MIGRATION AND ASSIMILATION:
THEORY AND EVIDENCE FROM THE AGE OF MASS MIGRATION

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Abstract

We study migration and assimilation as jointly determined decisions shaped by economic incentives and anticipated social interaction. In our model, individuals consider migrating to a more productive country, but anticipate coordination pressures in the host society. Adopting majority norms improves economic outcomes but may require abandoning intrinsically preferred behaviours, creating a tradeoff between economic gains and cultural values. Migration flows and assimilation outcomes are jointly determined in the unique equilibrium of the model. Productivity differentials, population sizes, and migration costs shape both the scale and composition of migration. Using U.S. census data from the Age of Mass Migration, we find evidence consistent with the model, including a non-monotonic (inverted-U) relationship between productivity differentials and assimilation, and a decline in assimilation following the diffusion of steamship technology.

Keywords: Cultural Assimilation, Immigration, Introspective Equilibrium, Age of Mass Migration

JEL classifications: D83, J10, O15, Z13

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1. INTRODUCTION

Immigration has long provoked controversy — much of it centred on whether migrants assimilate into the societies they enter. Migrants confront a fundamental tradeoff: access to higher economic returns typically requires coordinating with the host society, which may entail abandoning familiar norms and cultural behaviours. While migrants may prefer interacting with culturally similar peers, particularly when such groups are sizeable, adopting majority norms can substantially expand economic and social opportunities. Migration and assimilation are therefore joint decisions, with assimilation emerging as a strategic response to the incentives generated by social interactions in a new environment.[1]

The Age of Mass Migration (1850-1914), when millions of individuals moved to the United States, provides a natural setting in which to study these joint decisions. Migrants arrived from countries that differed sharply in productivity, population size, and cultural distance from the United States, generating substantial variation in both the incentives to migrate and to assimilate. For some groups, adopting American norms facilitated coordination and access to high return activities. For others, large migrant inflows supported ethnic enclaves that reduced assimilation pressures by enabling within-group coordination. Although migration was widespread, assimilation varied systematically across origins — reflecting differences in cultural distance, economic incentives, and expectations about social interaction.

We formalise the joint decisions to migrate and assimilate in a two-country framework. Individuals weigh the economic gains from relocating to a more productive country against migration costs, while anticipating the social coordination problem they will face upon arrival. Coordination takes place through a random-matching game in which adopting the host country's norms improves economic returns but may require abandoning preferred behaviours. Embedding this coordination problem in a two-stage model

[1] We treat assimilation as an individual's choice to forgo their intrinsic preference in order to better coordinate with the majority, in contrast to integration, which allows for adopting co-existing or hybrid behaviours that enable the minority group to fit in without necessarily sacrificing their own norms (Kuran and Sandholm, 2008).

endogenises both migration flows and the cultural composition of the destination population, allowing enclaves and majority-minority interactions to arise in equilibrium. A unique equilibrium emerges, characterised by no migration, full assimilation migration, or a mix of assimilating and non-assimilating migrants. We show how this equilibrium is shaped by productivity differences, population size, cultural distance, and migration costs.

The model delivers several testable predictions. First, assimilation exhibits a non-monotonic (inverted-U) relationship with the productivity gap between the destination and origin country. When the gap is small, migration does not occur; when it is moderate, assimilating migration increases; and when it is large, assimilation declines as large inflows relax pressures to adopt majority norms because of enclave formation. Second, the population size of the origin country amplifies this effect — large potential migrant pools strengthen enclave dynamics and reduce strategic incentives to assimilate. And third, reductions in migration costs increase the level of migration, but can lower average assimilation when they disproportionately attract individuals strongly attached to origin-country norms.

These results arise from modelling assimilation as a coordination problem with strategic uncertainty, resolved through an *introspective equilibrium* (Kets and Sandroni, 2019, 2021). Individuals form beliefs about others' behaviour by reasoning about how others reason about them, using common knowledge of group-level cultural preferences. At higher introspective levels, the majority behaviour increasingly anchors coordination, while deviations persist only among those with strong intrinsic attachment to origin-country norms. These expectations shape both the migration decision and behaviour upon arrival.

Our empirical analysis uses a newly constructed individual-level dataset drawn from U.S. census microdata covering more than 400,000 foreign-born adults who arrived during the period 1795-1930.[2] These records provide information on migrants' arrival cohorts, locations, demographic characteristics, occupations, English proficiency, and naturalisation status (Ruggles et al., 2024, 2025). We link each individual to time-varying characteristics of their origin country, including GDP per capita, population size, and measures of cultural distance from the United States (Bolt and van Zanden, 2024; Spolaore and Wacziarg, 2009). Although assimilation unfolds over time at differing rates, we interpret observed outcomes as reflecting initial sorting decisions. Prior to departure, individuals form expectations about economic opportunities, coordination pressures, and group composition, which jointly determine both the decision to migrate and the willingness to assimilate. Variation in assimilation trajectories observed at the time of the U.S. censuses (1900, 1910, 1920, and 1930), therefore, reflects heterogeneous rates of convergence across cohorts and origins, driven by differences in initial incentives and beliefs.

We capture assimilation with both cultural and economic measures. Cultural assimilation is measured by English proficiency and naturalisation, which reflect language acquisition and institutional connection. Economic assimilation is measured using task-based characteristics of occupations. We map historical census occupations to modern job characteristics to construct two indices — a direct contact measure capturing interpersonal and communication-intensive work, and an abstract task measure capturing highly skilled, non-routine activities (Autor and Dorn, 2013; Abramitzky et al., 2025). Both measures proxy for the extent to which productive activity requires coordination with the host society, rather than within co-ethnic networks, aligning closely with the strategic behaviour at the core of the model.

[2]We focus on migrants that are observed residing in the United States at the time of the U.S. censuses (1900, 1910, 1920, and 1930), rather than those that returned home, as return migration was less common during the Age of Mass Migration compared to other historical episodes (Hatton and Williamson, 1998). We also retain a limited number of migrants who arrived before the start of the Age of Mass Migration (1850). These cohorts allow us to identify the effect of declining migration costs on assimilation, driven by the diffusion of steamship technology in the late 1850s.

We exploit the introduction of steamship technology in the late nineteenth century as a plausibly exogenous reduction in the cost of migrating to the United States. The transition from sail to steam dramatically reduced travel times, monetary costs, and voyage risks, contributing to a sharp increase in migrant flows (Hatton, 2025; Pascali, 2017; Shen, 2025; Cohn, 2005). Lower migration costs expand the set of individuals for whom migration is attractive, including those strongly attached to origin-country norms, potentially weakening assimilation incentives. We test this prediction by comparing assimilation outcomes for migrants arriving before and after the widespread adoption of steamship technology.

2. Literature Review

Our model contributes to the theoretical literature on the assimilation of migrants in host societies. A central insight of this literature is that assimilation reflects a trade-off between intrinsic preferences and coordination motives (Kuran and Sandholm, 2008), or, alternatively, a choice between retaining an ethnic identity and a national one (Bazzi et al., 2019). In these papers, evolutionary processes gradually reshape individuals' choices since interaction among similar cultures yields higher payoffs.[3]

Our approach differs by modelling assimilation as a strategic choice made under uncertainty about others' behaviour, resolved through higher order beliefs. We adopt the introspective equilibrium (Kets and Sandroni, 2019, 2021) to select a unique equilibrium to the underlying coordination game by formalising how individuals reason about others' behaviours. Closest to our analysis, Duley and Gai (2025) apply introspection to a coordination environment in which individuals trade off miscoordination costs against lock-in costs from abandoning preferred behaviours. But in their model group shares are taken as exogenous. By introducing a prior migration stage, we endogenise the composition of the host society and show how economic incentives, population sizes, and migration costs shape an individual's joint decision

[3]In contrast to settings with intergroup contact, Bazzi et al. (2020) explore migrants' tendencies towards individualism, rather than fitting in, during the expansion of the U.S. frontier.

to migrate and assimilate. In our model, enclaves also form endogenously from migrants' expectations about how many like-minded migrants will arrive and what their behaviour might be, producing network effects.[4]

Our paper also relates to theoretical work on migration. Konya (2007) develops a random matching framework in which migration from South to North occurs only when individuals expect to match with fellow migrants or if it is worthwhile to assimilate and match with natives. Munshi (2020) studies an alternative approach by introducing network effects into the Roy (1951) model, showing how migrant stocks reduce frictions and drive flows even when economic returns differ. However, Konya (2007) abstracts from the multiple equilibria that arise when larger migrant communities make non-assimilation increasingly attractive, while networks in Munshi (2020) operate independently of natives and do not allow for assimilation. We address this by embedding migration in a coordination game in which strategic uncertainty between and among migrant and native groups is resolved through an introspective equilibrium drawing from social psychology. This fully characterises migration regimes through individuals' higher-order beliefs about one another's behaviours upon matching. Moreover, because group shares and behaviours are jointly determined in our model, network-like enclave effects emerge endogenously through shifts in the likelihood of matching with like-minded individuals.

The empirical analysis speaks to a large literature documenting patterns of assimilation during the Age of Mass Migration (Collins and Zimran, 2019, 2023; Lleras-Muney and Shertzer, 2015; Abramitzky and Boustan, 2017; Abramitzky et al., 2021). This work highlights that migrants' cultural assimilation improved economic outcomes (Abramitzky et al., 2020); that they faced no substantial earnings penalties upon arrival (Abramitzky et al., 2014); and that enclaves slow assimilation and contributed to low-earning occupations for migrants (Abramitzky et al., 2025; Xie and Gough, 2011; Danzer and Yaman,

[4]Similarly, theoretical work on enclaves that study how they shape incentives to become bicultural (Lazear, 1999), or network effects affecting assimilation (Verdier and Zenou, 2017), abstract from how such enclaves are formed.

2013; Danzer et al., 2022; Laliberté, 2019), particularly for outcomes in which coordination is important (Gagliarducci and Tabellini, 2025). We complement this literature by constructing a new dataset from which we test our predictions over how productivity differentials, population sizes, migration costs and cultural distance affected the likelihood that a migrant assimilated in the U.S. during the Age of Mass Migration.

There are also points of contact with studies examining how large-scale migration reshapes host societies and policies. Bandiera et al. (2019) show that U.S. states adopted compulsory schooling laws as a nation-building response to immigration during the Age of Mass Migration.[5] While this work emphasises institutional responses to migration, migrants and natives are treated as internally homogenous groups with exogenous shares. By contrast, we focus on migrants' ex ante decisions and discuss how variation in migration flows alters the cultural composition of the host society without policy intervention.[6]

Our analysis is also relevant to the literature on social identity (Akerlof and Kranton, 2000; Benjamin et al., 2016; Grossman and Helpman, 2021; Gorton and Zentefis, 2023; Besley and Persson, 2024; Carvalho, 2013; Belloc and Bowles, 2017; Guo, 2020). We view culture as compromising the behavioural norms and identity that affect the payoffs of different actions, so that assimilation becomes a behavioural outcome. But the tensions we study arise specifically in a migration context. Individuals who migrate and those who do not both alter the strategic environment in the migration process. Deviant behaviours demerge from the desire to coordinate on the most salient behaviour, rather than from imperfect self-control (Carvalho, 2013). This framework allows us to explore how migration flows, driven by economic and cultural costs and benefits, shape assimilation pressures on an individual's identity.

[5]Duley and Gai (2025) demonstrate how assimilationist and bicultural nation-building policies trade off greater coordination gains for larger lock-in costs, and vice versa. Alesina et al. (2021) show that, following threats of democratisation, elites adopt nation-building policies to homogenise groups and better preserve the status quo.
[6]Relatedly, Bazzi and Fiszbein (2025) identify several channels through which migrants can influence host society culture. We extend this by formalising how the presence of migrants incentivises non-assimilating migration and enables U.S. natives who prefer non-U.S. norms to adopt migrant norms.

Finally, our paper contributes to the broader migration literature that highlights how economic incentives shape migration flows and selection (Borjas, 1987; Dustmann and Görlach, 2016; di Giovanni et al., 2015; Grogger and Hanson, 2011). These papers emphasise wage differentials, migration costs, and selection on skills. We add to this literature by showing that migration decisions are also shaped by anticipated social interactions, and that changes in migration costs or economic opportunities affect both the volume of migration and its cultural composition. And by linking migration and assimilation decisions within a single framework, our paper provides a basis for understanding how economic and cultural forces jointly determine coordination-driven productivity in host societies.

3. Model

Environment. The world economy comprises two regions: a destination country, the United States (US), and a second region of countries, F_j, indexed $j \in \{1, \dots, J\}$. The population of the U.S. is normalised to 1 and the population of F_j, with measure $L_j < 1$, comprises a continuum $i \in [0, L_j]$ of individuals. Let $(1 - \alpha_j)$ be the share of F_j natives who remain in F_j, while the proportion α_j migrates to the U.S.[7] The group $G \in \{N, M_j\}$ denotes whether an individual is a native of the U.S., N, or a migrant, M_j, from country F_j.[8] After migration decisions have been made, the population share of U.S. natives is ω^N, while ω^{M_j} is the share of migrants from F_j. The total share of migrants in the U.S. is $\omega^M = \sum_{j=1}^{N} \omega^{M_j}$. In what follows, we make the simplifying assumption $\omega^M = \omega^{M_j}$, with $\omega^M = 1 - \omega^N < \frac{1}{2}$.[9] Migration is irreversible.

[7]Since we allow for heterogeneous behavioural preferences within cultural groups, our model permits a positive level of migration from US to F_j. We restrict our focus to flows from F_j to US where the migration threshold, defined by payoff parameters, is lower.
[8]Although a migrant to the U.S. is a native in F_j, we use the M superscript to refer to foreigners in general. The country codes F_j and US differentiate migrants from those who remain in F_j.
[9]While migrants from different countries may arrive simultaneously in the U.S., we emphasise the bilateral, strategic interactions between migrants from a given country of origin and natives in the U.S. This approach is motivated by the distinct patterns of arrival and geographic sorting across states over the migration period (Abramitzky et al., 2025; Passel et al., 2024).

