Shame, Guilt, and Motivated Self-Confidence[*]

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Abstract

The available evidence from anthropology, economics, and psychology suggests that sensitivity to the emotions of shame and guilt varies across cultures. So does (over)confidence in ability and skills. Is there a connection between these observations? We address this question theoretically and empirically. We find significant evidence, consistent with our model, of a negative relationship between the cultural importance of shame relative to guilt and individual confidence. The relationship holds across countries, and for U.S. immigrants relative to their culture of origin.

Keywords: Self-confidence, shame, guilt, cultural transmission, motivated beliefs

JEL Classification: Z1; D03; D83

1   Introduction

Standard economic analysis of externalities largely focuses on the role of financial incentives: taxes, subsidies, and/or regulation enforced through penalties for non-compliance. Yet many decisions in the presence of externalities are also influenced by psychological variables, acting as psychological incentive mechanisms. Shame and guilt, known as the "social emotions" or "moral emotions", clearly play such an incentive role: The anticipation of guilt or shame can be a powerful factor deterring some actions, while encouraging others, across a wide variety of contexts—from climate change to health-related behaviors.[1] Another psychological variable, self-confidence, also affects a wide range of decisions.[2] The incentive role of self-confidence can be illustrated through a simple example: Consider a decision-maker weighing up whether to embark on a demanding, ambitious project that could generate large positive externalities. Everything else held equal, the project is more likely to be undertaken if the decision-maker feels more confident in their ability to complete the project successfully. The incentive role of, say, shame, can also be illustrated by reference to this simple example: The decision-maker is more likely to embark on the project if choosing an alternative, easier option, with few if any potential positive externalities, would incur significant social disapproval.

Psychological variables are not policy instruments, but understanding how they emerge, interact and affect economic decisions is crucial for understanding behavior and for policy design. A large body of evidence from anthropology, psychology, and economics suggests that the relative importance of shame and guilt varies considerably across societies, and that cultural transmission plays a role in these differences. Self-confidence also exhibits significant variation across cultures.

Is there a connection between these findings, and if so, why and what are the economic implications? We address these questions theoretically and empirically. We build a simple model in which children can be socialized to become more (or less) sensitive to the harm they inflict on others (*guilt*) and/or to social disapproval of their actions (*shame*). We refer to this socialization as "cultural inputs" from the previous generation, representing the effect of parenting practices, cultural narratives and institutions (e.g., schools, media). Young, socialized individuals can influence their future self-confidence through selective attention, creative interpretation, and selective memory of the information they receive, as in the intra-personal recall game developed by Bénabou and Tirole (2002). In the future, they will face an investment decision, choosing between projects that differ in terms of externalities and observability by others.

In the model, the older generation chooses the cultural inputs to transmit to the young, taking into account the intrapersonal recall game each young individual

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[1]Recent examples that attracted media attention include flight shaming in the context of climate change (see, e.g., "Greta Thunberg popularized flight shaming. Now airlines are worried", Los Angeles Times, February 7, 2020), and the introduction of social distancing ambassadors who walk around public spaces reminding people that their behavior is being observed, but cannot issue fines or enforce compliance (see, e.g. "Singapore's Red Ants are here to remind (and occasionally shame) you about mask-wearing", Los Angeles Times, November 19, 2020).

[2]See, for example, Malmendier and Tate (2005, 2008) for evidence concerning the impact of overconfidence on corporate investment decisions and acquisitions.

will subsequently play, which may generate overconfidence. We focus on the socially optimal cultural transmission by the older generation, since we are interested in the costs and benefits for society of different psychological incentive mechanisms.[3]

Our main results depend on the degree of individuals' present bias. With low present bias, there are two possible equilibria: one in which shame plays no role, and one in which sensitivity to shame induces everyone to invest in "good" projects (associated with positive externalities). There is no overconfidence in equilibrium. With higher present bias, there are again two possible equilibria: one with high sensitivity to shame and no overconfidence, the other with overconfidence and low sensitivity to shame. Thus overconfidence and shame emerge as substitute incentive mechanisms in equilibrium. In all equilibria, sensitivity to guilt plays the same role in deterring "bad" behavior for which individuals can hide their responsibility from public view.

Irrespective of present bias, equilibria with shame induce conformity in observable behavior, correcting the tendency to underinvest in "good" projects. However, the private costs of conforming are unequally distributed, and shame can also induce inefficient investment by individuals with high private costs - an overinvestment problem. The equilibrium with overconfidence and low sensitivity to shame can provide a better balance between potential underinvestment and overinvestment for intermediate values of positive externalities. For larger values of these externalities, high sensitivity to shame is preferred.

Our theoretical results imply a negative relationship between the cultural importance of shame relative to guilt and the prevalence of overconfidence. Moreover, as long as at least part of the population is not fully sophisticated in terms of Bayesian updating, this entails a *negative* relationship between the *cultural* importance of *shame* relative to guilt and average *self-confidence*. Investigating this relationship empirically is challenging: It is difficult to capture the cultural importance of the social emotions, shame and guilt. Drawing on recent studies on measuring emotions and values using textual data, we are able to quantify the importance of shame and guilt with both contemporary web search data and historical folklore data. We follow Stephens-Davidowitz (2014) in using measures based on keyword search intensities from Google Trends, building on earlier work by anthropologists that analyzed the frequency of keyword use in field interviews (e.g., Fessler, 2004). Enke (2019) obtains broadly similar results using measures based on Google search intensities and measures from surveys conducted by psychologists, offering further support for this method. Furthermore, we follow Michalopoulos and Xue (2021) to look up occurrences of shame and guilt in historical folklore, which complements the web search measure and supports the model assumption of cultural transmission.

Our empirical analysis uses two approaches. First, we conduct a *cross-country* analysis with a large sample of online respondents. The predicted *negative* relationship appears to hold. Second, we study data on U.S. immigrants from NLSY79. This has the advantage of being a longitudinal data set with a nationally representative

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[3]We leave for future work the analysis of different channels of cultural transmission, including socialization effort by parents (e.g. Bisin, and Verdier, 2000, 2001; Bisin, Topa, and Verdier, 2004; Tabellini, 2008), diffusion of cultural narratives (e.g. Bénabou, Falk, and Tirole, 2018), institution building through the political process, and the role of the media.

sample of individuals, interviewed regularly by the U.S. Bureau of Labor Statistics, and offering additional control variables for our analysis. Our empirical strategy here relies on the persistence of cultural influences. We find that the importance of *shame relative to guilt in the culture of origin* has the predicted *negative* effect on the *individual self-confidence* of immigrants, suggesting a causal effect. The negative effect remains significant and of similar magnitude when we control for self-confidence 8 years earlier (measured in a previous wave of the NLSY79), lending support to the endogenous belief mechanism in our model.

Finally, we ask whether our model can shed light on the historical emergence of different cultures with respect to shame, guilt, and overconfidence. Our analysis shows that the equilibrium with high sensitivity to shame and low overconfidence is more likely to emerge when the social externalities associated with "good" projects are larger. We argue that in pre-industrial societies, the magnitude of these externalities was, on average, positively related to dependence on agriculture, relative to dependence on hunting and gathering.

We therefore hypothesize a positive relationship between the importance of shame relative to guilt in a society, and the degree of dependence on agriculture in the society's pre-industrial past. Using historical data from the Ethnographic Atlas, we test and find support for this hypothesis.

The remainder of the paper is organized as follows. We complete this section by briefly reviewing the literature on shame, guilt, and overconfidence, paying particular attention to the evidence on differences across cultures and countries. Section 2 introduces the baseline model, then discusses the concepts of guilt and shame and how to model them. Section 3 analyzes the baseline model in the absence of shame. Section 4 incorporates the role of shame into the analysis. Section 5 describes our data, followed by the empirical results in Section 6. Section 7 concludes. Most of the proofs are relegated to Appendix A.

1.1 Literature review

Our approach to the theoretical analysis of overconfidence belongs to a growing literature on motivated cognition in economics[4]. Within this literature, the closest paper to ours is Bénabou and Tirole (2002): They were the first to provide a rationale for overconfidence as a cognitive mechanism to alleviate under-investment in the presence of time-inconsistent preferences. We build on their work by introducing social externalities[5] and the moral emotions, shame and guilt.

These emotions have attracted considerable attention in the literature on social

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[4]See, among others, Carrillo and Mariotti (2000), Bénabou and Tirole (2002, 2006, 2011, 2016), Brunnermeier and Parker (2005), Eil and Rao (2011), Burks et al. (2013), Oster, Shoulson, and Dorsey (2013), Li (2013), Möbius et al. (forthcoming), Dessí and Zhao (2018), Engelmann et al. (2019), Hong, Huang, and Zhao (2019), Saucet and Villeval (2019), Schwardmann and Van der Weele (2019), Banerjee, Gupta, and Villeval (2020), Chew, Huang, and Zhao (2020), Zimmermann (2020), Huang, Wang, and Zhao (2021), Hagenbach and Koessler (2022), and Huffman, Raymond, and Shvets (forthcoming).

[5]This also relates our work to Dessí (2008), who studies the intergenerational transmission of memory affecting cultural confidence, in the presence of externalities from individuals' cultural investments.

image concerns and psychological game theory[6] (e.g., Bénabou and Tirole, 2006; Battigalli and Dufwenberg, 2007; Tadelis, 2011,). In this literature, individuals' sensitivities to guilt or image concerns are captured by exogenous parameters. Our paper endogenizes these sensitivities at the cultural level and can therefore be viewed as complementary to this body of work. There is, moreover, a link with the literature on the functional value of emotions (see, for example, the work by Coricelli and Rustichini, 2010, on envy and regret), as we model the functional value of the social emotions, shame and guilt.

Our focus on exploring the causes of differences in cognition and emotions across countries and cultures also relates our work to two recent papers. Dessí and Zhao (2018) develop a model of motivated cognition to examine the conditions for overconfidence to emerge in equilibrium in dynamic versus stable environments. Empirically, they find a positive relationship between self-confidence and dynamism, using cross-country and cross-sectional data. They do not examine the role of shame and guilt. Enke (2019) explores the role of guilt as a universal internalized moral value, and shame as a communal moral value. Empirically, he finds a positive relationship between shame relative to guilt, at the country/language level, and ancestral kinship tightness. He does not study self-confidence or motivated beliefs. Our paper builds on these recent papers by integrating motivated beliefs and the moral emotions into a unified framework, investigating the relationship between them theoretically and empirically.

Our interest in exploring the causes of differences in cognition and emotions across individuals and cultures is largely motivated by the related literature in psychology and anthropology. A number of studies in psychology have focused on comparing North American and East Asian countries, finding that the distribution of self-esteem scores is much more skewed towards high self-esteem in the former, and mechanisms that allow overconfidence to persist (e.g., selective attention and memory, attribution bias) are more widespread.[7] Schmitt and Allik (2005) investigate average self-confidence for a much larger sample of countries, corroborating earlier evidence of higher self-confidence in North America relative to East Asia, and identifying additional differences across countries. The evidence on variation in average self-confidence and in the mechanisms underlying overconfidence is summarized in Dessí and Zhao (2018).

Anthropologists and psychologists have similarly documented substantial differences in the importance of shame and guilt across countries and cultures (e.g., Wallbott and Scherer, 1995; Fessler, 2004, 2007).[8] In economics, Enke (2019) provides evidence of significant differences in shame relative to guilt across a broad set of countries. Anthropologists and psychologists have also investigated the role played by families in sustaining these cultural differences. For example, Miller, Fung, and Mintz (1996) studied parental practices in American families in Chicago and Chinese families in Taipei. They found that American parents put considerably more emphasis on protecting their children's *self-esteem* than Chinese parents. In contrast, Chinese

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[6] See Battigalli and Dufwenberg (forthcoming) for an excellent review.

[7] See Heine et al. (1999), as well as Heine and Hamamura (2007), for reviews and discussions.

