

Journal Pre-proof

Pandemic panic? Effects of health system capacity on firm confidence during COVID-19

Balagopal Gopalakrishnan, Jamus Jerome Lim, Sanket Mohapatra



PII: S0176-2680(23)00066-6
DOI: <https://doi.org/10.1016/j.ejpoleco.2023.102422>
Reference: POLECO 102422

To appear in: *European Journal of Political Economy*

Received date: 2 December 2022
Revised date: 16 April 2023
Accepted date: 20 June 2023

Please cite this article as: B. Gopalakrishnan, J.J. Lim and S. Mohapatra, Pandemic panic? Effects of health system capacity on firm confidence during COVID-19. *European Journal of Political Economy* (2023), doi: <https://doi.org/10.1016/j.ejpoleco.2023.102422>.

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2023 Elsevier B.V. All rights reserved.

1. Introduction

How much does the external environment affect businesses' assessments of their future prospects? Managers' perceptions, in terms of sentiment and risk, undoubtedly shape the manner by which firms save and invest for the future, which in turn impacts their performance. But such perceptions are shaped not only by the internal dynamics of the firm—such as the skills and motivation of its workforce, its access to capital financing, and the quality of its management and strategic initiatives (Marks 2015)—but also by external drivers, including supportive infrastructure, macroeconomic conditions, the overall investment climate, and the socio-political backdrop in which it does business (Miller 1993).

Typically, it is difficult—if not impossible—to disentangle the specific contribution of a given environmental factor from other macro-level correlates, since these may not only be relatively invariant over time, but also potentially associated with other, unobservable factors. However, the rapidity and severity of the onset of the COVID-19 pandemic meant that this exogenous shock stressed one particular factor—the capacity of the national healthcare system—without permitting enough time, by and large, for public and private agents to dramatically adjust their resources endogenously. Consequently, healthcare resources available *at the time of the pandemic* are a reasonable reflection of the systemic capacity available to meet economywide healthcare needs, and (just as importantly) since these available resources differ between nations, prospects for firms located within a country can likewise differ. We therefore exploit the COVID-19 shock as a quasi-natural experiment to obtain an estimate of the importance of health system capacity—a key element of modern “soft” infrastructure¹—for firm perceptions of risk and sentiment.

Although the object of our study is the health system, our goal is to provide more general insight into the importance of soft infrastructure—one that influences both busi-

¹Although there is no universally-agreed definition for the term, international and development organizations generally consider services that contribute toward the maintenance of governance, education, health, and culture as “soft” infrastructure, while physical constructs such as roads, bridges, railways, and ports commonly classified as “hard” infrastructure. See Brook & Irwin (2003) and Lam, Rodlauer & Schipke (2017).

ness conditions and employee wellbeing—for firm decisionmaking. In our application, the system we interrogate is the capacity of government health agencies and private health-care providers to mount a credible, effective epidemic response. Our estimates therefore provide an important gauge of how the system's *ex ante* capacity shapes businesses' expectations of how well they will have to navigate the consequences of an unexpected economywide shock.

The disease environment is not solely limited to preexisting health system capacity. COVID-19 saw countries worldwide mount proactive responses to manage the disease, including containment measures such as lockdowns and travel bans, along with other epidemic response measures, both of a medical (e.g. deployment of facial coverings, contact tracing) and nonmedical (e.g. income support, debt relief) nature. These *ex post* measures may shore up firms' expectations about the future as well, and hence it is reasonable to ask whether government pandemic management actions may also influence firm perceptions.

In this paper, we examine the importance of systemic capacity in shaping agents' perceptions of their exposure to an aggregate shock. More specifically, we examine how firms' perceptions of disease sentiment and risk associated with the novel coronavirus disease of 2019 (COVID-19)—which we collectively term business confidence²—relate to the total amount of healthcare resources available. We also examine the relative importance of public versus private resources devoted to healthcare for such perceptions, along with whether proactive (as opposed to passive) actions by countries made any material difference.

Our central hypothesis is that firm perceptions of negative sentiment and risk due to disease are both negatively related to *ex ante* total health system capacity. To the extent that such capacity is well-provided by the public sector, we further hypothesize that confidence should improve; conversely, if not, the private sector may serve as a substitute

²Business confidence indexes typically employed in the literature generally encompass a much broader range of metrics, including purely quantitative measures such as domestic and export order books, along with quantified sentiment measures, such as the degree of optimism about the future. Here, we use the term mainly for expositional economy, but note that it encompasses a similar philosophy as confidence measures: that of forward-looking expectations of firms.

to perform the same function. And finally, we posit that more intensive *ex post* response measures should, all else equal, bring about even additional reductions in perceptions of risk and negative sentiment.

Our results confirm the importance of *ex ante* health system capacity for firms' perception of COVID-19-related risk and sentiment; increased capacity gives rise to lower risk and reduced negative sentiment. These effects are statistically significant, and most pronounced for risk perceptions: a one percentage point increase in capacity results in a 2.5 percent decrease in risk, relative to its mean. Furthermore, we find evidence that both public and private health expenditures matter—the former more for risk, the latter for sentiment—and that the two appear to be more substitutes than complements. Finally, we also verify that *ex post* government interventions also play a part in shoring up business confidence.

Related literature and contribution. There has been a surge in papers on COVID-19 that emerged in the aftermath of the pandemic. Within the field of business and economics, papers have addressed the broad macroeconomics of the pandemic (Baldwin & Weder di Mauro 2020a,2)—such as growth (Coutiño & Zandi 2021), inflation (Jaravel & O'Connell 2020), unemployment (Auray & Eyquem 2020), and expectations (Bui, Dräger, Hayo & Nghiem 2022)—along with various applied microeconomic dimensions, such as consumption behavior (Baker, Farrokhnia, Meyer, Pagel & Yannelis 2020; Hoseini & Valizadeh 2021), labor markets (Forsythe, Kahn, Lange & Wiczler 2020; Hensvik, Le Barbanchon & Rathelot 2021), financial assets (Daehler, Aizenman & Jinjark 2021; Davis, Liu & Sheng 2021), income distribution (Crossley, Fisher & Low 2021), trade patterns (Liu, Ornelas & Shi 2021), and environmental outcomes (Brodeur, Cook & Wright 2021). A good number have also explore political-economy effects that have arisen due to COVID-19 (Ferraresi & Gucciardi 2022; Picchio & Santolini 2022).

Like us, a number of papers have examined firm dynamics during the pandemic. These include, *inter alia*, studies on sales (Bloom, Fletcher & Yeh 2021), business entry and exit (Fairlie 2020; Fareed & Overvest 2021), insolvency and debt (Demmou, Calligaris, Franco, Dlugosch, McGowan & Sakha 2021), productivity (Mischke, Woetzel, Smit, Manyika, Ra-

maswamy, Birshan, Windhagen, Schubert, Hieronimus, Dagorret & Nogue 2021), human resource management (Caligiuri, De Cieri, Minbaeva, Verbeke & Zimmermann 2020), and resilience (Borino, Carlson, Rollo & Solleder 2021). The first contribution of this paper is that our focus is on firms' business confidence, which is forward-looking in nature, as opposed to the abovementioned alternative aspects of outcomes and performance, which tend to be more backward-looking. As important as firm confidence is for a firm's future decisionmaking, it has been underexplored in the management literature, perhaps owing to the relative paucity of data measuring the phenomenon.

There is a small literature that explicitly considers elements of confidence and expectations. These include works that examine beliefs surrounding COVID-19, from the perspective of either the consumer (Abel, Byker & Carpenter 2021; Bui *et al.* 2022) or citizen attitudes toward government (Ferraresi & Gucciardi 2022) and government policies (Bol, Giani, Blais & Loewen 2021; Fuest, Immel, Neumeier & Peichl 2022). Others take on the question of expectations and sentiment more generally (Aguilar, Ghirelli, Pacce & Urtasun 2021; Altig, Baker, Barrero, Bloom, Bunn, Chen, Davis, Leather, Meyer, Mihaylov, Mizen, Parker, Renault, Smietanka & Thwaites 2020; Binder 2020). By and large, these papers are set within a limited context, encompassing either one or two countries, or a single region. Most do not address business confidence.³ Our second contribution is that, by encompassing a much larger global coverage—comprising both advanced and emerging economies—we reveal a number of counterintuitive insights that have been less recognized by the extant literature.

Such insights are amply illustrated when comparing our work with the handful of papers that are closest to our own, where the focus is on firm-level business confidence, and coverage is somewhat more expansive. Hassan, Hollander, van Lent & Tahoun (2020), from which we draw our dependent variables of interest, seek to understand how COVID-19 risk and sentiment affect the balance of demand and supply using a global dataset. However, since they do not introduce any systemic environmental variable, they do not

³For the clutch of papers that do adopt a more global coverage (Dryhurst, Schneider, Kerr, Freeman, Recchia, van der Bles, Spiegelhalter & van der Linden 2020; Eichengreen, Aksoy & Saka 2021), the analysis deals with neither business sentiment and risk.

arrive at any causal conclusions concerning the effects of system capacity on confidence, as we do.

Like us, Bartik, Bertrand, Cullen, Glaeser, Luca & Stanton (2020) takes on business expectations—with a focus on small businesses—but the study relies on only U.S. data, and is moreover narrowly focused on the implications of the Coronavirus Aid, Relief, and Economic Security (CARES) Act. Benton, Cobb & Werner (2022), in contrast, deal with risk communication for U.S. firms, but their mediating factors are firms' partisan positioning and political polarization of the issue at hand. This is also the case for Buchheim, Doern, Krolage & Link (2020), who rely on only German data, and deals with the adaptation and mitigation strategies of firms, as opposed to our concerns about environmental factors. As a result, these papers are unable to either provide an estimate of the importance of preexisting soft infrastructure for firm confidence, or to causally attribute variations in confidence to system capacity. Our third contribution, then, is that we approach the firm confidence question specifically from the perspective of the mediating role played by system capacity.

The rest of this paper is organized as follows. Section 2 sketches out the relevant theories that relate to our question of healthcare capacity and firm perceptions, and explicitly lays out a number of testable hypotheses. This is followed by a discussion of our methodological approach, data description, and identification strategy (section 3). We report our main results in section 4, before proceeding with an extended discussion of heterogeneity in our main findings in section 5. A final section concludes with limitations and suggestions for future work.

2. Theory

2.1. *Environmental factors affecting firm perceptions*

Firms have always considered the risk consequences of not just internal benchmarks—such as financial leverage, human resources, legal liability, and technological obsolescence—on sentiment and risk (Marks 2015), but also effects from the external environment. Such ex-

ternal factors include economic and policy conditions (Blake & Moschieri 2017; Oxelheim & Wihlborg 2005), the legal and regulatory framework (Djankov, La Porta, López-de Silanes & Shleifer 2001,0), the structure of the financial system (Purda 2008), the tax regime (Cevik & Miryugin 2022; Gande, John, Nair & Senbet 2020), the political setting (Giambona, Graham & Harvey 2017; Holburn & Zelner 2010), geography and trade (Oh, Shapiro, Ho & Shin 2020), and infrastructure (Doh & Ramamurti 2003; Guthrie 2006).

In addition to these standard factors, businesses are occasionally exposed to unexpected (and occasionally esoteric) external shocks. These include financial crises (Flammer & Ioannou 2021), natural disasters (De Mel, McKenzie & Woodruff 2012), terrorist attacks (Brück, Llussá & Tavares 2011), and public health crises. For the last, soft infrastructure—in terms of the overall capacity of the health system—undoubtedly matters. This would include not just the public system—which oversees disease spread, prevention, and control—but also the private one, which shores up capacity when the typically more affordable and accessible public system comes under significant stress.

