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

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July 2024

Abstract

This paper documents the effects of origin-country Internet expansion on immigrants' socio-economic integration, spatial segregation, and networking behavior. 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 data from the ACS (language skill, naturalization, location choice, employment, etc.), I find that growing Internet access at the origins slows down the pace of immigrants' socio-economic integration. Importantly, the effect is driven by lower-skilled immigrants, suggesting that the Internet can exacerbate the gaps between low- and high-skill immigrants. On the bright side, home-country Internet tends to decrease spatial concentration of new immigrants and increase their subjective well-being. 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 return intentions, 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

*I'm very grateful to Joop Adema, Cevat Aksoy, Catia Batista, Leah Boustan, Pedro Dal Bo, Frederic Docquier, Ruben Enikolopov, Martin Fernandez, Oded Galor, Paola Giuliano, Albrecht Glitz, Brian Knight, David McKenzie, Stelios Michalopoulos, Giovanni Peri, and David Weil for their valuable comments and suggestions. This paper has also benefited from active discussions at Brown, NBER, CERGE-EI, LISER, New Economic School, ASREC-2022 (London), Migration Workshop and Migration and Family Workshop in Paris-2023, CESifo Venice Summer Institute on "The Economics of Social Media" 2024, EEA-ESEM 2024, "Understanding Voluntary and Forced Migration" Conference (Lille 2024), Economics of Migration webinar, and PhD-EVS webinar.

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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, regular cross-border communications were hardly possible, while 15-25 years ago, international calls were prohibitively expensive. Since then, thanks to the growing spread of the Internet[1] and the emergence of new ICTs like Skype and Facebook in mid-2000s, we enjoy unprecedented opportunities to stay in touch with distant families, friends, and media. How does this transformation affect immigrants' integration into host countries? Do new ICTs bring closer or further segregate immigrants and natives? Despite recent discoveries of how the Internet affects local economics and politics[2], the cross-border effects of the Internet - on immigrants and receiving communities - remain unknown. Given the increasing global reach of the Internet, and growing salience of immigrants' (and refugees') integration, it is important to addresses this gap, which I do in this paper.

How can home-country Internet expansion affect immigrants? On the one hand, the Internet can reduce social costs of migration, 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, home-country Internet can allow immigrants to stay in their home-country online "bubbles", reducing destination-country networking and slowing down integration. Moreover, lower costs of separation from family and friends can change selection into migration, increasing the share of individuals highly attached to their homeland among the pool of immigrants. While there is some anecdotal evidence linking the Internet and immigrants' integration[3], we still lack both theoretical framework and systematic evidence.

In this paper, I provide both theory and evidence on the effects 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 generates 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 and economic in-

[1] In 2000, the share of population with Internet access in the non-OECD countries was 5%. For the OECD countries, the corresponding figure was 24%. By 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. Arat and Bilgili (2021) and Guo et al. (2022) find that online networks increase immigrants' subjective well-being and act as coping mechanisms. Miconi (2020) argues that immigrants' online networks are heavily co-national and bring little participation in local community or political life.

tegration - language use, naturalization, networking, employment - 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 2004 (in the "age of the Internet"), display slower language learning and slower naturalization than earlier cohorts. Second, with the Time Use data, I show that immigrants' time on local socialization, especially outside of home, has significantly decreased over the years, even more so than for natives. In contrast, time on computers, and calls / 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 enter the market in mid 2000s. Intuitively, in major sending countries, the usage of Facebook has responded to growing Internet access particularly strongly.

I then proceed to estimate the effects of origin-country Internet access on immigrants' integration using two strategies. First, I use the variation in origin-country Internet access at the time of arrival: I zoom into small windows around origin-country Internet improvements, and compare immigrants arriving a few years before vs. after Internet improvements. I find that immigrants arriving with better origin-country Internet have a slight advantage upon arrival but subsequently display much slower social (English skills, citizenship) and economic integration, eventually loosing to earlier, low-Internet cohorts. On the flip-side, immigrants arriving with better Internet sort into locations with fewer co-nationals. There results are robust to (i) different measures of Internet expansion, (ii) various sets of FEs, and (iii) are not driven by increasing migration from the origins following Internet expansions. However, despite immigrants' observables being balanced between treatment arms, different Internet at-arrival could still create both the composition and the post-migration effects.

To separate selection/composition effects from post-migration effects of the Internet, I use data from Collins Bartholomew on the staggered roll-out of 3G/4G technology across sending countries. I focus on immigrants who arrived in the US before any 3G Internet at the origins and estimate how a post-migration origin-country 3G shock affects social integration. As before, origin-country Internet shocks slow down immigrants' social integration. Naturally, the effects are stronger if Internet improvements happen in first several years post-arrival.

I document several important HTEs of home-country Internet access. First, with respect to characteristics of immigrants, the negative effects of the Internet on social integration are driven by lower-skilled immigrants (measured by education level or by English skill 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)). With respect to the characteristics of the destination regions, I find that the negative effects of home-country Internet are most pronounced in localities with smaller pre-existing shares of co-nationals - i.e., places where before Internet, immigrants would be most likely to interact with natives. Finally, the effects are also stronger for Hispanic immigrants.

What are the mechanisms behind these effects? First, I test whether immigrants change their networking behavior at destination. I use the American Time Use Survey (ATUS) to measure immigrants' networking behavior and find that increasing Internet access at the origins increases immigrants' time on family calls, and decreases time devoted to communications and socialization locally. Moreover, spread of Facebook at the origins increases leisure time spent on computers. Thus, decrease in local networking is one of the mechanisms.

Another mechanism could be changing return intentions - a shorter time horizon in a host country can decrease immigrants' incentives to invest in local human capital. Using data from the Gallup World Poll, I do not find evidence for increased return intentions as origin-country Internet expands. If anything, return intentions tend to decrease for several subgroups of immigrants (married, lower educated, etc.).

Finally, I document an important trade-off between social integration and subjective well-being of immigrants. On the one hand, there is a negative effect of home-country Internet on immigrants' social integration. On the other hand, subjective well-being and health of immigrants increases with growing home-country Internet access.

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-

[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).

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 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].

[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.

[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

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' social and economic integration. Section 5 shows treatment effect heterogeneities, while Section 6 explores the mechanisms. Additional evidence on how home-country Internet affects immigrants subjective well-being and cultural selection is discussed in Section 7. Section 8 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 between net monetary gains from migration (set as exogenous in this simple version) and social costs of separation from the origin.

Denote by $N^f_{i,o}$ the number of close friends and family members that individual i has at the origin, and let s^f_o 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, $n^f_{i,d}$ and maintaining origin ties, $n^f_{i,o}$. 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 $n^f_{i,o} = 0$.

After the Internet and cheap communication tools arrive, p_o drops, and maintaining origin

discuss any papers dealing with the effects of social media on immigrants. This paper addresses this gap.

[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.

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:

$$\max_{n^f_{i,o}\geq 0, n^f_{i,d}\geq 0} \quad U^f = \log(n^f_{i,o}) + \log(n^f_{i,d} + \bar{n})$$
$$\text{s.t.} \quad p_o \cdot n^f_{i,o} + n^f_{i,d} = T^f \;\; (BC)$$
$$n^f_{i,o} \leq s^f_o \cdot N^f_{i,o} \;\; (CC)$$

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 $(n^f_{i,o})^* = \frac{T^f + \bar{n}}{2p_o}$ units of time with the origin-country ties, and the remaining time establishing host country ties[11]. However, if origin-country connectivity s^f_o is low, the (CC) constraint becomes binding, so that $(n^f_{i,o})^* = s^f_o \cdot N^f_{i,o}$. Combining the two conditions, the amount of time an immigrant spends on origin-country ties is given by

$$(n^f_{i,o})^* = \min\{\frac{T^f + \bar{n}}{2p_o},\; s^f_o \cdot N^f_{i,o}\} \tag{1}$$

Thus, for low levels of origin-country connectivity s^f_o, 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.

[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 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.

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 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

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

[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.

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.

The final prediction of this model is that growing origin-country connectivity, s_o^f, allows immigrants to move closer to the unconstrained optimum, thereby increasing their utility levels. In terms of the testable predictions, this implies that origin-country Internet expansion is expected to increase immigrants' subjective well-being.

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

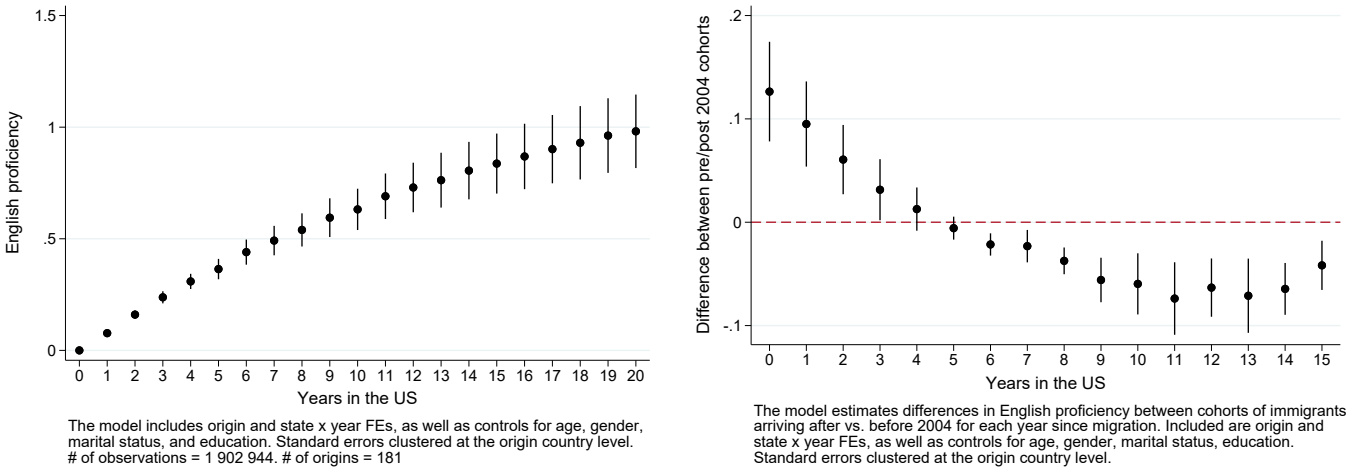
To measure immigrants social integration, I use data from the American Community Survey (ACS), obtained via IPUMS-USA. I focus on English proficiency and naturalization rates as key outcomes, and use residence in co-national enclaves as an additional outcome[14]. For my main analysis, I use the sample of immigrants aged 18 to 64, for whom English is not a native language, arriving from 1996 to 2019 (the period more relevant for the roll-out of the

[14]In progress in data analysis for two additional measures: inter-ethnic marriages, Bleakley and Chin (2010), and linguistic content of jobs, Peri and Sparber (2009).

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, e.g., 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 origin country level.



(a) Baseline

(b) Difference between pre/post 2004 cohorts

Figure 1: Linguistic Integration profiles

Figure 1a shows the baseline dynamics of linguistic integration with respect to the number of years spent in the US. One can clearly see a log-like dynamics, with the first 7 years post-arrival display the fastest accumulation of linguistic skill and accounting for half of the long-term increase. Importantly, Figure 1b shows that immigrants arriving after 2004 (in the "age of the Internet")[15] integrate much slower: while having an advantage upon entry, later cohorts learn much slower, loose their advantage in 4-5 years, and display lower

[15]The year 2004 is chosen as the first year when Skype and Facebook start to spread, and when the usage of the Internet first reached 50% in the developed world, Figure A5a. However, a similar picture is observed around any of the 2003-2006 threshold cohorts.

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

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	English Proficiency			Naturalized (citizenship)		
Log (Years in the US)	0.381***	0.433***	0.258***	0.246***	0.202***	0.344***
	(0.034)	(0.030)	(0.028)	(0.054)	(0.057)	(0.017)
Cohort post-2004	0.235***	0.277***	0.113***	0.164***	0.110***	0.302***
	(0.050)	(0.049)	(0.025)	(0.053)	(0.041)	(0.032)
Log (Years in the US) x Cohort post-2004	-0.141***	-0.165***	-0.065***	-0.087***	-0.055**	-0.172***
	(0.027)	(0.026)	(0.013)	(0.033)	(0.025)	(0.019)
Observations	1,626,396	1,104,666	521,725	1,564,263	1,056,821	507,437
Adjusted R-squared	0.434	0.360	0.251	0.209	0.197	0.259
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
State x Year 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. The Log of years spent in the US captures the concave integration path. In each specification, Log (Years in the US) is interacted with the cohort of arrival: before 2004 vs. after (inclusive). Columns (2) and (5) restrict the sample to immigrants without higher education (college dropouts, high school or lower). Columns (3) and (6) restrict the sample to immigrants with completed higher education. Robust standard errors, clustered at the level of countries of origin in parentheses, *** p<0.01, ** p<0.05, * p<0.1

levels of English skill in the long run. Importantly, the effects are driven by younger and lower-educated immigrants, as shown on Figure A2 in the Appendix.[16]

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. As one can see from column (1), post-2004 cohorts have approximately a 37% slow-down in the log rate of English learning. Importantly, the effect is much more pronounced for lower-educated immigrants (column (2)) than for higher-educated ones (column (3)). Despite the fact that post-2004 cohorts enter with better English skills, this initial difference disappears in 5-6 years, and earlier cohorts overtake later ones from thereon. Additional integration outcome is naturalization, which also slows down for post-2004 cohorts. Here, however, the effect mostly comes from higher-educated immigrants (column (6)) - potentially because more educated immigrants are more likely to pass the US naturalization test.

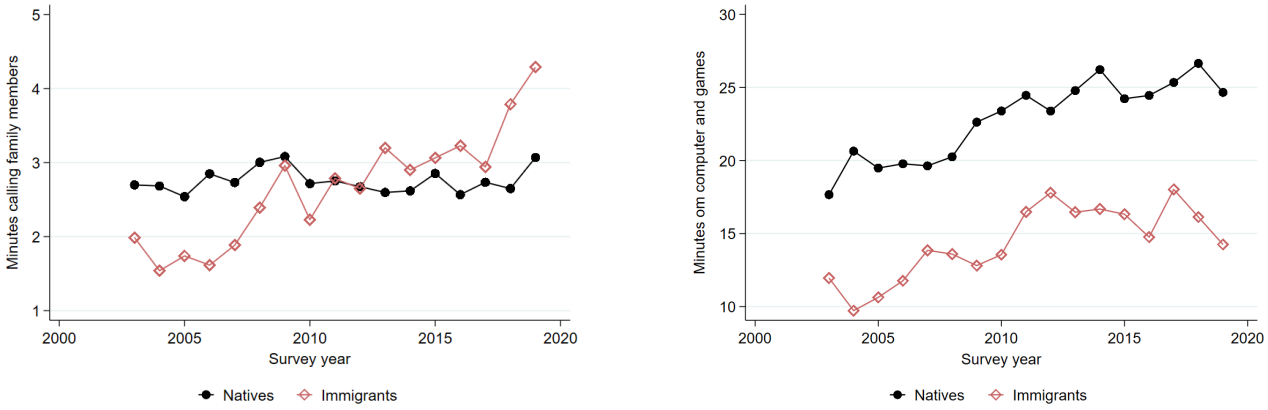
3.2 Networking patterns: American Time Use Data

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,

[16] Appendix Figure A1 further confirms a slow-down in the pace of linguistic integration among the 5-year arrival cohorts from 1996-2000 until 2015-2019.

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[17].

