Essays on Political Economy of Media and Trust

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Essays on Political Economy of Media and Trust

A dissertation presented
by

Egor Abramov

to

The Department of Economics

in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy
in the subject of
Economics

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Abstract

The current essays generally concern the topic of inter-personal, inter-institutional, person-to-institution, and institution-to-person communications as well as their reliability as means of information transmission and impact on other aspects of economic activity. In particular, the essays are focused on news media, trust in media and the bias of the latter, and inter-personal trust. The first chapter investigates the issue of news media capture in perfectly competitive environment. The second chapter demonstrates increasing political polarization of US newspapers. The last chapter focuses on the impact of income on inter-personal trust.
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Chapter 1

XXI’st century media capture\(^1\)

1.1 Introduction

New information technologies drastically reduced entry costs to the news media market, which led to a revamp of a discussion regarding the effect of competition on news media markets and in particular its ability to keep politicians in check. The question of whether free market entry makes media capture infeasible or dilutes media power has been receiving lots of attention especially in the most recent years when the issue of fake-news proliferation has become increasingly salient. The aim of the paper is twofold: first, we argue that media capture is feasible in a perfectly competitive market; second, we show that the impact of virtually perfect competition on media quality might be positive as well as negative, depending on the current equilibrium in the market.

Despite the growth of social media and widespread use of the Internet that brought a conventional remedy against media capture – virtually non-existent market barriers to entry – there are still politicians with autocratic tendencies to different degree such as Silvio Berlusconi, Vladimir Putin, and Donald Trump that manage to effectively silence opposition media through partial direct or indirect control of the media. Even though modern autocrats cannot or choose not to censor opposition media, they still achieve essentially the same

\(^1\)Co-authored with Pavel Andreyanov, University of California at Los Angeles
outcome as under classic media capture by making their supporters oblivious to any critique towards them. Such a result is usually attained through destruction of electorate’s trust in opposition news media, which can be well-illustrated by the 2016 presidential elections in the US when there was an observable decline in perceived level of news media quality.

We argue that news outlets produce quality externalities on the rest of the market that allow politicians to destroy trust in media and hence effectively achieve media capture. In contrast to the predictions of traditional models of media capture, lack of any entry barriers does not prevent an authoritarian politician to make the news media uninformative because there is no longer need to pay a monopoly rent to every outlet in order to control it. In fact, as the number of outlets grows it becomes in some sense easier to achieve an indirect media capture, for each outlet internalizes smaller portion of its externalities and hence has lower incentives to invest in its credibility.

Despite common opinion that competition is beneficial for consumers in general, there is no consensus in the literature concerning the effect of competition on news media quality. It is often believed that competition has a positive impact on media quality by promoting truth and contributing to political participation (Strömberg, 2004; Gentzkow, 2006; Gentzkow and Shapiro, 2006; Oberholzer-Gee and Waldogel, 2009; Schulhofer-Wohl and Garrido, 2009; Banerjee et al., 2010; Snyder and Strömberg, 2010; Gentzkow et al., 2011; Drago et al., 2013). However, some of the literature pointed out that competition might not deliver accuracy in media unless there is enough heterogeneity in readers’ political bias (Mullainathan and Shleifer, 2005) or preferences for media quality (Cage, 2014). Further, some papers pointed out that a rise in competition may cause a “race to the bottom” with a decrease in the quality of media under some conditions (Zaller, 1999; Arnold, 2002; Hamilton, 2004; Cage, 2014; Angelucci and Cage, 2017).

When it comes to media capture, there seems to be an agreement in the literature that greater competition hinders media capture. As argued by Besley and Prat (2006) and Prat and Strömberg (2013), the more media outlets are present in the market the harder it is for an autocrat to gain control over the news media due to greater costs. The theoretical
results are supported by empirical findings of McMillan and Zoido (2004) who demonstrate how costly media capture in a competitive environment and Gentzkow, Glaeser, and Goldin (2006) who argue that as the US newspaper market became more competitive newspapers started to focus on non-partisan information provision. It is worth noting however that media capture is less likely in markets with high advertising revenues (Hamilton, 2004; Besley and Prat, 2006; Di Tella and Franceschelli, 2009; Petrova, 2009; Prat and Strömberg, 2013) which might be shrinking as competition in the media market becomes more severe (Zaller, 1999; Arnold, 2002; Cage, 2014; Angelucci and Cage, 2017; Cage, Herv, and Viaud, 2017).

To develop our argument, we introduce a novel feature of quality externalities to a model of media market and – in contrast to the existing literature – argue that (a) competition per se might not have any particular effect media quality and bias – whether the effect is positive or negative might depend on the current equilibrium in the media market; (b) media capture might be feasible through means other than full control over a media market and hence greater competitiveness might not be prevent media capture – if a politician manages to destroy trust in media, he or she can effectively achieve media capture outcome without full control over the market.

The key novel feature of our model that leads to the results outlined above is externalities caused by the quality of content produced by a media outlet or consumed by a group of consumers. We build a model with continuum of heterogeneous consumers and continuum of firms that are engaged in perfect competition for every group of consumers. Each consumer and outlet faces a trade-off between bias and quality of news content. If the overall quality of news is low (high), there is high (low) demand for biased news and vice versa – as a results of such a self-enforcing mechanism, there are two possible equilibria: a fake-news equilibrium where outlets produce biased low-quality content and an informative-news equilibrium with high quality and no bias. A politician who controls a sufficiently

---

2The list of papers that have exogenous or endogenous quality-bias trade-off include but not limited to Mullainathan and Shleifer (2005), Baron (2006), and Bernhardt, Krasa, and Polborn (2008).
large portion of the media outlets (but not all) can force the market to move into or remain in the fake-news equilibrium, effectively achieving media capture.

There are multiple channels through which quality externalities might take an effect. On the supply side, news outlets can free-ride on investments in quality by other news sources and report news that are discovered by other market participants.\(^3\) Due to such a free-riding issue, an outlet that invests into quality produces positive externalities on other outlets that can costlessly increase their quality as well. On the demand side, externalities are coming from the fact that consumers cannot observe the quality directly: in order to assess the quality of an outlet, consumers can resort to cross-checking it with other sources. However, if the (believed) reliability of other sources is low, then customers have no means to assess the quality of their news outlets and thus no reason to believe that they are trustworthy;\(^4\); similarly, in the absence of alternative news sources for cross-check, news outlets have no incentives to provide high-quality news (the latter argument works even if consumers believe that their own news sources are trustworthy). Putting it another way, if the market share of high-quality news sources is low, most consumers are not exposed to them and hence cannot learn other signals and update their beliefs regarding the quality of their preferred news outlets. Other potential channels include peer pressure and reputation externalities from one news source to another.

A politician can try to exploit the externalities in order to establish indirect media capture. Even though media capture is generally viewed as full control over the media through ownership or censorship, we argue that media capture is in essence a state of a media market where news are virtually uninformative due to either low trust in news media on the demand side or lack of supply of high quality news reporting. Therefore, if a politician can reduce the media quality to zero, he or she can effectively achieve the same

---

\(^3\)According to Cage, Herv, and Viaud, (2017), “one quarter of the news stories are reproduced online in less than 4 minutes” in the French news media market.

\(^4\)Similarly, low-quality news sources can also confuse consumers and sow confusion among them: according to Pew (2016d), 84% of Americans say that made-up news has caused some confusion (in 64% of cases – a great deal of confusion) about the basic facts or current events.
outcome as that of the classical media capture. Under our assumptions, such an effect on news media can be achieved through partial control of the market: a politician controlling a share of market can cause (negative) externalities on the rest of the market and by doing so shift the equilibrium to the fake-news state. Hence, even in an environment where media capture is considered to theoretically infeasible (e.g., free entry to news media market), there still a possibility for an autocrat to establish indirect media capture that has virtually the same features as a classical one.

We illustrate the implications of the model using examples of Silvio Berlusconi, Vladimir Putin, and Donald Trump with the main focus on the last politician. Whereas both Silvio Berlusconi and Vladimir Putin have or had substantial control of the news media in their countries and actively exploit(ed) it both to promote their own agenda as well as to attack their opponents, Donald Trump has never had direct control over any news outlet but still managed to use the media and his electorate’s distrust in it to his own benefit through his aggressive condemnatory rhetoric towards news media.

To demonstrate how the case of Donald Trump fits into our logic, we focus on the rising concern over proliferation of fake news that accompanied the 2016 presidential elections and argue that the outbreak of fake news was caused by a temporary shock to the content quality of the mainstream news media. To show that, we compare news consumption patterns around 2012 and 2016 elections and find no significant aggregate differences. The latter fact is suggestive that there were no structural changes in the media market between the two election cycles. Thus, we conclude that the outbreak of fake news and a simultaneous sharp decline in the trust in media was caused by a shock to the content quality of the mainstream media as well as constant accusations against it of being fake and dishonest.

The rest of the paper is structured as follows: the next section sets up the model in a general form; section three provides the solution to the model for particular functional-form assumptions; section four presents the notion of modern media capture and shows how it can be achieved in a perfectly competitive market; the case studies are provided in section five; the last section concludes the paper.
1.2 Model

In this section we present a model of perfectly competitive news media market which we build upon in the next section when we discuss how media capture is feasible under the assumption of free entry.

We consider a model of a perfectly competitive news market\(^5\) with many heterogeneous consumers (readers) and heterogeneous firms (newspapers). Each customer has unit demand, and chooses the only firm to buy from according to her preferences.

There are two product characteristics that are important for the customer. First characteristic is the objective content of the newspaper (hard information, facts and figures), which is equally valued by all customers. Second characteristic is the subjective content (soft information, opinions), which is perceived differently by the customers. We refer to these two characteristics as quality and bias. The preference towards bias (but not quality) is the only source of customer heterogeneity.\(^6\)

Firms compete in product (news) characteristics, but not the price.\(^7\) There is a spectrum of firms in the market that have a comparative advantage at targeting certain types of consumer. One end of the spectrum (conventional media) has a comparative advantage at producing high quality news, while the other end (social media) has a comparative advantage in producing news with extreme bias. Given different customer preferences and firms ability with respect to these characteristics, the market is naturally segmented by the

---

\(^5\)The market is perfectly competitive with no entry costs. Despite the fact that we do not vary competitiveness of the market, such a set up allows us to judge what the extreme level of competition can lead to in a media market.

\(^6\)Even though we do not distinguish between perceived and actual quality in our model and therefore higher levels of news bias are associated in our model with lower levels of trust (\(=\) perceived quality) to news media, we could endogenize consumer’s preference towards bias as some prior beliefs regarding the state of the world – in such a set up ‘biased’ customers would believe that ‘biased’ news outlets are trustworthy. Under such an endogenization, a news outlet would have two alternative ways to prove trustworthiness: either by involving in a costly process of providing actual quality news with evidence, facts, analysis, etc. or by feeding news that comply with customer’s priors.

\(^7\)Even though we do not explicitly include price into our model, it would be a straightforward exercise to add one due to perfect competitiveness of the market. Moreover, there are elements of the model that implicitly assume some sort of pricing in the market.
firms.

The final ingredient of the model is positive quality externality. We assume that the preference for quality of each customer is correlated with the average quality in the market. In other words, in a highly biased market, each individual newspaper faces an upward pressure for delivering biased news.

1.2.1 Firms

There is an unlimited supply of firms with types \( t \in [0, 1] \). Each firm chooses quality and bias: \( q \geq 0, b \) of its product. Due to free entry, in the long run there will be enough firms in the market so that each consumer has her own favorite newspaper. We therefore abstain from the dynamics of entry and exit of firms, and look at the segmentation of the market when it is finally satiated. Due to the presence of perfect competition in the market, we can incorporate all costs and benefits associated with the production of news directly into customer’s utility function. As for the supply side, we only focus on the feasible production set. The feasible production set of the satiated media market is:

\[
q \leq \tilde{f}(b), \quad \frac{\partial}{\partial |b|} \tilde{f}(b) < 0, \quad (1.1)
\]

where \( \tilde{f}(b) \) follows from individual firm’s production sets.

The production set of a firm with type \( t \) has two key properties: first, the larger the output of bias, the lower maximal quality the firm can produce, or vice versa, the higher the quality of news, the smaller the extent to which that news can be biased; second, high-type firms are relatively more efficient in production of quality than low-type ones. Formally,

\[
q \leq \max \{ f(t, b), 0 \}, \quad \frac{\partial^2}{\partial |b| \partial t} f(t, b) \geq 0, \quad \frac{\partial}{\partial |b|} f(t, b) \leq 0 \quad (1.2)
\]

Due to unlimited supply of firms, consumers essentially face the industry production frontier \( \tilde{f}(b) \) that is the envelope of these production sets – a set of the best feasible combinations \((q, b), \) – and \( t^*(b) \) is the type of the firm that is competitive at producing bias
By construction, function $t^*(b)$ will be monotonic due to super-modularity of $f(t, b)$ and the envelope $\tilde{f}(b)$ is decreasing but not necessarily concave (even if the supporting functions are).

$$
\frac{\partial}{\partial b} \tilde{f}(b) = \frac{\partial}{\partial b} f(t, b)|_{t=t^*(b)}, \quad \frac{\partial^2}{\partial b \partial t} \tilde{f}(b) = \frac{\partial^2}{\partial b \partial t} f(t, b)|_{t=t^*(b)} + \frac{\partial}{\partial b} f(t, b)|_{t=t^*(b)} \cdot \frac{\partial}{\partial b} t^*(b)
$$

### 1.2.2 Customers

There is a unit mass of consumers of types $\theta \in [-\bar{\theta}, \bar{\theta}]$ with symmetric distribution defined by cumulative distribution function $F_\theta(\cdot)$.\(^8\) Consumer’s type defines their preference for bias. Let the average quality in the market be $\bar{q}$. The customer with type $\theta$ chooses from the set of firms $\{(b, q)\}$ in order to maximize the following objective function:

$$
u(\theta, b, q, \bar{q}) = g(\theta, b) + h(q, \bar{q}) - c(q),$$

\begin{align}
\frac{\partial^2}{\partial b \partial \theta} g(\theta, b) \leq 0, \quad &\frac{\partial^2}{\partial b \partial \theta} g(\theta, b) \geq 0, \quad \frac{\partial}{\partial q} h(q, \bar{q}) \geq 0, \quad (1.4) \\
\frac{\partial}{\partial q} h(q, \bar{q}) \geq 0, \quad &\frac{\partial^2}{\partial q \partial q} h(q, \bar{q}) \geq 0, \quad \frac{\partial}{\partial q} c(q) \leq 0
\end{align}

Note that the objective function incorporates both the utility function of the customer and costs and externalities of the production side of the market. Due to the competitive nature of the market, all the trade-offs faced by the outlets will be indirectly transferred to consumers through the market price.

The first term of the expression corresponds to the utility gained from the bias of the source: it is concave and maximized at $b = \theta$: each customer has the most preferred level of bias notated as $\theta$.

The second term corresponds to the utility gained from the quality of the outlet and has two key and novel features: (1) it is increasing in the average media quality, $\bar{q}$; (2) it is

\(^{8}\)Note that in fact $\theta$ does not have to be distributed over a symmetric interval – for now, we focus on a symmetric case for simplicity and consider an extension with asymmetric distribution later in the paper.
super-modular in $q$ and $\bar{q}$ – that is, the marginal utility from quality is increasing in the overall news quality, or putting it another way, there exist positive quality externalities. As we described in the introduction there are multiple channels for quality externalities to take an effect and for the interaction between news quality consumed by an individual and that consumed by the public: on the supply side, there is a quality free-riding issue; on the demand side, there are peer pressure and different mechanisms through which trust in media is formed (e.g., cross-checking). We believe that the latter channel, the way trust in news media is formed, is the primary reason for the interaction effect between individually consumed quality, $q$, and the average news quality, $\bar{q}$.

The last term corresponds to the costs associated with quality of news. Unlike bias, quality is costly to deliver, and again there are both supply- and demand-driven channels through which the costs enter the ultimate optimization problem. The most trivial channel is the supply-side one: high-quality content is costly to produce. However, customers also need to incur costs in order to sustain their trust in media and to incentivize media outlets to deliver high-quality news: as an example, one might consider effort required to do cross-checking or fact-checking.

The product choice of an agent of type $q$ is denoted as $b^*(q, \bar{q})$:

$$b^*(\theta, \bar{q}) = \arg\max_{b, \bar{q}} (g(\theta, b) + h(q, \bar{q}) - c(q)), \text{ s. t. } q \leq \max \{ \tilde{f}(b), 0 \}$$

(1.5)

where $b^*(\theta, \bar{q})$ is increasing in $\theta$ but decreasing in $\bar{q}$ by super-modularity.

Finally, a higher type firm will sell to a higher type customer through a monotonic function $t^*(b^*(\theta, \bar{q}))$. Moreover this matching function will uniformly decrease (move in favor of the quality-advantageous firms) for higher values of $\bar{q}$.

### 1.2.3 Equilibrium definition in general form

Shortly, the equilibrium is characterized by a matching function between $\theta$, $q$, $b$, and $t$, that tells which newspaper is bought by which agent.

**Definition.** A long-run equilibrium of the model is a collection of mappings $(\varphi, \psi)$ and the value
of \( \bar{q} \), such that:

- The mapping \( q_t : (\theta, q) \mapsto (b, q) \) is the solution to:

\[
    u(\theta, b, q, q) - c(q) \rightarrow \max_{q,b}, \quad 0 \leq q \leq \max \{ f(t, b), 0 \},
\]

which shows the product characteristics offered by firm of type \( t \) to customers of different types, such that their preferences are maximized subject to the production constraints.

- The mapping \( \psi : (\theta, \bar{q}) \mapsto t \) is the solution to:

\[
    u(\theta, q_t(\theta, \bar{q}), \bar{q}) \rightarrow \max_{t \in [0,1]},
\]

which shows the market segmentation resulting from the customers choice.

- The equation \( \hat{q}(\bar{q}) = \bar{q} \) holds, where \( \hat{q} : \mathbb{R} \rightarrow \mathbb{R} \) is the average bias response curve:

\[
    \hat{q}(x) = \int q_t^\theta(\theta, x)|_{t=q(\theta,x)}dF(\theta), \quad q_t = (\hat{q}^\theta, \hat{b}^\theta).
\]

The equilibrium is called (locally) stable, if \( \partial \hat{q}(x)/\partial x|_{x=\bar{q}} < 1 \).

### 1.2.4 Linear example

We now turn to specific functional forms in order to present a concise and tractable solution to the model.

For the sake of notational simplicity, we focus only on one side of consumer’s type distribution, \( \theta \geq 0 \) in this section. Since the distribution is symmetric, the other side of it would look identical.

Let the production frontier and the objective-function components take the following form:

\[
    \tilde{f}(b) = 1 - Ab, \quad g(\theta, b) = -B(b - \theta)^2, \quad h(q, \bar{q}) = D\bar{q}q, \quad c(q) = Cq
\]

Note that it does not really matter how the frontier is achieved as long as it is a smooth correspondence between \( q \) and \( b \).
The consumer problem then transforms into:

\[-B(b - \theta)^2 + D\bar{q}q - Cq \to \max_{b, q}, \text{ s. t. } q \leq \max \{1 - Ab, 0\}\]  

(1.7)

As visualized in Figure 1.1, the consumer choice is therefore:

\[\hat{q}(\theta, \bar{q}) = \begin{cases} 
0, & D\bar{q} \leq C + \max \left\{0, \frac{2B(\theta - 1)}{A^2}\right\} \\
1 - A\theta + \frac{A^2}{2B} (D\bar{q} - C), & C + 2\frac{B}{A} \theta \geq D\bar{q} > C + \max \left\{0, \frac{2B(\theta - 1)}{A^2}\right\} \\
1, & D\bar{q} > C + 2\frac{B}{A} \theta 
\end{cases}\]  

(1.8)

\[b^*(\theta, \bar{q}) = \begin{cases} 
\theta, & D\bar{q} \leq C + \max \left\{0, \frac{2B(\theta - 1)}{A^2}\right\} \\
\theta - \frac{A}{2B} (D\bar{q} - C), & C + 2\frac{B}{A} \theta \geq D\bar{q} > C + \max \left\{0, \frac{2B(\theta - 1)}{A^2}\right\} \\
0, & D\bar{q} > C + 2\frac{B}{A} \theta 
\end{cases}\]  

(1.9)

Figure 1.1: Visualization of Equation 1.8.

Thick solid lines correspond to \(\hat{q}(\theta_1, \bar{q})\) and \(b^*(\theta, \bar{q})\) for \(\theta_1 < 1\); Thick dash lines correspond the case for \(\theta_2 > 1\).

Assuming interior solution (chosen quality within the interval \((0, 1)\)), higher types \(\theta\) pick lower quality and higher bias, and the individual response curve (quality as a function of
of type and average quality) is linear:

$$\hat{q}(\theta, \bar{q}) = \bar{f}(b^*(\theta, \bar{q})) = 1 - A\theta + \frac{A^2}{2B} (D\bar{q} - C) \quad (1.10)$$

The intuition behind equations (1.8) and (1.9) is straightforward: if the average quality level is too low, no agent of type \(\theta\) trusts news sources / no news outlet can credibly signal its high quality, and fake-news biased firms win in competition over customers; if the overall quality in the market is goes up, consumers of type \(\theta\) trust the media more and want to consume higher quality news up to the point where they completely abandon biased news sources.

Equilibrium in the market is then achieved whenever the average quality in the market does not change. Call \(\hat{q}(\bar{q}) = E_\theta[\hat{q}(\theta, \bar{q})]\) the aggregate response curve that consists of (potentially) 5 parts and smooth transitions. Then, there is an equilibrium in the market if \(\hat{q}(\bar{q}) = \bar{q}\). The proposition below summarizes sufficient conditions for equilibrium existence.

**Proposition 1.**

- if \(D \leq \frac{2B}{A^2}\), then there exists a unique equilibrium, \(q = 0\).
- if \(D > \frac{2B}{A^2}\), then for any \(\bar{q}\) such that:

$$\bar{q} \leq \frac{A(D - C)}{2B}, \quad (1.11)$$

there exist exactly 2 stable equilibria (\(q = 0, 1\)) and one unstable for any distribution of \(F(\theta)\).