During the COVID-19 pandemic, health system capacity entailed the availability of medical infrastructure (e.g. intensive-care wards, convalescence facilities), medical (e.g. doctors, nurses) and public health (contact tracers, temperature screeners) personnel, and medical equipment (e.g. personal protective gear, test kits, and oxygen respirators). Countries that managed to shore up their capability prior to the arrival of the disease were generally in a better *a priori* position to deal with the shock, thereby mitigating firms' perceptions of the negative impact of the health crisis.

Hypothesis 1 (Health system affects firm perceptions) *Improvements in ex ante health system capacity will lead to reductions in firms' negative disease sentiment and risk, but this is moderated by the case load.*

2.2. Public and private provision in health system capacity

2.2.1. Benefits of public goods

To the extent that public goods are provided by government policymakers, it is useful to understand the extent to which such public goods provide benefits to agents in the economy. Public goods undoubtedly offer a host of direct benefits; for instance, public roads enhance connectivity and reduce travel times, while clean air improves health and quality of life.

But public goods also offer indirect benefits. For example, public education—by raising the overall literacy level of the society—can simultaneously improve the capacity of the workforce to adopt certain technologies, or improve the overall nature of democratic governance by nurturing an informed, civic-minded electorate. Better public health—by reducing the incidence and transmission of disease, as well as lowering mortality—can improve the overall environment that households live in, and the business climate in which firms operate.

There are several approaches to capturing the benefits that derive from public goods. The (public) economics literature evaluates the marginal contribution of public goods mainly from the perspective of their *optimal provision*. The policymaker's problem entails maximizing social welfare, subject to a production constraint, by choosing optimal rates of delivery. The intuition behind the theory is straightforward: public goods are efficiently provided when the marginal willingness to pay for such goods equals the marginal rate of where the public good may be transformed into a comparable private good (Samuelson 1954). There may be slight modifications to this "Samuelson Rule" in more sophisticated settings—such as when taxation is distortionary (Atkinson & Stern 1974; Stiglitz & Dasgupta 1971) or when agents are heterogeneous (Dahlby 1998; Gahvari 2006)—but the principle of equating the marginal costs of funds to the marginal rate of transformation remains essentially the same.

The disciplines of public administration and public policy build on the insights above to derive practical *cost benefit analyses* (CBA) for evaluating the net value—in terms

of policy impact for a given amount of monetary expenditure—of a public good (Adler & Posner 2006; Boardman, Greenberg, Vining & Weimer 2018). A related literature on *public value* (Alford & O’Flynn 2009) likewise seeks to impute collective valuation, but does so in a more holistic sense, by expanding the shadow price of a public good to include externalities and market power. The main shortcoming from these approaches is that they deal with the overall impact of a project, rather than the specific marginal effect of (positive) externalities, as we do here.

The environmental sciences apply a number of distinct approaches to valuing externalities from public goods. These fall into *stated preference* techniques—of which survey-based contingent valuation (Carson 2000) is the most pervasive—as well as *revealed preference* models, which infer underlying value from either related hedonic markets (Taylor 2003), voluntary contribution behavior (Champ, Bishop, Brown & McCollum 1997), associated travel costs (Parsons 2003), or potential economic damages (Neumann, Willwerth, Martinich, McFarland, Sarofim & Yohe 2020). While such methods have been successfully applied in many dimensions, they tend to be less applicable to public health concerns, whose use value—whether reported or inferred—is typically known with far less certainty.

The common theme across these different approaches is that public goods generate net benefits, which can be estimated. In the context of this study, the benefits are an improvement in firms’ business confidence, which derive from a credible and functional public health system. Our study captures such benefits within the context of a quasi-natural experiment: the COVID-19 pandemic, which—due to its unexpected nature—served as an exogenous shock that affected firms’ perceptions of the importance of public health provision.⁴

Hypothesis 2a (Public health affects firm perceptions) *Improvements in the public provision of healthcare will lead to reductions in firms’ negative disease sentiment and*

⁴It is important to recognize the distinction between an entirely *unplanned* event—a pandemic event certainly fell within the realm of possibility, and many public health agencies did have contingencies for such an eventuality—versus an *unexpected* event, for which, regardless of any advance planning, the actual incidence of the pandemic still represented an idiosyncratic shock, and hence exogenous from the perspective of agents.

risk, albeit moderated by the case load.

2.2.2. *Private provision of public goods*

The study of the private provision of public goods has a long history (see, for example, Bergstrom, Blume & Varian 1986; Demsetz 1970). Much of this literature explores the circumstances by which one crowds out the other; put another way, whether the two are substitutes—and if so, what the elasticity of substitution might be—or complements.

Such private provision is remarkably common in emerging and developing economies. This owes, often, to failures of the state to render such goods. In such countries, especially in the education (Ashley, McLoughlin, Monazza, Engel, Wales, Rawal, Batley, Kingdon, Nicolai & Rose 2014) and health (Basu, Andrews, Kishore, Panjabi & Stuckler 2012) sectors, there is often the emergence of a parallel private sector, of varying levels of quality (Chaudhury, Hammer, Kremer, Muralidharan & Rogers 2006).

After all, not all medical care is public in nature; a private sector may emerge to offer healthcare that serves individual needs in a manner that is both rivalrous and excludable (thereby satisfying the definition of private goods). Consequently, since we do not wish to rule out how public health needs may also be met by the private sector, we explore the possibility that private sector healthcare provision may serve as a substitute, and thereby improves firm perceptions.

Hypothesis 2b (Private health affects firm perceptions) *Improvements in the private provision of healthcare will lead to reductions in firms' negative disease sentiment and risk, albeit moderated by the case load.*

2.3. *Government interventions in healthcare markets*

There is a long intellectual history of debate over the proper role of government in healthcare markets (Cutler 2002; Diepeveen, Ling, Suhrcke, Roland & Marteau 2013; Poterba 1996). Most of this literature has focused on situations where government involvement is more or less justified, and less on outright healthcare crises (where government action is seldom questioned).

When pandemics emerge—especially those without any known treatment regime or vaccine—the efficacy of the government’s toolkit to end the pandemic is uncertain. Even so, during the COVID-19 pandemic, in only a very small number of instances did governments limit themselves to mainly informational or coordination roles; Sweden’s adoption of a comparatively more *laissez-faire* strategy⁵ comes to mind. By and large, however, most countries were proactive (to a greater or lesser extent) in seeking to control the spread of the disease, and the comprehensiveness of their interventions were typically limited by resources, rather than desire.

Nevertheless, governments were not expected to simply act as passive providers of public health services, especially in a pandemic environment. Increases in healthcare budgets provided greater resources for combating the spread of the disease, and specific actions on the part of governments—such as the willingness and speed of deploying facial coverings, the extensiveness of testing accompanied by contact tracing, imposition of physical distancing rules, restrictions on travel, and limitations on the size of public gatherings—all played a role in stemming the transmission of the disease. Such actions were clearly not consequential—indeed, they were hardly even considered—for agents’ confidence in disease management in the absence of COVID-19, but grew in importance after the arrival of the disease. Accordingly, we allow for these reactive policies to play a role in influencing firms’ perceptions.

Hypothesis 3 (Health interventions affect firm perceptions) *Improvements in ex post health interventions will lead to reductions in firms’ negative disease sentiment and risk, but this is moderated by the case load.*

⁵Unsurprisingly, Sweden has also come under criticism for its approach, and the strategy has been blamed for the relatively higher mortality rates the country has experienced, relative to its Nordic neighbors (Claeson & Hanson 2021).

3. Empirics

3.1. Methodological approach

Our baseline empirical specification captures our first hypothesis, which estimates the effect of *ex ante* health system capacity on firms' business confidence during the COVID-19 pandemic:

$$\begin{aligned}
 \text{Firm Perception}_{ijt} = & \alpha_0 + \alpha_1 \text{Log Cases}_{jt} + \alpha_2 \text{Health Capacity}_j \\
 & + \alpha_3 \text{Health Capacity}_j \times \text{Log Cases}_{jt} + \sum_s \alpha_{4,l} \mathbf{X}_{ij} \\
 & + \alpha_5 \mathbf{Y}_j + \gamma_j \times \text{Time Trend} + \mu_k \times \tau_t + \epsilon_{ijt},
 \end{aligned} \tag{1}$$

where $\text{Firm Perception}_{ijt}$ captures the perceptions of management for firm i in country j , during quarter t of 2020. We employ three proxies of management perceptions about the pandemic and its consequent effect on business confidence and firm performance, sourced from Hassan *et al.* (2020). The proxy variables are: (a) COVID-19 risk; (b) COVID-19 negative managerial sentiment; and (c) COVID-19 net managerial sentiment. Our key explanatory variable, *Health Capacity*, is proxied by *Health Exp./GDP*, the average health expenditure as a share of income, of country j in the years preceding COVID-19, which serves as a proxy for the *ex ante* health system capacity.⁶

Log Cases is the logarithm of the total number of new COVID-19 cases for a given country, in the given quarter (t ranges from the first to the third quarter of 2020).⁷ This variable captures the effects of the rate of increase in new cases on firm confidence. We further include the interaction of this term with that of health system capacity to better understand the important moderating effect of impending stress on the system.⁸

⁶In our robustness checks, we substitute this variable with an alternative metric for capacity, hospital beds per 1,000 population.

⁷Observe that firm perception enters the left hand side as a level term, but cases on the right hand side is logged. Hence, the coefficient would be the semi-elasticity; that is, the unit response of firm risk/sentiment to a one percent increase in new cases. Taking logarithms also converts exponential growth—typically a problem for case loads in an epidemic—to the (linear) trend for new cases.

⁸This is also the reason why we rely on log cases, instead of further adjusting cases per capita of the population. All countries possess total hospital capacities significantly lower than their total populations, and so the trend of total new cases speaks to the magnitude of the shock the system would need to process, regardless of the size of the population. It is also worth noting that, because of the exponential

\mathbf{X} is a vector that embeds a number of firm-level variables that are standard in the literature. These include (the logarithm of) sales, leverage, market-to-book ratio, cash holdings, and asset tangibility. Sales are a proxy for the overall size of the firm's operations, while leverage takes into account the debt overhang (and implied financial flexibility) of the firm. The market-to-book ratio represents its growth opportunities, cash holdings the amount of liquid resources at its disposal to face the pandemic shock, and asset tangibility the ability of a firm to borrow against tangible assets for the same reason. \mathbf{Y} is a vector that represents country-level variables. In our baseline, this is simply the value of the logarithm of GDP per capita, which serves as a proxy for the level of economic development of the country, and GDP growth, a proxy for recent economic performance. Firm- and country-specific variables all enter in lagged form.⁹

The specification also includes $\gamma_j \times Time\ trend$, which embeds any quarterly country-level trends that may alter firms' perceptions. $\mu_k \times \tau_t$, which are industry-level quarterly interactive fixed effects, subsume any industry-specific changes in managerial perceptions at the quarterly frequency. Estimation of Equation 1 is performed with standard errors that are robust to heteroskedasticity, as well as clustered at the firm level, to address the possibility of additional temporal effects (Petersen 2009).

3.2. Data description

We employ data from various sources in our analysis. The firm-specific perceptions variables are drawn from the disease exposure data compiled by Hassan *et al.* (2020). Other firm-level controls are obtained from Thomson Reuters' Worldscope database. Data on COVID-19 cases, containment measures, and government responses rely on the Oxford COVID-19 Government Response Tracker (OxCGRT) (Hale, Anania, Angrist, Bobby, Cameron-Blake, Di Folco, Ellen, Goldszmidt, Hallas, Kura, Lucino, Majumda, Nagesh,

nature by which cases develop, there is actually an imperfect relationship between the absolute number of cases and population size ($\rho = 0.65, p = 0.00$). In any case, as a robustness check, Table A.8 of the appendix reports regressions where cases per capita are included as an additional control. The results are qualitatively unchanged.

⁹Since our dependent variable is only available for three quarters in 2020, and the firm and country controls are only available annually, this effectively means that the variables in \mathbf{X} and \mathbf{Y} are a cross-section from the year 2019.