Figure 2 shows the dynamics of time devoted to (a) family calls and (b) computer use for leisure and games. While natives spend a constant amount of time on family calls, immigrants start at the lower level, increase family calls from 2006 onwards, and eventually overtake natives. Time on computers for leisure (including games, social media, chats, etc.) increases for both natives and immigrants, but the relative increase is larger for immigrants (approximately a 45% increase as compared to around 30% increase for natives)[18].



(a) Calling family

(b) Computer for leisure and games

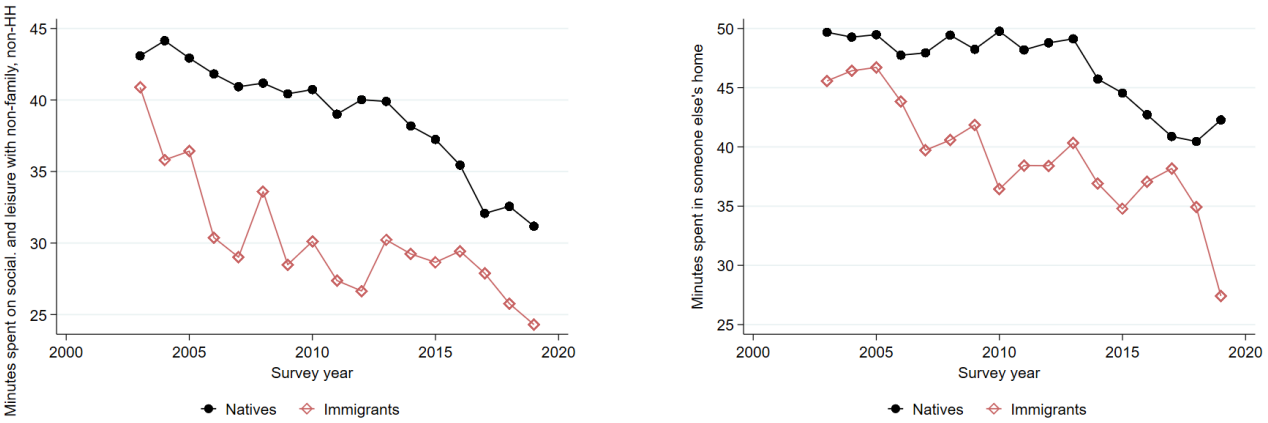
Figure 2: Digital time use by immigrants and natives

How does immigrants' local networking behavior change over time? Using the ATUS dimensions on "with whom" and "where" the activity is conducted, I measure how much time immigrants spend with non-household members, in someone else's homes, etc. 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 A5 shows that both immigrants and natives spend less and less time on socialization and communication activities

[17]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.

[18]Figure A3 in the Appendix shows that the effects are driven by (a) immigrants who live alone (so the calls are likely with family back at the origins), and (b) younger immigrants (15-35 years).

(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.

3.3 Internet penetration, new ICTs, and traditional calls

I use several sources of data to measure the modes of cross-border connectivity. First is the data from the International Telecommunications Union (ITU) on the percentage of population with access to the Internet[19]. Second, data from TeleGeography gives the volume of traditional (non-Internet) international calls between the US and every other country. Finally, I use data on the spread of online 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

[19]Figure A5a 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. E.g., in Germany, it took 4 years to go from 10% to 50%. Similar rapid expansion observed in other first adopters. In developing countries, the Internet expanded later, but the process was often as quick once good infrastructure arrived.

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.

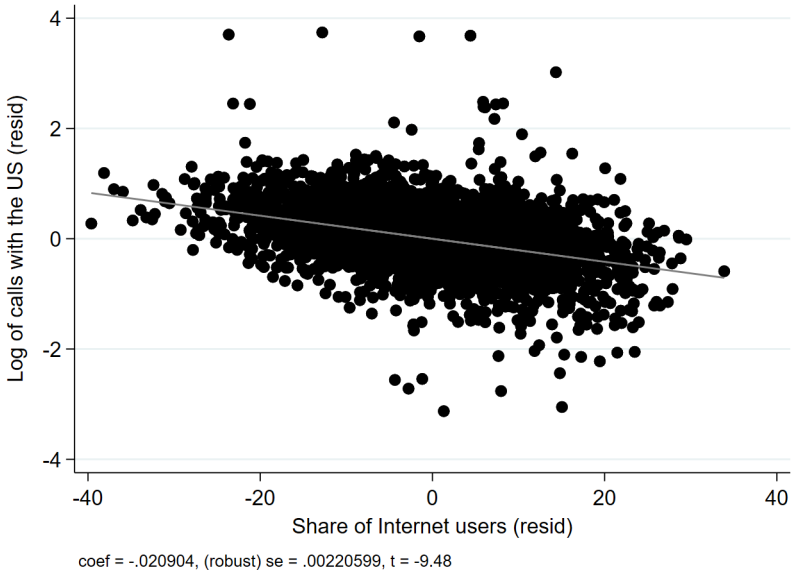


Figure 4: Log of calls with the US and spread of the Internet at the origins

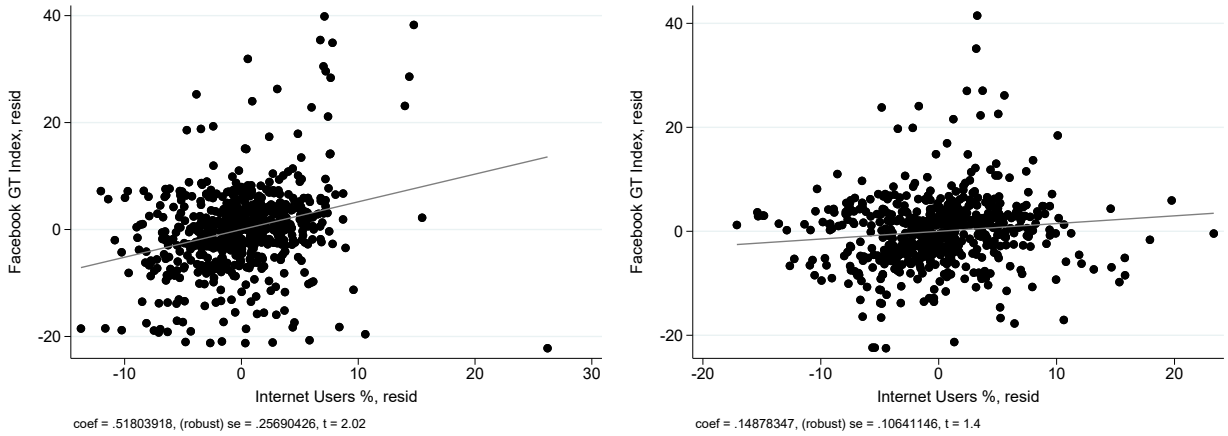
Figure 4 reveals a very clear substitution pattern: an increase in the Internet availability decreases reliance on traditional carrier calls to the US. Table B1 in the Appendix further shows that the effect of Internet is amplified by the growth of Skype's international calls market share. Importantly, while reaching 25% and 50% Internet penetration has large effects on traditional calls, reaching 10% Internet is not sufficient (null effect).

Switch towards new ICTs

Do immigrants switch to cheaper tools, such as Facebook or Skype, once origin-country Internet expands? To test this empirically, I use data on Facebook's search popularity from Google Trends (GT). This data allows me to measure online search intensity 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

[20]Figure A5b 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 A6 and A7 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.

time periods (Turkey in November 2012). As Facebook's global reach expanded after 2007, the respective GT search index grew until reaching its peak in early 2010s. Figure A8 shows the dynamics of search interest in Facebook, and brakes it down by net emigration rates: countries with high emigration rates display 60% more interest in Facebook at the peak.



(a) High net emigration

(b) Low net emigration

Figure 5: Facebook usage in sending counties and Internet access, by net emigration

Figure 5 shows that Facebook usage across sending countries responds positively to growing Internet access (country and year FEs included). Importantly, the effect is most pronounced for countries with higher net emigration. Thus, we see a clear substitution effect: better Internet access at the origins results in lower traditional calls with the US, and higher usage of new ICTs to stay in touch with those who left.

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 (which excludes composition effects). I then present my main findings and discuss several robustness checks.

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 strategy exploits differences in origin-country Internet at the time of migration, comparing immigrants who arrived in the US just before vs.

just after significant Internet expansion at the origins. Specifically, 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 $Y_{i,o,s,t,m}$ is an integration outcome (e.g., language proficiency) of immigrant i, from origin country o, living in state s, who arrived to the US in year m, and is observed in year t. $Connect_{o,m}$ is a measure of origin-country Internet connectivity at the time of migration. My main measure of online connectivity is based on the share of origin-country population with access to the Internet (ITU). Since the most rapid Internet expansion in many countries happens between 25% and 50% of coverage, I code origin countries as having "good Internet" when at least 50% of origin-country population has access to the Internet[21]. Alternatively, I use as a threshold the year of the biggest increase in Internet usage.

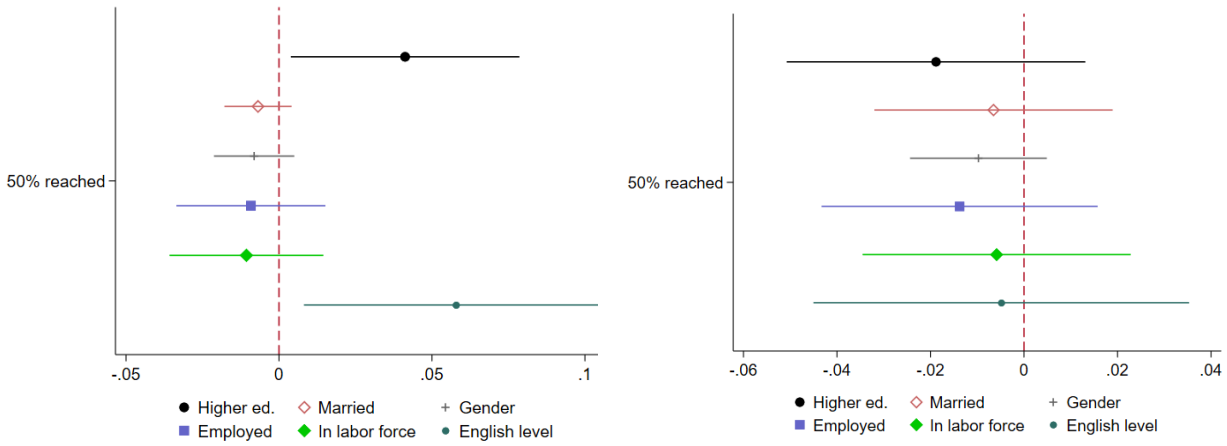
As before, model (5) includes state x time FEs to absorb shocks common to all immigrants across time periods (e.g., changes in national policies) and across locations (e.g., local labour market shocks). A collection of origin x migration cohort FEs captures differences in integration coming from changing characteristics of migrant cohorts, Borjas (1985, 2015).

It is crucial to acknowledge that the estimates of β_{t-m} from model (5) capture the combined effect of the home-country Internet via (i) potentially changing composition of immigrant population (home-country Internet changing selection into migration along economic or cultural lines), and (ii) differential pace of integration post-arrival, holding immigrants' characteristics fixed. To assess the severity of potential selection/composition effects, I report the estimates of the 50% Internet coverage indicator on observable characteristics of immigrants at arrival (years 0 or 1 since migration) on Figure 6a, including the set of origin, cohort, time, and state FEs. The only significant difference in key observables is in education and English skill: immigrants arriving with better origin-country Internet tend to be more educated and have better English skill at arrival[22].

To make control and treatment units more comparable, I zoom into 5-(or 3-)year windows around the improvement in origin-country Internet: upon-entry differences in observables between immigrants disappear, Figure 6b, but the effects of home-country Internet on integration (to be shown later) remain qualitatively the same. To further address the concerns of

[21]Results are weaker when using a 25% threshold of "good Internet" coverage. When the threshold is very low, the results are null (e.g., for 1% or 10% threshold).

[22]This result could reflect a stronger positive effect of the Internet on net benefits from emigration for higher educated people: e.g., online job search tends to be high-skill biased. Under the more restrictive set of FEs (interactions of cohort × origin FEs) differences upon arrival disappear even on the full sample.



(a) Full sample

(b) 5-year window around 50% year

Figure 6: Observables' balance: immigrants arriving before/after 50% Internet at the origins

home-country Internet affecting composition of immigrants, I identify individuals who were likely followers in the move: those married and not in the labor force. While selection is likely weaker here, I still see a strong effect of Internet at arrival on subsequent integration.[23]

Finally, origin country Internet expansion can potentially affect the size of immigration flows from the origins, Adema et al. (2022). I show in Table B2 in the Appendix that there are no strong effects of origin-country Internet penetration on the number of immigrants at the origin x year level[24]. In my most demanding specifications, I also allow for cohort-specific integration paths ($\theta_M \times YSM_{t,m}$), and even for origin-specific integration ($\phi_o \times YSM_{t,m}$). While the size of the effect decreases, the sign remains the same.

While the analysis of home-country Internet upon arrival reveals limited selection effects, the analysis of post-migration Internet shocks will partial out composition effects completely.

Internet improvements after migration

The second strategy uses sharp variations in origin-country Internet access 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 big Internet expansion at the origins against similar immigrants who arrived several

[23]In one of the robustness checks, I allow for separate integration profiles based on observable characteristics of immigrants - results remain stable.

[24]Since it may take more time for the Internet to affect immigration to the US, I control for the regional time-varying share of co-nationals.

years before. The hypothesis thus is that Internet improvements after migration matter only if happen in the first several years post arrival in the US.

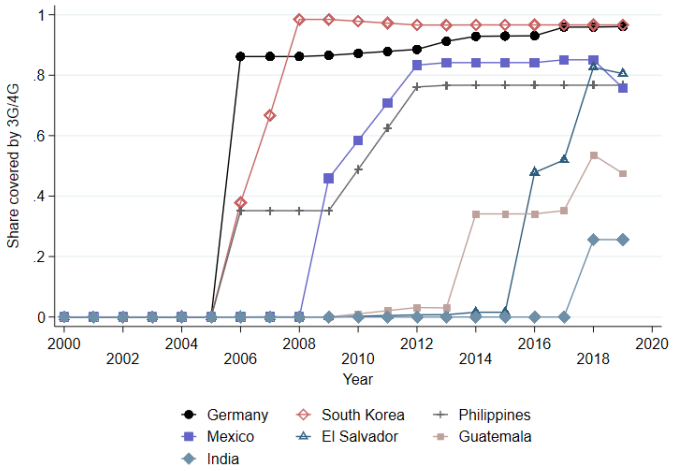


Figure 7: The dynamics of 3G/4G Internet expansion, several countries

I exploit sharp changes in Internet access post arrival using data from Collins Bartholomew on the spread of 3G/4G technologies across the globe. Figure 7 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 any 3G technology at the origins. I then compare integration dynamics of immigrants whose origin country got covered by 3G/4G technology shortly (1-4 years) after arrival to that of immigrants whose origins experienced 3G/4G expansion 5-10 years after arrival.

4.2 Effects of home-country Internet at the time of migration

4.2.1 Social integration: language learning and naturalization

Table 2 reports the effects of origin-country Internet at arrival on immigrants' subsequent social integration (language learning and naturalization). I start with a parametric, log-linear specification to capture the positive and concave effect of years spent in the US on social integration (in all columns, the effect of log-years in the US is positive and strong). In column (1), I introduce origin-country Internet coverage upon arrival, and show that on average, arriving with better origin-country Internet maps into lower subsequent English proficiency. Column (2) shows that better origin-country Internet slows down linguistic integration. Column (3) uses a 50% threshold for "good Internet coverage", and finds similar

results. Note that cohorts arriving with better origin-country Internet have higher starting levels of English skill, but lose the advantage in 3-4 years. Columns (4)-(6) replicate the analysis for naturalization dynamics: better home-country Internet at arrival slows down immigrants' naturalization.

