Competition Builds Trust

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Abstract

This paper shows that increases in (firm-level) competition positively impact (individual-level) trust. Using US states' banking de-regulation events that previous studies have already shown to have large impacts on competition in non-banking sectors, we show that an increase in competition had a causal impact on trust, measured in the General Social Survey (GSS). We develop a model which explains why increased competition within a state increases trust. The model also predicts a positive correlation between trust and sectoral competitiveness in the cross-section. We explore this implication using the 2004 wave of the GSS which we can match with US census of firms competition measures. The findings are consistent with the model's predictions, suggesting that competition across firms seems to build trust.

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1 Introduction

Recent empirical evidence, gleaned from a number of different sources, across many countries, and using different methods, is making a plausible case that culture affects economic outcomes.[2] Measures of culture are usually derived from responses to survey questions (for example the canonical "trust" question that we will discuss below). Many of these studies attempt to unearth the effects of culture on outcomes by exploiting its inter-generational persistence. For example, trusting parents are more likely to have trusting children, and these children are also more likely to inculcate trust into their children, and so on. As we briefly survey in the next section, this persistence has been important in helping researchers conclude that culture affects economic outcomes and is not just a reflection of them.

A tempting, but flawed, conclusion to draw from such inter-generational persistence is that the cultural factors that are important for economic outcomes are beyond the reach of policy. Trust is determined by the distant past, the distant past cannot be changed, so policy is irrelevant. But, as has long been argued, perhaps the distant past is not all that matters. Drawing on examples from European countries of his time, Montesquieu (1749) famously argued that markets themselves are key in providing the cultural underpinnings, like trust, that make societies work. Early in the 20th century, the sociologist, Georg Simmel (1908), provided an important caveat. He argued that it's not markets per se that lead to good culture, but market competition. Uncompetitive markets would not build it, but competitors battling for market share would.

Despite this fabled tradition, there have been no attempts using individual data to formally determine whether market competition actually builds trust, and by what mechanism it might do so. This is our task here. We proceed in three steps. Firstly, we exploit an episode of well-defined changes in competition to see what effects these had on trust. Following the approach of Levine et al. (2009), we instrument an increase in competition by using state level deregulation of the banking industry that occurred over a period of about 25 years starting in the mid 70s in the United States. Black and Strahan (2002) documented that the timing of this deregulation differs across US states and that it is linked to a significant increase in new incorporations and thus firm level competition. We use multiple waves of the US General Social Survey (GSS) to identify a causal relationship between trust, as measured by answers to the canonical generalized trust question, and these changes in competition. We find that increases in state level competition precipitated by bankings reforms are strongly related to increases in state trust levels as measured in the US General Social Survey (GSS).

[2] A brief survey of this literature follows in the next section.

We then develop a cultural evolutionary model to explain why enhanced competition might increase trustworthiness levels, and hence reported trust. Trustworthiness, in our model, is precipitated by the disciplining effect that competition has on free-riding within the workplace. Groups with more free-riders tend to under-perform and where firms are engaged in more intense competition, the collective punishment for under-performance is greater – underperforming firms are more likely to be forced to shut-down. Consequently inter-firm competition punishes free-riding, and this punishment is greater the stronger is competition across firms. The model explains why an exogenous increase in competition, as seen in the US states' data, will decrease free-riding, increase trustworthiness and hence increase trust. By modeling variation in competition levels across sectors, we also generate a set of cross-sectoral empirical implications that we can take to the data: Firms in higher competition sectors should have lower levels of free-riding and consequently higher levels of trust amongst workers.[3]

The third part of the paper shows that US data is strongly consistent with these cross-sectional predictions as well. We use the 2004 wave of the GSS as it included an extremely detailed workplace module that asked about many dimensions of work. Using this wave allows us to match trust levels to sectoral competition measures from the US Census of firms in order to test the model's predictions. Specifically we check whether workers employed in more competitive sectors have higher levels of trust. The immense detail of this wave of the GSS allows us to control for a large number of workplace characteristics – as well as including the many other individual level controls in the GSS. We introduce a full set of individual controls – including all of the previous factors that have predicted trust such as education, income, ethnicity, race, marital status, age, city size. We also include extensive workplace controls – workplace size, unionization rates, intensity of supervision, and measures of workplace relations. The predictions of the model are strongly supported: the more competitive the sector of work, the higher individual trust levels, and there is no evidence that this is due to selection of high trust individuals into more competitive sectors, or numerous other possible channels that we are able to rule out using the extensive workplace controls.

To our knowledge, our paper presents the first micro-level evidence of a causal relationship between competition and trust. The effects are also large. In variance normalized terms, they are slightly smaller than the effects of one of the most well-established trust determinants, schooling. Given the recent evidence concerning the magnitude and importance of trust for development outcomes that we will survey in the next section, an immediate implication of our findings is

[3] As we describe in the next section, evidence of such a group competition effect working in precisely such a way has already been seen in laboratory experiments, and the theory we develop is related to previous models that have looked at the disciplining effect of team competition on free-riding.

a renewed emphasis on the importance of strong competition regulation. We discuss further implications in the conclusion.

The paper proceeds as follows. Section 2 locates the paper with respect to numerous literatures to which it is related. Section 3 explores the exogenous variation in competition caused by banking de-regulation to estimate its impact on trust. Section 4 develops a model to explain the positive relationship between trust and competition. Section 5 establishes the relationship between trust and competitiveness using the 2004 wave of the GSS and census of firms data on sectoral competition. Section 6 concludes, discusses the results obtained here in reference to the current literature, and suggests future directions of research.

2 Previous Literature

Arrow (1972) was amongst the first modern economists to emphasize the importance of trust in overcoming everyday transaction costs and facilitating trade. He further argued a link to development: low trust tended to both characterize underdeveloped economies and significantly contribute to their state of underdevelopment. Other social scientists have also long emphasized the key role played by trust, some well-known examples are: Banfield (1958), Coleman (1988), Putnam (1993, 2000), Williamson (1993), and Fukuyama (1995). A recent and growing body of empirical work studies the evidence regarding that link. Typically, this work explores the relationship between aggregate (country or region wide survey) responses to the World Values Survey generalized "Trust" question and economic outcome variables such as GDP per capita. The question: "In general, would you say that individuals can be trusted, or that you can't be too careful in dealing with people", has been asked in the World Values Survey for nearly thirty years, and in country surveys (e.g., the US General Social Survey and the German Socio-Economic Panel Study) and continent level surveys (Latinobarometer, Asiabarometer, Eurobarometer, Afrobarometer). At the micro level, answers have been shown to predict behavior in games where financial rewards are at stake, and other types of pro-social behavior; most well known is the "Trust" game described in Berg et al. (1995). Glaeser et. al. (2000) showed the answers to this question correlated with trustworthiness (receiver behavior in this game), using a sample of Harvard undergraduates. On the other hand, Fehr et. al. (2003) showed that it correlated with trusting (sender) behavior in the "Trust" game, using the German Socio-Economic Panel. Sapienza et al. (2008) also find evidence to suggest that answers to the trust question pick up trusting behavior in a sample of Chicago MBA students, and argue that the survey questions are generally better at eliciting trust. Uslaner (2005) also shows trusting to be correlated with charitable contributions, and volunteering. Bacharach et al. (2007) provide an extensive review

of experiments on the Trust game, and interpretations of the findings therein. Fehr (2009) argues that the experimental evidence also suggests a behavioral (and biologically determined basis) for trusting behavior independently of risk aversion or perceived trustworthiness of others.

A recent literature in development economics has singled out trust as a key component of the broader notion of social capital in explaining underdevelopment; both Platteau (2000) and Basu (2006) discuss the societal benefits that arise when a generalized trust is extended between previously unacquainted indviduals. This notion underpins the formal theories developed by Zak and Knack (2000), Francois and Zabojnik (2005) and Tabellini (2008a). Uslaner (1999) also emphasizes the importance of generalized trust, i.e., trust in the unknown other rather than acquaintences. He argues that such trust derives largely from parents, and is not affected by daily experience. Our empirical results question this conclusion.

To explore causal effects of trust on economic outcomes, economists have utilized varying sets of (usually historical) instruments to isolate the effects of predetermined components of trust on outcome variables (most commonly GDP per capita). Most studies in this vein report evidence of significant, and usually large effects of trust, which they argue suggest a causal link from trust to economic development. Some attempts at identifying trust's effects are: Knack and Keefer (1997) who use a sample of countries and instrument for trust using ethnic fractionalization, Tabellini (2007) includes generalized trust as one of his sub-components in explaining economic outcome differences across regions of Europe, he also includes it directly, and instruments for it using historical literacy rates and historical political institutions. Guiso et al. (2006) instrument trust using the average levels in country of origin for children of parents who immigrated to the US. La Porta et. al (1998) instrument for trust using hierarchical religions. Algan and Cahuc (2010) explore within country variation by using country fixed effects. They do this by constructing a long time series on trust for countries by using information about ancestors' origins in the GSS. They also find a strong and large causal role of trust on country level outcomes, which persists with the addition of other time varying controls.[4] Guiso et. al (2009) is another recent and compelling study using historical variables to show that culture, although in this case the measure is not survey based trust but measures of civic engagement, has an important determining effect on economic outcomes.

We are examining a contrasting side of the trust phenomenon to that which has been the focus of much recent work. While not denying the importance of the past, it is also clear that trust is not entirely determined by the past. For example, education has long been known

[4]The idea of inheriting attitudes has been applied more broadly than trust. For example, Fernandez (2007) used attitudes towards working women in source countries to predict attitudes of US immigrants to such work.

to correlate with reported trust levels.[5] We view our inquiry as thus complementary to these studies. Whereas they have been trying to rule out higher frequency influences on attitudes in order to uncover their persistent components (which we do not contest on the basis of strong evidence for such effects), we are interested in a relatively immediate impact of an economic factor on these same attitudes.

Previous models of cultural evolution, which primarily hinge on parent-to-child values transmission such as Bisin and Verdier (2001) or Tabellini (2008a) do not seem like the natural place to start to examine the effect of changes in higher frequency economic variables like competition.[6] That is, unless selection is playing a big role, for example where individuals with differing characteristics acquired through the family select into different occupations or sectors based on these characteristics. These are features explored in the models of Corneo and Jeanne (2007) and Doepke and Zilibotti (2008). The latter assume that parents effectively choose the occupation of their off-spring by selecting a discount rate for them, whereas the former explore the effects of parents' inculcating different values on these occupational choices. Both develop models that are focused on societal trajectories over the very long run, and since our data will suggest that selection is not a big factor for our findings, we do not use models like those here.

The role of market settings and competition on subject behavior has been analyzed in laboratory contexts. The results are mixed. Bowles (1998) summarizes the earlier experimental literature which generally found the closer the experimental setting approximated the competitive ideal, the less other-regarding behavior ensued. However, Huck et al. (2007) studied the effects of increased competition amongst sellers with an ability to build reputations for experience goods. Increased competition, which lead to the possibility of punishing sellers by shopping elsewhere, increased trust in sellers. But in a similar environment, Brandts et al. (2006) found increased competition had little positive effect.[7]

The only paper we are aware of that has explored the much more directly related group competition effect in the laboratory is Nalbantian and Schotter (1997). There, they found that individual voluntary contributions to group output could be increased by creating group level rewards (shared equally among members) that depended on the group's performance relative to an outside group. This inter-group competition leading to increased intra-group voluntary effort

[5]For example, Tabellini (2008b) is concerned with the problem that trust levels may be determined by the quality of governance indicators and vice versa. One empirical strategy he exploits there is to explore exogenous source of variation in values (deriving from language) and exogenous sources in governance (deriving from legal origins) in order to net out causal effects running from trust to governance.

[6]See Bisin and Verdier (2006) for many more applications of cross-generational characteristic acquisition models.

[7]The work in laboratory settings on this issue does not seem to have reached a clear conclusion yet. In a recent study, Bolton, Loebbecke and Oxenfels (2008) argue that in internet markets competition may improve trust levels by improving information flows.

is key to the mechanism we will develop in our theory. The potential for gain arises because of a type of X-inefficiency as in Leibenstein (1987), which allows the possibility of free-riding within firms. Previous theoretical work: Scharfstein (1988), Vega-Redondo (1993) and Sjostrom and Weitzmann (1996) have explored the way in which increased competition between groups of individuals can increase efficiency within groups.[8] The model also bears some relation to Schmidt (1997) who is also concerned with the effects of competition on discretionary effort. Schmidt's richer model identifies numerous countervailing effects of competition which may actually lower individual effort, as well as one working to raise it as in our model. Our focus is instead on team-based production: the core of our model is the threat of free-riding endemic to such production and the way that it is attenuated via increases in competition.[9]

A number of studies have explored trust determinants at larger scales. Laporta et al. (1997) use the World Values Survey (WVS) trust question (which is similar to the one in the GSS) to compare trust across countries and its correlation with legal, civic and bureaucratic features of countries. They find positive correlations between bureaucratic quality, tax compliance, judicial performance, civic participation, large organizations and trust levels. Aghion et. al. (2009a,b) explore the role that regulation of labor market competition may have in engendering trust, in a cross-section of countries. Bidner and Francois (2010) develop a model predicting higher trust levels in larger countries, conditional upon institutional performance. They find considerable support for this using the WVS. Nunn and Wantchekon (2009) use Afrobarometer surveys to explore the effects of the slave trade on trust within African regions today. They find it to be large and deleterious. Fischer (2007), once again using the WVS, interacts country level competition (proxied by investment price/goods price ratio) and market integration (proxied via income categories). She finds that market integration seems to have a larger positive impact on trust in competitive environments. In primitive societies, market integration has been reported to positively affect pro-social behavior in a series of experiments conducted by Henrich et. al. (2001).

A recent paper by Butler et. al. (2010) argues for a causal effect of trust on individual economic returns. Trusting behavior has a non-monotonic effect on individual income, first increasing but falling for individuals whose trust is too high. These authors argue that the externality generating benefits of trust make their individual level finding consistent with the generally monotonic country level results.

[8] As Sjostrom and Weitzman (1997) note, this is also related to biologists' work on group selection. Henrich (2004) has also adapted biological approaches on group based selection to explaining pro-social behavior.

[9] We readily acknowledge, as is evidenced by Schmidt (1997), that a number of differing effects arise in richer models which could lead to competition lowering free-riding. Our modeling aim is not generality, but instead clarifying a single mechanism and generating empirical predictions that we can then take to data from it.