Petherick, Phillips, Tatlow, Webster, wood & Zhang 2020). All country-level macroeconomic variables are obtained from the World Development Indicators (WDI) of the World Bank. Full details of the definitions and sources are reported in Table A.1 of the appendix; here, we provide additional explanation for only the main variables of interest.

The disease risk and sentiment measures from Hassan *et al.* (2020) cover the first three quarters of 2020. Negative disease sentiment and risk are derived from textual analysis of quarterly earnings calls.¹⁰ The risk index is computed on the basis of the usage of synonyms for risk or uncertainty in the vicinity of the mention of the term COVID-19, and the sentiment index is computed based on an algorithm that takes into account the tone of the words around instances of the mention of COVID-19. For example, negative sentiment is computed from the use of words with negative connotations, such as “loss,” “decline,” and “difficult,” in conjunction with exposure. Net sentiment is simply the difference between positive and negative sentiment.

While perceptions of sentiment and risk are relatively uncommon (and indirect) measures of firm performance, the literature has long accepted the difficulty of adopting a single metric for organizational performance that is appropriate under all circumstances (Kaplan & Norton 1992; Richard, Devinney, Yip & Johnson 2009). While indirect, this text analysis-derived measure may be viewed as a subjective organizational performance measure that is nevertheless collected in a systematic, quantitatively-driven manner that allows cross-country comparison. Indeed, our chosen measures align well with recent calls to embrace the greater use of subjective performance metrics in cross-country analyses (Singh, Darwish & Potočnik 2016).

We then match the perceptions data from each firm to its corresponding financial information, using unique ISIN codes. The final matched firm-level data spans 53 countries, which comprise 24 advanced and 29 developing economies.¹¹ The average firm in our estimation sample has reported a positive risk due to COVID-19 exposure, and negative future sentiment due to the pandemic.

We utilize three country-level variables to measure health system capacity. Our main

¹⁰These correspond, respectively, to the first and second moments of business confidence.

¹¹The full list of countries is provided in the appendix.

explanatory variable is overall health expenditure, as a share of GDP. This measure captures variations in country-level preparedness in facing the pandemic. Given the paucity of recent data on the health system capacity, we take the average of the health expenditure variable over a relatively long span, 2010–18. This averaging captures the effects of sustained investment in national health capacity, while smoothing out the confounding effects of year-to-year fluctuations, including those due to the business cycle. To explore our other hypotheses, we also separately employ data on the capacity of the government, along with the private health system. In a number of additional specifications, we also utilize measures of health system capacity at the micro-level, such as the number of doctors per 1,000 population.

Overall health expenditure, as a share of GDP, is close to 13 percent, reflecting the dominance of advanced economy firms in our sample. Public spending constituted about 56 percent of the total, with the rest accounted for by private (out-of-pocket) health expenditure. The OxCGRT health and containment index ranges from 12.7 to 87.4 (on a scale of 0–100), while the overall government response index ranges from 12.7 to 85.6, with median values of 67.4 and 68.0 respectively (hence, containment measures tended to be on the high side). Average *new* COVID-19 cases over the two quarters amounted to around 247,700 per quarter. The geographical distribution of health expenditures, along with associated COVID-19 risk, is shown in Figure 1.

While firm-level financial data, as well as country-level variables, are available for a larger set of firms and countries, the availability of managerial sentiment data is based on earnings transcripts of listed firms, which constrains the size of our sample. The final working dataset includes 11,544 firm-quarter observations. This comprises 4,398 unique firms, of which a little less than half (2,126 firms) are from the United States.

The average firm in our sample reported total sales of 1.14 billion USD, and maintains a debt equity ratio of 1.04, suggesting leverage levels of 50 percent or higher. The average firm also has significant growth opportunities, as suggested by an M/B ratio of 3.4. Most firms were reasonably liquid: the average firm maintained 15 percent of its assets in cash and cash equivalents, whereas the median firm's liquid assets amounted to 8 percent

of its total assets. Unsurprisingly for publicly-listed firms, the average firm invested a significant amount in fixed assets: around a third (32 percent).

3.3. Identification considerations

As alluded to in the introduction, our primary identification strategy entails exploiting how the suddenness and severity of the COVID-19 pandemic meant that both public and private actors in the economy had little sense of the impending crisis—or the impetus to endogenously alter their behavior—which suggest that the shock was effectively exogenous. This allows us to treat healthcare resources available at the pandemic’s onset as a reasonable reflection of the *ex ante* systemic capacity available to meet economywide healthcare needs.

In addition, given how our primary units of measurements occur at the firm level—whereas the environmental variable of interest, health system capacity, is at the country level—simultaneity bias is extremely unlikely (no individual firm is generally able to directly alter national healthcare expenditures). Our reliance on lagged firm- and country-specific controls (corresponding to the pre-COVID year, 2019) is designed to further attenuate concerns over reverse causality.

Of course, omitted confounding variables could still introduce bias. To further isolate the health system capacity channel, we incorporate country-specific time trends ($\gamma_j \times Time\ Trend$) and industry-quarter interactive fixed effects ($\mu_k \times \tau_t$) to accommodate such additional unobserved heterogeneity.

Country-time effects are important, because perceptions of healthcare management may exhibit differential trends across countries during the COVID-19 period. For instance, a firm in a developing country where institutional support is weak may expect comparatively less policy support for businesses compared to an advanced economy, which would give rise to a less steep (or even downward) trend. Similarly, industry-period effects are likely to matter. For example, the hospitality and tourism sectors were more adversely affected by declines in demand, and lockdowns disrupted supply chains for certain goods—such as semiconductors—more than others. Interactive fixed effects will control for such

industry-specific shocks over each of the three quarters. Such interactive fixed effects also subsume quarterly fixed effects, which could result from seasonality in firms' perception at an aggregate level over the full sample period.

Taken together, this suite of fixed effects help us saturate the model in a fashion that controls for the possibility of omitted-variable bias at both country- and industry-levels (Gormley & Matsa 2014), lending additional confidence that our estimated effects are causal.

Finally, it is worth noting that our dependent variables—whether risk or sentiment—are coded in a fashion, as described in subsection 3.2, that are remarkably specific to the COVID-19 health shock. As a consequence, there is little concern that they are measuring aspects of firm business confidence associated with other types of unexpected shocks.

4. Results

4.1. Health system capacity and firm confidence

The results for the estimation of Equation 1 are presented in Table 1. Columns (1)–(2) report the results of the relationship between health expenditure and COVID-19 risk (as the dependent variable), columns (3)–(4) for COVID-19 negative sentiment, and columns (5)–(6) for COVID-19 net sentiment. Odd-numbered columns present the effect of prior health expenditure on the perceived risk and sentiment of the firm, whereas even-numbered columns show the effect of health expenditure, moderated by the number of cases.

We find that the impact of health system capacity, as proxied by prior health expenditure, on risk perceptions of firms due to COVID-19 exposure is negative and significant (see the coefficient of *Health Exp./GDP* in the first column). This result suggests that higher investment in health capacity is associated with a decline in firms' COVID-19 risk perceptions; specifically, a one percent increase in health capacity gives rise to a 0.002 unit decline in risk (or a 2.5 percent drop, relative to its mean). Put another way, a one standard deviation capacity increase mitigates risk by approximately 1/15 standard deviations.

However, this positive perception—which implies reduced risk—is adversely affected as the cases rise; this is evident from the positive coefficient on *Health Exp./GDP* × *Log Cases* in the second column. In our view, this contrary sign results from how, as cases rise, resource constraints end up overburdening the overall health system, reducing its capacity to deliver a positive outcome. Hence, while prior investment in health expenditure is viewed positively by firms overall, there is nevertheless an inflection point—contingent on the number of cases—beyond which firm perceptions become adversely affected.¹² This effect is demonstrated visually in Figure 2.

The coefficients in columns (4) and (6) indicate, respectively, that increased health system capacity contributes to a reduction in the negative sentiment of firms, while improving their net sentiment. This (partial) effect of expenditures persists after controlling for (observable and unobservable) confounders, and is statistically significant, albeit small.¹³ As before, this effect is moderated by increases in the number of cases. Indeed, the countervailing effect of cases on sentiment is sufficiently strong that the total effect is roughly nil. Taken together, the large negative effects of system capacity on negative sentiment alongside positive effects on net sentiment suggest that it is this diminution of negative sentiment that drives the improvement in net sentiment.

Insofar as the coefficient estimates on the other control variables are concerned, these tend to be consistent with *a priori* expectations. For instance, larger cash holdings are associated with higher (lower) net sentiment (negative sentiment), consistent with how such firms have a superior ability to meet liquidity demands arising from the pandemic. Similarly, larger firms are also likely to reflect greater (lesser) net sentiment (negative sentiment), since they are likely to have greater access to resources necessary to ride out a crisis. Even the somewhat counterintuitive coefficient on the level of development (marginally significant for one of the specifications) is consistent with an emerging stylized fact for the COVID-19 pandemic: that developing economies were hit less hard, and this

¹²Note that the total effect of health system capacity on risk remains negative, even when moderated by the number of cases, albeit with a larger magnitude; when total cases are zero, the total effect of health expenditure is -0.002—the unadjusted coefficient in the first specification, since *Health Exp./GDP* is already demeaned—whereas, when this is further moderated by the case load, the coefficient is -0.0021 (using coefficients in the second specification, $-0.015 + (12.89 * 0.001) = -0.0021$).

¹³Figure A.2 in the appendix captures this visually for all three measures of confidence.

in turn spurred (perhaps premature) optimism on the part of agents in these countries (Vigo, Thornicroft & Gureje 2020).

Overall, while proactive *ex ante* investments in system capacity help alleviate both risk perceptions and contributes to the positive outlook of firms, an overwhelming rise in infections ultimately serve to undermine business confidence. It is likely that the fatigue brought about the rising number of cases drains the ability of the health system to deal with a pandemic of such proportion, which in turn erodes confidence. The results in Table 1 support our baseline Hypothesis 1.

Robustness of the baseline. We consider a suite of additional robustness checks to the baseline specifications reported in Table 1. The most important among these is to replace our main proxy for health system capacity used in the baseline—the health expenditure share of GDP (a financial capacity metric)—with the number of hospital beds per 1,000 of the population (a real resource capacity measure). These are reported in appendix Table A.3.

The other robustness checks we consider allow for alternative estimation methods, along with changes to the independent covariates (such as the inclusion of only statistically significant firm controls, the inclusion of additional country controls, and variations in the fixed effects). These are described in greater detail in appendix Tables A.4 and A.5. By and large, our main conclusions are unaltered by this suite of sensitivity tests.

4.2. Public and private health capacity and firm confidence

We now turn to exploring the relative contributions of health capacity by the public and private sectors on firms' COVID-19 exposure and managerial confidence, along the lines of Hypotheses 2a and 2b.

The results are shown in Table 2. In columns (1)–(3), we jointly estimate the effect of government and private healthcare spending on firms' business confidence with regard to the COVID-19 pandemic. This approach decomposes the separate contribution (if any) of public versus private sector healthcare provision, which we proxy with their respective shares of health expenditures.

We find that a large private healthcare sector diminishes COVID-19 risk perceptions, as evidenced by the negative coefficient on *Pvt. Health Exp./GDP* in column (1). This effect, while potentially amenable to attenuation by the case load, appears to be only weakly affected by it (the coefficient on the interaction term is marginally significant in but one specification). This could be due to the overall greater efficiency of private sector healthcare, at the margin, which in turn reduces the risk perceptions of firms. There is no (statistically) appreciable effect of greater private expenditures on sentiment, however.

In contrast, greater government healthcare provision does improve managerial sentiment, as can be seen in columns (2) and (3). Even so, this positive outlook is attenuated by a greater cases load, similar to the findings in Table 1. This suggests that public health capacity—or its limits—was what drove the results for overall health expenditure, and implies that sentiment for the average firm is more shaken by its perceptions of how well the public sector is able to cope with rising cases during a pandemic.¹⁴ Therefore, when considering the prospects of a recovery over the medium term, proactive actions by the government in building public health capacity may play a critical role in improving firm sentiment.