**Proof of Proposition 1.** If \(D < 0\) then all the response curves are downward sloping and therefore the average response curve is downward sloping, thus unique intersection. If \(0 < D < \frac{2B}{A^2}\) then all the response curves have slope less than one and therefore there is a unique intersection again.

If \(D > \frac{2B}{A^2}\) then all we need is that at \(\bar{q} = 0\) the all types choose \(q = 0\), and at \(\bar{q} = 1\) all types choose \(q = 1\). To find the threshold types simply solve the following equation:

$$f(b^*(\bar{\theta}, 1)) = 1$$
Define $\hat{q}(\bar{q}) = E_q[q(\theta, q)]$ as the aggregate response curve. It consists of (potentially) 5 parts and smooth transitions. Moreover, the transitions are convex and concave so that there must be exactly 3 intersections:

- If $\bar{q} \leq \frac{C}{D}$, then trivially $\hat{q}(\bar{q}) = 0$.

- If $\frac{E}{D} < \bar{q} \leq \frac{\beta \theta - \gamma}{\alpha}$, where

$$\alpha = \frac{A^2 D}{2B}, \quad \beta = A, \quad \gamma = 1 - \frac{A^2 C}{2B},$$

then

$$\frac{\partial}{\partial \bar{q}} \hat{q}(\bar{q}) = \frac{\partial}{\partial \bar{q}} \int_{\theta = \bar{q}}^{\gamma + \alpha \bar{q} - \beta \theta} (\gamma + \alpha \bar{q} - \beta \theta) dF_\theta(\theta) = \alpha F_\theta \left( \frac{\gamma + \alpha \bar{q}}{\beta} \right)$$

- If $\frac{\beta \theta - \gamma}{\alpha} < \bar{q} \leq \frac{1}{\alpha}$, then $\hat{q}(\bar{q}) = \gamma + \alpha \bar{q} - \beta E[\theta]$

- If $\frac{1}{\alpha} < \bar{q} \leq \frac{1 + \beta \theta - \gamma}{\alpha}$, then

$$\frac{\partial}{\partial \bar{q}} \hat{q}(\bar{q}) = \frac{\partial}{\partial \bar{q}} \int_{\theta = \frac{\gamma + \alpha \bar{q} - \beta \theta}{\beta}}^{1 + \frac{\gamma + \alpha \bar{q}}{\beta}} (\gamma + \alpha \bar{q} - \beta \theta) dF_\theta(\theta) = \alpha \left( 1 - F_\theta \left( \frac{\gamma - 1 + \alpha \bar{q}}{\beta} \right) \right)$$

- Finally, if $\frac{1 + \beta \theta - \gamma}{\alpha} < \bar{q}$, trivially $\hat{q}(\bar{q}) = 1$.

The proposition above establishes two conditions for the existence of the informative equilibrium ($q = 1$): first, individual returns to public level of media quality are high enough (or alternatively, infeasibility of highly biased decent-quality news); second, polarization of the society (measured by the distribution of $\theta$) is not too large.

A visualization of the two equilibria is provided in Figure 1.2. There are three intersections of $q = \hat{q}(\bar{q})$ and the 45° line: $q = 0$ – the fake-news equilibrium that always exists in the model; $q = 1$ – an informative news equilibrium that exists only under some conditions; and also an unstable equilibrium with $0 < \bar{q} < 1$.\(^{10}\)

\(^{10}\)Note that in our model we assume that all news outlets are profit-seeking. Even though it might not necessarily be the case (e.g., BBC), an introduction of such firms as well as consumers that want to consume high-quality news no matter what would not change our key results but could potentially change the actual values of $q$ in each of the equilibria.
Note that under some conditions there might be two stable equilibria different from the ones described in Proposition 1. In particular, if \( \tilde{\theta} > \frac{A(D-C)}{2B} \) but not too high such that there are still two intersections between the aggregate response curve and \( \tilde{q} = \bar{q} \) line, then there are two stable equilibria as presented in panel (a) of Figure 1.3. If \( \tilde{\theta} \) is even larger and/or the distribution is different, then there exists just one stable equilibrium (\( q = 0 \)). Panel (b) of Figure 1.3 depicts an extreme case when there is one stable and one unstable equilibria.

The logic above is summarized in the following Corollary.

**Corollary 1.** There are exactly two stable equilibria and one unstable equilibrium if and only if there exists \( \bar{q} \) such that \( \tilde{q}(\bar{q}) > \bar{q} \) and \( D > \frac{2R}{A} \). Otherwise, there exist at most one stable equilibrium \( q = 0 \).
1.2.5 Comparative statics, equilibria stability, and extensions

For the sake of tractability assume that the distribution of consumer types is uniform across $[-\theta, \theta]$, $\mathcal{U}[-\theta, \theta]$. Let $q^*$ be the informative equilibrium quality of media, which is equal to one under conditions of Theorem 1 and less than one if $\bar{\theta} > \frac{A(D-C)}{2B}$ as long as the equilibrium exists. The following proposition summarizes comparative statics for $q^*$.

**Proposition 2.** The informative equilibrium quality, $q^*$, is non-decreasing in degree of substitution between quality and bias, $A$, and consumers’ preference for quality, $D$, and non-increasing in consumers’ polarization, $\bar{\theta}$, and preference for bias, $B$, and marginal cost of quality, $C$. $q^*$ might decrease only down to the point where the informative equilibrium is no longer existent.

The proof follows trivially from equation 1.8. To see how $\bar{\theta}$ affects $q^*$ note that $\bar{q}$ is non-increasing in $\bar{\theta}$.
Asymmetric distribution of types

So far, we assumed that the distribution of consumer types is symmetric as well as that consumers and firms are homogeneous in other dimensions across the spectrum of consumer types. However, it might be very well the case that there is some heterogeneity in firms and consumers. Particularly interesting case is when consumers on the left half of the spectrum are different from those on the right half.

Trivially, the comparative statics outlined in Theorem 2 holds for the parameters of both parts of the consumer distribution. In particular, it holds for our measure of polarization, \( \bar{\theta} \). This leads to an important implication: an increase in polarization / bias of a group of consumers can lead to higher bias and lower quality of news consumed by all the consumers. In other terms, there might be observable growth in polarization of consumed news on both sides of consumer bias spectrum despite the fact that the actual preference for media slant has changed only for half of bias distribution.

Local externalities

Another possible extension to the model is related to how the externalities are formed: one can think of them as having local effect – that is, customers and firms might be affected by quality of outlets that have close or aligned leaning on political scale. We focus on two specific types of local externalities: first, we consider the case when there are only partial externalities across the two halves of the political bias spectrum; second, we consider a general case of externalities that are decreasing with the distance on the spectrum. We do not provide complete formal arguments here, but explain how the results would have been obtained.

In the case of partial externalities across the two sides of the political bias spectrum, there might be separate equilibria on each side of the distribution. Formally, the externalities term, \( q_i \), depends on whether consumer’s type, \( \theta_i \), is below or above 0:
\[ q(\theta_i) = \begin{cases} 
\alpha E_{\theta|\theta<0}[q(\theta)] + (1 - \alpha) E_{\theta|\theta>0}[q(\theta)] & \text{if } \theta_i < 0 \\
(1 - \alpha) E_{\theta|\theta<0}[q(\theta)] + \alpha E_{\theta|\theta>0}[q(\theta)] & \text{if } \theta_i > 0 
\end{cases} \]

Then, if the cross-side externalities are weak (\(\alpha\) is high), then the market might end up having different equilibria on each side of the spectrum – the equilibria would not be however purely fake-news and informative-news: the bad equilibrium would have small but positive \(q\), and the good equilibrium would have \(q < 1\).

In the case of general local externalities, there might be heterogeneous equilibrium in which centrists consume high-quality news and extremists consume low-quality news. In a general case of local externalities, the "average" quality, \(\bar{q}\), depends on consumer’s type, \(\theta_i\):

\[ \bar{q}(\theta_i) = E_{\theta}[q(\theta)K(\theta - \theta)] = \int q(\theta)K(\theta - \theta)dF_{\theta}(\theta), \]

where \(K(\cdot)\) is a Kernel function. Then, an equilibrium is defined by the equation above and equation 1.8. Similarly to the former case, if the Kernel function is local enough – e.g., if consumers care only about the quality of news consumed by people who are close to them in terms of political bias – then there might be heterogeneous or/and asymmetric equilibrium in the market.

1.3 XXI’st century media capture

In this section, we explain how an autocrat can effectively achieve the same results as in the case of conventional media capture without actual control over the whole media market.

Let us first, describe how conventional media capture operates. A dictator controls the whole media market and can decide what news to feed to the public. In a world where politicians can commit, the autocrat would effectively choose the noisiness of the media in order to maximize his or her support. However, since the dictator cannot commit to disclose bad news occasionally, no bad news will be released to the public, and hence the news media becomes completely uninformative (\(q = 0\) in terms of our model).

Even though a politician that has control over the media fails to transmit good signals about his or her type under uninformative mass media, this outcome is still beneficial for
him or her. For in the absence of informative news the public is likely to maintain the same beliefs about politician’s type and to support the status quo, the politician can remain in control of the government as long as the media is of low quality.

Since “informative” media capture is anyway non-achievable, the goal of a sophisticated autocrat or a politician who has the majority support is thus to impede the public from learning any information by reducing the quality of the media to zero. One way to achieve that outcome is through classical media capture when the autocrat controls the media market completely. However, full control might be costly and/or even infeasible in the today’s world of unconventional media – a possible alternative to the classical approach is described below: it is enough for a politician to take over control of just a portion of the media to make the whole media market uninformative.

Another way to outline the claim above is the following: under conventional logic of perfectly competitive news media, a politician cannot easily decrease the informativeness or, equivalently, increase the bias of news outlets it controls because the competition would push the outlets out of the market – we argue that such an effect can be prevented if the original market share of politician-controlled news media owning to quality externalities.

Assume that the media market is currently in the informative equilibrium, \( q = 1 \). Define \( \tilde{q} \) as the media quality in the unstable equilibrium. In order to shift the equilibrium to the fake one, the politician must control a share of the media market large enough to reduce the average media quality, \( \bar{q} \), below the unstable level, \( \tilde{q} \). Note however that the politician needs to ensure the the incentive compatibility constraints hold for consumers – that is, that consumers that get their news from sources controlled by the politician would not switch to other media outlets once the quality of the ones consumed by them deteriorates.

**Definition 1.** Define a situation in a news media market where an agent controlling a substantial share of the market supply destroys consumers’ trust in the media via low-quality news provision as indirect media capture (or XXI’st century media capture).

Let the politician control the news media feeding to consumers of type \( \theta \in [-\theta, \theta_{mc}] \). \(^{11}\)

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\(^{11}\)We implicitly assume here that a politician can control media only as one single piece of the spectrum of
Then, if the controlled media reduces its quality to zero, the average quality in the market is equal to $\bar{q}_{mc} = 1 - F_\theta (\theta_{mc})$. Then, the incentive compatibility constraints takes the following form:\textsuperscript{12}

$$D\bar{q}_{mc} - B\theta_{mc}^2 - C \leq 0,$$

If the condition above is satisfied and $\bar{q}_{mc} < \tilde{q}$, then the market will converge to the fake-news long-run equilibrium. Trivially, if $q^* < 1$ or if the market is in the fake-news equilibrium to begin with, then the politician needs to control even smaller share of the market to achieve media capture. The following proposition summarizes the main result of the section.

**Proposition 3.** A politician can indirectly capture the news media if he or she controls outlets that feed news to consumers of $\theta \in [-\tilde{\theta}, \theta_{mc}]$, where $\theta_{mc}$ satisfies the following conditions:

$$D (1 - F_\theta (\theta_{mc})) - B\theta_{mc}^2 - C \leq 0$$

$$1 - F_\theta (\theta_{mc}) < \tilde{q}$$

(1.12)

The proof of the proposition is straightforward and described above. A visualization of the proposition is provided in Figure 1.4: a politician controlling $[-\tilde{\theta}, \theta_{mc}]$ of the market decreases the overall quality in the news media by $F_\theta (\theta_{mc})$ and therefore shifts the equilibrium to the fake-news one.

Note that in Proposition 3 we do not impose any restrictions on size of the share of the market that can be controlled by a politician. However, it might be the case that there are some feasibility constraints on a market share controlled by a politician, the most natural of which is $\theta_{mc} \leq 0$ – that is, a politician can only control media outlets that feed news to consumer bias. It is not unreasonable however to assume the contrary – the results of this section would still hold even though the expressions would be somewhat different.

In addition, an alternative way to model XXI’st century media capture would be to assume that a politician can obtain control over the firms that are most efficient in production of quality. Thus, the production frontier, $f'(b)$ would shift and the market would switch to another equilibrium. We do not consider such a case here.

\textsuperscript{12} Notice that we apply partial-equilibrium considerations here: even though outlets controlled by the politician reduce their quality to zero, the rest of the market continues to supply same-quality news as they used to do before.
her primary audience. In that case, an indirect media capture attempt will fail if it is not sufficient to control only one half of the consumer distribution or if competition will drive out politician-controlled firms out of the market as summarized in the corollary below.

**Corollary 2.** If \(1 - F_\theta (0) > \bar{q} \) or \(D (1 - F_\theta (0)) - C > 0\), indirect media capture is not feasible.

Similarly, if the quality externalities are local in any sense, that would also reduce politician’s ability to achieve indirect media capture.

Overall, the quality externalities allow politicians to destroy trust in media and hence effectively achieve media capture. In contrast to the predictions of traditional models of media capture, lack of any entry barriers does not prevent an authoritarian politician to make the news media uninformative because there is no longer need to pay a monopoly rent to every outlet in order to control it. In fact, as the number of outlets grows it in some sense becomes easier to achieve an indirect media capture, for each outlet internalizes smaller portion of its externalities and hence has lower incentives to invest in its credibility.
1.4 Case studies

In this section, we illustrate the implications of the model using examples of Vladimir Putin, Silvio Berlusconi, and Donald Trump discuss how modern autocrats fight off criticism coming from opposition media by destroying electorate’s trust in it.

At the first glance, the three cases differ in many important aspects. Vladimir Putin is essentially a dictator and controls the three branches of the Government as well as most of the news media. Notwithstanding the power consolidated in his hands, a number of news outlets remain independent – evidently but not necessarily by Putin’s choice. Silvio Berlusconi was not a dictator and never was able to consolidate as much power as Putin did despite numerous corruption scandals; he did however – and still does to some extent – directly or indirectly control an extremely large share of news media market (over 90% while in office). On the contrary to the first two cases, Donald Trump never controlled a single news outlet and never got close to becoming a dictator.

Although the three cases are quite different, the narrative of all of them revolves around one common question: why did the supporters of all three politicians despite having free access to ‘independent’ or opposition media that exposes wrongdoings of the politician and/or falsehood spread by him choose not to switch to more reliable news sources and instead stick to the news outlets they has been consuming news from – even when the reported trust in those sources goes down?

We argue that in all of the three cases it happens due to the same reason: a politician sows distrust in opposition media and confusion regarding the actual state of affairs among his supporters through directly or indirectly controlled or affiliated news media – in terms of our model, imposes negative quality externalities on the rest of the news media. This argument also provides explanation to some case-specific questions that we raise: why would not Vladimir Putin use his power to take over all the news media in the country and establish Chinese-style censorship, and why was there such a huge outbreak of fake news during the 2016 Presidential elections in the USA?
1.4.1 Case study: Vladimir Putin

While Vladimir Putin’s government one way or the other controls most of the Russian news media, some nation-wide news outlets still remain independent and in opposition to the government. However, despite a stark difference in quality of news provision between the independent media and the state-owned one, the Vladimir Putin essentially sets up an agenda for Russian mediascape through its media and effectively fends off any internal or external criticism by influencing the electorate to distrust Putin’s critics.

Throughout Vladimir Putin’s rule, there were (so far) two periods of media takeovers by the government, each bringing greater news-media market share under Putin’s control but still leaving a number of news outlets independent. As soon as Putin became a president, he moved to consolidate the authority of the state over the news media. Two years into his presidency, he already controlled three biggest TV channels and – by the end of his first term – most of Russian TV channels, radio stations, and newspapers (Dougherty, 2015; Gordts, 2015). However, a number of smaller TV channels, newspapers, and online news outlets remained independent and some new ones emerged. The second wave of media takeovers started in 2014 and was protracted through 2016 with the most prominent cases of takeovers being Dozhd TV (January 2014), Grani.ru (March 2014), Lenta.ru (March 2014), REN TV (August 2014), Russkaya Planeta (December 2014), TV2 (February 2014), Russian Media Group (August 2015), Russian edition of Forbes (January 2016), RBC (May 2016). Again, Putin has not managed to achieve a full control over Russian news media. At the same time when Dozhd TV and RBC were under government attack, Novaya Gazeta and Meduza.io maintained a narrative similar to the former two networks without any action from Kremlin.

The dynamics of media consolidation under Putin’s control prompts two questions: first, what was so special about 2014 that made the government mount an attack on the media;

\[13\] Dozhd TV remained as an independent entity but was virtually banned from television and was therefore forced to transform into an online news outlet.

\[14\] Benyumov (2016)
and second, why did not Putin go along the Chinese scenario and get a full control over Russian media? In general terms, both questions boil down to one: how does a dictator decides what share of the news media market can remain independent and uncensored? In Putin’s case, he decided not to take over control of larger number of news outlets in 2014 or even back at the beginning of 2000s, when his popularity was on the rise with growing oil prices and Russian GDP, even though he could do so with his effective control over Executive, Legislative and Judicial branches of the government.

Russian political landscape of 2014 fits perfectly into one of the predictions of the theory part of the paper: a politician involves in a costly process of media takeover if there is a need to reduce the overall news media quality or equivalently increase the bias of the media. Both annexation of Crimea followed by Russian intervention in the eastern Ukraine and international sanctions targeting a set of individuals and state-owned firms in 2014 and the Panama papers scandal in 2015 sparked a new wave of criticism towards Putin’s administration. In response to the criticism, Putin’s team had to tilt the current mix of fact and fiction broadcast by the state-owned media to more aggressive propaganda in attempt among other things (a) to hide combat losses in eastern Ukraine along with presence of any Russian troops there whatsoever,\(^\text{15}\) (b) to portray the sanctions as a hostile act of “western powers” rather than as a response to Russian aggressive foreign policy and to belittle their effect on Russian economy,\(^\text{16}\) (c) to deny Russian involvement into MH17 crash,\(^\text{17}\) and (d) to ignore the findings of the Panama scandal.\(^\text{18}\)

As a result, there was an observable decline in the perceived relative quality of news TV-channels (primarily state-owned) and an increase in the perceived relative quality of online news outlets (primarily independent at the time): the share of people saying that TV-channels are their most-trusted source of news hit its historic minimum of 50% and 41% in 2014 and 2015, respectively, - for comparison, it was

^{17}\)Platt (2014), Wilder (2014) \\
^{18}\)Balmforth (2016)
79% in 2009; on the contrary, the share of people saying that online news outlets are their most-trusted source of news hit the historic maximum of 20% and 18% in 2014 and 2015, respectively.\footnote{Leveda (2016)} It is little wonder that Putin’s administration mounted an attack on the independent news media and increase its control over it to countervail the degrading impact of propaganda on electorate’s trust in state-owned media.

Both in early 2000s and in 2014, Putin did not involve in a costly process of establishing either full control over news media or even Chinese-style censorship and still successfully bent the public opinion to its side and recovered some of the trust in state-owned media in spite of numerous instances of obvious falsehoods reported by it. Indeed, Putin’s approval rating grew from 61% at the end of 2013 (the lowest value since 2000) to 89% in the middle of 2015 (Levada, 2018). Likewise, the share of people saying that TV-channels are their most-trusted source of news climbed back to 59% in 2016 (Leveda, 2016). At the same time, the quality of news reporting has declined to the levels unseen since the Soviet times,\footnote{Lowe (2017), The Economist (2014)} accompanied by an increasing number of conspiracy theories.\footnote{Borenstein (2014)} Among the biggest instances of news falsifications and disregard for major news stories – in addition to the ones mentioned previously – were: virtually no reportage of two consecutive school attacks,\footnote{Meduza (2018)} a video game screenshot used as an “evidence” of US helping IS;\footnote{BBC (2017), Murphy (2017)} lack of any coverage of a terror attack in a Russian city;\footnote{Zelensky (2017)} two cases of evidently forged documents in English with numerous grammatical mistakes “proving” CIA and/or the Department of State involvement into Russian affairs.\footnote{Ennis (2016)} The last two observations with the fact that the share of people consuming news from television news networks (Levada, 2016) over
the considered period fit into the predictions of the model: even though the quality of the mainstream media declines, consumers cannot verify that the high-quality news sources are indeed trust-worthy due to low market share of the latter and hence consumers’ inability to perform cross-check of the content they are exposed to.

By employing the mechanism discussed in the theory section and illustrated here, Putin’s administration is holding the power and wards off attacks coming from small independent Russian news outlets, meanwhile using those small outlets as a relief valve for critically minded Russians and for show to deflect foreign criticism of low media freedom.

1.4.2 Case study: Silvio Berlusconi

In this part of the paper we rely heavily on Ragnedda (2014) that analyses and illustrates different types of censorship – in particular, the one that is aimed to undermine trust in the opposition media – that were employed by Silvio Berlusconi over 9 years of his service as the Prime Minister of Italy and almost 20 years in the Parliament and thus do not dwell in much detail and instead focus on a few vivid examples and arguments.

Even though Berlusconi unlike Putin did not become a full-fledged dictator, he at times consolidated under his direct or indirect control over 90% of Italian news media – an unprecedented for Western democracies concentration of news-media market share in hands of one person. Indeed, Berlusconi owns three private TV networks and while in the office controlled two public TV networks which added up to a total of five out of seven TV networks where the remaining ones (La 7 and RAI 3) are smaller than any of the other five. In addition, he owned largest magazine publisher, Mondadori, and advertising firm, Publitalia, and a handful local TV and radio stations. Such an immense media empire gave Berlusconi a tool-set to censor media agenda and attack the opposition in effort to divert the attention of his electorate from criticism of him.

In absence of institutionalized censorship, Berlusconi had to rely on unconventional ways to censor the content of the opposition media: if a scandal was impossible to hide, then he attempted to either destroy the reputation of the source or fill up the information
space with noise to distract the attention of the audience from the scandal. On top of that, Berlusconi’s media spread conspiracy theories, downplayed the harm from corruption – argued that it can be perceived as a quasi-legitimate way of conducting business and public affairs – and promoted anti-political views (Anderson, 2009; Ragnedda, 2014).