Finally Glaeser et. al. (2000) and Alesina and La Ferrara (2002) have examined many of the determinants of trust using different waves of the General Social Survey. Their analyses inform the baseline regression controls that we use throughout the analysis of individual level variation. Glaeser et al. (2000) was important in being the first to demonstrate that responses to the trust survey correlate with actual trusting play in experimental situations where financial rewards are at stake.[10] Alesina and La Ferrara (2002) extended the analysis of trust to investigation of neighbourhood effects. They documented such effects on trust arising from equality and heterogeneity and showed that it can be an important contributor to mistrust.

3 Banking Deregulation, Competition, and Trust

3.1 Background and Data

3.1.1 Bank Branching Deregulation

This subsection provides a brief overview on bank deregulation in the US, the reader is directed to Krozsner and Strahan (1999) for a more detailed discussion. Since the McFadden Act of 1927 ruled that national banks had to follow state-level bank branching restrictions, state governments have imposed significant restrictions on branching within their borders. Commercial banks were only allowed to open branches within a small geographic area within the state. Hence, some banks could only operate in one county, or within 100 miles from its head office, or even were only allowed to have a single branch (a regulation known as *unit branching*). In most cases, these bank branching restrictions were such that a bank would be a monopolist in these narrow confines.

Starting in the 1970s, several technological innovations such as automatic teller machines (ATMs), phone and mail banking, and more sophisticated credit-scoring systems radically reduced the cost of using banking services from a distant branch. These changes lead states to lift branching restrictions and permitting banks to operate multiple branches, either by opening new ones or by merging with other banks, in any part of the state.

Of particular interest for our research design is the fact that different states undertook branching deregulation at different times (Appendix D presents the dates). Krozsner and Strahan (1999) and Black and Strahan (2002) argue that the differences in the timing of these reforms across states were mainly driven by the state-level structure of banking, and by federal actions, but not associated with changes in the states' overall economic situation. More importantly, Black and Strahan (2002), Kerr and Nanda (2009), Levine et al. (2009) and our own evidence

[10] Though, somewhat surprisingly, they found that being trusting was correlated with playing trust games in a trustworthy matter. It was not the case that reporting oneself as trustworthy correlated with trustworthiness of play in the game. We discuss this, and similar papers, further in Section 4.

below, show that deregulation can be seen as positive exogenous shocks to the competitiveness of a state's *non-financial* sector.

Specifically, the timing of the reforms is not correlated with previous trends in the creation of new firms, but generated a large increase in the number of (non-financial) firms being started after they were implemented. This is explained by the fact that the deregulation of branching restrictions resulted in a more competitive (by breaking local monopolies) and efficient (by allowing mergers to occur) banking sector and more availability of credit, which in turn facilitated the creation of new firms and raised the contestability of local markets.

During the roughly similar period where the branching restrictions described above were lifted, states also ended restriction in the operation of out-of-state commercial banks within their border (note that most states did not enact these two reforms simultaneously). The literature on these deregulations commonly refer to the latter as *interstate* branching deregulation, and to the one discussed before as *intrastate* branching deregulation. Since previous research (e.g., Kerr and Nanda, 2009) has found that mainly intrastate had effects on firm entry, this paper focus only on the effect of these reforms, in a manner similar to Jayaratne and Strahan (1996) and Beck et al. (2010). We experimented with specifications including both types of reforms, and found that only the intrastate deregulations had statistically significant effects on firm entry and trust.

3.1.2 Data Description

The main data source for this section are the several waves of the US General Social Survey, which was first implemented in 1972, and at least every other year since then. The survey is asked of one adult per household and the sampling reflects regional population densities. The dependent variable of interest is the response to the following question: "Generally speaking, would you say that people can be trusted or that you can't be too careful in dealing with people?", which was discussed in more detail in Section 2. In the period analyzed in this section, the three possible answers were "Can Trust", "Cannot Trust" and "Depends". We code this into a binary variable taking value 1 if the respondent reported "Can Trust" and zero otherwise. Given that a very small fraction (3.9%) of the sample reported "Depends", different treatments of this answer (coding it as one, zero, or excluding it from the sample) do not affect the results in any significant way. The GSS also includes several economic and demographic variables on the respondents, such as income, employment, age, education, marital status, and race which we use as controls.

Not all states are surveyed at every year of the GSS, and we use an unbalanced panel of 43 states for the period 1973-1996 (Appendix D presents the list of states included in the sample). The starting date (1973) of the sample is defined by the availability of information on state

of interview, and the final point (1996) is defined both by the availability of our measure of competition and by the fact that in the mid-1990s federal legislation (the Riegle-Neal Act) eliminated interstate banking restrictions nationwide.[11] The sample includes 19,741 individual survey answers from the GSS.

As a proxy for state-level competition, we use the number of new incorporations per capita measured by the Dun and Bradstreet Corporation from official state records. This is the same variable used by Black and Strahan (2002), which discuss it in more detail, and and Levine et al. (2009). The average state in our sample has about 234 new incorporations per 100,000 people in a year (standard deviation of 115). The dates of both bank branching deregulation are taken from Kroszner and Strahan (1999) and were cross-checked with other studies of these reforms' effects.

3.2 Results

3.2.1 Graphical Analysis

We begin by presenting the results in a graphical analysis, tracing out the year-by-year relationship between the timing of the reforms, our measure of competition and trust levels. We do this by estimating the following equation:

$$trust_{ist} = \alpha + \sum_{j=-15}^{20} \beta_j D_{st,j} + \delta_s + \delta_t + \theta_s t + \varepsilon_{ist} \tag{1}$$

where $trust_{ist}$ is a dummy variable indicating if person i living in state s at year t responded "Can Trust" to the trust question. The $D_{st,j}$ variables indexes a set of variables that indicate the number of years until deregulation is enacted. The numbers are relative to the effect on the date of the reforms' enactment ("year zero"), which are normalized to zero. For example, $D_{st,-5}$ takes value one if state s at year t is going to enact deregulation in exactly five years or is zero otherwise, while $D_{st,3}$ is an indicator that takes value one if and only if deregulation happened exactly three years ago.

Hence, the model estimates the effect of being 15, 14, 13, ..., 1 years *before* a particular reform, as well as 1, 2, ..., 20 years *after* it in a completely flexible manner. We control for state and year fixed effects (δ_s and δ_t) and state-specific linear trends ($\theta_s t$), ruling out state differences that are fixed or vary linearly through time, as well as common nationwide factors that may evolve nonlinearly, such as the business cycle. The estimation also includes a dummy indicating if *interstate* bank deregulation took place and a variable measuring how many years since it occurred (note that $D_{st,j}$ measures the timing of *intrastate* deregulation).

[11] All years in which the GSS asked the trust question in the 1973-1994 period are included in the sample: 1973, 1975, 1976, 1978, 1980, 1983, 1984, 1986-1991 (every year in the interval), 1993, and 1994.

Figure 1 plots the estimates of β_j, hence tracing out the relationship between timing of reforms and trust levels (conditional on the controls). It also plots the result of performing the same exercise but substituting the dependent variable for our proxy of state-level competition: new incorporations per capita.

Both exercises produce a very similar, and striking, pattern. The first feature to notice is that the relationship between the timing of reform with trust and firm entry is flat in the periods *before* a reform occurs. This is direct evidence that the timing of the reforms is not correlated with previous trends in trust or competition and reinforces the notion that they can be considered exogenous events in the analysis of competition and trust. However, virtually immediately after each of the reforms take place, both competition and trust start trending up almost linearly. The relationship seems to stabilize at a higher level after about 10-15 years, but the estimated effects are noisier at this point, making it difficult to draw conclusions on this.

This coincidence in the timing of reforms and a trend break in the evolution of competition and trust make the case that deregulation had a causal impact on competition and trust. Moreover, the similarity in the pattern observed in both our competition and trust variables indicates that it is likely that they are determined by a unique process (which we aim to model in Section 4).

This nonparametric exercise in which no particular shape is imposed on the relationship between the timing of deregulation and our outcome variables is also valuable in guiding the parametric estimations reported in the next subsection.

3.2.2 Regression Results

We first explore the temporal and spatial variation in the timing of banking deregulation by estimating the following equation using the GSS waves for 1973-1996:

$$trust_{ist} = \alpha + \beta post_{st} + \gamma years_{st} + \lambda years_{st}^2 + \pi X_{ist} + \delta_s + \delta_t + \theta_s t + \varepsilon_{ist} \quad (2)$$

where again $trust_{ist}$ is a dummy variable indicating if person i in state s at year t trusts. $post_{st}$ is a dummy variable taking value one if at year t state s has already enacted a banking reform and zero otherwise. The variables $years_{st}$ measures, at year t, the number of years since state s has enacted its reform. For example, if a state enacted its reform in 1982, this variable equals one when $t = 1983$, two when $t = 1984$ and so on (while it value is zero for all years before, and including, 1982).

The estimation also controls for a vector of individual level controls (X_{ist}) that are known

to be correlated with trust[12] as well as state and year fixed effects (δ_s and δ_t) and state-specific linear trends ($\theta_s t$). Hence, the specification rules out state differences that are fixed or vary linearly through time as well as nationwide factors that may evolve nonlinearly, such as the business cycle.

This econometric framework requires only the *timing* of the reforms to be exogenous in order to estimate its causal effects, since the model captures trend breaks that coincide exactly with the timing of their enactment. Notice that we include the number of years after the reform was carried out (and its square) in addition to the dummy indicating the post-reform periods. This choice was guided by the fact that Figures 1 suggests that both firm entry and trust grow over time after the reforms take place. This pattern for firm entry is also found in previous studies (Kerr and Nanda, 2009; and Levine et al., 2009). This specification, however, nests the "difference-in-differences" case (where only post-reform dummies are included).

Given that the variables measuring competition and deregulation vary only at the state-year level, our estimates are *mathematically* the same as regressing average trust in a state-year on these variables (after the individual controls in X_{ist} are partialled out). We cluster the standard errors at the state level, allowing for correlation of unknown form across individuals within the same state (even at different years). Previous research has shown that, for similar data structure as the one used here, clustering standard errors appropriately addresses the issues that arise when one regresses individual variables (trust) on group (state) level variables (competition, deregulation) and the serial correlation likely present in the trust and competition variables.[13]

Table 1 presents the results of the estimation of equation (2) using both new incorporations per capita and trust levels as the dependent variable. Columns (1) and (2) show the results for our measure of competition. Column (1) allows the effect of the reform to vary nonlinearly over time by fitting a quadratic polynomial. Given the small size (and statistical insignificance) of the coefficients on the post-reform dummy and the squared time since reform, column (2) estimates the same model using only the "years since" variable. Both specifications indicate that a state that implements would have 8 more firms (per 100,000 inhabitants) being incorporated every year following the reform. This effect is statistically significant at the 1% level in both cases.

Our estimates are of similar size to the ones obtained in previous studies, even though the use

[12]These variables are a quadratic polynomial of age, indicators for completed high school and college education, population size of city/town of respondent, and a full set of dummies for race (black, white, other), gender, marital status (married, widowed, divorced, separated, never married) and religion (protestant, catholic, jewish, other/none). These variables are included only to increase the precision of the estimates and do not affect their magnitude in a significant way. We based the choice of covariates on what previous studies - Glaeser et al. (2000), Alesina and La Ferrara (2002) and Helliwell and Putnam (2007) - found to be correlated with trust.

[13]The simulations in Bertrand et al. (2004) and Hansen (2007) show that clustering standard errors at the state level lead to almost negligible size distortions in panels with similar cross-sectional and time-series dimensions as the one used here.

of the GSS leads to a slightly different sample of states and years and we include state-specific time trends, which are not present in some of the previous literature.

Columns (3) to (8) report the estimated effects of the reforms on trust levels. In consonance with the graphical analysis presented in the previous section, the estimates indicate that banking deregulation had an economically large and statistically significant impact on trust levels. The estimates imply that a state that lifted branching restrictions would experience about 1.0 - 1.2 percentage point increase in the share of its population reporting that they "Can Trust" every year after the reform. The estimated effect is of similar size across specifications (and it is always significant at the 5% level). Comparison between columns (3) and (4) indicate that, similarly to the firm entry case, a linear function of time since the reform captures its effect on trust. column (5) demonstrates that introducing the set of individual controls that are correlated with trust does not change our results, while columns (6) to (8) show that the estimates are robust to the inclusion of controls for statewide increases in average income and its inequality (these results are further discussed in the following subsection).

The fact that we find that the effect of deregulation on trust is better captured by a linear trend deserves some consideration. The empirical observation that deregulation lead to gradual cumulative increases on firm entry (instead of generating an immediate "jump") is noticed by Black and Strahan (2002), Kerr and Nanda (2009) and Levine et al. (2009), and the reader is referred to them for a discussion of this pattern. Given this result, finding a gradual cumulative impact on trust should be expected. It would be interesting to see if sharp, one-time, increases in competition lead to either sharp or gradual increases on trust, but this is not a feature present in this natural experiment.[14]

To investigate the effect of competition on trust we estimate to the following equation:

$$trust_{ist} = \alpha + \beta(new\ \ incorporations)_{st} + \pi X_{ist} + \delta_s + \delta_t + \theta_s t + \varepsilon_{ist} \tag{3}$$

where the variables and parameters are defined above.

By not including lagged values of firm entry, equation (3) estimates a contemporaneous effect of competition on trust. A year (the time dimension in our data) is presumably a long enough period for the effects of daily experiences to affect trust.[15] Moreover, the fact that the reforms grow gradually over time and the GSS is not surveyed every year in some periods make it a difficult task to pin down the lag structure between competition and trust.

Columns (1) to (8) of Table 2 provide different estimates of β. The first is its OLS estimate,

[14] Our proposed model predicts gradual adjustment of trust levels.

[15] See Alesina and La Ferrara (2002) who find that personal experiences within the last 12 months have a significant impact on trust in the GSS.

which is close to zero in size and significance.[16] Columns (2) to (8) report the estimates of β by 2SLS, where new incorporations is instrumented by variables measuring the number of years since banking reform was enacted. Column (2) reports a specification where the full quadratic function of the time since the reform is used as an instrument, while column (3) uses only the "years since" variable, which was the only significant term in the quadratic specification (note that the first-stage of these two specifications is reported on columns (1) and (2) of Table 1). In column (4), competition is instrumented by a full set of dummies indicating each year since the reform took place (i.e., the $D_{st,j}$ variables specified in equation 1). Note that there is a non-parametric interpretation for the first-stage of this specification, as no particular functional form of the effect of time since the reform on new incorporations is imposed. Column (5) adds the individual level controls to that specification.