In columns (4)–(6), we report an alternative approach to this decomposition. Instead of healthcare provision by financial expenditures, we focus on human resource allocation. Specifically, we include the number of doctors and community health workers, alongside total healthcare expenditures.¹⁵ While data limitations mean that it is not possible to perfectly disentangle the public-private distinction via this measure, we posit that community healthcare workers generally operate in the public sector (Schaaf, Warthin, Freedman & Topp 2020), while no such systematic pattern exists for doctors.¹⁶

After controlling for the health expenditure of a country, a larger number of doctors

¹⁴Public healthcare expenditures do appear to negatively affect risk, but the statistical support for this effect is weak.

¹⁵Unfortunately, for community workers, the data are only available for disparate years, and for the majority of countries, only one year was available. That said, for the countries where time-series data *are* present, the share is generally stable, which lends some comfort that the specific year from which observations are drawn is not as critical.

¹⁶It is useful to note that for this argument to work, it is not necessary that doctors be *equally* distributed between the public and private sectors, merely that there is no bias in this allocation that favors of one sector versus the other in different countries.

is associated with lower firm perceptions of COVID-19 risk. Understandably, countries with a greater number of skilled medical personnel (regardless of sector) are generally better able to manage the large health shock, thereby lowering risk perceptions. As before, this effect is moderated by the case load. Similarly, the presence of a larger mass of community health workers—a proxy for public health personnel—tends to be accompanied by a deterioration in negative sentiment.

Overall, the results in this subsection suggest that both public and private health capacity appear to be relevant for firm confidence, although they appear to be more substitutes rather than complements.

4.3. *Government ex post responses and firm confidence*

While we have examined the impact of proactive measures on firm perceptions, it is also important to understand how reactive government measures to address the health consequences of the pandemic alter business confidence. One of the earliest and most demonstrable reactions by governments around the world in limiting the spread of the virus was the institution of *containment* measures. The most dramatic among these—the imposition of lockdowns of varying degrees of severity—is often accompanied by other measures that limit social interactions, such as restrictions on public movements or the enforcement of physical distancing. More *health*-related measures include public information campaigns, a widespread testing regime, and contact tracing of potentially infected individuals.¹⁷ Many countries also engaged in *economic* interventions, such as COVID-19-related debt relief or other forms of income support.

The results from specifications related to such reactive government health interventions, along the lines of Hypothesis 3, are shown in Table 3. The left panel reports results corresponding to an index comprising containment and health measures, while the right panel considers an index of overall government response, which includes containment, health, and economic policies. For each panel, we have retained the three confidence

¹⁷One key intervention for COVID-19 involves vaccines and their rollout. Because our data encompass the initial phase of the crisis (the first three quarters of 2020), and vaccines only began to be available at the end of that year (and even so, for a limited set of countries), we leave the important issue of vaccines and firm confidence to future research.

measures of risk, negative sentiment, and net sentiment, respectively.

We find that more stringent containment measures designed to slow down the pace of the pandemic, as shown in columns (1)–(3), contributed only very tangentially to improved business confidence. While the signs of these coefficients do point in the expected direction—both in terms of lower risk perceptions and reduced negative sentiment—most are statistically indistinguishable from zero, with only the moderating effect on risk entering with marginally significance. Expanding these *ex post* interventions to encompass the overall degree of government response, presented in columns (4)–(6), reveal very similar (limited) effects. This is somewhat surprising, since one might expect business confidence to be heavily influenced by economic measures (the main difference between the two panels), but it is clear that—insofar as a health crisis is concerned—such policies turn out to be distinctly second order. However, the weak effects could perhaps be bolstered by improving informational flow (Fuest *et al.* 2022) or social capital (Ferraresi & Gucciardi 2022), as others have suggested.

Despite our inclusion of these *ex post* measures, our *ex ante* aspects of system capacity remain statistically significant. We do not wish to overplay this result. While the relationship between the two classes of measures is weak,¹⁸ the *quality* of execution of many components of health and containment measures surely do rely on *ex ante* capacity. Nevertheless, it would appear that the old health adage—prevention is better than cure—appears to be applicable here.

Policies closely linked to health infrastructure. In addition to the aggregative indexes considered above, we also look more carefully at responses to three policies that are closely linked to the capacity of the healthcare infrastructure: emergency health care spending (investments in enhancing the capacity of health systems, especially pertaining to quarantine facilities and respiratory support equipment); testing policies (PCR tests for active infection, as opposed to antibody tests for immunity); and contact tracing (the extent to which health authorities reach out to recent contacts following a positive

¹⁸For example, the correlation between the containment & health index and health expenditure share of GDP is very low ($\rho = -0.005$, $p = 0.62$). This result also likely means that the specification is unlikely to exhibit multicollinearity.

diagnosis). Furthermore, testing and tracing are often viewed as key complementary policies that would still need to be continued even after a reasonably successful vaccination campaign (Agarwal & Gopinath 2021). These specifications are documented in the left, middle, and right panels of Table A.6 in the appendix, respectively.

Overall, we find that emergency spending and contact tracing tend to lower perceived risk, while the former also elevates sentiment; both are also moderated by the case load. In terms of efficacy, contact tracing appears to offer much more improvement in business confidence, with coefficients an order of magnitude larger. We do not, however, find any evidence of statistically distinguishable effects of testing on either risk or sentiment.

5. Discussion

5.1. *What role does firm confidence play in mediating the effects of soft infrastructure on firm outcomes?*

By and large, our appreciation of the contribution of environmental factors to firm performance is premised on *direct* effects; for instance, how business cycle downturns, the strength of investor protections, or exposure to trade liberalization alters the investment or production choices of corporations. In contrast, our knowledge of how external factors *indirectly* alter firm outcomes is far more limited. By focusing on the importance of one class soft infrastructure—specifically, in healthcare—for firm perceptions, we are able to provide clear empirical evidence that risk and sentiment should be more seriously considered in theoretical frameworks of firm decisionmaking.

Undoubtedly, part of the difficulty in establishing this contribution has been the challenge of eliciting reliable measures of firm-level confidence, not just in response to general conditions, but ones sufficiently specific to the type of environmental shock of interest. Thankfully, advances in text processing has meant that obtaining such measures are now not only possible, but amenable to quantification and examination. It is through such analytical innovations that we are able to deploy firm metrics that further our understanding of whether health infrastructure matters.

Moreover, there is often an insufficient understanding of the *extent* to which environmental factors matter, especially when the effects of these factors—which apply especially to soft infrastructure—are often invariant, relatively removed from day-to-day firm operations, and likely to alter decisionmaking only at the margin. Our results indicate that such factors not only matter, but matter greatly. Table 1 reveals, for example, that the effects of health system capacity on sentiment is of a similar order of magnitude to familiar firm metrics such as sales and valuation, and the effects on risk perceptions are twice as important as that of major macro factors, like GDP growth.

5.2. *Development status amplifies effects of capacity on confidence*

Nonmarket strategy has traditionally focused on how various aspects of country risk—reflected, typically, by their levels of development—can affect firm performance, especially when it comes to multinational expansion and cross-border investment (Busse & Hefeker 2007; Wisniewski & Pathan 2014), and especially when realized as differences in the quality of institutional governance (Oh *et al.* 2020) or government policy choices (Blake & Moschieri 2017; Lu, Liu, Wright & Filatotchev 2014; Nguyen, Kim & Papanastassiou 2018)

Our study has made it clear that country risk operates through, among other channels, that of firm confidence. We can therefore further our understanding of the effects of healthcare infrastructure on firm risk and sentiment by taking into account a country's level of development. This approach is natural; after all, one of the principal constraints faced by companies operating in an emerging and developing economy (EMDE) context is that they are required to adapt to its riskier and more uncertain operating environment, relative to the more stable and predictable settings found in an advanced economy (AE).

Consequently, development status should alter the strategic choices firms deploy. For example, managerial decisions on market entry must, at some stage, accommodate the possibility that a firm's operations and performance in this market could well be affected by unanticipated health shocks, much like how COVID-19 upended many plans. Similarly, firms may choose nonmarket strategies—such as lobbying legislatures—on the basis of

whether these could pay off in terms of increased expenditures on public healthcare systems.

On the left panel of Table 4, we consider how the level of development may alter the effects of *ex ante* health system capacity (or, conversely, the effects of system capacity contingent on development status) on business confidence. We do so by introducing an indicator variable that classifies a country into either AE or EMDE status, and estimating the respective conditional effects.

In general, the conditional effect of health expenditure on both risk and sentiment appears to be more pronounced in EMDEs, as compared to AEs. We interpret this as reflective of how firms in developing economies already operate in a relatively riskier and more fragile environment, and so when this is compromised by an additional health shock, the detrimental effects on business confidence are correspondingly greater. In both cases, these effects are (again) moderated by the case load.

This result is especially interesting since, as first raised in subsection 4.1, per capita incomes followed an atypical pattern over the course of this pandemic, with higher-income countries performing comparatively more poorly in their *ex post* responses. Thus, *in spite of a weaker national response on average*, firm confidence was nevertheless buffeted less by the health shock in more developed economies. This points to how firms are most likely to consider *initial* conditions within a country in making their strategic choices, consistent with the findings in Hypothesis 1 that stress *ex ante* health system capacity.

5.3. *Firm size amplifies effects of capacity on sentiment but not risk*

It is well-accepted that firm size can mitigate risk and shape their strategic responses. Larger firms are often able to exploit resources unavailable to smaller firms, which strengthens their ability to operate in challenging or unfamiliar business environments; this in turn improves their overall performance (Bonaccorsi 1992). Larger firms are also more likely to be amenable to taking risks, due to heightened firm aspirations (Audia & Greve 2006) or differing incentives among top management (Lim & McCann 2014).

For analogous reasons, larger firms may feel more confident about the ability to nav-

igate an unanticipated health shock. Larger firms often possess superior capacity to develop their risk management capabilities; moreover, firm sizes often correlate with many other unobserved firm characteristics (such as political connections or strong banking relationships) that could be important for the same reason. For instance, since large firms are able to access sources of financing and/or insurance that smaller firms cannot, they may be better able to diversify from known risks. Likewise, larger firms may have superior access to government support that is offered to cushion shocks, through lobbying processes.

The right panel of Table 4 considers this other dimension—firm size—where we might expect effect estimates to systematically differ. We separate our firms into large or small—depending on whether its total assets fall above or below the median—designate an indicator variable accordingly, and repeat the exercise in the previous subsection.

Interestingly, firm size does not appear to matter that much for risk, although it remains deleterious to sentiment, with sentiment responding in a much more sensitive manner in smaller versus larger firms. There is, likewise, a more pronounced moderating effect for smaller firms as the case load increases. We attribute the irrelevance of size for risk to the fact that the riskiness emanating from a poor external health environment are likely to be comparable regardless of size, whereas the sentiment in smaller firms may be more reliant on the mercurial nature of a founder or early-stage CEO—as opposed to the more staid but collected management teams found in larger organizations—hence, small firms may be more materially affected by any deterioration in the health environment.

5.4. *Other sources of heterogeneity*

We also consider two additional dimensions, both related to firm financing capability, where heterogeneity in firms' confidence may present itself: whether the firm has sufficient liquidity (via its *cash holdings/asset* ratio) to weather the pandemic storm, and whether the firm is able to borrow (via its degree of asset *tangibility*) to finance liquidity needs. These are reported in Table A.7 of the appendix. By and large, including interactions with these additional variables do not give rise to substantial differences in the estimated

coefficients of interest.

