When in America, do as the Americans? Exploring the heterogeneity in immigrants unhealthy assimilation

Paolo Nicola Barbieri

University of Gothenburg

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Paolo Nicola Barbieri*[1]

[1]Centre for Health Economics - University of Gothenburg

Abstract

It is a well-established that immigrants upon their arrival in the United States are in better health condition with respect to their American counterpart and that such advantage erodes over time. In this paper we study the heterogeneity of such assimilation across different arrival cohorts and unhealthy behaviors. To do so we focus on the assimilation of: cigarette and alcohol consumption. Our theoretical predictions show that assimilation depends on social exposure and taste for consumption. Empirical results show that for binge drinking more recent immigrant cohorts arrive in the US with a higher probability of being binge drinker and experience a faster assimilation as time passes. On the contrary for smoking habits both earlier and later arrival cohorts report lower smoking rates, although such health advantage decreases with time spent in the US. These results show that there is indeed heterogeneity in the assimilation of unhealthy behaviors for American immigrants. Drinking habits assimilation start in the country of origin and continues as immigrants interacts with natives' habits; while for smoking healthier country of origin healthier habits are preserved in time, but immigrants struggle to maintain their health advantage as they interacts with natives.

Keywords: health immigration effects, unhealthy assimilation

JEL-Classification: J15, I10

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1 Introduction

Although immigrants in the United States are still relatively small in absolute term, representing roughly 12.5% of the entire population (Grieco et al., 2012), they are growing far more rapidly than the native-born population. According to Kandel (2011) *"between 2000 and 2008, the foreign born contributed 30% of the total U.S. population increase and almost all of the prime 25-54 working age group increase"*. This large and increasing presence of immigrants highlights the importance of monitoring, among other measures, their health condition. A large immigrant population may increase the pressure to the health care system, for example, related to specific health care needs connected to immigrants' cultural heritage and habits (Borjas and Hilton, 1995, Romero-Ortuno, 2004).

When considering the primary impact of immigration on health care there is a wide spread public view such that immigrants are frequently blamed to raise health care costs and to represent an increased burden on the health care system, especially on native taxpayers. However, empirical evidence shows that immigrants, upon arriving in the US, are younger and healthier than their American counterparts and less likely to utilize health care (Goldman et al., 2006). Such evidence is conventionally defined as *"health immigrant effect"*. Interestingly upon their arrival immigrants, are healthier than both their population of origin and natives in the host countries, but their health deteriorates as they spend time in the hosting country (Akbulut-Yuksel and Kugler, 2016, Antecol and Bedard, 2006). For example, Akbulut-Yuksel and Kugler (2016) show that even if immigrant children inherit a prominent fraction of their health status (e.g. body weight, asthma, depression) from their parents, the longer they remain in the US the more their health status is similar to the one of native children. This assimilation in health outcomes can be also reconciled with the slower convergence in earnings that later arrival cohorts exhibit (Borjas, 2015) leading them to be more exposed to unhealthy behaviors due to their lower socio-economic status (Pampel et al., 2010). Such assimilation is observed for several countries and across numerous health indicators (Antecol and Bedard, 2006, Kennedy et al., 2006, Leung, 2014). The existing literature provides evidence that the relative advantage that immigrants exhibit is due to self-selection and socio-cultural protection (Antecol and Bedard, 2006, Jass and Massey, 2004, McDonald and Kennedy, 2004, Riosmena et al., 2013). Upon arrival immigrants have health habits and behaviors acquired in their home countries promoting better health, however these habits deteriorate when they interacts with natives' customs, leading immigrants to converge to lower health standards.

Current literature on drinking and smoking assimilation by American immigrants does not incorporates the possibility heterogeneity across different immigrant cohorts. Leung (2014) for example shows that smoking rates in the country of origin are associated with different likelihood of ever quitting smoking for American immigrants. Warner et al. (2010) exploring the assimilation of alcohol use among immigrant youth, show that assimilation may vary by person and place due to familial and social factors. Alcohol use, binge drinking and substance abuses are also found to be have a different assimilation among adolescences based on their ethnic segmentation (Bui, 2013, Eitle et al., 2009). Unfortunately, very little is known about the process of assimilation and if it's heterogeneous across different arrival cohorts and/or health behaviors. Shedding light on such pattern is crucial to evaluate the costs and benefits of migration, and, in particular, its impact on health care.

One of the few papers that examined immigrant health assimilation and its possible heterogeneity across different arrival cohorts is Giuntella and Stella (2016), by applying an empirical methodology similar to the wage convergence literature (Borjas, 2015). In their paper, Giuntella and Stella (2016) focused their analysis on the spread of obesity among US immigrants. They show that more recent immigrant cohorts arrive with higher obesity rates and experience a faster weight gain. Such pattern can be reconciled to the fact that obesity rates in America are among the highest and healthier immigrants indeed converge toward them. We intend to build upon such analysis but to explore not only time differences in immigrants' unhealthy assimilation but also heterogeneity across different health behaviors. To do so we focus our analysis on the health immigration effect for American immigrant connected to drinking and smoking habits. We focus on this two indicators since, differently from obesity, which is a health measure resulting from a set of other consumption decisions, they represent two "direct" consumption choices. Thus they allow us to infer the direct behavior of American immigrants; while obesity, by being the result of different consumption inputs (e.g. food consumption, physical activity), cannot allows to do so. In addition to this we are able to show that the *health immigration effect* is still present for drinking and smoking habits, even if, differently from obesity rates, United States is ranked relatively low in cigarette consumption and it is a mid-tier country for risky alcohol consumption OECD (2015). In fact, based upon this evidence, we should expect that immigrants to be unhealthier or at least not markedly different from their natives' counterpart; what we find instead is that American immigrants are still healthier than their American counterparts, regardless from their home

countries statistics, and that their health deteriorates as time passes.