Table 2: Effect of origin-country Internet at arrival on English learning and naturalization

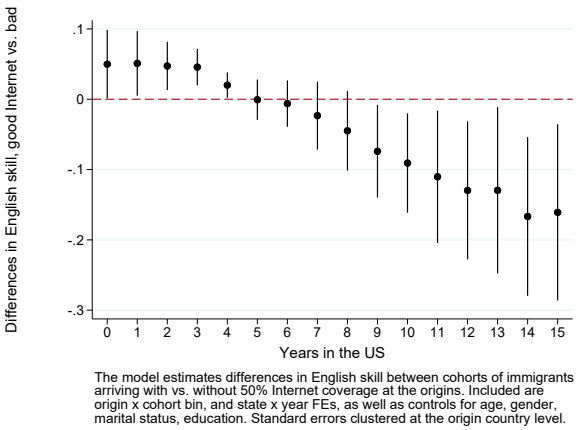
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	English Proficiency			Naturalized (citizenship)		
Log (Years in the US)	0.206***	0.253***	0.256***	0.024***	0.081***	0.079***
	(0.013)	(0.038)	(0.023)	(0.007)	(0.017)	(0.015)
Internet usage (% of the pop)	-0.459***	-0.161		-0.656***	-0.286***	
	(0.126)	(0.158)		(0.093)	(0.088)	
Log (Years in the US) x Internet usage		-0.143*			-0.178***	
		(0.077)			(0.041)	
Internet 50% usage reached			0.105**			0.034
			(0.045)			(0.031)
Log (Years 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 Year FE	Yes	Yes	Yes	Yes	Yes	Yes

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. The Log of years spent in the US captures the concave integration path. Columns (1) and (4) show the average effect of arriving with higher Internet usage at the origins. Columns (2) and (5) document how the integration profile changes with better origin-country Internet usage at arrival. Columns (3) and (6) use the 50% indicator of "good Internet coverage" at arrival, and how it affects the integration profile. Robust standard errors, clustered at the level of countries of origin in parentheses, *** p<0.01, ** p<0.05, * p<0.1

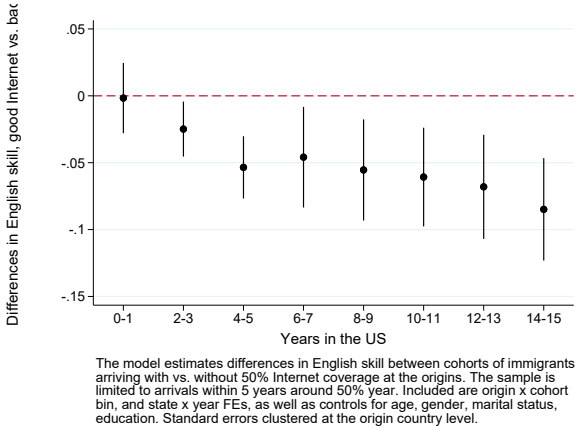
Figure 8 estimates a fully flexible specification from equation (5). It shows differences in linguistic integration paths between cohorts of immigrants arriving with good Internet (50% coverage at the origins) and those arriving without good Internet. Panel (a) uses the full sample of immigrants, while panel (b) restricts the arrival years to within 5 years around the year when 50% coverage was reached at the origins (to make treatment and control units more comparable). Clearly, immigrants arriving with better Internet at the origins show slower English proficiency growth. Even though "more connected" cohorts arrive with better starting level of English (on panel (a)), they loose the advantage in about 5 years.[25]

There are similar effects of origin-country Internet at arrival on subsequent naturalization process. Figure 9 shows that, on the full sample, cohorts arriving with better origin-country Internet show about 5 p.p. lower chances of obtaining citizenship within the first 5-9 years post-arrival. On a 5-year window sample, the effects last longer and amount to 6-7 p.p. lower

[25]FigureA9 in the Appendix shows similar results with the year of maximum increase in Internet coverage as the threshold year, instead of the (arguably arbitrary) 50% threshold.



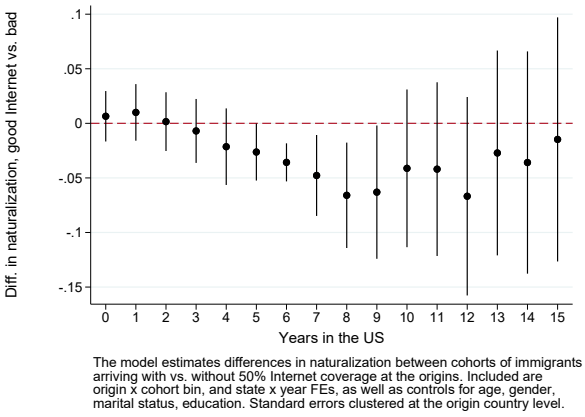
(a) Full sample



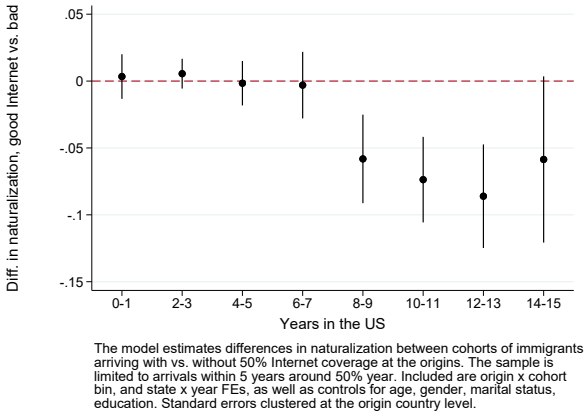
(b) 5-year window around 50% year

Figure 8: Linguistic integration: arriving after vs. before the origin reaches 50% coverage

naturalization rates in the long-run. Importantly, obtaining citizenship in the US is rarely possible before spending 5 years in the country, so the effects are naturally muted for the first 4-5 years since migration. Moreover, obtaining US citizenship requires a good command of English, so one can reasonably expect the effects to be concentrated in the upper part of the skill distribution (to be confirmed in Section 5).



(a) Full sample



(b) 5-year window around 50% year

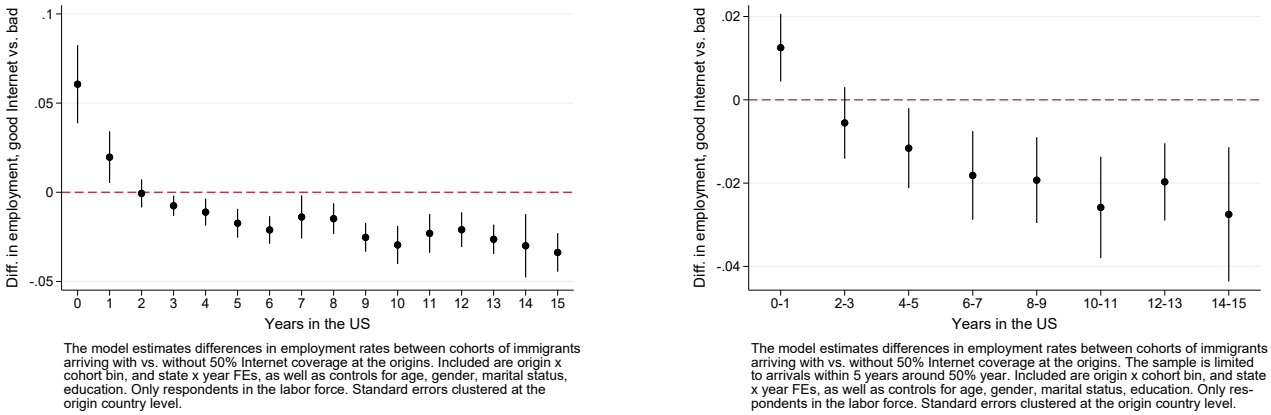
Figure 9: Naturalization dynamics: arriving after vs. before the origin reaches 50% coverage

4.2.2 Economic integration: employment and wages

To evaluate the effects of home-country Internet on the economic integration of immigrants, I estimate models similar to (5), but having employment and log wages as outcomes. The

hypothesis is that while home-country Internet can boost initial economic success of immigrants (due to better information pre-arrival, better labor-market match), the subsequent slower integration will (over)compensate for the initial gain.

Figure 10 estimates the effect of origin-country Internet (50% coverage threshold) on probability of being employed, conditional on being in the labor force. On both panel (a) (full sample), and panel (b) (5-year window around the 50% connectivity year), there is an initial gain in employment: 6% on the full sample and 1.2% on a more balanced sample. However, this initial gain quickly disappears and turns negative in the long-run. Within a narrow 5-year window sample, the long-run effect of arriving with better home-country Internet is around negative 2%.



(a) Full sample

(b) 5-year window around 50%

Figure 10: Probability of employment, differences by origin-country Internet (50%) at arrival

Similar results are observed for the 25% threshold Internet and for the years around biggest connectivity increase. Figure A10 in the Appendix shows similar differences between high- vs. low-Internet cohorts in terms of log-wage dynamics (conditional on being employed). Namely, initial wages are higher for immigrants arriving with good home-country Internet (could be an effect of better labor-market match at arrival), but this advantage disappears and turns slightly negative in the long-run.

4.2.3 Spatial clustering of immigrants

Physical proximity to co-nationals at destination (sometimes referred to as "enclave residence") is an important ingredient in the integration process, e.g., Borjas (1994, 2000), Edin et al. (2003), Beaman (2011), Battisti et al. (2021). How does home-country Internet affect

physical proximity of new immigrants to co-nationals at destination? If home-country Internet provides more information on destination pre-arrival, it can decrease the reliance on the diaspora for information and safety net provision, reducing the incentives of immigrants to settle in locations with larger diasporas. To test if better Internet access at the origins affects the initial location choice of immigrants within the US, I estimate the following model:

$$CoNatShare_{i,o,c(s),t,m} = \gamma \cdot Connect_{o,m} + X'_{i,o,c(s),t,m} + \phi_{o,s} + \psi_M + \eta_{c(s)} + \tau_{s,t} + \varepsilon_{i,o,c(s),t,m}, \quad (6)$$

where $CoNatShare_{i,o,c(s),t,m}$ is the share of co-nationals from o in county/PUMA[26] c in state s where immigrant i, who migrated in year m, resides in year t. Importantly, to construct the share of co-nationals in a given unit (county or PUMA) for a given origin, I use population counts from years 2005-2007 (three first years when county/PUMA IDs are available in the ACS). Thus, this model evaluates whether immigrants with better home-country Internet upon arrival sort into locations that had fewer co-nationals based on the 2005-2007 ACS[27]. As before, $Connect_{o,m}$ is a measure of origin-country Internet access at the time of migration. The hypothesis is that $\hat{\gamma} < 0$.

In contrast to previous models, I also include county/PUMA FEs, $\eta_{c(s)}$, and to evaluate the effects of the Internet on sorting within states, I include state x origin FEs, $\phi_{o,s}$. Since the goal is to estimate the effects on the initial location choice, I limit the sample to immigrants observed in years 0 and 1 since migration, and those who did not move within or across states (the results are robust to dropping this condition).

Table 3 shows that indeed, immigrants arriving with better origin-country Internet tend to select counties with smaller shares of co-nationals. Column (1) starts with the baseline specification, without any FEs, and columns (2)-(6) add progressively more demanding sets of FEs: the results remain qualitatively the same. Column (7) zooms into the +/- 5 years windows around the 50% connectivity threshold (to make treatment and control units more comparable), and finds identical effects. Column (8) shows similar results with a continuous measure of home-country Internet access. Data on the county of residence is not available for some respondents, so Table B3 in the Appendix repeats this analysis using the share of co-nationals at the PUMA level - results are slightly weaker but qualitatively unchanged.

[26]PUMAs are geographical units designed to address the fact that not all counties can be identified in the ACS data due to data protection reasons. About 22% of immigrants live in non-identifiable counties. In contrast, PUMA IDs are available for all respondents since 2005. There are in total 1079 unique PUMA regions in my ACS immigrants sample, while the number of identified counties is 526.

[27]An alternative is to allow the share of co-nationals to vary over time. The results are qualitatively the same, as the ranking of locations in terms of origin-country representation is relatively stable over time. Another option is to use older censuses (e.g., 1990) to calculate the county-level shares of co-nationals.

Table 3: Origin-country Internet and location choice (share of co-nationals in a county)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Share of co-nationals in a county							
50 % Internet reached	-0.006**	-0.001*	-0.001***	-0.001***	-0.001***	-0.003**	-0.003**	
	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	
Share of Internet users								-0.009**
								(0.005)
Constant	0.039**	0.019***	0.023***	0.024***	0.024***	0.024***	0.029***	0.027***
	(0.019)	(0.003)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Observations	88,768	88,766	88,764	88,206	88,184	88,178	35,286	88,178
Adjusted R-squared	0.063	0.496	0.757	0.888	0.888	0.888	0.908	0.888
Origin FEs	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort FEs	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FEs	No	No	Yes	Yes	Yes	Yes	Yes	Yes
State x Origin FEs	No	No	No	Yes	Yes	Yes	Yes	Yes
State x Year FEs	No	No	No	No	Yes	Yes	Yes	Yes
Origin x Cohort FEs	No	No	No	No	No	Yes	Yes	Yes
Sample	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM, 5y window	0-1 YSM

This Table gives the estimates of the effect of home-country Internet at arrival on the initial location choice of new immigrants. The outcome variable is the share of co-nationals in the county of residence (available in the ACS from 2005 onwards). The sample is restricted to initial locations (0 or 1 years since migration, and those who did not move within the US). The main explanatory variable is a 0/1 dummy for whether the origin country had reached 50% Internet coverage at the time of migration. An alternative measure used in column (8) is a simple share of home-country Internet users at the time of migration. Column (1) starts with no FEs; column (2) shows a simple TWFE estimator. Subsequent columns add more demanding sets of FEs. Column (7) additionally restricts the sample to +/- 5 years around the 50% threshold. Standard errors, clustered at the origin-country level, in parentheses, *** p<0.01, ** p<0.05, * p<0.1

4.2.4 Occupational clustering of immigrants

While physical clustering with co-nationals is an important side of the integration process, occupational clustering might have an even bigger effect on subsequent economic success. Patel and Vella (2013) show that new immigrants tend to chose occupations prevalent among their co-nationals, and Kerr and Mandorff (2023) document industry-level segregation in the US, driven by network effects. Does home-country Internet expansion affect the initial industry choice of immigrants (conditional on being employed)? Using an empirical model similar to (6) and adding industry (or, for robustness, occupational) dimension to it, I test whether arriving with better home-country Internet decreases the share of co-nationals in the selected industry and county, using the IPUMS 3-digit industry codes. Thus, the outcome variable here is the $CoNatShare_{i,o,c(s),k} = \frac{\#CoNat_{i,o,c(s),k}}{\#Employed_{c(s),k}}$, i.e., the share of total employment in a given county $c(s)$ and industry k taken by immigrant's i co-nationals from country o.[28]

Table 4 documents consistent negative effects of home-country Internet at arrival on the share of co-nationals in the initial industry of immigrant's employment.

[28]As with the county-level shares of co-nationals, I use time-invariant definitions of co-national shares, based on the 2000-2005 counts (results are robust to using time-varying shares of co-nationals).

