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Alexander Yarkin
UC Davis Global Migration Center, LISER and IZA

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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Home-Country Internet and Immigrants' Well-Being*

This paper documents the effects of home-country Internet expansion on immigrants' health and subjective well-being (SWB). Combining data on SWB and health from the European Social Survey (ESS) with data on 3G and overall Internet expansion (ITU and Collins Batholomew), I find that immigrants' SWB and health increase following home-country Internet expansion. This result is observed in both the TWFE, and event study frameworks. The effects are stronger for (i) first-generation immigrants, (ii) those less socially integrated at destination, and (iii) those with stronger family ties to the origins. Thus, while recent evidence points towards negative effects of the Internet and social media on user well-being, the effects are very different for immigrants.

JEL Classification: F22, I31, J15, J61

Keywords: immigration, internet, subjective well-being, health, social networks

Corresponding author:
Alexander Yarkin
UC Davis Global Migration Center
Social Sciences and Humanities Building
1 Shields
Ave, Davis, CA 95616
USA

E-mail: alexander_yarkin@alumni.brown.edu

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1 Introduction

The global spread of the Internet and the increase in immigration from developing countries are two of the biggest trends of the last decades.[1] A growing body of research suggests that the Internet - particularly social media - has negative effects on user well-being, especially in terms of mental health and social isolation (e.g., Allcott et al. (2020), Braghieri et al. (2022), Donati et al. (2022)). Immigrants, however, are potentially very different in this context: once the country of origin reaches sufficient Internet penetration, immigrants get an opportunity to reconnect with families, friends, and media content from the origins. This opportunity to stay in touch with the origins can reduce the costs of separation from familiar networks, and hence increase immigrants' well-being. Thus, the effects of the Internet on immigrants can be very different from its effects on natives. Yet, there is no causal evidence on how Internet access affects immigrants' well-being.[2] This paper addresses this gap and documents the effects of home-country Internet expansion on immigrants' health and subjective well-being (SWB).

Specifically, I estimate the effects of home-country Internet access on immigrants' SWB, combining data on immigrants' well-being from the European Social Survey (ESS) with data on home-country Internet access. I use two empirical approaches. First, in a TWFE framework, I estimate the effects of post-migration Internet shocks at the origins on immigrants' SWB. Second, I use the staggered roll-out of 3G Internet (which happens fast and opens doors for active social media ties with the origins) in an event-study framework. In all regressions, I partial out destination-country shocks and focus on (exogenous for immigrants) home-country Internet improvements after migration, thereby sidestepping many identification concerns.

I find that expanding home-country Internet access increases immigrants' subjective well-being and health, in both the TWFE and the event-study frameworks. The effects are quantitatively large: going from 0 to 50% Internet coverage at the origin increases SWB by 0.1 of a standard deviation, similar to moving from the 5th to the 8th decile in income distribution. The entire effect is driven by first-generation immigrants. Within this group, the effect weakens with (i) time spent and (ii) social integration (language, citizenship) at

[1] Internet penetration from early 2000s to today increased from close to zero to more than 50% in low and middle income countries. Likiwise, recent immigrants come predominantly from the same set of developing countries, IOM (2024).

[2] There is anecdotal evidence that social media ties with the origins increase immigrants' well-being, Dekker and Engbersen (2014), Komito (2011).

destination. Stronger family ties to the origins amplify the effects. Moreover, the effects are stronger for younger immigrants, who are likely to be active on social media. I show that these effects are not confounded by correlated shocks at the origins: shocks to GDP per capita, GDP growth, political stability, or institutional quality.

These results speak to several strands of the literature. First, this paper expands the research on the effects of new ICTs by showing the cross-border effects of the Internet on diasporas. Most existing papers document local effects of the Internet on local economies and politics, e.g., Zhuravskaya et al. (2020), Aridor et al. (2024) for the reviews. Second, this paper adds to the debate on the effects of the Internet and social media on users' offline behaviors and well-being, e.g., Allcott et al. (2020), Braghieri et al. (2022). While most studies document negative effects, I find that the Internet has a positive impact on immigrants' SWB, as it helps mitigate the social costs of migration. Finally, this paper contributes to the literature on immigrants' health and well-being, e.g., Nikolova and Graham (2015), Hendriks and Burger (2021), Batista and Neves (2022), among others.