5.5. *Do exposure and experience with pandemics matter?*

In our baseline specifications in section 4, we had focused on a number of firm and country controls that are standard in the literature, but were not specific to the pandemic experience. This may lead one to question how general our claim—about the importance of soft infrastructure for firm confidence—may be, once we simultaneously control for firm-specific health-related metrics. After all, national health expenditures could cease to be relevant, once we allow for such idiosyncratic measures.

We address this residual concern by introducing two additional variables specific to health shocks: the extent of current exposure of the firm to COVID-19,¹⁹ and its experience with past epidemics (namely H1N1 and SARS). These capture the importance of direct disease exposure in shaping a firm’s perceived confidence, as well as whether firms may have learned from their prior experience with epidemics in the handling of this one.

There is reason to believe that productive learning can and does occur within organizations. After all, one of the central functions of firms is to facilitate low-cost knowledge transfer (Coase 1937) and to serve as repositories of such knowledge (Winter 1988); such learning may then transform into a source of competitive advantage for the firm (Argote & Ingram 2000). To the extent that knowledge transfers occur over time, the firm can be said to exhibit a capacity for “learning” (Huber 1991); it is in this sense that we consider learning about optimal responses to crises as possible within banking institutions. There is empirical evidence that the process of knowledge transfer and retention does occur within firms (Kogut & Zander 1993; Walsh & Ungson 1991), which in turn translates into improved firm performance (Haleblian & Finkelstein 1999; Yelle 1979).

The results of this exercise are reported in Table 5. As might be expected, *contemporaneous* exposure to the pandemic heightens risk perceptions, while diminishing sentiment. Firms that are more exposed to COVID-19 are, understandably, more affected in terms of

¹⁹It is important to recognize that since this indicator is constructed from the frequency of mentions of the disease name (and synonyms) in earnings-call transcripts, its accuracy as a proxy for exposure could be due to either direct exposures (for example, employees catching COVID), or indirect exposures (company profits being hit by reduced demand or supply chain disruptions that result from COVID).

risk and sentiment. Furthermore, we also find some evidence in support of how learning bolsters confidence. Firms that had some prior epidemic experience are associated with lower risk, as well as a lower degree of negative sentiment; this result—that learning can improve firm performance—is broadly consistent with the findings of Haleblan & Finkelstein (1999), albeit in a different context.

It is also worth noting that, in spite of controlling for these idiosyncratic disease-related firm factors, overall health system capacity remains an important influence on business confidence, with both risk and sentiment retaining their effects, as reported in our baseline specification.

6. Conclusion

In this paper, we provide an estimate of the importance of health sector capacity for business confidence, using the incidence of COVID-19 as a quasi-natural experiment. We find that not only is the *ex ante* capacity of the healthcare system important for firms' perceptions of risk and sentiment, both the public and private systems play a complementary role, as do *ex post* government interventions. While the COVID-19 pandemic has often sparked panicked responses from observers, this study has shown that the erosion of sentiment and risk could actually be rational business responses to deteriorating prospects resulting from a worsening external environment.

Our work has also offered some useful takeaways, both for international businesses, and for policymakers. For the former, our findings that firms' confidence in a weak public system can be ameliorated by sound private provision suggest that multinational firms venturing into new markets should consider not just the extant public system, but also whether the private sector may offer alternative support for their operations. For the latter, we demonstrate that the important role that governments play in public goods provision matters not just directly—in terms of societal health and wellbeing—but also *indirectly*, by improving the business climate in which firms operate. This secondary benefit is seldom recognized, but should be seen as an additional important positive

externality that further justifies public investment. By extension, however, our work also underscores the importance of how political economy failures could amplify the challenges faced by smaller firms operating in an emerging market environment.

While we believe that this study offers important insight into the role that environmental factors play in shaping firm perceptions, it is, admittedly, a circumscribed one—limited particularly to understanding healthcare conditions—and so we refrain from claiming that all environmental factors play comparably important (whether more or less) roles. Hence, more studies of this nature—relying on different settings to assess the contribution of other sorts of environmental drivers of business confidence—will be a welcome avenue for future research.

References

- Abel, Martin, Tanya Byker & Jeffrey Carpenter (2021). “Socially Optimal Mistakes? Debiasing COVID-19 Mortality Risk Perceptions and Prosocial Behavior”. *Journal of Economic Behavior & Organization* 183(1) (March): 456–480
- Adler, Matthew D. & Eric A. Posner (2006). *New Foundations of Cost-Benefit Analysis*. Cambridge, MA: Harvard University Press
- Agarwal, Ruchir & Gita Gopinath (2021). “A Proposal to End the COVID-19 Pandemic”. *IMF Staff Discussion Note* 2021/004, Washington, DC: International Monetary Fund
- Aguilar, Pablo, Corinna Ghirelli, Matías Páez & Alberto Urtasun (2021). “Can News Help Measure Economic Sentiment? An Application in COVID-19 Times”. *Economics Letters* 199(1) (February): 109730
- Alford, John & Janine L. O’Flynn (2009). “Making Sense of Public Value: Concepts, Critiques and Emergent Meanings”. *International Journal of Public Administration* 32(3–4) (March): 171–191
- Altig, Dave, Scott Baker, Jose Maria Barrero, Nicholas Bloom, Philip Bunn, Scarlet Chen, Steven J. Davis, Julia Leather, Brent Meyer, Emil Mihaylov, Paul Mizzen, Nicholas Parker, Thomas Renault, Pawel Smietanka & Gregory Thwaites (2020). “Economic Uncertainty Before and During the COVID-19 Pandemic”. *Journal of Public Economics* 191(1) (November): 104274
- Argote, Linda M. & Paul L. Ingram (2000). “Knowledge Transfer: A Basis for Competitive Advantage in Firms”. *Organizational Behavior and Human Decision Processes* 82(1) (May): 150–169
- Ashley, Laura D., Clare McLoughlin, Aslam Monazza, Jakob Engel, Joseph Wales, Shenila Rawal, Richard Batley, Geeta Kingdon, Susan Nicolai & Pauline Rose (2014). “The Role and Impact of Private Schools in Developing Countries: A Rigorous Review of the Evidence”. *Education Rigorous Literature Review*. 2206, London, England: Department for International Development
- Atkinson, Anthony B. & Nicholas H. Stern (1974). “Pigou, Taxation and Public Goods”. *Review of Economic Studies* 41(1) (January): 119–128
- Audia, Pino G. & Henrich R. Greve (2006). “Less Likely to Fail: Low Performance, Firm Size, and Factory Expansion in the Shipbuilding Industry”. *Management Science* 52(1) (January): 83–94
- Auray, Stéphane & Aurélien Eyquem (2020). “The Macroeconomic Effects of Lockdown Policies”. *Journal of Public Economics* 190(1) (October): 104260

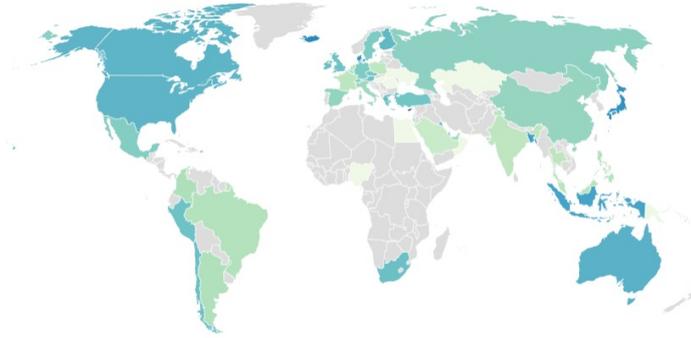
- Baker, Scott R., Robert A. Farrokhnia, Steffen Meyer, Michaela Pagel & Constantine Yannelis (2020). "How Does Household Spending Respond to an Epidemic? Consumption during the 2020 COVID-19 Pandemic". *The Review of Asset Pricing Studies* 10(4) (December): 834–862
- Baldwin, Richard E. & Beatrice Weder di Mauro (editors) (2020a). *Economics in the Time of COVID-19*. London, England: CEPR Press
- Baldwin, Richard E. & Beatrice Weder di Mauro (editors) (2020b). *Mitigating the COVID Economic Crisis: Act Fast and Do Whatever It Takes*. London, England: CEPR Press
- Bartik, Alexander W., Marianne Bertrand, Zoe Cullen, Edward L. Glaeser, Michael Luca & Christopher Stanton (2020). "The Impact of COVID-19 on Small Business Outcomes and Expectations". *Proceedings of the National Academy of Sciences* 117(30) (July 28): 17656–17666
- Basu, Sanjay, Jason Andrews, Sandeep Kishore, Rajesh Panjabi & David Stuckler (2012). "Comparative Performance of Private and Public Healthcare Systems in Low- and Middle-Income Countries: A Systematic Review". *PLoS Medicine* 9(6) (June): e1001244
- Benton, Richard A., J. Adam Cobb & Timothy Werner (2022). "Firm Partisan Positioning, Polarization, and Risk Communication: Examining Voluntary Disclosures on COVID-19". *Strategic Management Journal* 43(4) (April): 697–723
- Bergstrom, Theodore C., Lawrence E. Blume & Hal R. Varian (1986). "On the Private Provision of Public Goods". *Journal of Public Economics* 29(1) (February): 25–49
- Binder, Carola (2020). "Coronavirus Fears and Macroeconomic Expectations". *Review of Economics and Statistics* 102(4) (October): 721–730
- Blake, Daniel J. & Caterina Moschieri (2017). "Policy Risk, Strategic Decisions and Contagion Effects: Firm-Specific Considerations". *Strategic Management Journal* 38(3) (March): 732–750
- Bloom, Nicholas, Robert S Fletcher & Ethan Yeh (2021). "The Impact of COVID-19 on US Firms". *NBER Working Paper* 28314, Cambridge, MA: National Bureau of Economic Research
- Boardman, Anthony E., Anthony E. Greenberg, Anthony E. Vining & David L. Weimer (2018). *Cost-Benefit Analysis: Concepts and Practice*. New York, NY: Prentice-Hall
- Bol, Damien, Marco Giani, André Blais & Peter John Loewen (2021). "The Effect of COVID-19 Lockdowns on Political Support: Some Good News for Democracy?" *European Journal of Political Research* 60(2) (May): 497–505
- Bonaccorsi, Andrea (1992). "On the Relationship Between Firm Size and Export Intensity". *Journal of International Business Studies* 23(4) (December): 605–635
- Borino, Floriana, Eric Carlson, Valentina Rollo & Olga Solleder (2021). "International Firms and COVID-19: Evidence from a Global Survey". *Covid Economics* 75, London, England: Centre for Economic Policy Research
- Brodeur, Abel, Nikolai Cook & Taylor Wright (2021). "On the Effects of COVID-19 Safer-at-Home Policies on Social Distancing, Car Crashes and Pollution". *Journal of Environmental Economics and Management* 106(1) (March): 102427
- Brook, Penelope J. & Timothy C. Irwin (editors) (2003). *Infrastructure for Poor People : Public Policy for Private Provision*. Washington, DC: The World Bank
- Brück, Tilman, Fernanda Llussá & José A. Tavares (2011). "Entrepreneurship: The Role of Extreme Events". *European Journal of Political Economy* 27(1) (December): S78–S88
- Buchheim, Lukas, Jonas Doern, Carla Krolage & Sebastian Link (2020). "Firm-Level Expectations and Behavior in Response to the COVID-19 Crisis". *CESifo Working Paper Series* 8304, Munich, Bavaria: CESifo
- Bui, Dzung, Lena Dräger, Bernd Hayo & Giang Nghiem (2022). "Macroeconomic Expectations and Consumer Sentiment During the COVID-19 Pandemic: The Role of Others' Beliefs". *European Journal of Political Economy* p. 102295
- Busse, Matthias & Carsten Hefeker (2007). "Political Risk, Institutions and Foreign Direct Investment". *European Journal of Political Economy* 23(2) (June): 397–415