Below we provide some of the most famous examples of attacks of Berlusconi’s Mud Machine. Judge Raimondo Mesiano ruled against Berlusconi in a corruption case and later was accused by Berlusconi and his media as being a ‘communist judge’ participating in an international communist conspiracy against Berlusconi. Actor and satirist Daniele Luttazzi was publicly intimidated and sued for €20m after an interview in 2001 – the process prolonged for four years with Luttazzi winning the case. A hilarious example of an attack on opposition was the ‘Mitrokin Affair’: a special commission was looking into links between KGB and Romano Prodi (the leader of centre-left coalition and the Italian Prime Minister at the time) as well as Pecoraro Scanio (leader of the Green party) – accusations that were proven to be artificially created by Berlusconi’s team. Dino Boffo was attacked and claimed to be gay (later found as false) by Il Giornale – a newspaper affiliated with Berlusconi – shortly after articles covering Berlusconi’s sex scandals appeared in the Journal of the Episcopal Italian Council directed by Boffo. Similarly, Gian Franco Fini – a former ally of Berlusconi – was attacked by Il Giornale, Libero, and Berlusconi’s TV channels shortly after he publicly criticized Berlusconi. As a consequence, Boffo was overwhelmed with a series of minor scandals involving him and disappeared from Italian politics notwithstanding his 30 years of experience in the Parliament.

As shown in the examples above, Berlusconi’s tactic of undermining the reputation of his critics and spreading conspiracy theories to fight off any allegations has proven to be quite successful, given his control over an extremely large share of news media market: despite having full exposure to unregulated and uncensored news media market, news consumers were frequently confused regarding the actual truthfulness of a particular piece of news and kept consuming news from the same biased sources. In spite of low trust in news broadcast by television – 82.8% of Italians in 2005 believed that TV news is not credible
according to the World Values Survey – it remains the main source of information for most Italians: according to Demos & Pi Research (2012), 87% of Italians in 2007 got news from television. Furthermore, the news consumption pattern of Italians was largely insensitive to changes in bias of TV channels: as shown by Durante and Knight (2012), when the bias of both Berlusconi-owned private channels and public channels became more right-wing in between 2001 and 2004 (before and during Berlusconi’s send time in office, respectively) there was no change in their ratings and only unsubstantial decline in the proportion of left-wing voters who called public channels as their favorite news channel (from 60.9% to 55%) – even though most groups of viewers reported lower trust in both private and public channels in 2004 than in 2001.

Summing up, even in a democratic setting with free news media market politicians controlling a significant share of it can silence their critics by sowing confusion and mistrust among the electorate as illustrated by the case of Silvio Berlusconi.

1.4.3 Case study: Donald Trump and 2016 presidential elections

During the 2016 presidential elections and shortly after them, there was an observable decline in perceived level of news media quality accompanied by an outbreak of fake news. We argue that such a declined was caused a shock to content quality of the mainstream news media due to an extraordinary coverage of Donald Trump who in his turn in a short time became a champion of fake news. Following the elections, Trump efficiently exploited the outbreak of fake news and conspiracy theories to alienate his supporters from opposition media.

There are two key indicators of a decline in the perceived quality of news media: first, trust in media has significantly declined from 2015 to 2016: according to Swift (2016), the share of Americans who have a great deal or fair amount of confidence in the media fell down from 40% to 32%.26; second, the issue of fake news has become more salient: both inside and outside the US, proliferation of fake news has drawn lots of attention at the end

26See Figure 1.5 for details.
of 2016 (Silverman, 2016; Mozur and Scott, 2016; Connolly et al., 2016). As one can see at Figure 1.6, the interest towards the issue in the US has risen dramatically over the last quarter of 2016.

The sharp growth of concern over the problem of fake news is somewhat puzzling: why all the concern and the interest is so recent if there is nothing new in the deliberate fabrication of fake news stories? Similarly, the decline in the reported trust in news media is also shocking. A plausible explanation would be that the presidential elections created additional incentives for various interest groups to spread fake news and reduce trust in media. However, it just raises another question: why was not there a surge in fake news proliferation during the 2012 elections?

According to many metrics, the structure of news consumption did not significantly change between 2012 and 2016. According to Pew (2012) and Pew (2016a), the major sources of news for Americans remained more or less unchanged during that time: 57% and 55%
of respondents got their news from television in 2012 and 2016, respectively; for digital news – e.g., online and mobile news – the numbers are 39% and 38% (see Table 1.1 for more details).

**Table 1.1: % of adults who often get news from:**

<table>
<thead>
<tr>
<th>Source</th>
<th>2012</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television</td>
<td>55%</td>
<td>57%</td>
</tr>
<tr>
<td>Digital</td>
<td>39%</td>
<td>38%</td>
</tr>
<tr>
<td>Radio</td>
<td>33%</td>
<td>25%</td>
</tr>
<tr>
<td>Newspaper</td>
<td>29%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Sources: Pew (2012) and Pew (2016a)

The only considerable change in news media market is the growth of news accessed through social media that is frequently blamed for deterioration of news quality. Reuters Institute (2016) points out that the use of social media as a source of news in the US has risen from 27% in 2013 to 46% in 2016. The estimates of Pew (2016b) are even higher: 62% of Americans get their news on social media at least sometimes.

In light of the rise of social media, it is often blamed for the recent decline in the
(perceived) quality of news consumed by the public (Wingfield, Isaac and Benner, 2012) as it is frequently argued that it introduced a structural change into the media market. Social media considerably reduced the cost of entry to the news media market, increasing the competitiveness of the latter. Furthermore, the speed of reproduction without significant filtering or fact-checking and news spread is higher in social media that affects both the returns to high-quality journalism (Cage, Hervé, and Viaud, 2017) and the proliferation of fake news (Dewey, 2016).

However, there are multiple arguments contradicting the accusations against social media. First of all, only 8% of Americans named Facebook as their “main source” for news about the 2016 election campaign (Pew, 2017) – just 2% more than the number of people who were regularly getting 2012 campaign information on Facebook in 2012 (Pew, 2012b). Furthermore, the term social media is too loose: what news people access through social media is an equilibrium outcome, and accessing news via Facebook does not necessarily imply getting news from unconventional sources – consumers might use social networks in order to follow the major news outlets. Finally, it would be also hard to argue that the 2016 candidates were using the social media in their advantage more effectively than the 2012 candidates: Figure 1.7 shows that if anything the 2012 candidates used more social networking platforms; according to Pew (2016c), “In terms of total followers, Obama’s 2012 campaign had a much larger number of followers than the 2016 candidates.”

Given the lack of any significant differences in the structure of news media market, it might be possible that such a sharp outbreak of fake news and the decline in trust in media were triggered by the major news outlets.

One of the key differences in mainstream media behavior between the two election cycles is an exceptional amount of free media coverage Donald Trump received in the second half of 2015 and throughout 2016. Only by February 2016, Trump has received over $2 billion worth of free media coverage (Confessore and Yourish, 2016) – Figure 1.8 provides monthly breakdown of the number – that frequently included broadcasts of Trump campaign events in their entirety. At the peak of 2015, Trump received 580 minutes of prime
time coverage from 8/25 to 9/4 on CNN alone (MRC, 2017) – that is, more than 25% of the total programming time. By the election close, Trump earned more media coverage than Clinton in the 2016 election cycle and Obama and Romney in the 2012 election cycle all together (Harris, 2017). Trump also dominated all the other candidates by the number of mentions – Figure 1.9 provides more details.

The broadcasts of Trump campaign events and interviews that constituted a significant portion of the free coverage could hardly increase the trust of news consumers in media. According to Politifact, 70% of Trump statements are mostly or completely false. Furthermore, Trump has been constantly accusing the news media of being dishonest and corrupt (Stelter, 2016) and mainstreaming conspiracy theories (Gopnik, 2016). We interpret the extensive coverage of Trump and Trump’s aggressive rhetoric towards news media as a negative shock to content quality: even though Trump had no control over news media, the outstanding amount of free coverage gave him an opportunity to criticize the opposition media.

The observed decline of trust in news media and proliferation of fake news fits into predictions of our model. As predicted by our model with local externalities, a negative
shock to content quality should be the largest among the group of consumers with the greatest exposure to the shock – Republicans. Indeed, the share of republicans that have a great deal or fair amount of confidence in the media fell down from 32% to 14% from 2015 to 2016.\footnote{There was also a difference between republicans and democrats in observable behavior related to trust in news media: pro-Trump fake news were shared a total of thirty million times on Facebook, whereas pro-Clinton ones – only eight million times (Allcott and Gentzkow, 2017).}

Furthermore, according to a recent poll by MaristPoll, only 9% of Republicans trust the media a good amount or a great deal\footnote{For the Democrats, the figure is 56%.} whereas the figure for trust towards the Trump administration is 84% (NPR/PBS NewsHour/Marist Poll, 2017). A survey by Knight-Gallup (2018) found that “Four in 10 Republicans consider accurate news stories that cast a politician or political group in a negative light to always be ‘fake news.’” Trust towards media among Republicans is so low, that one might argue that there is a fake-news equilibrium on the conservative side of the consumer spectrum. Trump’s criticism towards news media\footnote{According to Stelter (2018), Trump used the word “fake” more than once a day in the first year of his presidency.} opposing him only aggravates the problem and might be interpreted as a media capture attempt: if the voters supporting Trump distrust the media opposing him,
they fail to learn any criticism towards him and thus keep favoring him.

Overall, the case of the 2016 presidential elections provides a good illustration to the mechanics of our model: despite much lower entry costs in the media market, the structure of news consumption remained virtually unchanged, and the outbreak of fake news was arguably caused by the temporary negative shock to the content quality of the mainstream media and the subsequent deterioration of trust in news media and a media capture attempt by Donald Trump.

1.5 Conclusion

The current paper contributes to a large strand of the literature that discusses the impact of competition on a media market. In particular, we claim the following: (a) free entry to a media market cannot prevent media capture (b) perfect competition with virtually free entry might have positive as well as negative effect on news-media quality.

We present a model of perfectly competitive news media market and introduce a novel feature to it: quality externalities across outlets and news consumers. Due to such externalities, high-quality news can be delivered to consumers by an outlet if and only if other media outlets also produce high-quality news and/or if there is demand for high-quality news across the whole market. Therefore, perfect competition in a news media
market can end up either enforcing deterioration of media quality or improving the latter. We demonstrate how such externalities can be exploited by an authoritarian politician in order to effectively achieve media capture without actual control over the whole market. We illustrate our findings with case studies of Silvio Berlusconi, Vladimir Putin, and Donald Trump.

The narrative of the case studies and the concept of XXI’st century media capture contribute to a larger discussion of the destructive effects of whataboutism and reversed cargo cult\textsuperscript{30} on modern and weak democracies. In many cases, corrupt and/or autocratic politicians when exposed decide not to pick up the fight to defend their name but instead argue that the electorate has no better alternative – that all politicians are corrupt, all elections are rigged, all news media is biased, all the news are fake, etc – and by doing so shift the burden of defense to the opposition. When such accusations are accompanied by a monopoly over the attention of politician’s supporters it often creates an impenetrable wall between them and any opposition. The growing number of politicians who employ the described defense technic present therefore a big threat to democracies around the world.

As a concluding note, we want to stress that new technologies and ways of getting news not only promote competition but also reduce the time and effort required to cross-check and/or share news, which enforces the role of quality externalities across news sources and consumers. The externalities in their turn can either lead to deterioration or improvement of news quality, depending on whether reliable news sources are consumed only by a small elite or general public. Not to mention, such quality externalities might be exploited by groups that have goals misaligned with the long-term interests of the society. Hence, not only growing competition but also the increasing effect of externalities present challenge for traditional players in news media markets and society as a whole.

\textsuperscript{30}The term refers to a notion of cargo cult: a range of spiritual practices spread in Pacific islands where cults imitated military drills and the like in expectation to receive a cargo drop from some spiritual agents (e.g., Gods). A reversed cargo cult is a mental construction in which a person building a plane out of straws and manure perfectly understands that it yields no cargo but also believes that no plane can bring any cargo and cargo itself is just a big lie. The term is usually applied to describe the rhetorics of politicians in autocratic regimes trying to convince the electorate that democratic institutions are fake and non-existent anywhere.
Chapter 2

Tell me who you cite and I will tell you who you are. Investigating newspaper polarization based on citation and columnist patterns.

2.1 Introduction

A growing literature in political science shows increasing polarization in American politics over the last few decades. However, it is still an open question whether political polarization of media has increased along with the polarization of the public and the elites. The current paper attempts to measure political slant of American daily newspapers based on citation patterns and columnist selection and documents how the it evolves over the last 15-20 years.

Newspaper’s content and decisions what news to cover and how to do that might be affected by its political slant (Baron, 2006; Getzkw and Shapiro, 2010). In particular,

1See Rohde (1991), Poole and Rosenthal (1997), Fleisher and Bond (2000), Sinclair (2000), Hetherington (2001), Fleisher and Bond (2004), McCarty et al. (2006), Fiorina et al. (2008), Gentzkow (2016), Voorheis et al. (2016) and others. In addition, see illustration from Doherty (2014) – Figure 2.1.
Newspaper’s bias might influence its decisions on what sources to cite and what columns to publish. If a newspaper is biased, it might be inclined to cite news that are aligned with its own standpoint more often that those opposing it and hence would be relatively more likely to cite sources that are closer to it on the political scale than those that are far away. Similarly, the content of newspaper’s columns might be impacted by its political slant. Therefore, a biased newspaper is more likely to publish columns by syndicated columnists that are close to it in terms of political leaning than those that are farther from it. The mechanism for biased selection of sources and columnists can be either intentional (for example, biased choice of newspaper syndicates to subscribe or intentional omission of facts/events) or unintentional caused by attention/time constraints (editors having limited number of work hours at their disposal can spend more time following politically aligned sources and columnists and therefore mechanically cite and publish those more often) or

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2Here, I refer to syndication subscriptions: an agreement that allows newspapers to access, republish, and reuse articles, commentary, images, etc. provided by a syndicate for a fee. Some examples of newspaper syndicates are The New York Times News Service, Telegraph Media Group, and Tribune Media Services.
both.

Building on the logic above, I suggest to estimate newspaper political bias and political polarization of the newspaper industry based on two metrics: first, what sources it cites and how often it cites them; second, what syndicated columnists the newspaper selects for publication and how often it selects them. The list of sources includes top-15 most circulated newspapers as of 2015, national TV news-channels, and one national news magazine.\(^3\) The list of columnists include all syndicated columnists with self-reported political slant.\(^4\) The data on citations and columns cover time interval from 1999 to 2017 and approximately 400 newspapers.

Employing the two datasets along with supplementary data, I demonstrate that political polarization of the US newspapers has been growing since approximately mid-2000s. To establish increasing polarization, I first validate that both citation-pattern and columnist-selection measures of political slant are affected by newspaper bias. Second, I show that newspapers has becoming more differentiated in what sources they cite and what columnist they publish in general and once projected onto the scale of political bias. In addition, I establish a positive correlation between bias/polarization and financial performance during the Great Recession.

The use of columnists and media citations has certain advantages – in particular when compared to textual analysis of the language used (e.g., Getzkow and Shapiro, 2010) and citations of other entities (e.g., think tanks – Groseclose and Milyo, 2005) – in the context of polarization analysis. The main advantage is the fact that the approach provides a dictionary of politically charged phrases (i.e., the names of the sources and the names of the columnists) that is fixed across all the years of the sample, making inter-temporal comparison of newspaper polarization more reliable: if the dictionary was changing from year to year, any quantifiable trend in media polarization or a part of it could have been

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\(^3\)As explained further in the Data section, the names of other national news magazines that cover politics are too general to be automatically searched by a web-scraping code.

\(^4\)The data was provided by James Snyder.
attributed to changes in the dictionary. Related to the previous point, editorial policy of the largest news sources is likely to be largely consistent across the years of the sample and changing slowly, also allowing for more reliable cross-annual comparison of newspaper bias. In addition, the approach encompasses a rather wide range of newspapers, since even small ones frequently cite big news outlets and have opinion pages. Finally, the use of columnists and media citations allows polarization analysis that does not rely on proxies of media bias or partisanship as described in more detail in the next section.

The analysis of the paper proceeds in three steps. First, I directly compare citation patterns and columnist-selection patterns across newspapers and demonstrate that the newspapers in my sample have been becoming more different in terms of what sources they cite and which columnists they publish. In the next step, I validate that the first-step results might be interpreted in light of political polarization and that in general citation patterns and columnist selection are indeed affected by newspaper bias by . Finally, I construct political-bias scores for each newspaper in the sample based on either columnist selection or citation patterns and explore the evolution of the bias distribution across the considered period. In addition to the main analysis, I explore how newspaper bias and polarization are related to financial performance during the Great Recession as proxied by the change in the number of employees over the last 10 years.

To the best of my knowledge, this paper is the first attempt to systematically investigate the evolution of political polarization of news media. The paper adds to the literature that attempts to estimate media bias and its determinants based on media content: Groseclose and Milyo (2005) compare citations of think tanks and similar agencies by 20 largest news outlets to those by Congress representatives in order to estimate the ADA scores of the news outlets; Gentzkow and Shapiro (2010) construct an index of media bias based the frequency with which newspapers use language associated with either left- or right-wing members of Congress. Another study close in the nature of the data and the question to the current one is Adamic and Glance (2005) where the authors investigate cross-references of political bloggers. Gentzkow and Shapiro (2011) look at the news exposure and consumption on the
Internet in order to measure ideological segregation, which is also somewhat similar to this study, since citation patterns and columnist selection reveal news consumption patterns of a very specific group of consumers – journalists and editors.

Another strand of the literature the paper contributes to is the literature on polarization of American politics: Rohde (1991), Poole and Rosenthal (1997), Fleisher and Bond (2000), Sinclair (2000), Hetherington (2001), Fleisher and Bond (2004), McCarty et al. (2006), Fiorina et al. (2008), Gentzkow (2016), Voorheis et al. (2016) and others. In addition, the result on correlation between financial performance and political polarization is in line with the findings of the literature on the relation between the quality and partisanship of news reporting and market revenue: Petrova (2011), Cage (2017), and others.


The rest of the paper proceeds as follows: the next section discusses the data that is employed in the paper; section three presents the empirical strategy and the results; finally, the last section concludes the paper.

5 Also, see Prat and Strömberg (2011) for an extensive review of the literature on political economy of media.
2.2 Data

The data for this paper consist of a three key pieces: first, the number of citations of a set of sources by a set of newspapers; second, the number of articles written by syndicated columnists in the newspapers, and third, measures of political slant of the newspapers, the sources, and the columnists.

Citation data


To obtain the data on the number of citations of a source by a newspaper, I web-scrape the Newsbank database for the number of citations or references to each of the sources – that is, appearances of the names of the sources – by a pre-determined set of newspapers from 1999 to 2017. To be precise, any mention of a source name counts as a citation (multiple mentions within one article is counted as one citation): if a newspaper mentions “New York Times” in 20 articles in a given year, I count it as 20 citations of New York Times by the newspaper.

Due to the nature of the data collection process, the term ‘citation’ in this paper encompasses a wide range of cases the two most prevalent of which are article reprints through syndication and references to article(s) published in a source. The first type of cases refers to syndication subscriptions: an agreement that allows newspapers to access, republish, and

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^6Unfortunately, the names of other national news magazines are too general to be automatically searched by a web-scraping code: e.g., “World,” “The Week.”
reuse articles, commentary, images, etc. provided by a syndicate\textsuperscript{7} for a fee. The use of such services is quite common and some newspapers republish up to a few syndicate articles on a wide variety of topics daily. For example, on November 28th, 2017, The Times-Picayune republished three New York Times articles: “Lefty slugger from Japan has 100 mph fastball,” “Will these senators live up to their principles?” and “Final four? For college football playoff, a surplus of contenders and arguments,” – two articles about sports and one political article from New York Times opinion pages. The second type of cases refers to conventional definition of citation when a newspaper cites a fact or a claim reported by a source. For instance, on October 1st, 2017, The Missoulian cited New York Times in its article “Give EPA the tools it needs to do its job in Montana,” by the following reference: “the New York Times reported that the EPA is also considering cutting off more than $20 million in funding for the Environment and Natural Resources Division of the Justice Department.” The variation in the nature of “citations” as well as the fact that a reference does not always imply an agreement obviously generate some amount of noise in the data.

Due to coverage limitations, I restrict the set newspapers to the ones available without gaps from 2003 onwards. Overall, my sample includes over 4 million citations by approximately 400 newspapers, for some of which the data are unavailable prior to 2003. Figure 2.2 shows how the total number of citations changes over the considered period. Note that for all the analysis where I conduct inter-temporal comparison of citation patterns, I restrict the sample of newspapers to the ones that have at least 22 citations – roughly, one per source per year – in each one of the considered years: Figure 2.3 shows how the total number of citations changes over the considered period for the restricted set of newspapers. The appendix contains supplementary figures with break-downs of the trend by each source separately and by the slant of the sources.

\textsuperscript{7}Some examples of newspaper syndicates are The New York Times News Service, Telegraph Media Group, and Tribune Media Services.
Figure 2.2: Trends in the total number of columns and citations

Figure 2.3: Trends in the total number of columns and citations for a fixed number of newspapers

Columnist data

The data on the number of columns by syndicated columnists – columnists that write for newspaper syndicates – are also collected through Newsbank over the same period (from 1999 to 2017). Again, I count any article with a columnist name in it – regardless of where in the article it appears – as a column.

Similarly to the other dataset, there is a fair amount of noise in the data caused by the way it was collected. The primary source of the noise are the articles that are not authored by the columnist. For example, Thomas Sowell appears in “Western values are superior” by Walter Williams that was published in Times Record of Fort Smith, Hays Daily News, and
many other newspapers in the second half of July, 2017. The exact quote is “My colleague Dr. Thomas Sowell reveals some of the problem. He says...” Since the name of Thomas Sowell in the column, all the reprints of it are counted towards both the author, Walter Williams, and Thomas Sowell. Obviously, such cases of miscount introduce noise into the data – especially, if the actual author of the article disagrees or criticizes the columnist.