2 Data and empirical strategy

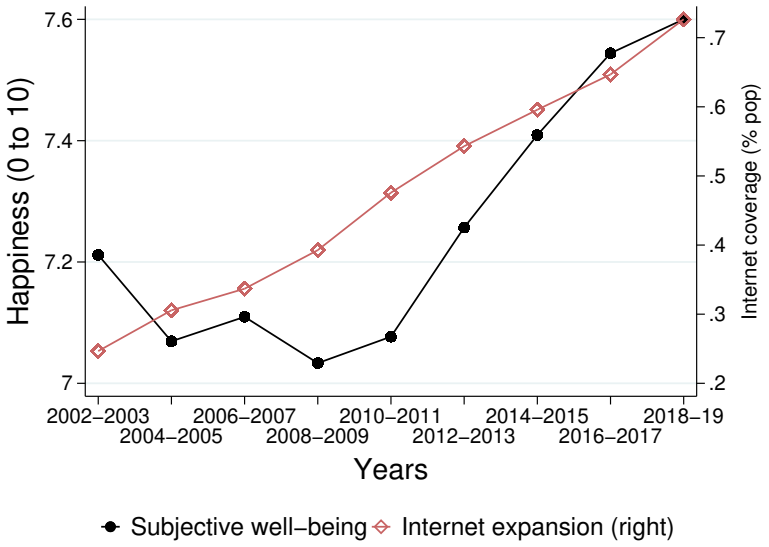
To measure immigrants' subjective well-being and health, I rely on the European Social Survey (ESS) data from 2002 to 2019. I use the following question: "Taking all things together, how happy would you say you are?" ranging from 0 (extremely unhappy) to 10 (extremely happy). As additional outcomes, I also use questions on life satisfaction, general health (physical and mental), and specific health issues, including mental health issues[3].

I use two complementary sources of data to measure Internet access in immigrants' home countries. First is the International Telecommunications Union's (ITU) data on (i) the share of Internet users, and (ii) access to broadband Internet (the two are strongly correlated). Second, to supplement the general Internet access with data capturing sharper "shocks" to connectivity at the origins, I use Collins Bartholomew's data on the staggered rollout of 3G technology (e.g., Guriev et al. (2020), Manacorda et al. (2022) for earlier uses of this data). Specifically, I merge mobile coverage rasters for 2006-2019 with population count rasters, and calculate the share of country population covered by 3G/4G technology in each year.[4]

[3]The question on general health is "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 is "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 so higher values reflect better health.

[4]Since the Collins data has gaps in coverage for some countries, I (i) restrict the sample to countries that

Figure 1: SWB and origin-country Internet: dynamics across all immigrants.



Notes: The averages of SWB (happiness scale from 0 to 10) and Internet access are calculated over all 1st-generation immigrants observed from round 1 to 9 of the ESS.

Figure 1 shows the dynamics of SWB and Internet coverage across all immigrants over almost two decades of the ESS data. Clearly, the average level of happiness has increased dramatically after 2010, aligning with the expansion of the Internet (from 20% to 70% coverage). Figure A1 shows that the increase in happiness trend is attributed entirely to Internet expansion at the origins.[5]

To document more rigorously the role of home-country Internet in immigrants' increasing SWB, I estimate the following model, where the level of immigrants' happiness / health depends on the origin-country Internet coverage:

$$Y_{i,o,d,t} = \beta \cdot Inet_{o,t} + X_i' + \phi_o + \tau_{d,t} + \varepsilon_{i,o,d,t} \tag{1}$$

where $Y_{i,o,s,t}$ is a well-being outcome of immigrant i from country o, living in country d, observed in year t. The model includes destination $\times$ year shocks $\tau_{d,t}$, and fixed differences across origins ϕ_o. Individual controls X_i' include gender, age, age^2, education, and marital status. $Inet_{o,t}$ is origin-country Internet access. The main strength of this empirical ap-

are consistently covered since at least 2012 (and vary the specific year for robustness), and (ii) for robustness, I replicate the event-study analysis with the overall Internet coverage shocks from the ITU data.

[5]The estimates of year FEs become insignificant once origin-country Internet is accounted for. The sample is limited to pre-2002 arrivals to limit the composition changes.

proach is that home-country Internet expansion is (i) exogenous for immigrants already at destination, and (ii) usually happens in the matter of several years, much faster than any other potentially correlated processes of economic development.

To have even sharper shocks to home-country Internet, I use the staggered roll-out of 3G Internet across origin countries.[6] Specifically, I test whether the emergence of 3G Internet at the origins affects immigrants' SWB in an event-study framework. I define the "event" as a year before a given origin country reaches 10% of 3G coverage. In the Appendix, Figure A3 illustrates the distribution of 3G treatment cohorts by years.