[8] See also, among others, Creighton (1990), Crystal et al. (2001), Doi (1973), Johnson (1992), and Lebra (1983). In an influential early work, Benedict (1946) emphasized the importance of shame in Japanese culture.

parents put more emphasis on inducing *shame* and *self-criticism* following behavioral transgressions. Similar differences have emerged in studies comparing American and Japanese parenting practices[9].

2   Baseline Model

Our model modifies the one introduced by Bénabou and Tirole (2002) to allow for externalities and cultural transmission of sensitivities to guilt and shame. It has two periods and three dates, $t = 0, 1, 2$. At the beginning of the first period ($t = 0$), each young individual receives a "cultural input" from the previous generation, discussed in detail below. At this stage, young individuals are indistinguishable. Following cultural transmission, individuals (privately) receive a signal informative about their ability/skill, θ. They choose their interpretation and recall strategy. At $t = 1$ individuals update their beliefs about their ability. They face a project investment decision, whose outcome will be realized at $t = 2$.[10]

2.1   Project investment decision

At $t = 1$ each individual faces a project investment choice. She chooses between investing in a "good" project, investing in a "bad" project, and no investment.

The good project will yield a personal benefit $V > 0$ and a non-negative social externality of value $E \geqslant 0$ if it succeeds at $t = 2$; If it fails, the private payoff and the externality will be zero. The probability of success depends on the individual's ability: For simplicity, it is equal to $\theta \in [0, \theta^{\max}]$, where $0 < \theta^{\max} < 1$. Investing in the good project entails a personal cost c. If the individual does not invest in any project, the personal cost, personal benefit, and externality are all equal to zero. Finally, if she invests in the bad project she obtains a personal benefit $Z > V$, and generates a social externality $-D$, ($D > 0$). We focus throughout on the more interesting case where $Z - D < 0$; Thus, it is always socially inefficient to invest in the bad project.

We assume, for simplicity, that investment in the good project is observed by others. Our results would also hold if investment in the good project is not observed by others directly, but can be credibly revealed to them by the individual. We will treat both possibilities equivalently when discussing the interpretation and implications of the results. We further assume that the choice between investment in the bad project and no investment is made privately. While in practice some investments in bad projects may be observable, many will not: We focus on these as individuals will have no incentive to reveal them publicly. For example, an individual investing in education, training, a new job or new business with potential positive externalities, has every incentive to make information about these investments observable by others. However, someone pursuing personal gain in a way that is detrimental to public health or the environment (negative externalities) will typically conceal this whenever possible. Similarly, researchers working on projects that, if successful, are expected to

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[9]See Weisz, Rothbaum, and Blackburn (1984), Winata and Power (1989), Lewis (1996), and Zahn-Waxler et al. (1996).

[10]They will then participate in cultural transmission to the subsequent generation of young individuals.

generate a new cure or vaccine will make these projects visible to others, but people producing malware or engaging in fraud will not disclose their activities.

2.2 Preferences

We allow for time-inconsistent preferences by assuming that individuals at $t = 1$ discount expected payoffs at $t = 2$ with a discount factor equal to $\beta\delta$, where δ is the normal discount rate, while $\beta < 1$ corresponds to quasi-hyperbolic discounting. In this case, individuals give an "excessive" weight to the present.[11] For simplicity, we assume that individuals are risk neutral.

2.3 Information and beliefs

At $t = 0$ each individual receives a signal s concerning her ability θ. For simplicity, we focus on the case where s can take just two values: $s = B$ ("bad" signal) and $s = \varnothing$ (no signal). Prior beliefs concerning the signal are described by the probability q; that is, $s = \varnothing$ with probability q and $s = B$ with probability $1 - q$. We can think of q as the proportion of higher-ability individuals in the population. The expected value of θ, conditional on each possible realization of the true signal s, is given by

$$\theta_L = E[\theta|s = B] < \theta_H = E[\theta|s = \varnothing].$$

As in Bénabou and Tirole (2002), we will analyze the intra-personal game between the individual at $t = 0$ ("self-0") and the individual at $t = 1$ ("self-1"). Self-0 can influence self-1's beliefs through the signal, $\hat{s}$, that she chooses to transmit: We can think of this transmission as (endogenous) memory. Given our assumptions, if the true signal is $s = \varnothing$, there is no opportunity for signal manipulation; thus $\hat{s} = \varnothing$. On the other hand, if the true signal is $s = B$, self-0 may either communicate the signal truthfully to self-1 ($\hat{s} = B$), or she may decide to suppress the bad signal ($\hat{s} = \varnothing$). At date 1, self-1 updates her beliefs about θ. At this date, before making her investment decision, self-1 privately learns her cost c. At date 0, the cost c is known to be uniformly distributed over the interval $[c_L, c_H]$. To make the analysis interesting, we assume that: $c_H > \delta\theta_H(V + E) > \beta\delta\theta_H V > \beta\delta\theta_L V > c_L$.

Self-0 chooses the recall strategy, that is, the probability that the bad signal will be recalled by self-1:

$$h = \Pr[\hat{s} = B|s = B].$$

We denote by h^* the beliefs held by self-1 concerning self-0's strategy.

2.4 Guilt and shame

We begin this subsection by discussing the notions of guilt and shame, and related evidence, that will inform our modeling choices.

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[11]See Strotz (1955) and Laibson (1997). Imai, Rutter, and Camerer (2021) provide a meta-analysis of present-bias estimates obtained using the Convex Time Budget protocol (Andreoni and Sprenger, 2012).

2.4.1 Guilt and shame: Concepts

Guilt   Our focus is on *interpersonal guilt*, i.e. guilt associated with *causing harm to others*, following Baumeister, Stillwell, and Heatherton (1994): "the prototypical cause of guilt would be the infliction of harm, loss, or distress on a relationship partner. Although guilt may begin with close relationships, it is not confined to them, guilt proneness may become generalized to other relationships... In particular, a well-socialized individual would presumably have learned to feel guilty over inflicting harm to even a stranger". This view highlights the importance of socialization, which will be captured by "cultural inputs" in our analysis below. However, there are limits to the effectiveness of guilt: Baumeister et al. (1994) describe a variety of strategies used by people to reduce their feelings of guilt[12].

Shame   Individuals tend to experience feelings of shame when they behave in ways that others disapprove of. The close connection between feelings of shame and social disapproval has been investigated in a recent experiment by Sznycer et al. (2016). In their study, the same set of 29 shame-evoking scenarios are shown to participants for evaluation. Each participant is assigned to one of two conditions: the "audience"condition, as audience in the scenarios, and the "shame"condition, as the shamed person in the scenarios.[13] The study finds that reported shame feelings in the shame condition are highly correlated with corresponding negative evaluations in the audience condition. Moreover, cross-country evidence shows that, while evaluations differ between local and foreign audiences, shame intensities are found to be correlated with the former, not the latter.

Thus shame is both universal (in all countries, there are situations that evoke feelings of shame), and culture-specific (there are situations that elicit greater social disapproval, and corresponding feelings of shame, in some countries than in others). As with guilt, people employ a variety of strategies to reduce their feelings of shame. However, a key difference is that individuals cannot manipulate as easily the disapproval of others as their own guilt feelings: For example, excuses and attempts to minimize the consequences of one's actions can be very unconvincing to external observers.

2.4.2 Modeling shame and guilt

We model guilt and shame as simply as possible, taking into account the evidence discussed above.

We assume that guilt imposes a cost on individuals who exert negative externalities on others, proportional to the magnitude of those externalities. Thus someone who has invested in the bad project and is able to enjoy the personal benefit Z will also incur a guilt cost λD, where λ represents the sensitivity to guilt and D the magnitude

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[12]These include reducing fellow feeling with one's victims (e.g., by dehumanizing them), minimizing the consequences of one's actions, and making excuses.

[13]Participants in the audience condition are asked to "indicate how you would view [someone of your same sex and age] if they were in those situations", on a scale ranging from 1 (I wouldn't view them negatively at all) to 7 (I'd view them very negatively). Participants in the shame condition are asked to "indicate how much shame you would feel if you were in those situations", on a scale ranging from 1 (no shame at all) to 7 (a lot of shame).

of negative externalities. Since we are interested in the cultural transmission of guilt and shame, we will abstract from individual differences in the innate propensity to feel guilt (as well as shame, see below), and focus on the role of of culture in fostering (or not) sensitivity to guilt (and shame), through parenting practices, cultural narratives, and a variety of institutions. We therefore assume that λ is a cultural input from the previous generation, determined at $t = 0$.

What about shame? As the evidence discussed earlier highlights, shame is strongly linked to social disapproval of a person's behavior. We model this by assuming that society, by fostering sensitivity to shame and disapproval of specific, observable behaviors, can impose a shame cost on individuals who adopt those behaviors. Specifically, society can impose a shame cost S on individuals who decide not to invest in the good project. Imagine, for example, that an existing widely used technology is found to have a harmful impact on the environment, while a new technology that can potentially replace it is more benign towards the environment. Social disapproval of those who do not invest in the new technology could have a powerful effect on adoption decisions, if people are sufficiently sensitive to shame. Social disapproval may well be combined with various forms of sanction towards those who deviate from approved behavior (e.g., reduced willingness to cooperate, exclusion). For simplicity, we include these potential practical costs in S, together with the purely psychological cost of feeling shame.

3 Guilt, no shame

We begin by considering the case without shame, as a benchmark; We will introduce shame in the next section. We allow for the possibility of guilt. The baseline model is solved starting with the behavior of self-1, followed by self-0's optimal strategy.

3.1 Self-1 belief updating and behavior

Consider self-1's decisions at date 1, in the light of the information available to her. Self-1 has to form expectations over her ability θ. In doing so, she will take into account the possibility that self-0 may have suppressed the true signal s. When $\hat{s} = B$, clearly there has been no suppression; Self-1 will therefore have a revised belief $\theta(r^*) = \theta_L$. When $\hat{s} = \varnothing$, self-1 estimates the following probability that the signal is accurate (the signal's "reliability"):

$$r^*(\gamma) = \Pr[s = \varnothing | \hat{s} = \varnothing; h^*] = \frac{q}{q + \gamma(1 - q)(1 - h^*)}$$

where $\gamma \in [0, 1]$ represents the degree of Bayesian rationality (e.g., for fully sophisticated, perfect Bayesian individuals, $\gamma = 1$). Revised beliefs are given by

$$\theta^* = \theta(r^*) = r^*\theta_H + (1 - r^*)\theta_L.$$

Given the revised belief θ^*, self-1 will invest in the good project if and only if

$$\beta\delta\theta^* V - c \geqslant \max[0, Z - \lambda D].$$

She will invest in the bad project if and only if

$$Z - \lambda D > \max[0, \beta \delta \theta^* V - c].$$

Finally, she will not invest if and only if

$$\beta \delta \theta^* V - c < 0 \text{ and } Z - \lambda D \leqslant 0.$$

3.2   Self-0 strategy

There are two cases to consider, depending on the value of λ.

   Case 1: $Z - \lambda D \leqslant 0$.

   In this case, self-1 will never invest in the bad project.

   When $s = B$, self-0 has to choose her recall strategy, h. If she transmits the signal accurately to self-1 ($\hat{s} = B$), her expected utility (ignoring discounting between date 0 and date 1 in what follows for simplicity) is given by

$$U_T \equiv \int_{c_L}^{\beta \delta \theta_L V} \{\delta \theta_L V - c\} f dc,$$

where the subscript T stands for "truth". If on the other hand self-0 suppresses the bad signal ($\hat{s} = \varnothing$), her expected utility depends on self-1's beliefs about the reliability of the signal, r^*, and is given by

$$U_S \equiv \int_{c_L}^{\beta \delta \theta(r^*) V} \{\delta \theta_L V - c\} f dc,$$

where the subscript S stands for "suppression". The net gain from suppressing the bad signal is therefore equal to

$$X(r^*, \beta) \equiv \int_{\beta \delta \theta_L V}^{\beta \delta \theta(r^*) V} \{\delta \theta_L V - c\} f dc.$$

   The following result characterizes the set of equilibria for this case.