The set of syndicated columnists includes all authors with known political leaning. The set of newspapers is identical to the one in the citation data. Overall, my sample includes over a million of articles by approximately 400 newspapers, for some of which the data are unavailable prior to 2003. Figure 2.2 in the appendix shows how the total number of columns changes over the considered period. For consistency with the citation data, I restrict the sample of newspapers to the ones that have at least 22 columns for all the inter-temporal analysis of columnist selection. On top of that, the set of columnists is narrowed down to the ones that remain active throughout all the years of the sample, where “active” means that there was at least one article authored by the columnist published in one of the newspapers included in the sample. Figure 2.3 in the appendix shows how the total number of columns changes over the considered period for the restricted set of newspapers and columnists. The appendix contains supplementary figures that classify the columns by the slant of the columnists.

Supplementary data

The paper employs two proxies for political bias of newspapers: based on endorsements and election results in counties where a newspaper is circulated. The endorsement data are obtained from Editor&Publisher and George Washington University for presidential elections from 1996 to 2016. For the other proxy, I employ the most recent county-level circulation figures provided by The Alliance for Audited Media and county-level presidential election results from Leip (2016).

Slant data for sources and columnists are also coming from different sources. For sources

8The data on political leaning of newspapers are hand-collected and were provided by James Snyder.
that are newspapers, I use the presidential endorsements. Since there is no endorsement data for news TV channels and for Newsweek, I build on Mitchell et al. (2014) and define Fox News as conservative, MSNBC as moderately liberal, and the remaining sources as neutral. Finally, the data on bias of the columnists were provided by James Snyder.

In addition, I employ data on newsroom employees from the American Society of News Editors and the Newsroom Employment Diversity Survey (previously known as the Newsroom Employment Census) that is available from 1998 to 2017.

2.3 Empirical Analysis and Results

The empirical analysis proceeds in the following way: first, I compare citation and columnist-selection patterns across newspapers; second, I show that citation patterns as well as selection of columnists are indeed affected by political slant of newspapers and sources; third, I construct measures of political bias implied from citation patterns of a newspapers or based on which columnists appear in it and describe the evolution of the distribution of the two measures; and finally, I check for statistical association between political bias/polarization and financial performance.

2.3.1 Citation patterns comparison

In this subsection, I quantify the difference in citation patterns and columnist selection across the newspapers and analyze its evolution over time.

The idea behind the approach is to abstract from any measures of political bias and construct a measure of polarization that it is completely agnostic to the nature of the newspaper differentiation and politics in general. On the one hand, it does not allow me to interpret the results in light of political polarization, but on the other hand, it does not rely on political-slant data that might be subject to measurement errors, low coverage, and

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9 The results are robust to slight changes to the assumptions.

10 ASNE changed their operational definitions in 2016; therefore, I use only data up until 2015.
lack of reference points. The last point refers to the fact that most measures of political slant in fact estimate partisanship rather than bias; therefore, polarization estimates based on such measures exclude the part of political polarization attributed to the polarization of the parties.

In particular, I construct the following indexes of newspaper differentiation:

\[
\frac{1}{N} \sum_{n} ED_{ny}^{c}, \quad \frac{1}{N} \sum_{n} ED_{ny}^{s},
\]

where \( ED \) stands for Euclidean distance\(^{11} \) between newspaper \( n \) and the average newspaper in year \( y \) as defined below:

\[
ED_{ny}^{c} = \sum_{s} \left( \text{proportion}_{nsy} - \text{proportion}_{sy} \right)^{2},
\]

\[
ED_{ny}^{s} = \sum_{c} \left( \text{proportion}_{ncy} - \text{proportion}_{cy} \right)^{2},
\]

and \( \text{proportion}_{nsy} = \text{citations}_{nsy} / \sum_{s} \text{citations}_{nsy} \) is the proportion of citations of source \( s \) in the total number of citations by newspaper \( n \) in year \( y \), \( \text{proportion}_{ncy} = \text{columns}_{ncy} / \sum_{c} \text{columns}_{ncy} \) is the proportion of columns by columnists \( c \) in the total number of columns by newspaper \( n \) in year \( y \), \( \text{proportion}_{sy} = \sum_{n} \text{citations}_{nsy} / \sum_{n,s} \text{citations}_{nsy} \) is the proportion of citations of source \( s \) in the overall number of citations of all sources by all newspapers in period \( y \); and finally, \( \text{proportion}_{cy} = \sum_{n} \text{columns}_{ncy} / \sum_{n,c} \text{columns}_{ncy} \) is the proportion of columns by columnist \( c \) in the overall number of columns by all columnists in all newspapers in year \( y \).

**Similarity measure selection**

I consider three alternative measures of distribution comparison: Euclidean distance (ED), Chi-squared statistic (CH), and a hybrid of the former two that is also referred as an adjusted Euclidean distance (AED) – see formal definitions below:

\[
ED_{i} = \sum_{j} \left( \text{proportion}_{ij} - \text{proportion}_{.j} \right)^{2},
\]

\(^{11}\text{In the next subsection, I discuss why the Euclidean distance is chosen among alternative statistics that compare distributions (e.g., chi-squared statistic).}\)
\[ CH_i = N_i \sum_j \left( \frac{\text{proportion}_{ij} - \text{proportion}_j}{\text{proportion}_j} \right)^2, \]
\[ AED_i = \sum_j \left( \frac{\text{proportion}_{ij} - \text{proportion}_j}{\text{proportion}_j} \right)^2, \]

where \( \text{proportion}_{ij} \) is the proportion of source(columnist) \( j \) in the total number of citations(columns) by newspaper \( i \), \( N_i \) is the total number of citations(columns) by newspaper \( i \), and \( \text{proportion}_j \) is the proportion of source(columnist) \( j \) in the total number of citations(columns) by the average newspaper – note that the latter is not equal to the average proportion.

Besides the fact that the three measures employ different weights, there are some sensitivity issues related to each of them:

1. The Euclidean distance is sensitive to the number of sources(columnists). In particular, consider the following example (the number in each cell = the number of columns):

<table>
<thead>
<tr>
<th></th>
<th>Newsp-r 1</th>
<th>Newsp-r 2</th>
<th></th>
<th>Newsp-r 1</th>
<th>Newsp-r 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columnist 1</td>
<td>0</td>
<td>0</td>
<td>Columnist 1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Columnist 2</td>
<td>0</td>
<td>0</td>
<td>Columnist 2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Columnist 3</td>
<td>0</td>
<td>2</td>
<td>Columnist 3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Columnist 4</td>
<td>2</td>
<td>0</td>
<td>Columnist 4</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

   Note that the two cases are identical in all the dimensions except that Columnists 3 and 4 are essentially split into two each, hence a distance measures should be ideally the same in the two examples. However, the \( ED \) measure is larger for each of the newspapers in Case 1 unlike the other two measures.

2. The Chi-squared measure is sensitive to the number of citations(columns). Consider the following example:

<table>
<thead>
<tr>
<th></th>
<th>Newsp-r 1</th>
<th>Newsp-r 2</th>
<th></th>
<th>Newsp-r 1</th>
<th>Newsp-r 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columnist 1</td>
<td>0</td>
<td>1</td>
<td>Columnist 1</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Columnist 2</td>
<td>1</td>
<td>0</td>
<td>Columnist 2</td>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

   Again, the two cases are different in only one dimension – the number of columns increased tenfold. Intuitively, a proper measure should find no difference between the
two cases. Both \( ED \) and \( AED \) do not change from Case 1 to Case 2; however, the \( CH \) measure is ten times larger for each of the newspapers in the second case.

3. The adjusted Euclidean measure is sensitive to asymmetric distributions. Consider the following example:

**Case 1:**

<table>
<thead>
<tr>
<th>Columnist 1</th>
<th>Newsp-r 1</th>
<th>Newsp-r 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Columnist 2</td>
<td>500</td>
<td>0</td>
</tr>
</tbody>
</table>

**Case 2:**

<table>
<thead>
<tr>
<th>Columnist 1</th>
<th>Newsp-r 1</th>
<th>Newsp-r 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>999</td>
<td></td>
</tr>
<tr>
<td>Columnist 2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

In the first case, \( ED = 0.5, \ CH = 500, \) and \( AED = 1, \) where omitted indexes means that these are the average values of the measures across all the newspapers. In the second case, 

\[
ED = \frac{1}{2} \left[ ((0 - 0.999)^2 + (1 - 0.001)^2 + (1 - 0.999)^2 + (0 - 0.001)^2) \right] \approx 1,
\]

\[
CH = \frac{1}{2} \left[ \left( \frac{(0-0.999)^2}{0.999} + \frac{(1-0.001)^2}{0.001} + 999 \left( \frac{1-0.999)^2}{0.999} + 999 \left( \frac{0-0.001)^2}{0.001} \right) \right) \right] \approx 500,
\]

and \( AED \approx 500. \) Whereas \( ED \) and \( CH \) changed only slightly, \( AED \) skyrocketed five hundred times. It might look however like a side effect of the way \( \text{proportion}_j \)'s are calculated (proportions of the total figures rather than average proportions) – to see that it is not the case consider a case with 1000 newspapers that evenly split between two columnists in the first case and all but one preferring the second columnist in the second case:

**Case 1:**

<table>
<thead>
<tr>
<th>Columnist 1</th>
<th>Newsp-r 1</th>
<th>...</th>
<th>Newsp-r 500</th>
<th>Newsp-r 501</th>
<th>...</th>
<th>Newsp-r 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Columnist 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Case 2:**

<table>
<thead>
<tr>
<th>Columnist 1</th>
<th>Newsp-r 1</th>
<th>Newsp-r 2</th>
<th>...</th>
<th>Newsp-r 999</th>
<th>Newsp-r 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Columnist 2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

In the second case, \( ED \approx 0 \) whereas \( CH \approx 1 \) and \( AED \approx 1 \) – that is, almost equal to the one of the first case where \( CH = AED = 1. \)

Due to high variation of the number of citations and columns across newspapers and years, the second issue completely rules out the Chi-squared statistics. Similarly, the adjusted Euclidean distance also seems like a bad candidate for the analysis, for high variation raises
the third issue. In addition, the number of columnists and sources is fixed\textsuperscript{12} in all the years whenever inter-temporal comparisons are made, meaning that the first issue is not particularly relevant for the analysis. Therefore, I employ the Euclidean distance measure in the paper.

**Results**

In essence, the newspaper differentiation index is a multidimensional variance. The larger the statistic is, the more unique newspapers are in terms of their citation pattern/columnist selection. Figure 2.4 presents the evolution of the newspaper differentiation based on the citation and columnist data across the considered period.\textsuperscript{13}

![Figure 2.4: Newspaper differentiation index](image)

\textsuperscript{12}In case of columnists, the sample is restricted to those that remain active throughout all the years of the sample; where “active” means that there was at least one article authored by the columnist published in one of the newspapers included in the sample.

\textsuperscript{13}Since there is no data available for some of the newspapers before 2003 and there is evidence showing that growth in polarization of the public has been taking place since mid-2000s (Doherty (2014)), I focus primarily on the period from 2003. See the results of the same analysis replicated on the subsample of newspapers with data available from 1999 in Figure A.8 in the appendix.

The sample of newspapers is restricted to the ones that have at least 22 columns or 22 citations in each year, respectively. That is, one citation per source per year – there are in total 22 sources in the sample. The restriction on the number of columns is applied for consistency. The motivation is to insure that the set of newspapers is fixed throughout the considered period and that the results are not too sensitive to inclusion of newspapers with too few columns or citations.

The sample of columnists is restricted to those that remain active throughout all the years of the sample; where “active” means that there was at least one article authored by the columnist published in one of the newspapers included in the sample.
In both cases, there is an evident upward trend in the newspaper differentiation index, suggesting that newspapers in the sample have been becoming more different in terms of what sources they cite and what columnists they publish since approximately mid-2000s. Since the number of citations of some of the sources also exhibit trends during the considered period (see supplementary figures in the appendix), I replicate the results excluding each of such sources individually – the results are very similar.

As stated before, the current results cannot be directly interpreted as reflecting political polarization; however it is possible to provide suggestive evidence for that by focusing on subsamples of articles about politics. In attempt to argue that the increasing differentiation is caused by political polarization, I replicate Figure 2.4 for the subsample of articles that have the word ‘president’ in it. As one can see in Figure 2.5, the results are very similar: there is an upward trend with slight election cycle – the values of the indexes are somewhat smaller in election years. Even though the results obtained on the subsamples do not serve as a direct proof of increasing polarization, it is indicative of the fact that the newspapers become more differentiated in topics related to politics.

**Figure 2.5: Replication of Figure 2.4 on the subsample articles containing the word “president”**

In addition, I replicate the same analysis on the subsample of articles containing the word “congress” – the results are similar. Interestingly, the same pattern although somewhat weaker is observed on subsamples of articles containing words “football” or “movie” and from the “sports” section (see the appendix for the supplementary figures with the results
on the subsamples).

The last fact – the increasing differentiation observed on articles containing words “football” or “movie” and from the “sports” section – can be explained by three factors. First, a significant portion of articles that contain words “football” or “movie” are not actually about those topics. For example, the top-5 ‘contributors’ to the sample of columns that contain the word “football” are Jack Kemp, Bill O’Reilly, Steve and Cokie Roberts, Eugene Robinson, and George Will (in the order of increasing number of columns) all of which are political commentators who almost never write about sports; ironically, Jack Kemp is an ex football player. Second, a considerable portion of citations are actually reprints of articles published in the sources though syndication (obviously, the same is true for most of syndicated columns): as outlined in the data section, articles that get reprinted cover a variety of topic including sports and movies – if newspaper editors decide which sources to subscribe for or which ones to reprint more frequently in a politically biased manner, then even citation patterns of politically neutral topics articles might reflect political slant. The final factor is similar to the previous one: newspaper editors might face capacity constraints in terms of how much time – their own or their employees’ – they can spend on browsing through other news outlets; therefore, if they allocate more time to some specific news outlets – for examples, politically aligned ones – they are also more likely to refer more to those outlets in topics unrelated to politics. The results of the next subsection demonstrate that citation patterns and columnist selection in the subsamples of articles containing words “football” or “movie” and from the “sports” section are indeed affected by newspaper bias.

As another step towards political interpretation of the newspaper differentiation growth, the results or Figure 2.4 are replicated, keeping only liberal or conservative columnists / sources.\textsuperscript{14} As demonstrated in Figure 2.6, the trend becomes weaker both in terms of proportional growth in the indexes and their consistency – especially in the case of citations. It is not surprising however that some of the trend is still there, since political slant is non-binary but rather a spectrum, and any divergence present in the whole distribution of

\textsuperscript{14}I discuss how the bias is estimated in more detail in the next subsection.
political bias should exist on each side of the distribution.

**Figure 2.6: Replication of Figure 2.4 on subsets of liberal or conservative columnists/sources**

Finally, as a placebo check, I replicate the analysis and calculate the newspaper differentiation index based on columnist selection among apolitical columnists which do not write about American politics.\(^{15}\) The topics that such columnists cover include farming, religion, humor, international affairs (e.g., politics of Latin America), and so on. Even though the results reported in Figure 2.7 should be interpreted with caution due to tiny sample size, they are suggestive that the growth in newspaper differentiation can be attributed with an increase in political polarization.

Overall, the results of this subsection indicate an increasing differentiation of US newspapers. The subsequent parts of the analysis attempt to argue that the observed differentiation

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\(^{15}\)Apolitical columnists are not included into any other analysis of the paper including the main results of this section.
is coming – at least partially – from political polarization; however, even this subsection provides suggestive evidence of increasing political polarization.

### 2.3.2 Citation frequency, columnist selection, and media slant

In this step of the analysis, I perform a validation exercise to confirm that indeed political bias of newspapers is associated with measures of political slant implied from what sources they cite and what columnists publish articles in them. First, I show that newspapers tend to cite more often sources and publish articles from columnists that are closer to them in terms of their political bias; and second, I check that these correlations are not driven by a particular year or a range of years.

#### Bias proxies

I begin with the description of proxies for newspaper bias.

Based on presidential endorsements, I construct two measures of political slant: a static one, $Bias_n$, that averages all the endorsements $^{16}$ by a newspaper and ranges from $-1$ for newspapers that endorsed only liberal candidates to 1 for newspapers that endorsed only conservative candidates; and a dynamic one, $Bias_{ny}$, that is defined by concurrent

---

$^{16}$The 2016 endorsements lacked almost any support for Donald Trump and hence can potentially spoil the results. In order to address that issue, all the results are replicated with 2016 endorsements being disregarded.
endorsements – equals to –1 for pro-democrat endorsements and to 1 for pro-republican ones – in election years and the average of the two most recent endorsements in the other years. I code every case of a newspaper that explicitly endorsed neither democrat nor republican – for example, no candidate or an independent candidate was endorsed – as neutral, 0.

Alternatively, following George and Waldfogel (2003), Gentzkow and Shapiro (2010), and others, I imply newspaper bias from the bias of areas where it is circulated. In particular, newspaper bias in an election year is calculated as

$$\sum_{\text{counties}} \frac{\text{circulation}_{\text{county}} \times \text{vote margin}_{\text{county}}}{\sum_{\text{counties}} \text{circulation}_{\text{county}}}$$

where vote margin$_{\text{county}}$ is the difference between Republican and Democrat vote shares in a county, and circulation$_{\text{county}}$ is the total circulation of a newspaper in the county. The measure naturally varies from –1 to 1 with larger values corresponding to more conservative leaning. Similarly to the endorsement proxy, I aggregate the measure across all the elections as well as keep it time-varying by extrapolation from the closest elections.

For the bias of the sources, I also exploit presidential endorsements whenever appropriate and rely on Pew Research Center classification, if endorsements are not available. Since there is no endorsement data for news TV channels and for Newsweek, I follow Pew Research Center (Mitchell et al., 2014) and define Fox News as conservative, 1, MSNBC as moderately liberal, –0.5, and the rest as neutral, 0. Similarly, $\text{Bias}_s$ and $\text{Bias}_{sy}$ are the static and the dynamic proxies for bias of the sources.

Finally, I employ the hand-collected data provided by James Snyder and quantify bias of all conservative columnists as $\text{Bias}_c = 1$, that of liberal columnists – as –1, and 0 otherwise.

---

17 If there is no data for a particular election year, I extrapolate it from the closest election year where the data are available.

18 The results are robust to slight changes to the assumptions, ±0.5, and to the exclusion of non-newspapers from the list of sources.
Citation frequency, columnist selection, and media slant

To demonstrate a relation between political slant, citation patterns, and columnist selection, I estimate the following specifications:

\[
proportion_{nsy} = \alpha + \beta \text{Alignment}_{nsy} + \gamma \text{Dist}_{ns} + \text{FE}_n + \text{FE}_y + \varepsilon_{nsy}, \tag{2.3}
\]

\[
proportion_{ncy} = \alpha + \beta \text{Alignment}_{ncy} + \text{FE}_n + \text{FE}_c + \text{FE}_y + \varepsilon_{ncy},
\]

\[
\ln(\text{citations}_{nsy}) = \alpha + \beta \text{Alignment}_{nsy} + \gamma \text{Dist}_{ns} + \text{FE}_n + \text{FE}_y + \varepsilon_{nsy}, \tag{2.4}
\]

\[
\ln(\text{columns}_{ncy}) = \alpha + \beta \text{Alignment}_{ncy} + \text{FE}_n + \text{FE}_c + \text{FE}_y + \varepsilon_{ncy},
\]

where the notations follow those of the previous subsection: \(\ln(\text{citations}_{ncy})\) and \(\ln(\text{columns}_{nsy})\) are the natural logarithms of the total number of columns by columnist \(c\) or citations of source \(s\) by newspaper \(n\) in year \(y\), respectively, and \(proportion_{ncy}\) and \(proportion_{nsy}\) are the respective proportions;\(^{19}\) \(\text{Dist}_{ns}\) is physical distance between the headquarters of the source and the newspaper; and finally, \(\text{FE}_n, \text{FE}_y, \text{FE}_c, \text{FE}_y\) are newspaper, source-by-year, columnist, and year fixed effects, respectively. \(\text{Alignment}_{nsy}\) and \(\text{Alignment}_{ncy}\) are measures of political alignment of the source / columnist and the newspaper that are equal to the squared difference between the bias proxies: e.g., \(\text{Alignment}_{nsy} = (\text{Bias}_n - \text{Bias}_s)^2\) or \(\text{Alignment}_{ncy} = (\text{Bias}_{ny} - \text{Bias}_c)^2\).

The estimation results are provided in Table 2.1 below.\(^{20}\)

As evident from the results, the correlations between different measures of political bias and citation patterns / columnist selection are quite strong. The results are robust both to exclusion of TV channels and non-nation-wide outlets from the list of sources and to exclusion of 2016 endorsements from the bias proxies\(^{21}\) – see supplementary tables in the

\(^{19}\)Since the original data on citations and columns are at daily level, similar regressions can be run at more quarterly, monthly, or even daily level; however, the political-bias data are no more granular than annual level.

\(^{20}\)Note that no restrictions are applied to the samples that go into the regressions, since no inter-temporal comparison is done here.