I augment the basic model (1) with the collection of dynamic lag and lead Fixed Effects relative to the time of 3G expansion:

$$Y_{i,o,d,t} = \sum_{k=-K}^{-2} \beta_k^{lead} \cdot D_{o,t}^e + \sum_{k=0}^{L} \beta_k^{lag} \cdot D_{o,t}^e + \phi_{g(o)} + \tau_{d,t} + \varepsilon_{i,o,d,t} \tag{2}$$

where $g(o)$ denotes the treatment cohort (when 3G expanded for a given origin o), and $D_{o,t}^e = \mathbb{1}[t - g(o) = k]$ denotes k years elapsed since treatment. Thus, β_k^{ld} and β_k^{lg} capture leads (pre-treatment differences) and lags (post-treatment effects). I implement two DID approaches: the standard event study, and the Callaway and Sant'Anna (2021) approach, where for each treatment cohort g, I only use never-treated and not-yet-treated as controls. Importantly, there are no significant pre-trends, suggesting that design is valid and there are no anticipation effects.

3 Main results

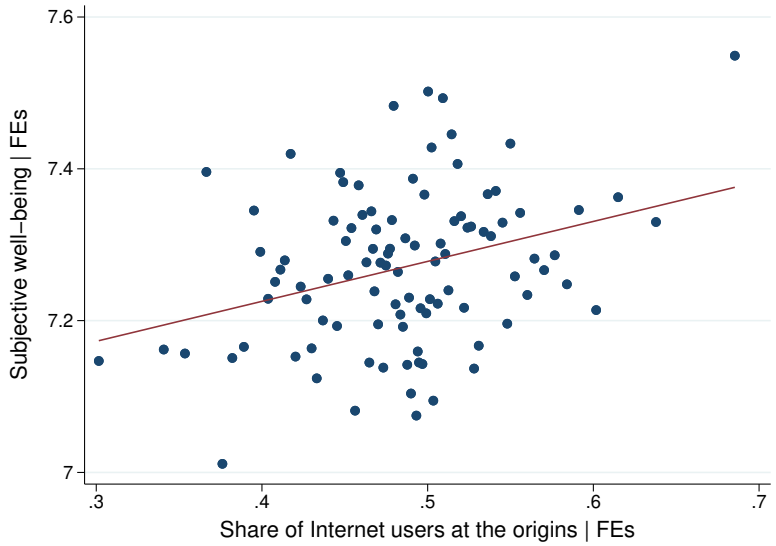
First, I estimate model (1) using the gradual expansion of Internet access at the origins (data from the ITU). Figure 2 shows that there is a strong positive link between home-country Internet access and first-generation immigrants' SWB. Figure A2 in the Appendix shows that the effect on second-gen immigrants is almost null.

There are similar positive effects on life satisfaction and subjective health assessment (including mental health), as reported in Table 1. The sample here only includes immigrants who migrated before 2002 (before the global spread of the Internet and before round 1 of the ESS), so these effects are unlikely to be driven by the changing composition of immigrants.[7]

[6] In addition, 3G Internet is known to increase social media usage, Guriev et al. (2020), which provides ample opportunities for cross-border networking.

[7] In robustness checks, I verify that the results are not affected by (i) differential rates of cohort attrition or selective return migration, or (ii) potentially changing size of the local diaspora, see also Yarkin (2024).

Figure 2: Origin-country Internet and immigrants' subjective well-being.



Notes: $\beta = 0.526$, s.e. $= 0.167$, p-val $= 0.002$. Included are destination x year, and origin FEs. Controls: age, age sq. gender, education, and marital status. S.e. clustered at the origin-country level. 34535 observations are split into 100 equal sized bins.

Table 1: Effect of origin-country Internet on immigrants' SWB and health

	(1)	(2)	(3)	(4)
VARIABLES	Happy	Happy	Life satisf.	Health
Internet coverage (% pop)	0.880	0.435	0.570	0.194
	(0.126)	(0.194)	(0.168)	(0.085)
Observations	27,121	27,121	27,166	27,304
Adjusted R-squared	0.013	0.138	0.171	0.276
Controls	No	Yes	Yes	Yes
Origin FEs	No	Yes	Yes	Yes
Dest. x Year FEs	No	Yes	Yes	Yes