Lemma 1 *Assume $\lambda \geqslant \frac{Z}{D}$. Self-1 will choose between non-investment and investment in the good project. In the signaling game between self-0 and self-1, there exist two threshold values, β_H and β_L (with $\beta_H > \beta_L$), such that: (i) If $\beta > \beta_H$, there is a unique PBE with $h^* = 1$; (ii) If $\beta < \beta_L$, there is a unique PBE with $h^* = 0$; (iii) Otherwise, there are three PBEs: the two pure-strategy equilibria with $h^* = 1$ and $h^* = 0$, and a mixed-strategy equilibrium.*

   Case 2: $Z - \lambda D > 0$.

   In this case, self-1 will always invest.

   For expositional convenience, let $K = Z - \lambda D$. Once again, when $s = B$, self-0 has to choose her recall strategy, h. Clearly, if $\delta \theta_L V - c_L \leqslant K$, self-0 will always prefer self-1 to invest in the bad project. In this case, she will always choose accurate

recall. Now suppose that $\delta\theta_L V - c_L > K$. If self-0 transmits the signal accurately to self-1 ($\hat{s} = B$), her expected utility is given by

$$U_T \equiv \int_{c_L}^{\max[\beta\delta\theta_L V - K, c_L]} \{\delta\theta_L V - c\} f dc + \int_{\max[\beta\delta\theta_L V - K, c_L]}^{c_H} K f dc,$$

while if she suppresses the bad signal ($\hat{s} = \varnothing$), her expected utility is given by

$$U_S \equiv \int_{c_L}^{\max[\beta\delta\theta(r^*)V - K, c_L]} \{\delta\theta_L V - c\} f dc + \int_{\max[\beta\delta\theta(r^*)V - K, c_L]}^{c_H} K f dc.$$

The net gain from suppressing the bad signal is therefore equal to

$$X(r^*, \beta) \equiv \int_{\max[\beta\delta\theta_L V - K, c_L]}^{\max[\beta\delta\theta(r^*)V - K, c_L]} \{\delta\theta_L V - K - c\} f dc.$$

The following result characterizes the set of equilibria for this case.

Lemma 2 *Assume $\lambda < \frac{Z}{D}$. Self-1 will choose between the good project and the bad project. In the signaling game between self-0 and self-1, there is a unique PBE with $h^* = 1$ if $c_L \geqslant \min[\delta\theta_L V - K, \beta\delta\theta_H V - K]$. Otherwise, there exist two threshold values, β'_H and β'_L (with $\beta'_H > \beta'_L$), such that: (i) If $\beta > \beta'_H$, there is a unique PBE with $h^* = 1$; (ii) If $\beta < \beta'_L$, there is a unique PBE with $h^* = 0$; (iii) If $\beta \in [\beta'_L, \beta'_H]$, there are three PBEs: the two pure-strategy equilibria with $h^* = 1$ and $h^* = 0$, and a mixed-strategy equilibrium.*

Discussion

In the absence of shame, our model yields the following implications.

(1) It is socially optimal to foster sensitivity to guilt, in order to induce individuals never to choose the bad project. This can be achieved if the sensitivity to guilt is at least equal to a threshold level $\lambda^* = \frac{Z}{D}$. When this is the case, individuals will choose between non-investment and investment in the good project, and incur no psychological cost of guilt in equilibrium.

Implicitly, we are assuming here that there is no cost to fostering sensitivity to guilt; otherwise, the benefits just highlighted will need to be compared to the costs. There are obviously costs associated with producing and communicating cultural narratives, just as there are costs associated with parental time and effort. However, it may be argued that these costs will need to be incurred in any case to ensure effective intergenerational cultural transmission and the socialization of children; in other words, they are unlikely to vary significantly between societies depending on the extent to which they foster sensitivity to guilt. Since our focus is on comparisons between societies on this dimension (as well as sensitivity to shame, see below), we can simplify the discussion by abstracting from such costs.

(2) Irrespective of guilt, overconfidence will generally emerge in equilibrium when present bias is sufficiently important[14]. As long as individuals possess some degree of

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[14]There are two exceptions, as shown in Lemma 2, which occur when guilt sensitivity is below the threshold level λ^*. First, it is possible for the net benefit from investing in the bad project to be so great that the bad project is preferred by self-0 for all possible realizations of the cost c. Then self-0 has no reason to suppress bad signals. Second, it is possible that, although self-0 would prefer to increase the probability of investment in the good project by self-1, suppression of the bad signal would not achieve that, irrespective of the beliefs held by self-1 over the recall strategy chosen by self-0.

Bayesian rationality ($\gamma > 0$), underconfidence will emerge too. Specifically, in equilibria with suppression of bad signals, the lower-ability individuals (θ_L) will overestimate their ability, while the remainder (θ_H) will underestimate theirs. If all individuals are fully Bayesian ($\gamma = 1$), the average (mean) belief will be the same as in equilibria with accurate recall. However, any departure from full Bayesian updating ($\gamma < 1$) will be associated with a higher average belief.

4 Shame

We now introduce the possibility of shame.

We assume that failure to invest in the good project can be sanctioned by social disapproval. By fostering sensitivity to shame and disapproving of individuals who do not invest in the good project, society can inflict on them a cost S. We can think of the cost as sensitivity to shame multiplied by the intensity of social disapproval for the specific behavior. Since society affects both components (sensitivity to shame, and behavior-specific disapproval), it is sufficient for our purposes to focus on S, treating it as a cultural input from the previous generation, determined at $t = 0$, as we did for λ, the sensitivity to guilt, in the previous section.

Is it socially optimal to set $S > 0$? To study this question, we need first of all to derive equilibrium behavior in the presence of a shame cost S. We do this under the assumption that individuals will not invest in the bad project, because of guilt ($\lambda \geqslant \lambda^*$)[15]. We will then investigate the socially optimal choice of S at $t = 0$.

4.1 Self-1 behavior

Self-1 will now choose between investing in the good project and not investing, given the shame cost S. She will invest in the good project if, and only if

$$\beta\delta\theta^* V - c \geqslant -S.$$

4.2 Self-0 strategy

When $s = B$, self-0 has to choose her recall strategy, h. If she transmits the signal accurately to self-1 ($\hat{s} = B$), her expected utility is given by

$$U_T \equiv \int_{c_L}^{\min[\beta\delta\theta_L V + S, c_H]} \{\delta\theta_L V - c\} f dc - \int_{\min[\beta\delta\theta_L V + S, c_H]}^{c_H} S f dc,$$

while if she suppresses the bad signal ($\hat{s} = \varnothing$), her expected utility is given by

$$U_S \equiv \int_{c_L}^{\min[\beta\delta\theta(r^*)V + S, c_H]} \{\delta\theta_L V - c\} f dc - \int_{\min[\beta\delta\theta(r^*)V + S, c_H]}^{c_H} S f dc.$$

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[15]Recall that we are focusing on the more interesting case where individuals can keep decisions to invest in a bad project private - thus social disapproval cannot be used to deter them. If we assumed instead that all bad project investment decisions are observable, we could allow for an additional shame cost S', incurred when the bad project is chosen.This could substitute for guilt in deterring bad project investments, without affecting the other results in this section.

The net gain from suppressing the bad signal is therefore equal to

$$X(r^*, \beta) \equiv \int_{\min[\beta\delta\theta_L V + S, c_H]}^{\min[\beta\delta\theta(r^*)V + S, c_H]} \{\delta\theta_L V + S - c\} f dc.$$

Equilibrium behavior will depend on the cost of shame. Define the following threshold values: $S^* \equiv c_H - \beta\delta\theta(r^*)V$, and $S' \equiv c_H - \beta\delta\theta_L V$. The following result describes the set of Perfect Bayesian equilibria of the signaling game between self-0 and self-1.

Lemma 3 *(1) Let society impose a fixed cost of shame $S \leqslant S^*$ on individuals who decide not to invest in the good project. Within this range, irrespective of the magnitude of S, the set of Perfect Bayesian equilibria of the signaling game between self-0 and self-1 is the same as in the absence of shame, described by Lemma 1. (2) For $S \geqslant S'$, there is a unique equilibrium with truthful transmission. (3) For $S' > S > S^*$, there exists a threshold value, β', such that: (i) If $\beta \geqslant \beta'$, there is a unique PBE with $h^* = 1$; (ii) If $\beta < \beta'$, there is a unique PBE with $h^* = 0$*

4.3 How much shame?

What is the socially optimal choice of S at $t = 0$? We will study two cases, to see how the answer depends on the degree of present bias: First, the case where present bias is low and there is truthful transmission in equilibrium; Second, the case with high present bias and suppression of bad signals in equilibrium.

4.3.1 Low present bias

We first consider the case where β is sufficiently high, so that the unique PBE entails truthful transmission of the bad signal by self-0. At $t = 0$, the older generation chooses S for the younger generation, before learning the individual realizations of each personal signal s. We assume that the older generation can commit to the chosen value of S, e.g., through cultural narratives and a variety of institutions.

Formally, the optimal choice corresponds to the choice that maximizes the weighted sum of the expected utility of each type, with the weights given by the probability of each type, but taking also into account any externalities. Thus the problem is to choose S to maximize $W_T^S \equiv qU_T^S(\theta_H) + (1-q)U_T^S(\theta_L)$, where

$$U_T^S(\theta_i) = \int_{c_L}^{\min[\beta\delta\theta_i V + S, c_H]} \{\delta\theta_i(V+E) - c\} f dc - \int_{\min[\beta\delta\theta_i V + S, c_H]}^{c_H} S f dc$$

for $i = H, L$. The following result describes the optimal choice of S and associated equilibria.

Define $\phi_T^S = q \int_{\beta\delta\theta_H V}^{c_H} \{\delta\theta_H(V+E) - c\} dc + (1-q) \int_{\beta\delta\theta_L V}^{c_H} \{\delta\theta_L(V+E) - c\} dc$.

Proposition 1 *(Low present bias) Suppose $\beta \geqslant \max[\beta', \beta_H]$. There are two possible equilibria: (i) If $\phi_T^S > 0$, an equilibrium with $S = c_H - \beta\delta\theta_L V$ and truthful transmission; (ii) If $\phi_T^S \leqslant 0$, an equilibrium with $S = 0$ and truthful transmission.*

Intuition for the result can be obtained by writing ϕ_T^S as follows:

$$\phi_T^S = q[\int_{\beta\delta\theta_H V}^{\delta\theta_H(V+E)} \{\delta\theta_H(V+E) - c\}dc + \int_{\delta\theta_H(V+E)}^{c_H} \{\delta\theta_H(V+E) - c\}dc]$$
$$+ (1-q)[\int_{\beta\delta\theta_L V}^{\delta\theta_L(V+E)} \{\delta\theta_L(V+E) - c\}dc + \int_{\delta\theta_L(V+E)}^{c_H} \{\delta\theta_L(V+E) - c\}dc].$$

The two terms in the expression multiplied by q represent the welfare consequences of the effect of shame on the behavior of high-ability individuals: The first term is positive, capturing the fact that shame alleviates the under-investment problem associated with present bias ($\beta < 1$) and the presence of positive externalities from the good project (when $E > 0$). The second term is negative, reflecting over-investment when shame induces even individuals with very high realizations of the cost c to invest. The two terms in the expression multiplied by $1 - q$ similarly capture the welfare gain and the welfare loss, respectively, from inducing all low-ability individuals to invest for all realizations of c.

It will be socially optimal to impose a strictly positive cost of shame, equal to $S = c_H - \beta\delta\theta_L V$, if and only if $\phi_T^S > 0$. When this is done, everyone always invests in the good project in equilibrium and nobody incurs the cost of shame. The welfare cost, relative to the case without shame, is due instead to overinvestment, but when $\phi_T^S > 0$ this is more than offset by the welfare gain due to correcting underinvestment.