To study cohort differences in the assimilation of binge drinking and cigarettes consumption among immigrants over time living in the US we use data from the public version of the Integrated Health Interview Survey (IHIS) from 1989-2014. We find that there are indeed cohort effects for alcohol consumption, with more recent cohorts having relatively higher rates of binge drinking and daily drinks upon arrival. The results show that assimilation increased for cohorts arriving in the 1990s. Before 1990, immigrant could expect an increase in their relative binge drinking status of approximately $3-4\%$, during the first 10 years in the US; while such assimilation increased to 5% for immigrants who arrived after the 1990, with a more pronounced increased for male and Hispanic immigrants. In terms of number of drinks, later cohorts exhibit a higher daily consumption of alcoholic beverages; however, the rate of assimilation was higher for cohorts arriving in the first half of the 1990s. Such results point out to a pattern such that, on average, immigrants tend to have a higher probability of becoming binge drinker the longer they stay in the US, however consuming fewer drinks than natives do. The results on smoking habits point to an interesting pattern, which contradicts the "health immigrant effect". Immigrants maintained and actually increased their relative advantages in terms of lower smoking rates and daily cigarettes consumption once upon arriving in the US. In terms of assimilation, however, the results shows that over time immigrants struggle to maintain their health advantage. In fact, immigrants in the 1990s could expect a decrease in their relative smoking status of approximately $6-8\%$, during the first 10 years in the US, however such divergence rate more than halved (2%) for immigrants who arrived after the 2000, for Hispanic and male immigrant this reduction was more pronounced. These results confirm that the dynamics of assimilation between drinking and smoking rates are different. The convergence towards American drinking habits seems to start in the home countries, since immigrants relative drinking habits advantage is decreasing over-time, and continues the longer they stay in the US; while for smoking habits immigrants' relative advantage is present and stronger over-time as they leave their home countries, however such advantage decrease the longer they stay in the US. These results show that there is indeed heterogeneity in the assimilation of unhealthy behaviors for American immigrants. The convergence over American drinking habits start in the country of origin and continues as immigrants interacts with natives; while for smoking habits country of origin healthier habits are preserved in time but immigrants struggle to maintain their health advantage as they interacts with natives.

2 A model of health assimilation

In this section we develop a model of how individual can be affected, in their consumption habits, due to social interaction. To do so we build upon the model of Reich and Weibull (2012) and define an economy composed by n individuals (with $i \in I\{1, ..., n\}$) and m goods (with $k \in K = \{1, ..., m\}$). For simplicity we assume that there exists just two goods and so each individual chooses a consumption pattern $x_i = (x_{i1}, x_{i2})$ from his budget constraint

$$B(p, y_i) = \left\{ x_i \in \mathbb{R}^m_+ : p_1 x_{i1} + p_2 x_{i2} \leq y_1 \right\} \tag{1}$$

where y_i is the (current) disposable income. Individual health, h_i, is determined by his consumption pattern and by his health dynamics, $h_i = f_i(x_i)$, which is assumed to be exogenously given to the individual. The vectors $\mathbf{x} = (x_1, ..., x_n)$ and $\mathbf{h} = (h_1, ..., h_n)$ (where $h_j = f_j(h_j)\ \forall j$) are the population consumption and health profile, respectively.

An individual can influence his health by choosing a consumption pattern according to the following utility function

$$U_i(\mathbf{x}) = \ln u_i(x_i) + \beta_i v_i(\mathbf{h}) \tag{2}$$

where $u_i(x_i)$ is the utility from consumption; while $v_i(\mathbf{h})$ is the component of the utility function describing the individual's i satisfaction with his own health, depending on his own and other's health. This second component of the utility function can be interpreted as health concern, with β_i as the relative weight of such concern. We assume that u_i and v_i are continuous, that u_i is strictly quasi-concave and strictly increasing in all the x; and that for any given $\mathbf{h}$, v_i is strictly quasi-concave in h_i with an unique maximum point representing individual's i ideal health, $\mu_i(\mathbf{h}_{-i})$. The individual unconstrained consumption is the consumption resulting by maximizing u_i if he had no health concerns. Such level result in the individual unconcerned health status, h_i^o, which is defined by $h_i^o = f_i(x_i^o)$ such that $x_1^o \in \max\ u_i(x_i)$.

We characterize individual health accumulation as follows

$$h_i = f_i(x_i) = \theta_{i1} x_{i1} + \theta_{i2} x_{i2} - e_i \tag{3}$$

where: $\theta_{ik} > 0$ if the consumption of good k is health-increasing, $\theta_{ik} < 0$ if the consumption of good k is

health decreasing and $\theta_{ik} = 0$ if it has no health effect. In our specific example we assume that good 1 is health-decreasing (unhealthy consumption such as smoking and/or alcohol consumption) and good 2 has no health effects.[1].

Regarding health concerns we assume the following quadratic loss function

$$v_i(\mathbf{h}) = -\frac{\sigma_i(\mathbf{h}_{-i})(h_i - \mu_i(\mathbf{h}_{-i}))^2}{2} \tag{4}$$

where σ_i and μ_i are positive and continuous functions of others' health, $\mathbf{h}_{-i}$. In this way σ_i reflects how fast the individual's satisfaction with his own health decreases as his actual health deviates from its ideal one. Thus σ_i can be also referred as health sensitivity parameter, which like μ_i is allowed to depend on others' health. A moderate health increase for individual with health close to their ideal creates a little effect on their utility but then the effect picks up as health deviates further from the ideal one to finally decrease as health deviates very far from the ideal.

The utility function part associated with consumption is assumed to exhibits constant elasticity of substitution (CES)

$$u_i(x_i) = (\alpha_{i1} x_{i1}^{\rho_i} + \alpha_{i2} x_{i2}^{\rho_i})^{1/\rho_i} \tag{5}$$

with $\rho_i < 1$ and $\alpha_{i1} + \alpha_{i2} = 1$. Each α parameter represents the intensity of individual desire to consume each good, while ρ_i is the degree of substitutability between them.