- Caligiuri, Paula, Helen De Cieri, Dana Minbaeva, Alain Verbeke & Angelika Zimmermann (2020). “International HRM Insights for Navigating the COVID-19 Pandemic: Implications for Future Research and Practice”. *Journal of International Business Studies* 51(5) (July): 697–713
- Carson, Richard T. (2000). “Contingent Valuation: A User’s Guide”. *Environmental Science and Technology* 34(8) (Apr): 1413–1418
- Cevik, Serhan & Fedor Miryugin (2022). “Death and Taxes: Does Taxation Matter for Firm Survival?” *Economics & Politics* 34(1) (March): 92–112
- Champ, Patricia A., Richard C. Bishop, Thomas C. Brown & Daniel W. McCollum (1997). “Using Donation Mechanisms to Value Nonuse Benefits from Public Goods”. *Journal of Environmental Economics and Management* 33(2) (June): 151–162
- Chaudhury, Nazmul, Jeffrey S. Hammer, Michael R. Kremer, Karthik Muralidharan & F. Halsey Rogers (2006). “Missing in Action: Teacher and Health Worker Absence in Developing Countries”. *Journal of Economic Perspectives* 20(1) (Winter): 91–116
- Chinn, Menzie D. & Hiro Ito (2008). “A New Measure of Financial Openness”. *Journal of Comparative Policy Analysis* 10(3) (September): 309–322
- Claeson, Mariam & Stefan Hanson (2021). “COVID-19 and the Swedish Enigma”. *The Lancet* 397(10271) (January): P259–261
- Coase, Ronald H. (1937). “The Nature of the Firm”. *Economica* 4(16) (November): 386–405
- Coutiño, Alfredo & Mark M. Zandi (2021). “Global Loss of Production Capacity Caused by the COVID-19 Pandemic”. *Journal of Policy Modeling* 43(3) (May–June): 493–502
- Crossley, Thomas F., Paul Fisher & Hamish Low (2021). “The Heterogeneous and Regressive Consequences of COVID-19: Evidence from High Quality Panel Data”. *Journal of Public Economics* 193(1) (January): 104334
- Cutler, David M. (2002). “Health Care and the Public Sector”. In Alan J. Auerbach & Martin S. Feldstein (editors), *Handbook of Public Economics*, volume 4 of *Handbook of Public Economics*, pp. 2143–2243. Amsterdam, the Netherlands: North-Holland
- Daehler, Timo B., Joshua Aizenman & Yothin Jinjarak (2021). “Emerging Markets Sovereign CDS Spreads During COVID-19: Economics versus Epidemiology News”. *Economic Modelling* 100 (July): 105504
- Dahlby, Bev (1998). “Progressive Taxation and the Social Marginal Cost of Public Funds”. *Journal of Public Economics* 67(1) (January): 105–122
- Davis, Steven J., Dingqian Liu & Xuguang Simon Sheng (2021). “Stock Prices, Lockdowns, and Economic Activity in the Time of Coronavirus”. *NBER Working Paper* 28320, Cambridge, MA: National Bureau of Economic Research
- De Mel, Suresh, David McKenzie & Christopher Woodruff (2012). “Enterprise Recovery Following Natural Disasters”. *Economic Journal* 122(559) (March): 64–91
- Demmou, Lilas, Sara Calligaris, Guido Franco, Dennis Dlugosch, Müge Adalet McGowan & Sahra Sakha (2021). “Insolvency and Debt Overhang Following the COVID-19 Outbreak: Assessment of Risks and Policy Responses”. *OECD Economics Department Working Papers* 1651, Paris, France: Organisation for Economic Cooperation and Development
- Demsetz, Harold (1970). “The Private Production of Public Goods”. *Journal of Law and Economics* 13(2) (October): 293–306
- Diepeveen, Stephanie, Tom Ling, Marc Suhrcke, Martin Roland & Theresa M. Marteau (2013). “Public Acceptability of Government Intervention to Change Health-Related Behaviours: A Systematic Review and Narrative Synthesis”. *BMC Public Health* 13 (August): 756
- Djankov, Simeon, Rafael La Porta, Florencio López-de Silanes & Andrei Shleifer (2001). “The Regulation Of Entry”. *Quarterly Journal of Economics* 117(1) (February): 1–37
- Djankov, Simeon, Rafael La Porta, Florencio López-de Silanes & Andrei Shleifer (2003). “Courts”. *Quarterly Journal of*

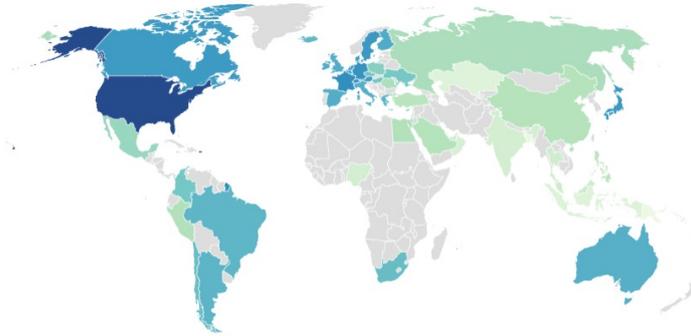
- Economics* 118(2) (May): 453–517
- Doh, Jonathan P. & Ravi Ramamurti (2003). “Reassessing Risk in Developing Country Infrastructure”. *Long Range Planning* 36(4) (August): 337–353
- Driscoll, John C. & Aart C. Kraay (1998). “Consistent Covariance Matrix Estimation With Spatially Dependent Panel Data”. *Review of Economics and Statistics* 80(4) (November): 549–560
- Dryhurst, Sarah, Claudia R. Schneider, John Kerr, Alexandra L.J. Freeman, Gabriel Recchia, Anne Marthe van der Bles, David Spiegelhalter & Sander van der Linden (2020). “Risk Perceptions of COVID-19 Around the World”. *Journal of Risk Research* 23(7–8) (July–August): 994–1006
- Eichengreen, Barry, Cevat Giray Aksoy & Orkun Saka (2021). “Revenge of the Experts: Will COVID-19 Renew or Diminish Public Trust in Science?” *Journal of Public Economics* 193(1) (January): 104343
- Fairlie, Robert W. (2020). “The Impact of COVID-19 on Small Business Owners: Evidence from the First Three Months After Widespread Social-Distancing Restrictions”. *Journal of Economics & Management Strategy* 29(4) (Winter): 727–740
- Fareed, Fozan & Bastiaan Overvest (2021). “Business Dynamics During the COVID Pandemic”. *CPB COVID-19 Publication* 1, The Hague, Netherlands: Netherlands Bureau for Economic Policy Analysis
- Ferraresi, Massimiliano & Gianluca Gucciardi (2022). “Political Alignment, Centralisation, and the Sense of Government Unpreparedness During the COVID-19 Pandemic”. *European Journal of Political Economy* 73(1) (June): 102144
- Flammer, Caroline & Ioannis Ioannou (2021). “Strategic management during the financial crisis: How firms adjust their strategic investments in response to credit market disruptions”. *Strategic Management Journal* 42(7) (July): 1275–1298
- Forsythe, Eliza, Lisa B. Kahn, Fabian Lange & David Wiczer (2020). “Labor Demand in the Time of COVID-19: Evidence from Vacancy Postings and UI Claims”. *Journal of Public Economics* 189(1) (September): 104238
- Fuest, Clemens, Lea Immel, Florian Neumeier & Andreas Peichl (2022). “Does Expert Information Affect Citizens’ Attitudes Toward Corona Policies? Evidence from Germany”. *European Journal of Political Economy* (forthcoming): 102350. URL <https://www.sciencedirect.com/science/article/pii/S0176268022001537>
- Gahvari, Firouz G. (2006). “On the Marginal Cost of Public Funds and the Optimal Provision of Public Goods”. *Journal of Public Economics* 90(6) (August): 1251–1262
- Gande, Amar, Kose John, Vinay B. Nair & Lemma W. Senbet (2020). “Taxes, Institutions, and Innovation: Theory and International Evidence”. *Journal of International Business Studies* 51(9) (December): 1413–144
- Giambona, Erasmo, John R. Graham & Campbell R. Harvey (2017). “The Management of Political Risk”. *Journal of International Business Studies* 45(4) (May): 523–533
- Gormley, Todd A. & David A. Matsa (2014). “Common Errors: How To (and Not To) Control for Unobserved Heterogeneity”. *Review of Financial Studies* 27(2) (February): 617–661
- Guthrie, Graeme (2006). “Regulating Infrastructure: The Impact on Risk and Investment”. *Journal of Economic Literature* 44(4) (December): 925–972
- Hale, Thomas, Jessica Anania, Noam Angrist, Thomas Boby, Emily Cameron-Blake, Martina Di Folco, Lucy Ellen, Rafael Goldszmidt, Laura Hallas, Beatriz Kura, Maria Lucino, Saptarshi Majumda, Radhika Nagesh, Anna Petherick, Toby Phillips, Helen Tatlow, Samuel Webster, Andrew wood & Yuxi Zhang (2020). “Variation in Government Responses to COVID-19”. *Blavatnik School of Government Working Paper* BSG-WP-2020/032, Oxford, England: University of Oxford
- Haleblian, Jerayr J. & Sydney Finkelstein (1999). “The Influence of Organizational Acquisition Experience on Acquisition Performance: A Behavioral Learning Perspective”. *Administrative Science Quarterly* 44(1) (March): 29–56
- Hassan, Tarek Alexander, Stephan Hollander, Laurence van Lent & Ahmed Tahoun (2020). “Firm-Level Exposure to Epidemic Diseases: COVID-19, SARS, and H1N1”. *NBER Working Paper* 26971, Cambridge, MA: National Bureau of Economic Research

- Hensvik, Lena, Thomas Le Barbanchon & Roland Rathelot (2021). "Job Search During the COVID-19 Crisis". *Journal of Public Economics* 194(1) (February): 104349
- Holburn, Guy L.F. & Bennet A. Zelter (2010). "Political Capabilities, Policy Risk, and International Investment Strategy: Evidence from the Global Electric Power Generation Industry". *Strategic Management Journal* 31(12) (December): 1290–1315
- Hoseini, Mohammad & Abolmohsen Valizadeh (2021). "The Effect of COVID-19 Lockdown and the Subsequent Reopening on Consumption in Iran". *Review of Economics of the Household* 19(2) (June): 373–397
- Huber, George P. (1991). "Organizational Learning: The Contributing Processes and the Literatures". *Organization Science* 2(1) (February): 88–115
- Jaravel, Xavier & Martin O'Connell (2020). "Real-Time Price Indices: Inflation Spike and Falling Product Variety During the Great Lockdown". *Journal of Public Economics* 191(1) (November): 104270
- Kaplan, Robert S. & David P. Norton (1992). "The Balanced Scorecard—Measures that Drive Performance". *Harvard Business Review* 1992(1) (January): 71–79
- Kaufmann, Daniel, Aart C. Kraay & Massimo Mastruzzi (2011). "The Worldwide Governance Indicators: Methodology and Analytical Issues". *Hague Journal on the Rule of Law* 3(2) (September): 220–246
- Kogut, Bruce & Udo Zander (1993). "Knowledge of the Firm and the Evolutionary Theory of the Multinational Corporation". *Journal of International Business Studies* 24(4) (Fourth Quarter): 625–645
- Lam, W. Raphael, Markus H. Rodlauer & Alfred Schipke (editors) (2017). *Modernizing China: Investing in Soft Infrastructure*. Washington, DC: International Monetary Fund
- Lim, Elizabeth N.K. & Brian T. McCann (2014). "Performance Feedback and Firm Risk Taking: The Moderating Effects of CEO and Outside Director Stock Options". *Organization Science* 25(1) (January–February): 262–282
- Liu, Xuepeng, Emanuel Ornelas & Huimin Shi (2021). "The Trade Impact of the Covid-19 Pandemi". *CEPR Discussion Paper* 16201, London, England: Centre for Economic Policy Research
- Lu, Jiangyong, Xiaohui Liu, Mike Wright & Igor Filatotchev (2014). "International Experience and FDI Location Choices of Chinese Firms: The Moderating Effects of Home Country Government Support and Host Country Institutions". *Journal of International Business Studies* 45(4) (May): 428–449
- Marks, Norman (2015). *World-Class Risk Management*. Scotts Valley, CA: CreateSpace
- Miller, Kent D. (1993). "Industry and Country Effects on Managers' Perceptions of Environmental Uncertainties". *Journal of International Business Studies* 24(4) (December): 693–714
- Mischke, Jan, Jonathan Woetzel, Sven Smit, James Manyika, Sree Ramaswamy, Michael Birshan, Eckart Windhagen, Jörg Schubert, Solveigh Hieronimus, Guillaume Dagherret & Marc Canal Nogue (2021). "Pathways for Productivity and Growth After the COVID-19 Crisis". *MGI Special Report*, San Francisco, CA: McKinsey Global Institute
- Neumann, James E., Jacqueline C. Willwerth, Jeremy A. Martinich, James R. McFarland, Marcus C. Sarofim & Gary W. Yohe (2020). "Climate Damage Functions for Estimating the Economic Impacts of Climate Change in the United States". *Review of Environmental Economic Policy* 14(1) (January): 25–43
- Nguyen, Quang, Trang Kim & Marina Papanastassiou (2018). "Policy Uncertainty, Derivatives Use, and Firm-Level FDI". *Journal of International Business Studies* 49(1) (January): 96–126
- Oh, Chang Hoon, Daniel M. Shapiro, Shuna Shu Ham Ho & Jiyoung Shin (2020). "Location Matters: Valuing Firm-Specific Nonmarket Risk in the Global Mining Industry". *Strategic Management Journal* 41(7) (July): 1210–1244
- Oxelheim, Lars C. & Clas G. Wihlborg (2005). *Corporate Performance and the Exposure to Macroeconomic Fluctuations*. Stockholm, Sweden: Norstedts Akademiska Förlag
- Parsons, George R. (2003). "The Hedonic Method". In Patricia A. Champ, Kevin J. Boyle & Thomas C. Brown (editors), *A Primer on Nonmarket Valuation*, pp. 331–393. Dordrecht, the Netherlands: Springer
- Petersen, Mitchell A (2009). "Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches". *Review of Financial Studies* 22(1) (January): 435–480