Table 4: Origin-country Internet and location choice (share of co-nationals in a county)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Share of co-nationals in a county							
50 % Internet reached	-0.006**	-0.001*	-0.001***	-0.001***	-0.001***	-0.003**	-0.003**	
	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	
Share of Internet users								-0.009**
								(0.005)
Constant	0.039**	0.019***	0.023***	0.024***	0.024***	0.024***	0.029***	0.027***
	(0.019)	(0.003)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Observations	88,768	88,766	88,764	88,206	88,184	88,178	35,286	88,178
Adjusted R-squared	0.063	0.496	0.757	0.888	0.888	0.888	0.908	0.888
Origin FEs	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort FEs	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FEs	No	No	Yes	Yes	Yes	Yes	Yes	Yes
State x Origin FEs	No	No	No	Yes	Yes	Yes	Yes	Yes
State x Year FEs	No	No	No	No	Yes	Yes	Yes	Yes
Origin x Cohort FEs	No	No	No	No	No	Yes	Yes	Yes
Sample	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM, 5y window	0-1 YSM

This Table gives the estimates of the effect of home-country Internet at arrival on the initial location choice of new immigrants. The outcome variable is the share of co-nationals in the county of residence (available in the ACS from 2005 onwards). The sample is restricted to initial locations (0 or 1 years since migration, and those who did not move within the US). The main explanatory variable is a 0/1 dummy for whether the origin country had reached 50% Internet coverage at the time of migration. An alternative measure used in column (8) is a simple share of home-country Internet users at the time of migration. Column (1) starts with no FEs; column (2) shows a simple TWFE estimator. Subsequent columns add more demanding sets of FEs. Column (7) additionally restricts the sample to +/- 5 years around the 50% threshold. Standard errors, clustered at the origin-country level, in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Interestingly, additional analysis shows that the country-level industrial clustering with co-nationals also decreases with home-country Internet at arrival. This further suggests that home-country Internet's effect on immigrants' occupational choice does not operate solely through lower spatial proximity to co-nationals. One channel could be online job search from abroad, which decrease the overall reliance on co-national networks.

Overall, the evidence presented thus far suggests that while there might be some positive short-run effects of good origin-country Internet - better English skill, lower co-national segregation - these initial effects dissipate over the years spent at destination. In the long-run, immigrants arriving equipped with good origin-country Internet tend to show lower levels of (i) English proficiency, (ii) naturalization, and (iii) economic success.

4.2.5 Robustness checks

Even though we found balance in important observables (Fig. 6), one robustness check allows for separate integration profiles for people with different education levels: the main effects remain almost intact.

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 A11. Immigrants from OECD countries integrate faster, so previous results were underestimating the negative effects of origin-country Internet.

In one of the most restrictive specifications, I allow immigrants from each origin country to have their own integration profile. Thus, I estimate the effects of the Internet on integration profile only from within-origin Internet changes. The results remain qualitatively the same, but somewhat weaken quantitatively, Figure **??** in the Appendix.

I also replicate the main results keeping only the 60 biggest (in terms of the share of the overall immigrant population in the US) origin countries, constituting in total 90% of all immigrants. Main results remain intact, Figure **??** in the Appendix.

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% or 10% Internet coverage at the origins at the time of migration makes no difference for subsequent integration path[29].

Finally, I identify likely "family migrants", e.g., those who were more likely followers in the move: those married and not in the labor force. The results remain qualitatively the same, and if anything quantitatively stronger for this population subgroup.

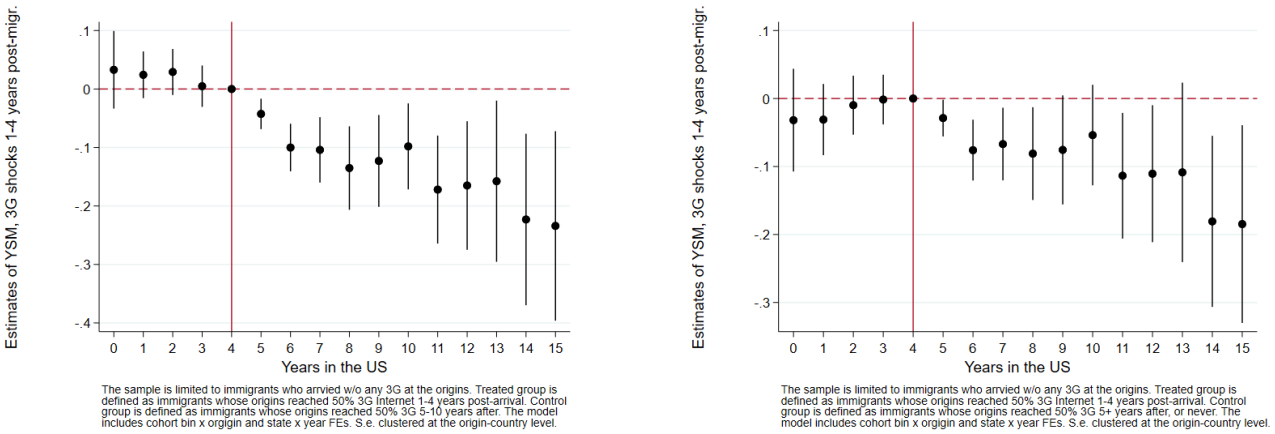
4.3 Internet improvements after migration

In this section, I aim to partial out the effects that origin-country Internet expansion can exert on the intensity and composition of migration flows to the US. To do so, I focus on 3G Internet shocks after migration. A staggered (and quick) roll-out of 3G/4G technologies, see Figure 7, represents sharper connectivity shocks at the origins. I limit the sample to immigrants who arrived in the US with zero 3G/4G access at the origins, and define immigrants as "treated" if their origins reached 50% 3G/4G coverage from 1 to 4 years after migration. I consider two versions of control groups: (i) immigrants whose origins experienced a 3G shock 5-10 years after migration, or (ii) a broader group that includes never treated immigrants: immigrants whose origins reached 50% 3G Internet more than 5 years after migration or never.

Figure 11 shows that immigrants whose origin countries received 3G/4G technology 1-4

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

years after migration, show a much slower integration path[30]. Note that the 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": treatment and control groups display similar integration dynamics before 3G shocks at the origins.



(a) Control group: 3G shock 5-10 YSM (b) Control group: 3G shock 5+ YSM or never

Figure 11: Linguistic integration: effect of 3G Internet shocks 1-4 years after migration

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 A12 shows that there is no difference between such immigrant groups in the first 4-5 years since migration, but the difference kicks in afterwards.

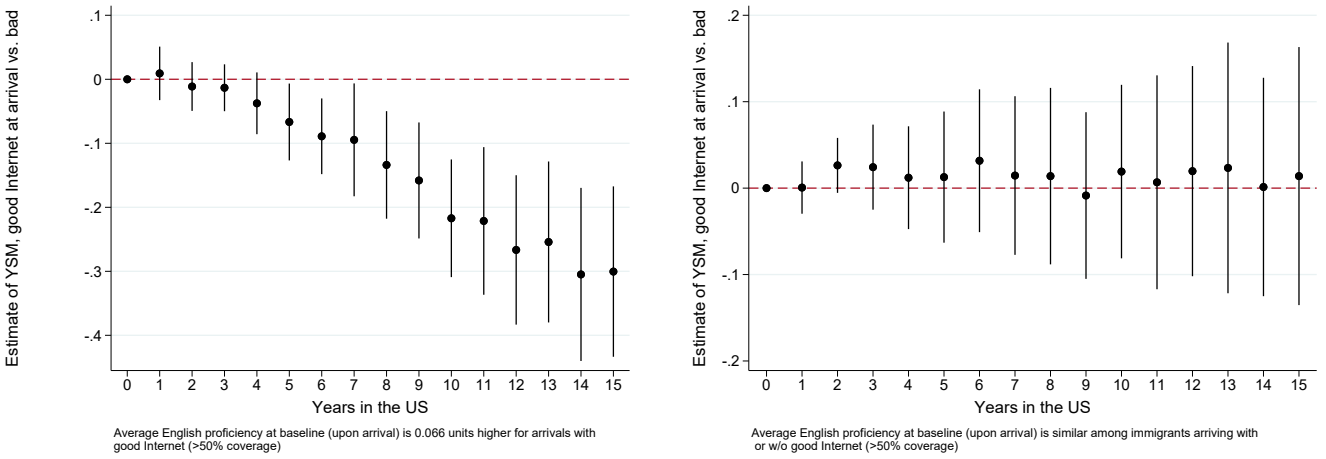
5 Heterogeneous Effects of Origin-country Internet

There are several important dimension of heterogeneity in the effects of origin-country Internet on immigrants' integration trajectories. This section explores heterogeneity with respect to the characteristics of (i) individuals (first of all, education levels), (ii) destination locations (counties, PUMAs, etc.), and (iii) origins.

Education and language skill I document that the bulk of the effect found in Section 4 is driven by the less-educated immigrants. Figure 12 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

[30]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.

tertiary education. Thus, the expansion of Internet at the origins can increase already large gaps between low- and high-skilled immigrants[31].



(a) College dropouts, high school, or less

(b) College or higher

Figure 12: Effects of origin-country Internet: differences across education levels

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 A15 confirms that the effect is driven by lower-educated immigrants.

Notably, the effects of home-country Internet at arrival on subsequent citizenship acquisition display a very different heterogeneity: the entire effect is driven by immigrants with tertiary education, Figure A14 in the Appendix. This is reasonable, as getting citizenship in the US requires a certain level of basic reading, writing and English skills. And indeed, the entire effect comes from the upper part of the English skill distribution.

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 A16.

Native-speaking immigrants If most of the effect of origin-country Internet comes through

[31]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 A13.

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.

Size of the local diaspora As long as the effect of origin-country Internet on immigrants' integration operates via sacrificing ties with natives in favor of that with the origins, one can expect the effect to be stronger for immigrants living in communities where immigrants were more likely to interact with natives to begin with. On the other hand, regions with larger international diasporas might also be more welcoming to immigrants overall, which can work in the opposite direction. Table **??** in the Appendix verifies that this is indeed the case: I subdivide PUMA localities into two groups, large- vs. small-diaspora PUMAs, and find that the negative effect of home-country Internet on English skill and naturalization is stronger in small-diaspora PUMAs.

Hispanic and Asian origins A large proportion of immigrants in the US originate from the Americas and, more recently, from South and East Asia. Moreover, in some of the states and counties, high levels of concentration of Spanish-speaking residents lowers the incentives to invest in local linguistic skills. Whether the effects of home-country Internet are stronger or weaker for Hispanic / Asian or other minorities is an empirical question. Figure **??** in the Appendix reports that the negative effects of home-country Internet are stronger for Hispanic populations and weaker for Asian populations, other things equal[32].

6 Mechanisms

6.1 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 5 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, im-

[32]As shown above, this can at least partly reflect differences in education levels, starting English skills, and other characteristics.

Table 5: 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.

migrants increase their calls to family and overall communications (mails, emails, messages, etc.). 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[33].

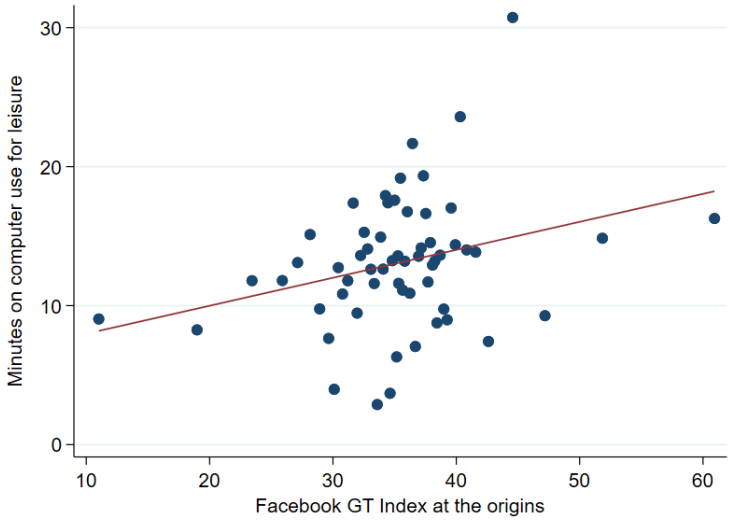


Figure 13: Binscatter: effects of origin-country facebook usage on computer leisure time. With origin and state x year FEs.

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[34] 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.

[33]The strongest effects of origin-country Internet on communications with the family are observed for the years after significant spread of Skype and Facebook: Figure A17 in the Appendix shows that the effect of home-country Internet on telephone calls, messages and emails by immigrants is driven by post-2008 years (when Skype began to dominate the market for international calls and Facebook grew in popularity, Section 3.3). All the effects reported above are stronger for younger people.

[34]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).

6.2 Immigrants' return intentions

One additional mechanisms behind a decreasing pace of immigrants' social integration at destination could potentially be tied to length of planning horizon at destination. If a given individual does not intend on staying for long or plans to return back home, then there is less of an incentive to invest in local human capital, citizenship acquisition, and so on. To assess the effects of growing home-country Internet access on immigrants' return intentions, I use data from the Gallup World Poll (GWP) covering most of destination and sending countries in the world from 2006 onwards.

Table 6: Effect of origin-country Internet on immigrants' return intentions (Gallup data).

	(1)	(2)	(3)	(4)
VARIABLES	Want to move back to the home country			
Internet coverage (% pop)	-0.027	-0.009	-0.024	-0.042
	(0.020)	(0.021)	(0.021)	(0.028)
Internet coverage (% pop) x Married		-0.030***		
		(0.008)		
Internet coverage (% pop) x Less educated			-0.020***	
			(0.008)	
Internet coverage (% pop) x No local Internet				0.025**
				(0.012)
Constant	0.103***	0.095***	0.094***	0.116***
	(0.011)	(0.010)	(0.010)	(0.013)
Observations	82,100	82,100	82,100	50,073
Adjusted R-squared	0.065	0.065	0.065	0.059
Origin FE	Yes	Yes	Yes	Yes
Destination x Time FE	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes

The main outcome variable is an indicator for whether a respondent wants to move back to his or her home country, constructed from two questions: (i) whether a respondent wants to move, and (ii) if yes, to which country. The value of 1 means that a respondent want to move, and the target country is his or her home country. The value of 0 is given to all immigrants who either do not want to move, or want to move a non-origin country. The main explanatory variable is the share of origin-country population with access to the Internet. Robust standard errors clustered at the origin-country level in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

I use GWP variables on whether immigrants (i) want to move permanently to another country, and (ii) if yes, whether this country is their home country. I test whether shocks to home-country Internet access (using the ITU Internet coverage data, and, for robustness, the Collins Bartholomew's 3G/4G coverage) affect return intentions. In all specifications I account for Origin FEs, as well as Destination x Year FEs. Table 6 shows that, on average across all origin and destination countries, there is a negative effect, which is not statistically significant. However, there is a strong and significant negative effect for certain subgroups of population: (i) married immigrants, (ii) those with less education, and (iii) no effect for those without local Internet access. Thus, if anything, a growing home-country Internet

access decreases immigrants' return intentions. This effect might be driven by the fact that with better home-country Internet immigrants can stay in touch without the need to regularly return home. Overall, it seems that changing return intentions are not part of the mechanism behind the slow-down in immigrants' social integration.

7 Additional results

In this section, I provide additional evidence on the effects of origin-country Internet on (i) immigrants' subjective well-being, and (ii) several dimensions of cultural selection.

7.1 Immigrants' subjective well-being and home country Internet

One of the Section 2 model's predictions is that growing origin-country Internet allows immigrants to move out of the corner solution (no contact with the origin) into an interior solution with a better mix of local and origin-country contacts. Thus, the model predicts that origin-country Internet expansion increases immigrants' utility / happiness, creating a trade-off between immigrants' happiness and social integration at destination[35].