The utility function, combining all equations above, becomes

$$U_i(\mathbf{x}) = \frac{1}{\rho_i} ln(\alpha_{i1} x_{i1}^{\rho_i} + \alpha_{i2} x_{i2}^{\rho_i}) - \frac{\beta_i \sigma_i(\mathbf{h}_{-i})}{2} (\theta_{i1} x_{i1} - e_i - \mu_i(\mathbf{h}_{-i}))^2 \tag{6}$$

In order to model the *health assimilation* we will assume that the more the individual's reference deviate from his individual ideal health, the less he will be concerned by his own deviation for his ideal health. This means that if a person is surrounded by individuals with lower health he will be less concerned with the consequences of having a health lower than his own ideal one. Formally let individual health sensitivity, σ_i

[1]See Reich and Weibull (2012) for a generalization of this model to more than two consumption goods.

to depend on others' health as follows

$$\sigma_i(\mathbf{h}_{-i}) = (1-\gamma_i)\sigma_i^o + \gamma_i e^{-\kappa(h_j-\mu_i)^2/2} \tag{7}$$

where the first term, $\sigma_i^o \geq 0$ is the i's basic sensitivity to own health while the second term represents peer effect and is decreasing as the health of i's reference peers deviates further from i's ideal, with κ representing i's sensitivity to this deviation.

Under this endogeneization the utility function becomes

$$U_i(\mathbf{x}) = \frac{1}{\rho_i} ln(\alpha_{i1}x_{i1}^{\rho_i} + \alpha_{i2}x_{i2}^{\rho_i}) - \beta_i \frac{(1-\gamma_i)\sigma_i^o + \gamma_i e^{-\kappa(h_j-\mu_i)^2/2}}{2}(\theta_{i1}x_{i1} - e - \mu_i))^2 \tag{8}$$

Dividing the first-order condition for each of the two goods and substituting for the budget constraint gives the first order condition in only one variable, namely the health-decreasing good

$$\begin{aligned} &\frac{\alpha_{i1}}{\alpha_{i2}}[1-\beta_1(1-\gamma_i)\sigma_i^o + \gamma_i e^{-\kappa(h_j-\mu_i)^2/2}(\theta_{i1}x_{i1} - e_i - \mu_i)\theta_{i1}x_{i1}]\left(\frac{y_i - p_i x_{i1}}{p_2 x_{i1}}\right)^{1-\rho_i} \\ &= \frac{p_1}{p_2} + \beta_i(1-\gamma_i)\sigma_i^o + \gamma_i e^{-\kappa(h_j-\mu_i)^2/2}\theta_{i1}(\theta_{i1}x_{i1} - e_i - \mu_i) \cdot \frac{y_i - p_1 x_{i1}}{p_2} \end{aligned} \tag{9}$$

The unique solution when the individual has no concern for health, $\sigma_1 = 0$, is x_{i1}^o, which is the individual unconcerned consumption with corresponding health $h_1^o = \theta_{i1}x_{i1} - e_i$.

In equilibrium for an individual living in a society with a lower average health than himself (i.e. $h_i > \mu_i(\mathbf{h_{-i}})$) the RHS of equation (9) is positive like the LHS implying that the factor in square brackets is positive. If we divide by that factor and express income in real term ($y_i = Y_i/p_2$) and $p = p_1/p_2$ and express equation (9) in terms of health, we get

$$\frac{\alpha_{i1}}{\alpha_{i2}} \cdot \left(\frac{\theta_{i1}y_i}{h_i + e_i} - p\right)^{1-\rho_i} = p + \frac{\beta_i[(1-\gamma_i)\sigma_i^o + \gamma_i e^{-\kappa(h_j-\mu_i)^2/2}](h_i - \mu_i)}{1 - \beta_1[(1-\gamma_i)\sigma_i^o + \gamma_i e^{-\kappa(h_j-\mu_i)^2/2}](h_i + e_i)(h_i - \mu_i)} \cdot \theta_{i1}y_i \tag{10}$$

Proposition 2.1. *The health of an individual living in a society unhealthier than himself (i.e. $h_i > \mu_i(\mathbf{h_{-i}})$) is decreasing in social sensitivity (κ_i and γ_i) and in the preference for unhealthy consumption (α_{i1}/α_{i2}).*

Proposition 2.1 shows that if others' health is low and the individual is sufficiently socially sensitive then

he may choose a consumption bundle that leads to a low own health. Intuitively the speed and magnitude of convergence will depend on the relative weight that individual has on the social component of their fitness sensitivity (i.e. γ_i) and on their sensitivity toward deviation of peer's health with respect to his (i.e. κ_i). In addition to this, such convergence, depends also on the relative taste that individual has regarding unhealthy consumption (α_{i1}/α_{i2}) i.e. individual are allowed to have heterogeneous assimilation rate depending on the type of unhealthy good considered.

The theoretical model provides two main channel of health assimilation for immigrants. The first one is a social norm component through which immigrants are influenced by natives' and earlier immigrants norms in term of unhealthy consumption. The second one is a relative taste component which can be reconciled with the lower socio-economic status due to their slower economic assimilation, which is influencing their consumption choice exposing them to more unhealthy consumption.