Irrespective of which instruments are used, the 2SLS estimates indicate similar point estimates of β, which are always statistically significant (we discuss inference in more detail in the subsection addressing the possibility of weak instruments below). The implied effect from the estimate on column (5), for example, is that a 10% increase in firm entry (from sample mean level) causes a 2.4 p.p. increase in the share of its population responding that they "Can Trust".[17] Given that the standard deviation of firm entry is 115 new incorporations per 100,000 inhabitant, a one standard deviation change in competition raises the percentage of people reporting they can trust by 11.8 p.p..

The F-tests on the instruments in the first-stage (i.e., testing if the relationship between banking reform and new incorporations is zero) indicates significance below 5% levels for all three specifications of the instruments. However, in the case of the full quadratic polynomial (column 2) and the "years since" variable as a single instrument (column 3), the F-test is below usual rule-of-thumb values for the possibility of weak instruments.[18] To address this issue, Table 2 also reports inference based on Anderson-Rubin (AR)[19] statistics that have correct size independently of the strength of the instruments. The AR tests always reject the hypothesis that the effect of competition on trust is zero at the level of significance of 10% (column 2),

[16] The OLS estimate is substantially smaller than its 2SLS counterparts. The likely reason for this is that while the 2SLS captures only the effect of persistent increases in competition caused by the banking reforms, the OLS captures transitory variations in new incorporations (since state effects and trends, as well as time dummies, are included). Since it is likely that only persistent increases in competition affect trust (as our model predicts), the OLS estimate is expected to be smaller than the 2SLS.

[17] The reported coefficient equals the effect of the additional *flow* of having one more additional firm per 100,000 resident entering a state every year. For example, column (4) indicates that if 10 more firms (per 100,000 people) are being incorporated in a state every year, the percentage of its population reporting trust would be 1.3 p.p. higher.

[18] Several of the results on weak instruments discussed in this section are explained in more detail in the surveys by Andrews and Stock (2005) and Stock et al. (2002).

[19] The AR statistics allow for heteroskedasticity and clustering at the state level.

5% (column 3) and 1% (columns 4-8).[20] In the case where a full set of dummies for each year since the reform is used as instruments, the first stage relationship is very strong, and unlikely to be affected by the weak instrument problem, and hence we report of our robustness checks (columns 5-8) based on that specification.

Alternative Explanations and Threats to the Exclusion Restriction

The estimation of equation (3) imposes the exclusion restriction that banking deregulation had no effect on trust levels through a channel other than increased competition. Although this assumption cannot be directly tested, we can present evidence against other competing channels that could explain the deregulation-trust link. In particular, we focus on income levels and inequality.

Previous studies have shown that the branching deregulation explored in the paper have promoted income growth (Jayaratne and Strahan, 1996) and lowered income inequality (Beck et al., 2009). Hence we explore if our results are affected by including time-varying state-level measures of these variables: the (log) mean and Gini index of the annual individual income of a state, computed from several waves of the March Current Population Survey.[21]

We add these variables to the estimation of both the "reduced-form" OLS estimate of the impact of the reforms on trust (columns 6-8 of Table 1) and the 2SLS estimate of the effect of competition on trust (columns 6-8 of Table 2), and find that the results remain virtually unchanged by their inclusion, either separately or jointly.[22]

These results imply that it is unlikely that branching deregulation increased trust through increased income or lower inequality, strengthening the notion that these episodes of deregulation built trust through increased competition or, in other words, that there is no substantial violation of our exclusion restriction.

To summarize, our results indicate that competition has a positive impact on reported trust. The next section develops a model to explain this effect.

[20] Note also that the results from the just-identified case (column 3) does not differ from other specifications.

[21] The data was computed by J. Guetzkow, B. Western, and J. Rosenfeld for the Russell Sage Program on the Social Dimensions of Inequality, and is available at www.inequalitydata.org. The average annual income is adjusted to 2002 dollar using the CPI.

[22] Other measures of income (personal income and gross state product reported by the Bureau of Economic Activity) and inequality (differences between deciles of the income distribution) lead to similar results. We also included the variables as endogenous regressors (also instrumented by the years since reform dummies). The effect of competition remain qualitatively similar to those reported on Table 2.

4 The model

4.1 Informal Description

Firms require workers to contribute unverifiable effort. Each worker is one of two possible types: a free-rider or a trustworthy type, and type is non-observable. Free-riders never contribute unverifiable effort, trustworthy types always do. A worker's type is an inherent characteristic that is pre-determined at the time of entering the firm but that can change gradually through time. Type variation is driven by a cultural evolutionary process that has analogs with more familiar biological evolutionary processes. One can think of this as individuals choosing a rule of thumb that will be fixed for a number of periods. The rule of thumb thus denotes their type. If the expected returns to free-riding exceed those to trustworthiness, the worker will choose to be a free-rider, and vice versa if returns to trustworthiness are higher. These rules are reconsidered periodically, so that types can change as economic conditions do.

Each type has its advantages. Free-riding is good for the individual, conditional upon firm performance. However, a firm with too many free-riders will perform poorly, which adversely affects all workers. How adversely, depends on the level of competition. In particular, the more competitive the firm's environment, the more likely are poorly performing firms forced to shut down. Shut downs are costly to workers, and the key feature of shut downs is that they affect all workers equally. Since free-riders save on effort contributions, and since, in the event of shut down, they do no worse than the trustworthy, these considerations favour becoming a free-rider. We call this effect the "individual selection" effect. It is present due to the group nature of production that makes free-riding possible. Conditional on the performance of one's group or firm, any single individual always prefers to contribute as little as possible.

However, an advantage to being trustworthy is that one is less likely to be involved in a shut down. A worker contributing effort lowers the probability of her firm being forced to close. We call this effect the "group selection" effect. Though the trustworthy benefit all members of their group equally, they also lower their own personal chances of being in a group that performs poorly. This benefit is greater the stronger the forces of selection acting across groups.

An equilibrium balances these two forces and yields a distribution of types depending on the relative strengths of the "individual" and "group" selection effects. When a sector is very competitive, the probability of shut down in case of poor firm performance is high, and the "group selection" effect is strong. With low competition, in contrast, even if a firm performs poorly, shut down is unlikely, and the force of "group selection" is weak. The outcome then is that highly competitive sectors will have higher levels of trustworthiness.

To link this type of explanation to the evidence we have already reported, it is sufficient

to additionally assume that worker trust levels are affected by the trustworthiness of their colleagues. This is a valid assumption if the trust question in the GSS is picking up respondents' beliefs about how others are likely to behave, i.e, the trustworthiness of others. Experimental and survey evidence has indeed shown this to be the case. Sapienza et. al (2008) look at how answers to the trust question correspond with play in a modified version of the trust game where senders are also asked directly what they believe about receiver trustworthiness. They show there that trust, as reflected in answers to the GSS type trust question, is highly correlated with a respondent's beliefs about the trustworthiness of their partner. This relationship between the trust question and trusting behavior was also reported by Fehr et. al (2003), and with slightly different results by Glaeser et. al (2000). Sapienza et. al (2008) provide a unified rationalization of the findings.[23]

Notation

Assume J sectors in the economy. In each of those sectors, there exist Z firms. A firm requires N workers to produce. Firms produce for one period only and are either high quality (H) or low quality (L), depending on the composition of their selected workers. There are no other factors of production. There are potentially two types of worker: trustworthy (T) workers, who always contribute costly non-contractible and non-verifiable effort; and free-riders (F) who never contribute non-contractible, non-verifiable effort. A worker's type is non-observable but known to the worker. Time is discrete, and the discount rate across periods is r. Workers die with probability δ, at which point a new worker is born as replacement, so that the population stays fixed in total number at M where $M > JZN$, so that there exist enough workers to potentially meet all firms' labour requirements. New born workers are initially without type. Workers of either type have (indirect) utility which is linearly increasing in income and linearly decreasing in effort. Workers also have a constant opportunity cost activity which is always available (this can be thought of as unemployment or equivalently self-employment). This activity pays a wage W with effort cost normalized to 0.

Production technology

Once employed in a firm, each worker independently and simultaneously either contributes effort or not. This effort imposes on workers of either type a disutility cost of c. If not contributed, working at the firm incurs zero disutility. If effort at the firm is contributed by at least one of the N workers, the firm is H, otherwise it is L, so that the critical number of contributing workers is

[23]The issue of contention between these authors is whether answers to the GSS trust question are a reflection of the trustworthiness of others, or alternatively reflect the respondent's own level of trustworthiness. In contrast to the others cited above, Glaeser et. al.'s (2000) results suggest the latter. It is worth noting that under Glaeser et. al's (2000) interpretation the link between our model and the evidence would be even more direct. Trust answers are simply then a reflection of individual trustworthiness. Consequently, we do not need to take a stand here on this aspect of the trust question's interpretation.

one. In Appendix B we demonstrate that the key features of the model we study are preserved for any critical number strictly less than N.

Competition

Competition in a sector affects the probability that a low quality firm is forced to shut-down. The more competitive the sector, the higher this probability. In sector j, L quality firms shut down with probability $\gamma_j \geq 0$. H quality firms do not shut down. Thus each sector is caracterised by its competitiveness that is denoted by the term γ_j.

Cultural Evolution

At birth, the worker's sector is chosen and then type is "selected" to be either T or F. Sector is chosen before the newborn has a type, in reflection of the fact that types are determined through workplace experience. The individual can change type in a subsequent period with probability $\mu < 1$ per period.[24] Types are determined by a cultural evolution process that is a combination of "Payoff Dependent" and "Oblique" components. It is "Payoff Dependent" because both the newborns and potential changers consider the expected lifetime returns when deciding on type. If it is strictly better, in an expected lifetime utility sense, to be one of the types, that type is chosen with probability one. If individuals are indifferent to type, then they are socialized to be the same type as a randomly chosen population member. This is the "Oblique" component.[25]

Let V_{jt}^T denote the lifetime expected utility of being a trustworthy type at time t in sector j, and the corresponding value function denoting the utility for a free-rider is V_{jt}^F. These are explicitly derived in Appendix A. Let R_{jt} denote the net difference in the value functions: $R_{jt} \equiv V_{jt}^T - V_{jt}^F$, and let ϕ_{jt} denote the time t proportion of individuals of T type in sector j. At time t, the cultural evolutionary process that we posit implies that, in sector j, the probability of an individual without type becoming trustworthy is given by the function $\eta(R_{jt})$, with $\eta : \{\mathbb{R}\} \to [0,1]$ and:

$$\begin{aligned} \eta(R_{jt}) &= 1 \text{ if } R_{jt} > 0 \\ \eta(R_{jt}) &= 0 \text{ if } R_{jt} < 0 \\ \eta(R_{jt}) &= \phi_{jt} \text{ if } R_{jt} = 0. \end{aligned} \tag{4}$$

Firms

Each firm requires N workers and their only decision is the wage, w_{zj}, (for firm z in sector j) to call. We allow only a limited set of contracting possibilities for firms in order for type

[24] Though it is possible for individuals to change sectors, the equilibrium we characterize will generate no incentives for sectoral switching. Consequently, for simplicity, we characterize value functions under the assumption that switching does not occur, and demonstrate in the appendix that this is indeed the case in equilibrium.

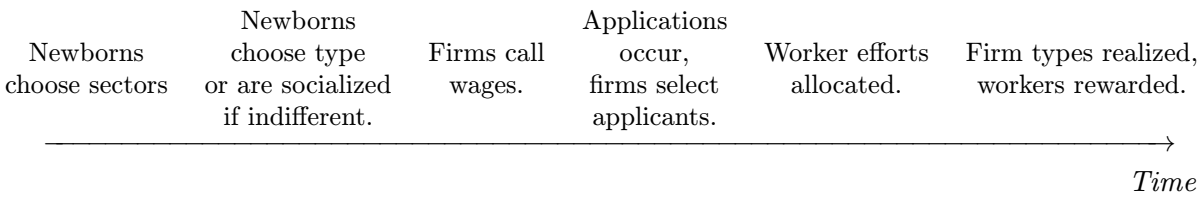
[25] We apply the law of large numbers to maintain constant proportions in steady states.

variation to be of consequence.[26] We assume that firms are not able to make wages contingent on either the firm or workers' types, which are unobservable, but can make them contingent on production occurring, i.e., on the firm remaining viable. If firms are H type, they produce for certain, and receive profits, $\pi(H)_{zj}$, for firm z in sector j. Net profits are then $\pi(H)_{zj} - Nw_{zj}$. If they are L type, they produce with probability $1-\gamma_j$ and generate profits $\pi(L)_{zj} - Nw_{zj}$ or are forced to shut down, probability γ_j, and receive 0.

Timing

Newborns choose their sector and their types are selected. Wage offers are made. Workers independently apply to firms. Applications are costless and, within a sector, multiple applications are possible. If more workers apply than the N openings at a firm, positions are randomly allocated to the applicants. Applicants not hired at any firm consume reservation utility. Workers then contribute effort according to type. If at least one worker contributes effort, the firm is H type, there is no shut-down and all workers are paid. If no worker contributes effort, the firm is L type, it shuts down with probability γ_j, in which event no workers are paid. With probability $1-\gamma_j$ an L firm produces nonetheless, and workers receive promised wages.[27] The timing is shown in Figure 2.

Figure 2: Timing of Events in the Model



Stationary steady state

A stationary steady state consists of a time invariant proportion of trustworthy types ϕ_j in each sector. Let Φ^* be the steady state distribution of the ϕ_j^* across all sectors. In a stationary steady state we also have:

S1*. The value of being either type in any sector is constant through time, i.e., V_{jt}^i is fixed for all t and both i.

S2*. In any sector with a positive proportion of both types, values must be equivalent across type, i.e., for j such that $0 < \phi_j^* < 1$: $V_j^T = V_j^F$.

[26] As Williamson (1993) has pointed out, if contracts are complete, the type of trading partners essentially becomes unimportant, as all types can be forced into choosing the correct sets of actions with appropriate punishments. So some limits on contracting are needed for type variation to matter.

[27] This probability of shutdown does not depend on promised wages because promised wages are never so high as to make net profits negative in case of production, that is $\pi(L_i) > Nw_i$. Though this restriction is not placed on primitives (since w_i is an equilibrium outcome) it will be seen that once wages are determined in equilibrium, that the corresponding restriction on primitives is $\pi(L_i) > N(W+c)$.

S3*. In any sector with a unique type, returns to that type strictly exceed returns to the other, i.e., for j such that $\phi_j^* = 0 : V_j^T < V_j^F$, and for j such that $\phi_j^* = 1 : V_j^F < V_j^T$.