Coordination and production. Production in each country takes the form of a coordination game played by individuals who are randomly matched into pairs. Individuals are strangers to each other and cannot communicate prior to their interaction. Once matched, each individual chooses a social behaviour, $s_i \in \{a, b\}$. These social behaviours reflect norms and cultural perspectives – for example, behaviour a could represent a handshake, while b could be a respectful bow of the head. Production payoffs are generated when behaviours are synchronised, and are denoted γ^{F_j} in country j and γ^{US} in the U.S. We assume $\gamma^{F_j} < \gamma^{US}$ for all j, so coordinating behaviours leads to greater production in the U.S., and that $0 < \gamma^{US} \leq 1$.[10]

In addition to a payoff from production, each individual gains an intrinsic payoff, $\pi_i^{G,s}$, from following a social behaviour. These intrinsic payoffs are drawn independently across individuals and groups. Since our focus is on migration to the U.S., we model each F_j population as sharing the same cultural preference at the group level.[11] We suppose that for natives in the U.S.,

$$\pi_i^{N,a} \sim U(0,1); \;\; \pi_i^{N,b} \sim U(0, 1-2\varepsilon_j)\,, \tag{1}$$

and for migrants from country F_j,

$$\pi_i^{M_j,b} \sim U(0,1); \;\; \pi_i^{M_j,a} \sim U(0, 1-2\varepsilon_j)\,, \tag{2}$$

for $\varepsilon_j \in (0, \frac{1}{2})$. The parameter ε_j captures the *cultural distance* between the U.S. and F_j, and it allows us to order countries in the rest of the world so that $\varepsilon_1 < \varepsilon_2, \ldots, \varepsilon_N$. For notational simplicity, let each

[10]If we impose $\gamma^{US} > 1$, there are exactly two strong Nash equilibria in pure strategies: one in which everyone chooses a and one in which everyone chooses b. A pure-strategy Nash equilibrium is *strong* if each individual has a unique pure-strategy best response to her opponents' equilibrium strategies (Keser et al., 2012). Including strong Nash equilibria means that individuals would always prefer the behaviour that is universally adopted, regardless of the intrinsic value associated with each behaviour. In other words, the benefits of coordination become highly significant.

[11]This means that the distribution of preferences is identical across the population; individuals may still differ in realised preferences.

country have a distinct level of cultural distance from the U.S., and we drop the j subscript for F, L and ε in what follows.

The difference in the support of the distributions has a negligible impact on payoffs when ε is arbitrarily small. But it serves an important informational role — a is the *group-preferred* behaviour by U.S. natives, while b is group-preferred by migrants.[12] When cultural distance is large, $\varepsilon \to \frac{1}{2}$, these preferences vary significantly *between* groups, but there is little diversity in preferences *within* groups, and so the two societies are highly polarised (Esteban and Ray, 1994). And when cultural distance is low, $\varepsilon \to 0$, within-group diversity is large for both groups, which in turn lowers cross-group cultural distance. Table 1 summarises the payoff matrix from the coordination game.

TABLE 1. Payoff structure for the coordination game between two individuals i and i' in the U.S.

	$s_{i'} = a$	$s_{i'} = b$
$s_i = a$	$\gamma^{US} + \pi_i^{G,a}$, $\gamma^{US} + \pi_{i'}^{G,a}$	$\pi_i^{G,a}$, $\pi_{i'}^{G,b}$
$s_i = b$	$\pi_i^{G,b}$, $\pi_{i'}^{G,a}$	$\gamma^{US} + \pi_i^{G,b}$, $\gamma^{US} + \pi_{i'}^{G,b}$

Since behavioural preferences vary at the individual level, the costs (or benefits) for a migrant assimilating in the U.S. are idiosyncratic and given by the differential $\Delta_i^M \equiv \pi_i^{M,b} - \pi_i^{M,a}$, drawn from a trapezoidal distribution $H_1(\Delta)$, where $\Delta \in [-(1-2\varepsilon), 1]$.[13] Assimilation costs enable the possibility of *lock-in* – the net benefit foregone when an individual gives up her intrinsically preferred behaviour to assimilate to the salient social behaviour and avoid miscoordination.

[12]In other words, an expected proportion $\frac{1}{2} + \varepsilon$ of the native-group individuals intrinsically prefer behaviour a, while $\frac{1}{2} + \varepsilon$ of the migrant-group individuals from F intrinsically prefer behaviour b.

[13]For natives, the stochastic differential is $\Delta_i^N \equiv \pi_i^{N,a} - \pi_i^{N,b}$. Since we allow for heterogeneous preferences among individuals within the same cultural group, it may be that $\Delta_i^M = \pi_i^{M,b} - \pi_i^{M,a} < 0$, i.e., individual i from F intrinsically prefers the salient behaviour in US. However, in expectation, migrants prefer behaviour b and so $\Delta_i = \pi_i^{M,b} - \pi_i^{M,a} > 0$.

Migration decision. Individuals face fixed costs from migrating, μ_i, which are idiosyncratic and drawn from a uniform distribution $H_2(\mu)$ with support over the unit interval.[14] Migrants make migration decisions based on expected payoffs after their preferences and migration costs have been realised. The expected payoff to individual i in F from relocating and adopting social behaviour $x = s_i \in \{a, b\}$ when she is randomly matched with another individual i' in the U.S. is given by

$$\tilde{u}_i^M(x, s_{i'}) = \gamma^{US}[\omega^M p^{M,x} + (1 - \omega^M)p^{N,x}] + \pi_i^{G,x} - \mu_i\,, \tag{3}$$

where $p^{M,x}$ and $p^{N,x}$ are the probabilities that an individual from each group selects behaviour x. We determine these probabilities in equilibrium in the next section.

Assumption 1. *All individuals who remain in foreign (non-U.S.) countries choose behaviour b.*

Assumption 1 rules out equilibria where there is only partial assimilation into the behaviour preferred by the majority of individuals in F. Relaxing this assumption retains our main results, but it means that an individual's decision to migrate is significantly more complex in the presence of imperfect assimilation in her home country.

Introspection. The coordination game in Table 1 is characterised by strategic uncertainty and multiple equilibria under complete information — each individual does not know how the stranger she encounters will behave. In our model, cultural values serve as a coordination device, allowing individuals to resolve strategic uncertainty without previous communication or interaction. We appeal to an introspective process (Kets and Sandroni, 2019, 2021), by which individuals use their own mental models and narratives, to

[14]Migration and assimilation costs are independently distributed. The qualitative results remain valid as long as the two variables are not perfectly correlated. We assume uniformly distributed migration costs for analytical tractability, and control for this with country fixed effects in our empirical analysis.

predict how another person is likely to behave and pin down a unique equilibrium of the coordination game.

If individual i intrinsically prefers behaviour b (for example, if for a migrant $\pi_i^{M,b} - \pi_i^{M,a} > 0$), her instinct is to adopt b in the coordination game. This defines her $k = 0$ level strategy, $\sigma_i^0(\pi^{G,s})$, where k represents the level of introspective reasoning in terms of higher-order beliefs. Through introspection, individual i realises that others will likewise behave according to their intrinsic preferences in the absence of strategic reasoning. By observing her own preferences, i forms a belief about her partner's values and formulates a best response to this belief. This defines the individual's $k = 1$ strategy, $\sigma_i^1(\pi_i^{G,s})$. At each subsequent level of introspection $k > 1$, i forms a best response to the previous level $(k-1)$ strategy of her partner. The introspective process has infinite levels of reasoning in this manner. If a limit to this process exists, it defines an *introspective equilibrium*. That is, a strategy profile $\sigma = (\sigma_i)_i$ is an introspective equilibrium if $\sigma_i = lim_{k\to\infty}\sigma_i^k$.

Timing. At $t = 0$, individual i living in F observes her migration costs to the U.S., μ_i, and her intrinsic preferences $\pi_i^{M,a}$ and $\pi_i^{M,b}$. She then chooses to migrate or remain in F. At $t = 1$, individuals are randomly paired and payoffs accrue. Table 2 summarises the timeline of events.

TABLE 2. Timeline of events.

$t = 0$	$t = 1$
(1) Individuals living in F observe their migration and assimilation costs. (2) Individuals living in F decide whether to migrate to US or stay in F.	(1) Individuals are randomly matched in pairs. (2) Each pair plays the coordination game in Table 1 and payoffs accrue.

4. Analysis

We proceed backwards, solving first for the unique equilibrium of the production coordination game at $t = 1$ with a given share of natives and migrants, before turning to the $t = 0$ migration decision. All proofs are in Appendix A.

Proposition 1. *There is a unique introspective equilibrium in the subgame game at $t = 1$, with strategy profile $\sigma^* = (\sigma_i^*)_i$, where*

$$\sigma_i^* = \begin{cases} a & \text{if } G = M \text{ and } \Delta_i^M < \Delta^{M*} \text{ or } G = N \text{ and } \Delta_i^N \geq \Delta^{N*}, \\ b & \text{otherwise,} \end{cases} \tag{4}$$

with thresholds

$$\Delta^{M*} \equiv -\gamma^{US}\left[2\left(\omega^N(1-p^{N,a}) + (1-\omega^N)p^{M,b}\right) - 1\right],$$

and

$$\Delta^{N*} \equiv -\gamma^{US}\left[2\left(\omega^N p^{N,a} + (1-\omega^N)(1-p^{M,b})\right) - 1\right],$$

for all $\varepsilon \in [0, \frac{1}{2})$, $\gamma^{US} \in (0, 1]$ and $\omega^N \in (\frac{1}{2}, 1]$. When all individuals follow this strategy, the equilibrium proportions of those who select group-preferred behaviour are given by the following system of equations,

$$\begin{aligned} p^{N,a} &= H_1\left(-\gamma^{US}\left[2\left(\omega^N p^{N,a} + (1-\omega^N)(1-p^{M,b})\right) - 1\right]\right), \\ p^{M,b} &= H_1\left(-\gamma^{US}\left[2\left(\left(1-\omega^N\right)p^{M,b} + \omega^N\left(1-p^{N,a}\right)\right) - 1\right]\right). \end{aligned} \tag{5}$$

Proposition 1 resolves the coordination dilemma among natives and migrants, and establishes the level of assimilation at $t = 1$, given population shares ω^N and ω^M, defined by the proportion of individuals who prefer behaviour b but choose a in equilibrium.[15] The unique threshold driving behaviour for each group, Δ^{G*}, arises through an introspective process, from which a monotone, bounded sequence emerges, in an individual's level-k reasoning about the probabilities that members of each group select their group-preferred behaviour at level k. Each sequence converges to the unique limiting proportions $p^{N,a}$ and $p^{M,b}$.

Both migrants and natives sometimes forego their intrinsic preferences to adapt to a cultural norm. An individual adopts her intrinsically preferred behaviour only if her benefits from that behaviour and the expected proportion of others choosing it are sufficiently high. Otherwise, if she still receives some intrinsic benefit from the other behaviour, or she expects a large proportion of others to choose that behaviour, then she assimilates despite her preferences. This heuristic underpins Proposition 1, as the individual predicts how others' preferences are likely to influence their behaviour when they are reasoning in a similar way, given common knowledge about cultural group preferences. Similarly, a "deviant" native that prefers behaviour b is more likely to choose the migrant group behaviour if they receive a greater benefit from it and expect a sufficiently large proportion to adopt b. Since there is complete assimilation in F, in the interest of simple exposition, $p^{N,x}$ always refers to the native group in the U.S., and $p^{M,x}$ always refers to the migrant group in the U.S. for each behaviour $x \in \{a, b\}$.

We next consider the $t = 0$ migration decision of individuals in F, taking the introspective limits from Proposition 1 into account. Individuals in a foreign country have three choices: i) migrate and adopt behaviour a; ii) migrate and adopt behaviour b; or iii) remain in F and adopt behaviour b. Formally, the expected payoff from each choice is:

[15]Formally, the measure of individuals in the U.S. that assimilate in equilibrium is

$$\omega^N \int_{\Delta^{N*}}^{0} h_1(\Delta) d\Delta + (1 - \omega^N) \int_{0}^{\Delta^{M*}} h_1(\Delta) d\Delta \,.$$

$$V_a = P^a \gamma^{US} + \pi_i^{M,a} - \mu_i \,,$$

$$V_b = (1 - P^a)\gamma^{US} + \pi_i^{M,b} - \mu_i \,,$$

$$V_s = \gamma^F + \pi_i^{M,b} \,,$$

where $P^a = \omega^N p^{N,a} + (1-\omega^N)(1-p^{M,b})$ is the proportion of the U.S. population (including natives and migrants) choosing behaviour a. The proportion that adopts behaviour b is $P^b = \omega^N(1-p^{N,a}) + (1-\omega^N)p^{M,b}$.

The migration decision can be characterised by three cutoff thresholds in the cost variables μ_i and Δ_i^M, which we derive by equating the relevant expected payoffs. The cutoffs for assimilating migration, non-assimilating migration, and no migration are given by

$$\Delta^{M*} = \quad -(2P^b - 1)\gamma^{US} \,, \tag{6}$$

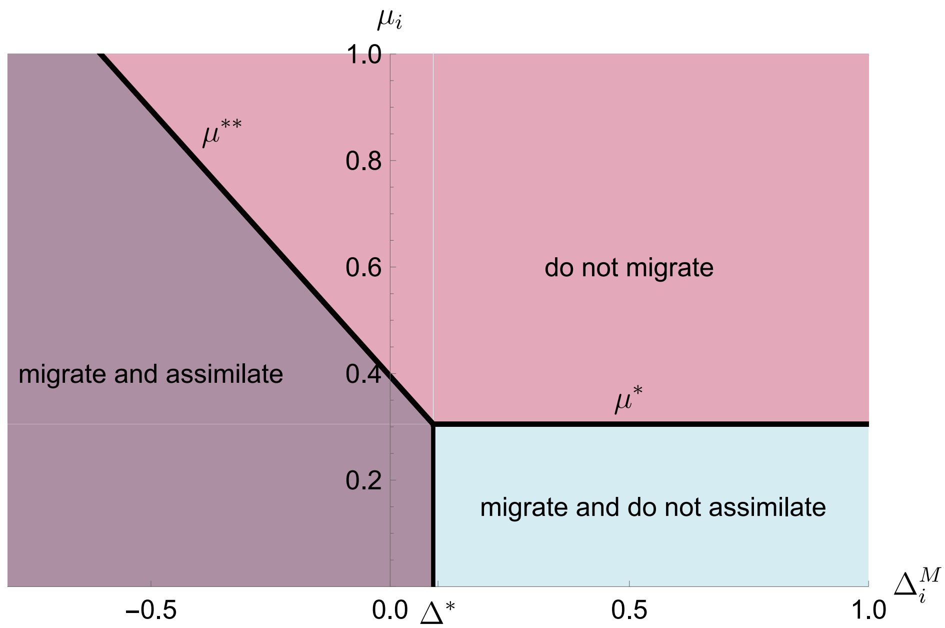
$$\mu^* = \quad P^b \gamma^{US} - \gamma^F \,, \tag{7}$$

$$\mu^{**}(\Delta_i^M) = \quad P^a \gamma^{US} - \gamma^F - \Delta_i^M \,. \tag{8}$$

Individuals optimally migrate and assimilate whenever $\Delta_i^M < \Delta^{M*}$ and $\mu_i < \mu^{**}(\Delta_i^M)$. They migrate and do not assimilate if $\mu_i < \mu^*$ and $\Delta_i^M \geq \Delta^{M*}$. Otherwise, they do not migrate. Figure 1 illustrates migration decisions in the (Δ, μ) plane.