To explore the relationship between Internet access at the origins and immigrants' subjective well-being, I rely on the European Social Survey (ESS) data from 2002 to 2019 (nine rounds of surveys). I use the following question: "Taking all things together, how happy would you say you are?" ranging from 0 (extremely unhappy) to 10 (extremely happy). As additional outcomes, I also use questions on life satisfaction, general health (physical and mental) and specific health issues, including mental health issues[36]. Combining the ESS data with the ITU data on the origin-country shares of Internet-users, I estimate a simple model where the level of immigrants' happiness / health depends on the origin-country Internet:

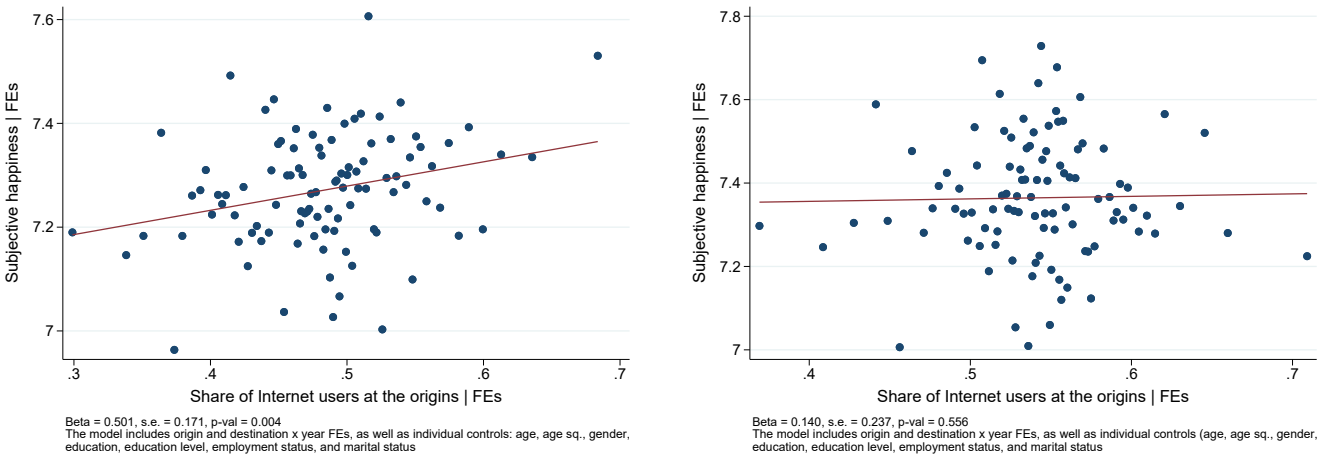
$$Y_{i,o,d,t} = \beta \cdot Connect_{o,t} + X'_{i,o,d,t} + \phi_o + \tau_{d,t} + \varepsilon_{i,o,d,t} \tag{7}$$

where $Y_{i,o,s,t}$ is a well-being outcome of immigrant i from country o, living in destination

[35]Online access to origin-country friends, family, and information has two effects. On the one hand, it can reduce immigrants' local networking and slow down linguistic and social integration - as documented above. On the other hand, due to cultural attachment to home-country networks, having online access to the origins can increases immigrants' well-being.

[36]Question on general health reads "How is your health (physical and mental health) in general?", ranging from 1 (very bad) to 5 (very good). The question on specific health issues reads "Are you hampered in your daily activities in any way by any longstanding illness, or disability, infirmity or mental health problem?", ranging from 1 (No), to 3 (Yes, a lot). Both scales were recoded to make them increasing.

country d, observed in year t. The model allows for destination $\times$ year shocks $\tau_{d,t}$, and fixed differences across origins, ϕ_o. Individual controls $X'_{i,o,d,t}$ include gender, age and age squared, education, marital status and employment status. As before, $Connect_{o,t}$ is a measure of origin-country Internet access.



(a) First-gen immigrants

(b) Second-gen immigrants

Figure 14: Binscatter: effects of origin-country Internet on immigrants' happiness, ESS data.

Table B4 in the Appendix shows that there are strong positive effects of home-country Internet on immigrants' happiness on the combined sample of 1st and 2nd-gen immigrants. However, as revealed by Figure 14, the entire effect is driven by the 1st-gen immigrants. Table B4 also shows positive effects on life satisfaction, general health, and lower incidence of health issues. Importantly, the effects are robust to restricting the sample to immigrants who arrived at destination before the year 2000 (before the global spread of the Internet). Thus, these effects are unlikely to be driven by the changing composition of immigrants.

Within the 1st-gen immigrants, home-country Internet has a weaker effect on happiness when immigrants live at destination with their parents, suggesting part of the effect operates through contacts with family left behind. Moreover, immigrants reporting higher importance of family and traditions experience slightly stronger effect of home-country Internet on happiness. In addition, more integrated immigrants (as measured by citizenship acquisition or destination-country language use at home) experience a weaker effect of home-country Internet on their happiness levels. Figure A18 in the Appendix documents these results.

To improve the identification, I use the staggered rollout of 3G/4G Internet across origin countries to test if sharp connectivity shocks affect immigrants' subjective well-being. Figure 15 reports the estimates from a standard staggered rollout event-study: there are clear

positive effects of the emergence of 3G at the origins on immigrants' well-being. The sample is restricted to immigrants who arrived before 2006 (when global spread of the 3G began).

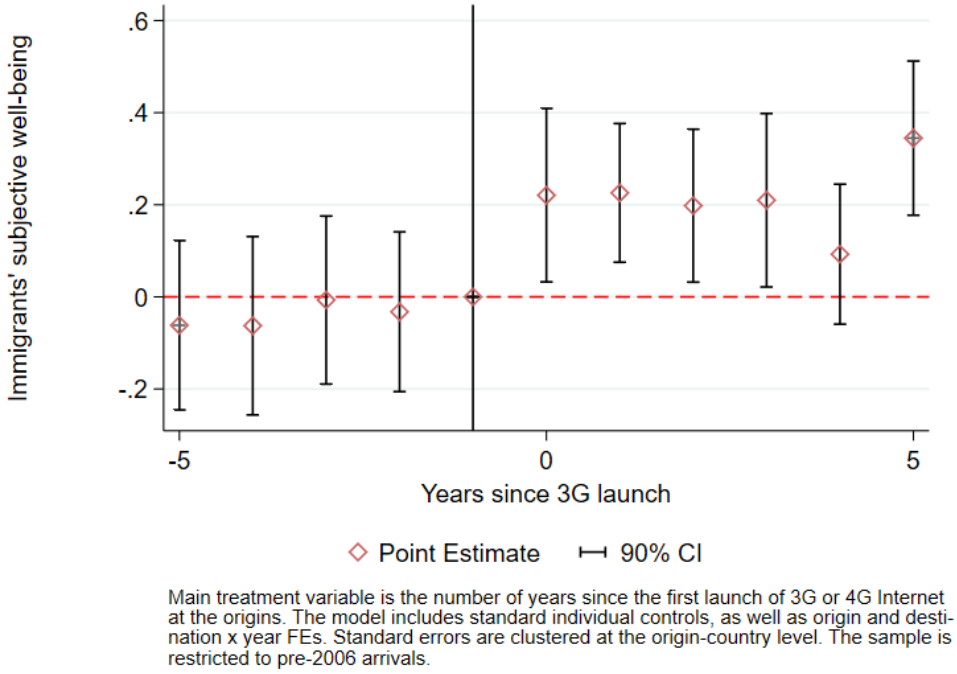


Figure 15: Event study: effects of origin-country 3G emergence on immigrants' SWB

Importantly, since older immigrants might be under-utilizing digital tools, one can expect to see a weaker effect of home-country Internet on older immigrants. Indeed, after dividing the sample into two halfs (around age 51), I find that the entire effect of home-country 3G adoption on subjective well-being is driven by younger immigrants, Figure A19. Finally, the TWFE estimates in Table B5 in the Appendix reveal that 3G Internet expansion at the origins increases both immigrants' happiness and health. In contrast to Internet's effects on social integration, the effects on subjective well-being come from the early spread of 3G (first adoption, 10%), not 25-50% thresholds of 3G coverage[37].

Overall, this section emphasizes an important trade-off: immigrants' slower social integration vs. their better subjective well-being following home-country Internet improvements.

[37]The reason for this discrepancy might be that the effects on subjective well-being are immediate, while the effects on integration take more time and require a larger part of the network to go online.

7.2 Is there a cultural selection effect of home-country Internet?

To test for the importance of cultural selection effects from origin-country Internet, I use again the European Social Survey (ESS) data, which provides a battery of questions on social, political, and cultural dimensions. Like in Section 4.2.3 on immigrants location choice at arrival, I evaluate the effect of origin-country Internet at arrival on cultural views and political opinions of new immigrants to test whether immigrants arriving after vs. before good home-country Internet are systematically different along any of the cultural/political domains. Importantly, since social/political views may adapt to the host-country environment, I restrict the sample to recently arrived immigrants (at most 5 years at destination). The model I estimate is the following:

$$CultValues_{i,o,d,t,m} = \beta \cdot Connect_{o,t} + X'_{i,o,d,t,m} + \phi_o + \tau_{d,t} + \psi_m + \varepsilon_{i,o,d,t,m}, \tag{8}$$

where $CultValues_{i,o,s,t,m}$ stands for one of the cultural values of immigrant i from country o, living in destination country d, observed in year t, who migrated in year m[38]. The model allows for destination $\times$ year shocks $\tau_{d,t}$, and fixed differences across origins, ϕ_o, and arrival cohorts, ψ_m. Individual controls $X'_{i,o,d,t,m}$ include gender, age and age squared, education, marital status and employment status. As before, $Connect_{o,t}$ is a measure of origin-country Internet access, where I use both the general share of Internet users, as well as the 3G expansion shocks at the origins.

The main hypothesis, according to the model in Section 2, is that growing home-country Internet access reduces cultural costs of separation from family, friends, and origin-country overall, thereby increasing the prevalence of immigrants with more traditional values. Figure A20 in the Appendix shows that there are no visible effects of home-country Internet upon entry (using the overall Internet access or the 3G Internet emergence) on a collection of cultural traits of immigrants in the ESS data[39]. If anything, immigrants arriving after 3G Internet starts to spread at the origins tend to be somewhat more liberal. This result is consistent with the reported (Section 4) positive upon-entry effect of home-country Internet on education and English skill: there a positive skill selection, but no selection based on traditional values (which could have lowered linguistic skill of an average immigrant).

[38]Note that in the ESS data, specific year of migration is only available in rounds 5-9, so the sample here is (i) smaller, and (ii) represents years 2010-2019.

[39]Results are robust to using various thresholds of the overall or 3G Internet access.

8 Conclusion

A common belief is that globalization erases communication barriers, fastens integration, and makes individuals less "ethnic". Moreover, conventional wisdom suggests that immigrants from better connected countries would have an advantage. This paper explores a potential other side of the Internet expansion. I find that (i) reduced cross-border communication barriers slow down the process of immigrants' integration; and that (ii) immigrants 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. The effects are driven by changing immigrants' networking patterns: decrease in local socialization and increase in communications with the origins.

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.

References

Abramitzky, Ran, Leah Boustan, and Katherine Eriksson, "Do Immigrants Assimilate More Slowly Today Than in the Past?," *American Economic Review: Insights*, March 2020, *2* (1), 125–41.

Adema, Joop Age Harm, Cevat Giray Aksoy, and Panu Poutvaara, "Mobile Internet Access and the Desire to Emigrate," *CESifo Working Paper*, 2022, *9758.*

Arat, Ece and Özge Bilgili, "Transnational and Local Co-ethnic Social Ties as Coping Mechanisms Against Perceived Discrimination - A Study on the Life Satisfaction of Turkish and Moroccan Minorities in the Netherlands," *Frontiers in Sociology*, 2021, *6.*

Aridor, Guy, Rafael Jiménez-Durán, Ro'ee Levy, and Lena Song, "The Economics of Social Media," 2024.

Barsbai, Toman, Hillel Rapoport, Andreas Steinmayr, and Christoph Trebesch, "The Effect of Labor Migration on the Diffusion of Democracy: Evidence from a Former Soviet Republic," *American Economic Journal: Applied Economics*, 2017, *9* (3), 36–69.

_ , **Victoria S. Licuanan, Andreas Steinmayr, Erwin R. Tiongson, and Dean Yang**, "Information and Immigrant Settlement," Working Papers in Economics and Statistics 2021-30, Innsbruck 2021.

Battisti, Michele, Giovanni Peri, and Agnese Romiti, "Dynamic Effects of Co-Ethnic Networks on Immigrants' Economic Success," *The Economic Journal*, 04 2021, *132* (641), 58–88.

Beaman, Lori A., "Social Networks and the Dynamics of Labour Market Outcomes: Evidence from Refugees Resettled in the U.S.," *The Review of Economic Studies*, 08 2011, *79* (1), 128–161.

Biavaschi, Costanza, Corrado Giulietti, and Yves Zenou, "Social Networks and (Political) Assimilation in the Age of Mass Migration," *CEPR Discussion Paper*, 2021, *DP16182*.

Bleakley, Hoyt and Aimee Chin, "Language Skills and Earnings: Evidence from Childhood Immigrants," *The Review of Economics and Statistics*, 2004, *86* (2), 481–496.

_ **and** _ , "Age at Arrival, English Proficiency, and Social Assimilation among US Immigrants," *American Economic Journal: Applied Economics*, January 2010, *2* (1), 165–92.

Blumenstock, Joshua E, Guanghua Chi, and Xu Tan, "Migration and the Value of Social Networks," *The Review of Economic Studies*, 12 2023, p. rdad113.

Borjas, George J., "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants," *Journal of Labor Economics*, 1985, *3* (4), 463–489.

Borjas, George J, "Self-Selection and the Earnings of Immigrants," Working Paper 2248, National Bureau of Economic Research May 1987.

_ , "Ethnicity, neighborhoods, and human capital externalities," 1994.

_ , "Ethnic enclaves and assimilation," *Swedish Economic policy review*, 2000, *7* (2), 89–122.

Borjas, George J., "The Slowdown in the Economic Assimilation of Immigrants: Aging and Cohort Effects Revisited Again," *Journal of Human Capital*, 2015, *9* (4), 483–517.

Campante, Filipe, Ruben Durante, and Andrea Tesei, "Media and Social Capital," *Annual Review of Economics*, 2022, *14* (1), 69–91.

Dekker, Rianne and Godfried Engbersen, "How social media transform migrant networks and facilitate migration," *Global Networks*, 2014, *14* (4), 401–418.

Dustmann, Christian and Francesca Fabbri, "Language Proficiency and Labour Market Performance of Immigrants in the UK," *The Economic Journal*, 07 2003, *113* (489), 695–717.

Edin, Per-Anders, Peter Fredriksson, and Olof Åslund, "Ethnic Enclaves and the Economic Success of Immigrants—Evidence from a Natural Experiment*," *The Quarterly Journal of Economics*, 02 2003, *118* (1), 329–357.

Farré, Lídia and Francesco Fasani, "Media exposure and internal migration — Evidence from Indonesia," *Journal of Development Economics*, 2013, *102*, 48–61. Migration and Development.

Foged, Mette, Linea Hasager, Giovanni Peri, Jacob Nielsen Arendt, and Iben Bolvig, "Language Training and Refugees' Integration," *The Review of Economics and Statistics*, 06 2022, pp. 1–41.

Gentzkow, Matthew, "Television and Voter Turnout*," *The Quarterly Journal of Economics*, 08 2006, *121* (3), 931–972.

Geraci, Andrea, Mattia Nardotto, Tommaso Reggiani, and Fabio Sabatini, "Broadband Internet and social capital," *Journal of Public Economics*, 2022, *206*, 104578.