S4*. In all sectors, either newborns do not enter, or if they do, participation is rational for at least one type, i.e., $V_j^i \geq \frac{W}{r+\delta}$, for at least one of $i = T$ or F.

There is a unique steady state in this model as described in the following proposition:

Proposition 1 *There exists a unique stationary steady state characterized by a distribution of trustworthiness levels across sectors Φ^*, with each sector's level being ϕ_j^*. In this steady state, sectors with competition levels below a cut-off (defined as $\gamma = \frac{c}{W+c}$), have no trustworthy types. Sectors with γ_j values beyond that cut-off have a strictly positive proportion of trustworthy types, and this proportion is strictly increasing in sectoral competition. The distribution of sectoral trustworthiness levels is given by*

$$\phi_j^* = \begin{cases} 0 & \text{for } \gamma_j \leq \frac{c}{W+c} \\ 1 - \left(\frac{c}{(W+c)\gamma_j}\right)^{\frac{1}{N-1}} > 0 & \text{for } \gamma_j > \frac{c}{W+c} \end{cases} \tag{5}$$

All proofs in Appendix A.

The effect of competition, γ_j, is to impose an indirect cost on the free-riders. But competition in a sector must be sufficiently high to generate any trustworthy types in that sector in steady state. The reason for such a cut-off is that competition must be strong enough to off-set the incentives for free-riding. If γ_j is very low, it always pays to be a free-rider as even low quality firms will only rarely be forced into shut-downs.

The model yields a simple and direct explanation of what happens to trustworthiness levels when we increase competition in all the sectors of the economy.

Corollary 1 *A increase in competition in all sectors strictly increases trust in all sectors in which initial trust levels are non-zero.*

Proposition 1 also generates prediction on trust at the sectoral level. In steady state, necessarily there must exist equivalence in returns to type both within and across sectors where both are present. For the trustworthy to be indifferent across sectors, wages must be equivalent in all sectors where they are present. But then the frequency of trustworthy types cannot be equal across sectors. If it were, free-riders in the least competitive sectors would be better off, since these have the lowest chance of shut-down in case of firms being low quality. Consequently, for free-rider returns to equalize across sectors, the steady state distribution of trustworthy types just off-sets sectoral differences in competition. This is achieved by the high competition sectors having higher proportions of trustworthy agents, which gives us our main empirical implication.

Though we do not formally consider the dynamics of this system, it is intuitive that such a steady state distribution is extremely robust to slight mistakes in the equilibrium distribution of types across sectors. To see why, suppose that too many trustworthy types are in a sector k at time t so that $\phi_{kt} > \phi_k^*$ at time t. In such a sector, evolutionary incentive strictly favor free-riders, so that all newborns entering the sector, and all those able to change would become free-riders. But this lowers ϕ_k, and such incentives will persist until ϕ_k^* is reached.

We thus obtain a set of predictions for the cross-section of an economy: namely, that highly competitive sectors should tend to have workplaces where co-workers are more likely to be trustworthy and hence where respondents tend to report that they are more likely to trust others. Moreover, taking the model further, this positive relationship should only occur beyond a certain threshold level of sectoral competitiveness. We will be able to test these predictions in the next section.

5 Trust and Sectoral Competition

We explore the relationship between sectoral competition and sectoral trust levels here. As the model allows for no underlying individual heterogeneity, it makes predictions about reported trust for individuals who are otherwise identical in their propensity to trust ex ante. But since there are many previously well documented determinants of individual trust, it is imperative to control for these when looking at this prediction. Additionally other aspects of the workplace may be playing a role. For example, the personnel policies of a firm, its degree of employee supervision, and the congeniality of relationships between management and workers, could all conceivably play roles. It is thus also important to control for as many other details of the workplace that may be varying in ways that could affect trust.

A major challenge we face in testing the model is in obtaining a measure of competition at the level of sector in which an individual is employed. The GSS includes no such competition measures, although the respondent's sector of employment is identified. For these reasons we use a particular wave of the GSS, 2004, that is advantageous for two reasons. Firstly, this wave included an extremely detailed extended workplace module. Secondly, by taking this year we can link individual sectors of employment to a measure of sectoral level of competition that we obtain from the US census of firms wave that was administered in 2002.

Data Description

In the 2004 wave of the US General Social Survey there are four responses to the same generalized trust question as we saw earlier, "Can Trust", that are linked to the workplace module. These are (with unconditional response rates in parentheses): 1 "always trusted"

(3.76%), 2 "usually trusted" (44.40%), 3 "usually not trusted" (42.14%) and 4 "always not trusted" (9.70%).

The literature on trust has established a set of individual characteristics to be used as explanatory variables. We use these as our basic controls in all regressions: income, which is a categorical variable with 24 brackets which we include as dummies; education, measured in years of completed schooling; age; marital status; gender; and city size.[28] Additionally, three categories of race (white, black, other) and self-reported ethnicity information by country of ancestral origin are included. From these we construct ethnicity and race dummies, the details of which are elaborated in Appendix C. This appendix also reports the sample means and standard deviations for each of these variables for our sub-sample of 616 individuals who comprise the core of our analysis. The determinants of this sample are explained below.

The Competition Measure

We match individual sector of employment with a sectoral measure of competition. Every five years, the Census Bureau surveys the population of US firms. The survey reports the percentage of total sales covered by the n largest firms ($n = 4, 8, 20, 50$) in North American Industrial Classification System (NAICS) sectors.[29] As a measure of competition this is clearly not perfect, as factors other than the competitiveness of a sector will affect these measures. A preferred, but still imprecise, measure would be the Hirschman/Herfindahl Index measure of concentration, but the census reports these for manufacturing only.[30]

The main determinant of selection into the sample we analyze is the availability of an industry code for individuals, and the matching of this to a competition measure from the census of firms. Not all individuals – the unemployed and retired for example – will have such a code. When a code is available, furthermore, the census does not cover every sector. Since the GSS reports sector, or industry of employment, using 1980 census (3-digit) codes, it is necessary to first convert these to 1990 census code measures and then use a cross-walk converter to obtain the corresponding NAICS (4 and 5 digit) measures. Each one of these steps also leads to the loss of a small number of observations as industry classification systems change. Our final sample includes 107 industry classifications (average of 5.75 individuals per sector).

Once a NAICS measure is obtained for each observation it is matched with the census percentage sales measures. The final variable, which is our measure of competition using the sales measure for the top 50 firms, "Comp50", is computed by subtracting the concentration measures

[28] We mainly follow Glaeser et. al. (2000) here. We include controls for the size of a city in which one lives, and will include workplace size controls later. Alesina and La Ferrara (2002) analyze a richer set of regional measures than we have available, and connect these to regional income Ginis and fragmentation measures.

[29] More details on the website: www.census.gov/epcd/www/naics.html

[30] The correlation between the Hirschman/Herfindahl index of concentration and our competition measure, described below, is very high: 0.85.

from 1. We have also computed results for all four other possible measures of competition available, but report only results for Comp50 in the text. Thus Comp50 for sector x is the percentage of total sales in x that is NOT covered by the largest 50 firms in that sector, since our measures are of competition and are coded inversely to concentration measures. Results for Comp4 (1 - share of sales of 4 larger firms), which are largely similar, are reported in Appendix E. Results using variables constructed with the shares from the 8 and 20 largest firms are even closer to those using Comp50 and are not reported, but are available upon request.

The average sector in our sample has measures of 60.53% for Comp50. A sector corresponding approximately to the average is NAICS # 42314 "Used Motor Vehicle Parts Merchant Wholesalers". An example of a particularly competitive sector is NAICS # 44112 "Used Car Dealers", Comp50 = 87%. A particularly uncompetitive sector is NAICS # 31132 "Chocolate and Confectionery Manufacturing from Cacao Beans", with Comp50 = 1.2%. Appendix D reports sectoral averages for more aggregate (two-digit) sectoral constructs. In general, most service sectors are more competitive than both manufacturing and retailing.

Estimation Procedure

In order to test the cross-sectional prediction, we run OLS regressions of the following form for an individual i working in industry j:

$$trust_{ij} = \beta_0 + \beta_1 comp50_j + \gamma Z_{ij} + e_{ij} \tag{6}$$

where Z_{ij} is a vector of independent variables that we describe below. The vector γ corresponds to their coefficients. The estimates are mathematically the same as regressing average trust in an industry against its competition measure (after individual controls - Z_{ij} - are partialled out). This particular interpretation is appealing since the number of sectors (107) is relatively large compared to the number of workers in a sector. Notice also that the main econometric implication of a small number of workers per industry is random sampling error in the measurement of average trust in a sector, which is uncorrelated with Comp50 and hence does not bias the results in any direction. The standard errors are clustered at the sectoral level, allowing for arbitrary correlation between workers of the same sector.[31]

Since almost ninety percent of the responses fall in the two middle categories "usually trust" and "usually don't trust", we focus on these. We code "usually trust" as 1 and "usually don't trust" as 0 (different codings do not affect the result). Given the infrequency of the "always" answers, the estimation of ordered logit is unlikely to be particularly useful. We have also estimated all of the regressions we report below as logit and probit regressions, but we report results in the

[31] Clustering leads to the appropriate inference in cases of "large number of groups/small group size" as the one present here.

paper obtained from estimating a linear probability model, since the significance of estimates does not change under this specification, and the coefficients can be directly interpreted.[32]

Results

We first show that the data conform to the usual patterns seen when trust is regressed on individual characteristics. This set of estimations is on our core sample of 612 respondents for whom we have industry and competition information and can therefore designate a competitiveness variable, and the Appendix D reports summary statistics for this core sample as well. The mean answer to the trust question, which is our dependent variable in all reported regressions, is 0.495 with standard deviation 0.500, i.e., about 50% of respondents answer "usually trust" as opposed to "usually don't" in response to the canonical trust question. This is higher than the usual positive answers to the trust question reported in most previous studies undertaken using US subjects. This is because, in order to obtain workplace competition measures, we have selected on individuals who are employed. As previous studies have found a positive correlation between trust and income, we should expect this to imply a higher than representative proportion of trusters in our core sample.

Firstly, all regressions we report include controls for income, gender, race, ethnicity, marital status, religion and occupation dummies as well as city size.[33] We find estimates on these variables that are consistent with previous studies of trust (Glaeser et. al (2000), Helliwell and Putnam (2007) and Alesina and La Ferrara (2002)), years of education is a strong determinant of trust, with an additional year of schooling being associated with a 2.54% increase in the probability that an individual reports that they "usually trust" as opposed to "usually don't trust". A one standard deviation increase in years of schooling increases trust by 7.3 percentage points. The set of income dummies indicate positive correlation between income and trust, (F-test suggests these are jointly significant). Age is entered as a second order polynomial, and is significant at the higher order.

Column (1) in Table 3 provides the most raw test of the model's predictions, i.e., that workers in competitive sectors should have higher levels of trust. The coefficient on Comp50 is 0.191 and

[32]Moreover, a Brant test of the ordered logit specifications rejected its parallel regressors assumption.We also experimented with two further types of estimation. In one, we estimate a multinomial logit version of the model which utilizes all of the four response categories, but allows different βs to be estimated for the transition to each response relative to an omitted category. The results that we obtained on the "usually trust" versus "usually don't" under this estimation are very similar to those reported here. In a second variant, we pooled all responses into a binary category. That is, the responses "always trust" and "usually trust" are coded as 1 for "yes" to the trust question and "always don't trust" and "usually don't trust" are coded as 0 for "no". This estimation yields slightly lower size on the competition variables than reported here, and consequently lower significance, but leaves things otherwise unchanged.

[33]We have also run all of these regressions without occupation dummies, which has no substantive effects on results.

is significant at the 1% level,[34] implying that a 10-p.p. increase in sectoral level competition leads to 1.91-p.p. increase in the probability that a respondent answers "usually trust". In variance normalized terms, this implies that a one standard deviation increase in Comp50 leads to about a 4.8 p.p. increase in trust. This result is fully robust to excluding different subsets (or all) of the individual controls.

The remaining columns in the table introduce various additional variables in order to demonstrate that the effect we are picking up is being driven by competition per se, and not some other correlates of trust that happen to be correlated with competition. On this front, we explore all the possibilities that we were able to identify and that the data allow, namely that competitive sectors have workplaces which: have less job security, are smaller, have more supervision, select different types of individuals, or somehow cultivate more congenial workplaces.

The general picture that emerges is that the effect of competition on trust is virtually unchanged by the inclusion of this large set of controls. While each individual inclusion sheds light on the (non-)importance of a specific omitted variable, the collective result increases our confidence that the results are likely to be robust to the inclusion of other variables that are not available in our data.[35]

Job Security: Karlan (2005) and Schechter (2007) show that trusting behavior in experimental settings is correlated with low risk aversion. If competitive sectors had low levels of job security, then it may be that these select risk lovers, who are also those likely to trust. This could explain the competition-trust link, but has nothing to do with the model we developed. Since we don't have information on risk aversion directly we thus include a measure of job security. Respondents were asked to respond to the statement "job security is good". We code a dummy variable equal to 1 if individuals respond that this is "very" or "somewhat" true, and equal to zero if "not too" or "not at all" true. As column (2) reports, the coefficient on Comp50 is entirely unaltered by the addition of this variable. As with all other workplace controls, the coefficient (and standard error) of the variable is reported on the more detailed tables of Appendix D.

Workplace Size: It is possible that competition is affecting trust by altering the size of workplaces in which individuals work. For instance, it may be the case that more competitive sectors, by admitting more firms, *ceteris parabus*, also tend to have smaller workplaces. By repeatedly interacting with a smaller group of individuals, it may be the case that individuals

[34] As indicated in Appendix E, results for Comp4 are largely in line with those reported here for Comp50, except of marginally lower significance. Our conjecture as to why this is the case relates to the coefficient of variation in Comp50 being significantly larger than that of Comp4. The proportion of sales covered by the largest 50 firms seems to be picking up much more of the cross industry variation in competition than that of the top 4.

[35] This is discussed formally by Altonji et al. (2005), and is applied to the case of trust questions by Nunn and Watchenkon (2009). If the similar procedure was applied to our results, it would imply that selection on unobservables would need to be at least 40 times greater than on observables to explain away our results.

are developing reputation-based trust with these individuals, which then translates into higher levels of trust overall. The GSS does attempt to measure the size of the workplace by asking: "About how many people work at the location where you work?" Respondents were allowed to choose from 7 categories. Column (3) adds dummy variables constructed from these categories to the baseline set of regressors, which does not attenuate the effect of competition on trust as the coefficient on Comp50 increases in size, and remains significant at the 1% level.