3 Data

We collected individual-level data from the Integrated Health Interview Survey (IHIS), which is a harmonized dataset for over 50 years (1963-2014) collected by the National Health Interview Survey (NHIS). In this paper, we used a sub-set of the IHIS, going from 1989 to 2014, when the information on the number of years spent in the US was collected. Following similar literature (Antecol and Bedard, 2006, Borjas, 2015, Giuntella and Stella, 2016) and to ensure the representativeness of the sample we restricted the observations to individual aged 25-65 years that migrated to the US after the age of 18 years. We consider several dependant variables. The first two are two dummy variables coded one if the individual is a smoker or a binge drinker. Following the guidelines from the National Institute of Alcohol Abuse and Alcoholism (NIAAA) binge drinking is defined as *"... a pattern of drinking that brings blood alcohol concentration (BAC) levels to 0.08 g/dL; this typically occurs after 4 drinks for women and 5 drinks for men"*. Therefore, a binge drinker is a man consuming more than 5 drinks a day, or a woman consuming more than 4 drinks. The other two variables are continuous variable measuring the number of cigarettes and alcoholic beverages[2] that the individual is consuming on a daily basis[3]. We excluded from the sample any observation with missing data

[2]Alcoholic beverages include liquor, beer, wine, wine coolers, and any other type of alcoholic beverage

[3]Since the IHIS codebook exercise caution in interpreting very high values for drinking habits we dropped any observation reporting more than 20 drinks per day, as they may have misunderstood the question (e.g., they may have given a response

for drinking, smoking, age, years since migration, year of arrival[4]. After such restriction, we have a final sample consisting of: 669,445 US natives (548,853 White people, 23,753 Hispanics and 99,226 Black people) and 42.558 immigrants (27,330 White people, 23,420 Hispanics and 4.142 Black people).

[Table 1 about here.]

[Table 2 about here.]

In Table 1 and 2 we report the descriptive statics for our final sample divided for men and women and stratified by ethnicity and citizenship. Native men and women have higher education attainment (13.3 years of education) with respect to immigrants (12 years); they are more likely to be married (63% for natives versus 62% for immigrants); natives are also more likely to work (especially women). Regarding drinking habits the rate of binge drinking is slightly higher for immigrants with respect to natives (11% versus 10%), mostly due to white immigrants binge drinker (13% versus 10%). Natives women have a higher probability of being binge drinker than immigrants (6% versus 2.5% and 1.2 drinks versus 0.6), such difference is more pronounced for Hispanic ethnicity (10% versus 3%). The striking finding is that native men and women have a greater chance of being smoker than their immigrant counterparts (30% versus 20% for men; 24% versus 9% for women). If we compare the number of cigarettes daily consumed, native men and women consumes a striking higher number of cigarettes with respect to natives (5 cigarettes versus 2 for men; 3 versus less than 1 for women). From Table 1 and 2 it is easy to see that such relationship are the same for all ethnic group considered.

4 Empirical Framework

In order to investigate cohorts' differences in the level of immigrant drinking and smoking habits upon arrival in the US and in the rate of growth of immigrant assimilation, we employ a linear probability model similar to Borjas (2015), Giuntella and Stella (2016). Such model allows for the presence of cohort differences in the rate of assimilation.

related to the number of days that they drank or related to a different reference period, such as the number of drinks per year).

[4]When we control for education, marital status, income and current employment we also drop any observation with missing data for years of education and current employment and marital status. Such results are qualitatively similar to the one presented in the paper and are available upon request.

Following the empirical methodology from Borjas (2015), Giuntella and Stella (2016), we consider the following model

$$B_i = \delta A_i + \gamma C_i + \theta(A_i \cdot C_i) + \beta X_i + \epsilon_i \tag{11}$$

where the unit of observation is individual i aged 25-64 years at time of the IHIS interview. B_i represents the outcome of interest (e.g. binge drinking, smoking), X_i is a vector of control variables including age (introduced as a third-order polynomial) interacted with a variable indicating whether the person is foreign- or native[5]; A_i is linear variable indicating the number of years the immigrant has lived in the US (equal to 0 for natives); C_i is a vector of dummy variables identifying immigrant arrival cohorts (i.e. cohort fixed effects), with the omitted category given by comparable natives. Following the novelty introduced by Giuntella and Stella (2016) we include in (1) the factor $A_i \cdot C_i$, which represents the interaction between the linear term of the years-since-migration and each cohorts fixed effects. Such term allows us to control for the fact that each arrival cohort has its own growth path regarding B_i. In this way we can examine the differential assimilation pattern that the different immigrant-arrival cohorts exhibit.

In equation (1) the δ coefficient represents the effect of assimilation on the specific health behavior of interest, while the γ coefficient indicates whether upon their arrival in the US immigrants were more or less likely to engage in unhealthy behaviors with respect to otherwise similar native[6].

As in Borjas (2015) in addition to the regression analysis we also report the relative unhealthy behavior growth rates in the first 10 years after immigration[7]. Such analysis is intended to illustrate the trends in the rate of unhealthy assimilation, by computing the extend to which the health gap between natives and immigrants narrowed over the first decade in the US[8].

[5]This is the same set of controls used by Giuntella and Stella (2016) and Borjas (2015). The results is unchanged if we include controls for years of schooling, marital status, income and labor force participation.

[6]Since the immigrant's year of arrival is defined as the difference between the survey year and the years since migration to the US. However, given that the years since migration, in the IHIS dataset is reported as a categorical variable with five intervals (i.e. 0-1, 1-4, 5-9, 10-14 and 15+), to construct a continuous variable for the year of arrival, we used the mid point for each interval of years since migration. The interval 15+ is coded as 29 years.

[7]The 10-year growth in the relative incidence of unhealthy behaviors of immigrants is calculated by computing immigrant and native incidence rates both at the time of entry, assuming it occurred at 25 years old and 10 years later.

[8]To construct these interactions, we follow Borjas (2015).

5 Result

We estimate equation (1) using ordinary least squares (OLS) of the linear probability model, using the pooled data from the whole sample. We also estimated the average marginal effect from a Probit regression, yielding similar results. Such results are available upon request. Tables 3 to 6 present the results for the various models and the different health variables considered. The upper part (panel (a)) of each table presents the immigrant arrival cohort fixed effects identifying cohorts differences in alcohol and smoking status between immigrants, at the time of their entry, and comparable American natives. The lower part (panel (b)), instead, provides the interactions between cohorts fixed effect and the number of years since migration. This part is developed following Borjas (2015), the interactions are meant to describe the amount of convergence across different immigrant cohorts over their first 10 years in the US.