Glitz, Albrecht, "Ethnic segregation in Germany," *Labour Economics*, 2014, *29*, 28–40.

Guo, Yihan, Junling Xu, and Yuan Zhou, "Effects of Internet Adoption on Health and Subjective Well-Being of the Internal Migrants in China," *International Journal of Environmental Research and Public Health*, 2022, *19* (21).

Guriev, Sergei, Nikita Melnikov, and Ekaterina Zhuravskaya, "3G Internet and Confidence in Government*," *The Quarterly Journal of Economics*, 12 2020, *136* (4), 2533–2613.

Heller, Blake H. and Kirsten Slungaard Mumma, "Immigrant Integration in the United States: The Role of Adult English Language Training," *American Economic Journal: Economic Policy*, August 2023, *15* (3), 407–37.

Hjort, Jonas and Jonas Poulsen, "The Arrival of Fast Internet and Employment in Africa," *American Economic Review*, March 2019, *109* (3), 1032–79.

Kerr, William R and Martin Mandorff, "Social networks, ethnicity, and entrepreneurship," *Journal of Human Resources*, 2023, *58* (1), 183–220.

Manacorda, Marco, Guido Tabellini, and Andrea Tesei, "Mobile internet and the rise of political tribalism in Europe," LSE Research Online Documents on Economics, London School of Economics and Political Science, LSE Library 2022.

Martén, Linna, Jens Hainmueller, and Dominik Hangartner, "Ethnic networks can foster the economic integration of refugees," *Proceedings of the National Academy of Sciences*, 2019, *116* (33), 16280–16285.

Miconi, Andrea, "News from the Levant: A Qualitative Research on the Role of Social Media in Syrian Diaspora," *Social Media + Society*, 2020, *6* (1), 2056305119900337.

Nieto, Adrián, "Television and the Labor Supply: Evidence from the Digital Television Transition in the UK," *Journal of Human Resources*, 2023.

Patel, Krishna and Francis Vella, "**Immigrant networks and their implications for occupational choice and wages**," *Review of Economics and Statistics*, 2013, *95* (4), 1249–1277.

Peri, Giovanni and Chad Sparber, "Task Specialization, Immigration, and Wages," *American Economic Journal: Applied Economics*, July 2009, *1* (3), 135–69.

Zhuravskaya, Ekaterina, Maria Petrova, and Ruben Enikolopov, "Political Effects of the Internet and Social Media," *Annual Review of Economics*, 2020, *12* (1), 415–438.

Online Appendix

to

"Does the 'Melting Pot' Still Melt? Internet and Immigrants' Integration

A. Additional Figures

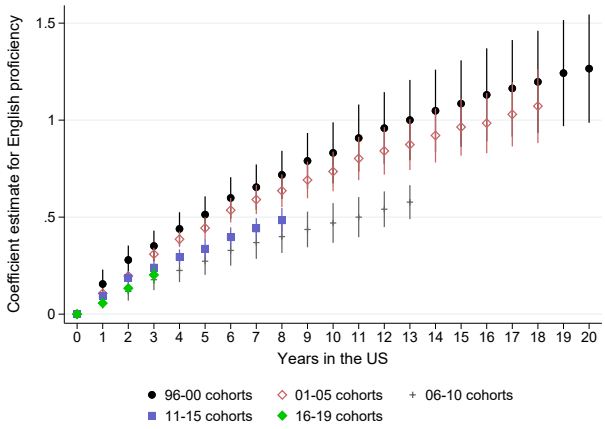
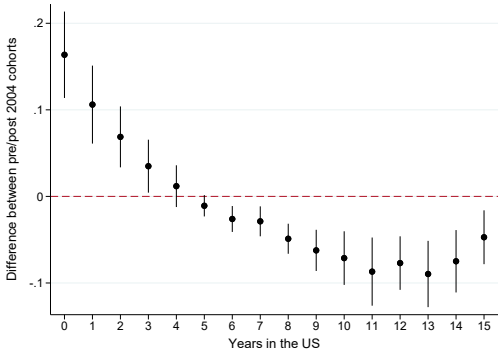
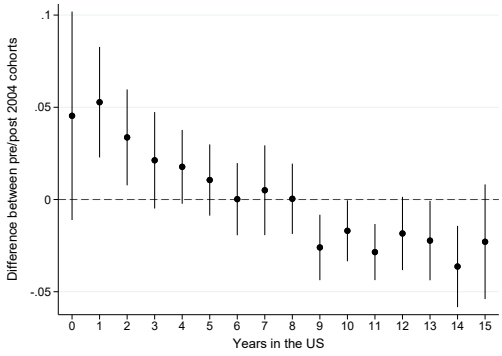


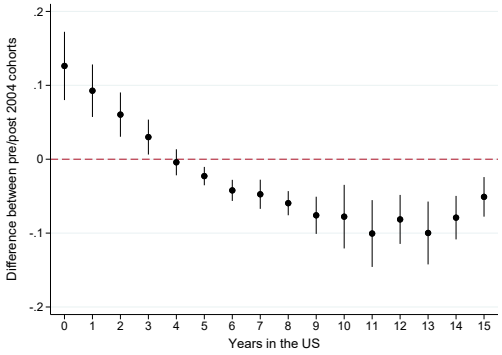
Figure A1: Differences in the pace of linguistic integration: by 5-year cohort bins



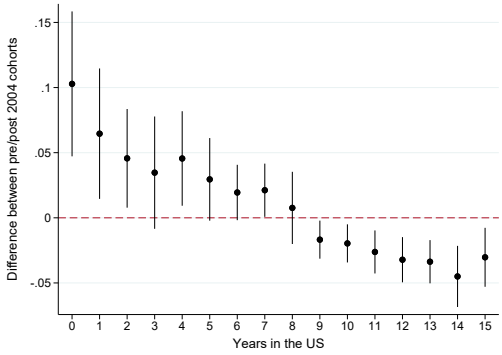
(a) Without tertiary education



(b) With tertiary education

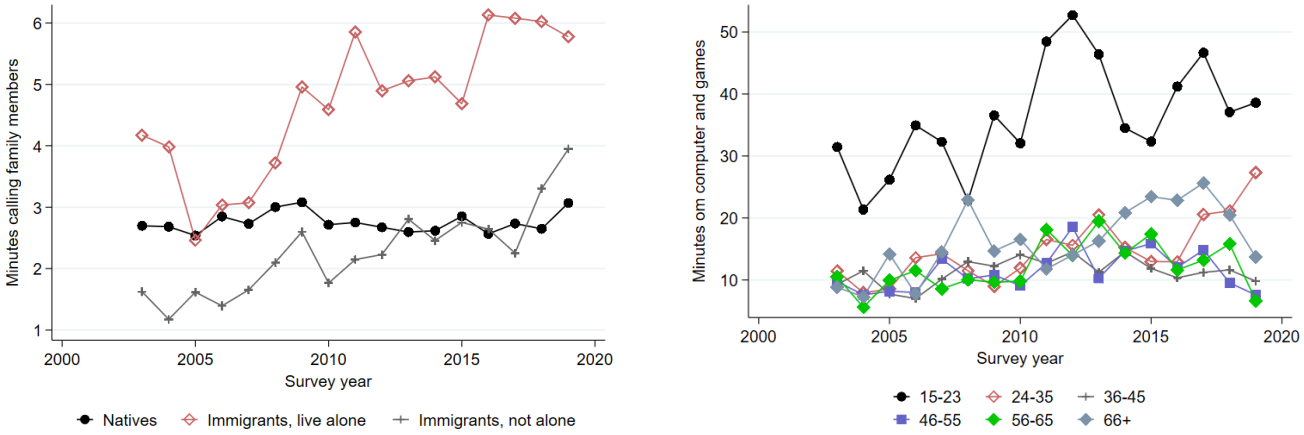


(c) Younger than 35



(d) Older than 35

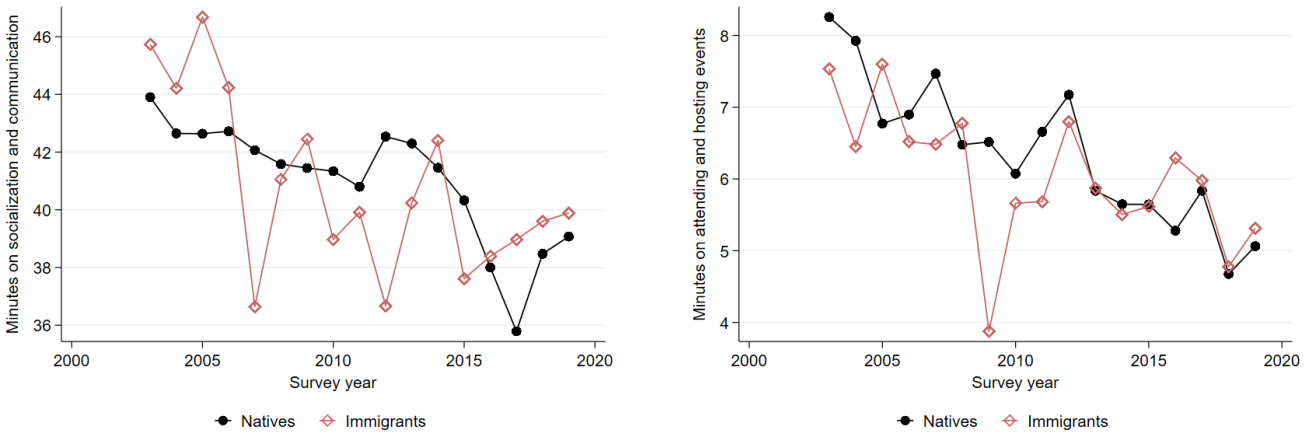
Figure A2: Differences between pre- vs. post-2004 cohorts: heterogeneity by education and age



(a) Calling family

(b) Computer for leisure and games

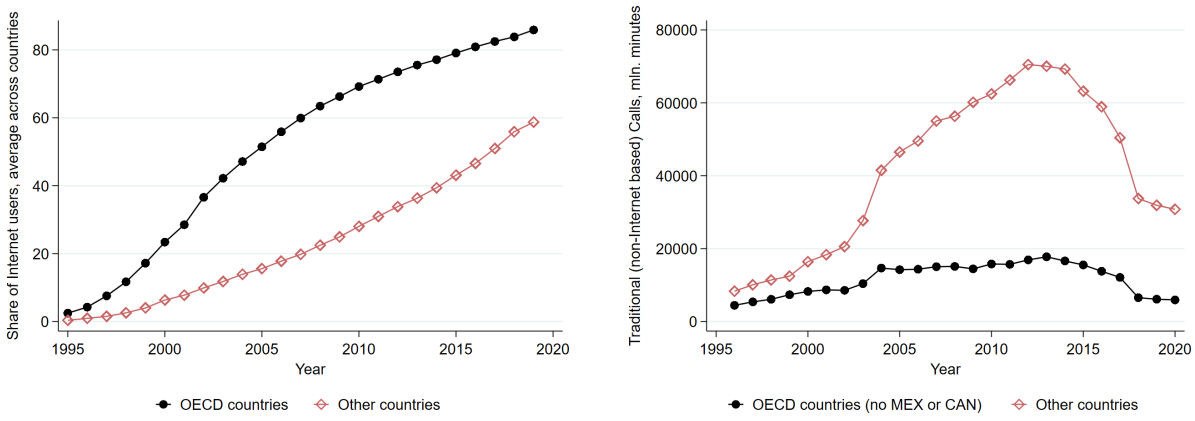
Figure A3: Time on (a) family calls (by HH composition), and (b) computer use (by age)



(a) Time on socialization and communication

(b) Time attending and hosting events

Figure A4: Time on local socialization, communication, and attending/hosting events