Congeniality of the Workplace: One may conjecture that the forces of competition induce firms to provide more congenial workplaces – which are costly – in order to retain the best employees. This is an argument made by Cohen and Prusak (2001). They argue that competitive environments that threaten employers with worker turnover induce employers to provide the sorts of workplaces that mitigate stress, allow workers to attain a sense of achievement, and respect family and other obligations. These more congenial workplace may contribute to a sense of overall well-being, and perhaps higher levels of trust. In order to see whether this is what the basic correlation is picking up, we exploit a rich set of workplace related questions. These are briefly described in Appendices C and D, with details (means, standard deviations, response categories) reported there as well. Many of these variables are directly concerned with the respondent's perceptions of relations between co-workers in the workplace; for example, whether there are heated arguments, people shout, people are put down, others take credit, others are helpful when needed, people act upset, or they turn away when others are threatened. Others ask directly whether the workplace is stressful and how often the respondent skipped work due to unhappiness with the work situation. Column (4) reports the relationship between Comp50 and trust after the addition of these extra workplace variables to the basic set of controls in column (1). The picture that emerged previously is largely unchanged. The coefficient on Comp50 remains at around 0.2 and highly significant, suggesting that these workplace variables do not seem to be related to the avenues through which competition affects trust.

The regressors also include whether the workplace is unionized, which is never significant, and we have also included the job security and workplace size controls. We have experimented with many different combinations from this full set of additional workplace variables and the picture obtained remains unchanged. The significance and magnitude of the competition measure is largely unaltered by the particular combination we try.

Supervision: Another possible hypothesis for the coefficient in column (1) is that sectoral competition, by increasing the costs to firms from poorly performing employees, induces firms to employ proportionately greater supervisory resources. Acting in a more restricted environment could make workers seem more trustworthy and lead to higher reported trust levels. This is

related to but distinct from the theory that we developed in the previous section. The model suggests competition across groups of workers is the key disciplining effect on free-riding, not restrictions on their discretion, even if the latter is arising due to competition. In order to examine the possibility that supervision is the source of the effect, we include responses to the question: "Does the Respondent have a supervisor on your job to whom you are directly responsible." This variable is included in column (5). Again, the results remain unchanged.

Optimism: As mentioned earlier, individuals who are observed to play high levels of trust in the trust game, are also individuals who are less averse to risk. While we have ruled out the selection of these more risk loving types through the job security question, it is possible that competitive sectors are selecting individuals with other characteristics that are related to their willingness to bear risk. One such characteristic is optimism. Individuals who are more optimistic that outcomes will turn out well, may be more willing to trust. Once again, we want to ensure that such an effect is not generating a spurious relation from competition to trust. The results from doing this are reported in column 7. There we include the variables "Optimism" (strength of agreement with "I'm always optimistic about my future") and "More Good" (strength of agreement with "Overall, I expect more good things to happen to me than bad"). Both of these are constructed as dummies with responses to the statements that are "strongly agree" and "agree" coded a 1, and "disagree" and "strongly disagree" coded a zero. It should be noted that the sample size drops to 532 when we do this, as these questions were given to only a sub-sample of all survey respondents. Neither of these variables enters significantly either on their own or together, and their impact on the coefficient on Comp50 is negligible.

As a final test, column (7) reports the regression results obtained when we include all of the variables reported above simultaneously. Once again, the coefficient on Comp50 remains at around 0.2 and strongly statistically significant.

Selection: Even though we have controlled for a number of observables, a correlation between competition and trust may be observed in such a cross-section even without sectoral competition causing increased trust if it is the case that individuals who are inherently more trusting are somehow selected into competitive sectors. The theory we developed in the previous section starts from ex ante symmetry across individuals. Consequently, once we have controlled for the individual specific factors that have predicted trust in previous studies, that theory would suggest that there should be no evidence of individuals who are inherently trusting selecting into competitive sectors. Evidence against this theory would then be provided if we found that individuals with no, or little, experience had higher (or as high) levels of trust, as individuals with longer experience in the competitive sectors. The GSS does not follow individuals through

time, so we use the "potential experience" measure commonly used in labor economics. This is created by subtracting years of education from the respondent's age minus 6. We then interact our competition measure with this constructed experience variable. Experience interacted results are reported on Table 4. Column (1) reports results obtained when we add this interaction term and omit experience directly in the regressions; as it is colinear with age and education.[36]

The results here are striking. Adding the interaction term makes both competition variables on their own insignificantly different from zero. Moreover, the interaction term itself is positive and significant for both competition variables across all specifications, at the 10% level. Table 4 replicates the regressions reported on Table 3 in the same order but now including the experience interaction. In general, $p - values$ are well below 10% on Comp50 in all specifications. For example, the final column (7) which includes all of the potential regressors, and the experience interaction, has a $p - value$ of 0.57.

The zero finding on direct inclusion of competition is evidence against selection. Individuals without experience are no more likely to respond positively to the trust question if they work in competitive sectors. However, as individuals increase their experience in the labor market, working in a competitive sector has a positive impact on their reported trust. Moreover, this impact is increasing the longer their experience. One explanation for this finding could be that interacting competition with experience is significant because this measure has less noise than the competition measure on its own. Though possible, this seems unlikely as the experience we measure is, if anything, introducing more noise because its ability to proxy for time spent in a sector is weaker the longer the individual has been in the labor market. The results here suggest it is unlikely to be the case that competitive sectors are selecting individuals with high levels of trust.

Examining the Threshold Prediction

Pushing the model further, it should be the case that, in addition to Comp50 being a positive determinant of trust, there is a threshold in the relationship between competition and trust in the cross-section. Specifically, for low levels of competition, there should be essentially no relationship, only at higher levels of competition should we expect the positive correlation. Due to space considerations, we explore this possibly non-linear (and non-smooth) shape of the relationship between trust and competition in detail in Appendix F but do not report it here. We find robust evidence of its presence.

[36]In order to be able to include experience directly, we have also run a specification where we include age dummies, instead of age as a continuous variable, and include our constructed measure of experience as a control as well. The results in these two specifications are not significantly different so we discuss the specification with continuous age in the paper.

6 Conclusion

Banking de-regulation that was implemented at different times across differing US states had the effect of increasing the rate of new firm incorporations in these states. We show that this source of increased competition also lead to state level increases in trust, as reflected in answers to the GSS generalized trust question. We then develop a model to explain this finding. The model is based on the disciplining effect that group level competition has on free-riders within a group, that leads through a cultural evolutionary model, to a positive effect of competition on trust. The model also predicts a positive correlation between competition and trust in the cross-section. We test this by analyzing an extremely detailed workplace module in the 2004 wave of the GSS. As the model predicted, individuals working in sectors that are more competitive have significantly higher levels of reported trust than individuals working in less competitive sectors. This relationship is robust, statistically significant and large. In variance normalized terms, it is slightly smaller than the effect of years of education on trust.

A tempting conclusion to draw from many recent studies that have established strong inter-generational persistence in trust (and other attitudes) is that such factors, to the extent that they matter for economic outcomes, are not amenable to policy influence, since trust is determined by the distant past. While the past clearly matters, our results cast doubt on a conclusion that policy does not. Policy clearly affects competition levels, and our evidence suggests that competition levels also affect trust. Given the centrality and magnitude of measured effects of social capital (and trust more narrowly) on development outcomes, such a previously ignored benefit from market competition has the potential to be as important for economic outcomes as the already well studied effects of competition in improving allocative efficiency.

This research raises two broad questions which we are continuing to explore. One concerns the general applicability of these findings to contexts outside the United States. Do increases in competition increase trust in other developed countries? Does this happen in LDCs? Is there a link between these findings and the increased pro-social behavior found in primitive societies that have experienced greater market penetration, as reported by Henrich et. al. (2001)? If so, this suggests that there exists another strongly pro-social benefit of market competition.

The second direction concerns the mechanism of effect. We think interactions in the workplace are key, as suggested by the model we have developed to explain our empirical findings. But this should be subjected to more rigorous scrutiny in other contexts. Other instances of dramatic change in sectoral competitiveness are a natural place to start. One candidate set of countries are the European ones. For these countries, trust attitudes could be explored using Eurobarometer data, which has been asked annually for 35 years in some cases. Specific events

where large changes in market competition occurred for some sectors, and which can be used as quasi-experiments are; European Union trade harmonization and German Unification.

As far back as Montesquieu, it has been conjectured that markets may be instrumental in generating pro-social behavior. Liberal market structures can only work when built on the give and take of a functioning civil society. Do markets sustain themselves by replicating these civil values, as Montesquieu contended? Or does the process of market competition itself tend to undermine the very values necessary for markets to exist? As, for example, Marx and Schumpeter argued.[37] Our evidence, which is a first step, is consistent with Montesquieu's conjecture, and suggests further investigation in this direction may be fruitful.

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[37] See Hirschman (1982) for a review of this older literature.

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Appendix A - Proofs

Derivation of Value Functions:

Let α_j denote the probability that at least one other worker in a randomly drawn firm in sector j is a trustworthy type. This clearly depends on the equilibrium object ϕ_j; the proportion of trustworthy individuals in that sector. Let p_j denote the probability of obtaining a job in sector j. As above, V_{jt}^T denotes the value of being a T type at time t in sector j; with the corresponding value function for an F type being V_{jt}^F. The value function solves:

$$\begin{aligned} & rV_{jt}^T \\ = \; & p_{jt}(E(w_{jt}) - c) + (1 - p_j)W - \delta V_{jt}^T + \\ & (1-\delta)\mu(V_{jt+1} - V_{jt+1}^T) + (1-\delta)(1-\mu)(V_{jt+1}^T - V_{jt}^T) \end{aligned} \tag{7}$$

where $V_{jt} = \max\{V_{jt}^T, V_{jt}^F\}$.[38] In words, with probability p_{jt} the worker in sector j obtains a job paying the expected wage and contributes effort at cost c. With the reciprocal probability, the worker consumes the reservation, w_j at no effort cost. At the end of the period, with probability δ the worker dies, and with probability $(1-\delta)$ he or she lives and either has the

[38] We proceed by assuming that the probability of finding a job is independent of the wage called by the firm, so that the expectation operator can be simply treated by multiplying through by the probability. In equilibrium, this turns out to be the case as all firms set the same wages. So we have not complicated the notation by allowing this when writing down the value function, though we do consider deviations in wages in proving the existence of equilibrium.

ability to change type (with probability μ) or remain the same $(1-\mu)$. If able to change, he or she chooses $\max\{V_{jt}^T, V_{jt}^F\}$. Similarly, the valuation for the free-rider is given by:

$$\begin{aligned} & rV_{jt}^F \\ = \; & p_{jt}E(w_{jt})((1-\gamma_j)(1-\alpha_{jt})+\alpha_{jt}) + (1-p_j)W - \delta V_{jt}^F + \\ & (1-\delta)\mu(V_{jt+1}-V_{jt+1}^F) + (1-\delta)(1-\mu)(V_{jt+1}^F - V_{jt}^F). \end{aligned} \tag{8}$$

Note that the difference here is that, since free-riders do not contribute effort, receiving a wage requires either one other worker to contribute effort (α_j), or if this does not happen, the firm being low quality but not shutting down $(1-\alpha_j)(1-\gamma_j)$. The net difference in lifetime valuations between types, which recall plays a critical role in the cultural evolution process in (4) and is denoted R_t, is given by:

$$\begin{aligned} & r(V_{jt}^T - V_{jt}^F) \\ = \; & p_{jt}(E(w_{jt})(1-\alpha_{jt})\gamma_j - c) - \delta(V_{jt}^T - V_{jt}^F) + (1-\delta)\mu(V_{j,t+1}^F - V_{j,t+1}^T) \\ & +(1-\delta)(1-\mu)(V_{j,t+1}^T - V_{j,t+1}^F + V_{jt}^F - V_{jt}^T) \end{aligned} \tag{9}$$

$\Leftrightarrow$

$$\begin{aligned} & R_{jt} \equiv (V_{jt}^T - V_{jt}^F) \\ = \; & \frac{\Big(p_{jt}(E(w_{jt})(1-\alpha_{jt})\gamma_j - c) + (V_{j,t+1}^T - V_{j,t+1}^F)((1-\delta)(1-2\mu))\Big)}{1+r-(1-\delta)\mu} \end{aligned} \tag{10}$$

Proof of Proposition 1

The steady state conditions have the following implications, where * denote steady state values:

Condition S2 implies that if $\phi_j^* > 0$:

$$\begin{aligned} & V_j^T - V_j^F \\ = \; & \frac{p_j\left(E(w_j)(1-\alpha_j)\gamma_j - c\right)}{\delta + r + (1-\delta)\mu} = 0. \end{aligned}$$

Also, since a trustworthy type knows for sure that there will be at least one trustworthy worker in any firm she works we have:

$$V_j^T = \frac{p(E(w)-c)+(1-p)W}{r+\delta}. \tag{11}$$

Alternatively if there are no T types in the sector (with $\phi_j^* = 0$) condition S3 implies:

$$\frac{p_j(E(w_j)-c)+(1-p_j)W}{r+\delta} = V_j^T < V_j^F = \frac{pE(w_j)(1-\gamma_j)+(1-p_j)W}{r+\delta}$$

Existence:

Suppose $\gamma_j > \frac{c}{W+c}$, Then $V_j^T = V_j^F$ implies

$$\frac{p_j^* \left(w_j^*(1-\alpha_j^*)\gamma_j - c \right)}{\delta + r + (1-\delta)\mu} = 0,$$

so that necessarily:

$$w_j^* = \frac{c}{\left(1-\alpha_j^*\right)\gamma_j}. \tag{12}$$

Firm profit maximization implies that participation constraints bind: i.e. $V_j^{*T} = \frac{W}{r+\delta} = \frac{p_j^*(w_j^*-c)+(1-p_j^*)W}{r+\delta}$ which implies, for any value of p_j^* :

$$w_j^* = W + c. \tag{13}$$

Combining (12) and (13) yields

$$\alpha_j^* = 1 - \frac{c}{(W+c)\,\gamma_j}. \tag{14}$$

It is immediate from (14) that given $\gamma_j > \frac{c}{W+c}$necessarily $\alpha_j^* > 0$, and also since $\gamma_j \leq 1$, necessarily $\alpha_j^* < 1$. Since firms allocate positions randomly amongst the pool of applicants, if more than N apply, this yields a binomial distribution within firms with parameter ϕ_j^*; hence the probability of x trustworthy amongst the $N-1$ employees is:

$$P(M) = \left(\begin{array}{c} N-1 \\ M \end{array} \right) \left(\phi_j^*\right)^M \left(1-\phi_j^*\right)^{N-M-1}.$$

Since the term α above is the probability of at least one other success, i.e., $1 - P\,(0)$:

$$\alpha_j^* = 1 - \left(1-\phi_j^*\right)^{N-1}.$$

Substituting this into equation (14) yields a unique solution for ϕ_j^* :

$$\begin{aligned} 1 - \left(1-\phi_j^*\right)^{N-1} &= 1 - \frac{c}{(W+c)\,\gamma_j} \\ \phi_j^* &= 1 - \left(\frac{c}{(W+c)\,\gamma_j} \right)^{\frac{1}{N-1}}, \end{aligned} \tag{15}$$

which is the value stated in the proposition.

