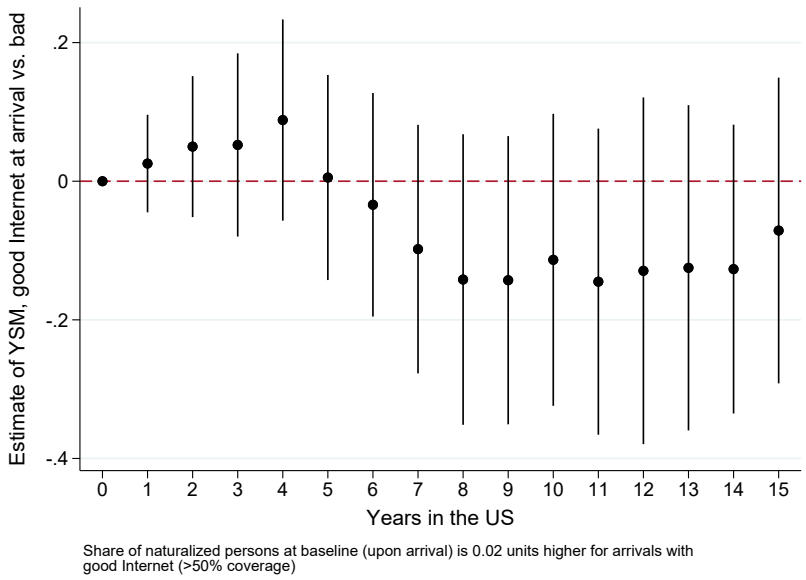


Figure A13: Linguistic integration, difference by origin-country Internet at arrival, 7 or under y.o. at arrival

B. Anecdotal evidence and interviews of immigrants

Descriptive evidence from Dekker and Engbersen (2014) describes very well the mechanisms I model. First, on the "network substitution" effect:

- "I still have many friends in Ukraine and, regardless of the distance, we can still communicate – Skype is amazing. Once there was the birthday of my mate. They were at my friend's apartment drinking beer, so they called me on Skype, ... and I was drinking beer with them." (Viktor, 21, migrated from UA to NL)

- "My life is very good here, but much of my social life is still in Brazil. Nowadays, 90 per cent of my contacts on the internet, in emails or on Facebook are in Brazil. ... much of my life is still there... I have friends here of course, but it is a ... more distant relationship. In Brazil, I have closer friendships, people whom I talk with more frequently, via Skype, Facebook or email." (Beatriz, 45, migrated from BR to NL)

Second, on the "cultural selection" effects:

- "If I were to migrate 20 years ago without having this technology, phones and internet, it would probably be far more difficult for me since my bonds with my friends are very

close. ... So, it would be difficult for me. I would probably miss them a lot. But, now it is quite easy." (Viktor, 21, migrated from UA to NL)

- "I was not sure which country to go to so I decided that a good first step would be to contact a relative in Belgium ... . I had never met him in person because he migrated years ago but my father told me about him. I searched for him on Vkontakte.ru and found his daughter. They were very happy to hear from me and they sent me an invitation to visit them in Kortrijk [Belgium] so I could apply for a tourist visa." (Ivan, 27, migrated from UA to BE)