Under rational expectations, the actual proportion of migrants who prefer to migrate aligns with individuals' expectations, $\mathbb{E}[\omega^N]$ and $\mathbb{E}[\omega^M]$, formed under common knowledge of the distributions of Δ_i^M and μ_i. Notice that if the productivity in F, γ^F, is sufficiently large relative to the U.S., γ^{US}, the cutoff for non-assimilating migration can be negative. So there are two possible migration outcomes – one where

FIGURE 1. Migration and assimilation decisions for an individual in country Foreign. The x axis shows the extent to which the individual prefers behaviour b over a, denoted Δ_i^M, and the y axis is the fixed cost of migration, μ_i.



individuals may choose not to assimilate even though they migrate, and one where individuals always assimilate upon migration.

For the first outcome, the realised measure of individuals who migrate to the U.S. is given by

$$\mathbb{E}[\alpha^*]L = \left[H_1(\Delta^{M*})\mu^* + \int_{-(1-2\varepsilon)}^{\Delta^{M*}} \mu^{**}(\Delta) d(1 - H_1(\Delta)) \right] L \,. \tag{9}$$

Equation (9) equates the expected measure of migrants with the actual measure. The first term on the right-hand side reflects the proportion who migrate and do not assimilate. And the second term captures those who migrate and assimilate.

The second outcome involves migrating individuals who always assimilate. In this case, the cutoff for non-assimilating migration can be negative and occurs whenever $P^b \leq \frac{\gamma^F}{\gamma^{US}}$. This also implies that

$\Delta^{M*} \in [\max\{0, \gamma^{US} - 2\gamma^F\}, \gamma^{US}]$. The equilibrium condition reduces to

$$\mathbb{E}[\alpha^*]L = \left[\int_{-(1-2\varepsilon)}^{\Delta^{M*}} \mu^{**}(\Delta) d(1 - H_1(\Delta))\right] L. \tag{10}$$

Equation (9) nests both migration outcomes, since $H_2(\mu^*) = 0$ whenever $\mu^* \leq 0$ and $P^b \in [0, \frac{1}{2})$ in introspective equilibrium so that $\Delta^{M*} \in [0, \gamma^{US}]$. Accounting for the fact that the limits to the introspective equilibrium depend on the proportion of foreign individuals that choose to migrate, the equilibrium with migration is fully characterised by the unique solutions $(p^{N,a}, p^{M,b}, \omega^M)$ to the following system of equations:

$$\begin{aligned} p^{N,a} &= H_1(\Delta^{M*}(p^{N,a}, p^{M,b}, \omega^M))\,, \\ p^{M,b} &= H_1(\Delta^{M*}(p^{N,a}, p^{M,b}, \omega^M))\,, \\ \omega^M &= \frac{\alpha^*(p^{N,a}, p^{M,b})L}{\alpha^*(p^{N,a}, p^{M,b})L + 1}\,. \end{aligned} \tag{11}$$

Proposition 2. *Suppose Assumption 1 holds. There is a unique solution to the migration problem that yields the following migrant share of the population in the U.S.,*

$$\omega^M = \frac{\alpha^* L}{1 + \alpha^* L}\,.$$

And if overseas productivity is sufficiently high, $\gamma^F > \overline{\overline{\gamma}}^F \equiv P^a\gamma^{US} + 1 - 2\varepsilon$, no migration occurs in equilibrium. If $\overline{\gamma}^F \equiv P^b\gamma^{US} < \gamma^F < \overline{\overline{\gamma}}^F$, then only assimilating migrants move to the U.S. If overseas productivity is sufficiently low, $\gamma^F < \overline{\gamma}^F$, then non-assimilating migration also occurs to the U.S.

Proposition 2 underscores two effects facing potential migrants to the U.S. First, the decision to migrate depends on the productivity differential $(\gamma^{US} - \gamma^F)$. This is the *coordination effect*. Individuals are willing to incur migration costs to capitalise on greater payoffs from productive exchanges in the U.S. But there is also an assimilation cost to migrating. For individuals who intrinsically prefer behaviour b (i.e., for whom $\Delta_i^M > 0$), migrating is only worthwhile if there is a large number of individuals in the U.S. expected to choose behaviour b *or* if the coordination gains outweigh the costs of assimilating into the group-preferred behaviour, a, of U.S. natives. This is the *lock-in effect*.

When foreign productivity is sufficiently close to U.S. productivity, $\gamma^F > \overline{\overline{\gamma}}^F$, migration does not occur since the costs of migration exceed its expected benefits. But as the productivity gap widens, $\overline{\gamma}^F < \gamma^F < \overline{\overline{\gamma}}^F$, individuals less attached to social behaviour b migrate, resulting in assimilating migration. This effect increases in the productivity differential since a higher payoff from coordinating amplifies both the coordination and lock-in effects. However, once the gap is large enough to attract even those strongly attached to behaviour b, $\gamma^F < \overline{\gamma}^F$, the lock-in effect relaxes, and the average propensity to assimilate falls. At this point, non-assimilating migrants find it worthwhile to migrate and maintain the non-dominant behaviour b. This, in turn, encourages further non-assimilating migration since it raises the likelihood of matching with individuals choosing b in the U.S.

Lemma 1 establishes that the level of cultural distance between the U.S. and Foreign, ε, also plays a crucial role in the composition of migration in equilibrium.

Lemma 1. *Let $(1-\omega^N) < \frac{\gamma^F}{\gamma^{US}} < \frac{1}{2}$. There exists a critical level of cultural distance between the U.S. and Foreign, $\tilde{\varepsilon} \in [0, \frac{1}{2})$, that defines the equilibrium migration regime. When $\varepsilon < \tilde{\varepsilon}$, there is a positive mass of non-assimilating migration. When $\varepsilon \geq \tilde{\varepsilon}$, only assimilating migrants move to the U.S. in equilibrium.*

When the degree of cultural distance is high, individuals in Foreign are strongly beholden to their group-preferred behaviour, $\varepsilon \geq \tilde{\varepsilon}$, and the coordination benefits from moving to the host country (U.S.) are offset by the lock-in costs from the compulsion to assimilate. Since individuals anticipate that others will likewise reason in this way, the equilibrium is characterised by migration *only* by those who do not strongly prefer behaviour b, so all migrating individuals assimilate. Therefore, increases in cultural distance work in the same way as the productivity in Foreign, γ^F, to dampen non-assimilating migration. On the other hand, when a Foreign country is culturally close to the U.S., $\varepsilon < \tilde{\varepsilon}$, some natives in the U.S. are more likely to choose behaviour b. A migrant preferring b faces less pressure to assimilate to coordinate for γ^{US} (the lock-in effect relaxes), so there is non-assimilating migration in equilibrium. For example, a migrant from the United Kingdom can expect many others in the U.S. to also adopt their preferred behaviour, given their historic linkages.

Proposition 3 relates the threshold level of cultural distance, $\tilde{\varepsilon}$, to the relative population size overseas, L.

Proposition 3. *A higher population in Foreign, L, permits non-assimilating migration to the U.S. for higher levels of cultural distance, ε, $\frac{\partial \tilde{\varepsilon}}{\partial L} > 0$.*

If Foreign has a larger population, then the mass of individuals able to migrate to the U.S. increases. Individuals in Foreign who intrinsically prefer behaviour b (i.e., $\Delta_i^M > 0$) migrate only if (i) there is a large number of individuals in the U.S. expected to choose behaviour b, or (ii) if the coordination gains outweigh the costs of assimilating into behaviour a (the lock-in effect). A larger population in Foreign strengthens the first condition and relaxes the lock-in effect because, in equilibrium, a larger share of the U.S.'s population will be migrants who have Foreign's group-preferred preference for behaviour b. We refer to this as the *enclave effect* since the larger presence of other migrants holding similar preferences eases pressures to assimilate. Consequently, more migrants choose not to assimilate since they have a higher probability of coordinating on behaviour b. Non-assimilating migration is sustained for greater levels of cultural distance and $\tilde{\varepsilon}$ rises.

Corollary 1 shows that lower average migration costs, reflected in a reduction in the support of μ_i to $[0, \overline{\mu}]$ where $\overline{\mu} < 1$, increase migration flows to the U.S. This can decrease or increase the ratio of assimilating to non-assimilating migrants, depending on the threshold for behavioural preferences, Δ^*, above which a migrant never assimilates.

Corollary 1. *Lower migration costs increase migration flows to the U.S. When $\Delta^{M*} < 2\varepsilon$, the ratio of assimilating to non-assimilating migrants decreases. When $\Delta^{M*} > 2\varepsilon$, the ratio increases.*

The productivity differential between the U.S. and Foreign, $\gamma^{US} - \gamma^{F}$, induces migration to the U.S. through the coordination effect: Individuals are willing to incur migration costs to capitalise on greater payoffs from productive exchanges in the U.S. Lower migration costs, μ, strengthen this effect by pushing more individuals' costs below the threshold μ^*, where migrating is worthwhile. As a result, overall migration flows to the U.S. increase.

The effect of lower migration costs on the ratio of assimilating to non-assimilating migrants is more subtle and depends on the assimilation threshold for behavioural preferences, Δ^{M*}, above which there is a mass of individuals in Foreign who never assimilate. When $\Delta^{M*} < 2\varepsilon$, individuals in Foreign that are strongly beholden to behaviour b never migrate and assimilate.[16] Such individuals only migrate if the probability of matching with others who prefer b in the U.S. is sufficiently high. This probability rises as migrant flows to the U.S. increase. Thus, a decrease in migration costs makes migration more attractive for individuals strongly beholden to b, and the mass of non-assimilating migrants grows faster than that of assimilating ones. In contrast, when $\Delta^{M*} > 2\varepsilon$, some individuals in Foreign that are strongly beholden to b are nonetheless willing to migrate and assimilate to capitalise on the U.S.'s greater productivity. As

[16]The inequality, $\Delta^{M*} < 2\varepsilon$, is implicit because the assimilation threshold for behavioural preferences, Δ^{M*}, is a function of cultural distance, ε.

there is a smaller mass of individuals who would never assimilate, the net effect of lower migration costs is an increase in assimilating migration.

5. Drivers of assimilation: lessons from the Age of Mass Migration

The Age of Mass Migration provides a rich setting to test the model's predictions about who migrates and their assimilating trajectories. Between the late nineteenth and early twentieth centuries, tens of millions of individuals relocated from Europe, Asia, and the Americas to the United States, fundamentally reshaping its demographic, economic, and cultural landscape. These migrants varied widely in language, skills, and cultural norms, and faced different incentives and barriers to assimilation depending on their origin and destination within the U.S.

In our framework, we treat the foreign-born individuals observed in the U.S. Census as a self-selected group with a revealed preference to migrate. The cross-country variation in origin characteristics, productivity levels, population size, and cultural distance to the U.S., allows us to test the model's predictions about the conditions under which migrants are more likely to assimilate.

Assimilation is inherently a dynamic process that unfolds as migrants interact, learn, and adapt within the host society (Kuran and Sandholm, 2008; Bazzi et al., 2019). But in focusing on the characteristics and choices formed by individuals at the point of departure, our static framework nonetheless captures a rich selection effect at the extensive margin. These ex ante choices reflect migrants' expectations about coordination, social interactions, and economic payoffs in the destination country, and they strongly influence the trajectories along which assimilation later evolves. In this sense, our empirical observations are motivated by the theory that the assimilation path, to some extent, has already been predetermined at the time of departure, even though certain behavioural shifts evolve gradually.

Data. We construct a new individual-level dataset with micro and macro variables to explore the mechanisms highlighted in our model, linking historical U.S. census microdata on migrants to rich characteristics of their countries of origin during the Age of Mass Migration.[17] Using harmonised IPUMS USA data, we identify foreign-born individuals and their country of origin and retain the microdata rather than aggregating to the country level. This design allows us to combine information on migrants' arrival cohort, state of residence, demographic characteristics, English proficiency, naturalisation status, and detailed occupation with macroeconomic and cultural measures for their origin countries, and to exploit heterogeneity in post-migration assimilation outcomes while controlling for location, origin and time fixed effects. Our final dataset comprises 435,271 foreign-born individuals who arrived in the United States between 1795 and 1930 and were at least 18 years old at the time of the census. For each migrant, we observe year of arrival from the home country, age, gender, presence of spouse and children, literacy, occupation, native language, and census-reported race.

To measure assimilation, we employ several complementary proxies. First, we use conventional indicators of institutional and linguistic assimilation: English proficiency and the naturalisation decision (citizenship acquisition). Second, we construct two task-based indices of economic assimilation that summarise the nature of migrants' jobs, in particular the extent to which they require communication-intensive, interpersonal work.

We operationalise the task-based measures by classifying occupations according to the types of skills they require. Following Autor et al. (2003), we adopt a task framework that distinguishes routine cognitive/manual, non-routine manual, and non-routine cognitive tasks (including abstract and interactive

[17] Appendix B provides a detailed description of data sources, linkage procedures, and the construction of all variables.

work).[18] From these data, we construct two assimilation proxies. The first is the Direct Contact with People (DCP) index, which measures whether an occupation requires interpersonal interaction and therefore captures assimilation potential through social coordination and communication. The second is a continuous abstract task score, derived by applying Principal Component Analysis (PCA) to three standardised task indices—routine, manual, and cognitive—so that higher values indicate occupations that are more abstract and cognitively demanding, with lower routinisation and manual content. Both task indices are normalised to lie in the unit interval, while English proficiency and citizenship acquisition are binary indicators.

Taken together, our dataset enables us to evaluate the model's comparative statics at the individual level. For each migrant, we attach the relevant country-year characteristics of the origin economy, such as productivity and population, as well as cultural distance to the United States, and relate these to realised assimilation outcomes (citizenship, English proficiency, and occupational tasks). In the empirical analysis that follows, we estimate individual-level versions of our baseline regression equations, controlling for a set of individual characteristics and fixed effects for census year, origin country, U.S. destination state, and arrival cohort.

Productivity Differential and Assimilation. Proposition 2 implies that the productivity differential between the U.S. and a migrant's home country, $\gamma^{US} - \gamma^{F}$, has a non-monotonic (inverted-U) effect on assimilating migration, specifically:

Prediction 1. *The predicted level of assimilation has a non-monotonic (inverted-U) relationship with the productivity differential between the U.S. and a migrant's home country. When the differential is small*

[18]To implement this, we crosswalk 1950 IPUMS occupation codes to 1990 Census occupation codes and merge task content scores from the Dictionary of Occupational Titles (DOT), as coded in the ONET dataset, following Autor and Dorn (2013) and Abramitzky et al. (2025).

or moderate, $\gamma^F > \overline{\gamma}^F$*, assimilating migration increases in the productivity differential. But, when the difference is large,* $\gamma^F < \overline{\gamma}^F$*, assimilating migration decreases in the differential.*

This mechanism derives from two forces: i) the coordination effect, as individuals incur migration costs to relocate to the more productive U.S.; and ii) the lock-in effect, as some migrants abandon their preferred behaviour to increase their likelihood of coordinating in the U.S. Thus, migrating is only worthwhile for individuals with preferences for their home country's norms when either the improvement in lifestyle from productive exchange exceeds the cost of assimilating into the behaviour preferred in distribution in the U.S., a, or when enough individuals in the U.S. are expected to choose behaviour b. The coordination effect dominates when the productivity gap is small, promoting assimilation. But as the gap becomes large, migrants more predisposed to their origin country norms relocate, dampening incentives to assimilate.