We estimate equation (1) for the whole sample (columns (1)), dividing by gender (columns (2) for male and (3) women) and ethnic origin (columns (4) for Hispanic people, (5) for White people and (6) for Black people). In this way we can analyze the rate of assimilation of a given immigrant sub-group over their native counterpart, with no base group set. We will present the results for the sample as a whole and, if present, we will describe different patter for different gender or ethnic origins[9].

[Table 3 about here.]

[Table 4 about here.]

Table 3 presents the results on the probability of being a binge drinker, the cohort effects are uniform, significantly negative and smaller, in absolute term, for recent arrival cohorts. These results support the evidence of the healthy immigrant effect, with recent cohorts having a higher probability of being binge drinker than the earlier ones. The initial entry level of binge drinking of immigrants who arrived before 2000 was 8% lower than that of natives, while the initial entry level of immigrant arriving between 2005 and 2014 is 6% lower than that of natives. In general, similar patterns are found by gender and ethnic groups, with the only exception of women and Black (columns (3) and (6)). While for male immigrant and Hispanic

[9]We also estimated the same regression including controls for years of education, marital and employment status, and the yield the similar results, since the inclusion of such control might better represent the different economic context in which immigrants live. Years of education has a protective effect reducing the rate of consumption of alcohol and cigarettes. Such results are available upon request.

(columns (2) and (4)), by far the largest immigrant ethnic group in the US, the entry level declines from 11% to 5% and from 3% to less than 1% (although not statistically significant) respectively. In panel (b) of table 3, the rates of assimilation from the whole sample (column 1) show that the estimated coefficient are positive, increasing and significant. The coefficients increase with more recent arrival cohorts. The rates of assimilation significantly increase for cohorts arrived after 1995. Before 1995, immigrants could expect an increase in their relative binge drinking rate of 3 to 5-percentage points in the first ten years in the US. Immigrants arrived after 1995, instead, could expect an increase of almost 5-percentage point. This increase in the rates of assimilation for the whole sample is mainly driven by Hispanic and male sub-samples (column (2) and (4)), for whom the increase is particularly pronounced.

Table 4 presents the results for the number of alcoholic drinks daily consumed. On average immigrants arrived after 2000 consumed a little more than half a drink less per day than natives, while from 1985 to 1990 they consumed almost a full drink less. In general the results are comparable to the one for binge drinking, although the assimilation rates actually decreased for later cohorts, especially from 1995 onward, when the increases in binge drinking assimilation was higher. These results point out to the fact that later cohorts are more prone in becoming binge drinker although consuming less alcoholic beverages (on average) with respect to natives. Such pattern could be easily reconciled with the slower economic assimilation that later cohorts have (Borjas, 2015) which is limiting their possibility to purchase higher doses of alcoholic beverages.

[Table 5 about here.]

[Table 6 about here.]

Table 5 presents the results for smoking rate. In the upper part, we notice that later immigrants cohorts are actually less likely to smoke, particularly after 1995. The initial entry level of smoking rate of immigrants who arrived before 1995 was 7% lower than that of natives, while the initial entry level of immigrant arriving between 1995 and 2014 increased to 16%. In general, similar patterns are found by gender and ethnic groups, with the only exception of Black people (column (5)) which saw a slight decrease after 1995 (from 9% to 7%). From the lower panel of Table 5 we notice that the assimilation rates are negative and significant. This means that immigrants are actually diverging from natives' smoking rates over time, a sort of de-assimilation. However such divergence is decreasing over time. Such de-assimilation significantly decreased, in absolute

term, for cohorts arrived after 2000, prior to that time immigrants could expect to have a decrease in their relative smoking rate of more than 10-percentage point on average in the first ten years in the US. Immigrant arrived after 2000, instead, could expect a sharp reduction in this rate to less than 1-percentage point. Such general trend is mainly influenced by the rate of de-assimilation of White and male immigrants (columns (2) and (4)), for which the increase is particularly pronounced, such that it turned positive (i.e. assimilation) after 2000. This means that later immigrant cohorts arrive with lower smoking rates, but as they spent time in the US, especially if they are male and/or White, the probability of maintaining such health advantages decreases.

Table 5 presents the results for the number of cigarettes consumed daily. On average immigrant arrived after 2000 consumed 2 cigarettes less than their American counterpart, while before that time less than one. In general, the results are similar to the one for smoking rates, with sharp changes in the de-assimilation rates after 2000, similarly to the one for smoking rates, especially for male and Hispanic (columns (2) and (4)).

6 Conclusion

In this paper we study immigrant long-term trend of assimilation of drinking and smoking habits from American natives. To do so we use data from the Integrated Health Interview Survey (1989-2014). We find that not only there are cohort differences in alcohol consumption and smoking rates of immigrants once they arrive in the US, but also in their assimilation of such behaviors as time passes. Recent cohorts exhibit lower differences in drinking habits with respect to natives and faster assimilation. While for smoking recent cohorts report lower smoking habits, however such relative advantage seems to be decreasing with time spent in the US. Especially Hispanic and male immigrants are the one in greater risk of assimilating both unhealthy behaviors. Overall our results provide evidence that there is heterogeneity in how immigrants assimilate unhealthy behaviors from natives. For drinking the convergence towards American rates seems to start in the home countries and continues the longer they stay in the US; while for smoking habits immigrants' relative advantage is present and stronger over-time as they leave their home countries, however the longer they stay in the US the more likely they are to erode such advantage.