Suppose $\gamma_j \leq \frac{c}{W+c}$. It is immediate from the above that there does not exist a $\phi_j^* > 0$ such that $V_j^T \geq V_j^F$. Setting $\phi_j^* = 0$, we have $V_j^T < V_j^F = \frac{W}{r+\delta}$, which implies

$$w_j^* = W/\left(1-\gamma_j\right) < W + c. \tag{16}$$

Consequently $\phi_j^* = 0$, and the wage given in (16) is the unique wage such that the participation constraint of the free-riders binds. A higher value of wages will not be profit maximizing, and lower values will not induce participation.

Uniqueness:

Since workers are indifferent to participating in the steady state above, p_j^* is not pinned down. Consequently equilibria are unique only up to $p_j^* \in [\frac{NZ}{M}, 1]$. Suppose $\gamma_j > c/(W+c)$, and consider the possibility of a steady state in which $\phi_j^* = 0$ for any one of these sectors. Necessarily, participation for the F types requires that:

$$V_j^F(t) \geq \frac{W}{\delta + r} \text{ for all } t. \tag{17}$$

Suppose that this holds with equality in the posited steady state, then using (19) and the fact that in the posited steady state, since only free-riders exist then $\max\{V_j^T, V_j^F\} = V_j^F$. Equation (17) binding implies that $w_j^* = \frac{W}{1-\gamma}$. Now consider the value to being trustworthy under such a posited wage, $V_j^T(t)$. Using expression (11) this equals: $V_j^T(t) = \frac{p_j(W/(1-\gamma_j)-c)+(1-p_j)W}{r+\delta}$, which since $\gamma_j > c/(W+c)$ implies that $V_j^T(t) > \frac{W}{r+\delta}$. But this contradicts $\max\{V_j^T, V_j^F\} = V_j^F$.

So it is not possible for $\phi_j^* = 0$ when $\gamma_j > c/(W+c)$. Hence, in that case, necessarily $\phi_j^* > 0$ implying $V_j^T = V_j^F$. But from (15) we have already demonstrated that the unique solution for which $V_j^T = V_j^F$ is that given by (15).

Now suppose $\gamma_j \leq \frac{c}{W+c}$. In this case, it has already been established that there does not exist a $\phi_j > 0$ such that $V_j^T = V_j^F$. And for $\phi_j^* = 0$ condition (16) established the unique value of the wage at which participation constraints bind, consequently $\phi_j^* = 0$ and $w_j^* = W/(1-\gamma_j)$ is the unique solution.■

Proof of Corollary 1. A steady state with $\phi_j > 0$ exists if and only if $\gamma_j \geq \frac{c}{W+c}$. From equation (5) it is immediate that an increase in γ_j leads to an increase in steady state trust, ϕ_j^*.■

Table 1: Bank Branching: Effects on Firm Entry and Trust

Dependent Variable:	New Incorporations		Trust Indicator (x100)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-Deregulation	-7.463	-	-1.484	-	-	-	-	-
	(8.071)		(1.904)					
Years Since Deregulation	8.029	8.066	1.271	1.180	0.973	1.037	0.961	1.024
	(2.821)***	(2.813)***	(0.537)**	(0.485)**	(0.401)**	(0.409)**	(0.413)**	(0.421)**
(Years Since Deregulation^2)/100	-6.109	-	-0.182	-	-	-	-	-
	(26.537)		(3.461)					
Controls								
Individual Controls†	-	-	-	-	Yes	Yes	Yes	Yes
(log) Median Income	-	-	-	-	-	Yes	-	Yes
Income Inequality (Gini)	-	-	-	-	-	-	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific Time Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19741	19741	19741	19741	19741	19741	19741	19741

*** -Significant (1% level); **-Significant (5% level); *-Significant (10% level). Robust standard errors clustered at the state level in parenthesis. Each column is reports a separate regression using data on 43 states for the 1973-1996 period, controlling for state fixed effects, year effects, and state-specific trends. The dependent variable in Columns (1)-(2) is the number of new incorporations in a state-year (per 100,000residents). The dependent variable in Columns (3)-(8) is an indicator if the respondent trusts (multiplied by 100).

† The set of individual controls are income, a quadratic polynomial of age, indicators for completed high school and college education, population size of the city/town of residence, and a set of dummies for employment status, race, gender, marital status and religion.

Table 2: Effects on Trust: OLS and 2SLS

	OLS	Two-Stage Least Squares (2SLS)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
New Incorporations per 100,000 people	0.014	0.150	0.146	0.131	0.104	0.118	0.110	0.127
	(0.019)	(0.071)**	(0.070)**	(0.047)***	(0.041)**	(0.043)***	(0.043)**	(0.046)***
	-	{2.27}*	{5.75}**	{61.15}***	{134.98}***	{84.16}***	{70.38}***	{59.44}***
F-Test of Excluded Instruments in First Stage	-	3.30**	7.99***	97.57***	94.31***	78.29***	49.75***	41.15***
Overidentification Test Hansen J-Stat (χ^2 dist.)	-	0.16	-	23.64	30.15	31.43	30.02	31.87
Instruments								
Quadratic Polynomial of Years Since Deregulation	-	Yes	-	-	-	-	-	-
Years Since Deregulation	-	-	Yes	-	-	-	-	-
Set of Dummies for each Year Since Deregulation	-	-	-	Yes	Yes	Yes	Yes	Yes
Controls								
Individual Variables†	-	-	-	-	Yes	Yes	Yes	Yes
(log) Median Income	-	-	-	-	-	Yes	-	Yes
Income Inequality (Gini)	-	-	-	-	-	-	Yes	Yes
Time Effects, State Fixed Effects, and State-Specific Time Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19741	19741	19741	19741	19741	19741	19741	19741

*** -Significant (1% level); **-Significant (5% level); *-Significant (10% level). Robust standard errors clustered at the state level in parenthesis - (). Heteroskedascity-robust and state-level clustered version of the Anderson-Rubin test statistics (F distributed) for the null hypothesis that the coefficient is zero are reported in in braces - {}. Each column reports a regression estimating the impact of new incorporations (per capita) on a dummy variable indicating if the respondent trusts (×100) using data on 43 states for the 1973-1996 period, controlling for state fixed effects, year effects, and state-specific trends. In Column (2) new incorporations is instrumented with an indicator if the state enacted branch deregulation, the number of years since deregulation occurred, and its squared value. In Columm (3), the instrument is only the number of years since deregulation. In Columns (4)-(8), new incorporations is instrumented by dummy variables for each year after deregulation.

† The set of individual controls are income, a quadratic polynomial of age, indicators for completed high school and college education, population size of the city/town of residence, and a set of dummies for employment status, race, gender, marital status and religion.

Table 3: Effects of Sectoral Concentration on Trust

	Dependent Variable: Trust Indicator						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Comp50	0.191 (0.073)***	0.191 (0.073)***	0.213 (0.079)***	0.208 (0.079)***	0.187 (0.072)***	0.161 (0.078)**	0.187 (0.086)**
Education	0.026 (0.008)***	0.026 (0.008)***	0.026 (0.008)***	0.026 (0.008)***	0.026 (0.007)***	0.022 (0.009)**	0.021 (0.01)**
Age	-0.011 (0.007)	-0.010 (0.007)	-0.010 (0.007)	-0.011 (0.007)	-0.010 (0.007)	-0.011 (0.007)**	-0.014 (0.007)**
Age Squared/100	0.014 (0.007)*	0.013 (0.007)*	0.013 (0.007)*	0.014 (0.007)*	0.013 (0.007)**	0.015 (0.006)***	0.019 (0.006)***
Controls Included in Specification:							
Job Security	-	Yes	-	Yes	-	-	Yes
Union Status	-	-	-	Yes	-	-	Yes
Arguments	-	-	-	Yes	-	-	Yes
Skip Work	-	-	-	Yes	-	-	Yes
Supervisor	-	-	-	-	Yes	-	Yes
More Good	-	-	-	-	-	Yes	Yes
Optimism	-	-	-	-	-	Yes	Yes
Workplace Size	-	-	Yes	Yes	-	-	Yes
Other Workplace Covariates	-	-	-	Yes	-	-	Yes
Observations	612	612	612	612	612	530	530

*** -Significant (1% level); **-Significant (5% level); *-Significant (10% level).

Robust standard errors clustered at the industry level in parenthesis. Each column reports the results of a separate regression with a dummy indicator if the respondent can trust as the dependent variable. All specifications include income, gender, race, ethnicity, marital status, and religion dummies as well as city size, and the list of additional controls indicate the variables added to the specification in that column. See text for a description of the variables.

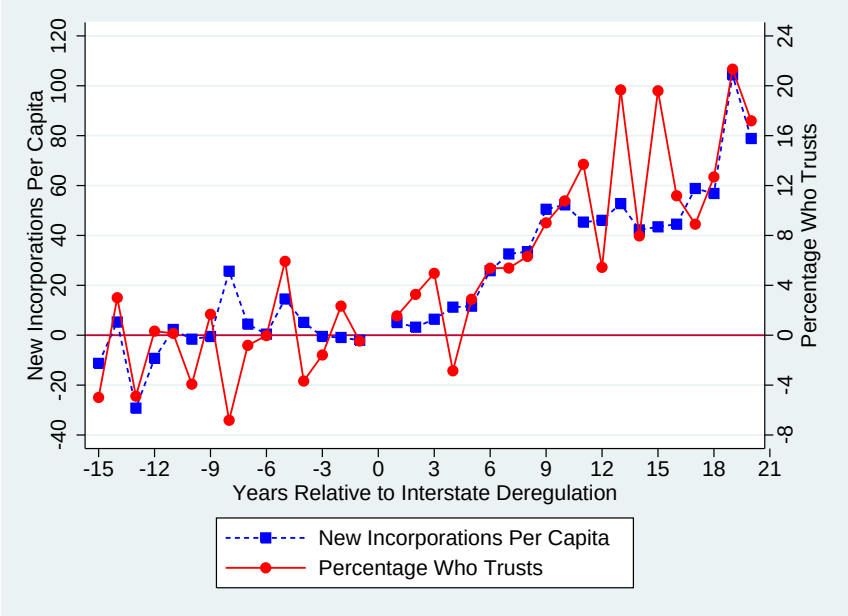
Table 4: Effects of Sectoral Concentration on Trust Interacted with Experience

	Dependent Variable: Trust Indicator						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Comp50	-0.076	-0.076	-0.061	-0.060	-0.090	-0.097	-0.071
	(0.149)	(0.149)	(0.146)	(0.152)	(0.149)	(0.155)	(0.156)
Comp50*Experience	0.009	0.009	0.009	0.009	0.010	0.009	0.009
	(0.005)**	(0.005)**	(0.005)**	(0.005)*	(0.005)**	(0.005)*	(0.005)*
Education	0.031	0.031	0.032	0.031	0.032	0.028	0.027
	(0.008)***	(0.008)***	(0.008)***	(0.009)***	(0.008)***	(0.009)***	(0.011)**
Age	-0.019	-0.019	-0.020	-0.020	-0.021	-0.025	-0.025
	(0.009)**	(0.009)**	(0.009)**	(0.009)**	(0.009)**	(0.009)***	(0.008)***
Age Squared/100	0.017	0.017	0.018	0.017	0.019	0.023	0.024
	(0.007)**	(0.008)**	(0.008)**	(0.007)**	(0.007)***	(0.007)***	(0.007)***
Controls Included in Specification:							
Job Security	-	Yes	-	Yes	-	-	Yes
Union Status	-	-	-	Yes	-	-	Yes
Arguments	-	-	-	Yes	-	-	Yes
Skip Work	-	-	-	Yes	-	-	Yes
Supervisor	-	-	-	-	Yes	-	Yes
More Good	-	-	-	-	-	Yes	Yes
Optimism	-	-	-	-	-	Yes	Yes
Workplace Size	-	-	Yes	Yes	-	-	Yes
Other Workplace Covariates	-	-	-	Yes	-	-	Yes
Observations	612	612	612	612	612	530	530

*** -Significant (1% level); **-Significant (5% level); *-Significant (10% level).

Robust standard errors clustered at the industry level in parenthesis. Each column reports the results of a separate regression with a dummy indicator if the respondent can trust as the dependent variable. All specifications include income, gender, race, ethnicity, marital status, and religion dummies as well as city size, and the list of additional controls indicate the variables added to the specification in that column. See text for a description of the variables.

Figure 1: Firm Entry, Trust, and Timing of Bank Deregulation



The figure plots the effect of each individual year before and after bank branching deregulation on both the number of new incorporations (per 100,000 state residents) and the probability of answering positively to the trust question. It reports the βs from the following regression:

$$Y_{ist} = \alpha + \sum_j \beta_j D_{st,j} + \pi X_{ist} + \delta_s + \delta_t + \theta_s t + \varepsilon_{ist}$$

where Y_{ist} is either the new incorporations or trust. $D_{st,-j}$ is an indicator taking value =1 if state s enacted deregulation exactly j years after (or $-j$ years before) year t. $D_{st,0}$(the indicator for the year reform takes place) is omitted, so all effects are relative to that year The regression controls for state fixed effects (δ_s), time effects (δ_t), individual state trends (θ_s). Data covers 43 states in the 1973-1996 period.

APPENDICES NOT FOR PUBLICATION

Appendix B - Varying the Production Technology

We have assumed that discretionary effort needs to be supplied by only one of the N workers in each firm. Consider what happens if instead of one, the critical number of workers required to contribute discretionary effort for the firm to be H quality is some $x+1 : 0 < x \leq N$? The first thing to note is that, in each sector, there now emerges a degenerate equilibrium in which all workers are of F type. This is because, up to x, effort contributions are complementary, conditional upon zero effort from co-workers, it is always optimal to be of F type. The key element of the model that we have studied, free-riding, and the mitigating effect that competition has upon this, does not arise in such degenerate equilibria.