(a) Internet access

(b) Traditional calls with the US

Figure A5: Internet access and traditional calls: OECD vs. other countries

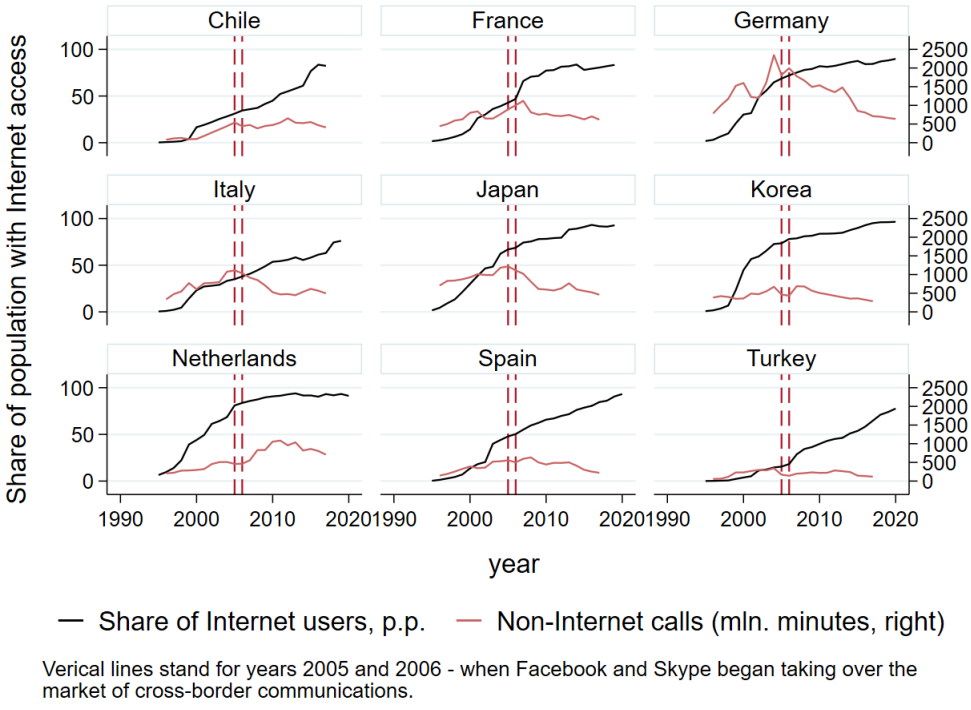


Figure A6: Calls with the US and Internet penetration, first adopters

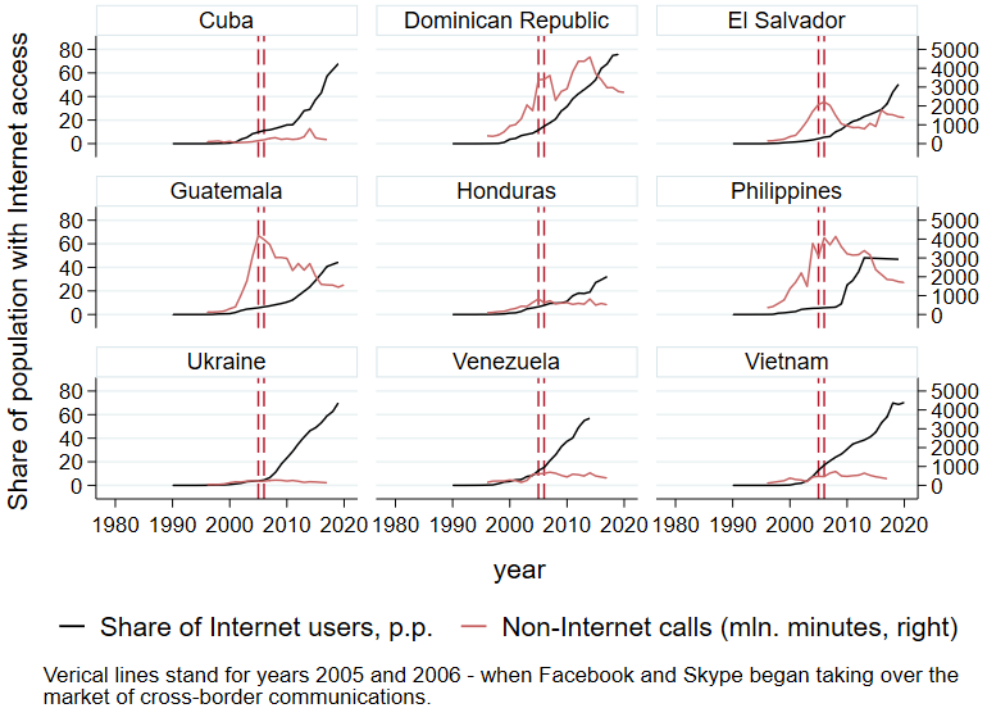


Figure A7: Calls with the US and Internet penetration, followers

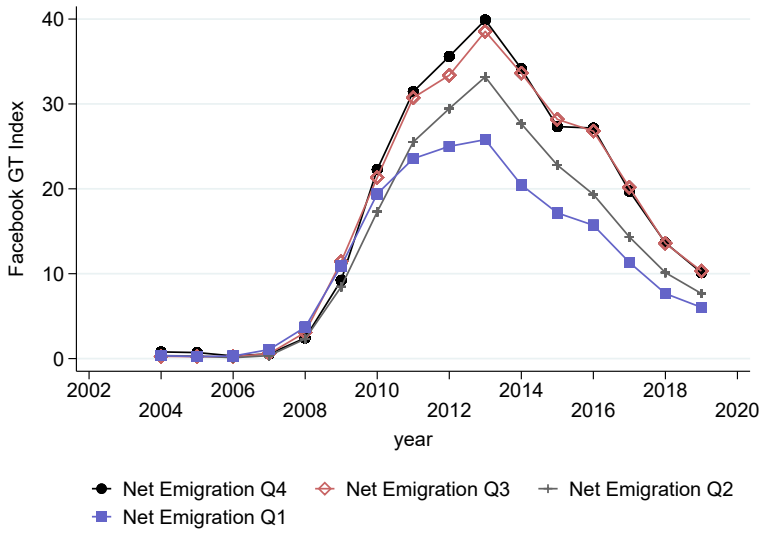
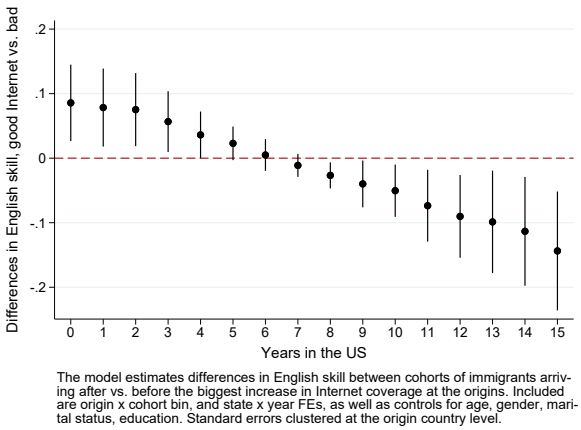
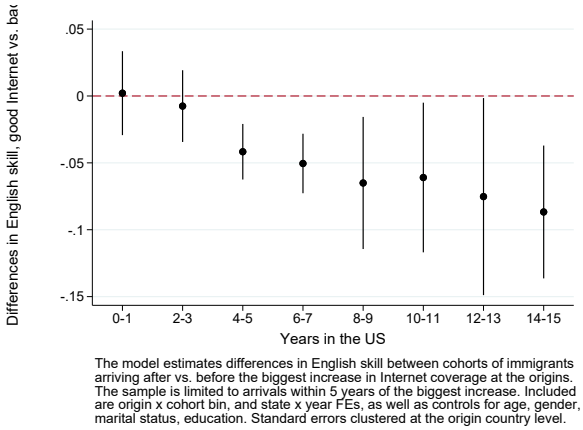


Figure A8: Dynamics of "Facebook" Google Trends Index, by Net Emigration groups

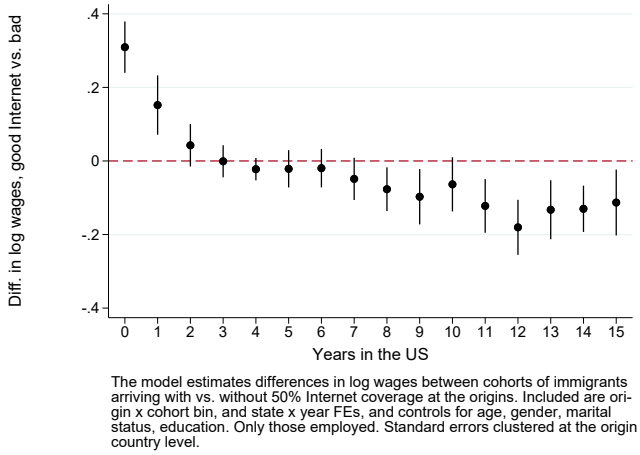


(a) Full sample

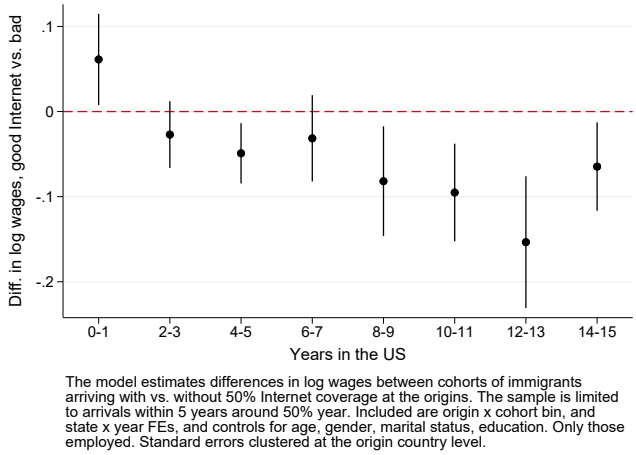


(b) 5-year window around biggest increase

Figure A9: Linguistic integration: arriving after vs. before the biggest increase in Internet coverage at the origins



(a) Full sample



(b) 5-year window around 50%

Figure A10: Log of wages, differences by origin-country Internet (50%) at arrival

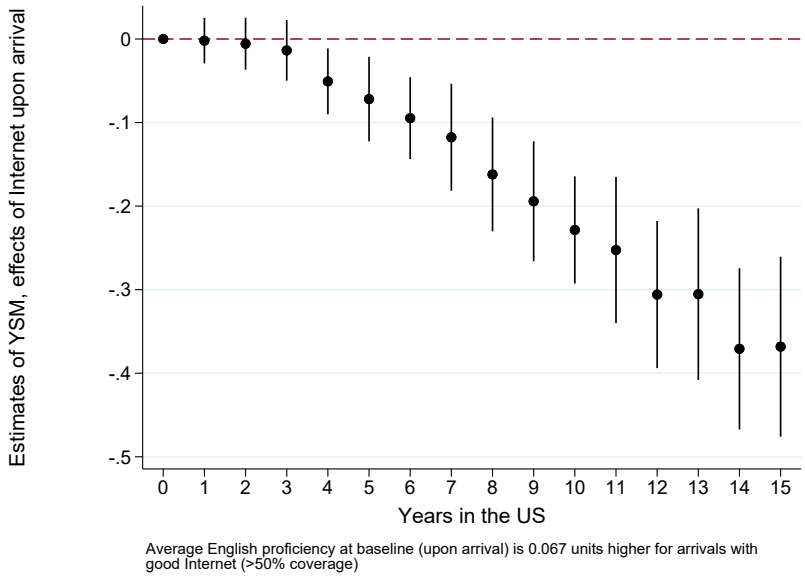


Figure A11: Difference by origin-country Internet at arrival, allowing different integration paths: (i) OECD/not, and (ii) by arrival cohort bins

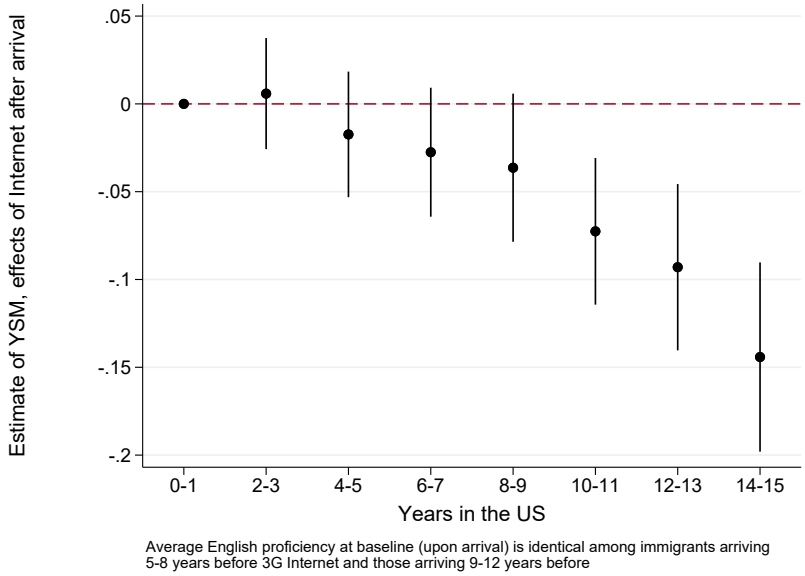
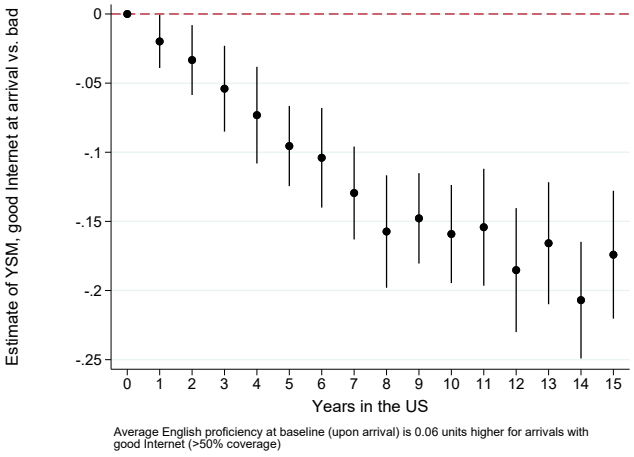
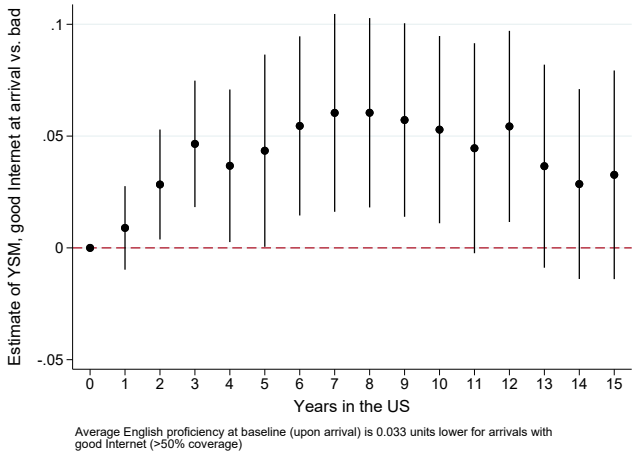


Figure A12: Linguistic integration: effect of 3G Internet shocks 5-8 years after migration

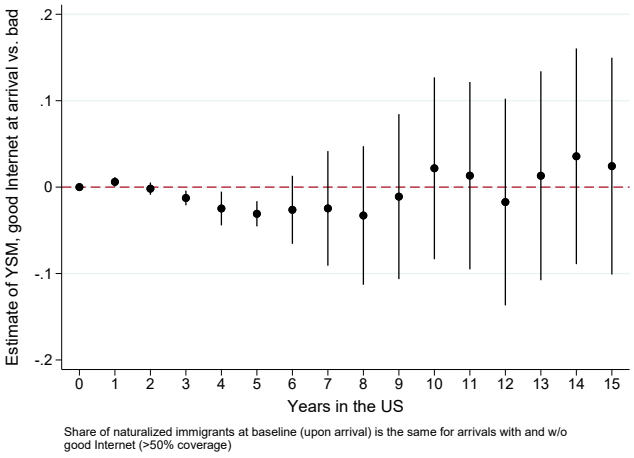


(a) Low English proficiency

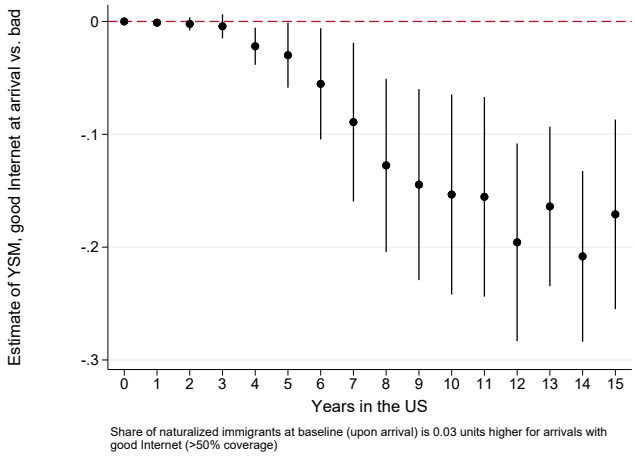


(b) High English proficiency

Figure A13: Effects of origin-country Internet on English skills: separate by parts of English sill distribution

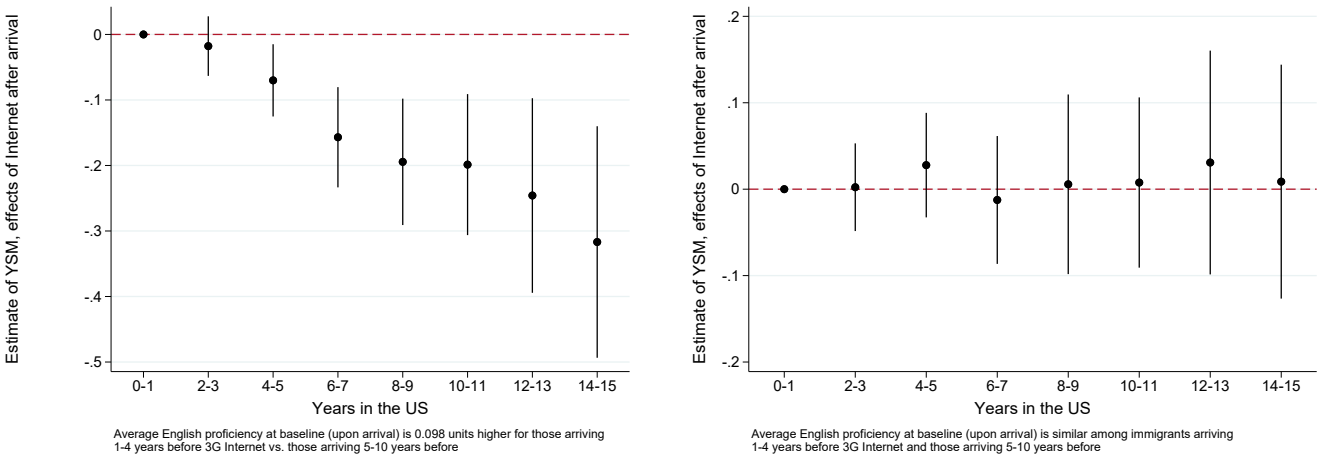


(a) College dropouts, high school, or less



(b) College or higher

Figure A14: Effects of origin-country Internet on naturalization: differences across education levels



(a) High school and college dropouts

(b) College or higher

Figure A15: Effects of origin-country 3G-Internet post-migration: differences by education