4.3.2 High present bias

We now turn to the case where β is low enough to yield a unique Perfect Bayesian equilibrium of the signaling game between self-0 and self-1 in which self-0 always suppresses the bad signal, *unless* the cost of shame is set so high that self-1 always invests in the good project, even with beliefs θ_L (i.e. $S = c_H - \beta\delta\theta_L V$). In the latter case, as seen earlier, the unique PBE entails truthful transmission of the signal by self-0. Expected welfare is then equal to W_T^S, evaluated at $S = c_H - \beta\delta\theta_L V$, denoted by $W_T^S(c_H - \beta\delta\theta_L V)$.

The older generation at $t = 0$ maximizes $W_S^S \equiv qU_S^S(\theta_H) + (1-q)U_S^S(\theta_L)$, where

$$U_S^S(\theta_i) = \int_{c_L}^{\min[\beta\delta\bar{\theta} V + S, c_H]} \{\delta\theta_i(V+E) - c\}fdc - \int_{\min[\beta\delta\bar{\theta} V + S, c_H]}^{c_H} Sfdc$$

for $i = H, L$. The following result describes the optimal choice of S and associated equilibria.

Define $\phi_S^S = \int_{\beta\delta\bar{\theta} V}^{c_H} \{\delta\bar{\theta}(V+E) - c\}dc$.

Proposition 2 (High present bias) *Suppose $\beta < \min[\beta', \beta_L]$. There are two possible equilibria: (i) If $\phi_S^S > 0$, an equilibrium with $S = c_H - \beta\delta\theta_L V$ and truthful transmission; (ii) If $\phi_S^S \leqslant 0$, an equilibrium with $S = 0$ and suppression of bad signals.*

As before, intuition for the result can be obtained by writing ϕ_S^S as follows:

$$\phi_S^S = q[\int_{\beta\delta\bar{\theta}V}^{\delta\theta_H(V+E)} \{\delta\theta_H(V+E) - c\}dc + \int_{\delta\theta_H(V+E)}^{c_H} \{\delta\theta_H(V+E) - c\}dc]$$

$$+ (1-q)[\int_{\beta\delta\bar{\theta}V}^{\delta\theta_L(V+E)} \{\delta\theta_L(V+E) - c\}dc + \int_{\delta\theta_L(V+E)}^{c_H} \{\delta\theta_L(V+E) - c\}dc].$$

This expression shows once again the welfare gains and losses associated with reliance on shame, as in the previous section: The difference is that the first integral, representing the gain from correcting underinvestment by high-ability individuals, is now greater, because underinvestment by these individuals is more pronounced in an equilibrium with signal suppression; Conversely, the third integral, representing the gain from correcting underinvestment by low-ability individuals, is now smaller, because underinvestment by these individuals is less pronounced in an equilibrium with signal suppression.

4.4 Empirical implications

Our theoretical analysis shows that when present bias is sufficiently important, there are two possible equilibria (Proposition 2): one with a *high cost of shame* and truthful transmission (*no overconfidence*), and one with *no role for shame* ($S = 0$), and suppression of the bad signal (hence *overconfidence* of lower-ability individuals). Moreover, as long as at least some individuals in the population are less than fully Bayesian, the equilibrium with no role for shame will exhibit *higher average self-confidence*. Guilt, on the other hand, plays the same role in both equilibria.

This suggests the following two hypotheses for our empirical analysis.

Hypothesis 1.1 *In cultures where shame is more important, relative to guilt, overconfidence will be less important, and average self-confidence lower, other things held equal.*

Hypothesis 1.2 *Immigrants from cultures where shame plays a more prominent role, relative to guilt, will tend to exhibit less overconfidence, and lower average self-confidence, other things held equal.*

Moreover, it is clear from Proposition 2 that the equilibrium with a *high cost of shame* and truthful transmission (*no overconfidence*)is more likely to occur, other things held equal, for larger values of E, the positive externalities from the good project. This suggests that societies where these positive externalities were larger, historically, are more likely to have developed cultures giving a prominent role to shame, relative to guilt. We thus have an additional hypothesis concerning the historical emergence of cultural differences in the importance of shame and guilt.

Hypothesis 2 *In societies where the positive social externalities of investment in good projects were higher, historically, shame is more important, relative to guilt.*

These hypotheses are obviously very challenging to test empirically, because of the many potential confounding factors. In the next sections, we make a first attempt at investigating them with currently available data.

5 Data

This section presents how we measure shame, guilt, and self-confidence, and our data sources. We first introduce our measures of shame and guilt, using web search intensities and historical folklore, and then describe our measure of self-confidence, obtained from two sources: a large-scale, cross-sectional survey with participants in many countries, and a longitudinal survey containing information about US immigrants from different countries of origin.

5.1 Measuring shame and guilt

We are interested in the cultural components of sensitivities to shame and guilt, which are very hard to measure. We draw on previous studies and try to quantify the importance of shame and guilt based on textual data, using two different approaches.

5.1.1 Google Trends: Shame and guilt across contemporary countries

To capture the cultural components of shame and guilt, we use the Google search volume of the respective term(s) for "shame" and "guilt" in different languages, for different countries. The search behavior for "shame" or "guilt" reflects how often people across countries and languages think about them (Stephens-Davidowitz, 2014; Enke, 2019). Google Trends provides the relative search intensity of a term for each individual country. Specifically, the search index of a keyword is calculated on a scale from 0 to 100, in which 100 corresponds to the country or territory with the highest keyword search volume as a fraction of its total queries. Thus, it is feasible to compare search behavior across different countries using the same language. To avoid potential bias, Enke (2019) uses languages that are an official language in at least two countries to exploit within-language variation, an approach that we follow.

To improve the selection process of country-language pairs, we first restrict the language set to those that are an official or *de facto* official language[16] in at least two countries, which means that multilingual countries have multiple observations, e.g., Canada appears twice as Canada-English and Canada-French. Here "language" refers to written languages, for search volumes are solely based on search keywords.[17] We access the Unicode Common Locale Data Repository (CLDR) Project[18] for language and territory information, which is mainly based on the *Ethnologue* and per-country census data. Then, starting from the list of translations for "shame" and "guilt" gathered by Jaffe et al. (2015) using Google Translate, we additionally implement the translation–back-translation procedure with Google Translate again to check the precision of the translations. The complete list of translations is provided in Appendix B. Note that the translations only cover nouns. We do not include adjectives

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[16]The *de facto* official languages apply to countries that do not formally designate an official language, such as the United States and Australia.

[17]While some linguistically close languages share words of the same spelling, for example, shame in German and in Dutch both spelled as *schande* (case insensitive), the search intensities of such identically spelled terms in different languages will not be compared in the analysis by design.

[18]See https://cldr.unicode.org/. CLDR is considered reliable and is widely used by operating systems and software for internationalization and localization.

as translating adjectives into certain languages introduces the complication of grammatical gender, which extends the number of translations dramatically, making the queries in Google Trends infeasible.

After inputting the translated terms into Google Trends, we obtain the relative search intensities[19] of the translations of shame and guilt in 14 languages, from January 1, 2011 to December 31, 2015[20]. For each country-language pair, we first take the difference between the search intensity of shame and guilt, and then compute its z-score across countries within each language. Thus, we obtain our Google Trends measure, denoted by Shame − Guilt. The resulting data consists of language-country pairs, measuring shame and guilt at language-country level, where multilingual countries appear more than once, as noted before. We further restrict our sample to one-to-one mappings of countries and languages by keeping only the most widely used language, in terms of the population of speakers, in each multilingual country. We call such languages dominant languages. This dominant-language subsample serves to proxy for the complete list of language-country paris, and is used when matching with data sources in which language information is unavailable.

5.1.2   Folklore: Shame and guilt across historical narratives

We further leverage a novel data set of historical folklore constructed by Michalopoulos and Xue (2021), based on anthropologist and folklorist Yuri Berezkin's lifetime work on folklore, which documents the contents and distributions of 2,564 traditional narratives, or *motifs*[21], across 958 ethnic groups around the world, to measure the sensitivities to shame and guilt in pre-industrial societies.

Folklore, according to the *Oxford Dictionary*, "consists of the traditional beliefs, customs, and stories of a community, passed through the generations by word of mouth." This collection of stories is of particular interest to us as the very definition of folklore coincides with our model assumption of intergenerational transmission of the sensitivities to shame and guilt, enabling us to examine the informal channel of cultural transmission.

Since the contents of the motifs are available in English, translated by Berezkin and Google Translate, we are able to quantify shame and guilt that appear in folklore in a similar fashion to the construction of Google Search intensities, yet not limited to within-language comparison. Starting from the English words "shame" and "guilt", we take the most parsimonious (minimalistic) set of derivatives of the two words, by looking up the occurrences of the exact strings of "shame" and "guilt" in either description by Berezkin or Google Translate. As a result, adjectives "ashamed", "shameful", and "guilty" are included, expanding the selection of keywords compared to the noun-only Google Trends keywords as noted earlier.

Given the set of words related to shame and guilt, we tag motifs that contain these words. The complete list of motifs that mention shame, guilt, and adjectives

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[19]The construction of the search intensity of Google Trends is explained in detail in Appendix C.

[20]Google indicates that they made changes to their data collection systems on January 1, 2011 and January 1, 2016, so we confine the range of our sampling period to 2011–2015 for measurement consistency.

[21]A motif is an episode or an image found in the set of narratives recorded in an ethnolinguistic community (Michalopoulos and Xue, 2021).

can be found in Appendix D, including motif ID, title, and descriptions. Then, we calculate the frequency of shame- or guilt-related motifs among all motifs that have been spread in each ethnic group, after which we average all ethnic groups within a given country, weighted by group population, to obtain the frequencies of shame and guilt motifs at the country level. Finally, we take the difference between the frequencies of shame and guilt for each country and calculate the z-score, in order to obtain a folklore measure that is comparable to the Google Trends measure.

5.2 Measuring self-confidence

To measure individual self-confidence, we use the self-competence score from the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 2015), which remains the most widely used measure of global self-esteem in psychology (Wylie, 1974; Byrne, 1996; Schmitt and Allik, 2005). RSES contains ten items, e.g., "I feel that I am a person of worth, at least on an equal plane with others" (positively worded) and "All in all, I am inclined to feel that I am a failure" (negatively worded). Ten items are commonly answered on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Tafarodi and Swann Jr (2001) and Tafarodi and Milne (2002) decompose RSES into two subcomponents: self-competence and self-liking. The self-competence score consists of the first five items, measuring the sense that one is "confident, capable and efficacious", while the self-liking score includes the last five items and measures the sense that "one is a good person, is socially relevant, and contributes to group harmony". The self-competence score is hence closely connected to our interest in beliefs about individual ability.

RSES has been administered in many psychological studies, yet data representativeness and availability are limited. We access two data sources: Open Source Pyschometrics Project and National Longitudinal Survey of Youth 1979 Cohort.

5.2.1 Open Source Pyschometrics Project

Open Source Pyschometrics Project[22] (hereafter OSPP) is a publicly available data source, which offers a wide selection of online psychological tests, mostly personality tests. We use the RSES data set of answers by $47,974$ participants who visited the RSES page between 2011 and 2014 and completed the test[23], including responses to the ten questions, gender, age, and country (territory)[24]. Thus, we are able to obtain the self-competence score for each respondent. The OSPP does not collect information on the language(s) spoken by each participant; We therefore match respondents to the dominant language in their country (territory).

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[22]See https://openpsychometrics.org/.

[23]According to the website, "users were informed at the beginning of the test that their answers would be used for research and were asked to confirm that their answers were accurate and suitable for research upon completion (those that did not have been removed from these data sets)."

[24]Country/territory information is "inferred from technical information using MaxMind GeoLite", which is based on the IP geolocation of visitors. This method might be inaccurate if the participant visits the website when he/she is in a foreign country or using a VPN. In this paper we frequently use the term "country" to refer to any territory for simplicity, even if some are not internationally recognized as a sovereign state.