To capture cross-country variation in productivity levels, we append each individual-level record with macroeconomic indicators from the Maddison Project Database 2023 Edition (Bolt and van Zanden, 2024). For every migrant, we merge census data with historical estimates of real GDP per capita (2017 international dollars, PPP-adjusted).[19] These additions allow us to construct productivity differentials between migrants' home countries and the U.S. at the time of emigration.

Method and results. To test Prediction 1, we define the productivity differential by computing the log ratio of GDP per capita (PPP-adjusted) between the United States and each migrant's country of origin at the time of migration. To allow for the theorised non-monotonic (inverted-U) relationship, we include both linear and quadratic terms.

[19] All macro variables are matched by country and year. In cases where country-year data are missing from Maddison, we linearly interpolate within countries between missing years, and we linearly extrapolate with the closest positive growth rate.

Formally, we estimate:

$$Y_{ist} = \beta_0 + \beta_1 \log\left(\frac{\text{GDP}^{US}_{t'}}{\text{GDP}^{F_j}_{t'}}\right) + \beta_2 \left[\log\left(\frac{\text{GDP}^{US}_{t'}}{\text{GDP}^{F_j}_{t'}}\right)\right]^2 + X_{ist} + \delta_t + \eta_j + \theta_s + \kappa_t + u_{ist}, \tag{12}$$

where Y_{ist} denotes the assimilation outcome for migrant i residing in state s and observed in census year t. The key explanatory variable is the productivity differential $\left(\frac{\text{GDP}^{US}_{t'}}{\text{GDP}^{F_j}_{t'}}\right)$ between the home country F_j and U.S., measured at the migrant's year of arrival t'. X_{ist} is a vector of individual-level controls (e.g., age, gender, literacy). δ_t is the fixed effect of the decade of arrival to the U.S., and η_j, θ_s, and κ_t denote country-of-origin, state-of-residence, and census-year fixed effects, respectively. Standard errors are clustered at the state level.

This design allows us to assess whether migrants from moderately less productive countries are more likely to assimilate than those from countries with either very small or very large productivity gaps relative to the U.S.

TABLE 3. Effect of Countries' Productivity Differential on Assimilation Outcomes

	(1) Interactive Task	(2) Abstract task	(3) Speak English	(4) Citizen
Productivity Differential	0.516***	0.251***	0.185	0.0973
	(0.127)	(0.0591)	(0.214)	(0.129)
Productivity Differential, quadratic	-0.0936*	-0.0526***	-0.0652	-0.0748*
	(0.0518)	(0.0192)	(0.0641)	(0.0443)
Individual Controls	*Yes*	*Yes*	*Yes*	*Yes*
Arrival Decade & Home Country FE	*Yes*	*Yes*	*Yes*	*Yes*
State & Census FE	*Yes*	*Yes*	*Yes*	*Yes*
Observations	214,750	214,750	339,898	417,906

Standard errors in parentheses: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

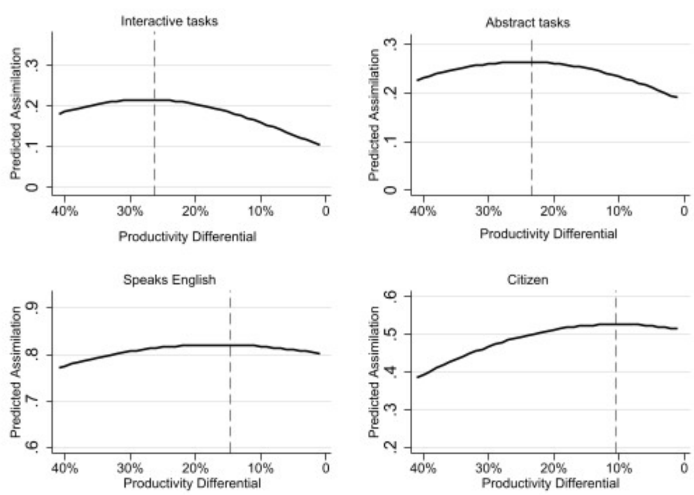
Table 3 provides evidence that the effect of the productivity differential on assimilation is non-monotonic for our measures of economic assimilation. For interactive and abstract task outcomes, the linear term in the productivity differential is positive and significant, while the quadratic term is negative, implying an inverted-U relationship. This pattern indicates that migrants from countries with moderately lower productivity than the United States are more likely to assimilate economically by sorting into occupations that require interaction and coordination, whereas migrants from countries with very large productivity gaps are less likely to do so. This is consistent with the model, where productivity gains from coordinating in the United States incentivise assimilating migration among individuals who are weakly attached to their home country's preferred behaviour b when the productivity gap between a migrant's country of origin and the United States lies in the theoretically predicted intermediate range, $\gamma^F > \overline{\gamma}^F$, but these gains are not large enough to incentivise individuals strongly beholden to their country's preferences to migrate. For example, an individual selecting to migrate to the U.S. is more likely to work in a job that requires interaction and coordination, as even a moderate productivity gain was sufficient for them to migrate and to forgo their country's preferred behaviour.[20]

But when the productivity differential is sufficiently large, $\gamma^F < \overline{\gamma}^F$, the second row of Table 3 indicates that its effect on assimilating migration becomes negative. As productivity in the country of origin, γ^F, falls, individuals preferring behaviour b nonetheless migrate due to the relatively more attractive coordination benefits. This reinforces the decision of individuals strongly preferring b to also migrate. As a result, there is less pressure to assimilate, and a migrant to the U.S. is less likely to sort into jobs with interactive or abstract tasks that require coordination. Consequently, countries with moderate productivity differentials with the U.S. during the Age of Mass Migration, such as Germany (with a log productivity gap ranging between 0.276 and 0.930), sent more assimilating migrants than those with larger productivity gaps, such as China (with a log productivity gap ranging between 1.413 and 2.478) — even when controlling for cultural differences.

[20]To verify that this non-monotonic relationship is not driven by the imposed quadratic functional form, Appendix C.1 provides a non-parametric validation using productivity-gap deciles.

Figure 2 illustrates the non-monotonic effect of the productivity differential on assimilation by plotting marginal effects of productivity differentials on the predicted assimilation probabilities. Focussing on interactive tasks, the United Kingdom consistently lies to the right of this threshold, indicating that a larger productivity gap draws relatively more assimilating migrants through moderate economic incentives. By contrast, migrants from the Baltic region lie to the left of the threshold, so that a larger differential, associated with a lower predicted assimilation: economic incentives are strong enough to induce large migration flows, relaxing assimilation pressures. Russia represents an intermediate case. Although it generally lies to the right of the threshold, it temporarily crosses to the left during the Russian Civil War (1917–1922). The sharp decline in GDP per capita during this period substantially increased the economic pull of the United States, generating a large inflow of Russian migrants that facilitated enclave effects and reduced assimilation.

FIGURE 2. Countries' productivity differential with the U.S. exhibits a non-monotonic (inverted-U) relationship with migrant assimilation outcomes. The dashed line marks the turning point beyond which predicted assimilation decreases in the productivity differential.



Notes: All specifications include individual controls, arrival decade and home country fixed effects, and state and census year fixed effects. Standard errors clustered by state.

Enclave Effects and Assimilation. Proposition 3 relates the population size of a migrant's country of origin to migration flows to the U.S., namely:

Prediction 2. *The population of a migrant's home country is inversely related to the predicted level of assimilation. Migrants are least likely to assimilate when their home country has a relatively large population that is culturally distant to the U.S. Conversely, migrants are most likely to assimilate when their home country is relatively small and culturally close to the U.S.*

Larger migrant groups can coordinate around culturally familiar norms within co-ethnic enclaves, thereby raising the threshold of cultural distance, $\tilde{\varepsilon}$, above which there is only assimilating migration. As a result, the higher threshold enables non-assimilating migration for more culturally distant individuals. On the other hand, when a migrant comes from a country with a small population relative to the U.S., migrant groups find it harder to coordinate without assimilating, as the enclave effect is weaker, so the threshold, $\tilde{\varepsilon}$, falls, increasing the likelihood of assimilation. Thus, the population of a migrant's home country is inversely related to the probability that they assimilate through this *enclave effect*.

Migrants are least likely to assimilate when they come from countries with relatively large populations that are culturally distant to the U.S. This is because they have a greater likelihood of matching with others from their country in the U.S., increasing the threshold, $\tilde{\varepsilon}$. Non-assimilating migration is thus sustained for higher levels of cultural distance, so those from countries that are also culturally distant to the U.S. (a high ε) can choose to migrate for greater productivity gains, while remaining beholden to their group-preferred behaviour, b. As a result, we predict that migrants from these countries are least likely to assimilate due to enclaves and a relaxed lock-in effect. By contrast, migrants from smaller countries face greater pressures to assimilate, and when they are culturally close to the U.S., assimilation is more likely because it is also less costly.

Empirically, we partition origin countries into groups along two dimensions: (i) whether the population of the origin country is large or small relative to the U.S. (a small versus large population differential), and (ii) whether the origin is culturally close or distant to the U.S. As with productivity, we construct population differentials using the ratio between U.S. population and the population of the migrant's home country at the time of migration t',

$$\frac{\text{Pop}_{t'}^{US}}{\text{Pop}_{t'}^{F_j}}.$$

For the baseline estimation, cultural distance between each origin country and the U.S. is measured using genetic distance, following Spolaore and Wacziarg (2009). Their measure captures the idea that societies with closer genetic ties are more likely to share traits and coordinate on similar behaviours, whereas societies that have been separated for longer develop divergent norms.[21] We incorporate their measure as a weighted genetic distance between the U.S. and each migrant's origin, accounting for the ethnic composition of sending countries.

Method and results. We test Prediction 2 by examining whether migrants from more populous countries are less likely to assimilate, conditional on cultural distance. We operationalise the enclave mechanism using the log population differential between the United States and each migrant's home country F_j:

$$\log\left(\frac{\text{Pop}_{t'}^{US}}{\text{Pop}_{t'}^{F_j}}\right),$$

where t' is the year of migration. A smaller population differential corresponds to a larger origin-country population relative to the U.S. and thus a stronger potential for enclave formation; a larger differential corresponds to a smaller origin country and a weaker enclave effect.

[21]Similarly, Guiso et al. (2009) use genetic distance as a proxy for trust in trade, and Desmet et al. (2011) finds a robust, strong correlation between World Values Survey responses and genetic distance.

Formally, we estimate:

$$Y_{ist} = \beta_0 + \beta_1 \log\left(\frac{\text{Pop}_{t'}^{US}}{\text{Pop}_{t'}^{F_j}}\right) + X_{ist} + \delta_t + \theta_s + \kappa_t + u_{ist}, \tag{13}$$

where Y_{ist} denotes an assimilation outcome for migrant i residing in state s and observed in census year t. The coefficient β_1 captures whether migrants from relatively smaller origin countries (a larger U.S.–origin population gap) are more likely to assimilate, in line with the enclave mechanism. The vector X_{ist} includes individual-level controls (e.g. age, gender, presence of spouse and children, literacy). We control for state-of-residence θ_s, country-of-origin η_j, decade of arrival to U.S. δ_t and census-year κ_t fixed effects, and standard errors are clustered at the state level.[22] In extended specifications, we test the effect of the population differential and how its effect varies by cultural distance, interacting the population ratio with indicators for culturally close and culturally distant origins based on different measures of cultural distance, such as genetic, linguistic and religious proximity.[23]

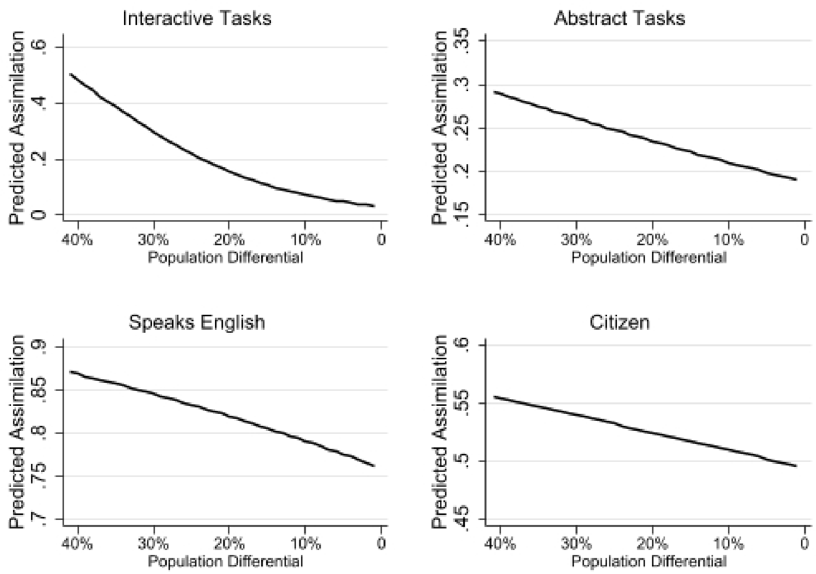
Figure 3 plots marginal effects of the log population differential on each assimilation outcome, and Table 4 reports the corresponding regression coefficients.

The first row of Table 4 presents evidence that the population differential is positively associated with selecting into interactive tasks, as well as that migrants are more likely to learn English and become citizens when they are from a relatively smaller country. Conversely, in Figure 3, migrants from countries with populations closer to the U.S. are less likely to assimilate as the differential shrinks.

The remaining rows in Table 4 examine how population differentials interact with cultural distance to shape migration outcomes. As predicted, the individuals least likely to assimilate come from countries

[22]In extended specifications that include interaction terms with cultural distance, we drop the home country fixed effect.
[23]In Appendix C.2, see Table C2 for a linguistic proximity measure, and Table C3 for a religious proximity measure.

FIGURE 3. Effect of countries' population differential on assimilation outcomes



Notes: All specifications include individual controls, arrival decade fixed effect, and state and census year fixed effects. Standard errors clustered by state.

TABLE 4. Effect of Countries' Population Differential on Assimilation Outcomes, cultural distance proxied by genetic distance.