The reported difference in the patterns of assimilation for smoking and drinking habits can be reconciled

with the overall trends in American risk factors. In fact from an international comparison we can notice that US are among the countries with the lowest risk factor associated with cigarette consumption but the risk associated with alcohol consumption is higher, ranking US as a middle performer OECD (2015). In addition to this smoking in US declined from 20.9% in 2005 to about 15% in 2015 (Jamal, 2016) while almost 20% of American adults engage in regular binge drinking (Safer, 2012). Therefore the deterioration of drinking habits of American immigrants might have started in their country of origin but as they interacted with American's drinking habits (especially for binge drinking) they accelerated their assimilation of American drinking customs, mainly due to social norm exposure. The results for smoking habits show a different pattern, Immigrants over-time maintained and increased their relative advantage, due to their healthier home countries habits, however the longer they stayed in the US the more likely they are to erode such advantage. Given that US is ranked relatively low in cigarette consumption, such deteriorations of immigrants' health might be recollected to their slower convergence in earnings that later arrival cohorts exhibit leading them to be more exposed to unhealthy behaviors due to their lower socio-economic status.

Unfortunately due to limitation in the data (e.g. country of migration, area of migration, reference peers) we can only speculate on the specific drivers behind these assimilation patterns. One possible explanation is related to social norms and peers effects toward which immigrants are exposed once they arrive in the US, with this effect being more pronounced among second-generation immigrants (Ali and Dwyer, 2009, Gaviria and Raphael, 2001, Powell et al., 2005). Another possible explanation is the slower economic assimilation that new immigrants experience (Borjas, 2015), causing them to be at higher risk of experiencing unhealthy behaviors.

References

Akbulut-Yuksel, M. and A. D. Kugler (2016). Intergenerational persistence of health in the us: Do immigrants get healthier as they assimilate? Technical report, National Bureau of Economic Research.

Ali, M. M. and D. S. Dwyer (2009). Estimating peer effects in adolescent smoking behavior: a longitudinal analysis. *Journal of Adolescent Health 45*(4), 402–408.

Antecol, H. and K. Bedard (2006). Unhealthy assimilation: why do immigrants converge to american health status levels? *Demography 43*(2), 337–360.

Borjas, G. J. (2015). The slowdown in the economic assimilation of immigrants: Aging and cohort effects revisited again. Technical Report 4, Journal of Human Capital.

Borjas, G. J. and L. Hilton (1995). Immigration and the welfare state: Immigrant participation in means-tested entitlement programs. Technical report, National Bureau of Economic Research.

Bui, H. N. (2013). Racial and ethnic differences in the immigrant paradox in substance use. *Journal of Immigrant and Minority Health 15*(5), 866–881.

Eitle, T. M., A.-M. G. Wahl, and E. Aranda (2009). Immigrant generation, selective acculturation, and alcohol use among latina/o adolescents. *Social science research 38*(3), 732–742.

Gaviria, A. and S. Raphael (2001). School-based peer effects and juvenile behavior. *Review of Economics and Statistics 83*(2), 257–268.

Giuntella, O. and L. Stella (2016). The acceleration of immigrant unhealthy assimilation. *Health Economics*.

Goldman, D. P., J. P. Smith, and N. Sood (2006). Immigrants and the cost of medical care. *Health Affairs 25*(6), 1700–1711.

Grieco, E. M., E. Trevelyan, L. Larsen, Y. D. Acosta, C. Gambino, P. De La Cruz, T. Gryn, and N. Walters (2012). The size, place of birth, and geographic distribution of the foreign-born population in the united states: 1960 to 2010. *Population Division Working Paper 96*.

Jamal, A. (2016). Current cigarette smoking among adults - united states, 2005–2015. *MMWR. Morbidity and Mortality Weekly Report 65*.

Jass, G. and D. S. Massey (2004). Immigrant health: selectivity and acculturation. Technical report, IFS Working Papers, Institute for Fiscal Studies (IFS).

Kandel, W. (2011). The us foreign-born population trends and selected characteristics. washington, dc: Congressional research service report r41592.

Kennedy, S., J. T. McDonald, and N. Biddle (2006, December). The Healthy Immigrant Effect and Immigrant Selection: Evidence from Four Countries. Social and Economic Dimensions of an Aging Population Research Papers 164, McMaster University.

Leung, L. A. (2014). Healthy and unhealthy assimilation: Country of origin and smoking behavior among immigrants. *Health economics 23*(12), 1411–1429.

McDonald, J. T. and S. Kennedy (2004). Insights into the healthy immigrant effect: health status and health service use of immigrants to canada. *Social science & medicine 59*(8), 1613–1627.

OECD (2015). Health at a glance 2015: Oecd indicators. *OECD Publishing, Paris*.

Pampel, F. C., P. M. Krueger, and J. T. Denney (2010). Socioeconomic disparities in health behaviors. *Annual review of sociology 36*, 349.

Powell, L. M., J. A. Tauras, and H. Ross (2005). The importance of peer effects, cigarette prices and tobacco control policies for youth smoking behavior. *Journal of health Economics 24*(5), 950–968.

Reich, B. and J. W. Weibull (2012). Obesity as a social equilibrium phenomenon.

Riosmena, F., R. Wong, and A. Palloni (2013). Migration selection, protection, and acculturation in health: a binational perspective on older adults. *Demography 50*(3), 1039–1064.

Romero-Ortuno, R. (2004). Access to health care for illegal immigrants in the eu: should we be concerned? *European Journal of Health Law 11*(3), 245–272.

Safer, M. H. (2012). Cdc vital signs.

Warner, T. D., D. H. Fishbein, and C. P. Krebs (2010). The risk of assimilating? alcohol use among immigrant and us-born mexican youth. *Social science research 39*(1), 176–186.