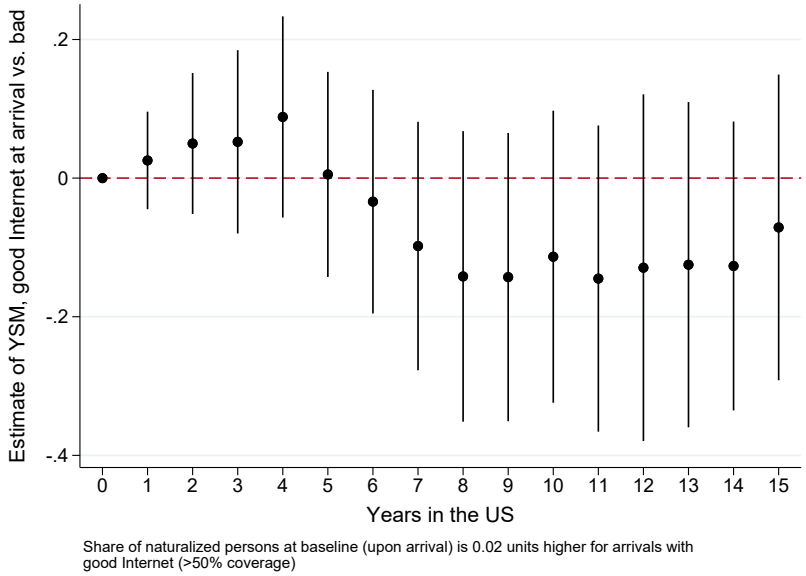
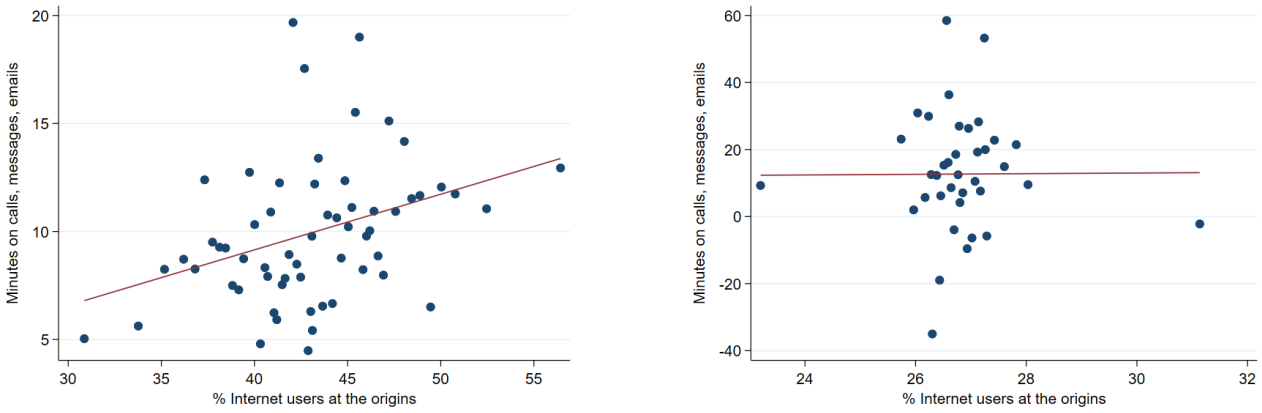


Figure A16: Difference by origin-country Internet at arrival, 7 y.o. or under at arrival



(a) Post-2008 years

(b) Pre-2008 years

Figure A17: Binscatter: effects of origin-country Internet on calls/messages/emails. With origin and state x year FEs.

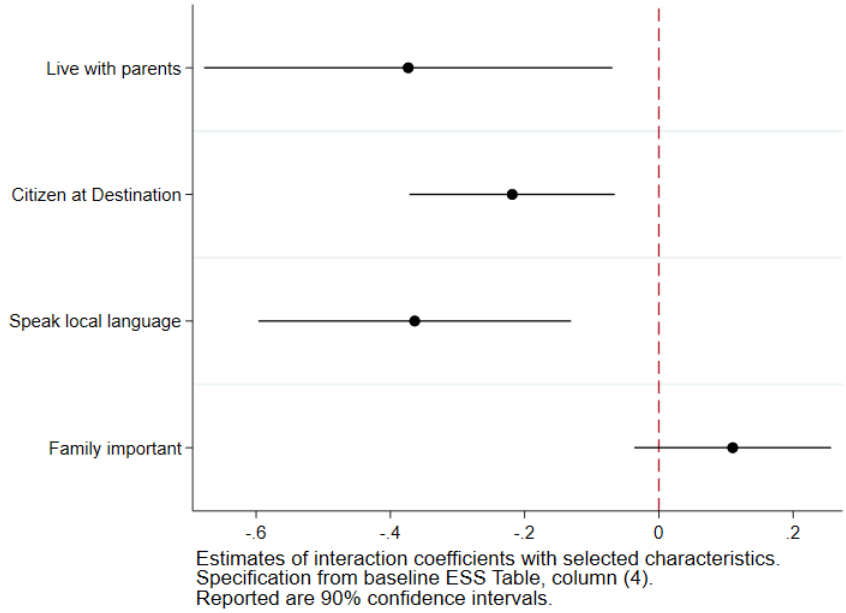
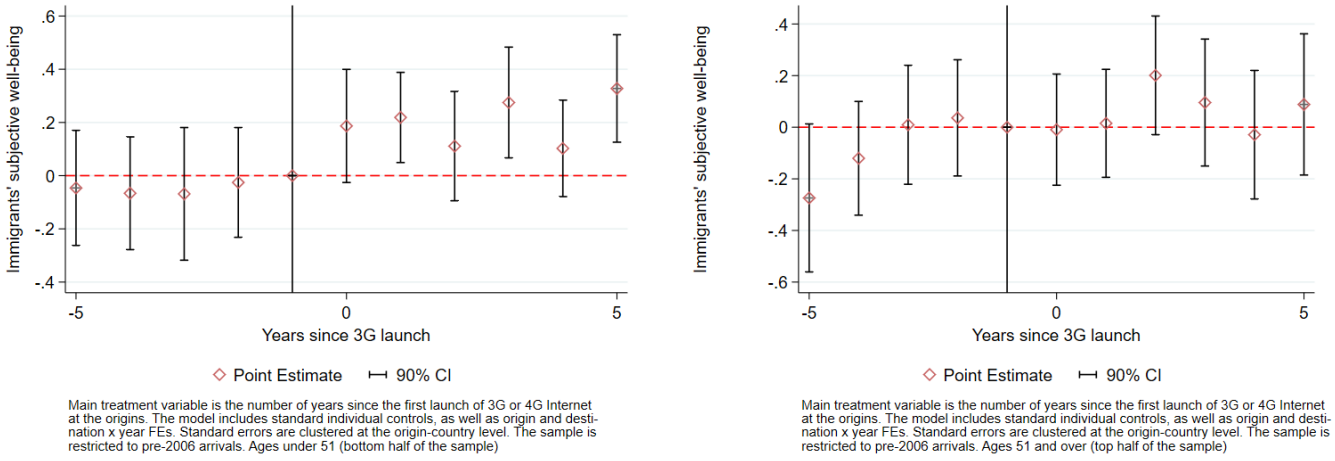
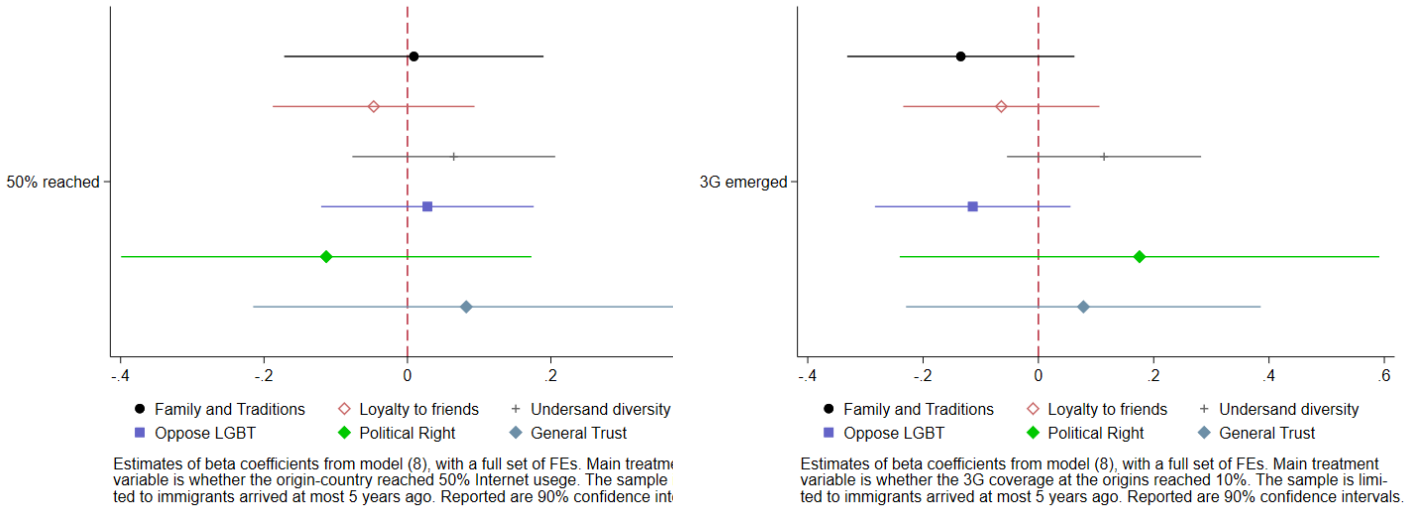


Figure A18: Origin-country Internet and immigrants' happiness: Interactions with integration at destination and family ties



(a) Younger immigrants (under 51) (b) Older immigrants (51 and over)

Figure A19: Event-study: effects of origin-country 3G emergence on immigrants happiness, by age groups



(a) Overall Internet access (50% dummy) (b) 3G Internet access

Figure A20: Effects of origin-country Internet on new immigrants' cultural values, ESS data.

B. Additional Tables

Table B1: Effect of origin-country Internet and Skype on traditional calls with the US

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	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

Table B2: Effect of origin-country Internet on numbers of new immigrants.

	(1)	(2)	(3)	(4)
VARIABLES	Number of new immigrants (origin x year)			
Internet coverage (% pop)	-388.050			
	(314.491)			
Internet 50% reached		13.907		
		(89.305)		
Internet coverage (% pop), lag			-141.762	
			(331.870)	
Internet 50% reached, lag				113.238
				(93.094)
Observations	3,300	3,300	3,178	3,178
Adjusted R-squared	0.639	0.638	0.626	0.626
Origin FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes

The outcome variable is the number of new immigrants arriving in the US in a given year from a given origin. The explanatory variables are (i) the share of origin-country population with access to Internet, and (ii) an indicator variable for reaching 50% Internet coverage at the origins. Columns (3) and (4) report the estimates with the lagged Internet overage (since migration decisions might respond to Internet availability with a lag). Robust standard errors, clustered at the origin-country level, in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table B3: Origin-country Internet and location choice (share of co-nationals in a county)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Share of co-nationals in a PUMA region							
50 % Internet reached	-0.010***	-0.002***	-0.001**	-0.001**	-0.001**	-0.002	-0.002	
	(0.004)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	
Share of Internet users								-0.007*
								(0.004)
Constant	0.039***	0.023***	0.029***	0.029***	0.029***	0.029***	0.034***	0.032***
	(0.015)	(0.003)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Observations	120,793	120,792	120,786	120,112	120,107	120,100	49,555	120,100
Adjusted R-squared	0.061	0.357	0.702	0.822	0.821	0.821	0.852	0.821
Origin FEs	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort FEs	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PUMA FEs	No	No	Yes	Yes	Yes	Yes	Yes	Yes
State x Origin FEs	No	No	No	Yes	Yes	Yes	Yes	Yes
State x Year FEs	No	No	No	No	Yes	Yes	Yes	Yes
Origin x Cohort FEs	No	No	No	No	No	Yes	Yes	Yes
Sample	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM	0-1 YSM, 5y window	0-1 YSM

This Table gives the estimates of the effect of home-country Internet at arrival on the initial location choice of new immigrants. The outcome variable is the share of co-nationals in the PUMA region of residence (available in the ACS from 2005 onwards). The sample is restricted to initial locations (0 or 1 years since migration, and those who did not move within the US). The main explanatory variable is a 0/1 dummy for whether the origin country had reached 50% Internet coverage at the time of migration. An alternative measure used in column (8) is a simple share of home-country Internet users at the time of migration. Column (1) starts with no FEs; column (2) shows a simple TWFE estimator. Subsequent columns add more demanding sets of FEs. Column (7) additionally restricts the sample to +/- 5 years around the 50% threshold. Standard errors, clustered at the origin-country level, in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table B4: Effect of origin-country Internet on immigrants' happiness and health (ESS data).

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Level of happiness (from 0 to 10)				Life Satisf.	General Health	No health issues
Internet coverage (% pop)	0.916***	0.431***	0.502***	0.471**	0.569***	0.180**	0.112*
	(0.139)	(0.143)	(0.171)	(0.228)	(0.194)	(0.091)	(0.066)
Observations	51,724	51,708	34,416	24,620	24,662	24,786	24,706
Adjusted R-squared	0.073	0.144	0.140	0.149	0.186	0.271	0.154
Origin FEs	No	Yes	Yes	Yes	Yes	Yes	Yes
Destination x Year FEs	No	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Full	Full	1st gen	Arrival pre-2000	Arrival pre-2000	Arrival pre-2000	Arrival pre-2000

This Table gives the estimates of the effect of home-country Internet in a given year on immigrants' subjective wellbeing. In columns (1)-(4) the outcome variable is the level of happiness (from 0 to 10). Column (1) does not include any Fixed Effects, while column (2) adds Origin and Destination x Year FEs. Column (3) restricts the sample to 1st gen immigrants, while column (4) requires that immigrants had arrived either before year 2000 (when the exact year of migration is available, rounds 5-9), or at least 10 years ago (rounds 2-4, covering years 2002-2010). Column (5) uses level of life satisfaction (from 0 to 10) as an outcome. Column (6) uses subjective assessment of general health (from 1 "very bad" to 5 "very good"). Column (7) uses as an outcome whether a respondent is hampered by a health issue (including mental health). Standard errors, clustered at the origin-country level, in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table B5: Effect of origin-country Internet on immigrants' happiness and health (ESS data).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Subjective well-being / happiness (scale from 0 to 10)								General Health	
3G first launch	0.168***	0.192***							0.083***	
	(0.057)	(0.065)							(0.028)	
10% 3G reached			0.117***	0.140***						0.031
			(0.044)	(0.052)						(0.024)
25% 3G reached					0.059	0.079				
					(0.049)	(0.056)				
50% 3G reached							0.039	0.069		
							(0.053)	(0.069)		
Observations	23,131	18,323	23,155	18,346	23,155	18,346	23,155	18,346	18,401	18,424
Adjusted R-squared	0.127	0.127	0.126	0.127	0.126	0.127	0.126	0.127	0.201	0.200
Origin FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	1st-gen	1st-gen, pre-2006	1st-gen	1st-gen, pre-2006	1st-gen	1st-gen, pre-2006	1st-gen	1st-gen, pre-2006	1st-gen, pre-2006	1st-gen, pre-2006

This Table gives the estimates of the effect of home country 3G Internet rollout on immigrants' subjective wellbeing and health. In columns (1)-(8) the outcome variable is the level of subjective well-being / happiness (from 0 to 10). In columns (9)-(10) the outcome variable is subjective health assessment (from 1 to 5). Columns (2), (4), (6), and (8)-(10) restrict the sample to immigrants who arrived before year 2006. Standard errors, clustered at the origin-country level, in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

C. 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)