	Interactive Task		Abstract Task		Speak English		Citizen	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Population Differential	0.466***		0.0670**		0.142***		0.0676***	
	(0.0737)		(0.0281)		(0.0489)		(0.0213)	
Small PopDifferential × Distant		0.321**		0.232***		-0.937***		-2.394***
		(0.128)		(0.0690)		(0.263)		(0.316)
Small PopDifferential × Close		0.196*		0.177***		2.501***		0.448***
		(0.102)		(0.0481)		(0.213)		(0.0243)
Large PopDifferential × Distant		0.224*		0.0723		-0.0681		0.0430
		(0.115)		(0.0450)		(0.185)		(0.0692)
Large PopDifferential × Close		0.507***		0.206***		0.856***		0.621***
		(0.0896)		(0.0287)		(0.147)		(0.0644)
Individual Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Home Country FE	*Yes*		*Yes*		*Yes*		*Yes*	
Arrival Decade FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
State & Census FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	199,460	182,308	199,460	182,308	307,917	268,331	385,505	345,530

Notes: Standard errors in parentheses: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

culturally distant from the U.S., with a large population, such as China. These migrants are strongly beholden to their group-preferred behaviour and, due to the enclave effect, are able to nonetheless coordinate in the U.S. population without assimilating. In contrast, countries that are culturally distant from the U.S., but have a smaller population, such as Serbia, demonstrate a greater propensity to learn English than those from larger nations. Since the enclave effect is weaker, these migrants face greater pressures to assimilate, even with significant cultural differences.

Our results suggest that the migrants that are most likely to assimilate are from countries (such as Ireland) with a relatively small population that is culturally *close* to the U.S.: assimilation is both incentivised and relatively easy. These individuals are more likely to select into interactive task jobs, learn English (when it is not their native language), and eventually seek U.S. citizenship. On the other hand, countries that are culturally close to the U.S. with a small population differential are relatively less likely to learn English because the higher threshold, $\tilde{\varepsilon}$, sustains greater levels of non-assimilating migration. Taken together, these interaction terms confirm that, while cultural distance significantly shapes the likelihood of assimilation, its effect is substantially moderated by relative population sizes and the enclave effect.

Migration Costs and Assimilation. Following Corollary 1, Prediction 3 states that lower average migration costs correspond with a lower ratio of assimilating to non-assimilating migrants when $\Delta^* < 2\varepsilon$.[24]

Prediction 3. *Migration costs, μ, are inversely related to the ratio of assimilating to non-assimilating migrants.*

Lower migration costs increase migration flows to the U.S. by strengthening the coordination effect. That is, more overseas individuals' migration costs are pushed below the threshold, μ^*, where migrating to capitalise on the U.S.'s greater productivity becomes worthwhile. This also induces greater migration

[24]The extreme case where $\Delta^* > 2\varepsilon$ occurs when the share of migrants from a single country converges towards the share of natives at $\frac{1}{2}$, which is not relevant to our study of the U.S.

from those strongly beholden to behaviour b – who never assimilate into behaviour a, as the probability of matching with others who prefer b in the U.S. increases with the flow of migration. As a result, a decrease in migration costs makes the mass of non-assimilating migrants grow faster than that of assimilating ones since the latter lack this reinforcing mechanism.

We capture a negative shock to migration costs through the introduction of the steamship. The steamship, on average, halved travel times from Western Europe to the U.S. and reduced the risks as well as the costs associated with long voyages, such as forgone earnings (Pascali, 2017; Hatton, 2025). Shen (2025) shows that the transition to steamships led to a significant increase in the number of migrants to the U.S. But, this transition was not immediate, and it took several years for the steamship to become cost-effective due to initial inefficiencies, concurrent improvements in sailing ships, and the late introduction of iron and screw technology, allowing larger vessels to be built (Cohn, 2005). So, to test our prediction that steamships lowered the ratio of assimilating to non-assimilating migrants, we follow Cohn (2005), Hatton (2025) and Shen (2025) in identifying the late 1850s as the period by which steamships became competitive with sailing ships.[25] Since this literature focuses on Western Europe, where the adoption of steamships occurred relatively uniformly, we restrict our sample to migrants from that region. We also concentrate on interactive and abstract tasks, as the U.S. passed the Naturalization Act of 1855 during this time, making naturalisation through marriage significantly easier and a confounding factor in our predictions.

Method and results. Our main specification is a linear probability model with high-dimensional fixed effects and standard errors clustered by state:

$$Y_{ist} = \beta_0 + \beta_1 \text{Post1855}_i + X_{ist} + \eta_F + \theta_s + \kappa_t + u_{ist}, \tag{14}$$

[25]Specifically, we select the beginning of this period, 1855, for simplicity and because it reflects an early conservative estimate, as steamships had just become competitive with sailing ships. We show in Appendix C.3 that our results remain statistically and economically significant for any selected year between 1855-1860.

where Y_{ist} denotes an assimilation outcome for individual i residing in state s and observed in census year t. The indicator Post1855$_i$ equals one if migrant i arrived in the United States in the steamship era (post-1855), and zero otherwise. The vector X_{ist} includes individual-level controls (e.g. age, sex, literacy). Country-of-origin (η_F), state-of-residence (θ_s), and census-year (κ_t) fixed effects are included, and standard errors are clustered at the state level. We estimate Equation (14) for four assimilation outcomes: working in an interactive task, working in an abstract task, speaking English, and holding U.S. citizenship. We present linear probability model (LPM) estimates alongside Poisson pseudo-maximum likelihood (PPML) estimates for each outcome. In all specifications, the main regressor of interest is an indicator for arrival in the steamship era (Post1855$_i$). The sample is restricted to migrants from Western Europe, and we include individual controls, country-of-origin, state-of-residence, and census-year fixed effects; standard errors are clustered by state.[26]

TABLE 5. Effect of Decreasing Migration Cost on Assimilation Outcomes

	Interactive Task		Abstract Task		Speak English		Citizen	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Arrived after 1855	-0.0605***	-0.0830	-0.0443***	-0.113***	0.0287***	0.520***	0.145***	1.138***
	(0.0172)	(0.0695)	(0.00948)	(0.0348)	(0.00782)	(0.140)	(0.0125)	(0.0570)
Individual Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Home Country FE	*Yes*		*Yes*		*Yes*		*Yes*	
State & Census FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R^2 (LPM)	0.207		0.201		0.289		0.420	
Pseudo R^2 / PPML	0.110		0.030		0.370		0.387	
PPML % effect		-7.97		-10.70				
Observations	141,327	141,327	141,327	141,327	226,288	226,156	281,326	281,326

Standard errors in parentheses
PPML columns report log link coefficients; PPML % effect shows $100 \cdot (\exp(\beta_{post1855}) - 1)$.
FE: state, origin, year; SE clustered by state.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5 shows that following the introduction of the steamship and, consequently, a reduction in migration costs, the probability that a migrant from Western Europe selects an interactive or abstract occupation

[26]As we drop the decade of arrival fixed effect, we add a continuous variable indicating time spent in the host country to the vector of individual-level controls X_{ist}.

declines. For these economic assimilation outcomes, the PPML coefficients imply a decline of roughly 8 per cent for interactive tasks and 11 per cent for abstract tasks (reported in the "PPML % effect" row), which are closely aligned with the LPM estimates in levels. Thus, as migration costs decrease and migrant flows increase, the pressure to assimilate appears to weaken, and, consistent with our prediction, a larger share of non-assimilating individuals migrate to the United States, so that the average migrant becomes less likely to sort into occupations that rely on interpersonal interactions. By contrast, the increase in the probability of becoming a citizen after this period is consistent with the confounding effect of the U.S. Naturalization Act of 1855 on our non-economic assimilation measure, reinforcing our emphasis on task-based measures as indicators of economic assimilation.

6. Conclusion

Existing theories of migration often treat migration and assimilation as separate problems, abstracting from the economic and social pressures that jointly shape both the scale of migration flows and their cultural composition. Our paper brings these decisions together by modelling migration as a choice made in anticipation of the social environment migrants expect to face on arrival. Assimilation emerges as a strategic response to a coordination problem rather than as a mechanical or purely identity-driven process.

The model highlights how economic incentives, population size, and cultural distance interact to determine whether migrants assimilate or form enclaves. Larger productivity differentials increase migration, but can weaken assimilation tendencies by expanding migrant inflows and relaxing coordination pressures. Similarly, large populations in the country of origin can facilitate enclave formation, reducing the incentive to adopt host-country norms. These forces generate systematic heterogeneity in assimilation outcomes, even among migrants responding to similar economic prospects. The Age of Mass Migration offers a test bed that supports these predictions, showing that variation in assimilation across origins reflects differences in incentives and expectations formed at the time of migration.

By interpreting long-run migrant outcomes as the result of an ex ante sorting decision, our paper offers a lens through which to jointly study cultural and economic assimilation. It clarifies why periods of rapid migration may coincide with declining assimilation, and why technological changes that affect migration costs may alter the scale and composition of migration. More broadly, by emphasising how beliefs about others' behaviour matter in shaping assimilation, our framework suggests that the cultural consequences of migration depend crucially on how migrants and their hosts expect to interact. While other forces, including conflict, institutions, and politics shape migration and social interactions, the role of beliefs and coordination examined in this paper seems important for analysing both historical and contemporary migration patterns.

Appendix A. Proofs of Main Propositions

A.1. **Proof of Proposition 1.** Equation (3) and Table 1 show that expected migrant payoffs from after migrating are strictly increasing in the proportion of others who adopt the same behaviour. So if behaviour a is the best response to individual i when $P^a \equiv \omega^N p^{N,a} + (1-\omega^M)p^{M,b}$ others adopt the same behaviour, then a is always the best response when the probability is even higher. For a to be preferred by an individual in either group, it must hold that

$$\pi_i^{G,a} + \gamma^{US} P^a \geq \pi_i^{G,b} + \gamma^{US}(1 - P^a). \tag{15}$$

Rearranging for $\pi_i^{G,a} - \pi_i^{G,b}$ and setting the expression to an equality gives a critical threshold on relative preference for behaviour a above which a is preferred. Clearly, this critical threshold depends on an individual's realised and relative intrinsic preference for each behaviour.

We next show how strategic reasoning about this differential, and reasoning recursively about others' reasoning process, helps to pin down a unique equilibrium threshold applied by all individuals. To do this, we show that the sequence of the expected proportion adopting the group-preferred behaviour at each strategic level, k, is increasing for the majority group and decreasing for the minority group, and both are bounded. By the monotone sequence convergence theorem, this limit defines the strategy profile $\sigma = (\sigma_i)_i$ that forms the unique introspective equilibrium of the game.

At level $k = 0$, there are no strategic considerations and individuals simply act in accordance with their values (as in the previous equilibrium). Therefore, i's $k = 0$ strategy, σ_i^0, is the following

$$\sigma_i^0 = \begin{cases} a & \text{if } \pi_i^{G,a} > \pi_i^{G,b} \\ b & \text{if } \pi_i^{G,a} < \pi_i^{G,b}\,. \end{cases} \tag{16}$$

If $\pi_i^{G,a} = \pi_i^{G,b}$, i chooses either behaviour with probability $\frac{1}{2}$.

Moving to the next introspective level, an individual's finds it preferable to choose behaviour a over b if and only if

$$\pi_i^{G,a} + \gamma^{US}\mathbb{E}_0[P^a] \geq \pi_i^{G,b} + \gamma^{US}\left(1 - \mathbb{E}_0[P^a]\right) \,, \tag{17}$$

where $\mathbb{E}_0[P^a]$ is the proportion of the population in the U.S. that is expected to prefer behaviour a at level $k = 0$.

Individuals are rational, and both the group share and cultural value differentials (the supports on $\pi_i^{G,x}$ for each group) are common knowledge. Therefore, at level $k = 1$, individual i expects others to behave according to their own values, given her own $k = 0$ strategy. Given the uniform distributions over preferences in equations (1) and (2, irrespective of her group identity, individual i expects that the proportion choosing behaviour a at $k = 0$ is

$$P_0^a = \mathbb{P}[\pi_{i'}^{G,a} > \pi_{i'}^{G,b}] = \omega^N\left(\frac{1}{2} + \varepsilon\right) + (1 - \omega^N)\left(\frac{1}{2} - \varepsilon\right) \,, \tag{18}$$

for $i' \neq i$. In what follows, we use $p_0^{G,x}$ to denote the expected proportion adopting behaviour x by an individual in group G at introspective level $k = 0$. In this case, $p_0^{N,a} = \frac{1}{2} + \varepsilon$ and $p_0^{M,a} = \frac{1}{2} - \varepsilon$. The first term on the right-hand side is the measure of individuals in the native group who have an intrinsic, non-strategic preference for a, and the second term is the measure of individuals who prefer a in the migrant group. The proportion expected to prefer behaviour b at levle $k = 0$ is

$$P_0^b = \mathbb{P}[\pi_{i'}^{G,a} \leq \pi_{i'}^{G,b}] = \omega^N\left(\frac{1}{2} - \varepsilon\right) + (1 - \omega^N)\left(\frac{1}{2} + \varepsilon\right) \,. \tag{19}$$

The proportions are already asymmetric at level $k = 1$. For all $\varepsilon < \frac{1}{2}$ and $\omega^N > \frac{1}{2}$, we have $P_0^a > P_0^b$. Given these beliefs, i's best response at level $k = 1$ is to choose behaviour a if and only if

$$\left[\omega^N \left(\frac{1}{2} + \varepsilon\right) + (1 - \omega^N) \left(\frac{1}{2} - \varepsilon\right)\right] \gamma^{US} + \pi_i^{G,a} \geq \left[\omega^N \left(\frac{1}{2} - \varepsilon\right) + (1 - \omega^N) \left(\frac{1}{2} + \varepsilon\right)\right] \gamma^{US} + \pi_i^{G,b} . \tag{20}$$

Rearranging Equation (20), we have a critical mass condition on preference differentials. Individual i prefers social behaviour a at $k = 1$ if and only if

$$\Delta_i^N \geq -\gamma^{US} \left(2 \left(\omega^N p_0^{N,a} + (1 - \omega^N) p_0^{M,a}\right) - 1\right) , \tag{21}$$

for $i \in N$ and

$$\Delta_i^M \geq -\gamma^{US} \left(2 \left(\omega^N p_0^{N,b} + (1 - \omega^N) p_0^{M,b}\right) - 1\right) , \tag{22}$$

for $i \in M$, where $\Delta_i^N \equiv \pi_i^{N,a} - \pi_i^{N,b}$ and $\Delta_i^M \equiv \pi_i^{M,b} - \pi_i^{M,a}$, in expectation, are random variables drawn from an identical trapezoidal distribution.