Table 1: Summary statistics for men, by nativity and ethnic origin

	All Origin		Hispanic		White		Black	
	(1) Native	(2) Immigrant	(3) Native	(4) Immigrant	(5) Native	(6) Immigrant	(7) Native	(8) Immigrant
Binge Dr.	0.10	0.11	0.19	0.16	0.10	0.13	0.07	0.05
Smoking	0.28	0.19	0.26	0.20	0.27	0.21	0.32	0.14
N. of drinks (Daily)	1.87	1.89	2.77	2.30	1.92	2.12	1.55	1.35
N. of cigarettes (Daily)	4.71	1.98	2.69	1.79	4.90	2.16	3.82	1.43
Age	44.00	43.93	40.39	43.47	44.08	44.36	44.05	44.63
Married	0.57	0.65	0.50	0.65	0.60	0.65	0.40	0.54
Education (Years)	13.54	12.24	12.87	10.30	13.66	11.41	12.78	13.21
Employed	0.81	0.82	0.80	0.82	0.83	0.82	0.70	0.82
Before 1970		0.04		0.04		0.04		0.03
1970-80		0.21		0.21		0.23		0.20
1980-85		0.18		0.17		0.18		0.20
1985-90		0.06		0.07		0.06		0.06
1990-95		0.11		0.11		0.11		0.10
1995-00		0.19		0.20		0.19		0.20
2000-05		0.13		0.14		0.13		0.13
2005-14		0.08		0.05		0.06		0.07
Less than 1 year		0.02		0.02		0.02		0.01
1-5		0.17		0.15		0.15		0.15
5-9		0.21		0.22		0.20		0.22
10-14		0.18		0.20		0.18		0.20
15+		0.42		0.41		0.44		0.41
Observations	146923	17847	9357	9740	122266	11438	20282	1763

Table 2: Summary statistics for women, by nativity and ethnic origin

	All Origin		Hispanic		White		Black	
	(1) Native	(2) Immigrant	(3) Native	(4) Immigrant	(5) Native	(6) Immigrant	(7) Native	(8) Immigrant
Binge Dr.	0.06	0.03	0.10	0.03	0.06	0.03	0.04	0.02
Smoking	0.24	0.09	0.19	0.09	0.24	0.11	0.24	0.05
N. of drinks (Daily)	1.18	0.66	1.49	0.65	1.23	0.74	0.92	0.57
N. of cigarettes (Daily)	3.32	0.81	1.65	0.67	3.55	1.02	2.44	0.39
Age	43.75	44.39	39.97	43.95	44.05	44.80	42.90	44.85
Married	0.53	0.59	0.45	0.56	0.60	0.58	0.27	0.42
Education (Years)	13.53	11.91	12.77	10.37	13.67	11.25	12.97	12.60
Employed	0.69	0.57	0.67	0.52	0.70	0.54	0.65	0.70
Before 1970		0.04		0.04		0.05		0.04
1970-80		0.22		0.23		0.24		0.21
1980-85		0.18		0.16		0.18		0.19
1985-90		0.07		0.08		0.06		0.06
1990-95		0.12		0.13		0.12		0.11
1995-00		0.18		0.19		0.18		0.18
2000-05		0.13		0.13		0.13		0.13
2005-14		0.07		0.04		0.05		0.07
Less than 1 year		0.02		0.01		0.01		0.02
1-5		0.15		0.13		0.13		0.14
5-9		0.22		0.23		0.22		0.22
10-14		0.19		0.20		0.19		0.20
15+		0.43		0.42		0.45		0.42
Observations	171890	21630	12714	12105	135552	13997	31205	2048

Table 3: Linear probability model model allowing for cohort effects in binge drinking

	All Origin			Hispanic	White	Black
	(1) All	(2) Male	(3) Female	(4) All	(5) All	(6) All
(a) Cohort Effects:						
1985-90	-0.0797***	-0.114***	-0.0530***	-0.0461***	-0.0685***	-0.0440**
	(0.00860)	(0.0161)	(0.00494)	(0.00407)	(0.0104)	(0.0115)
1990-95	-0.0870***	-0.0786**	-0.0884***	-0.0950***	-0.101***	-0.0284*
	(0.00891)	(0.0161)	(0.00547)	(0.00394)	(0.0107)	(0.0101)
1995-00	-0.0787***	-0.0727**	-0.0920***	-0.0633***	-0.0675***	-0.0369**
	(0.00907)	(0.0167)	(0.00565)	(0.00399)	(0.0106)	(0.00925)
2000-05	-0.0738***	-0.0613**	-0.0974***	-0.0344***	-0.0612***	-0.0282*
	(0.00920)	(0.0170)	(0.00567)	(0.00411)	(0.0107)	(0.00999)
2005-14	-0.0604***	-0.0507*	-0.0830***	-0.00853	-0.00186	-0.0517***
	(0.00904)	(0.0169)	(0.00558)	(0.00451)	(0.0108)	(0.0101)
(b) Relative growth in the first 10 years:						
1985-1990 arrivals	0.0338***	0.0878***	0.0057	0.00142	0.0459***	0.0004
	(0.0023)	(0.0015)	(0.3055)	(0.8311)	(0.0055)	(0.2587)
1990-1995 arrivals	0.040***	0.0484***	0.0292***	0.0322***	0.0604***	0.005
	(0.0033)	(0.0305)	(0.0007)	(0.0005)	(0.0012)	(0.6717)
1995-2000 arrivals	0.0429***	0.0549**	0.0366***	0.0159**	0.0475***	0.103
	(0.0024)	(0.0191)	(0.0002)	(0.0187)	(0.0044)	(0.3686)
after 2000 arrivals	0.0463***	0.0674***	0.0408***	0.0376***	0.0563***	0.0116
	(0.0015)	(0.0073)	(0.0000)	(0.0002)	(0.0019)	(0.4201)
Observations	358276	164761	193515	43914	283245	55294

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Linear probability model model allowing for cohort effects in number of drinks