\(^{21}\)Due to almost unanimous lack of endorsement for Donald Trump during the 2016 elections, newspaper
### Table 2.1: Panel results

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(columns)</th>
<th>Pr(columnist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.010***</td>
<td>-0.021***</td>
</tr>
<tr>
<td></td>
<td>[0.002]</td>
<td>[0.004]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.006***</td>
<td>-0.015***</td>
</tr>
<tr>
<td></td>
<td>[0.001]</td>
<td>[0.003]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.021***</td>
<td>-0.082***</td>
</tr>
<tr>
<td></td>
<td>[0.004]</td>
<td>[0.017]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.007***</td>
<td>-0.031***</td>
</tr>
<tr>
<td></td>
<td>[0.003]</td>
<td>[0.011]</td>
</tr>
</tbody>
</table>

- Observations: 1,268k 1,268k 1,246k 1,246k 1,240k 1,240k 1,218k 1,218k
- R-squared: 0.254 0.254 0.248 0.248 0.099 0.099 0.097 0.097
- SD[Alignment]: 1.531 1.716 .55 .659 1.529 1.715 .55 .658
- Number of newspapers: 358 358 354 354 358 358 354 354
- Number of columnists: 195 195 195 195 195 195 195 195

Standard errors clustered at newspaper level in brackets. *** p < 0.01; ** p < 0.05; * p < 0.1

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(citations)</th>
<th>Pr(source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.041***</td>
<td>-0.400***</td>
</tr>
<tr>
<td></td>
<td>[0.006]</td>
<td>[0.060]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.015***</td>
<td>-0.210***</td>
</tr>
<tr>
<td></td>
<td>[0.005]</td>
<td>[0.032]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.138***</td>
<td>-1.428***</td>
</tr>
<tr>
<td></td>
<td>[0.029]</td>
<td>[0.262]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.040*</td>
<td>-0.958***</td>
</tr>
<tr>
<td></td>
<td>[0.021]</td>
<td>[0.151]</td>
</tr>
</tbody>
</table>

- Observations: 143,110 143,110 140,668 140,668 141,504 141,504 139,370 139,370
- R-squared: 0.705 0.704 0.707 0.707 0.546 0.546 0.533 0.532
- SD[Alignment]: 1.002 1.304 .477 .641 1.002 1.303 .477 .641
- Number of newspapers: 358 358 354 354 358 358 354 354

Standard errors clustered at newspaper level in brackets. *** p < 0.01; ** p < 0.05; * p < 0.1

The results also hold on subsamples of articles containing specific terms (that is, president, congress, football, and movie) as well as on the subsample of articles from ‘sports’ section – see supplementary tables in the appendix.

It is worth noting that unlike the results for the columnist dataset the ones for the citation data are not that trivial. One could imagine that journalists would follow and cover the same topics, but take different stances on them, depending on their bias: in some sense, endorsements of that election cycle could be arguably considered as outliers.
citation patterns stand for the extensive margin of media bias whereas the intensive margin is how news are covered. The results however suggest the presence of the extensive margin.

Given the results on the main sample, it is no surprise that the correlations hold for articles that are likely to be about politics (those containing words “president” or “football”), however it is interesting that the correlation is quite strong on the subsamples of more neutral articles: especially for citations, the magnitude and the significance of the coefficients are very similar to the ones in Table 2.1. The latter result reassures the logic outlined in the previous subsection about different factors that might lead to relation between political slant and citations/columns on neutral topics: some of those articles might be in fact politics and in addition some financial or attention constraints might lead to a politically motivation selection of sources or columnists when it comes to sports or movies.

To demonstrate that the results in Table 2.1 are not driven by a specific year or a range of years, I report year-by-year estimation results for specification (2.3) in Figure 2.8.\textsuperscript{22}

\textsuperscript{22}A similar graph for specification (2.4) as well as the results from 1999 are provided in supplemental figures the appendix.

Similarly to the analysis in the previous subsection, the sample of newspapers is restricted to the ones that have at least 22 columns or 22 citations in each year, respectively, and the sample of columnists is restricted to those that remain active throughout all the years.
Figure 2.8: Year-by-year estimates of specifications (2.3), 2003 - 2017

\[
\text{proportion}_{nc} = \alpha + \beta \text{Alignment}_{nc} + FE_n + FE_c + \epsilon_{nc}
\]

(a) Average endorsements  \hspace{1cm} (b) Endorsements  \hspace{1cm} (c) Average demand  \hspace{1cm} (d) Demand

\[
\text{proportion}_{ns} = \alpha + \beta \text{Alignment}_{ns} + \gamma \text{Dist}_{ns} + FE_n + FE_s + \epsilon_{ns}
\]

(e) Average endorsements  \hspace{1cm} (f) Endorsements  \hspace{1cm} (g) Average demand  \hspace{1cm} (h) Demand

Year-by-year estimates of coefficients for \text{Alignment}_{ncy} and \text{Alignment}_{nsy} from specifications (2.3) along with 90% confidence intervals for a fixed number of newspapers: graphs (a) - (c) are constructed on the sample of newspapers that have at least 22 columns in each year; graphs (d) - (f) are constructed on the sample of newspapers that have at least 22 citations in each year.

Note that any trends in the correlations do not speak for changes in political polarization, for each individual correlation is not a proxy for polarization: it essentially estimates the degree of association between two measures of media slant, whereas polarization is the variance of the bias.\textsuperscript{23} Even though it might seem that there is an upward trend in the magnitudes of the coefficients, it is inconsistent across specifications and statistically undetectable in most cases.

As before, there is a concern that 2016 endorsements are not representative of actual political slant of newspapers. Therefore, I replicate the results omitting the 2016 endorsements from calculations of the alignment measures – the results are identical (see supplementary

\textsuperscript{23}Consider the following more formal but still superficial explanation. Let there be two proxies, \( p_1 = a_1 + \beta_1 b + \epsilon_1 \) and \( p_2 = a_2 + \beta_2 b + \epsilon_2 \), for bias, \( b \), where \( a_i, \beta_i \) are parameters and \( \epsilon_i \) are measurement errors. Then, correlation between them is \( \rho = \frac{a_1 a_2}{\sigma_1 \sigma_2} \), which has nothing to do the distribution of \( b \). Polarization is on the opposite a characteristic of the bias distribution.
All in all, the results of this subsection, first of all, confirm that newspapers select sources to cite and columnists to publish in a biased fashion, and second, provide additional validation for the claim that the first set of results – increasing newspaper differentiation – speaks for political polarization.

2.3.3 Implied media bias

The final step of the analysis abstracts from the measures of political bias of newspapers and focuses on the evolution of media bias implied from their citation patterns as well as their preference for columnists. In essence, the idea of this part is to replicate the analysis of the first part with each source/columnist ‘projected’ onto the one-dimensional space of political bias.

For each newspaper in each period \( t \) (e.g., year, quarter, etc.), I construct two proxies for their political slant:

\[
\text{ImplBias}_{ny}^c = \sum_c \text{proportion}_{ncy} \text{Bias}_c, \quad \text{ImplBias}_{ny}^s = \sum_s \text{proportion}_{nsy} \text{Bias}_s, \quad (2.5)
\]

where by construction \( \text{ImplBias}_{nt}^s \) is the implied bias of newspaper \( n \) in year \( y \) based on its citation pattern, and \( \text{ImplBias}_{nt}^c \) is the implied bias of the newspaper in year \( y \) based on its selection of columnists.

The two new proxies for political bias have certain advantages over endorsement-induced or demand-implied ones: they are available for a much larger universe of newspapers because they do not rely on either endorsement- or circulation-data availability; for the same reason, they are available for years/months/days outside the election ones; likewise, they are more dynamic and can be estimated for much finer periods of time; finally, they are not subject to measurement and other errors incorporated into endorsement-induced or demand-implied proxies. An obvious downside of the proxy is that it requires a reasonable number of citations/columns so that the estimated can be reliable: I require at least 22 citations/columns which is consistent with the rest of the analysis and also close to a
universally accepted rule of thumb for the minimal number of observation for the Law of Large Number and Central Limit Theorem to work. Also, the proxies obviously suffer from the reliance on the measures of political slant of the sources and the columnists, since the latter might be noisy and speak for partisanship rather than bias.

Figure 2.9 visualizes the evolution of the standard deviations of $ImplBias_{ny}$ and $ImplBias_{ny}$ across the considered period.\(^{24}\)

**Figure 2.9: Newspaper polarization**

![Figure 2.9: Newspaper polarization](image)

In both cases, there is an upward trend in the dispersion of the implied political bias. Similarly to the previous section, there is a concern that 2016 election endorsements might spoil the proxy for political bias of sources – thus, the figure is replicated in the appendix with a bias proxy that relies solely on endorsements in 1996-2012. The trend remains even if 2016 elections are excluded (see supplementary figures in the appendix). Interestingly, the timings of the two trends coincide with the ones found in the first step of the analysis – around 2004-2005 for the columnist data, and around 2008-2009 for the citation data – which strengthens the argument that the results of the growing newspaper differentiation can be attributed to political differentiation.

\(^{24}\)Similarly to Figures 2.4 and 2.8, the sample of newspapers is restricted to the ones that have at least 22 columns or 22 citations in each year, respectively, and the sample of columnists is restricted to those that remain active throughout all the years.

See the results for years from 1999 and on in the appendix.

Note that the confidence intervals should be interpreted with caution, since they are not accounted for the fact that the implied biases are estimates themselves.
The same trends hold on subsamples of articles that contain words “president,” “congress,” “football,” and “movie” as well as on the subsample of “sports” articles: they are non-surprisingly a bit stronger for the ‘political’ topics than for the neutral ones. Note however that the sample size is very small for most of the results on the subsamples and some of proxies are built on as few as 5 columns which makes their reliability questionable.

A more detailed breakdown of the distribution of the implied bias is provided in Figure 2.10: the figure presents the evolution of six quantiles of the distribution of the implied bias. As one can observe on the graph, there is almost no change in the center of the distribution with more polarization increase happening farther away from the median newspaper.

Figure 2.10: Newspaper polarization: quantiles

This third step of the analysis incorporates both the methodology and the results of the previous parts and tests directly for an increase in media polarization. The results of this subsection together with the ones of the first two strongly indicate that there has been an increase in political polarization of US newspapers starting from approximately mid-2000s.

2.3.4 Heterogeneity analysis: financial performance

In addition to the main results, I explore how media bias and polarization are related to financial performance of newspapers. The motivation for this last step of the analysis comes both from the literature that highlights the importance of (advertisement) revenues for newspapers to deliver non-partisan and high-quality news (Petrova, 2011; Cage, 2017) and
from the fact that the most recent downturn in the newspaper industry in the US closely coincided with the period of growth in public and media polarization as shown in Figure 2.11.

**Figure 2.11: Newspaper revenue**

To obtain a measure of financial performance at newspaper level, I employ the data on the number of newsroom employees from the American Society of News Editors and the Newsroom Employment Diversity Survey (previously known as the Newsroom Employment Census). Number of employees is arguably a decent proxy for revenue: newspapers (and firms in general) that have greater revenue then to have more employees.

Specifically, I estimate the proportion of employees that were laid off between 2006 and 2015 – the two years are marked with red vertical lines in Figure 2.11 – where 2006 is the beginning of the downturn and 2015 is the last year before ASNE changed their survey definitions. In particular, I construct the following measure $Layoff_n = \frac{\text{Employees}_{2006} - \text{Employees}_{2015}}{\text{Employees}_{2006}}$ which is a proportional change in the number of newsroom employees between 2006 and 2015.

**Bias and financial performance**

To test for the relation between bias and financial performance, I estimate regressions similar to the ones in section 2.3.2:
\[
\text{prop}_{n_{cy}} = \alpha + \beta \text{Alignment}_{n_{cy}} + \delta \text{Alignment}_{n_{cy}} \times \text{Layoff}_{n} + \text{FE}_{n} + \text{FE}_{c} + \text{FE}_{y} + \epsilon_{n_{cy}},
\]
\[
\ln(\text{col}_{n_{cy}}) = \alpha + \beta \text{Alignment}_{n_{cy}} + \delta \text{Alignment}_{n_{cy}} \times \text{Layoff}_{n} + \text{FE}_{n} + \text{FE}_{c} + \text{FE}_{y} + \epsilon_{n_{cy}},
\]
\[
\text{prop}_{n_{sy}} = \alpha + \beta \text{Alignment}_{n_{sy}} + \delta \text{Alignment}_{n_{sy}} \times \text{Layoff}_{n} + \gamma \text{Dist}_{n_{sy}} + \text{FE}_{n} + \text{FE}_{c} + \text{FE}_{y} + \epsilon_{n_{sy}},
\]
\[
\ln(\text{cit}_{n_{sy}}) = \alpha + \beta \text{Alignment}_{n_{sy}} + \delta \text{Alignment}_{n_{sy}} \times \text{Layoff}_{n} + \gamma \text{Dist}_{n_{sy}} + \text{FE}_{n} + \text{FE}_{c} + \text{FE}_{y} + \epsilon_{n_{sy}},
\]

where the difference is the interaction between alignment and layoff variables. Positive sign of the coefficient would imply that newspapers that laid off more people – did worse financially – exhibit lower bias in terms of citation pattern and columnist selection. On the contrary, negative sign would imply that newspapers that laid off more employees are more likely to cite like-minded sources and publish like-minded columnists.

The estimation results are provided in Table 2.2 below.

Even though the coefficient is not consistently significant across the specifications, it is fairly significant in most of them and positive. The latter fact means that newspapers that did better financially exhibited more bias when they selected sources to cite or columnists to publish. The magnitude of the coefficients are especially interesting: newspapers that did not display biased columnist selection or citation pattern lost almost all the employees between 2006 and 2015.

As the rest of the empirical analysis, this part does not make any causal claims; it does however provide two potential explanations for the the outlined correlation. First, it could be the case that newspapers that feed to the priors of the audience and produce more biased content sell better – especially during financial crisis. This hypothesis is consistent with the literature that shows that adverse economic conditions promote extreme political views (Mian et al., 2014; Voorheis et al., 2016; Autor et al., 2017). Another possible explanation is that some newspapers got bought off by different interest groups during the Great Recession and hence did not have to layoff as many people due to infusion of cash but at the same time had to adjust their editorial policy to accommodate the groups’ interests (Akhavan-Majid, Rife, and Gopinath, 1991). See supplementary tables in the appendix for a breakdown of
Table 2.2: Correlation between political bias and financial performance

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(columns)</th>
<th>Pr(columnist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.012*** [0.003]</td>
<td>-0.036*** [0.006]</td>
</tr>
<tr>
<td>Ind.Var. × Empl. change</td>
<td>0.009* [0.005]</td>
<td>0.040*** [0.014]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.008*** [0.002]</td>
<td>-0.027*** [0.005]</td>
</tr>
<tr>
<td>Ind.Var. × Empl. change</td>
<td>0.008* [0.004]</td>
<td>0.033*** [0.011]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.027*** [0.005]</td>
<td>-0.112*** [0.017]</td>
</tr>
<tr>
<td>Ind.Var. × Empl. change</td>
<td>0.013 [0.009]</td>
<td>0.077* [0.039]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.013*** [0.003]</td>
<td>-0.056*** [0.012]</td>
</tr>
<tr>
<td>Ind.Var. × Empl. change</td>
<td>0.015** [0.007]</td>
<td>0.070** [0.030]</td>
</tr>
</tbody>
</table>

Observations: | 1,059k | 1,059k | 1,104k | 1,104k | 1,004k | 1,004k | 1,038k | 1,038k |
R-squared: | 0.253 | 0.253 | 0.244 | 0.244 | 0.112 | 0.112 | 0.104 | 0.104 |
Number of newspapers: | 286 | 286 | 298 | 298 | 286 | 286 | 298 | 298 |
Number of columnists: | 195 | 195 | 195 | 195 | 195 | 195 | 195 | 195 |

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1

Outcome variable: ln(citations) Pr(source)

| Av. Pol. Dist.: end-ts | -0.043*** [0.008] | -0.351*** [0.089] |
| Alignment × Layoff | 0.018 [0.019] | 0.029 [0.190] |
| Pol. Dist.: endorsements | -0.023*** [0.007] | -0.238*** [0.048] |
| Alignment × Layoff | 0.029* [0.016] | 0.167 [0.102] |
| Av. Pol. Dist.: demand | -0.190*** [0.033] | -1.801*** [0.319] |
| Alignment × Layoff | 0.161*** [0.041] | 1.485*** [0.454] |
| Pol. Dist.: demand | -0.089*** [0.024] | -1.180*** [0.178] |
| Alignment × Layoff | 0.162*** [0.029] | 0.966*** [0.251] |

Observations: | 114,818 | 114,818 | 118,998 | 118,998 | 113,718 | 113,718 | 118,030 | 118,030 |
R-squared: | 0.695 | 0.695 | 0.702 | 0.702 | 0.546 | 0.546 | 0.541 | 0.541 |
Number of newspapers: | 286 | 286 | 298 | 298 | 286 | 286 | 298 | 298 |

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1
the Table 2.2’s results for pre-2006 and post-2006 subsamples: the effect is somewhat larger and more significant for the pre-period, suggesting that the former explanation is more plausible.

**Polarization and financial performance**

To shed some light on the correlation between financial performance and polarization, I replicate the analysis of section 2.3.1 on subsamples of newspapers that performed relatively worse or relatively better financially. More specifically, I split the sample by the median share of laid off employees between 2006 and 2015 and then estimate the newspaper differentiation index on each of the subsamples separately.

Figure 2.12 shows the difference between the two indexes for each year of the sample. Note that each individual Euclidean distance is calculated based on the same average newspaper: the ‘average’ proportions – \(\text{proportion}_{cy}\) and \(\text{proportion}_{sy}\) in Equation 2.2 – are calculated on the whole sample of newspapers. In other words, the same reference point is employed for both better-performing and worse-performing newspapers.

**Figure 2.12: Polarization and financial performance**

\[
\frac{1}{N/2} \sum_{\text{better fin.}} ED_{nt}^c - \frac{1}{N/2} \sum_{\text{worse fin.}} ED_{nt}^c
\]

\[
\frac{1}{N/2} \sum_{\text{better fin.}} ED_{nt}^s - \frac{1}{N/2} \sum_{\text{worse fin.}} ED_{nt}^s
\]

The results reported in Figure 2.12 demonstrate that newspapers that laid off few people were consistently more polarized than those that laid off many employees. Interestingly, the
effect holds for years before the great recession, somewhat supporting the demand-driven argument that adverse economic conditions promote extreme political views. Nevertheless, these results should be interpreted with extreme caution.

2.4 Conclusion

The current paper contributes to the literature on polarization of American politics by providing evidence that the US news media has also experienced an increase in political polarization over the last two decades. To demonstrate that fact, the paper relies on three pieces of evidence: first, I show that US newspapers have been becoming more different in what sources they cite and which columnists they publish; second, I establish strong correlation between newspaper slant and its citation pattern and columnist selection – that is, newspapers tend to cite and publish sources and columnists, respectively, that have similar political views; finally, I infer newspaper bias from its citation pattern and columnist selection and employ the resulting proxies to show that political polarization of US newspapers has been growing.

Even though the current paper does not attempt to uncover the reasons behind the growing polarization of the media and more research needs to be done to understand them, the results are quite alarming. With more polarized news media, differences in political views between conservatives and liberals get entrenched and intensified and therefore politicians have fewer incentives to promote bi-partisan agenda. Furthermore, the positive correlation between bias and financial performance suggests – regardless of the causes of it – that more biased and polarized news outlets have greater financial and human resources at their disposal and thus have competitive advantage in non-political dimensions of news reporting.

Aside from demonstrating increased media polarization, the results of the paper present, first, two new interesting metrics for newspaper bias can be employed in research focusing on media slant and its causes and consequences and, secondly, a new avenue for future research that would aim to explain the growth in media polarization.
Chapter 3

Is Wealth Important for Trust?

3.1 Introduction

A large peace of economic literature highlights the impact of trust on economic outcomes. However, there has been shown a limited evidence of and little attention to the reversed causal relation. The purpose of the current paper is to stress the possibility of reversed relation – low income levels might foster distrustful behavior and similarly high income might create favorable conditions for trustful behavior – and the importance of this relation between income and trust in some particular cases.

In the paper, I employ the definition of trust introduced by Gambetta (2000): “When we say we trust someone or that someone is trustworthy we implicitly mean that the probability that he will perform an action that is beneficial... ...is high enough for us to consider in engaging in some form of cooperation with him.” In essence, it means that trust assumes willingness to engage in risky activity with another agents, which incorporates both beliefs about counterpart’s honesty and the relative size of possible gain/loss from the activity – e.g., even if a counterpart is perceived as honest with, say, 80% probability, the risk imposed by trustful action might be still too large to trust the agent. The view that trust does not

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1There is a huge literature showing strong correlation between trust and GDP per capita/growth (Knack and Zak (2001); Knack and Keefer (1996); Guiso et al. (2004); Tabellini (2008b); Algan and Cahuc (2010)), trust and stock-market participation (Guiso et. al. (2008)), trust and international trade (Guiso et al. (2009)).
solely represent the beliefs about one’s trustworthiness is supported by the literature that links risk-tolerance to trusting behavior (Karlan (2002); Schechter (2003); Sapienza et al. (2007)\(^2\)); Miller and Mitamura (2003) also show that a significant part of trust is explained by ‘caution’ of respondents.

Income can affect level of trust and trustworthiness of individuals in a society through two channels. First, income level has a direct effect on agent’s risk-aversion. The degree of risk-aversion, in its turn, has been shown to have an effect on trustful behavior in experimental and quasi-experimental settings (Karlan (2002); Schechter (2003); Sapienza et al. (2007)). High income/wealth relative to amount of transactions that require trust reduces risk-aversion, making it more likely that an individual expresses more trustful behavior; on the contrary, an individual with low income/wealth may be reluctant to trust other agents as that agent would face a huge marginal decline in utility in an unfortunate event of being cheated. Experimental evidence of association between income and risk-tolerance in a trust game is shown Sapienza et al. (2007). Butler et al. (2010) show the same pattern, using the European Social Survey. The second channel of the effect of income level on trust goes through the overall level of income/wealth in an economy and its effect on agents’ trustworthiness: the marginal utility of gain obtained by cheating is relatively lower for wealthier agents than for poorer ones; meanwhile, the marginal penalty for cheating is the same if not greater for wealthier individuals than for poorer ones – the penalty can be linked to both income and some personal traits that (dis-)encourage trustful/trustworthy behavior.

The impact of income on trust is extremely important in the context of low-income societies as well as in societies that experienced a huge (non-)transitory income shocks. Examples of the former societies would be groups of impoverished people in developing countries, where low income creates poverty trap not only through lack of funds to invest – as commonly seen among economists – but also through lack of trust that prevents agents from engaging into productive activities: even if two or more impoverished individuals have

\(^2\)Even though the authors make the opposite claim in the paper, they provide a solid evidence that risk-tolerance predicts response to the question about general trust from World Values Survey.
enough funds to make an NPV-positive investment together, they might be too distrustful towards each other to collaborate. Hence, a vicious cycle occurs: people are so poor that a relative loss from being cheated and relative gain from cheating prevents everyone from engaging into any productive activity; at the same time, lack of joint productive activities slows or prevents growth completely leaving people in poverty. Examples of the latter societies would be economies that experienced either a major war, or a severe natural disaster, or a political turmoil – e. g., transition economies of ex-Soviet block. In all the cases, a sudden and sharp decline in income/wealth levels can decrease overall level of trust in the society and hence hamper recovery from the shock and possibly change the long-term growth path of the economy.