Proceeding to level $k = 2$, cultural-group preferences become significant. Suppose that i is in group N and her $k = 1$ best response is behaviour $s_i = a$. There are four 'sets' of people expected to adopt the same behaviour as prescribed by i's level $k = 1$ best response: (i) those in the native group who intrinsically prefer a and have a $k = 1$ best response to choose a; (ii) those in the native group who intrinsically prefer b but who – through introspection – adopt behaviour a as a $k = 1$ best response; (iii) those in the migrant group who are 'deviants' in the sense that they intrinsically prefer behaviour a and have a $k = 1$ best response to select a; and, finally, (iv) those in the migrant group who prefer behaviour b but – through inspection – adopt behaviour a as a $k = 1$ best response. Together, these groups form i's level $k = 2$

proportion expected to adopt behaviour a:

$$\omega^N p_1^{N,a}\left(\frac{1}{2}+\varepsilon\right)+\omega^N p_1^{N,a}\left(\frac{1}{2}-\varepsilon\right)+(1-\omega^N)(1-p_1^{M,b})\left(\frac{1}{2}-\varepsilon\right)+(1-\omega^N)(1-p_1^{M,b})\left(\frac{1}{2}+\varepsilon\right)\ , \quad (23)$$

where $p_1^{N,a}$ is the proportion of individuals in group N that have a $k=1$ best response to adopt behaviour a. This proportion is mass of those for whom equation (21) holds, and can be written as follows

$$p_1^{N,a} = \mathbb{P}[-(2P_0^a - 1)\gamma^{US} < \Delta_i^N]\,. \quad (24)$$

The proportion of migrants with a $k=1$ best response to choose their group-preferred behaviour is defined similarly as follows

$$p_1^{M,b} = \mathbb{P}[-(2P_0^b - 1)\gamma^{US} < \Delta_i^M]\,. \quad (25)$$

The distribution of Δ_i is identical and commonly known across groups. This common knowledge means that, even without knowing others' realised values, the probability that another individual, i', in the native group has a best response to select behaviour a – *from the perspective of* i – is the same regardless of whether i' actually preferred behaviour a or b. The same holds for those in the migrant group, from the perspective of i. Formally, this means that the proportion in Equation (23) simplifies to

$$P_1^a \equiv \omega^N p_1^{N,a} + (1-\omega^N)(1-p_1^{M,b})\,. \quad (26)$$

We define the tail distribution of Δ_i^G as $H_1(y) \equiv \mathbb{P}[\Delta_i^G > y]$, as follows:

$$H_1 = \begin{cases} 1 & \text{if } y < -(1-2\varepsilon); \\ 1 - \frac{1}{2-4\varepsilon}(1-2\varepsilon+y)^2 & \text{if } y \in [-(1-2\varepsilon), 0); \\ 1 - \frac{1}{2}(1-2\varepsilon) - y & \text{if } y \in [0, 2\varepsilon); \\ \frac{1}{4\left(\frac{1}{2}-\varepsilon\right)}(1-y)^2 & \text{if } y \in [2\varepsilon, 1]; \\ 0 & \text{otherwise.} \end{cases} \tag{27}$$

Using this notation, we have

$$p_1^{N,a} = H_1(-[2P_0^a - 1]\gamma^{US}), \tag{28}$$

and

$$p_1^{M,a} = 1 - H_1(-[2P_0^b - 1]\gamma^{US}). \tag{29}$$

Generalising this to any level $k > 1$, individual i has a $k > 1$ best response to adopt behaviour a if and only if

$$-[2\left\{\omega^N p_{k-1}^{N,a} + (1-\omega^N)(1-p_{k-1}^{M,b})\right\} - 1]\gamma^{US} < \Delta_i^G, \tag{30}$$

where

$$p_{k-1}^{N,a} = H_1(-[2\left\{\omega^N p_{k-2}^{N,a} + (1-\omega^N)(1-p_{k-2}^{M,b})\right\} - 1]\gamma^{US}),$$

and

$$p_{k-1}^{M,b} = H_1(-[2\left\{\omega^N (1-p_{k-2}^{N,a}) + (1-\omega^N)p_{k-2}^{M,b}\right\} - 1]\gamma^{US}).$$

We next show that the sequence $\{p_k^{N,a}\}_k$ is increasing in k and bounded from above. In this case, by the monotone sequence convergence theorem, the limit $p^{N,a}$ exists. To show this, observe that at each level

$k > 1$, $p_k^{N,a} \geq p_k^{M,b}$, since $p_0^{N,a} > p_0^{M,b}$ and since $\omega^N > 1 - \omega^N$. By the expression in Equation (28) and definition of H_1 in Equation (27),

$$p_k^{N,a} = \begin{cases} 1 - \frac{1}{2(1-2\varepsilon)}\left(1 - 2\varepsilon + \hat{\Delta}^N(p_{k-1}^{N,a}, \overline{p}_{k-1}^{M,b})\right)^2 & \text{if } \hat{\Delta}^N(p_{k-1}^{N,a}, p_{k-1}^{M,b}) \leq 1 - 2\varepsilon\,; \\ 1 & \text{if } \hat{\Delta}^N(p_{k-1}^{N,a}, \overline{p}_{k-1}^{M,b}) > 1 - 2\varepsilon\,, \end{cases}$$

where $\hat{\Delta}^N(p_{k-1}^{N,a}, \overline{p}_{k-1}^{M,b}) \equiv -\left[2\left\{\omega^N p_{k-1}^{N,a} + (1-\omega^N)(1 - \overline{p}_{k-1}^{M,b})\right\} - 1\right]\gamma^{US} < 0$ for any fixed $\overline{p}^{M,b} \in [0, p_{k-1}^{N,a})$. If the second case is true, the result follows immediately. So assume that $\hat{\Delta}^N \leq 1 - 2\varepsilon$. Define

$$f(p) \equiv 1 - \frac{1}{2(1-2\varepsilon)}\left(1 - 2\varepsilon + \hat{\Delta}^N(p, \overline{p}_{k-1}^{M,b})\right)^2 . \tag{31}$$

This function is strictly increasing, $\partial f / \partial p > 0$, and $f(p) \leq 1$ whenever $\hat{\Delta}^N \leq 1 - 2\varepsilon$. Therefore, for all $k > 1$, $f(p_{k-1}^{N,a}) \geq p_{k-1}^{N,a}$ and the limit $p^{N,a}$ exists. And, at any level k, the proportion that chooses the other social behaviour, $p_k^{N,b}$, is the complement of $p_k^{N,a}$, we also have a well-defined limit $p^{N,b} = 1 - p^{N,a}$.

Next, we show that the other limit, $p^{M,b}$ is well defined. Fix $p_{k-1}^{N,a} = \overline{p}^{N,a} \in (p_{k-1}^{M,b}, 1]$. Define $\hat{\Delta}^M(\overline{p}^{N,a}, p_{k-1}^{M,b}) \equiv -\left[2\left\{\omega^N(1 - p_{k-1}^{N,a}) + (1-\omega^N)\overline{p}_{k-1}^{M,b}\right\} - 1\right]\gamma^{US} > 0$ for all $\overline{p}^{N,a}$. Since $\overline{p}^{N,a} \in (p_{k-1}^{M,b}, 1]$, the threshold $\hat{\Delta}^M(\overline{p}^{N,a}, p_{k-1}^{M,b})$ is weakly positive. Again referring to the definition of H_1 in Equation (27), migrant propensity to adopt behaviour b is given by

$$p_k^{M,b} = \begin{cases} 1 - \frac{1}{2}(1-2\varepsilon) - \hat{\Delta}^M(\overline{p}^{N,a}, p_{k-1}^{M,b}) & \text{if } \hat{\Delta}^M(\overline{p}^{N,a}, p_{k-1}^{M,b}) < 2\varepsilon; \\ \frac{1}{4\left(\frac{1}{2}-\varepsilon\right)}(1 - \hat{\Delta}^M(\overline{p}^{N,a}, p_{k-1}^{M,b}))^2 & \text{if } 2\varepsilon < \hat{\Delta}^M(\overline{p}^{N,a}, p_{k-1}^{M,b}) \leq 1; \\ 0 & \text{otherwise.} \end{cases} \tag{32}$$

The sequence $\{p_k^{M,b}\}_k$ is monotone decreasing and bounded. The result is immediate if $\hat{\Delta}^M(\overline{p}^{N,a}, p_{k-1}^{M,b}) > 1$. So fix $\hat{\Delta}^M(\overline{p}^{N,GP}, p_{k-1}^{M,GP}) \leq 1$. Define the limiting function

$$g(p^{M,GP}) = \begin{cases} 1 - \frac{1}{2}(1-2\varepsilon) - \hat{\Delta}^M(\overline{p}^{N,GP}, p_{k-1}^{M,GP}) & \text{if } \hat{\Delta}^M(\overline{p}^{N,GP}, p_{k-1}^{M,GP}) < 2\varepsilon; \\ \frac{1}{4\left(\frac{1}{2}-\varepsilon\right)}(1 + \hat{\Delta}^M(\overline{p}^{N,GP}, p_{k-1}^{M,GP}))^2 & \text{otherwise.} \end{cases} \tag{33}$$

In either case, $g(p^{M,b})$ is strictly decreasing in $p^{M,b}$ for all $k > 1$ and it collapses to zero whenever $\hat{\Delta}^M(\overline{p}^{N,a}, p_{k-1}^{M,b}) > 1$. Therefore, by the monotone sequence convergence theorem, the limits $p^{M,b}$ and $p^{M,a} = (1 - p^{M,b})$ exist.

Together, these limits form simultaneous equations

$$\begin{aligned} p^{N,a} &= H_1\left(-\gamma^{US}\left[2(\omega^N p^{N,a} + (1-\omega^N)(1-p^{-M,b})) - 1\right]\right) \\ p^{M,b} &= H_1\left(-\gamma^{US}\left[2(\omega^N(1-p^{N,a}) + (1-\omega^N)p^{M,b}) - 1\right]\right). \end{aligned} \tag{34}$$

Thus, in the unique introspective equilibrium, each individual in group $G \in \{N, M\}$ adopts her group-preferred behaviour, $s \in \{a, b\}$, if and only if the critical mass of individuals expected to adopt that behaviour is met. That is,

$$\begin{aligned} \Delta_i^N &\geq \Delta^{N*} \equiv -\gamma^{US}\left(2\left[\omega^N p^{N,a} + (1-\omega^N)(1-p^{M,b})\right] - 1\right), \text{ and} \\ \Delta_i^M &\geq \Delta^{M*} \equiv -\gamma^{US}\left(2\left[\omega^N(1-p^{N,a}) + (1-\omega^N)p^{M,b}\right] - 1\right), \end{aligned} \tag{35}$$

where $p^{N,a}$ and $p^{M,b}$ are the limits in Equation (34).

A.2. **Proof of Proposition 2.** Proposition 2 states that there is a unique solution to the migration problem in introspective equilibrium and that the presence and make-up of migration depend on the productive capacity of Foreign, γ^F. First, we show the existence of this equilibrium. The right-hand side of (9) is continuous and maps the compact, convex interval $[0, L]$ to itself. These properties satisfy Brouwer's fixed-point theorem and guarantee the existence of an equilibrium. The limiting proportions in the introspective process depend on group shares in the U.S. Rewriting the equilibrium condition in terms of the U.S.'s group share, we have

$$\mathbb{E}[\omega^M] = \frac{\left[H_1(\Delta^*)H_2(\mu^*) + \int_{-(1-2\varepsilon)}^{\Delta^*} H_2(\mu^{**}(\Delta))d(1 - H_1(\Delta))\right] L}{\left[H_1(\Delta^*)H_2(\mu^*) + \int_{-(1-2\varepsilon)}^{\Delta^*} H_2(\mu^{**}(\Delta))d(1 - H_1(\Delta))\right] L + 1}. \tag{36}$$

Since the expected migrant share in the U.S. is strictly decreasing in the share of natives, $\mathbb{E}[\omega^M] = 1 - \mathbb{E}[\omega^N]$, uniqueness is obtained in general when the gradient of α^* is greater than -1. The existence of two regimes means that α^* is not differentiable in ω^N, and so we demonstrate uniqueness in Figure A1. We verify that a unique equilibrium holds for all parameter configurations under our assumptions.

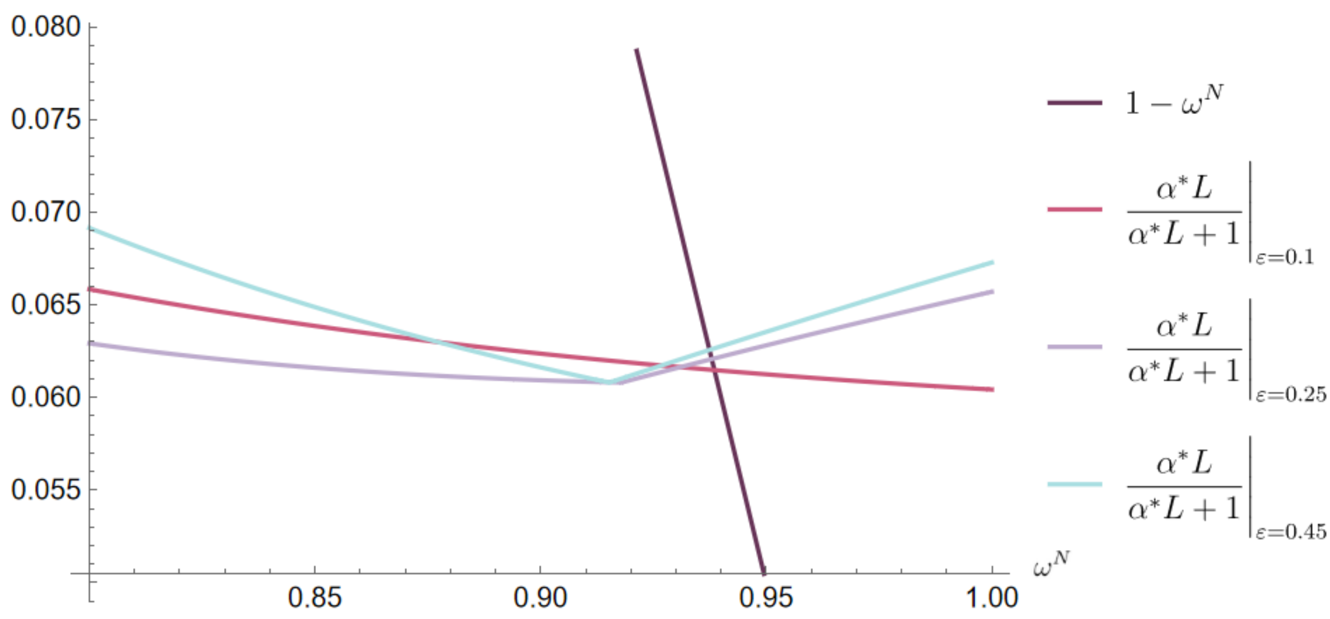


FIGURE A1. The unique equilibrium migration regime is at the intersection between $\omega^M = 1-\omega^N$ and the realised migrant share, $\frac{\alpha^* L}{\alpha^* L+1}$. The latter is influenced by the degree of cultural distance, ε. In this example, $\mu \sim U(0,1)$, $\gamma^{US} = 0.40$, $\gamma^F = 0.02$ and $L = 0.99$.