Due to the anonymous nature of online tests, observations of respondents aged over or equal to 100 are considered invalid and removed. Those under 16 are also removed. Following Baumeister and Tice (1988) and Schmitt and Allik (2005), we compute the inverse of the standard deviation of all ten items as Metatraitedness Index to measure the consistency of a subject's responses. As Baumeister and Tice (1988) define, Metatraitedness Index is "the trait of having or not having a particular trait". We eliminate those on or below the first percentile. Observations with any missing value or of unrecognized IP geolocation are removed as well. This results in $40,684$ observations from 166 countries (territories). Despite the imperfections of online surveying, this data set covers more countries than any other available studies that measure self-competence and the responses should be fairly accurate since respondents' primary purpose is to obtain their RSES score.

5.2.2 National Longitudinal Survey of Youth 1979 Cohort (NLSY79)

NLSY79 is a longitudinal data set designed and collected by the U.S. Bureau of Labor Statistics, and is "a nationally representative sample of 12,686 young men and women who were 14–22 years old when they were first interviewed in 1979". The same individuals were interviewed every year between 1979 and 1994 and biannually from 1994 onwards. NLSY79 respondents took the RSES test in 1980, 1987, and 2006 waves, while only 1980 and 1987 waves provide answers to all ten items, allowing us to compute the self-competence scores. We use the self-competence score in 1987 wave as our dependent variable in all regressions, and the score in 1980 as a control variable in the relevant regressions.

We obtain a subsample of immigrants from the entire cohort. Specifically, we rely on a question asking "what country (you were, or the principal entrant or immigrant with whom you entered was) a citizen of at the time of your entry" when "you first enter(ed) the U.S. to live for six months or more"[25]. For respondents who are not the principal entrant or immigrant, we keep those who are the kid of the the principal entrant or immigrant, ruling out the spouse or other relative. Furthermore, we eliminate the respondents of whom both parents are born in the U.S. In other words, our sample consists of all the immigrants among the survey respondents.

We rely on the questions about respondents' country of origin and language spoken at home[26] to identify respondents' cultural origin and match them to our measures of shame and guilt. Hence, our empirical strategy for NLSY79 data exploits the persistence of cultural influences. Specifically, to the extent that immigrants are influenced by their culture of origin, we can investigate whether the relative importance of shame and guilt in those cultures affects their self-confidence in their new environment, and

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[25]The codebook of NLSY79 indicates that the answers to this question are from respondents who "(are) not a citizen of the United States; entered as a principal entrant/immigrant; visa or immigration status: Refugee, Diplomat, sponsored by employer, labor certification not sponsored by employer, entry without permission, other or don't know." The description of "entered as a principal entrant/immigrant" contradicts the question's original wording, and there are indeed respondents who are not the principal entrant or immigrant.

[26]For the question on language spoken at home, NLSY79 only recorded the following languages (besides English): Spanish, French, and German. complement the missing values, for the monolingual countries. This means that observations of multilingual countries, whose languages are not among these three, are removed.

whether any such effect is consistent with our theoretical analysis.

5.3   Additional data sources

Following the broad literature on cultural variation and historical development[27], we obtain variables that drew attention in previous studies and use them, where relevant, as control variables in our empirical analysis.

We control for the ancestral characteristics of contemporary countries provided by Giuliano and Nunn (2018), who gather the database based on *Ethnographic Atlas* (EA). Historical controls include the dependence on agriculture, political development measured by the levels of jurisdictional hierarchies beyond the local community, kinship tightness index constructed by Enke (2019), and year of observation. In addition, we control for contemporary characteristics including religious and ethnic diversities by Alesina et al. (2003), and, where relevant, a variable proxying for the changefulness or stability of the economic and social environment by Dessí and Zhao (2018).

6   Empirical analysis

In this section, we investigate empirically the relationship between individual self-confidence and the cultural importance of shame and guilt. We begin with the Google Trends measures of shame and guilt, present cross-country evidence from the OSPP online survey, and examine data on immigrants in the U.S. from NLSY79. Then, we replicate our cross- and within-country findings with the folklore measures of shame and guilt. Finally, we turn to the environmental determinants of culture, in particular, the relationship between historical modes of subsistence, associated with different social externalities, and the relative importance of shame compared to guilt.

6.1   Contemporary shame and guilt in Google Trends

6.1.1   Cross-country evidence

Our theoretical analysis suggests that countries whose culture gives a more prominent role to shame relative to guilt should exhibit lower average self-confidence, other things held equal. As noted earlier, it is challenging to control for all potential confounding factors. The results presented below should be viewed as a first attempt to explore this prediction.

Our measure of self-confidence is the self-competence score from the RSES test of OSPP, described in the previous section. We run cross-sectional regressions of the self-competence score on the importance of shame relative to guilt, denoted by Shame − Guilt, constructed from Google Search intensities, and a variety of controls, including gender, age, and historical and contemporary controls described earlier. [28]

Table 1 shows the regression results. Individual demographics and language fixed effects are always controlled for. Standard errors are adjusted for heteroscedasticity

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[27]See Alesina et al. (2003), Ashraf and Galor (2013), Alesina, Giuliano, and Nunn (2013), Enke (2019), and Giuliano and Nunn (2018) among others.

[28]Since language information is not available in OSPP, we match respondents from multilingual countries to the dominant-language subsample of Google Trends measures of shame and guilt.

and clustered by country. We control for historical characteristics in column (1) and further control for contemporary characteristics in columns (2) and (3). The estimated coefficients of Shame − Guilt are significantly negative at the 1% level in all columns. The results in Table 1 are consistent with our Hypothesis 1.1: *Societies in which shame plays a more important cultural role relative to guilt are associated, on average, with a lower level of individual self-confidence.* We also find that males are more confident than females on average, and the self-competence score is increasing and concave in age, consistent with existing evidence of gender and age differences in self-confidence.

Table 1: Shame, relative to guilt, and self-competence across countries today

	Dependent variable: Self-competence		
	(1)	(2)	(3)
Shame − Guilt	−0.168***	−0.238***	−0.205***
	(0.061)	(0.051)	(0.050)
Male	0.492***	0.494***	0.506***
	(0.065)	(0.065)	(0.069)
Age	0.136***	0.136***	0.137***
	(0.009)	(0.009)	(0.009)
Age^2	−0.001***	−0.001***	−0.001***
	(0.000)	(0.000)	(0.000)
Changefulness			1.028
			(0.623)
Contemporary controls	No	Yes	Yes
Historical controls	Yes	Yes	Yes
Language FE	Yes	Yes	Yes
Countries	77	76	52
Observations	36,321	36,294	34,751
Adjusted R^2	0.067	0.068	0.067

Note: Cluster-adjusted (at country level) standard errors in parentheses. Self-competence is from OSPP. Shame − Guilt is from Google Trends and is observed at country–dominant-language level. Historical controls include historical dependence on agriculture, kinship tightness, the number of levels of jurisdictional hierarchies beyond the local community, and year of observation in Ethnographic Atlas. Contemporary controls include ethnic diversity and religious diversity. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6.1.2 Within-country evidence from U.S. immigrants

We now turn to U.S. immigrants to examine whether the cultural importance of shame and guilt in their countries of origin influences their self-confidence, as stated in Hypothesis 1.2. Based on their country of origin and language spoken at home, respondents are matched to the relative importance of shame to guilt of the corresponding country-language pair.

We report two sets of results in Tables 2 and 3. In both tables, the dependent variable is self-competence in the 1987 wave. Table 3 differs from Table 2 in that we additionally control for self-competence in the 1980 wave in Table 3. All regressions

control for an extensive set of individual-level characteristics, including gender, age, race, marital status, having children or not, religion raised in, whether father (mother) was born in the U.S. or not[29], and relationship to the principal entrant (immigrant), as well as a few indicator variables that are unique to this survey: having a library card or not, receiving a newspaper regularly or not, and receiving magazines regularly or not. In addition, in columns (1), (3), and (5) we control for education level, specifically the highest grade completed, total net family income in the past calendar year, and employment status. These variables may be correlated with unobservable individual innate ability, generating biased estimates. We therefore remove them in columns (2), (4), and (6).

Table 2: Shame, relative to guilt, and self-competence of U.S. immigrants in 1987

| | Dependent variable: Self-competence in 1987 | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Shame − Guilt	−0.347***	−0.199	−0.466***	−0.513***	−0.590***	−0.662***
	(0.109)	(0.140)	(0.139)	(0.147)	(0.156)	(0.138)
Male	0.185	0.437**	0.195	0.462**	0.193	0.422**
	(0.192)	(0.180)	(0.198)	(0.199)	(0.189)	(0.170)
Age	−0.757	−1.548	−0.832	−1.728	−0.878	−1.677
	(1.570)	(1.237)	(1.639)	(1.339)	(1.555)	(1.183)
Age^2	0.014	0.028	0.016	0.032	0.017	0.032
	(0.029)	(0.023)	(0.031)	(0.025)	(0.029)	(0.022)
Education	0.250***		0.241***		0.210***	
	(0.026)		(0.027)		(0.032)	
Income	0.314***		0.297***		0.258***	
	(0.080)		(0.076)		(0.071)	
Library					0.958***	1.185***
					(0.230)	(0.226)
Newspaper					−0.366*	−0.254
					(0.204)	(0.176)
Magazine					−0.116	0.028
					(0.388)	(0.305)
Contemporary controls	No	No	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Language FE	Yes	Yes	Yes	Yes	Yes	Yes
Countries	22	24	22	24	22	24
Observations	219	266	219	266	216	263
Adjusted R^2	0.238	0.100	0.233	0.116	0.276	0.186

Note: Cluster-adjusted (at country level) standard errors in parentheses. Self-competence is from NLSY79 1987 wave. Shame − Guilt is from Google Trends and is observed at country-language level. Historical controls include historical dependence on agriculture, kinship tightness, the number of levels of jurisdictional hierarchies beyond the local community, and year of observation in Ethnographic Atlas. Contemporary controls include ethnic diversity and religious diversity. Individual-level controls include employment status, race, marital status, having children or not, religion raised in, whether father (mother) was born in the U.S. or not, and relationship to the principal entrant (immigrant). Columns (2), (4), and (6) exclude employment status. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Turning first to the results in Table 2, we find that the relative importance of shame to guilt has a *significantly negative effect on individual self-competence*, consistent with our Hypothesis 1.2. This suggests an important effect of the culture of origin on immigrants' self-confidence. Since respondents' self-confidence was elicited in 1987, one might be concerned that search intensities for shame and guilt in 1987, had they existed, could reflect idiosyncratic events occurring in the countries of ori-

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[29]Around 90% of the immigrants in our sample have both parents born outside of the U.S.

gin around that time. This is not a concern in our analysis as we use data on search intensities over the 2011–2015 period. This approach does rely, on the other hand, on the assumption that the cultural components of shame and guilt are stable or change slowly over time, as suggested by the literature reviewed in Section 1.1.