The paper consists of two main parts: first, I present a simple model that accentuates the described above channels of influence of income on trust and then provide a suggestive empirical evidence for association between income and trust.

The theoretical part proceeds in two steps. First, it develops on Dixit (2003) with two agents engaging into an activity, where one agent decides whether to trust the other one and the second agent is not perfectly enforced to obey informal agreement between the agents and can cheat on the first agent. Then, a behavioral component of trust is introduced following Bisin and Verdier (2000, 2001), Bisin, Topa, and Verdier (2004), Dohmen et. al. (2007), Tabellini (2008a), and sociological/psychological literature (Andreoni (1990); Cosmides and Tooby (1992); Cooter (1998); Barkow, Cosmides, and Tooby (1992); Fehr, Fischbacher, and Gachter (2002); Massey (2002)) that show how individual values might affect agent’s decisions in social interactions. In this framework, I consider intergenerational transmission of trust attitudes, where parents choose which values to transmit to their children.

There are several theoretical predictions of the model. I show that poorer agents are less likely to engage into any activity with other agents and also trust lower proportion of population. The result comes from two channels: first, poorer agents have greater incentives to steal and hence are less trustworthy than richer ones; second, poorer agents are less
willing to engage into risky activity, for they marginal loss in utility in case of bad outcome is much greater than that of richer agents. Intergenerational dynamics implies that in poor countries parents rationally choose to transmit distrustful values to their children. Another implication is that the relationship holds not only across economies but also within economy: if incomes of parents and children are correlated, then parents with low wealth transmit distrustful values to children and parents with high wealth do the opposite. Finally, a transitive income shock might cause a switch from high-trust to low-trust equilibrium or vice versa, leading to a prolonged effect on social interactions and economic growth.

The empirical part employs the sixth wave of the World Values Survey. I estimate association between generalized trust (an answer to “Can most people be trusted?”)\(^3\) and income (decile of income distribution based on self-reported household income) conditional on a number of individual characteristics. Within-country estimates exhibit very strong and robust positive association between income and trust, controlling for perceived trustworthiness of others and risk tolerance. I show that income plays a larger role in determining trust attitudes as the expected level of trustworthiness falls: the coefficient on income becomes larger as specification changes from the one with “trust to family” as the dependent variable to that with “trust to friends” and to that with “trust to strangers.” The association is robust to continent-wise exclusion of countries from the sample. Finally, country-wise estimates show that the association is not driven by some specific historical reasons or cultural traits. Even though I control for a large variety of characteristics, the estimates lack any reasonable identification and should be treated as no more than suggestive evidence.

The results of the paper are supported by the experimental literature. Ashraf et al. (2003) find positive association between income and amount sent in the trust game when controlling for expected return. On the contrary, the association found in Burks et al. (2003)

\(^3\)There has been a controversy in experimental literature about whether an answer to general-trust question predicts trust. Glaeser et al. (2000), Lazzarini et al. (2004) find no association between an answer to the the general-trust question and amount sent in the trust game. Nonetheless, Johansson-Stenman et al. (2004) and Sapienza et al. (2007) find the opposite results. In addition, Levitt and List (2007) claim that experimental setting distorts behavior of agents. Finally, Miller and Mitamura (2003) show that an answer to general-trust question captures both beliefs about others’ trustworthiness and one’s willingness to take risk.
in a sample of American students is insignificant; however, the measure of wealth employed in the study is not individual wealth but a wealth of family – this fact and low value at stake (the initial endowment was $10) makes it difficult to rely on the finding. The importance of value at stake is shown in Carter and Castillo (2002): they conduct the trust game in South Africa and find positive association between income and amount sent that is even greater for low level of incomes. Finally, Fehr and List (2004) show that CEOs from the coffee agro-industrial sector of Costa Rica are much more trusting in the same experimental setting (TG) than students from the same country.

The theoretical predictions of the paper find huge support in Ananyev and Guriev (2015): they find the effect of income on generalized trust, employing panel data on Russian regions; furthermore, they show that regions that experienced the largest drops in income and trust during 2008-2009 recession were not able to recover to the pre-recession level of trust, which is line with the predicted intergenerational dynamics.

The major contribution of the paper is to the literature on determinants, persistence and evolution of trust: Alesina and Ferrara (2002) show that trust is associated with a group of factors such as history of traumatic experiences, being a member of a minority of a discriminated group, income, and education; Aghion et al. (2010) argue that government regulation and trust are substitutes; a large strand of literature focuses on intergenerational transmission of trust (Guiso et al. (2004, 2008b); Dohmen et al. (2007); Giuliano (2007); Tabellini (2008a, 2008b); Fernandez and Fogli (2009)).

The paper also contributes to literature that relates trust to economic outcomes. Besides the papers mentioned earlier, recent literature that employ either field data or laboratory experiments to study relation between trust and various dimensions of economic performance includes Camerer (2003), Tabellini (2008b); Algan and Cahuc (2010); Nunn and Wantchekon (2009); La Porta et. al. (1997); Bloom et al (2009), and Aghion et al. (2010), Butler et al. (2010).

The rest of the paper proceeds as follows. The second section presents theoretical model of relation between income and trust. The third section present the empirical association
between income and trust. Finally, the last section concludes.

3.2 Theory

This section presents a theoretical model describing the relationship between trust, trustworthiness, and income.

The section proceeds in a few steps. First, I present a simple model set-up of interaction between an investor and an entrepreneur, following Dixit (2003), and describe the implications of the model. This first step allows me to highlight the forces driving the relationship between trust and income. Then, I introduce a behavioral component of trust following Bisin and Verdier (2000, 2001), Bisin, Topa, and Verdier (2004), Dohmen et al. (2007), and Tabellini (2008a) – agents get penalized for cheating/not-trusting and rewarded for trusting/trustworthy actions – and look into inter-generational dynamics of trust. Finally, I discuss the theoretical predictions and the major take-aways from them.

3.2.1 One generation

Consider a simple model as in Dixit (2003). A continuum of one-period-lived agents with endowment distributed over \([w, \bar{w}]\) according to some distribution \(F_w(\cdot)\) are randomly matched into pairs. Out of each pair, one individual is assigned to be an entrepreneur and another – as investor. Investor \(i\) can invest \(I \leq w_i\) into an enterprise run by the entrepreneur.\(^4\)

If the investor decides to avoid any interaction, both individuals get utility \(u(w_i, e)\), where \(w_i\) and \(w_e\) are investor’s and entrepreneur’s wealth, respectively. The gross return on the investment is \(R(I)\), where \(R(I) > I\), out of which the entrepreneur promises to transfer...

\(^4\)Note that \(I\) is fixed: investors cannot choose \(I\), but can decide whether to engage in any activity with the entrepreneur or not. One might think of multiple settings where the size of required investment is fixed: e. g., opening a store or a restaurant in some location costs the same regardless of individual’s income. The required investment might be seen as more or less stable even across locations/countries, for costs do not perfectly match local income level: for instance, the relative price – relative to income – of a car is still greater in India than in the US even though the nominal price is significantly lower in India. The assumption could be relaxed by making the investment size endogenous and imposing some exogenous lower bound on possible level of investment – that is, \(I > \text{const}\) or \(I = 0\). As an example, that assumption would correspond to some minimal required investment to start a business. One could also easily extend the model to the case of non-fixed \(I\). In any case, the results would remain qualitatively the same.
\( \gamma R(I) \) to the investor. However, the entrepreneur can cheat and keep all \( R(I) \) to oneself. Cheating is costly and costs the portion \( \alpha \) of entrepreneur’s wealth, \( w_e \), where \( \alpha \sim F_\alpha(\cdot) \) over \([a, \bar{a}]\). The agents are risk-averse with utility function \( u(\cdot) \) such that \( u'(\cdot) > 0, u''(\cdot) < 0, u(0) = -\infty \), and the coefficient of absolute risk aversion is decreasing, \( \left( -\frac{u''(c)}{u'(c)} \right)^{\prime} < 0 \).

Assume also that agents only observe wealth of their counterparts.

Throughout the section, I refer to the endowment as wealth, since in the empirical part of the paper I look at the association between different measures of income and trust. Nevertheless, there might be many other interpretations of \( w \); e.g., it could an endowment of effort, some of which can spent at work in expectation to get part of the return on it in form of salary increase or a promotion. One could reasonably assume that investor’s wealth and entrepreneur’s wealth are drawn from different distributions – I do not do so for two reasons: first, such an alteration would not affect the results; second, it allows for an interpretation that is in line with the empirics, where the agents are not disintegrated into ‘investors’ and ‘entrepreneurs.’

There are multiple ways to interpret the cost of cheating. Essentially, it is a shortcut to an endogenously identified cost of cheating in a richer game that involves reputation and multiple – possibly infinite – number of periods. For instance, one could say that cheater get excluded from participation in the market for a few periods – or permanently – and lose out some return that they could make on their wealth. Similar interpretation in the framework of employer-employee relationship would be that a dishonest employer would have to spend more of its own effort in future periods as the employee would be discouraged to work hard after being cheated.

The assumption of no information about counterpart’s reliability, \( \alpha \) can be relaxed: one might assume that there is some noisy signal about entrepreneur’s wealth – that would add mathematical complexity to the model, leaving the results unchanged.

---

5 There is overwhelming empirical evidence that individual utility functions exhibit decreasing absolute risk aversion (Friend and Blume (1975)).

6 The model can be easily extended to cases where agents receive noisy signals about their counterparts or no signal at all. The results would remain unchanged.
In the next subsection, I introduce an explicit behavioral component of utility which relates to trustful/trustworthy actions. In particular, entrepreneurs (investors) receive an additive utility gain $u_e^+ / 2 > 0$ ($u_i^+ / 2 > 0$) if they conduct trustworthy (trustful) actions – do not cheat (do invest). If agents do not perform trustful/trustworthy actions, they receive penalty $u_i^+ / 2$ or $u_e^+ / 2$, respectively.

Below, I provide a solution to the model and the respective comparative statics with no explicit component of utility that relates to trust, $u_e^+ = u_i^+ = 0$.

Solution

Consider backward induction. Entrepreneur $e$ cheats whenever

$$ (1 - a)w_e + R(I) \geq w_e + (1 - \gamma)R(I). \quad (3.1) $$

Then, the probability of cheating derived from (3.1) is equal to

$$ p(I, w_e) = F_a\left(\frac{\gamma}{w_e}R(I)\right), \quad (3.2) $$

which depends on the amount of investment, $I$, and entrepreneur’s endowment, $w_e$.

Then, investor $i$ takes this information into account and decides whether to engage into investment activity or not. The condition for interaction is provided below.

$$ (1 - p)u(w_i - I + \gamma R(I)) + pu(w_i - I) \geq u(w_i). \quad (3.3) $$

Condition (3.3) defines two important thresholds: $w_i^*(I, w_e)$ and $w_e^*(I, w_i)$. Both are lower participation bound on investor’s and entrepreneur’s wealths, respectively: no investor with wealth below $w_i^*(I, w_e)$ is willing to engage in activity with an entrepreneur with wealth $w_e$, and no investor with wealth $w_i$ is willing to engage in activity with an entrepreneur with wealth below $w_e^*(I, w_i)$. Existence of the thresholds is established in the claim below.

---

7For simplicity, assume that condition (3.1) holds for $\tilde{a}$ and $\tilde{w}$ – that is, $(1 - \tilde{a})\tilde{w} + R(I) \geq \tilde{w} + (1 - \gamma)R(I)$ – and does not hold for $a$ and $w$. These two assumptions ensure that neither any agents can be perceived as 100% trustworthy nor some might be believed to be 100% non-trustworthy.
Claim 1. There exist thresholds \( w^*_i(I, w_e) \) and \( w^*_e(I, w_i) \) such that condition (3.3) holds only for pairs \( \{w_i, w_e\} \) that satisfy either \( w_i \geq w^*_i(I, w_e) \) or \( w_e \geq w^*_e(I, w_i) \).

Proof. of Claim 1 Notice that \((1 - p)u(w_i - I + \gamma R(I)) + pu(w_i - I) = u((1 - p(1))\gamma R(I) - I + w_i - \epsilon(w_i))\), where \( \epsilon(w_i) \) is the difference between the expected payoff and the certainty equivalent. Then, condition (3.3) holds whenever \((1 - p(1))\gamma R(I) - I - \epsilon(w_i) > 0\). Note also that \( \epsilon(w_i) \) is decreasing with \( w_i \):

\[
u'((1 - p(I))\gamma R(I) - I + w_i - \epsilon(w_i))(1 - \epsilon'(w_i)) = (1 - p)u'(w_i - I + \gamma R(I)) + pu'(w_i - I),
\]

but \( u'((1 - p(I))\gamma R(I) - I + w_i - \epsilon(w_i)) < (1 - p)u'(w_i - I + \gamma R(I)) + pu'(w_i - I) \), since \(-u'(\cdot)\) is a concave function with greater curvature, \(\frac{|u''(\cdot)|}{u'(\cdot)} > \frac{|u''(\cdot)|}{u'(\cdot)}\) due to decreasing risk aversion. Hence, \( \epsilon'(w_i) < 0 \).

If \((1 - p(I))\gamma R(I) - I \leq 0\), then condition (3.3) never holds and \( w^*_i(I, w_i) = w^*_e(I, w_e) > 0 \). If \((1 - p(I))\gamma R(I) - I > 0\), then \( w^*_i(I, w_i) \) is defined by \((1 - p(I))\gamma R(I) - I - \epsilon(w^*_i(I, w_e)) = 0 \)

Finally, existence of \( w^*_i(I, w_i) \) trivially follows from the fact that \( p \) is increasing in \( w_e \).  

From condition (3.3) and Claim 1, investment decision depends on investor’s wealth and degree of risk-aversion and on entrepreneur’s wealth. The respective comparative statics is summarized in the claim below.

Claim 2. (1) An increase in entrepreneur’s wealth, \( w_e \), or a decrease in the degree of risk-aversion lead to lower investor’s participation threshold, \( w^*_i(I, w_e) \). (2) Entrepreneur’s participation threshold, \( w^*_e(I, w_i) \), is decreasing in investor’s wealth, \( w_i \). (3) \( p(I^*, w_e) \) is decreasing in entrepreneur’s wealth, \( w_e \).

\(^8\)Notice that each threshold can be outside the domain of \( w \), so that any or no agent is willing to invest.

\(^9\)Let \( \epsilon(L, u) \) be a certainty equivalent of a lottery \( L \) under utility function \( u(\cdot) \) – that is, \( E_L[u(x)] = u(\epsilon(L, u)) \). Define function \( u_1(\cdot) \) to be less risk-averse than \( u_2(\cdot) \) if for any two lotteries \( L_1 \) and \( L_2 \) such that \( L_2 \) is a mean-preserving spread of \( L_1 \), \( \epsilon(L_1, u_1) = \epsilon(L_2, u_1) < \epsilon(L_1, u_2) = \epsilon(L_2, u_2) \) and both \( u_1(\cdot) \) and \( u_2(\cdot) \) represent the same preferences over certain alternatives (not lotteries). That is, a less risk-averse utility function has lower penalty for an increase in risk. As a corollary, each lottery has lower certainty equivalent under a more risk-averse function – to see that, set \( L_1 \) in the definition above to be a degenerate lottery that delivers a particular outcome with probability 1, then \( \epsilon(L_1, u_1) = \epsilon(L_1, u_2) \). Throughout the paper, I use this definition whenever I talk about changes in the degree of risk-aversion.
Proof. of Claim 2 An increase in $w_e$ leads to lower $p$, which in turn makes an investment more attractive. Lower degree of risk-aversion also make investment more attractive: lower risk-aversion implies smaller difference between $(1 - p)u(w_i - I + \gamma R(I)) + pu(w_i - I)$ and $u((1 - p(I))\gamma R(I) - I + w_i)$ - that is, larger value of the right-hand side of inequality 3.3. In both cases, there must be lower participation threshold, $w^*_i(I, w_e)$.

By definition, $(1 - p(I, w^*_e))u(w_i - I + \gamma R(I)) + p(I, w^*_e)u(w_i - I) = u(w_i)$. If $w^*_e$ remains constant, an increase in $w_i$ makes the left-hand side of the equality larger. Thus, $p(I, w^*_e)$ must increase in $w_i$ in order to hold the equality – or, in other words, $w^*_e(I, w_i)$ is declining in $w_i$.

The last part trivially follows from condition (3.3).

A trivial – but important – implications of these results are that entrepreneurs with lower wealth have much stronger incentives to steal from investors and that subsequently investors do not trust low-wealth entrepreneurs. Also, only wealthy investors venture investing their money into projects run by entrepreneurs. Furthermore, the first two parts of the claim essentially say that the poor are more likely to be trusted by the rich than by the poor, which implies that the poor on average trust lower proportion of individuals in the economy - or in other words, the poor view smaller proportion of population as trustworthy than the rich do. Finally, it is worth noticing that for any levels of investor’s and entrepreneur’s wealth there exists an upper boundary on the amount of investment that is acceptable for the entrepreneur. This upper bound decreases with investor’s and entrepreneur’s wealth, which is a straightforward corollary of the claim above.

Notice also that the overall level of wealth\(^{10}\) defines overall level of investment – in terms of the model, it is the probability that an investor meets a trustworthy entrepreneur, $Pr[\{w_i, w_e\} | w_i \geq w^*_i(I, w_e) \text{ or } w_e \geq w^*_e(I, w_i)]$ – in the economy: the wealthier the country is, the more investment is made in the economy.

\(^{10}\)There are many ways to define a change in the overall level of wealth. In the paper, the notion of first-order stochastic dominance is used: the overall level of income under distribution $F^1_w(\cdot)$ is greater than under $F^2_w(\cdot)$ if $F^1_w(\cdot)$ has first-order stochastic dominance over $F^2_w(\cdot)$. 

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3.2.2 Intergenerational transmission of values

Now, consider a set-up with non-overlapping generations in which each generation determines trust attitudes of the next one: assume that parents choose values of their children, taking into account children’s utility as well as parent’s willingness to transmit their own values to the children.

For that purpose introduce an explicit behavioral component of utility which relates to trustful/trustworthy actions. In particular, entrepreneurs (investors) receive an additive utility gain \( u_i^+ / 2 > 0 \) (\( u_e^+ / 2 > 0 \)) if they conduct trustworthy (trustful) actions – do not cheat (do invest). If agents do not perform trustful/trustworthy actions, they receive penalty \( u_i^+ / 2 \) or \( u_e^+ / 2 \), respectively.\(^{11}\) \( u^+ \in [0, \bar{u}] \).

A parent determines the values of \( u_i^+ \) and \( u_e^+ \) for the child. On the one hand, parents want a child to have the same values as theirs and receive penalty, \( L(u_c^+ - u_p^+) \) for deviation of the child’s values from the parent’s one.\(^{12}\) The penalty might be interpreted in different manners: one might see it as direct disutility that parents get when their children have different values from their own; or one might interpret the penalty as actual costs – it might be difficult and require effort for parents to transmit different from their own values to children. On the other hand, parents also care about child’s well-being and try to choose values that maximize children’s utility. Assume that parents do not know their children’s future wealth and choose \( u_c^+ \), taking the two considerations into account. Also, assume that the distribution of wealth is the same across generations unless otherwise stated. Finally, assume that parents do not take some multi-generation strategic considerations into account and so do not incorporate children’s component of utility that accounts for transmission of...

\(^{11}\)Notice that utility bonuses/penalties could be formulated in a more general way: \( \beta u_i^+ \) and \( (1 - \beta)u_e^+ \) are the penalty and the reward, respectively. This specification might make more sense, since one could reasonable assume that distrustful/non-trustworthy behavior is penalized at different rate than trustful/trustworthy actions: e. g., parents can severely punish a child who cheated on a test and take no specific action if the child does not cheat, growing child’s aversion to cheating. However, the general specification does not change the implications of the model, so I proceed further with \( \beta = 0.5 \).

\(^{12}\)Here, \( p \) stands for parent and \( c \) – for child. The missing argument is the subscript that is either \( e \) or \( i \), standing for entrepreneur or investor, respectively. \( L(\cdot) \) is a convex function that is minimized at 0: e. g., \( L(x) = x^2 \).
values to later generations (grand children, etc.).

The set-up can be well applied to intragenerational dynamics with agents facing multiple periods of interactions and may costly adjust their own values.

**Solution**

With an explicit behavioral component of utility which corresponds to trust, the condition for cheating is defined as:

\[ u \left( (1 - \alpha)w_e + R(I) \right) \geq u \left( w_e + (1 - \gamma)R(I) \right) + u_e^+. \] (3.4)

Define \( \bar{w}_e(u_e^+) \) the threshold for entrepreneur’s income such that an individual cheats whenever \( w_e < \bar{w}_e(u_e^+) \). Similarly, \( p(u_e^+) \) is the probability of cheating, which is not specified, for the exact form of it would depend on the source of uncertainty.

Similarly, the condition for positive investment decision takes the following form:

\[ (1 - p)u(w_i - I + \gamma R(I)) + pu(w_i - I) + u_i^+ \geq u(w_i), \] (3.5)

which defines \( \bar{w}_i(u_i^+) \) such that an agent invests if and only if \( w_i > \bar{w}_i(u_i^+) \).

Consider the choice of \( u_{ec}^+ \). A parent with values \( u_{ec}^+ \) chooses \( u_{ec}^+ \) that maximizes

\[
\bar{w}_e(u_{ec}^+)
\int_{\mathbb{W}} \left[ u \left( (1 - \alpha)w_e + R(I) \right) - u_{ec}^+/2 \right] dF_w(s) + \int_{\overline{\bar{w}_e(u_{ec}^+)}}^{\bar{w}_e(u_{ec}^+)} \left[ u \left( w_e + (1 - \gamma)R(I) \right) + u_{ec}^+/2 \right] dF_w(s)
- L(u_{ec}^+ - u_{ep}^+). \] (3.6)

The optimal level is defined by the first-order condition:

\[ 0.5 \left( 1 - 2F_w(\bar{w}_e(u_{ec}^+)) \right) = L'(u_{ec}^+ - u_{ep}^+), \] (3.7)

unless it is a corner solution.