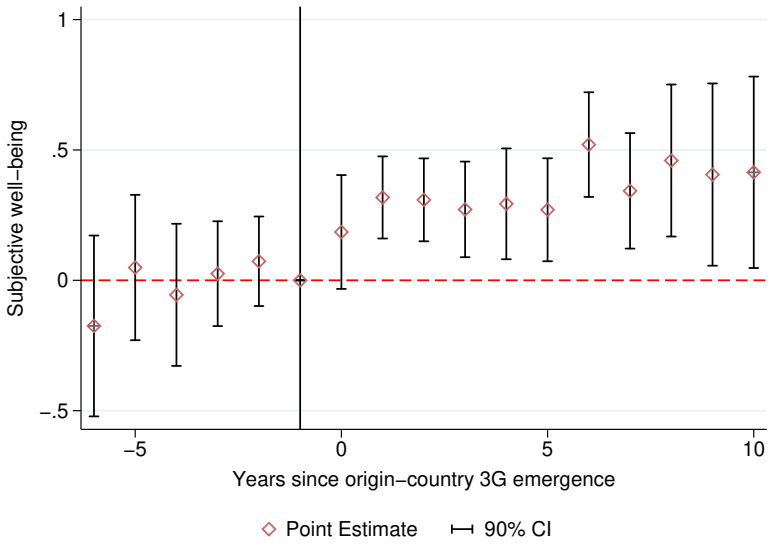
Notes: Reported are the estimates of β from model (1). In columns (1)-(2), the outcome is the level of happiness (from 0 to 10). In column (3), it is life satisfaction (from 0 to 10), and in column (4), it is general health assessment (from 1 "very bad" to 5 "very good"). The sample is restricted to first-generation immigrants who arrived before 2002. Standard errors are clustered at the origin-country level (in parentheses).

The estimate in column (2) suggests that going from 0 to 50% Internet coverage at the origin increases SWB by 0.1 of a standard deviation. Table B1 in the Appendix shows that the initial spread of the Internet (around 25% threshold in particular) drives the results.

One concern could be that improvements in home-country Internet access simply reflect origin-country development or associated changes in institutions, politics, or violence. Table B2 in the Appendix shows that potentially correlated changes at the origins - GDP per capita, GDP growth, political stability, and control of corruption - do not affect the relationship between home-country Internet and immigrants' subjective well-being.

Turning to model (2), I use the initial spread of 3G Internet at the origins in an event-study framework. Figure 3 shows that there are no pre-trends and strong positive post-treatment effects of home-country 3G on immigrants' SWB. The sample is limited to pre-2006 arrivals (before the global spread of 3G). Figure A4 shows similar (albeit noisier) estimates using the Callaway and Sant'Anna (2021) estimator: (i) on raw data, and (ii) on collapsed data, to ensure the results are not driven by the biggest sending countries.

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



Notes: The main treatment variable is the number of years since the launch of 3G or 4G Internet at the origins. The model includes standard individual controls, as well as origin and destination x year FEs. Standard errors are clustered at the origin-country level. The sample is restricted to pre-2006 arrivals.

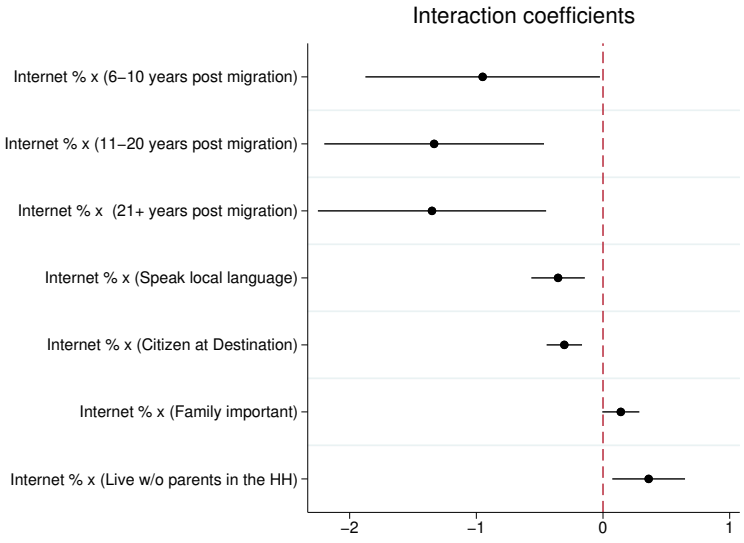
Table B3 in the Appendix shows that early years of 3G expansion matter most, and that 3G shocks have stronger effect when the overall Internet is still low. Finally, since the 3G

coverage data is missing for some countries and incomplete for some years, I re-do the event-study analysis using the ITU data on the overall Internet coverage. Although the "events" are less sharply defined, I still use the 10% threshold (results similar with 25% threshold), as with the 3G data. The results on Figure A5 confirm that immigrants' SWB increases following the home-country Internet expansion.

4 Heterogeneous effects

In this section, I document the role of immigrants' demographics, network ties to the origins, and social integration at destination affecting the strength of the effects reported above.