The point of intersection between the expected migrant proportion, $1-\omega^N$, and the actual proportion that finds it optimal to move, $\frac{\alpha^* L}{\alpha^* L+1}$, defines the migration equilibrium.

Using the definition for μ^*, it is clear that when Foreign's productivity falls below $\overline{\gamma}^F \equiv P^b\gamma^{US}$, the event where non-assimilating migration occurs is empty. To ensure that assimilating migration occurs, we require

$$\mu^{**}(-[1-2\varepsilon]) > 0\,.$$

This is true whenever $\gamma^F < \overline{\overline{\gamma}}^F \equiv P^a\gamma^{US} + 1 - 2\varepsilon$. It is straightforward to check that $\overline{\overline{\gamma}}^F > \overline{\gamma}^F$ since $P^a > P^b$ for all $\omega^N > \omega^M$. Therefore, for all $\overline{\gamma}^F < \gamma^F < \overline{\overline{\gamma}}^F$, there is only assimilating migration in equilibrium. And when $\gamma^F > \overline{\overline{\gamma}}^F$, no migration occurs in equilibrium.

A.3. **Proof of Lemma 1.** Lemma 1 establishes that there is a critical level of cultural distance, $\tilde{\varepsilon}$, below which both non-assimilating and assimilating migration occur and above which there is only assimilating migration. The non-assimilating migration cutoff, μ^*, is continuous and weakly convex in ε. The cutoff is decreasing in ε for all $\varepsilon \in \left(0, \frac{1}{2}\right)$. To see this, consider

$$\frac{\partial \mu^*}{\partial \varepsilon} = \gamma^{US}\frac{\partial P^b}{\partial \varepsilon} = \gamma^{US}\left[-\omega^N\frac{\partial p^{N,a}}{\partial \varepsilon} + (1-\omega^N)\frac{\partial p^{M,b}}{\partial \varepsilon}\right] < 0\,,$$

or

$$\frac{\frac{\partial p^{M,b}}{\partial \varepsilon}}{\frac{\partial p^{N,a}}{\partial \varepsilon}} < \frac{\omega^N}{1-\omega^N}\,, \tag{37}$$

which holds for $\omega^N > \frac{1}{2}$, $\gamma^{US} \in (0,1)$ and $\varepsilon \in (0, \frac{1}{2})$. For example, at $k=0$ we have $p^{N,a} = p^{M,b} = \frac{1}{2} + \varepsilon$ so this becomes

$$1 < \frac{\omega^N}{1-\omega^N}$$

which is true since $\omega^N > \frac{1}{2}$.

Alternatively, for all $k > 0$ we have

$$\frac{\partial p^{G,GP}}{\partial \varepsilon} = \frac{\partial H_1}{\partial \varepsilon} + \frac{\partial H_1}{\partial \Delta^{M*}} \frac{\partial \Delta^{M*}}{\partial \varepsilon}$$

where $\frac{\partial H_1}{\partial \varepsilon}$ is strictly positive, $\frac{\partial H_1}{\partial \Delta^{M*}}$ is strictly negative and $\frac{\partial \Delta^{M*}}{\partial \varepsilon}$ can be either sign. However, the strategic effect in the second term is larger for the native group since $\omega^N > 1 - \omega^N$, ensuring that the inequality in Equation (37) is generally satisfied. Having established that μ^* is decreasing in ε, we define $\tilde{\varepsilon} \equiv \varepsilon : \mu^* = 0$ which is in $(0, \frac{1}{2})$.

For all $\varepsilon > \tilde{\varepsilon}$, the cutoff is negative so that $H_2(\mu^*) = 0$ and there is only assimilating migration in equilibrium. Otherwise, the first term on the right-hand side of Equation (9) is positive, and there are both non-assimilating migrants and assimilating migrants in equilibrium.

We prove that $\tilde{\varepsilon} \in (0, \frac{1}{2})$ is always possible for some parameter values of γ^{US} and γ^F. Note that $\tilde{\varepsilon}$ is identified if there exists a point $\tilde{\varepsilon} \in (0, \frac{1}{2})$ such that $P^b(\tilde{\varepsilon}) = \frac{\gamma^F}{\gamma^{US}}$, i.e., where $\mu^* = 0$.

First, consider when cultural distance is minimised, $\varepsilon \to 0$. Both U.S. natives and Foreign individuals share identical value distributions over a and b, so $P^b = \frac{1}{2}$. At $k = 0$, we have $P_0^b = \frac{1}{2}\omega^N + \frac{1}{2}(1-\omega^N) = \frac{1}{2}$. Proceeding to all levels $k > 0$, it follows that $P_k^b = H_1(-\gamma[2P_{k-1}^b] - 1) = H_1(0) = \frac{1}{2}$. By induction, as $k \to \infty$, we converge to an introspective equilibrium with $P^b = \frac{1}{2}$. This suggests that

$$P^b(0) > \frac{\gamma^F}{\gamma^{US}} \, ,$$

if

$$\frac{\gamma^F}{\gamma^{US}} < \frac{1}{2} \, .$$

And when cultural distance is maximised $\varepsilon \to \frac{1}{2}$, all individuals in the U.S. prefer a and all individuals in Foreign prefer b. Consequently, $P^b < \frac{1}{2}$ by our assumption that $\omega^N > \frac{1}{2}$. This implies

$$P^b\left(\frac{1}{2}\right) < \frac{\gamma^F}{\gamma^{US}}\,,$$

if

$$\frac{\gamma^F}{\gamma^{US}} > 1 - \omega^N\,.$$

Thus, for $\tilde{\varepsilon} \in (0, \frac{1}{2})$ we require that

$$1 - \omega^N < \frac{\gamma^F}{\gamma^{US}} < \frac{1}{2},$$

which is always possible since $1 - \omega^N < \frac{1}{2}$ and $\frac{\gamma^F}{\gamma^{US}} \in (0, 1)$ by our assumptions that $\omega^N > \frac{1}{2}$ and $\gamma^{US} > \gamma^F$, respectively.

A.4. **Proof of Proposition 3.** Proposition 3 states that the threshold level of cultural distance above which there is no non-assimilating migration, $\tilde{\varepsilon}$, is increasing in the population of Foreign, L.

In Lemma 1, we define threshold $\tilde{\varepsilon}$ as the level of cultural distance such that

$$\mu^*(\tilde{\varepsilon}) = P^b(\gamma^{US}, \omega^N, \tilde{\varepsilon})\gamma^{US} - \gamma^F = 0. \tag{38}$$

To see how L shapes $\tilde{\varepsilon}$, consider

$$\frac{\partial \omega^M}{\partial L} = \frac{\alpha^*}{(\alpha^* L + 1)^2} > 0.$$

Since P^b is increasing in ω^M, an increase in L widens the range of ε for which $\varepsilon < \tilde{\varepsilon}$, i.e.

$$P^b(\gamma^{US}, \omega^N(L), \varepsilon)\gamma^{US} > \gamma^F.$$

So in Equation (38) we have $P^{b'}(\gamma^{US}, \omega^N(L'), \tilde{\varepsilon})\gamma^{US} > P^b(\gamma^{US}, \omega^N(L), \tilde{\varepsilon})\gamma^{US}$, where $L' > L$, and the threshold $\tilde{\varepsilon}$ rises.

A.5. **Proof of Corollary 1.** Corollary 1 shows that lower migration costs, μ, increase migration flows to the U.S. When $\Delta^{M*} < 2\varepsilon$, this also decreases the share of assimilating to non-assimilating migration. But when $\Delta^{M*} > 2\varepsilon$, the share increases.

An individual's migration cost is drawn from a uniform distribution $H_2(\mu)$ with support $\mu \in [0, 1]$. This gives us the total measure of individuals who migrate to the U.S.

$$\mathbb{E}[\alpha^*]L = \left[H_1(\Delta^{M*})\mu^* + \int_{-(1-2\varepsilon)}^{\Delta^{M*}} \mu^{**}(\Delta) d(1 - H_1(\Delta)) \right] L\,,$$

where the first term on the right-hand side reflects the proportion who migrate and do not assimilate, and the second term captures those who migrate and assimilate.

We capture lower migration costs by reducing the support on μ to $\mu \in [0, \overline{\mu}]$, where $\overline{\mu} < 1$, so that this measure becomes

$$\mathbb{E}[\alpha^*]L = \left[H_1(\Delta^{M*})\frac{\mu^*}{\overline{\mu}} + \frac{1}{\overline{\mu}} \int_{-(1-2\varepsilon)}^{\Delta^{M*}} \mu^{**}(\Delta) d(1 - H_1(\Delta)) \right] L\,.$$

$$\mathbb{E}[\alpha^*]L = \frac{1}{\overline{\mu}} \left[H_1(\Delta^{M*})\mu^* + \int_{-(1-2\varepsilon)}^{\Delta^{M*}} \mu^{**}(\Delta) d(1 - H_1(\Delta)) \right] L\,. \tag{39}$$

As a result, reducing the greatest migration cost that an individual can face, $\overline{\mu}$, increases the proportion of those who migrate and assimilate *and* the proportion of those who migrate and do not assimilate, as density shifts to the bottom of Figure 1. Thus, the level of migration rises. We now consider when the increase in migrants who do not assimilate is greater. This is when

$$\frac{1}{\bar{\mu}} H_1(\Delta^{M*})\mu^* > \frac{1}{\bar{\mu}} \int_{-(1-2\varepsilon)}^{\Delta^{M*}} \mu^{**}(\Delta) d(1 - H_1(\Delta)) \, ,$$

or

$$H_1(\Delta^{M*})\mu^* > \int_{-(1-2\varepsilon)}^{\Delta^{M*}} \mu^{**}(\Delta) d(1 - H_1(\Delta)) \, .$$

Expanding the right-hand side gives

$$\int_{-(1-2\varepsilon)}^{\Delta^{M*}} \mu^{**}(\Delta) d(1 - H_1(\Delta)) = \mu^{**}(\Delta^*)(1 - H_1(\Delta^*)) - \mu^{**}(-(1-2\varepsilon))(1 - H_1(-(1-2\varepsilon))) \, ,$$

$$\frac{1}{\bar{\mu}} \int_{-(1-2\varepsilon)}^{\Delta^{M*}} \mu^{**}(\Delta)(1 - H_1(\Delta)) = \mu^*(\Delta^*)(1 - H_1(\Delta^*)) - 0 \, ,$$

since $\mu^{**} = \mu^*$ at Δ^*. So we have

$$H_1(\Delta^{M*})\mu^* > \mu^*(1 - H_1(\Delta^{M*})) \, ,$$

or

$$H_1(\Delta^{M*}) > (1 - H_1(\Delta^*)),$$

which is equivalent to

$$\Delta^{M*}(\varepsilon) < 2\varepsilon \, , \tag{40}$$

as $H_1(\Delta^{M*}) = (1 - H_1(\Delta^{M*}))$ at $\Delta^{M*} = 2\varepsilon$. Therefore, a reduction in migration costs lowers the ratio of assimilation to non-assimilating migration if $\Delta^{M*} < 2\varepsilon$ and raises it if $\Delta^{M*} > 2\varepsilon$.

Appendix B. Data

Table B1. Constructed Variables: Definitions and Data Sources

Variable	Definition and Methodology	Source
Assimilation Outcomes		
Interactive Task (DCP Index)	Continuous index on $[0,1]$ measuring the extent to which an occupation requires direct interpersonal interaction (communication, coordination, face-to-face tasks). Constructed by merging historical occupations (IPUMS 1950 codes) to 1990 Census codes, then to DOT/ONET task content following Autor and Dorn (2013); Autor et al. (2003) and Abramitzky et al. (2025)	Ruggles et al. (2025, 2024); US Department of Labor (1977); Firpo et al. (2011); National Center for O*NET Development (2025)
Abstract Task Score	Continuous index derived via PCA from three standardised task measures (routine cognitive/manual, non-routine manual, non-routine cognitive). The underlying measures were constructed by merging historical occupations (IPUMS 1950 codes) to 1990 Census codes, then to DOT/ONET task content following Autor and Dorn (2013); Autor et al. (2003) and Abramitzky et al. (2025). Higher values indicate greater abstract and cognitively intensive work.	Ruggles et al. (2025, 2024); US Department of Labor (1977); Firpo et al. (2011); National Center for O*NET Development (2025). PCA constructed by authors
Speak English	Indicator equal to 1 if the census reports the individual can speak English; 0 otherwise.	Ruggles et al. (2025, 2024)
Citizen	Indicator equal to 1 if the individual is naturalised U.S. citizen at census date; 0 otherwise.	Ruggles et al. (2025, 2024)
Origin-Country Characteristics		
Productivity Differential	The natural logarithm of the ratio of PPP-adjusted real GDP per capita in the U.S. to the migrant's origin-country PPP-adjusted real GDP per capita in the migrant's year of arrival. For missing data, values were interpolated using the closest years, where possible, or extrapolated using the closest positive trend.	Authors' construction from Bolt and van Zanden (2024)
Population Differential	The natural logarithm of the ratio of the total population of the U.S. in the migrant's arrival year to the total population of the migrant's home country in that year. Higher values indicate that the origin country is relatively small compared with the United States.	Authors' construction from Bolt and van Zanden (2024)
Cultural Distance (Genetic Distance, Linguistic Proximity, Religious Proximity)	Weighted Cavalli–Sforza genetic distance between origin and the U.S., adjusted for ethnic composition. Indicator for linguistic closeness or distance between origin and U.S. based on shared branches in linguistic trees. Index of similarity in religious composition (major denominations share).	Spolaore and Wacziarg (2009)
Migration-Cost Proxy		
Steamship Arrival (Post-1855)	Binary variable indicating if the migrant arrived after 1855, capturing the full transition to steamship technology.	Cohn (2005); Hatton (2025); Shen (2025); Ruggles et al. (2024, 2025)
Controls and Fixed Effects		
Individual-Level Controls	Indicators directly from Census: Age, Sex, Marital Status, Literacy, Race, Child Home, English as Mother-tongue, Labour Force status, years spent in U.S.	Ruggles et al. (2025, 2024)
Arrival Decade Fixed Effect	Authors' coding from the year of arrival variable in the census.	Ruggles et al. (2025, 2024)
Home Country Fixed Effect	Authors' coding from the country of origin variable in the census.	Ruggles et al. (2025, 2024)
State and Census Fixed Effects	State of residency fixed effects for location at the census year.	Ruggles et al. (2025, 2024)

APPENDIX C. ROBUSTNESS CHECKS

C.1. **Robustness Check: Prediction 1.** This appendix provides a flexible and non-parametric validation of Prediction 1, which posits a non-monotonic (inverted-U) relationship between assimilation and the productivity differential between the United States and the country of origin of a migrant.

In the main analysis, this relationship is captured using a quadratic specification in the log ratio of U.S. to origin-country GDP per capita. To verify that the resulting inverted-U pattern is not driven by functional-form assumptions, we re-estimate the baseline models using a more flexible approach in which the productivity differential is discretised into deciles.