---

13 Assume that the impact of individual’s choice of \( u_{ec}^+ \) has infinitesimal impact on the overall probability of cheating in the economy, \( p \).

14 The other terms cancel out, since \( u \left( (1 - \alpha)w_e + R(I) \right) = u \left( w_e + (1 - \gamma)R(I) \right) + u_e^+ \) at \( \bar{w}_e \).
Essentially, the sign of the left-hand side of the equation depends on whether parents expect the child to cheat with probability greater than 0.5\textsuperscript{15}. If most probably, a child will cheat, the parents do not want her to suffer moral cost of cheating, \( u_{ec}^+ \), and push it as low as possible. On the contrary, if a child is expected to behave trustworthy, then the parents try to enhance this kind of behavior.

Hence, depending on the distribution of \( w \), there could be up to three steady states:

\[
\begin{align*}
\text{Claim 3.} & \quad (1) \quad u_{ep}^+ = u_{cc}^+ = 0, \quad u_{ep}^+ = u_{cc}^+ = \bar{u}, \quad \text{and} \quad u_{ep}^+ = u_{cc}^+ = u_m, \quad \text{where} \quad F_w(\bar{\omega}_c(u_m)) = 0.5. \quad \text{However, the last steady state is highly unstable.}
\end{align*}
\]

The relation between income distribution and possible steady states is formulated in the claim below.

\[
\text{Proof. of Claim 3} \quad \text{In all of the cases, the marginal costs of transmitting any values different from} \quad u_{pe}^+ \quad \text{is always greater than the marginal benefits, and hence no deviation occurs. For instance, consider the case of} \quad u_{pe}^+ = 0. \quad \text{Then, total costs of teaching some} \quad u_{cc}^+ \neq 0 \quad \text{is equal to} \quad L(u_{cc}^+) \geq 0.5 \int_0^{u_{cc}^+} (1 - 2F_w(\bar{\omega}_c(s))) \, ds, \quad \text{where the latter term is equal to the marginal benefit of teaching} \quad u_{cc}^+. \quad \square
\]

Notice that the conditions stated in Claim 3 are not necessary. The existence of the steady states depends on how fast the cost of teaching grows with the size of deviation – how large \( |L'(\cdot)| \) and \( L''(\cdot) \) are. The claim is illustrated with Figure 3.1.

An immediate consequence of the claim is that all the steady states are achievable under the same set of parameters only if \( u_m \) exists, which is formulated in the corollary below.

\text{\textsuperscript{15}The threshold probability of cheating might seem large at first glance. Notice, however, that only non-enforceable contracts are considered and the actual probability of cheating can be as high as 1. Also, notice that the value (0.5) comes from a specific assumption about the relation between moral cost of cheating and moral reward of non-cheating. In general, the threshold is \((1 - \beta)\) that can be much lower than 0.5 if we believe that moral costs in case of cheating are larger than moral rewards in case of non-cheating.}
Panel (a) of the graph depicts the case of all three steady state existing. Panel (b) depicts the case of non-existing low-trust steady state: the net benefit of transmitting $u_{cc}$ to children is equal to $(\text{area A}) - (\text{area B}) - (\text{area C}) > 0$. Panel (c) depicts the case of non-existing high-trust steady state: the net benefit of transmitting $u_{cc}$ to children is again equal to $(\text{area A}) - (\text{area B}) - (\text{area C}) > 0$. Finally, panel (d) shows the case of non-existing intermediate steady state.
Theorem 1. (1) If income distribution is such that $F_w(\bar{w}_e(\bar{u})) > 0.5$, then there exists only one steady state that is $u_{ip}^+ = u_{ic}^+ = 0$. (2) If income distribution is such that $F_w(\bar{w}_e(0)) < 0.5$, then the only steady state is $u_{ip}^+ = u_{ic}^+ = \bar{u}$. (3) Both steady states can exist only if none of the two conditions hold – that is, if $F_w(\bar{w}_e(\bar{u})) < 0.5 < F_w(\bar{w}_e(0))$.

Proof. of Corollary 1 In the first two cases, only corner solutions are steady states, since $0.5(2F_w(\bar{w}_e(s)) - 1) \neq 0 \forall s \in [0, \bar{u}]$. *need more details*

Basically, the corollary states the following: if the overall level of wealth in the economy is low, then parents transmit low-trust attitudes to their children; if the overall level of wealth in the economy is high, parents transmit high-trust attitudes to their children; finally, if the overall level of wealth in the economy is intermediate, then parents might transmit low-trust as well as high-trust attitudes to their children.

Now, consider the choice of $u_{ic}^+$. A parent with values $u_{ip}^+$ chooses $u_{ic}^+$ that maximizes

$$
\int_{\bar{\omega}} \left[ u_{ic}^+ - \bar{u}_{ic} / 2 \right] dF_w(s) + \int_{\bar{\omega}} \left[ (1 - \bar{p})u(s - 1 + \gamma R(I)) + \bar{p}u(s - 1) + 0.5u_{ic}^+ \right] dF_w(s)
$$

$$
- L(u_{ic}^+ - u_{ip}^+). \tag{3.8}
$$

Similarly to the previous case, the optimal $u_{ic}^+$ is either a corner solution or described by the following FOC:

$$
0.5 \left( 1 - 2F_w(\bar{w}_i(u_{ic}^+)) \right) = L'(u_{ic}^+ - u_{ip}^+). \tag{3.9}
$$

Hence, similar implications are true for steady states of $u_i^+$: see Claim 4 and Corollary 2 below.

Claim 4. (1) $u_{ip}^+ = u_{ic}^+ = 0$ is a steady state if $0.5 \left( 1 - 2F_w(\bar{w}_i(s)) \right) \leq L'(s) \forall s \in [0, \bar{u}]$. (2) $u_{ip}^+ = u_{ic}^+ = \bar{u}$ is a steady state if $0.5 \left( 1 - 2F_w(\bar{w}_i(s)) \right) \geq L'(s - \bar{u}) \forall s \in [0, \bar{u}]$. (3) Finally, $u_{ip}^+ = u_{ic}^+ = u_m$, where $F_w(\bar{w}_i(u_m)) = 0.5$, is a steady state if such a $u_m$ exists, $0.5 \left( 1 - 2F_w(\bar{w}_i(s)) \right) \leq -L'(u_m - s) \forall s \in [u_m, \bar{u}]$, and $0.5 \left( 1 - 2F_w(\bar{w}_i(s)) \right) \geq L'(s - u_m) \forall s \in [0, u_m]$.

Corollary 2. (1) If income distribution is such that $F_w(\bar{w}_i(\bar{u})) > 0.5$, then there exists only one steady state that is $u_{ip}^+ = u_{ic}^+ = 0$. (2) If income distribution is such that $F_w(\bar{w}_i(0)) < 0.5$, then the
only steady state is \( u_{ip}^+ = u_{ic}^+ = \bar{u} \). (3) Both steady states can exist only if none of the two conditions hold – that is, if \( F_w(\bar{\omega}_i(\bar{u})) < 0.5 < F_w(\bar{\omega}_i(0)) \).

Intergenerational transmission of values without uncertainty

Now, consider a very specific case of intergenerational dynamics when children have exactly the same wealth as their parents.\(^{16}\) Then, parents face no uncertainty about child’s decisions as both investor and entrepreneur. Since both \( \bar{\omega}_e(u_e^+) \) and \( \bar{\omega}_i(u_i^+) \) are decreasing in \( u_e^+ \) and \( u_i^+ \), respectively, parents with high wealth try to increase the reward for trustworthy/trustful behavior and parents with low wealth do the opposite. Thus, for each \( u_{ip}^+ \), there exists a threshold on wealth such that parents with wealth below the threshold transmit low-trust values to their children and those with wealth above the threshold transmit high-trust values to the children. As a result, there is a unique steady state in the economy, which is described in the claim below.

**Claim 5.** There is a unique steady state in the economy such that (a) \( u_{ep}^+ = u_{ec}^+ = 0 \) for all agents with wealth below some threshold, \( \bar{\omega}_e \), and \( u_{ep}^+ = u_{ec}^+ = \bar{u} \) for all agents with wealth above the threshold; (b) \( u_{ip}^+ = u_{ic}^+ = 0 \) for all agents with wealth below some (not necessarily equal to the previous one) threshold, \( \bar{\omega}_i \), and \( u_{ip}^+ = u_{ic}^+ = \bar{u} \) for all agents with wealth above the threshold.

Notice that the thresholds depend on the starting point: if the initial level of trust is high, more agents would converge to high-trust values; on the contrary, if the initial level of trust is low, some agents who potentially would want to have greater level of trust could not escape low-trust values due to concave cost function.

3.2.3 Discussion

There are three direct take-aways from the model. The first one is the most straightforward: greater wealth is associated with higher trustworthiness and trustfulness – the poor are able

\(^{16}\)Even though the assumption might seem to be very restrictive, it can be easily relaxed to the case where child’s wealth is unknown but correlated with parent’s wealth. One could also add uncertainty about child’s values conditional on effort. Both extensions would not alter the results but would bring more complexity to the model.
to trust significantly less proportion of people than that trusted by the rich. The result relies on two assumptions: uncertainty about counterpart’s actions and risk-aversion declining with wealth. The second result is that individuals with high wealth are more likely to transmit high-trust values to their offsprings than people with low wealth. This result applies to both inter- and intra-society comparison of agents. The result about within-society relation between income and transmitted values relies on the assumption of positive correlation between parent’s and child’s wealth. The final direct take-away is that depending on income distribution a country might be in one out three states: with only low-trust steady-state possible, with only high-trust steady state possible, and with both steady states possible.

These results lead to two important indirect implications.

First, low income may baffle economic growth. Lack of wealth in the economy results in too few economic interactions due to lack of trust: the probability of investment, $Pr\{w_t, w_c|w_t \geq w_t^*(I, w_c) \text{ or } w_c \geq w_c^*(I, w_t)\}$, is increasing in the overall level of wealth in the economy. In the extreme case, it might create poverty traps through lack of trust. If the overall level of wealth in an economy is so low that no agent sees others as trustworthy, $w_t^*$ exceeds $\bar{w}$, then no productive activity takes place in the economy and economic growth is halted.\(^\text{17}\)

Second, income shocks may shift societies from one equilibrium to another – from high trust to low or vice versa. Consider an example of an economy with income distribution that allows for both high- and low- trust steady states and is initially in the high-trust equilibrium, $u_{pc,t=0}^+ = \bar{u}$. In period 1, the economy experiences a transitive negative income shock that shifts the economy to a state where only low-trust steady state is feasible as depicted on Figure 3.2: $0.5 \left(1 - 2F_w(\bar{w}(u^+))\right)$ shifts downwards. Expecting the shock, parents transmit less trusting attitudes to the offsprings: $u_{pc,t=0}^+ < u_{pc,t=0} = \bar{u}$. After period 1, the wealth distribution returns to that before period one ($0.5 \left(1 - 2F_w(\bar{w}(u^+))\right)$ shifts back); however,\(^\text{17}\)

\(^{17}\)For instance, a project that delivers 80% return ($\gamma R(I) = 1.8I$) but has cheating probability of one third ($p = 1/3$) – which translates into 20% expected return – would not be initiated unless investor’s wealth exceeds the required investment more than two times (assuming logarithmic utility function).
that does not happen to the trust level: a one-period shock led to a jump in values large enough to make the system converge to another steady state – the low-trust one (each next period $u_{pe}^+$ is lower than the previous one to the point where it is equal to zero).

**Figure 3.2: Intergenerational dynamics of trust and income shock**

The figure illustrates intergenerational evolution of trust after a one period income shock.

Given an overwhelming evidence that trust is an important of long-term growth, a one-period transitive income shock in the considered example leads to a shift in the long-run growth path, preventing the economy from recovery and slowing economic development. As an example one could consider transition economies of ex-Soviet block. Aghion et al. (2010) argue that low trust in absence of strict government regulation led to economic decline. However, it is unclear what the level of interpersonal trust was in Soviet republics (Khodyakov (2007)), and so the dynamics could be well the opposite: a sharp decline in income caused by lack of any free-market culture among citizens could lead to a sharp decline in the level of trust.
Overall, the theoretical section suggests that income itself is an important determinant of trust that can play a crucial role in evolution of trust.

3.3 Empirics

3.3.1 Data and empirical specification

In the empirical part of the paper, I employ the last (6th) wave of the World Values Survey. The survey was conducted between 2010 and 2014 and included 56 countries with more than 57,000 respondents in the final sample.\(^{18}\)

The main dependent variable is the answer to “Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?” The possible answers are: “Most people can be trusted” and “Need to be very careful.”\(^{19}\) The full set of dependent variables includes more specific measures of trust – trust to family, friends, neighborhood, strangers, people of different religion, and people of different nationality – and measures of justifiability of cheating – justifiable to claim unearned benefits, to avoid transport fares, to steal property, to cheat on taxes, and to pay bribes.

The major independent variable is “Income scale” that is calculated from total income of the household of a respondent and normalized to income distribution with the country. It differs from 1 to 10, the largest value standing for the largest income. I also employ two other explanatory variables for robustness: satisfaction with financial standing of the household – larger values stand for greater satisfaction – and whether a respondent saved or borrowed during the last year – changes from 1 (had to borrow) to 4 (saved money).

\(^{18}\)South Africa is excluded from the sample, since the result for rural areas of the country (>70% of the subsample) is a very strong outlier: not only the association between income and trust is reversed and significant, but also the associations between risk tolerance and trust and between ‘take advantage’ variable (“Other people would take advantage of me if the had a chance”) and trust are reversed and significant as well. This observation contradicts the existing quasi-experimental and experimental evidence existed so far as well as general logic and the observations in the rest of the sample – especially, for ‘take advantage’ variable that is a very strong predictor of trust across surveys and countries. Moreover, similar estimation employing South African survey during the fifth wave shows positive association between income and trust.

\(^{19}\)As argued in the introduction, the general trust question should capture the overall willingness to trust which incorporates beliefs about counterparts’ trustworthiness, risk tolerance, and relative value at stake.
Following the experimental literature, I control for risk tolerance that is measured by question “Adventure and taking risks are important to this person; to have an exciting life.” The larger value of the variable corresponds to greater agreement with the statement. Another important control is a more direct measure of others’ trustworthiness – a degree of agreement with statement “Other people would take advantage of me if the had a chance.” The smallest value corresponds to “people would be fair.” This control is the most close measure of the perceived probability of cheating, which corresponds to $p$ in terms of the model.

Finally, I include a set of controls that capture individual characteristics – age, age squared, gender, religiosity, education, life satisfaction, marital status, happiness, whether a respondent was a victim of a crime in the last 12 months, whether a member of respondent’s family was a victim of a crime in the last 12 months, and whether a respondent felt unsafe because of crime in the last 12 months – neighborhood controls reported by respondents – city size and different measures of security$^{20}$ – and region (sub-country level) and ethnicity fixed effects.

Overall, the specification takes the following form:

$$Trust_i = const + \beta_1 Income_i + \beta_2 Risk\text{-}tolerance_i + \beta_3 Take\text{-}advantage_i + \gamma X_i + FE_i + error_i,$$

(3.10)

where $X_i$ is the total set of controls and $FE_i$ are fixed effects.

Individual and neighborhood controls serve two major purposes: first they rule out effects of observed individual characteristics as well as peer effects – one might reasonably expect that richer people live in better neighborhoods and interact with richer and trustworthier people. The fixed effects allow for within-society comparison of individuals.

$^{20}$The full list of security controls is: how often there happened robberies in the neighborhood in the last 12 months; how often there happened consumption of alcohol in the neighborhood in the last 12 months; how often there happened consumption of drugs in the neighborhood in the last 12 months; how often there police had to take action in the neighborhood in the last 12 months; whether a respondent avoided caring cash because of insecure neighborhood; whether a respondent avoided going outside at night because of insecure neighborhood; whether a respondent felt unsafe because of insecure neighborhood.
3.3.2 Results

The first set of results is provided in Table 3.1. The coefficient on income is highly significant and robust across specifications. The only sharp decline in the magnitude of the coefficient occurs with an introduction of individual controls. The magnitude of the coefficient is also economically significant: the difference between the top and the bottom income group is approximately 0.055 that is a quarter of the sample mean, 0.21. Notice that the coefficient remains significant after the introduction of control ‘Others would take advantage of me’ that corresponds to the probability of cheating, $p$, in the model: exactly as predicted by the model, there is a positive association between income and trust even among agents that share the same beliefs about others’ trustworthiness.

Table B.1 in the appendix provides the same estimates for two other measures of income: satisfaction with financial conditions of the household and family saving during the past year. The results resemble that in Table 3.1.
Table 3.1: Association between income and trust

Dependent variable: “Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?” Answers are: 1 – “Most people can be trusted”, 0 – “Need to be very careful.”

<table>
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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
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<td>0.007</td>
<td>0.007</td>
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<td>[0.001]***</td>
<td>[0.001]***</td>
<td>[0.001]***</td>
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<td></td>
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<td></td>
<td>[0.002]**</td>
</tr>
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<td>Others would take advantage of me</td>
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<td>-0.021</td>
<td>-0.021</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[0.004]***</td>
<td>[0.004]***</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
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<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<td>59,449</td>
<td>58,229</td>
<td>58,229</td>
<td>57,200</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.209</td>
<td>0.220</td>
<td>0.232</td>
<td>0.232</td>
<td>0.234</td>
</tr>
</tbody>
</table>

The table presents results of estimation of equation (3.10). Scale of incomes ranges from 1 to 10, where 10 stands for the largest income. Individual controls are: age, age squared, gender, religiosity, education, life satisfaction, marital status, happiness, whether a respondent was a victim of a crime in the last 12 months, whether a member of respondent’s family was a victim of a crime in the last 12 months, and whether a respondent felt unsafe because of crime in the last 12 months. Neighborhood controls are: city size and different security measures. All controls – except for age and age squared – are included in a form of fixed effects for each possible answer. “Region” means sub-national administrative unit unless there is none provided in the data, in which case “region FE” means country FE. Robust standard errors clustered at country level in brackets. *** p<0.01, ** p<0.05, * p<0.1.
Table 3.2: Association between income and trust: multiple measures of trust

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<tr>
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<th>Neighborhood</th>
<th>Friends</th>
<th>Strangers</th>
<th>Different religion</th>
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<td>Others would take advantage of me</td>
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<tr>
<td>Individual controls</td>
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</tbody>
</table>

The table presents results of estimation of equation (3.10). Scale of incomes ranges from 1 to 10, where 10 stands for the largest income. Individual controls are: age, age squared, gender, religiosity, education, life satisfaction, marital status, happiness, whether a respondent was a victim of a crime in the last 12 months, whether a member of respondent’s family was a victim of a crime in the last 12 months, and whether a respondent felt unsafe because of crime in the last 12 months. Neighborhood controls are: city size and different security measures. All controls – except for age and age squared – are included in a form of fixed effects for each possible answer. “Region” means sub-national administrative unit unless there is none provided in the data, in which case “region FE” means country FE. Robust standard errors clustered at country level in brackets. *** p<0.01, ** p<0.05, * p<0.1.
Even though I control for a variety of observed respondent’s characteristics, there is still an issue of endogeneity in the regressions presented. For instance, one might argue that people who were lucky to meet more trustworthy people in their lives are richer and more trusting today. Nevertheless, the correlations in Tables 3.1 and B.1 are aligned with the theoretical predictions: greater income is associated with higher level of trust.

To proceed further in the hypothesis testing, consider trust towards different groups of people: trust to family members, trust to friends, etc. The model predicts that the level of trust decreases more with income as an agent becomes less informed about the counterpart’s type – as the probability of cheating increases. The empirical results support this theoretical conclusion (see supplementary tables in the appendix). The estimates of the coefficient on the income variable become both larger in magnitude and more significant as we consider trust towards people less familiar to a respondent. This observation implies that the difference in trust between low- and high-income individuals enlarges as the level of uncertainty about counterpart’s trustworthiness increases. This finding also supports the claim that income affects trust but still suffers from endogeneity concerns.

Finally, I check for heterogeneity in the results across countries. The results are robust to exclusion of African, European, Asian, or South American countries (see the supplementary tables in the appendix). Second, Figure 3.3 provides country-wide estimates of the effect of income on trust. As one can observe, the effect does not uniformly across countries. The observation can partly attributed to the presence of reversed causality that can be non-monotone (Butler, Giuliano, and Guiso (2010)), to heterogeneity in interpretation of the question, and to heterogeneity of measurement error in the main regressor. However, the set of countries for which the result is significant for very diverse – Nigeria, Uzbekistan, the US, Pakistan, Sweden, Philippines, Turkey, Kazakhstan, Australia, Netherlands, Russia, and Uruguay – which suggests that the effect can be hardly attributed to some culture-specific or historical reasons.

21 Here, I refer to the fact that both $w_i$ and $w_e$ increase with $a$ and hence low-wealth agents become more reluctant to trust their counterparts.
The figure reports coefficients on *Scale of incomes* (bars) with 95% confidence intervals for them (thin lines) obtained through country-wise estimations of equation (3.10) with all the controls and fixed effects. Standard errors are not clustered due to technical reasons – some countries have none or too few sub-national regions specified – but the results are very similar with region-level clustering for countries with reasonable number of sub-national regions.

Overall, this section provides a compelling evidence of positive association between income and trust. The finding supports the results of the theoretical part of the paper.

### 3.4 Conclusion

Determinants of trust, its evolution, and its relation with economic outcomes have been of interest to economists for a long time. The aim of the paper is to contribute to the economic literature on trust by describing how income affects interpersonal trust and stress...
the importance of the effect.

For that purpose, I construct a theoretical model that shows how poor agents rationally choose to distrust others in order to avoid risk. The result comes from risk-aversion of agents and some uncertainty in actions of counterparts. Then, I amend the model by introduction of moral cost/reward of cheating/non-cheating and show that parents who expect their children to cheat/not to trust transmit low-trust values to their offsprings. Hence, parents with low wealth transmit less trusting values to their children than those with high wealth if the expected wealth of children is correlated to that of parents. Finally, income shocks might affect intergenerational transmission of values, switching low-trust steady state to the high-trust one and vice versa.

Then, I present an empirical evidence of strong and robust positive association between income and trust, employing the sixth wave of the World Values Survey. Unfortunately, the current empirical evidence does not allow me to make causal claims. Nevertheless, the association very closely resembles that derived in the model.