Figure 4: Home-country Internet and immigrants' SWB: Important interaction effects



Notes: Estimates of interaction coefficients with selected demographic, integration, or family characteristics. Specification from column (2) in Table 1. Included are destination x year, and origin FEs. Controls: age, age sq., gender, education, and marital status. The sample is restricted to 1st-gen immigrants, who arrived before 2002. S.e. clustered at the origin-country level, and 90% confidence intervals are reported. For the years post migration, the omitted category is "0-5 years post migration", and the estimate of β for this category is 1.71. Thus, the effect of home-country Internet gradually declines with years post-migration. The effects of citizenship and speaking local language work above and beyond the effect of years post-migration.

First, looking at the gradual improvements in overall Internet access at the origins after migration, Figure 4 shows that the positive effect of home-country Internet on SWB gradually decreases with more time spent at destination, possibly due to decreasing attachment to the

origins. Pointing in this direction is also the fact that immigrants' social integration at destination (measured via host-country language use at home and citizenship) decreases the positive effect of home-country Internet improvements. The moderating effects of speaking the local language and having local citizenship are not absorbed by the moderating effect of additional years spent at the destination. At the same time, having part of the family back at the origins and placing more value on family ties tends to increase the positive effects of the Internet on SWB, suggesting that part of the effect operates through contacts with family left behind.

Notably, since older immigrants tend to use digital tools—particularly social media—less actively, the effect of home-country 3G Internet expansion on this group is expected to be weaker. Indeed, Figure A6 in the Appendix confirms that the impact of home-country 3G adoption on subjective well-being is primarily driven by younger immigrants (under age 50).

5 Discussion and Conclusion

We live in an increasingly interconnected world, where the Internet provides unprecedented opportunities to network and consume content from abroad. The impact of new ICTs on immigrants and their well-being, however, remained unclear. On the one hand, recent studies found mostly negative effects of the Internet and social media on SWB in general. On the other hand, SWB tends to increase with the intensity of social interactions (Hamermesh (2020), Waldinger and Schulz (2023)), so for immigrants the effect can be very different.

This paper found strong positive effects of home-country Internet on immigrants' SWB and health in Europe using both the standard TWFE and the event-study methods. The effects are driven by (i) first-generation immigrants, (ii) the young and the less integrated in the host society, and (iii) those having stronger family ties to the origins. There could be two main channels, to be explored in future research. First, the Internet can affect SWB through increased social comparisons with reference groups (e.g., Appel et al. (2016)). For immigrants, the home-country Internet can reshuffle the comparison weights, away from destination peers and toward (usually poorer) home-country peers, increasing SWB; see also Gelatt (2013). Second, the home-country Internet allows immigrants to reconnect with familiar networks and home-language content (e.g., via Facebook and YouTube), which could be more valuable than destination-country networks and content.

In a related paper, Yarkin (2024) investigates the other part of the story of how the Internet affects immigrants. That paper documents the negative effects of home-country Internet

on immigrants' social integration (English proficiency and naturalization) and economic success in the US. Thus, the global spread of the Internet creates an important trade-off between immigrants' socio-economic integration at destination and their well-being and cross-border ties. Social welfare implications of these multifaceted effects of new ICTs on immigrants and receiving communities remain to be explored further.

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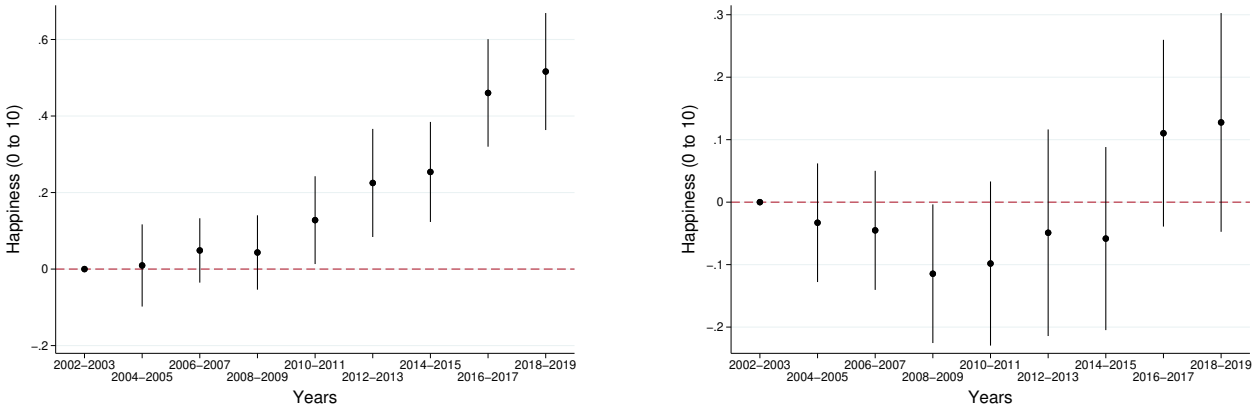
Online Appendix

to

"Home-country Internet and Immigrants' Well-being"