Table 3: Shame, relative to guilt, and self-competence of U.S. immigrants in 1987, controlling for self-competence in 1980

	Dependent variable: Self-competence in 1987					
	(1)	(2)	(3)	(4)	(5)	(6)
Shame − Guilt	−0.371***	−0.223**	−0.522***	−0.515***	−0.612***	−0.611***
	(0.086)	(0.101)	(0.120)	(0.108)	(0.140)	(0.129)
Self-competence in 1980	0.260***	0.365***	0.269***	0.361***	0.248***	0.315***
	(0.029)	(0.037)	(0.028)	(0.035)	(0.038)	(0.032)
Male	0.167	0.339*	0.183	0.363*	0.165	0.334**
	(0.187)	(0.171)	(0.193)	(0.186)	(0.182)	(0.161)
Age	−1.596	−2.549**	−1.712	−2.697**	−1.588	−2.432*
	(1.591)	(1.221)	(1.682)	(1.303)	(1.639)	(1.221)
Age^2	0.029	0.046*	0.031	0.049*	0.030	0.045*
	(0.030)	(0.023)	(0.031)	(0.025)	(0.031)	(0.023)
Education	0.193***		0.181***		0.155***	
	(0.026)		(0.027)		(0.036)	
Income	0.226**		0.202**		0.180**	
	(0.086)		(0.078)		(0.073)	
Library					0.894***	0.977***
					(0.229)	(0.202)
Newspaper					−0.278	−0.214
					(0.181)	(0.153)
Magazine					−0.238	−0.098
					(0.349)	(0.295)
Contemporary controls	No	No	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Language FE	Yes	Yes	Yes	Yes	Yes	Yes
Countries	22	24	22	24	22	24
Observations	219	266	219	266	216	263
Adjusted R^2	0.288	0.217	0.287	0.231	0.322	0.270

Note: Cluster-adjusted (at country level) standard errors in parentheses. Self-competence is from NLSY79 1987 wave. Shame − Guilt is from Google Trends and is observed at country-language level. Historical controls include historical dependence on agriculture, kinship tightness, the number of levels of jurisdictional hierarchies beyond the local community, and year of observation in Ethnographic Atlas. Contemporary controls include ethnic diversity and religious diversity. Individual-level controls include employment status, race, marital status, having children or not, religion raised in, whether father (mother) was born in the U.S. or not, and relationship to the principal entrant (immigrant). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

It could still be the case that specific conditions or events in their countries of origin induced particular groups of individuals to emigrate to the U.S., that these conditions or events had a lasting effect on their self-confidence, *and* that they also had a lasting effect on feelings of shame and guilt in their countries of origin. Any such effects on self-confidence would be captured by self-competence scores elicited in the 1980 wave. We control for this variable in Table 3. The results show that the effect of Shame − Guilt remains negative, significant, and of very similar magnitude: Even after eight years of life experiences in a new country, immigrants' self-confidence is still influenced by the importance of shame relative to guilt in their culture of origin. This is consistent with the endogenous belief mechanism examined in our model.[30]

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[30]Ideally, we would like to rule out the possibility of idiosyncratic events occurring between 1980

6.2 Historical shame and guilt in folklore

Having presented the empirical evidence across countries and among U.S. immigrants using Google Trends to measure shame and guilt, we replicate our findings by switching the measure of shame and guilt to historical folklore. Our specifications in all columns are identical to the ones presented earlier using Google Trends measure.

6.2.1 Cross-country evidence

In Table 4, the self-competence score from OSPP is regressed on the relative importance of shame to guilt in folklore, as well as control variables. The coefficient of Shame − Guilt is significantly negative at the 5% level in column (3), controlling for all contemporary characteristics, and of similar magnitude to estimates in Table 1. Considering that cultural transmission of shame and guilt though informal narratives might have been hindered due to industrialization and modernization in the 20th and 21st century, it would seem plausible that the importance of shame, relative to guilt, in historical folklore has a less significant impact on individual self-confidence today. Still, we obtain qualitatively consistent results, suggesting a persistent effect of shame and guilt transmitted through historical narratives.

6.2.2 Within-country evidence from U.S. immigrants

For immigrants, we again present two sets of results, in Tables 5 and 6, where Table 6 additionally controls for self-competence elicited in the 1980 wave. In all columns, we obtain significantly negative estimates for the coefficient of Shame − Guilt at the 5% level or above, and the estimates are of, again, similar magnitude to the ones estimated using the Google Trends measure in Table 3. Taken together, the results suggest that the negative impact on individual self-confidence of the cultural importance of shame relative to guilt strikingly persists across generations, from as early as 1800 when folklore publications and records started to emerge, to immigrants from different countries who emigrated to a new country in the 1980s, all the way to modernized citizens in the 21st century.

6.3 Shame and its environmental determinants

So far we have shown evidence supporting our model's prediction of two equilibria, in Proposition 2, one corresponding to societies with low sensitivity to shame and high overconfidence, the other corresponding to societies with high sensitivity to shame and low overconfidence.

A more fundamental question follows: What determined which equilibrium occurred in different societies? Proposition 2 shows that with a higher social externality E of investing in good projects, the equilibrium with high shame and low overconfidence is more likely to occur. The externality E is a key exogenous environmental

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and 1987 and affecting both the self-confidence of immigrants in 1987 and feelings of shame in their countries of origin in an enduring way, captured by our search intensity measures for 2011–2015. Since search engines were not in existence between 1980 and 1987, we cannot check search intensities for shame and guilt over that period. We have mitigated this potential concern as far as possible by including a sample of many countries, and a variety of control variables in our analysis.

Table 4: Shame, relative to guilt, in folklore and self-competence across countries today

	Dependent variable: Self-competence		
	(1)	(2)	(3)
Shame − Guilt	−0.132**	−0.116*	−0.137**
	(0.066)	(0.059)	(0.067)
Male	0.482***	0.490***	0.497***
	(0.061)	(0.062)	(0.064)
Age	0.138***	0.139***	0.140***
	(0.009)	(0.009)	(0.009)
Age^2	−0.001***	−0.001***	−0.001***
	(0.000)	(0.000)	(0.000)
Changefulness			1.345**
			(0.594)
Contemporary controls	No	Yes	Yes
Historical controls	Yes	Yes	Yes
Countries	135	130	86
Observations	39,921	39,889	38,204
Adjusted R^2	0.064	0.064	0.065

Note: Cluster-adjusted (at country level) standard errors in parentheses. Self-competence is from OSPP. Shame − Guilt is from folklore and is observed at country level. Historical controls include historical dependence on agriculture, kinship tightness, the number of levels of jurisdictional hierarchies beyond the local community, and year of observation in Ethnographic Atlas. Contemporary controls include ethnic diversity and religious diversity. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

parameter in our model, reflecting how intensely and broadly individuals need to cooperate in their environment, and the value of this cooperation. Historically, we can relate this to pre-industrial economic activities.

Pre-industrial societies differed in terms of their reliance on modes of subsistence such as agriculture or hunting and gathering. These modes of subsistence were associated with different social externalities. It is thus natural to hypothesize that the variation in subsistence styles across societies could have been one of the drivers of cultural differences in the importance of shame and guilt. In particular, it seems likely that a higher dependence on agriculture and lower dependence on hunting and gathering would have been associated with a higher value of E. Agricultural activity required substantial and stable coordination and cooperation, e.g., building, dredging, and draining irrigation systems, crop planting, harvesting, and protection (Talhelm et al., 2014). Hunter-gatherers, for the most part, lived in smaller groups with considerable group and individual mobility, implying smaller values of E.[31]

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[31]Smith et al. (2010) consider the full range of hunter-gatherers described in ethnographic records, which exhibits significant heterogeneity: "[...] we can differentiate smaller, more mobile societies [...] of a few dozen people or less [...] from larger, more sedentary groups". Nevertheless, the former are much more prevalent. For example, as the authors point out, in the more geographically representative Standard Cross-Cultural Sample, "over two thirds are classed as "nomadic" or "semi-nomadic", and less than a tenth as "sedentary"". See also Apicella and Silk (2019) and Smith et al. (2018).

Table 5: Shame, relative to guilt, in folklore and self-competence of U.S. immigrants in 1987

	Dependent variable: Self-competence in 1987					
	(1)	(2)	(3)	(4)	(5)	(6)
Shame − Guilt	−0.701***	−0.893**	−0.629***	−0.606**	−0.630**	−0.625**
	(0.236)	(0.394)	(0.229)	(0.299)	(0.263)	(0.289)
Male	0.269	0.411**	0.273	0.421**	0.255	0.394**
	(0.237)	(0.191)	(0.241)	(0.193)	(0.219)	(0.182)
Age	0.790	−0.077	0.734	−0.181	0.751	−0.243
	(0.824)	(0.955)	(0.871)	(0.996)	(0.853)	(0.946)
Age^2	−0.016	0.001	−0.015	0.003	−0.014	0.005
	(0.015)	(0.018)	(0.016)	(0.019)	(0.016)	(0.018)
Education	0.282***		0.278***		0.253***	
	(0.035)		(0.035)		(0.043)	
Income	0.181		0.179		0.143	
	(0.110)		(0.111)		(0.110)	
Library					1.020***	1.261***
					(0.192)	(0.180)
Newspaper					−0.381	−0.205
					(0.262)	(0.178)
Magazine					−0.343	−0.215
					(0.225)	(0.213)
Contemporary controls	No	No	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Language FE	Yes	Yes	Yes	Yes	Yes	Yes
Countries	42	42	42	42	42	42
Observations	317	379	317	379	314	375
Adjusted R^2	0.264	0.130	0.259	0.135	0.306	0.205

Note: Cluster-adjusted (at country level) standard errors in parentheses. Self-competence is from NLSY79 1987 wave. Shame − Guilt is from folklore and is observed at country level. Historical controls include historical dependence on agriculture, kinship tightness, the number of levels of jurisdictional hierarchies beyond the local community, and year of observation in Ethnographic Atlas. Contemporary controls include ethnic diversity and religious diversity. Individual-level controls include employment status, race, marital status, having children or not, religion raised in, whether father (mother) was born in the U.S. or not, and relationship to the principal entrant (immigrant). Columns (2), (4), and (6) exclude employment status. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Shame, relative to guilt, in folklore and self-competence of U.S. immigrants in 1987, controlling for self-competence in 1980

	Dependent variable: Self-competence in 1987					
	(1)	(2)	(3)	(4)	(5)	(6)
Shame − Guilt	−0.571***	−0.710***	−0.547**	−0.567**	−0.586**	−0.616**
	(0.181)	(0.221)	(0.208)	(0.227)	(0.241)	(0.236)
Self-competence in 1980	0.252***	0.341***	0.252***	0.334***	0.235***	0.294***
	(0.043)	(0.044)	(0.042)	(0.045)	(0.044)	(0.041)
Male	0.288	0.358*	0.291	0.366*	0.268	0.344*
	(0.246)	(0.191)	(0.249)	(0.194)	(0.229)	(0.180)
Age	0.224	−0.698	0.206	−0.742	0.317	−0.678
	(0.964)	(1.135)	(0.995)	(1.140)	(0.951)	(1.060)
Age^2	−0.005	0.012	−0.005	0.013	−0.006	0.012
	(0.018)	(0.021)	(0.019)	(0.021)	(0.018)	(0.020)
Education	0.222***		0.220***		0.203***	
	(0.029)		(0.029)		(0.035)	
Income	0.137		0.134		0.111	
	(0.111)		(0.113)		(0.108)	
Library					0.899***	1.053***
					(0.195)	(0.175)
Newspaper					−0.305	−0.171
					(0.250)	(0.178)
Magazine					−0.480**	−0.351*
					(0.202)	(0.192)
Contemporary controls	No	No	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Language FE	Yes	Yes	Yes	Yes	Yes	Yes
Countries	42	42	42	42	42	42
Observations	317	379	317	379	314	375
Adjusted R^2	0.313	0.231	0.308	0.229	0.348	0.275

Note: Cluster-adjusted (at country level) standard errors in parentheses. Self-competence is from NLSY79 1987 wave. Shame − Guilt is from folklore and is observed at country level. Historical controls include historical dependence on agriculture, kinship tightness, the number of levels of jurisdictional hierarchies beyond the local community, and year of observation in Ethnographic Atlas. Contemporary controls include ethnic diversity and religious diversity. Individual-level controls include employment status, race, marital status, having children or not, religion raised in, whether father (mother) was born in the U.S. or not, and relationship to the principal entrant (immigrant). Columns (2), (4), and (6) exclude employment status. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

We therefore hypothesize a positive relationship between the cultural importance of shame relative to guilt in a society and the degree of dependence on agriculture in that society's pre-industrial past. We test our hypothesis with data on historical dependence on agriculture, controlling for kinship tightness by Enke, 2019, year of observation in EA, and language fixed effects. Since our measure of shame and guilt is at the country-language level, we make use of the data on dependence on agriculture at the ethnicity-language-level from EA, aggregated to country-language level, weighted by ethnic group population.