	All Origin			Hispanic	White	Black
	(1) All	(2) Male	(3) Female	(4) All	(5) All	(6) All
(a) Cohort Effects:						
1985-90	-0.697***	-0.433**	-0.993***	-0.760***	-0.623***	-1.020***
	(0.0631)	(0.108)	(0.0653)	(0.0582)	(0.0508)	(0.0871)
1990-95	-0.882***	-0.594***	-1.023***	-1.061***	-0.968***	-0.624***
	(0.0654)	(0.106)	(0.0702)	(0.0530)	(0.0494)	(0.0824)
1995-00	-0.722***	-0.481**	-1.065***	-0.825***	-0.649***	-0.296**
	(0.0667)	(0.109)	(0.0719)	(0.0498)	(0.0485)	(0.0758)
2000-05	-0.625***	-0.378**	-1.027***	-0.556***	-0.523***	-0.391**
	(0.0677)	(0.111)	(0.0722)	(0.0499)	(0.0492)	(0.0828)
2005-14	-0.543***	-0.413**	-0.866***	-0.0298	-0.187**	-0.358**
	(0.0666)	(0.110)	(0.0706)	(0.0493)	(0.0494)	(0.0801)
(b) Relative growth in the first 10 years:						
1985-1990 arrivals	0.122	0.088	0.231**	0.0504	0.216**	0.439***
	(0.1236)	(0.5110)	(0.0124)	(0.5694)	(0.0125)	(0.0023)
1990-1995 arrivals	0.236**	0.194	0.209**	0.222**	0.409***	0.0857
	(0.0111)	(0.1582)	(0.0212)	(0.0215)	(0.0002)	(0.4077)
1995-2000 arrivals	0.181**	0.140	0.301***	0.147*	0.224***	0.0357
	(0.0357)	(0.2979)	(0.0032)	(0.0850)	(0.0062)	(0.7099)
after 2000 arrivals	0.175**	0.183**	0.265***	0.0573	0.227***	0.247**
	(0.0543)	(0.0203)	(0.0068)	(0.4769)	(0.0000)	(0.0446)
Observations	358034	164553	193481	43867	283051	55263

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Linear probability model model allowing for cohort effects in smoking habits

	All Origin			Hispanic	White	Black
	(1) All	(2) Male	(3) Female	(4) All	(5) All	(6) All
(a) Cohort Effects:						
1985-90	-0.0479***	-0.0886***	-0.00532	-0.0872***	-0.109***	-0.0762**
	(0.00908)	(0.0171)	(0.00765)	(0.0117)	(0.00680)	(0.0226)
1990-95	-0.0653***	-0.00845	-0.0977***	-0.0507**	-0.0653***	-0.142***
	(0.00840)	(0.0158)	(0.00731)	(0.0120)	(0.00639)	(0.0204)
1995-00	-0.0718***	-0.0276	-0.123***	-0.0554**	-0.0516***	-0.0905**
	(0.00814)	(0.0159)	(0.00708)	(0.0120)	(0.00619)	(0.0190)
2000-05	-0.111***	-0.100***	-0.135***	-0.0593**	-0.106***	-0.0664*
	(0.00818)	(0.0159)	(0.00711)	(0.0122)	(0.00627)	(0.0208)
2005-14	-0.156***	-0.147***	-0.182***	-0.121***	-0.174***	-0.0663*
	(0.00785)	(0.0155)	(0.00679)	(0.0125)	(0.00617)	(0.0209)
(b) Relative growth in the first 10 years:						
1985-1990 arrivals	-0.1436***	-0.116***	-0.159***	-0.167***	-0.111***	-0.0653*
	(0.0000)	(0.0008)	(0.0000)	(0.0001)	(0.0000)	(0.0636)
1990-1995 arrivals	-0.0630***	-0.0559**	-0.0816***	-0.0250	-0.0441***	-0.0769**
	(0.0005)	(0.0299)	(0.0000)	(0.1340)	(0.0009)	(0.0185)
1995-2000 arrivals	-0.0833***	-0.0845***	-0.0751***	-0.0252***	-0.0909***	-0.0215
	(0.0001)	(0.0038)	(0.0000)	(0.0082)	(0.0000)	(0.3971)
after 2000 arrivals	-0.0172***	0.0487**	-0.0396***	-0.0449**	0.0416***	-0.0869***
	(0.1194)	(0.0436)	(0.0014)	(0.0191)	(0.0009)	(0.0039)
Observations	327600	150107	177493	47108	256269	51398

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Linear probability model model allowing for cohort effects in number of cigarettes

	All Origin			Hispanic	White	Black
	(1) All	(2) Male	(3) Female	(4) All	(5) All	(6) All
(a) Cohort Effects:						
1985-90	-0.0537	-0.463	-0.418***	-1.114***	-0.588**	-1.317***
	(0.114)	(0.236)	(0.0646)	(0.106)	(0.139)	(0.208)
1990-95	-0.844***	-0.540*	-0.953***	0.133	-0.821***	-1.416***
	(0.114)	(0.229)	(0.0631)	(0.106)	(0.149)	(0.172)
1995-00	-0.895***	-0.558*	-1.343***	-0.110	-0.692**	-0.913***
	(0.115)	(0.236)	(0.0617)	(0.104)	(0.152)	(0.154)
2000-05	-1.641***	-1.846***	-1.590***	-0.315*	-1.706***	-0.823**
	(0.117)	(0.239)	(0.0619)	(0.106)	(0.155)	(0.166)
2005-14	-2.163***	-2.421***	-2.088***	-0.889***	-2.417***	-0.873***
	(0.114)	(0.235)	(0.0593)	(0.108)	(0.157)	(0.156)
(b) Relative growth in the first 10 years:						
1985-1990 arrivals	-2.371***	-2.531***	-2.110***	-1.587***	-2.749***	-0.264
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.3496)
1990-1995 arrivals	-1.876***	-2.117***	-1.756***	-1.054***	-1.912***	-0.370
	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.1541)
1995-2000 arrivals	-2.130***	-2.479***	-1.720***	-1.125***	-2.447***	-1.064***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	0.0000()	(0.0011)
after 2000 arrivals	-1.621***	-1.320***	-1.230***	-0.793***	-1.173***	-1.261***
	(0.0000)	(0.0016)	(0.0000)	(0.0004)	(0.0002)	(0.0004)
Observations	327600	150107	177493	47108	256269	51398

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$