A. Additional Figures

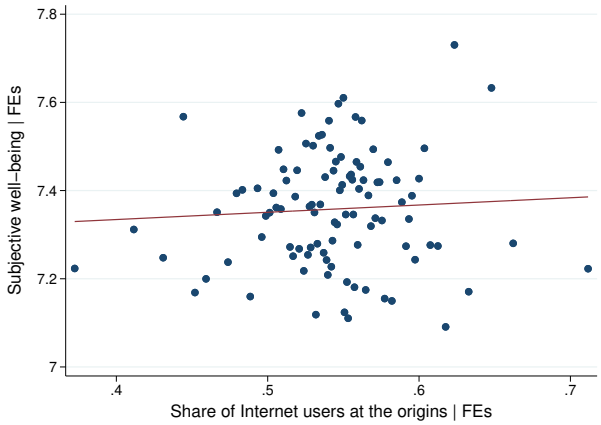
Figure A1: Dynamics of immigrants' SWB: (a) baseline, (b) with home-country Internet



(a) Baseline (b) Control for home-country Internet

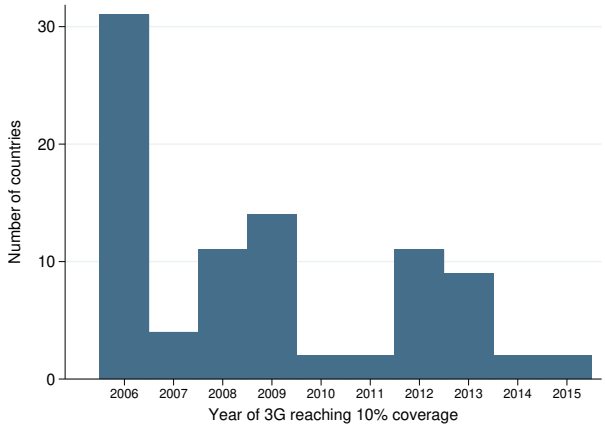
Notes: This Figure reports the estimates of ESS round FEs from model (1), excluding Destination x Year FEs, but including destination and origin FEs. Controls: age, age sq., gender, education, and marital status. S.e. clustered at the origin-country level. Panel (a) excludes origin-country Internet, and panel (b) includes origin-country Internet. The sample is restricted to 1st-gen immigrants, who arrived before 2002. Thus, the entire increasing trend in immigrants' SWB is attributed to origin-country Internet growth.

Figure A2: Origin Internet and migrants' SWB: 2nd-generation immigrants only



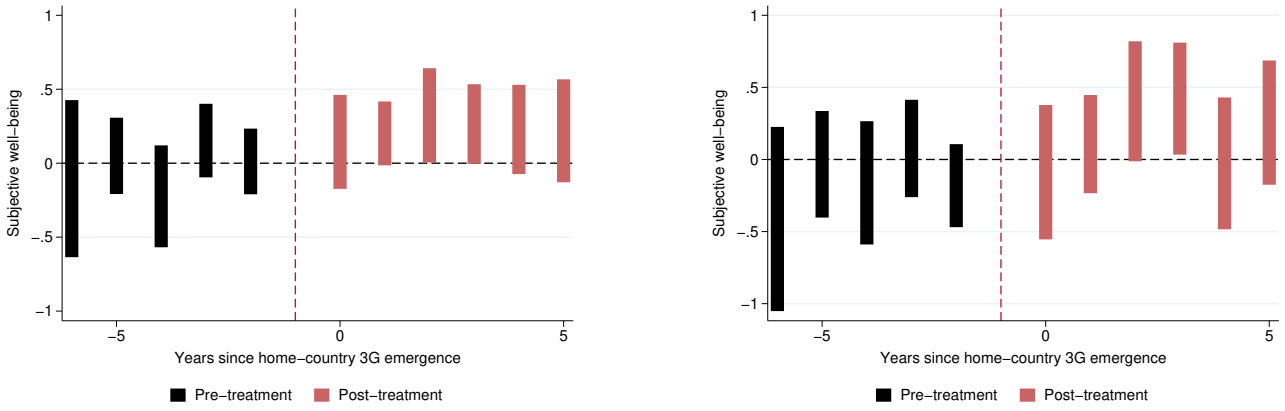
Notes: $\beta = 0.165$, s.e. $= 0.240$, p-val $= 0.496$. Included are destination x year, and origin FEs. Controls: age, age sq., gender, education, and marital status. S.e. clustered at the origin-country level. 17474 observations are split into 100 equal sized bins.