Table 7: Historical mode of subsistence and shame, relative to guilt, across contemporary countries

	Dependent variable: Shame − Guilt			
	(1)	(2)	(3)	(4)
Dependence on agriculture	2.330**	2.060**		
	(0.931)	(0.988)		
Dependence on hunting and gathering			−4.469**	−5.767
			(1.750)	(3.472)
Language FE	Yes	Yes	Yes	Yes
Countries	61	60	61	60
Observations	66	65	66	65
Adjusted R^2	0.216	0.208	0.216	0.203

Note: Country-language level regressions. Cluster-adjusted (at country level) standard errors in parentheses. Kinship tightness and year of observation in Ethnographic Atlas are always controlled for. Columns (2) and (4) exclude New Zealand. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results are shown in columns (1) and (2) of Table 7. In column (2), we exclude New Zealand from our sample and repeat the regression in column (1). The reason for excluding New Zealand is that the Ethnographic Atlas does not include historical dependence on agriculture data for the population of ethnic European descent in contemporary New Zealand, so the corresponding observation for Maori is used and leads to the inclusion of New Zealand in column (1). From column (2) we see that excluding New Zealand does not alter our qualitative result.

We find that higher historical dependence on agriculture is associated with higher cultural importance of shame relative to guilt, supporting our Hypothesis 2 based on Proposition 2. We also estimate, in columns (3) and (4), the same regressions using dependence on hunting and gathering, instead of dependence on agriculture. Based on Proposition 2, we would expect a negative coefficient in this case (lower E). Columns (3) and (4) of Table 7 report the regression results when we include and exclude New Zealand, respectively, and we obtain the expected negative coefficient for dependence on hunting and gathering.

7   Conclusion

In this paper, we find significant evidence of a negative relationship between the cultural importance of shame relative to guilt and individual self-confidence (confidence

in own ability). In spite of the limitations of data sources and quantitative measurements for these psychological and cultural variables, we obtain a consistent set of results using both contemporary and historical measures of shame and guilt, and both cross-country and within-country data on self-confidence. The findings provide substantial support for our model, in which cultural transmission interacts with motivated cognition. Our results suggest that the effects of cultural transmission on self-confidence exhibit significant persistence, even as families emigrate from different countries to the U.S. We view our effort as a first step towards a better understanding of the interactions between these psychological mechanisms, the role of cultural transmission, and implications for economic behavior.

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Appendix A   Proofs

Proof of Lemma 1 Follows directly by applying the proof of Proposition 2 in Bénabou and Tirole (2002).

Proof of Lemma 2 For all $r \in [q, 1]$ and $\beta \in [0, 1]$, define

$$X(r, \beta) \equiv \int_{\max[\beta\delta\theta_L V - K, c_L]}^{\max[\beta\delta\theta(r)V - K, c_L]} \{\delta\theta_L V - K - c\} f dc.$$

Assume that $\delta\theta_L V - K > c_L$. Then: (i) If $\beta\delta\theta_H V - K \leqslant c_L$ ($\Rightarrow \beta < \frac{\theta_L}{\theta_H}$), $X(r, \beta) = 0$. The net gain from suppressing the bad signal is zero: Irrespective of beliefs, self-1 will always choose the bad project. (ii) Suppose that $\beta\delta\theta_H V - K > c_L$. For any given r, $X(r, \beta) > 0$ for $\beta \leqslant \frac{\theta_L}{\theta(r)}$, and $X(r, 1) < 0$. Moreover, for all $\beta > \frac{\theta_L}{\theta(r)}$, we have one of two possibilities: either $\beta\delta\theta_L V - K \geqslant c_L$ and

$$\frac{\partial X(r, \beta)}{\partial \beta} = \delta^2 V^2 \{\theta(r)[\theta_L - \beta\theta(r)] - (1 - \beta)\theta_L^2\} f < 0$$

or $\beta\delta\theta_L V - K < c_L$ and

$$\frac{\partial X(r, \beta)}{\partial \beta} = \delta^2 V^2 \theta(r)[\theta_L - \beta\theta(r)] f < 0.$$

Thus there exists a unique $b(r) \in [0, 1]$ such that $X(r, b(r)) = 0$ and: (a) $X(r, \beta) > 0$ for all $\beta < b(r)$, while $X(r, \beta) < 0$ for all $\beta > b(r)$; (b) $1 > b(r) > \frac{\theta_L}{\theta(r)}$. Furthermore, for $\beta > \frac{\theta_L}{\theta(r)}$, we have

$$\frac{\partial X(r, \beta)}{\partial r} = \beta\delta^2 V^2 (\theta_H - \theta_L)[\theta_L - \beta\theta(r)] f,$$

implying that $\frac{\partial X(r, b(r))}{\partial r} < 0$. Therefore, by the implicit function theorem, $b'(r) < 0$. This establishes that Lemma 1 in Bénabou and Tirole (2002) applies; The proof then follows directly from the proof of Proposition 2 in Bénabou and Tirole (2002).

Proof of Lemma 3 (1) Let

$$X(r^*, \beta) \equiv \int_{\beta\delta\theta_L V + S}^{\beta\delta\theta(r^*)V + S} \{\delta\theta_L V + S - c\} f dc.$$

Then

$$X(r^*, \beta) = f\{\beta\delta^2\theta_L V^2(\theta(r^*) - \theta_L) - \frac{1}{2}(\beta\delta\theta(r^*)V)^2 + \frac{1}{2}(\beta\delta\theta_L V)^2\},$$

which does not depend on S. Moreover, it is straightforward to verify that

$$\int_{\beta\delta\theta_L V}^{\beta\delta\theta(r^*)V} \{\delta\theta_L V - c\} f dc = f\{\beta\delta^2\theta_L V^2(\theta(r^*) - \theta_L) - \frac{1}{2}(\beta\delta\theta(r^*)V)^2 + \frac{1}{2}(\beta\delta\theta_L V)^2\}.$$

(2) Let $S \geqslant c_H - \beta\delta\theta_L V$. The net gain from suppressing the bad signal is zero. In

this case, there is a unique equilibrium with truthful transmission. Self-1 will always invest in the good project, and thereby avoid the cost of shame in equilibrium. (3) Let

$$X(r^*, \beta) \equiv \int_{\beta\delta\theta_L V + S}^{c_H} \{\delta\theta_L V + S - c\} f dc.$$

Note that the value of this expression no longer depends on r^*. We know that $c_H < S + \beta\delta\theta(r^*)V$. Thus if β is such that $\beta\delta\theta(r^*)V = \delta\theta_L V$; i.e., $\beta = \frac{\theta_L}{\theta(r^*)}$, we know that $c_H < \delta\theta_L V + S$. This means that $X(\beta) > 0$ for all $\beta \leqslant \frac{\theta_L}{\theta(r^*)}$. On the other hand, $X(1) < 0$. For all $\beta > \frac{\theta_L}{\theta(r^*)}$, we have

$$\frac{\partial X(\beta)}{\partial \beta} = -\delta\theta_L V(\delta\theta_L V - \beta\delta\theta_L V) f < 0.$$

Thus there exists a unique β' such that $X(\beta') = 0$ and: (a) $X(\beta) > 0$ for all $\beta < \beta'$, while $X(\beta) < 0$ for all $\beta > \beta'$; (b) $1 > \beta' > \frac{\theta_L}{\theta(r^*)}$.

Proof of Proposition 1 Define $W_T^S \equiv qU_T^S(\theta_H) + (1-q)U_T^S(\theta_L)$, and

$$U_T^S(\theta_i) = \int_{c_L}^{\min[\beta\delta\theta_i V + S, c_H]} \{\delta\theta_i(V + E) - c\} f dc - \int_{\min[\beta\delta\theta_i V + S, c_H]}^{c_H} S f dc$$

for $i = H, L$. Consider first the case where $\beta\delta\theta_H V + S \leqslant c_H$. Then

$$U_T^S(\theta_i) = \int_{c_L}^{\beta\delta\theta_i V + S} \{\delta\theta_i(V + E) - c\} f dc - \int_{\beta\delta\theta_i V + S}^{c_H} S f dc.$$

Differentiating by S yields

$$\frac{\partial U_T^S(\theta_i)}{\partial S} = f[\delta\theta_i(V + E) - c_H + S].$$

Letting $\bar{\theta} = q\theta_H + (1-q)\theta_L$, we have

$$\frac{\partial W_T^S}{\partial S} = f[\delta\bar{\theta}(V + E) - c_H + S]; \quad \frac{\partial^2(W_T^S)}{\partial S^2} = f > 0.$$

Now suppose $c_H - \beta\delta\theta_L V \geqslant S > c_H - \beta\delta\theta_H V$. Then

$$U_T^S(\theta_H) = \int_{c_L}^{c_H} \{\delta\theta_H(V + E) - c\} f dc$$

and

$$U_T^S(\theta_L) = \int_{c_L}^{\beta\delta\theta_L V + S} \{\delta\theta_L(V + E) - c\} f dc - \int_{\beta\delta\theta_L V + S}^{c_H} S f dc.$$

In this case we have

$$\frac{\partial W_T^S}{\partial S} = (1-q)f[\delta\theta_L(V + E) - c_H + S]; \quad \frac{\partial^2(W_T^S)}{\partial S^2} = (1-q)f > 0.$$

In both cases, when $S = 0$ we have $\frac{\partial W_T^S}{\partial S} < 0$. Moreover, $\frac{\partial^2 (W_T^S)}{\partial S^2} > 0$, implying that there is no interior solution for S. Thus without loss of generality we can focus attention on two possibilities: $S = 0$ and $S = c_H - \beta\delta\theta_L V$. We have (a) When $S = 0$,

$$W_T^S(0) = q \int_{c_L}^{\beta\delta\theta_H V} \{\delta\theta_H(V + E) - c\}fdc + (1 - q) \int_{c_L}^{\beta\delta\theta_L V} \{\delta\theta_L(V + E) - c\}fdc;$$

(b) When $S = c_H - \beta\delta\theta_L V$,

$$W_T^S(c_H - \beta\delta\theta_L V) = q \int_{c_L}^{c_H} \{\delta\theta_H(V + E) - c\}fdc + (1 - q) \int_{c_L}^{c_H} \{\delta\theta_L(V + E) - c\}fdc.$$

Denoting by $\phi_T^S \equiv \frac{1}{f}[W_T^S(c_H - \beta\delta\theta_L V) - W_T^S(0)]$, we obtain

$$\phi_T^S = q \int_{\beta\delta\theta_H V}^{c_H} \{\delta\theta_H(V + E) - c\}dc +$$

$$+ (1 - q) \int_{\beta\delta\theta_L V}^{c_H} \{\delta\theta_L(V + E) - c\}dc.$$

Proof of Proposition 2 Define $W_S^S \equiv qU_S^S(\theta_H) + (1 - q)U_S^S(\theta_L)$, and

$$U_S^S(\theta_i) = \int_{c_L}^{\min[\beta\delta\bar{\theta}V + S, c_H]} \{\delta\theta_i(V + E) - c\}fdc - \int_{\min[\beta\delta\bar{\theta}V + S, c_H]}^{c_H} Sfdc$$

for $i = H, L$. Consider first the case where $\beta\delta\bar{\theta}V + S \leqslant c_H$. Then

$$U_S^S(\theta_i) = \int_{c_L}^{\beta\delta\bar{\theta}V + S} \{\delta\theta_i(V + E) - c\}fdc - \int_{\beta\delta\bar{\theta}V + S}^{c_H} Sfdc.$$

Differentiating by S yields

$$\frac{\partial U_S^S(\theta_i)}{\partial S} = f[\delta\theta_i(V + E) - c_H + S].$$

Thus we have

$$\frac{\partial W_S^S}{\partial S} = f[\delta\bar{\theta}(V + E) - c_H + S]; \quad \frac{\partial^2 (W_S^S)}{\partial S^2} = f > 0.$$