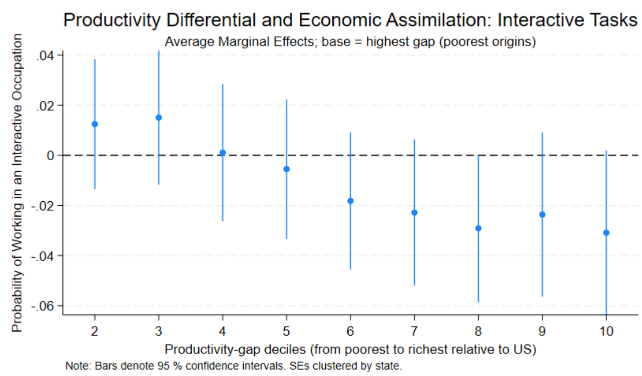
Specifically, we construct deciles of the productivity differential, $\log\left(\frac{GDP_{US,t'}}{GDP_{F,t'}}\right)$, and reverse their ordering so that lowest values correspond to poorer origin countries, and use the highest-gap (poorest-origin) decile as the reference category. We then estimate fractional logit models for task-based assimilation outcomes (interactive and abstract occupations), maintaining the same set of individual controls and fixed effects as in the baseline specifications. For ease of interpretation, we report and plot average marginal effects relative to migrants from the poorest origin countries.

Figure C1 plots the resulting average marginal effects across productivity-gap deciles. When the productivity differential is discretised into deciles and ordered from the poorest to the richest origin countries, assimilation exhibits a clear inverted-U pattern. Relative to migrants from the poorest origins, the probability of working in interactive or abstract occupations initially increases as the productivity gap narrows, peaks at intermediate differentials, and subsequently declines for migrants from origins with productivity levels closer to that of the United States. This pattern closely mirrors the quadratic relationship estimated in the main specifications and confirms that the non-monotonic (inverted-U) result is not driven by functional-form assumptions.

FIGURE C1. Non-parametric validation of Prediction 1: productivity-gap deciles and economic assimilation.

Figures/Graph_prop1_rob1.png

(A) Interactive Tasks



(B) Abstract Tasks

Table C1 reports the corresponding coefficient estimates from the non-parametric specifications, while Figure C1 plots average marginal effects for ease of interpretation. Overall, full non-parametric estimates, presented in Table C1, confirm that the central result underlying Prediction 1 is present in the data and does not depend on imposing a particular parametric form on the productivity differential.

C.2. **Robustness Check: Prediction 2.** In the main text, cultural distance between a migrant's origin country and the U.S. is measured using genetic distance. To assess the robustness of Prediction 2 to alternative ways of capturing cultural proximity, we re-estimate the baseline specification using two additional measures of cultural distance: linguistic proximity and religious proximity. In each case, we construct indicators for culturally "close" and culturally "distant" origins based on the respective proximity measure, and interact these with indicators for small and large population differentials. The specification is

TABLE C1. Prediction 1 Robustness: Assimilation Outcomes across GDP-Per-Capita Bins Relative to the U.S., with the Poorest Origin Countries as the Baseline Group

	(1) Interactive Task	(2) Abstract Task	(3) Speak English	(4) Citizen
Productivity Differential Decile 9	0.0986	0.0792**	-0.613***	-0.513***
	(0.106)	(0.0390)	(0.214)	(0.168)
Productivity Differential Decile 8	0.119	0.0733*	0.120	0.303*
	(0.110)	(0.0386)	(0.148)	(0.160)
Productivity Differential Decile 7	0.00880	0.0511	0.247	0.284*
	(0.113)	(0.0433)	(0.210)	(0.173)
Productivity Differential Decile 6	-0.0449	0.0205	0.905***	0.510***
	(0.116)	(0.0455)	(0.112)	(0.132)
Productivity Differential Decile 5	-0.153	-0.0268	0.675***	0.440***
	(0.115)	(0.0509)	(0.118)	(0.131)
Productivity Differential Decile 4	-0.195	-0.0347	1.024***	0.514***
	(0.123)	(0.0509)	(0.101)	(0.133)
Productivity Differential Decile 3	-0.252**	-0.0462	1.243***	0.536***
	(0.126)	(0.0544)	(0.0971)	(0.124)
Productivity Differential Decile 2	-0.202	-0.00892	1.276***	0.483***
	(0.140)	(0.0547)	(0.106)	(0.130)
Productivity Differential Decile 1 (richest)	-0.268*	-0.0533	2.795***	0.603***
	(0.142)	(0.0563)	(0.147)	(0.119)
Individual Controls	*Yes*	*Yes*	*Yes*	*Yes*
Arrival Decade & Home Country FE	*Yes*	*Yes*	*Yes*	*Yes*
State & Census FE	*Yes*	*Yes*	*Yes*	*Yes*
Observations	214,750	214,750	340,165	417,921

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

otherwise identical to that used in the main analysis, with the same set of individual controls and fixed effects.

TABLE C2. Effect of Countries' Population Differential on Assimilation Outcomes. Linguistic proximity as cultural distance.

	Interactive Task	Abstract Task	Speak English	Citizen
Small PopDifferential × Distant	-0.395***	-0.116**	3.626***	-0.267***
	(0.0948)	(0.0559)	(0.196)	(0.0674)
Small PopDifferential × Close	-0.340***	-0.231***	-0.375***	-0.421***
	(0.0784)	(0.0419)	(0.129)	(0.0681)
Large PopDifferential × Distant	-0.245***	-0.0104	0.602*	-0.525***
	(0.0893)	(0.0587)	(0.315)	(0.115)
Large PopDifferential × Close	-0.221***	-0.178***	-0.0337	-0.284***
	(0.0709)	(0.0363)	(0.128)	(0.0598)
Individual Controls	*Yes*	*Yes*	*Yes*	*Yes*
Arrival Decade FE	*Yes*	*Yes*	*Yes*	*Yes*
State & Census FE	*Yes*	*Yes*	*Yes*	*Yes*
Observations	216,576	216,576	343,169	421,123

Standard errors in parentheses: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table C2 reports results when cultural distance is proxied by linguistic proximity. The interaction coefficients indicate that the relationship between relative population size and assimilation is sensitive to how culturally close or distant the origin is linguistically, for the task-based economic assimilation outcomes the pattern is consistent with the enclave mechanism: a weaker enclave effect for migrants from relatively smaller countries (large population differential) is associated with higher assimilation, for a given cultural distance.

TABLE C3. Effect of Countries' Population Differential on Assimilation Outcomes. Religious proximity as cultural distance.

	Interactive Task	Abstract Task	Speak English	Citizen
Small PopDifferential × Distant	0.0259	-0.0331	-0.417*	0.120*
	(0.0649)	(0.0292)	(0.219)	(0.0616)
Small PopDifferential × Close	-0.279***	-0.249***	-1.323***	-0.448***
	(0.0911)	(0.0393)	(0.233)	(0.0798)
Large PopDifferential × Distant	0.0597	-0.115		0.576*
	(0.188)	(0.0837)		(0.315)
Large PopDifferential × Close	-0.122	-0.136***	-0.914***	-0.302***
	(0.0768)	(0.0340)	(0.216)	(0.0811)
Individual Controls	*Yes*	*Yes*	*Yes*	*Yes*
Arrival Decade FE	*Yes*	*Yes*	*Yes*	*Yes*
State & Census FE	*Yes*	*Yes*	*Yes*	*Yes*
Observations	216,576	216,576	343,154	421,123

Standard errors in parentheses: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table C3 repeats the exercise using religious proximity as the measure of cultural distance. The interaction coefficients indicate that the relationship between relative population size and assimilation is sensitive to how culturally close or distant the origin is in religious terms, but the overall pattern is consistent with the enclave mechanism: a weaker enclave effect for migrants from relatively smaller countries (large population differential) is associated with higher assimilation.

C.3. **Robustness Check: Prediction 3.** To address uncertainty about the exact timing of steam adoption, we replace the post–1855 indicator with a placebo–cutoff dummy Post_c, defined as $\text{Post}_c = 1$ if ArrivalYear $\geq c$ and 0 otherwise, for a pre-declared grid $c \in \{1840, 1842, \ldots, 1870\}$. Estimates, presented in Tables C4 - C9, are stable across neighbouring cutoffs: for our task-based assimilation measures, the coefficient on Post_c is negative, with linear-probability magnitudes of roughly $3-7$ p.p. for interactive tasks and $3-5$ p.p. for abstract tasks; the corresponding PPML specifications imply declines of about 5–11%. The pattern holds across plausible cutoffs around 1850–1860 and persists under PPML, indicating that our conclusions do not hinge on a single breakpoint.

TABLE C4. Effect of Decreasing Migration Cost on Assimilation Outcomes: Interactive Task. Placebo year cutoffs. Linear Probability Model.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	1840	1842	1844	1846	1848	1850	1852	1854	1856	1858	1862	1864	1866	1868	1870
Arrived after	-0.0561*	-0.0673**	-0.0645**	-0.0462*	-0.0677***	-0.0556***	-0.0476***	-0.0615***	-0.0600***	-0.0648***	-0.0545***	-0.0533***	-0.0448***	-0.0455***	-0.0567***
	(0.0332)	(0.0312)	(0.0259)	(0.0233)	(0.0207)	(0.0189)	(0.0165)	(0.0175)	(0.0171)	(0.0159)	(0.0158)	(0.0138)	(0.0116)	(0.0109)	(0.00857)
Obs.	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327
R^2	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.207	0.207	0.207	0.207	0.207	0.207	0.207	0.208

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE C5. Effect of Decreasing Migration Cost on Assimilation Outcomes: Interactive Task. Placebo year cutoffs. Poisson Pseudo Maximum Likelihood Model.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	1840	1842	1844	1846	1848	1850	1852	1854	1856	1858	1862	1864	1866	1868	1870
Arrived after	0.0163	-0.0540	-0.0416	-0.0232	-0.0726	-0.0588	-0.0509	-0.0885	-0.0840	-0.0969	-0.0817	-0.0825	-0.0626	-0.0637	-0.102**
	(0.0822)	(0.0804)	(0.0660)	(0.0610)	(0.0619)	(0.0561)	(0.0565)	(0.0666)	(0.0702)	(0.0701)	(0.0708)	(0.0666)	(0.0576)	(0.0571)	(0.0500)
Obs.	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327
Pseudo R^2	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110
PPML % effect	1.64	-5.26	-4.08	-2.30	-7.00	-5.71	-4.96	-8.47	-8.06	-9.24	-7.85	-7.92	-6.07	-6.17	-9.66

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE C6. Effect of Decreasing Migration Cost on Assimilation Outcomes: Abstract Task. Placebo year cutoffs. Linear Probability Model.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	1840	1842	1844	1846	1848	1850	1852	1854	1856	1858	1862	1864	1866	1868	1870
Arrived after	-0.0374*	-0.0437**	-0.0430***	-0.0312**	-0.0466***	-0.0416***	-0.0383***	-0.0456***	-0.0439***	-0.0454***	-0.0375***	-0.0369***	-0.0314***	-0.0320***	-0.0380***
	(0.0187)	(0.0163)	(0.0147)	(0.0128)	(0.0114)	(0.0116)	(0.0100)	(0.00972)	(0.00943)	(0.00872)	(0.00892)	(0.00810)	(0.00698)	(0.00637)	(0.00538)
Obs.	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327
R^2	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.201	0.201	0.201	0.201	0.201	0.201	0.201	0.202

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE C7. Effect of Decreasing Migration Cost on Assimilation Outcomes: Abstract Task. Placebo year cutoffs. Poisson Pseudo Maximum Likelihood Model

	(1) 1840	(2) 1842	(3) 1844	(4) 1846	(5) 1848	(6) 1850	(7) 1852	(8) 1854	(9) 1856	(10) 1858	(11) 1862	(12) 1864	(13) 1866	(14) 1868	(15) 1870
Arrived after	-0.0637	-0.0935**	-0.0890**	-0.0668*	-0.106***	-0.1000***	-0.0968***	-0.117***	-0.113***	-0.117***	-0.0998***	-0.0995***	-0.0850***	-0.0865***	-0.105***
	(0.0493)	(0.0448)	(0.0410)	(0.0367)	(0.0357)	(0.0357)	(0.0331)	(0.0342)	(0.0345)	(0.0334)	(0.0336)	(0.0316)	(0.0267)	(0.0249)	(0.0201)
Obs.	141,327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327	141327
Pseudo R^2	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
PPML % effect	-6.17	-8.93	-8.52	-6.46	-10.09	-9.52	-9.23	-11.03	-10.67	-11.05	-9.50	-9.47	-8.15	-8.28	-9.95

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE C8. Effect of Decreasing Migration Cost on Assimilation Outcomes: Speak English. Placebo year cutoffs. Linear Probability Model.

	(1) 1840	(2) 1842	(3) 1844	(4) 1846	(5) 1848	(6) 1850	(7) 1852	(8) 1854	(9) 1856	(10) 1858	(11) 1862	(12) 1864	(13) 1866	(14) 1868	(15) 1870
Arrived after	0.0445***	0.0388***	0.0423***	0.0432***	0.0391***	0.0350***	0.0330***	0.0304***	0.0300***	0.0323***	0.0311***	0.0322***	0.0319***	0.0328***	0.0341***
	(0.0137)	(0.0110)	(0.00978)	(0.00894)	(0.00868)	(0.00822)	(0.00751)	(0.00790)	(0.00837)	(0.00762)	(0.00830)	(0.00809)	(0.00812)	(0.00746)	(0.00696)
Obs.	226,288	226,288	226,288	226,288	226,288	226,288	226,288	226288	226288	226288	226,288	226,288	226,288	226,288	226,288
R^2	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289	0.289

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE C9. Effect of Decreasing Migration Cost on Assimilation Outcomes: citizenship. Placebo year cutoffs. Linear Probability Model.

	(1) 1840	(2) 1842	(3) 1844	(4) 1846	(5) 1848	(6) 1850	(7) 1852	(8) 1854	(9) 1856	(10) 1858	(11) 1862	(12) 1864	(13) 1866	(14) 1868	(15) 1870
Arrived after	0.173***	0.173***	0.174***	0.165***	0.158***	0.150***	0.148***	0.145***	0.148***	0.153***	0.157***	0.158***	0.155***	0.150***	0.144***
	(0.0218)	(0.0171)	(0.0171)	(0.0161)	(0.0144)	(0.0127)	(0.0118)	(0.0120)	(0.0123)	(0.0121)	(0.0117)	(0.0111)	(0.0107)	(0.00933)	(0.00938)
Obs.	281326	281326	281326	281326	281326	281326	281326	281326	281326	281326	281326	281326	281326	281326	281326
R^2	0.417	0.418	0.418	0.418	0.418	0.419	0.419	0.420	0.420	0.421	0.422	0.422	0.422	0.422	0.422

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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