- Picchio, Matteo & Raffaella Santolini (2022). "The COVID-19 Pandemic's Effects on Voter Turnout". *European Journal of Political Economy* 73(1) (June): 102161
- Poterba, James M. (1996). "Government Intervention in the Markets for Education and Health Care: How and Why?" In Victor R. Fuchs (editor), *Individual and Social Responsibility: Child Care, Education, Medical Care, and Long-Term Care in America*, pp. 277–308. Chicago, IL: University of Chicago Press
- Purda, Lynnette D. (2008). "Risk Perception and the Financial System". *Journal of International Business Studies* 39(7) (October): 1178–1196
- Richard, Pierre J., Timothy M. Devinney, George S. Yip & Gerry Johnson (2009). "Measuring Organizational Performance: Towards Methodological Best Practice". *Journal of Management* 35(3) (June): 718–804
- Samuelson, Paul A. (1954). "The Pure Theory of Public Expenditure". *Review of Economics and Statistics* 36(4) (November): 387–389
- Schaaf, Marta, Caitlin Warthin, Lynn Freedman & Stephanie M. Topp (2020). "The Community Health Worker as Service Extender, Cultural Broker and Social Change Agent: A Critical Interpretive Synthesis of Roles, Intent and Accountability". *BMJ Global Health* 5(6) (June): e002296
- Singh, Satwinder, Tamer K. Darwish & Kristina Potočnik (2016). "Measuring Organizational Performance: A Case for Subjective Measures". *British Journal of Management* 27(1) (January): 214–224
- Stiglitz, Joseph E. & Partha S. Dasgupta (1971). "Differential Taxation, Public Goods, and Economic Efficiency". *Review of Economic Studies* 38(2) (April): 151–174
- Taylor, Laura O. (2003). "The Hedonic Method". In Patricia A. Champ, Kevin J. Boyle & Thomas C. Brown (editors), *A Primer on Nonmarket Valuation*, pp. 331–393. Dordrecht, the Netherlands: Springer
- Vigo, Daniel, Graham Thornicroft & Oye Gureje (2020). "The Differential Outcomes of Coronavirus Disease 2019 in Low- and Middle-Income Countries vs High-Income Countries". *JAMA Psychiatry* 77(12) (December): 1207–1208
- Walsh, James P. & Gerardo Rivera Ungson (1991). "Organizational Memory". *Academy of Management Review* 16(1) (January): 57–91
- Winter, Sidney G. (1988). "On Coase, Competence, and the Corporation". *Journal of Law, Economics, and Organization* 4(1) (Spring): 163–180
- Wisniewski, Tomasz P. & Saima K. Pathan (2014). "Political Environment and Foreign Direct Investment: Evidence from OECD Countries". *European Journal of Political Economy* 36(1) (December): 13–23
- World Bank (2020). *Doing Business 2020: Comparing Business Regulation in 190 Economies*. Washington, DC: The World Bank
- Yelle, Louis E. (1979). "The Learning Curve: Historical Review and Comprehensive Survey". *Decision Sciences* 10(2) (April): 302–328

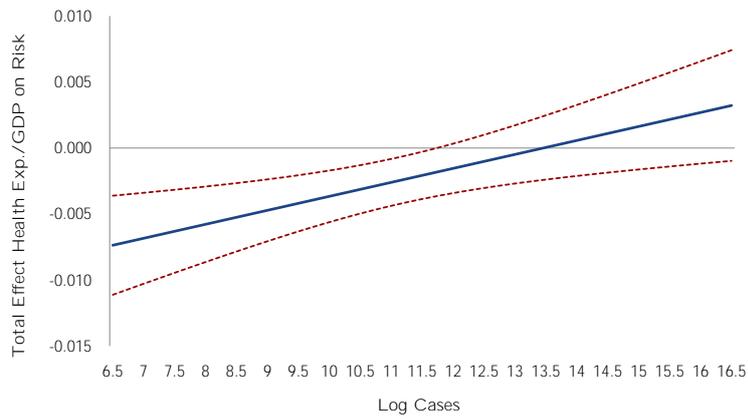


(a) COVID-19 Risk



(b) Health Expenditure/GDP

Figure 1: The map shows the global geographic distribution of perceived COVID-19 risk by firms (top panel) and health expenditures as a share of GDP (bottom panel), averaged across country-year observations. Darker shades indicate greater perceived risk (health expenditure), while gray shading indicates that no data were available. Visual inspection suggests that risks were perceived to be highest for North America, as well as Chile, Indonesia, and Japan, while health system capacity is greatest in advanced economies, especially in Australia, Japan, the United States, and Western Europe.



Source: Authors' calculations.

Figure 2: The figure represents the total effect of health system capacity on firm perceptions of COVID risk, as the number of cases rise. The moderating effect of (the logarithm of) cases is allowed to range from between 6.5 and 16.5. The solid blue line represents the total effect, and the dashed red lines are the 95 percent confidence intervals. While the total effect remains negative for around two thirds of the lower range of cases, after around 13.4 for Log Cases, the total effect turns positive, although this never turns statistically significant.

Table 1: Health spending and firms' COVID-19 risk & sentiment

The dependent variable in columns (1)–(2) is COVID *Risk*, in columns (3)–(4) is COVID *Negative Sentiment*, and in columns (5)–(6) is COVID *Net Sentiment*. The health expenditure variable is demeaned to aid in interpretation of the interaction terms. Additional firm and country controls are defined in the text and Table A.1. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level. Robust heteroskedasticity-consistent standard errors clustered at the firm level are presented below the estimated coefficients. Country-specific trends capture any country-level quarterly trends in the variables.

	COVID <i>Risk</i>		COVID <i>Neg. Sentiment</i>		COVID <i>Net Sentiment</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Health Exp./GDP</i>	-0.002** (0.001)	-0.015*** (0.005)	0.001 (0.003)	-0.048*** (0.016)	0.000 (0.003)	0.032** (0.015)
<i>Health Exp./GDP</i> × <i>Log Cases</i>		0.001*** (0.000)		0.004*** (0.001)		-0.003** (0.001)
<i>Log Cases</i>	0.002 (0.003)	0.008** (0.004)	0.01 (0.008)	0.033*** (0.011)	0.007 (0.007)	-0.008 (0.011)
<i>Log Sales</i>	-0.002* (0.001)	-0.002* (0.001)	-0.018*** (0.004)	-0.018*** (0.004)	0.011*** (0.003)	0.011*** (0.003)
<i>Leverage</i>	-0.002 (0.002)	-0.002 (0.002)	0.009 (0.005)	0.008 (0.005)	0.000 (0.005)	0.000 (0.005)
<i>Market/Book</i>	0.000 (0.000)	0.000 (0.000)	-0.004*** (0.001)	-0.004*** (0.001)	0.003*** (0.001)	0.003*** (0.001)
<i>Cash/Assets</i>	-0.007 (0.011)	-0.007 (0.011)	-0.174*** (0.041)	-0.173*** (0.041)	0.124*** (0.036)	0.123*** (0.036)
<i>Tangibility</i>	0.000 (0.009)	0.000 (0.009)	-0.123*** (0.033)	-0.123*** (0.033)	0.048* (0.029)	0.048* (0.029)
<i>Log GDP per capita</i>	0.000 (0.006)	0.008 (0.007)	-0.036* (0.019)	-0.008 (0.021)	-0.011 (0.018)	-0.03 (0.020)
<i>GDP growth (3-yr avg.)</i>	-0.004 (0.003)	-0.008** (0.003)	0.004 (0.010)	-0.009 (0.011)	-0.001 (0.009)	0.008 (0.010)
Firm-quarter obs.	11,544	11,544	11,544	11,544	11,544	11,544
Country-specific trends	Yes	Yes	Yes	Yes	Yes	Yes
Industry-quarter FEs	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.099	0.099	0.283	0.283	0.113	0.114

Table 2: Government and private health spending and availability of doctors & CHWs: Firms' COVID-19 risk & sentiment

The dependent variable in columns (1) and (4) is COVID *Risk*, in columns (2) and (5) is COVID *Negative Sentiment*, and in columns (3) and (6) is COVID *Net Sentiment*. The health expenditure variables are demeaned to aid in interpretation of the interaction terms. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level. Robust heteroskedasticity-consistent standard errors clustered at the firm level are presented below the estimated coefficients. Country-specific trends capture any country-level quarterly trends in the variables.