Now suppose $c_H - \beta\delta\theta_L V > S > c_H - \beta\delta\bar{\theta}V$. Then

$$U_S^S(\theta_i) = \int_{c_L}^{c_H} \{\delta\theta_i(V + E) - c\}fdc.$$

In this case self-1 always invests, for all possible realizations of c and irrespective of ability θ. The outcome is the same as $W_T^S(c_H - \beta\delta\theta_L V)$. Thus without loss of generality we can focus attention on two possibilities: no shame (i.e. $S = 0$), and shame set so as to induce self-1 to invest for all possible realizations of c, as well as θ (i.e. $S \geqslant c_H - \beta\delta\bar{\theta}V$). It is possible to achieve the second outcome (self-1 always invests) by setting $S = c_H - \beta\delta\bar{\theta}V$, which induces suppression of the bad signal, or by

setting the higher cost of shame $S = c_H - \beta\delta\theta_L V$, which induces truthful transmission of the bad signal. We will assume that when the investment outcome is the same, the shame cost inducing truthful transmission is chosen (a strict preference could easily be obtained by allowing for even a very small cost of memory management, or a very small probability that signal suppression is unsuccessful). We have: (a) When $S = 0$,

$$W_S^S(0) = q \int_{c_L}^{\beta\delta\bar{\theta}V} \{\delta\theta_H(V + E) - c\}fdc + (1 - q) \int_{c_L}^{\beta\delta\bar{\theta}V} \{\delta\theta_L(V + E) - c\}fdc;$$

(b) When $S = c_H - \beta\delta\theta_L V$,

$$W_S^S(c_H - \beta\delta\theta_L V) = q \int_{c_L}^{c_H} \{\delta\theta_H(V + E) - c\}fdc + (1 - q) \int_{c_L}^{c_H} \{\delta\theta_L(V + E) - c\}fdc.$$

Denoting by $\phi_S^S \equiv \frac{1}{f}[W_S^S(c_H - \beta\delta\theta_L V) - W_S^S(0)]$, we obtain

$$\phi_S^S = q \int_{\beta\delta\bar{\theta}V}^{c_H} \{\delta\theta_H(V + E) - c\}dc + (1 - q) \int_{\beta\delta\bar{\theta}V}^{c_H} \{\delta\theta_L(V + E) - c\}dc$$

$$= \int_{\beta\delta\bar{\theta}V}^{c_H} \{\delta\bar{\theta}(V + E) - c\}dc.$$

Appendix B   Translations of shame and guilt

Table B8: Translations of "shame" and "guilt" by Google Translate

Language	Shame	Guilt
Arabic	عار، الخجل، خجل، خزي، حياء، هوان، مصدر خزي، عار خزي، ارتباك	إثم، تهمة، معصية، ذنب إثم
Chinese (Simplified)	耻辱，羞耻，羞辱，羞，耻，侮辱	有罪，罪，辜
Chinese (Traditional)	恥辱，羞恥，羞辱，羞，恥，侮辱	有罪，罪，辜
Croatian	sramota, šteta, sram, stid, bruka	krivica, grijeh
Dutch	schaamte, schande	schuld, misdaad
English	shame	guilt, fault, blame, onus
French	honte, dommage, confusión	culpabilité, accusation
German	Scham, Schande, Schmach, Beschämung, Unwürdigkeit	Schuld, Täterschaft
Italian	vergogna, peccato, pudore, onta, disonore, obbrobrio, indecenza	colpa, colpevolezza
Persian	شرم، خجالت، ننگ، شرمساری، سرافکندگی، فضاحت، ازرم، عار	گناه، جرم، تقصیر، مجرمیت، بزه
Portuguese	vergonha, pudor, ignomínia, opróbrio, desonra	culpa, crime, delito
Russian	стыд, позор, срам, бесславие, досада, неприятность	вина, виновность, чувство вины, грех
Serbian (Latin)	sramota, šteta, sram, stid, bruka	krivica, greh
Spanish	vergüenza, lástima, oprobio, deshonra, mula	culpa

Note: Mutually intelligible languages, such as Simplified and Traditional Chinese, and Croatian and Serbian (Latin), are treated as different languages since they use different writing systems.

Appendix C   Construction of Google Search intensity

In this section, we formally present the construction of our measures using Google Trends data. The English word "shame" (and "guilt") is translated into one or more terms in each language. Within a certain time range, the search intensity of a certain term i in language ℓ in country c is measured by the fraction of its search volume to the total search volume in country c of all terms, namely

$$SearchRate_{i,\ell,c} = \frac{SearchVol_{i,\ell,c}}{TotalSearchVol_c}.$$

Then, the search rate of term i is adjusted based on the highest value over all countries speaking language ℓ,

$$AdjSearchRate_{i,\ell,c} = \frac{SearchRate_{i,\ell,c}}{\max_c SearchRate_{i,\ell,c}} \cdot 100,$$

so that the maximum intensity of word i across countries speaking language ℓ is always 100. For those languages having $n > 1$ translations, i.e., multiple synonyms for "shame" (or "guilt"), search rate of each translation are weighted by its relative search volume among n translations within each country (performed by Google Trends), namely

$$w_{i,\ell,c} = \frac{SearchVol_{i,\ell,c}}{\sum_{i=1}^{n} SearchVol_{i,\ell,c}}.$$

Finally, the search rate of "shame" (or "guilt") in language ℓ of country c is calculated as the weighted average of the rescaled search rates for all n synonyms

$$SearchRate_{\ell,c} = \sum_{i=1}^{n} AdjSearchRate_{i,\ell,c} w_{i,\ell,c}.$$

Appendix D   Folklore on shame and guilt

D.1   Shame motifs

Below we list motifs that contain either "shame", "ashamed", or "shameful" in either description by Berezkin or by Google Translate. Related words are underlined.

ID: b105   **Title**: She [daughter-in-law] is transformed
Descriptions:
Berezkin: Father- or mother-in-law gets to see his or her daughter-in-law in an improper situation (combing her hair, taking a bath, etc.). She is ashamed in turns into a bird (usually a hoopoe) or a turtle.
Google Translate: The father-in-law or mother-in-law finds the daughter-in-law in a position she is ashamed of (bare-headed, swimming, etc.) From shame, it turns into a bird (usually a hoopoe) or a tortoise.

ID: f83   **Title**: News precede[s] man
Descriptions:
Berezkin: Person commits something shameful, obscene. Presumably, nobody could see him doing it. When he asks people, "What's the news?", they answer that so-and-so (this person) has done such a thing.
Google Translate: The character does something forbidden and indecent in a place hidden from prying eyes, and then asks people what's new. He is told that there is no news — except that the name (this character) did this and that.

ID: k46   **Title**: Woman throws herself into the ocean
Descriptions:
Berezkin: Giving way to a burst of horror or shame, woman or girl runs to the ocean, throws herself into the water or remains on the beach. Her husband or suitor pursues but cannot catch her.
Google Translate: In a fit of fear or shame, a woman or girl runs to the sea, rushes into the water or hides on the shore. A contender for her hand tries in vain to overtake her.

ID: l100c   **Title**: Duped visitors of a chaste woman
Descriptions:
Berezkin: When a man comes to a beautiful woman she tricks him by asking to finish some trivial task, keeping him by her magic in an awkward or ridiculous position until daylight. Episode is repeated next nights with other or (rare) the same suitor. Usually the first suitor being ashamed tells the other that everything was nice, so all of them are humiliated the same way.
Google Translate: When a man comes to a lonely living beauty, she asks him to perform a void order (close the door, etc.) and leaves him magic all night in a ridiculous and uncomfortable position (he holds on the door handle, etc.) The next night the same thing happens with another (rarely: the same) fan. Everyone, ashamed, says to others, as if he enjoyed.

ID: m114j   **Title**: All women are similar

Descriptions:

Berezkin: When a (married) man cultivate a (married) woman she demonstrates him that all women are alike (like eggs painted in different colors). The man is <u>ashamed</u> and let the woman in piece.

Google Translate: A woman does not refuse to those who harass her, but calmly explains that there is no point in trying to master many, because everyone is the same (they differ no more than eggs painted in different colors).

ID: m123a   **Title**: Three-toed foot

Descriptions:

Berezkin: Raven marries or tries to marry a girl pretending to be handsome chief. They notice that somebody is eating carrion. Usually when everybody have to take off there footgear, raven's three-toes feet are exposed. He is driven away or runs away being <u>ashamed</u>.

Google Translate: The raven marries or tries to marry, posing as a leader and handsome. Once notice that someone is eating carrion. Usually, everyone is forced to take off moccasins and see that the crow has a three-fingered paw. The raven in disgrace expelled or in a hurry to leave

ID: m77   **Title**: A soiled bed

Descriptions:

Berezkin: While person is asleep, another smears with excrements or something that reminds excrements his or her bed or clothes. The <u>ashamed</u> person runs away or agrees to make what the trickster wants in exchange of his silence.

Google Translate: The character soils the other's clothes or bed with sewage or something like sewage, threatens to spoil the air and blame the other, etc .; taking advantage of the victim's confusion

D.2   Guilt motifs

Below we list motifs that contain either "guilt" (none) or "guilty" in either description by Berezkin or by Google Translate. Related words are underlined.

ID: f70   **Title**: Potiphar's wife: false accusation of sexual abuse

Descriptions:

Berezkin: Woman makes vain overtures to young man and/or falsely accuses him of sexual abuse. Her husband believes that the young man is <u>guilty</u>, kills or tries to kill him.

Google Translate: Woman falsely accuses a man of encroachment on her.

ID: h36d   **Title**: Death and the hare

Descriptions:

Berezkin: Hare is responsible for introduction of permanent death.

Google Translate: The hare distorts the command of God and/or is <u>guilty</u> of the fact that man is mortal.

ID: h36ff   **Title**: Death and the raven

Descriptions:

Berezkin: Raven is responsible for introduction of permanent death.
Google Translate: A raven (crow) or another large vulture tries to kill people and/or is guilty of the fact that a person (tiger: domestic animals) is mortal or prone to disease.

ID: k32g1   **Title**: Forty horses or forty knives?
Descriptions:
Berezkin: Person is asked to choose between objects that have utilitarian value, often forty (seven, etc.) horses or forty knives. Usually the person does not understand that the question is about different kinds of execution.
Google Translate: The guilty are offered a choice of items that have utilitarian value (often forty, seven, three, etc. horses or as many knives). He usually does not understand that it is a question of methods of execution.

ID: k73   **Title**: Children of the youngest wife
Descriptions:
Berezkin: A young woman promises to bear a wonderful child. In her husband's absence other people (co-wives, mother-in-law, etc.) try to kill the mother and/or the child, usually slandering her.
Google Translate: Young wife (promises to give birth and) gives birth to a wonderful child. In the absence of the husband, the wife or her child is trying to kill (usually slandered before the husband), but they remain alive. The guilty are usually punished.

ID: m124   **Title**: A bull's tail
Descriptions:
Berezkin: Person buries a tail or head of a bull or other domestic animal with a tail or horns outside. He explains that the animal sank into the ground and usually asks the others to pull the tail (horns). When they are "torn off", he tells that people are guilty of the animal being lost.
Google Translate: The character buries the tail (head, ears) of the pet, claiming that it has gone to the ground. Usually, he asks others to pull on the tail (head) and when he "breaks off", accuses others of having disappeared.

ID: m197d   **Title**: The shortened stick
Descriptions:
Berezkin: A judge gives sticks to all the suspects in a court case and tells them that the guilty one's stick will grow during the night. The guilty man cuts a bit off his stick and thus is discovered.
Google Translate: To find a thief, a person gives sticks to the assembled and says that the thief will have it longer in a night. The thief cuts off the end of his stick and is thus discovered.

ID: m198a3   **Title**: Who did steal the ruby?
Descriptions:
Berezkin: One of the brothers steals a treasure for which all of them have equal rights or he is a bastard. Brothers come to a powerful person and want him to say who of them is the thief or the bastard. Usually the person tells a story and discovers the

guilty one considering his reaction.

Google Translate: One of the brothers secretly takes away the property of all of them or is illegitimate. The brothers come to the imperious character, so that he identified the thief or illegitimate. Usually the character tells the story and determines the culprit by the reaction of those who came.