Figure A3: Distribution of 3G treatment cohorts, by year of 10% 3G coverage



Notes: Countries that never reached 10% 3G coverage or those that reached it after 2017 are used as never-treated in the analysis.

Figure A4: Callaway and Sant'Anna (2021) event-study estimates: home-country 3G Internet and immigrants' SWB.

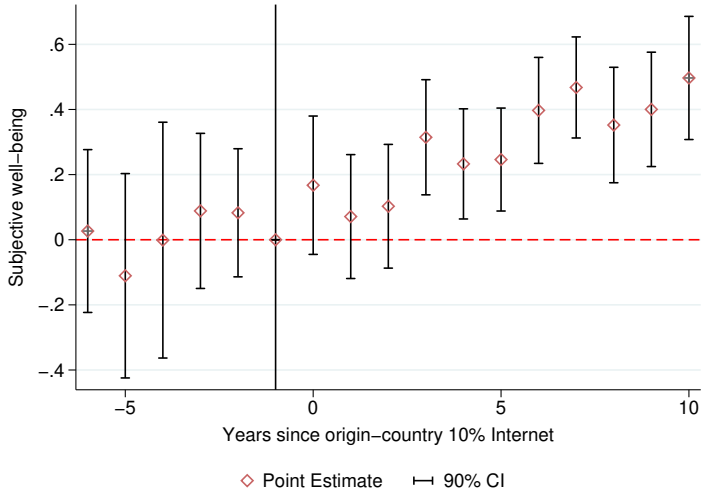


(a) Baseline

(b) Collapsed data

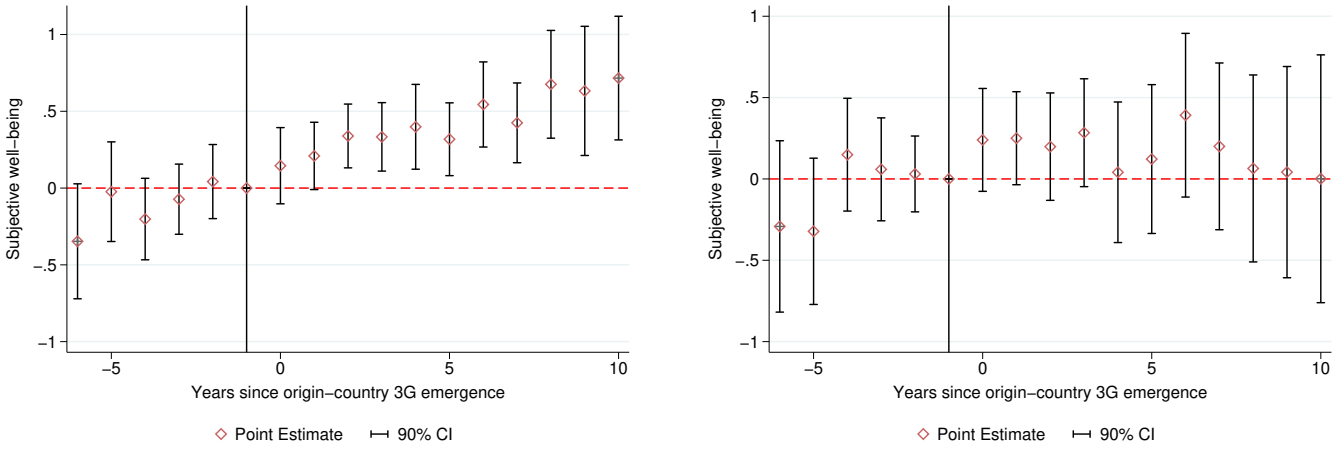
Notes: This figure reports the Callaway and Sant'Anna (2021) event-study estimates of the effects of home-country 3G (reaching 10% coverage) on immigrants' SWB, model 2. The model includes Destination x Year and Origin FEs. Controls: age, age sq., gender, education, and marital status. To include controls in the CS (2021) estimator, I first partialled out FEs and controls from the outcomes, and then ran the CS (2021) estimator on the residualized outcome. S.e. clustered at the origin-country level. Panel (a) shows the results based on non-collapsed data, and panel (b) shows similar specification on data collapsed to destination x origin x year level. The sample consists of 1st-gen immigrants, 18 to 64 years old, who arrived before 2006.

Figure A5: Event study: effects of origin-country Internet on immigrants' SWB.



Notes: The main treatment variable is the number of years since the origin-country Internet crossed the 10% threshold. The model includes standard individual controls, as well as origin and destination x year FEs. Standard errors are clustered at the origin-country level. The sample is restricted to pre-2002 arrivals.