However, there always exists another equilibrium which is qualitatively similar to that which we observe in our model. Specifically, for sufficiently high levels of competition, a stable steady state equilibrium also emerges in which a constant share of the workers are of T type. None of the qualitative results of our model are affected. Formally, the only difference is in the probability of a worker ending up in a H type firm. We denote by $\alpha(x)$, the probability that out of $N-1$ randomly drawn workers, at least x of them are of T type. Formally,

$$\alpha_{jt}(x) = 1 - \sum_{k=0}^{x-1} P_{jt}(k)$$

where

$$P_{jt}(k) = \left(\begin{array}{c} N-1 \\ k \end{array} \right) \phi_{jt}^{k} \left(1-\phi_{jt}\right)^{N-k-1}.$$

This modifies the value function for the different types:

$$\begin{aligned} & rV_{jt}^{T} \\ = \; & p_{jt}E(w_{jt})((1-\gamma_j)(1-\alpha_{jt}(x)) + \alpha_{jt}(x) - c) + (1-p_{jt})W - \delta V_{jt}^{T} + \\ & (1-\delta)\mu(V_{j,t+1} - V_{j,t+1}^{T}) + (1-\delta)(1-\mu)(V_{j,t+1}^{T} - V_{jt}^{T}) \end{aligned} \tag{18}$$

trustworthy individuals are no longer ensured to be in a H type firm. Similarly, the valuation for a free-rider is given by:

$$\begin{aligned} & rV_{jt}^{F} \\ = \; & p_{jt}E(w_{jt})((1-\gamma_j)(1-\alpha_{jt}(x+1)) + \alpha_{jt}(x+1)) + (1-p_j)W - \delta V_{jt}^{F} + \\ & (1-\delta)\mu(V_{j,t+1} - V_{j,t+1}^{F}) + (1-\delta)(1-\mu)(V_{j,t+1}^{F} - V_{jt}^{F}). \end{aligned} \tag{19}$$

The net difference in lifetime valuations between types, which recall plays a critical role in the cultural evolution process in (4) and is denoted R_{jt}, is given by:

$$\begin{aligned} & r(V_{jt}^T - V_{jt}^F) \\ = \; & p_{jt}(E(w_{jt})(\alpha_{jt}(x) - \alpha_{jt}(x+1))\gamma_j - c) - \delta(V_{jt}^T - V_{jt}^F) + (1-\delta)\mu(V_{j,t+1}^F - V_{j,t+1}^T) \\ & +(1-\delta)(1-\mu)(V_{j,t+1}^T - V_{j,t+1}^F + V_{jt}^F - V_{jt}^T) \end{aligned} \tag{20}$$

$\Leftrightarrow$

$$\begin{aligned} & R_{jt} \equiv (V_{jt}^T - V_{jt}^F) \\ = \; & \frac{\left(p_{jt}(E(w_{jt})P_{jt}(x)\gamma_j - c) + (V_{j,t+1}^T - V_{j,t+1}^F)((1-\delta)(1-2\mu))\right)}{1 + r - (1-\delta)\mu} \end{aligned} \tag{21}$$

noting that $\alpha_{jt}(x) - \alpha_{jt}(x+1) = P_{jt}(x)$.

The interior steady state conditions have the following implications, where * denote steady state values and the t indices are dropped:

Condition S2 implies that if $\phi_j^* > 0$:

$$\begin{aligned} & V_j^T - V_j^F \\ = \; & \frac{p_j\left(E(w_j)P(x)\gamma_j - c\right)}{\delta + r + (1-\delta)\mu} = 0. \end{aligned}$$

Firm profit maximization implies that participation constraints bind: i.e.

$$V_j^T = \frac{W}{r+\delta} = \frac{p_j^*(w_j^*(1-\gamma_j + \gamma_j\alpha_{jt}(x)) - c + (1-p_j^*)W}{r+\delta}$$

which implies, for any value of p_j^* :

$$w_j^* = \frac{W + c.}{1 - \gamma_j + \gamma_j\alpha_j(x)} \tag{22}$$

The steady state interior equilibrium condition becomes

$$P_j(x) = \frac{c}{W+c}\left(\frac{1-\gamma_j}{\gamma_j} + \alpha_j(x)\right)$$

Note that $P_j(x)$ is a unimodal function of ϕ_j that takes zero when $\phi_j = 0$ and when $\phi_j = 1$ and that has a maximum for $\phi_j = \frac{x}{N-1}$.

$$\frac{dP_j(x)}{d\phi_j} = \frac{x - \phi_j(N-1)}{\phi_j(1-\phi_j)}P_j(x)$$

Similarly, $\alpha_j(x)$ is a monotonically increasing function of ϕ_j that is first convex and then concave.

Note also that the right hand side of the equilibrium condition is a translation of $\alpha_j(x)$. When γ_j falls the function increases in value. When c rises, the slope of the function and the value of the function also rise. This is graphically depicted on Figure A1.

Proposition 2 *For all $c > 0$, there exists a $\gamma(c)$ such that when $\gamma_j < \gamma(c)$, the only stable steady state equilibrium is the degenerate one i.e. $\phi_j = 0$. When $\gamma_j > \gamma(c)$, there exists another interior stable steady state equilibrium $\phi_j(\gamma_j)$. This equilibrium is decreasing with γ_j.*

Proof. a) $\phi_j = 0$ is always a steady state equilibrium when $x > 0$ as there is no gain to being a T type.

b) $P_j(x)$ is a unimodal function of ϕ_j and takes zero value when $\phi_j^* = 0$ or 1. $\alpha_j(x)$ is a monotonic function going from zero to one for $\phi_j \in [0,1]$ and $\frac{c}{W+c}(\frac{1-\gamma_j}{\gamma_j} + \alpha_j(x))$ is a translation of $\alpha_j(x)$ that falls when γ_j increases. Therefore, we have that there exists a $\gamma(c)$ such that when $\gamma_j < \gamma(c)$, $P_j(x) < \frac{c}{W+c}(\frac{1-\gamma_j}{\gamma_j} + \alpha_j(x))$ for all ϕ_j and when $\gamma_j > \gamma(c)$, the two functions cross at least twice. We define as $\phi_j(\gamma_j)$ the largest of those roots. Therefore, at $\phi_j(\gamma_j)$, $\frac{d(P_j(x) - \frac{c}{W+c}(\frac{1-\gamma_j}{\gamma_j} + \alpha_j(x)))}{d\phi_j} < 0$, this insures the stability of the equilibrium. It also ensures that $\phi_j(\gamma_j)$ is decreasing in γ_j as $\frac{d(P_j(x) - \frac{c}{W+c}(\frac{1-\gamma_j}{\gamma_j} + \alpha_j(x)))}{d\phi_j} = \frac{c}{W+c}\frac{1}{\gamma_j^2} > 0$. ■

Appendix C - Details on Creation of Variables from the GSS

- Income dummy variables are generated for each of the 24 categories (including refused) of the "income98" (total family income) variable.

- Ethnicity dummy variables are generated for groupings of the "ethnic" (country of family origin) variable: Northern European (Austria, Czechoslovakia, Denmark, Finland, Germany, Hungary, Netherlands, Norway, Poland, Sweden, Switzerland, Lithuania, Yugoslavia, Other European), Anglo (Other (English) Canada, England and Wales, Ireland, Scotland), Southern European (French Canada, France, Greece, Italy, Spain), Hispanic (Mexico, Puerto Rico, Other Spanish), Asian (China, Japan, Philippines, Russia, India, Arabic, Other Asian), African, Other Ethnicity (West Indies, Other, American Indian, Non-Spanish West Indies, American only).

- Religion dummy variables are generated for groupings of the "relig" (religious preference) variable: Protestant, Catholic, Jewish, No religion (None), Other Religion (Other, Buddhism, Hinduism, Other Eastern, Moslem/Islam, Orthodox-Christian, Christian, Native American, Inter-denominational)

- Occupation dummy variables are generated for groupings of the "occ80" (census occupation code (1980)" variable. Dummy variables are assigned to each occupation range i.e.: Professional, Technical and Kindred Workers 33% (Occupation codes 001-196), Managers and Administrators Except Farm 14% (Occupation codes 201-296), Clerical and Kindred Workers 12% (Occupation codes 301-396), Craftsmen and Kindred Workers 21% (Occupation codes 401-590a), Operatives Except Transport 2% (Occupation codes 601-696), Transport Equipment Operatives 5% (Occupation codes 701- 796), Farmers, Farm Managers, Farm Laborers and Farm Foreman 6% (Occupation codes 801-846), Other Service Workers 6% (Occupation codes 900+).

- The binary measure of trust equals one for respondents who answered "usually trusted" and zero for respondents who answered "usually not trusted" to the question "Generally speaking, would you say that people can be trusted or that you can't be too careful in dealing with people?". The union dummy variable equals one for respondents who indicated that they belong to a union in response to the question "Do you belong to a labor union?"

- Dummies related to the workplace variables are constructed by collapsing responses into two categories. For the following variables, responses of "often" and "sometimes" are assigned one and responses of "rarely" and "never" are assigned zero. Heated arguments occur in workplace (hotargus), People at work can be relied on (reliedon), How often respondent finds work stressful (wkstress), Some people hold standards in workplace that others don't (difstand), People feel free to report problems in workplace (rptprobs), Other people take credit for respondents work or ideas (othcredt), People at work treat respondent in a manner that puts respondent down (putdown), People at work fail to give respondent necessary information (lackinfo), People at work get in respondent's personal space to intimidate (perspace), Respondent has been threatened with physical harm at work (physharm), People at work throw things when upset with respondent (actupset), People at work shout at respondent in hostile manner (shout), How often respondent stayed at home or left work early (skipwork).

- For the following variables, responses of "strongly agree" and "agree" are assigned one and responses of "disagree" and "strongly disagree" are assigned zero: People are treated with respect (treatres), People look the other way when others are threatened (lookaway), On the whole I am satisfied with myself (satself), I am always optimistic about my future (optimist), I expect more good things to happen to me than bad (moregood).

- For the job security (gdjobsec) variable, responses of "very true" and "somewhat true" are assigned one and responses of "not too true" and "not at all true" are assigned zero.

- Dummy variables for size of workplace are generated for each of the seven categories of the "localnum" (number of employees at respondents' work site) variable.

- The supervision dummy variable equals one for respondents who answered "yes" to the question "Do you or your spouse have a supervisor to whom you are directly responsible? (Note: references to spouses are asked only "if applicable". That is, these apply only if answering questions relating to the spouse's occupation. Since our data uses Respondent's who are employed and uses respondent's industry and occupation codes, the relevant individual is the respondent and not the spouse.)

- There are three dummy categories for Race, White (79%), Black (13%) and Other (8%).

Appendix D - Descriptive Statistics

Table A1 provides the dates of both type of deregulation for the 40 states included in the sample. Descriptive statistics are provided on Table A2.
Table A3 presents the summary statistics for the variables in the sample, while Table A4 provide the values of Comp50 by 1-digit industries and its (kernel) density function. Table A5 outlines descriptive statistics for the extended workplace variables.

Appendix E - Additional Tables and Robustness to Different Competition Measure (Comp4)

Tables A6 and A7, respectively, report regression results similar to the ones on Tables 3 and 4 of the main text. The only difference is that the measure of competition used in the main text (Comp50) is substituted by a different one, Comp4, which is obtained from subtracting the share of sales of the four largest firms in a sector (more details in the main text).

The magnitude of the results using Comp4 are very similar to the ones using Comp50, showing the robustness of the results to the use of different competition measures. The only noteworthy difference is that the former results are usually significant only at the 10% level, while the former are at the 5% and 1%. Table A8 show that, much like in the case with Comp50, the effect of competition on trust is observed mainly in more experienced workers, as the interaction of Comp4 and experience is significant, while the coefficient on the non-interacted variable is not. As in the case of Comp50, the results are robust to the inclusion of several controls.

Appendix F - Examining the Threshold Prediction

Pushing the model futher, it should be the case that, in addition to Comp50 being a positive determinant of trust, there is a threshold in the relationship between competition and trust in the cross-section. Specifically, for low levels of competition, there should be essentially no relationship, only at higher levels of competition should we expect the positive correlation. We explore the possibly non-linear (and non-smooth) shape of the relationship between trust and competition in three ways.

Firstly, we re-estimate equation (6) substituting the comp50 for a set of 16 dummies indicating the category of values that the variable can take (e.g., between 0-6.25, 6.25-12.5, ..., 93.75-100).[39] Results are reported graphically in Figure A2, where each dot represent the coefficient of a category of comp50 values. Note that this is the same as plotting local averages of the trust variable, or estimating a Nadaraya-Watson non-parametric regression with uniform (non-weighted) kernel once the covariates (Z) are partialled out.

Figure A2 also plots the fit from a regression of trust on a flexible (6th-order) polynomial of Comp50, after also controlling for all covariates. Both exercises indicate that the cross-sectional relationship between trust and competition is relatively flat (but oscillating) for values of Comp50 below 0.4, and above that point the relationship shows an upward trend. In other words, the results are consistent with the existence of a threshold as predicted in the model. Moreover, this result is obtained using methods that impose different degrees of smoothness over the data.

Thirdly, Figure A2 plots the fit from a linear spline version of equation (6) that allows the coefficient of Comp50 to change for values above/below 0.4, the level indicated by both the local averages and flexible polynomial as the likely threshold (and where a vertical line is placed). One can clearly see that the slope is relatively flat below the threshold and substantially steeper after it.[40]

The first column of Table A8 presents the formal estimates of the spline regression plotted in Figure A2. It shows that the effect of Comp50 on trust in industries with low levels of competition are close to zero and statistically insignificant. However, the effect on industries with Comp50 above 40 is on the order of 0.28 and significant, consistent with the threshold prediction. Column (2) also reports results for interactions with experience and the pattern that emerges is one where the impact of competition on trust is only positive on experienced workers in sectors above the competition threshold.

[39] We decided to use 16 categories since that is the largest number of equal-sized categories in which the comp50 measure can be divided without leading to no "empty" category (without any observations).

[40] Varying the threshold slightly (e.g., to 0.35 or 0.45) does not affect any the results in a significant manner.

It must be noticed that about 75% of the sample are in sectors above the 40%-threshold, and consequently most of the results reported in Tables 4 and 5 are mainly driven by the "above-threshold" sectors. Hence, due to space considerations, we do not report the robustness of the results of Table A8 to the inclusion of the several different control variables studied in the section above as they are unchanged.