A natural follow up of this research would be a lab experiment that replicates the set-up from the theoretical part of the paper. Unlike the usual trust game, the current set-up would allow to mitigate the effect of altruism – as both players would possess some initial endowment – and to estimate the effect of endowment size on trusting behavior – as initial endowment would randomly vary across agents.
References


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Appendix A

Appendix to Chapter 2

A.1 Supplemental materials for Section 2.2

Figure A.1: Trends in the total number of columns for a fixed number of newspapers by columnist slant
Figure A.2: Trends in the total number of citations for a fixed number of newspapers by source slant.
Figure A.3: Trends in the total number of columnists
Figure A.4: Trends in the total number of citations for a fixed number of newspapers by source #1
Figure A.5: Trends in the total number of citations for a fixed number of newspapers by source #2
Figure A.6: Trends in the total number of citations for a fixed number of newspapers by source #3
Figure A.7: Trends in the total number of citations for a fixed number of newspapers by source #4
A.2 Supplemental materials for Section 2.3.1

Figure A.8: Replication of Figure 2.4 for 1999-2017
Figure A.9: Replication of Figure 2.4 excluding specific sources
Figure A.10: Replication of Figure 2.4 on the subsample articles containing the word “congress”
Figure A.11: Replication of Figure 2.4 on the subsample articles containing the word “football”
Figure A.12: Replication of Figure 2.4 on the subsample articles containing the word “movie”
Figure A.13: Replication of Figure 2.4 on the subsample articles from “sports” section
### Supplemental materials for Section 2.3.2

**Table A.1: Panel regression results with excluded sources**

(a) TV channels excluded

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(citations)</th>
<th>Pr(source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.042*** [0.008]</td>
<td>-0.456*** [0.086]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.013** [0.006]</td>
<td>-0.207*** [0.041]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.149*** [0.037]</td>
<td>-1.502*** [0.397]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.025 [0.026]</td>
<td>-0.923*** [0.200]</td>
</tr>
</tbody>
</table>


R-squared: 0.704 0.704 0.708 0.708 0.591 0.590 0.578 0.577

SD[Alignment]: 1.02 1.393 .506 .688 1.02 1.392 .506 .688

Number of newspapers: 358 358 354 354 358 358 354 354

(b) Nation-wide sources only

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(citations)</th>
<th>Pr(source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.045*** [0.008]</td>
<td>-0.807*** [0.125]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.023*** [0.008]</td>
<td>-0.567*** [0.094]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.163*** [0.035]</td>
<td>-2.820*** [0.501]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.106*** [0.033]</td>
<td>-2.425*** [0.414]</td>
</tr>
</tbody>
</table>

Observations: 71,555 71,555 70,334 70,334 70,730 70,730 69,586 69,586

R-squared: 0.731 0.731 0.731 0.731 0.580 0.579 0.578 0.577

SD[Alignment]: 1.006 1.106 .534 .591 1.006 1.106 .535 .59

Number of newspapers: 358 358 354 354 358 358 354 354

*Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1*
Table A.2: Panel regression results with excluded 2016 endorsements

(a) Columnists

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(columns)</th>
<th>Pr(columnist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.009*** [0.001]</td>
<td>-0.019*** [0.004]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.007*** [0.001]</td>
<td>-0.016*** [0.003]</td>
</tr>
<tr>
<td>Observations</td>
<td>1,211,340 1,211,340 1,185,015 1,185,015</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.257 0.257 0.104 0.104</td>
<td></td>
</tr>
<tr>
<td>SD[Alignment]</td>
<td>1.585 1.741 1.584 1.74</td>
<td></td>
</tr>
<tr>
<td>Number of newspapers</td>
<td>341 341 341 341</td>
<td></td>
</tr>
<tr>
<td>Number of columnists</td>
<td>195 195 195 195</td>
<td></td>
</tr>
</tbody>
</table>

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1

(b) Sources

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(citations)</th>
<th>Pr(source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.034*** [0.006]</td>
<td>-0.305*** [0.055]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.015*** [0.005]</td>
<td>-0.164*** [0.031]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.134*** [0.030]</td>
<td>-1.265*** [0.258]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.071*** [0.023]</td>
<td>-0.795*** [0.153]</td>
</tr>
<tr>
<td>Observations</td>
<td>136,664 136,664 140,668 140,668 135,146 135,146 139,370 139,370</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.704 0.704 0.707 0.707 0.546 0.545 0.532 0.532</td>
<td></td>
</tr>
<tr>
<td>SD[Alignment]</td>
<td>1.118 1.404 .494 .644 1.118 1.404 .494 .644</td>
<td></td>
</tr>
<tr>
<td>Number of newspapers</td>
<td>341 341 354 354 341 341 354 354</td>
<td></td>
</tr>
</tbody>
</table>

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1
Table A.3: Panel regression results on the subsample of articles containing word “president”

(a) Columnists

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(columns)</th>
<th>Pr(columnist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.007***</td>
<td>-0.023***</td>
</tr>
<tr>
<td></td>
<td>[0.001]</td>
<td>[0.005]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.005***</td>
<td>-0.017***</td>
</tr>
<tr>
<td></td>
<td>[0.001]</td>
<td>[0.004]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.010***</td>
<td>-0.080***</td>
</tr>
<tr>
<td></td>
<td>[0.003]</td>
<td>[0.017]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.003*</td>
<td>-0.023**</td>
</tr>
<tr>
<td></td>
<td>[0.002]</td>
<td>[0.011]</td>
</tr>
</tbody>
</table>

Observations: 1,268,475 1,268,475 1,246,830 1,246,830 1,194,180 1,194,180 1,158,690 1,158,690
R-squared: 0.193 0.193 0.184 0.184 0.069 0.069 0.068 0.068
SD[Alignment]: 1.531 1.716 .55 .659 1.523 1.714 .547 .653
Number of newspapers: 358 358 354 354 358 358 354 354
Number of columnists: 195 195 195 195 195 195 195 195

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1

(b) Sources

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(citations)</th>
<th>Pr(source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.031***</td>
<td>-0.380***</td>
</tr>
<tr>
<td></td>
<td>[0.005]</td>
<td>[0.059]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.011***</td>
<td>-0.193***</td>
</tr>
<tr>
<td></td>
<td>[0.004]</td>
<td>[0.032]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.097***</td>
<td>-1.128***</td>
</tr>
<tr>
<td></td>
<td>[0.023]</td>
<td>[0.262]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.029*</td>
<td>-0.768***</td>
</tr>
<tr>
<td></td>
<td>[0.016]</td>
<td>[0.155]</td>
</tr>
</tbody>
</table>

Observations: 143,110 143,110 140,668 140,668 139,722 139,722 136,796 136,796
R-squared: 0.672 0.672 0.669 0.669 0.512 0.512 0.475 0.475
SD[Alignment]: 1.002 1.304 .477 .641 1 1.302 .477 .64
Number of newspapers: 358 358 354 354 358 358 354 354

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1
Table A.4: Panel regression results on the subsample of articles containing word “congress”

(a) Columnists

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(columns)</th>
<th>Pr(columnist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.004***</td>
<td>-0.032***</td>
</tr>
<tr>
<td></td>
<td>[0.001]</td>
<td>[0.006]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.003***</td>
<td>-0.022***</td>
</tr>
<tr>
<td></td>
<td>[0.001]</td>
<td>[0.004]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.008***</td>
<td>-0.121***</td>
</tr>
<tr>
<td></td>
<td>[0.002]</td>
<td>[0.022]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.002*</td>
<td>-0.043***</td>
</tr>
<tr>
<td></td>
<td>[0.001]</td>
<td>[0.014]</td>
</tr>
</tbody>
</table>

Observations: 1,261,970 1,261,970 1,228,214 1,228,214 1,070,880 1,070,880 1,036,348 1,036,348
R-squared: 0.118 0.118 0.111 0.111 0.050 0.050 0.048 0.048
SD[Alignment]: 1.53 1.715 .552 .661 1.512 1.712 .542 .646
Number of newspapers: 358 358 350 350 358 358 349 349
Number of columnists: 194 194 194 194 194 194 194 194

(b) Sources

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(citations)</th>
<th>Pr(source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.019***</td>
<td>-0.311***</td>
</tr>
<tr>
<td></td>
<td>[0.005]</td>
<td>[0.064]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.008**</td>
<td>-0.155***</td>
</tr>
<tr>
<td></td>
<td>[0.004]</td>
<td>[0.034]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.076***</td>
<td>-0.977***</td>
</tr>
<tr>
<td></td>
<td>[0.021]</td>
<td>[0.286]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.023*</td>
<td>-0.599***</td>
</tr>
<tr>
<td></td>
<td>[0.013]</td>
<td>[0.167]</td>
</tr>
</tbody>
</table>

Observations: 143,110 143,110 140,668 140,668 134,706 134,706 130,592 130,592
R-squared: 0.580 0.579 0.569 0.569 0.437 0.437 0.411 0.411
SD[Alignment]: 1.002 1.304 .477 .641 .996 1.3 .474 .636
Number of newspapers: 358 358 354 354 358 358 354 354

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1
### Table A.5: Panel regression results on the subsample of articles containing word “football”

#### (a) Columnists

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(columns)</th>
<th>Pr(columnist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.001*** [0.000]</td>
<td>-0.022*** [0.006]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.001*** [0.000]</td>
<td>-0.012*** [0.004]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.001 [0.001]</td>
<td>-0.055*** [0.020]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.000 [0.000]</td>
<td>-0.023* [0.013]</td>
</tr>
</tbody>
</table>

| Observations | 1,254,986 | 1,254,986 | 1,230,542 | 1,230,542 | 978,730 | 978,730 | 945,168 | 945,168 |
| R-squared | 0.088 | 0.088 | 0.086 | 0.086 | 0.055 | 0.055 | 0.055 | 0.055 |
| SD[Alignment] | 1.53 | 1.716 | .552 | .661 | 1.504 | 1.711 | .543 | .65 |
| Number of newspapers | 356 | 356 | 351 | 351 | 356 | 356 | 351 | 351 |
| Number of columnists | 194 | 194 | 194 | 194 | 194 | 194 | 194 | 194 |

Standard errors clustered at newspaper level in brackets. *** p < 0.01; ** p < 0.05; * p < 0.1

#### (b) Sources

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(citations)</th>
<th>Pr(source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.027*** [0.004]</td>
<td>-0.482*** [0.069]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.010*** [0.003]</td>
<td>-0.231*** [0.037]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.082*** [0.018]</td>
<td>-1.285*** [0.038]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.026* [0.011]</td>
<td>-0.885*** [0.176]</td>
</tr>
</tbody>
</table>

| Observations | 143,110 | 143,110 | 140,668 | 140,668 | 132,638 | 132,638 | 129,712 | 129,712 |
| R-squared | 0.519 | 0.518 | 0.524 | 0.524 | 0.292 | 0.292 | 0.301 | 0.301 |
| SD[Alignment] | 1.002 | 1.304 | .477 | .641 | .996 | 1.301 | .477 | .64 |
| Number of newspapers | 358 | 358 | 354 | 354 | 358 | 358 | 354 | 354 |

Standard errors clustered at newspaper level in brackets. *** p < 0.01; ** p < 0.05; * p < 0.1
Table A.6: Panel regression results on the subsample of articles containing word “movie”

(a) Columnists

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(columns)</th>
<th>Pr(columnist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.002***</td>
<td>-0.025***</td>
</tr>
<tr>
<td></td>
<td>[0.000]</td>
<td>[0.005]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.001***</td>
<td>-0.017***</td>
</tr>
<tr>
<td></td>
<td>[0.000]</td>
<td>[0.004]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.003***</td>
<td>-0.107***</td>
</tr>
<tr>
<td></td>
<td>[0.001]</td>
<td>[0.021]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.001**</td>
<td>-0.053***</td>
</tr>
<tr>
<td></td>
<td>[0.001]</td>
<td>[0.014]</td>
</tr>
</tbody>
</table>

Observations 1,258,866 1,258,866 1,234,616 1,234,616 996,578 996,578 951,958 951,958
R-squared 0.105 0.105 0.101 0.101 0.060 0.060 0.057 0.057
SD[Alignment] 1.529 1.714 .551 .660 1.508 1.709 .541 .646
Number of newspapers 357 357 352 352 357 357 352 352
Number of columnists 194 194 194 194 194 194 194 194

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1

(b) Sources

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>ln(citations)</th>
<th>Pr(source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.020***</td>
<td>-0.296***</td>
</tr>
<tr>
<td></td>
<td>[0.005]</td>
<td>[0.059]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.007**</td>
<td>-0.158***</td>
</tr>
<tr>
<td></td>
<td>[0.003]</td>
<td>[0.033]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.081***</td>
<td>-1.037***</td>
</tr>
<tr>
<td></td>
<td>[0.019]</td>
<td>[0.247]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.028**</td>
<td>-0.795***</td>
</tr>
<tr>
<td></td>
<td>[0.013]</td>
<td>[0.158]</td>
</tr>
</tbody>
</table>

Observations 143,110 143,110 140,668 140,668 131,780 131,780 128,238 128,238
R-squared 0.522 0.521 0.516 0.515 0.353 0.353 0.322 0.322
SD[Alignment] 1.002 1.304 .477 .641 .994 1.299 .473 .634
Number of newspapers 358 358 354 354 358 358 354 354

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1
<table>
<thead>
<tr>
<th>Outcome variable</th>
<th>ln(citations)</th>
<th>Pr(source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.026*** [0.005]</td>
<td>-0.451*** [0.069]</td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.011*** [0.003]</td>
<td>-0.227*** [0.039]</td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.114*** [0.020]</td>
<td>-1.340*** [0.267]</td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.039*** [0.013]</td>
<td>-0.939*** [0.189]</td>
</tr>
</tbody>
</table>

Observations: 137,720 137,720 139,128 139,128 101,794 101,794 99,946 99,946
R-squared: 0.503 0.502 0.514 0.514 0.382 0.382 0.407 0.407
SD[Alignment]: .996 .1301 .478 .642 .985 1.296 .471 .635
Number of newspapers: 344 344 350 350 344 344 350 350

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1
Figure A.14: Year-by-year estimates of specifications (2.3), 1999 - 2017

Year-by-year estimates of coefficients for $Alignment_{ncy}$ and $Alignment_{nsy}$ from specifications (2.3) along with 90% confidence intervals for a fixed number of newspapers: graphs (a) - (c) are constructed on the sample of newspapers that have at least 22 columns in each year; graphs (d) - (f) are constructed on the sample of newspapers that have at least 22 citations in each year.
Figure A.15: Year-by-year estimates of specifications (2.4)

Year-by-year estimates of coefficients for $Alignment_{nxy}$ and $Alignment_{nxy}$ from specifications (2.4) along with 90% confidence intervals for a fixed number of newspapers: graphs (a) - (c) are constructed on the sample of newspapers that have at least 22 columns in each year; graphs (d) - (f) are constructed on the sample of newspapers that have at least 22 citations in each year.
Figure A.16: Replication of Figure 2.8 with excluded 2016 endorsements

$\text{proportion}_{\text{HS}} = \alpha + \beta \text{Alignment}_{\text{HS}} + \gamma \text{Dist}_{\text{HS}} + FE_n + FE_s + \epsilon_{\text{HS}}$

Year-by-year estimates of coefficients for $\text{Alignment}_{\text{acy}}$ and $\text{Alignment}_{\text{hsy}}$ from specifications (2.3) along with 90% confidence intervals for a fixed number of newspapers: graphs (a) - (c) are constructed on the sample of newspapers that have at least 22 columns in each year; graphs (d) - (f) are constructed on the sample of newspapers that have at least 22 citations in each year. 2016 election endorsements were disregarded.
A.4 Supplemental materials for Section 2.3.3

Figure A.17: Replication of Figure 2.9 with omitted 2016 endorsements
Figure A.18: Replication of Figure 2.9 for 1999-2017
Figure A.19: Replication of Figure 2.9 on the subsample of articles containing word “president”
Figure A.20: Replication of Figure 2.9 on the subsample of articles containing word “congress”
Figure A.21: Replication of Figure 2.9 on the subsample of articles containing word “football”
Figure A.22: Replication of Figure 2.9 on the subsample of articles containing word “movie”
Figure A.23: Replication of Figure 2.9 on the subsample of articles from “sports” section
### A.5 Supplemental materials for Section 2.3.4

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>Before 2006</th>
<th>Pr(columnist)</th>
<th>After 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.040*** [0.009]</td>
<td>-0.034*** [0.006]</td>
<td></td>
</tr>
<tr>
<td>Ind.Var. × Layoff</td>
<td>0.044** [0.022]</td>
<td>0.039*** [0.014]</td>
<td></td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.027*** [0.007]</td>
<td>-0.028*** [0.005]</td>
<td></td>
</tr>
<tr>
<td>Ind.Var. × Layoff</td>
<td>0.033* [0.018]</td>
<td>0.035*** [0.012]</td>
<td></td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-0.112*** [0.024]</td>
<td>-0.115*** [0.019]</td>
<td></td>
</tr>
<tr>
<td>Ind.Var. × Layoff</td>
<td>0.182*** [0.054]</td>
<td>0.034 [0.041]</td>
<td></td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-0.044*** [0.017]</td>
<td>-0.074*** [0.015]</td>
<td></td>
</tr>
<tr>
<td>Ind.Var. × Layoff</td>
<td>0.132*** [0.036]</td>
<td>0.026 [0.037]</td>
<td></td>
</tr>
</tbody>
</table>

R-squared 0.122 0.122 0.115 0.115 0.130 0.130 0.118 0.118
Number of newspapers 286 286 298 298 286 286 298 298
Number of columnists 195 195 195 195 195 195 195 195

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1
Table A.9: Bias and financial performance: per- and post-2006, citations

<table>
<thead>
<tr>
<th>Outcome variable:</th>
<th>Before 2006</th>
<th>Pr(source)</th>
<th>After 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Pol. Dist.: end-ts</td>
<td>-0.416***</td>
<td>-0.319***</td>
<td></td>
</tr>
<tr>
<td>[0.106]</td>
<td>[0.092]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ind.Var. × Empl. change</td>
<td>0.066</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>[0.228]</td>
<td>[0.194]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pol. Dist.: endorsements</td>
<td>-0.226***</td>
<td>-0.255***</td>
<td></td>
</tr>
<tr>
<td>[0.062]</td>
<td>[0.056]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ind.Var. × Empl. change</td>
<td>0.127</td>
<td>0.199*</td>
<td></td>
</tr>
<tr>
<td>[0.131]</td>
<td>[0.117]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Av. Pol. Dist.: demand</td>
<td>-1.866***</td>
<td>-1.779***</td>
<td></td>
</tr>
<tr>
<td>[0.395]</td>
<td>[0.326]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ind.Var. × Empl. change</td>
<td>2.256***</td>
<td>1.117**</td>
<td></td>
</tr>
<tr>
<td>[0.577]</td>
<td>[0.472]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pol. Dist.: demand</td>
<td>-1.260***</td>
<td>-1.153***</td>
<td></td>
</tr>
<tr>
<td>[0.274]</td>
<td>[0.181]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ind.Var. × Empl. change</td>
<td>1.298***</td>
<td>0.765***</td>
<td></td>
</tr>
<tr>
<td>[0.325]</td>
<td>[0.263]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Observations 38,368 38,368 39,534 39,534 75,350 75,350 78,496 78,496
R-squared 0.528 0.527 0.504 0.503 0.556 0.555 0.561 0.560
Number of newspapers 286 286 298 298 286 286 298 298

Standard errors clustered at newspaper level in brackets. *** p<0.01; ** p<0.05; * p<0.1
Table B.1: Association between income and trust: other measures of income

<table>
<thead>
<tr>
<th>Regressors:</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale of incomes</td>
<td>0.006</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.001]***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family savings during past year</td>
<td>0.009</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.003]***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with financial situation of household</td>
<td>0.004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk tolerance</td>
<td>0.004</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>[0.002]**</td>
<td>[0.002]***</td>
<td>[0.002]***</td>
</tr>
<tr>
<td>Others would take advantage of me</td>
<td>-0.021</td>
<td>-0.021</td>
<td>-0.021</td>
</tr>
<tr>
<td></td>
<td>[0.004]***</td>
<td>[0.004]***</td>
<td>[0.004]***</td>
</tr>
<tr>
<td>Observations</td>
<td>57,200</td>
<td>53,947</td>
<td>57,098</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.234</td>
<td>0.239</td>
<td>0.234</td>
</tr>
<tr>
<td>Region FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Individual controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Neighborhood control</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Country-level clustering</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Dependent variable: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" Answers are: 1 – “Most people can be trusted”, 0 – “Need to be very careful.” Robust standard errors clustered at country level in brackets. *** p<0.01, ** p<0.05, * p<0.1.
Table B.2: Association between income and trust: excluding continents

<table>
<thead>
<tr>
<th>Regressors</th>
<th>Europe</th>
<th>Asia</th>
<th>Africa</th>
<th>South America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale of incomes</td>
<td>0.006</td>
<td>0.007</td>
<td>0.007</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>[0.001]**</td>
<td>[0.002]**</td>
<td>[0.001]**</td>
<td>[0.002]**</td>
</tr>
<tr>
<td>Risk tolerance</td>
<td>0.005</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>[0.002]**</td>
<td>[0.002]**</td>
<td>[0.002]**</td>
<td>[0.002]**</td>
</tr>
<tr>
<td>Others would take advantage of me</td>
<td>-0.016</td>
<td>-0.021</td>
<td>-0.022</td>
<td>-0.023</td>
</tr>
<tr>
<td></td>
<td>[0.003]**</td>
<td>[0.004]**</td>
<td>[0.004]**</td>
<td>[0.004]**</td>
</tr>
<tr>
<td>Observations</td>
<td>45,446</td>
<td>40,976</td>
<td>49,334</td>
<td>51,250</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.221</td>
<td>0.252</td>
<td>0.236</td>
<td>0.229</td>
</tr>
<tr>
<td>Region and Ethnicity FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Individual controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Neighborhood control</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Dependent variable: “Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?” Answers are: 1 – “Most people can be trusted”, 0 – “Need to be very careful.” Robust standard errors clustered at country level in brackets. *** p<0.01, ** p<0.05, * p<0.1.