Figure A6: Event-study: effects of origin-country 3G on immigrants happiness, by age groups



(a) Younger immigrants (up to 50) (b) Older immigrants (51 and over)

Notes: The main treatment variable is the number of years since the launch of 3G or 4G Internet at the origins. The model includes standard individual controls, as well as origin and destination x year FEs. Standard errors are clustered at the origin-country level. The sample is restricted to pre-2006 arrivals. Panel (a) restricts the sample to ages 18 to 50, and panel (b) considers only ages 51 and older, splitting the sample roughly in half by age of the respondent.

B. Additional Tables

Table B1: Effect of origin-country Internet on immigrants' SWB: stages of Internet expansion

	(1)	(2)	(3)	(4)
VARIABLES	Happy	Happy	Happy	Happy
Internet coverage (% pop)	0.627	0.559		
	(0.369)	(0.520)		
Coverage 10% reached			0.013	
			(0.119)	
Coverage 25% reached				0.203
				(0.071)
Observations	14,003	13,067	10,800	10,800
Adjusted R-squared	0.129	0.130	0.135	0.136
Controls	Yes	Yes	Yes	Yes
Origin FEs	Yes	Yes	Yes	Yes
Dest. x Year FEs	Yes	Yes	Yes	Yes
Sample	0 to 50 coverage	50+ coverage	0 to 50 coverage	0 to 50 coverage

Notes: Reported are the estimates of β from model (1). The outcome is the level of happiness (from 0 to 10). In column (1), (3), and (4), the sample is restricted to Internet coverage from 0 to 50% of population. In column (2) the sample is restricted to 50+ coverage (weaker effects). In all columns, the sample is restricted to 1st-gen immigrants, who arrived before 2002. In addition, in columns (3) and (4), the sample is restricted to origin countries which had not got 10% or higher until at least 2003 (thus removing the always-treated). Standard errors are clustered at the origin-country level (in parentheses).

Table B2: Origin-country Internet and immigrants' SWB: development confounders

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Happy	Happy	Happy	Happy	Happy
Internet coverage (% pop)	0.421	0.412	0.416	0.419	0.434
	(0.194)	(0.199)	(0.192)	(0.192)	(0.193)
Log(GDP per capita)		0.055			
		(0.133)			
GDP growth			-0.001		
			(0.005)		
Political stability				-0.054	
				(0.033)	
Control of corruption					-0.076
					(0.082)
Observations	27,020	27,020	27,020	27,020	27,020
Adjusted R-squared	0.138	0.138	0.138	0.138	0.138
Controls	Yes	Yes	Yes	Yes	Yes
Origin FEs	Yes	Yes	Yes	Yes	Yes
Dest. x Year FEs	Yes	Yes	Yes	Yes	Yes

Notes: Reported are the estimates of β from model (1). The outcome is the level of happiness (from 0 to 10). In column (1), (3), and (4), the sample is restricted to Internet coverage from 0 to 50% of population. In column (2) the sample is restricted to 50+ coverage (weaker effects). In all columns, the sample is restricted to 1st-gen immigrants, who arrived before 2002. In addition, in columns (3) and (4), the sample is restricted to origin countries which had not got 10% or higher until at least 2003 (thus removing the always-treated). Standard errors are clustered at the origin-country level (in parentheses).

Table B3: Effect of origin-country Internet on immigrants' SWB: stages of Internet expansion

	(1)	(2)	(3)	(4)
VARIABLES	Happy	Happy	Happy	Happy
Reached 10% 3G	0.158			0.207
	(0.057)			(0.056)
Reached 25% 3G		0.071		
		(0.063)		
Reached 50% 3G			0.052	
			(0.079)	
Reached. 10% 3G after 50% Int.				-0.195
				(0.077)
Observations	16,829	16,829	16,829	16,806
Adjusted R-squared	0.123	0.122	0.122	0.123
Controls	Yes	Yes	Yes	Yes
Origin FEs	Yes	Yes	Yes	Yes
Dest. x Year FEs	Yes	Yes	Yes	Yes

Notes: Reported are the TWFE estimates of the effects of 3G expansion at the origins on immigrants' SWB. The outcome is the level of happiness (from 0 to 10). In column (4), the 10% 3G treatment is interacted with the dummy variable taking the value of 1 for countries where 10% 3G coverage was reached after the overall Internet coverage exceeded 50% of the population. We see that 3G shocks matter only when the overall Internet is not yet highly developed. In all columns, the sample is restricted to 1st-gen immigrants, who arrived before 2006. Origin-country sample is restricted to countries with consistent data on 3G coverage (like in the event-study estimates). Standard errors are clustered at the origin-country level (in parentheses).