Appendix Tables

Table A1: Dates of Branching Deregulation

State	Date	State	Date
Alabama	1981	Montana	1990
Alaska	1960	New Hampshire	1987
Arizona	1960	New Jersey	1977
Arkansas	1994	New York	1976
California	1960	North Carolina	1960
Colorado	1991	North Dakota	1987
Connecticut	1980	Ohio	1979
District Of Columbia	1960	Oklahoma	1988
Florida	1988	Oregon	1985
Georgia	1983	Pennsylvania	1982
Illinois	1988	Rhode Island	1960
Indiana	1989	South Carolina	1960
Iowa	1999	Tennessee	1985
Kansas	1987	Texas	1988
Kentucky	1990	Utah	1981
Louisiana	1988	Vermont	1970
Maryland	1960	Virginia	1978
Massachusetts	1984	Washington	1985
Michigan	1987	West Virginia	1987
Minnesota	1993	Wisconsin	1990
Mississippi	1986	Wyoming	1988
Missouri	1990		

Sources: Krozsner and Strahan (1999), Levine et al. (2009), Kerr and Nanda (2009).

Table A2: Summary Statistics: State-Level Data

	Mean	Std. Dev.	Min.	Max.
Individual-level Variables:				
Can Trust (×100)	39.57	48.90	0.00	100.00
Age	45.19	17.60	18.00	88.00
City Size (in thousands)	369.47	1229.79	0.00	7895.00
Employed	0.57	0.49	0.00	1.00
Income (in 1986 US$ thou.)*	13.13	17.95	0.00	139.30
Female	0.57	0.50	0.00	1.00
Highest Degree: High School	0.54	0.50	0.00	1.00
Highest Degree: College or Higher	0.19	0.40	0.00	1.00
White	0.84	0.36	0.00	1.00
Black	0.13	0.34	0.00	1.00
Married	0.57	0.49	0.00	1.00
Jewish	0.02	0.14	0.00	1.00
Catholic	0.25	0.43	0.00	1.00
State-level Variables:				
New Incorporations (per 100,000 people)	233.78	115.27	85.08	721.65
Gini Index (Income)	0.33	0.03	0.26	0.45
Mean Income (per capita 1982 US$ thou.)	27.36	34.16	17.50	40.79

*The income variable is calculated by the GSS based on imputations from categorical variables across years. See GSS Methodological Report n. 64 for details.

Appendix Tables

Table A3: Summary Statistics: Cross-Sectional Data

Variable	Mean	Std. Dev.	Variable	Mean	Std. Dev.
Can Trust	0.50	0.50	Education	13.54	2.87
Female	0.60	0.49	Age	46.02	16.43
Anglo	0.21	0.40	North Europe	0.22	0.41
South Europe	0.08	0.27	Africa	0.09	0.28
Asia	0.06	0.24	Black	0.13	0.34
White	0.81	0.40	City Size	290.96	1041.76
Married	0.52	0.50	Widowed/Divorced	0.27	0.45
Protestant	0.54	0.50	Catholic	0.22	0.42
Jewish	0.03	0.16	No Religion	0.13	0.33
Comp50	0.61	0.25	Comp4	0.83	0.16

Table A4: Sectoral Averages for Competition Measure (Comp50)

Public Administration	76.52%
Information, Finance and Insurance, Real Estate	48.17%
Agriculture, Mining and Utilities	22.20%
Manufacturing, Wholesale Trade, Transportation and Warehousing	34.36%
Arts, Entertainment, and Recreation, Accommodation and Food Services	84.11%
Other Services	80.32%
Education Services	80.03%
Professional, Scientific and Technical Services	70.28%
Health Care and Social Assistance	70.39%
Retail Trade	50.78%

Table A5: Descriptive Statistics for Extended Workplace Variables

Variable	Response Categories	Mean (SD)
Others Credit	1. Often, 2. Sometimes, 3. Rarely, 4. Never	3.10 (0.96)
Put Down	1. Often, 2. Sometimes, 3. Rarely, 4. Never	3.43 (0.92)
Heated Arguments	1. Often, 2. Sometimes, 3. Rarely, 4. Never	3.21 (0.89)
Lack Information	1. Often, 2. Sometimes, 3. Rarely, 4. Never	2.93 (0.97)
Helpful	1. V. True, 2. Somewhat T. 3. Not too True, 4. Not at all	1.46 (0.66)
Treat Respect	1. Strong Agree, 2. Agree, 3. Disagree, 4. S. Disagree	1.70 (0.66)
Act Upset	1. Often, 2. Sometimes, 3. Rarely, 4. Never	3.76 (0.62)
Shout	1. Often, 2. Sometimes, 3. Rarely, 4. Never	3.68 (0.68)
Look Away	1. Strong Agree, 2. Agree, 3. Disagree, 4. S. Disagree	3.18 (0.78)
Work Stressful	1. Always, 2. Often, 3. Sometimes, 4. Hardly Ever, 5. Never	2.74 (1.00)
Skip Work	1. Often, 2. Sometimes, 3. Rarely, 4. Never	3.75 (0.57)
Personal Space	1. Often, 2. Sometimes, 3. Rarely, 4. Never	3.57 (0.75)
Standards	1. Often, 2. Sometimes, 3. Rarely, 4. Never	2.38 (1.10)
Report Probs	1. Often, 2. Sometimes, 3. Rarely, 4. Never	1.74 (0.94)
Harm Threat	1. Often, 2. Sometimes, 3. Rarely, 4. Never	3.88 (0.43)
Job Secure	1. V. True, 2. Somewhat T. 3. Not too True, 4. Not at all	1.64 (0.82)
Work Size	7 categories (1-9, 10-49, 50-99, ..,2000+)	2.92 (1.82)
Union Member	1. Yes, 2. No	1.90 (0.29)

Appendix Tables

Table A6: Sectoral Concentration (Comp4) and Trust

	Dependent Variable: Trust Indicator						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Comp4	0.175	0.175	0.203	0.213	0.185	0.160	0.222
	(0.106)*	(0.106)	(0.110)*	(0.111)*	(0.105)*	(0.110)	(0.119)*
Education	0.026	0.026	0.026	0.026	0.026	0.022	0.021
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.007)***	(0.009)**	(0.01)**
Age	-0.0100	-0.010	-0.011	-0.011	-0.012	-0.015	-0.017
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)*	(0.007)**	(0.007)**
Age Squared/100	0.013	0.013	0.014	0.014	0.016	0.019	0.020
	(0.007)*	(0.007)*	(0.007)*	(0.007)**	(0.007)**	(0.007)***	(0.006)***
Job Security		-0.001		-0.028			-0.052
		(0.042)		(0.052)			(0.062)
Union				-0.107			-0.101
				(0.108)			(0.111)
Arguments				-0.180			-0.136
				(0.077)**			(0.079)*
Skip Work				0.237			0.152
				(0.134)*			(0.13)
Supervisor					-0.044		-0.088
					(0.075)		(0.077)
More Good						-0.062	-0.083
						(0.061)	(0.063)
Optimism						0.005	0.024
						(0.059)	(0.052)
Workplace Size Dummies			Yes	Yes			Yes
Other Workplace Covariates				Yes			Yes
Observations	612	612	612	612	612	530	530
R2	0.198	0.198	0.202	0.232	0.203	0.223	0.267

*** -Significant (1% level); **-Significant (5% level); *-Significant (10% level).
Robust standard errors clustered at the industry level in parenthesis. The dependent variable is a dummy indicator if the respondent can trust. All specifications include income, gender, race, ethnicity, marital status, and religion dummies as well as city size (see text for details).

Appendix Tables

Table A7: Sectoral Concentration (Comp4) and Trust

	Dependent Variable: Trust Indicator						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Comp4	-0.182	-0.185	-0.169	-0.154	-0.184	-0.135	-0.111
	(0.252)	(0.252)	(0.245)	(0.241)	(0.254)	(0.238)	(0.22)
Comp4*Experience	0.014	0.014	0.015	0.014	0.014	0.012	0.013
	(0.008)*	(0.008)*	(0.008)*	(0.008)*	(0.008)*	(0.008)	(0.008)*
Education	0.037	0.037	0.039	0.038	0.038	0.032	0.032
	(0.011)***	(0.011)***	(0.01)***	(0.011)***	(0.01)***	(0.011)***	(0.012)***
Age	-0.025	-0.025	-0.026	-0.026	-0.027	-0.028	-0.030
	(0.011)**	(0.011)**	(0.011)**	(0.01)**	(0.011)**	(0.011)**	(0.01)***
Age Squared/100	0.016	0.016	0.017	0.017	0.018	0.022	0.023
	(0.007)**	(0.007)**	(0.007)**	(0.007)**	(0.007)***	(0.007)***	(0.007)***
Job Security		0.01		-0.020			-0.050
		(0.042)		(0.053)			(0.063)
Union				-0.105			-0.111
				(0.108)			(0.112)
Arguments				-0.170			-0.128
				(0.074)**			(0.078)
Skip Work				0.231			0.153
				(0.133)*			(0.13)
Supervisor					-0.048		
					(0.074)		
More Good						-0.065	-0.086
						(0.063)	(0.062)
Optimism						0.005	0.023
						(0.058)	(0.051)
Workplace Size Dummies			Yes	Yes			Yes
Other Workplace Covariates				Yes			Yes
Observations	612	612	612	612	612	530	530
R2	0.208	0.208	0.213	0.242	0.214	0.233	0.27

*** -Significant (1% level); **-Significant (5% level); *-Significant (10% level).
Robust standard errors clustered at the industry level in parenthesis. The dependent variable is a dummy indicator if the respondent can trust. All specifications include income, gender, race, ethnicity, marital status, and religion dummies as well as city size (see text for details).

Table A8: Examining the Threshold Prediction

	Dependent Variable: Trust Indicator	
	(1)	(2)
Comp50	-0.032	-0.199
	(0.202)	(0.494)
Comp50*(Indicator if Comp50>0.4)	0.284	-0.037
	(0.109)***	(0.217)
Comp50*Experience	-	0.004
		(0.015)
Comp50*(Indicator if Comp50>0.4)*	-	0.012
*Experience		(0.007)*
Education	0.025	0.028
	(0.008)***	(0.007)***
Age	-0.009	-0.015
	(0.007)	(0.008)*
Age Squared/100	0.013	0.016
	(0.007)*	(0.007)**
Observations	612	612
R2	0.20	0.223

*** -Significant (1% level); **-Significant (5% level); *-Significant (10% level).

Robust standard errors clustered at the industry level in parenthesis. The dependent variable is a dummy indicator if the respondent can trust. All specifications include income, gender, race, ethnicity, marital status, and religion dummies as well as city size (see text for details). There are 147 observations with Comp50<0.4.

Figure A1: Depiction of $P(x)$ and $\alpha(x)$ as a function of ϕ

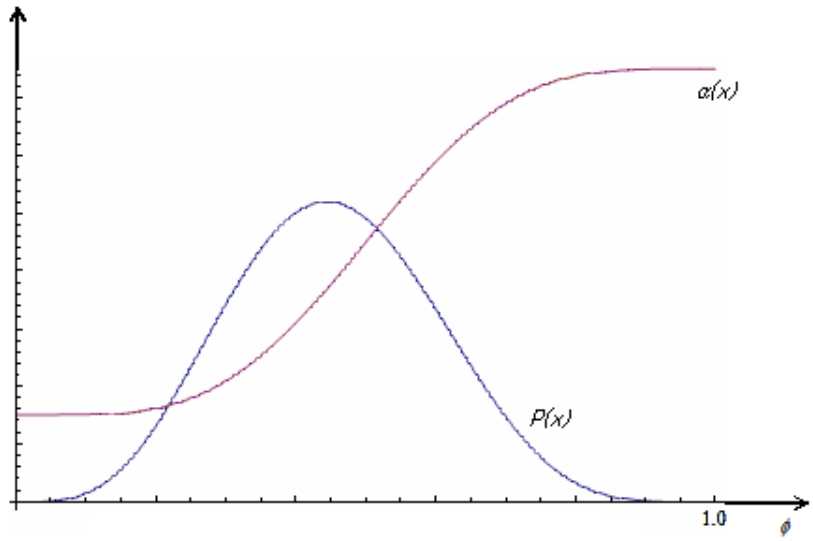
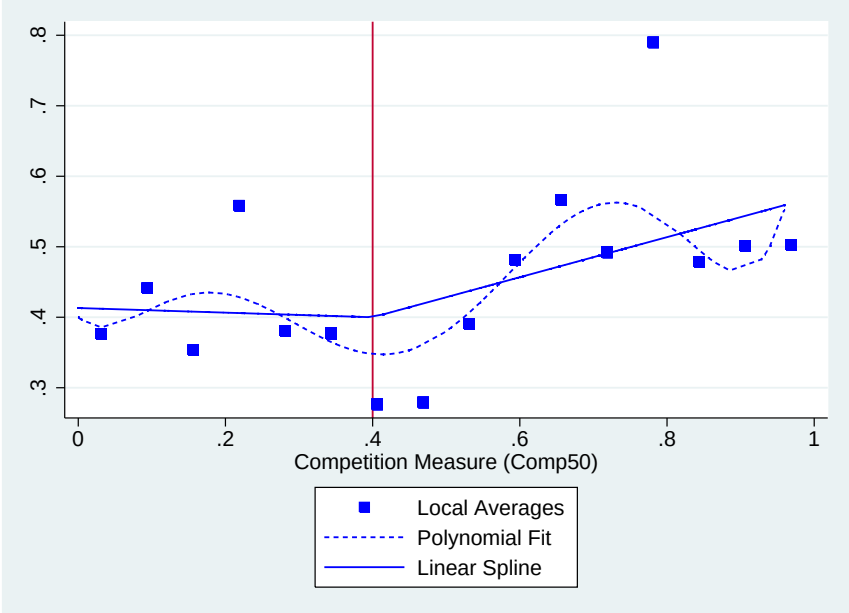


Figure A2: Competition and Trust - Local Averages, Polynomial Fit and Linear Spline



The figure presents the estimates of f from a regression $trust_{ij} = \beta_0 + f(comp50_j) + \beta Z_{ij} + e_{ij}$. Where $trust_{ij}$ and $comp50_j$ are, respectively, the a binary indicator of trust and a (inverse) measure of concentration for worker i at industry j. The function f is approximated by a set of 16 categorical dummies (local averages), a flexible polynomial and a linear spline with one knot at $comp50 = 40$. Covariates Z_{ij} inlclude education, a quadratic polynomial of age, city size and income, gender, race, ethnicity, marital status, and religion dummies as well as city size (see text for details). Data (612 obs.) is from the 2004 wave of the GSS.