	<i>Health exp. sample</i>			<i>CHW and doctors sample</i>		
	<i>Risk</i>	<i>Neg. Sent.</i>	<i>Net Sent.</i>	<i>Risk</i>	<i>Neg. Sent.</i>	<i>Net Sent.</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Govt. Health Exp./GDP</i>	-0.011* (0.006)	-0.052*** (0.020)	0.037* (0.019)			
<i>Govt. Health Exp./GDP</i> \times <i>Log Cases</i>	0.001 (0.001)	0.005** (0.002)	-0.004** (0.002)			
<i>Pvt. Health Exp./GDP</i>	-0.021** (0.009)	-0.042 (0.029)	0.021 (0.028)			
<i>Pvt. Health Exp./GDP</i> \times <i>Log Cases</i>	0.002* (0.001)	0.004 (0.003)	-0.002 (0.003)			
<i>CHW per 1,000</i>				-0.626** (0.265)	-1.659*** (0.630)	1.335* (0.712)
<i>CHW per 1,000</i> \times <i>Log Cases</i>				0.060*** (0.023)	0.082 (0.061)	-0.061 (0.062)
<i>Log Cases</i>	0.009** (0.004)	0.032** (0.012)	-0.006 (0.012)	-0.002 (0.008)	0.026 (0.020)	-0.001 (0.021)
<i>Doctors per 1,000</i>				-0.173*** (0.059)	-0.531*** (0.156)	0.378** (0.164)
<i>Doctors per 1,000</i> \times <i>Log Cases</i>				0.020*** (0.007)	0.054*** (0.019)	-0.038* (0.020)
<i>Log Sales</i>	-0.002* (0.001)	-0.018*** (0.004)	0.011*** (0.003)	-0.002 (0.001)	-0.023*** (0.004)	0.017*** (0.004)
<i>Leverage</i>	-0.002 (0.002)	0.008 (0.005)	0.000 (0.005)	-0.001 (0.002)	0.011 (0.007)	-0.005 (0.006)
<i>Market/Book</i>	0.000 (0.000)	-0.004*** (0.001)	0.003*** (0.001)	0.000 (0.000)	-0.003** (0.001)	0.002* (0.001)
<i>Cash/Assets</i>	-0.007 (0.011)	-0.173*** (0.041)	0.123*** (0.036)	-0.008 (0.014)	-0.180*** (0.048)	0.117*** (0.042)
<i>Tangibility</i>	0.000 (0.009)	-0.123*** (0.033)	0.048* (0.029)	-0.002 (0.012)	-0.089** (0.042)	0.028 (0.037)
<i>Log GDP per capita</i>	0.002 (0.008)	-0.004 (0.026)	-0.03 (0.025)	0.038* (0.022)	0.137** (0.063)	-0.115* (0.065)
<i>GDP growth (3-yr avg.)</i>	-0.006** (0.003)	-0.009 (0.011)	0.006 (0.010)	0.024 (0.015)	0.173*** (0.043)	-0.122*** (0.046)
Firm-quarter obs.	11,544	11,544	11,544	7,559	7,559	7,559
Country-specific trends	Yes	Yes	Yes	Yes	Yes	Yes
Industry-quarter FEs	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.099	0.283	0.113	0.111	0.287	0.102

Table 3: *Ex post* government responses to COVID-19 and firms' risk & sentiment

The dependent variable in columns (1) and (4) is COVID *Risk*, in columns (2) and (5) is COVID *Negative Sentiment*, and in columns (3) and (6) is COVID *Net Sentiment*. The containment & health measure and overall government response variables are demeaned to aid in interpretation of the interaction terms. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level. Robust heteroskedasticity-consistent standard errors clustered at the firm level are presented below the estimated coefficients. Country-specific trends capture any country-level quarterly trends in the variables.

	<i>Containment & health score</i>			<i>Overall govt. response score</i>		
	<i>Risk</i>	<i>Neg. Sent.</i>	<i>Net Sent.</i>	<i>Risk</i>	<i>Neg. Sent.</i>	<i>Net Sent.</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Log Containment</i>	-0.035 (0.023)	-0.079 (0.070)	0.040 (0.065)			
<i>Log Containment</i> \times <i>Log Cases</i>	0.005* (0.002)	0.006 (0.007)	0.000 (0.007)			
<i>Log Govt. Response</i>				-0.037 (0.023)	-0.071 (0.069)	0.04 (0.064)
<i>Log Govt. Response</i> \times <i>Log Cases</i>				0.004* (0.002)	0.005 (0.007)	0.000 (0.006)
<i>Health Exp./GDP</i>	-0.008 (0.005)	-0.041** (0.016)	0.035** (0.016)	-0.008 (0.005)	-0.042** (0.016)	0.037** (0.016)
<i>Health Exp./GDP</i> \times <i>Log Cases</i>	0.001* (0.000)	0.004*** (0.001)	-0.003** (0.001)	0.001* (0.000)	0.004*** (0.001)	-0.003** (0.001)
<i>Log Cases</i>	0.007* (0.004)	0.034*** (0.012)	-0.012 (0.011)	0.007* (0.004)	0.034*** (0.012)	-0.012 (0.012)
<i>Log Sales</i>	-0.002* (0.001)	-0.018*** (0.004)	0.011*** (0.003)	-0.002* (0.001)	-0.018*** (0.004)	0.011*** (0.003)
<i>Leverage</i>	-0.002 (0.002)	0.008 (0.005)	0.000 (0.005)	-0.002 (0.002)	0.008 (0.005)	0.000 (0.005)
<i>Market/Book</i>	0.000 (0.000)	-0.004*** (0.001)	0.003*** (0.001)	0.000 (0.000)	-0.004*** (0.001)	0.003*** (0.001)
<i>Cash/Assets</i>	-0.007 (0.011)	-0.173*** (0.041)	0.123*** (0.036)	-0.007 (0.011)	-0.173*** (0.041)	0.123*** (0.036)
<i>Tangibility</i>	0.000 (0.009)	-0.123*** (0.033)	0.048* (0.029)	0.000 (0.009)	-0.123*** (0.033)	0.048* (0.029)
<i>Log GDP per capita</i>	0.000 (0.008)	-0.018 (0.026)	-0.030 (0.024)	0.000 (0.008)	-0.016 (0.026)	-0.031 (0.025)
<i>GDP growth (3-yr avg.)</i>	-0.006* (0.003)	-0.004 (0.011)	0.005 (0.010)	-0.005* (0.003)	-0.004 (0.011)	0.005 (0.010)
Firm-quarter obs.	11,544	11,544	11,544	11,544	11,544	11,544
Country-specific trends	Yes	Yes	Yes	Yes	Yes	Yes
Industry-quarter FEs	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.099	0.283	0.113	0.099	0.283	0.113

Table 4: *Ex ante* health spending and firms' COVID-19 risk & sentiment: development status and firm size

The dependent variable in columns (1) and (4) is COVID *Risk*, in columns (2) and (5) is COVID *Negative Sentiment*, and in columns (3) and (6) is COVID *Net Sentiment*. The health expenditure variable is demeaned to aid in interpretation of the interaction terms. The coefficients for the “*AE*” and “*EMDE*” represent the effect of the variables for firms in advanced economies and emerging markets and developing economies, respectively. The coefficients for the “*Small*” and “*Large*” represent the effect for firms that fall below and above the median values of total assets, respectively. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level. Robust heteroskedasticity-consistent standard errors clustered at the firm level are presented below the estimated coefficients. Country-specific trends capture any country-level quarterly trends in the variables. Firm and country controls comprise variables reported in Table 1.

	<i>AE vs. EMDE countries</i>			<i>Large vs. small firms</i>		
	<i>Risk</i>	<i>Neg. Sent.</i>	<i>Net Sent.</i>	<i>Risk</i>	<i>Neg. Sent.</i>	<i>Net Sent.</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Health Exp./GDP</i>	-0.012**	-0.039**	0.020			
× <i>AE</i>	(0.005)	(0.018)	(0.017)			
<i>Log Cases</i>	0.017**	0.090***	-0.036			
× <i>AE</i>	(0.008)	(0.028)	(0.027)			
<i>Health Exp./GDP</i>	0.002**	0.010***	-0.006*			
× <i>Log Cases</i> × <i>AE</i>	(0.001)	(0.004)	(0.003)			
<i>Health Exp./GDP</i>	-0.024***	-0.091***	0.047*			
× <i>EMDE</i>	(0.009)	(0.029)	(0.028)			
<i>Log Cases</i>	0.010**	0.043***	-0.014			
× <i>EMDE</i>	(0.004)	(0.012)	(0.012)			
<i>Health Exp./GDP</i>	0.002**	0.009***	-0.004			
× <i>Log Cases</i> × <i>EMDE</i>	(0.001)	(0.003)	(0.003)			
<i>Health Exp./GDP</i>				-0.015***	-0.040**	0.027*
× <i>Large</i>				(0.005)	(0.016)	(0.016)
<i>Log Cases</i>				0.007**	0.029***	-0.005
× <i>Large</i>				(0.004)	(0.011)	(0.011)
<i>Govt. Health Exp./GDP</i>				0.001**	0.004**	-0.002*
× <i>Log Cases</i> × <i>Large</i>				(0.000)	(0.001)	(0.001)
<i>Health Exp./GDP</i>				-0.015***	-0.055***	0.036**
× <i>Small</i>				(0.005)	(0.016)	(0.015)
<i>Log Cases</i>				0.008**	0.033***	-0.008
× <i>Small</i>				(0.004)	(0.011)	(0.011)
<i>Govt. Health Exp./GDP</i>				0.001***	0.005***	-0.003**
× <i>Log Cases</i> × <i>Small</i>				(0.000)	(0.001)	(0.001)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-quarter obs.	11,544	11,544	11,544	11,544	11,544	11,544
Country-specific trends	Yes	Yes	Yes	Yes	Yes	Yes
Industry-quarter FEs	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.099	0.284	0.114	0.1	0.283	0.113

Table 5: Health spending and firms' COVID-19 risk & sentiment: Robustness to COVID-19 exposure and prior epidemic exposure

The dependent variable in columns (1)–(2) is COVID *Risk*, in columns (3)–(4) is COVID *Negative Sentiment*, and in columns (5)–(6) is COVID *Net Sentiment*. The health expenditure variable is demeaned to aid in interpretation of the interaction terms. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level. Robust heteroskedasticity-consistent standard errors clustered at the firm level are presented below the estimated coefficients. Country-specific trends capture any country-level quarterly trends in the variables. Firm and country controls comprise variables reported in Table 1.

	<i>Risk</i>		<i>Neg. Sentiment</i>		<i>Net Sentiment</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Health Exp./GDP</i>	-0.002** (0.001)	-0.013*** (0.005)	0.001 (0.003)	-0.030** (0.012)	0.000 (0.003)	0.025* (0.014)
<i>Health Exp./GDP</i> × <i>Log Cases</i>		0.001** (0.000)		0.003** (0.001)		-0.002* (0.001)
<i>Log Cases</i>	-0.002 (0.002)	0.003 (0.003)	-0.015*** (0.006)	-0.001 (0.008)	0.018** (0.007)	0.006 (0.010)
<i>COVID Exposure</i>	0.055*** (0.002)	0.054*** (0.002)	0.353*** (0.006)	0.353*** (0.006)	-0.149*** (0.007)	-0.149*** (0.007)
<i>Prior Pandemic Exposure</i>	-0.010** (0.005)	-0.010** (0.005)	-0.024 (0.015)	-0.024* (0.014)	0.020 (0.014)	0.020 (0.014)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-quarter obs.	11,544	11,544	11,544	11,544	11,544	11,544
Country-specific trends	Yes	Yes	Yes	Yes	Yes	Yes
Industry-quarter FEs	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.224	0.224	0.637	0.637	0.21	0.21

Pandemic Panic? Effects of Health System Capacity on Firm Confidence During COVID-19*

Balagopal Gopalakrishnan[†], Jamus Jerome Lim[‡] and Sanket Mohapatra[§]

Abstract

We examine whether firms' business confidence—defined as their perceptions of risk and sentiment associated with the COVID-19 pandemic—is affected by *ex ante* health system capacity and *ex post* government responses. Using firm-level data from 53 countries, we find that *ex ante* proactive measures, such as healthcare spending and the availability of medical staff, favorably impact firms' confidence. This effect is, however, moderated by the COVID-19 case load. We also find that the *ex post* reactive measures, such as health and containment actions and the overall quality of the government response, also bolster business confidence. These effects on confidence vary by firm size and the level of development of the economy, but are largely impervious to prior epidemic experience.

KEYWORDS: health system capacity, COVID-19, private and public healthcare, firm sentiment and risk, textual analysis

JEL CLASSIFICATION: D22, H41, H51, I18

*This paper has benefited from valuable comments and suggestions from Ajay Pandey, Chirantan Chatterjee, Constantine Sorokin, Joshy Jacob, Tarun Jain, and Giovanni Pittaluga, and participants at the 11th RCEA Money, Macro & Finance and 3rd Ariel Political Economy of Public Policy conferences. Figure 1 and ?? were created with the assistance of Datawrapper. No financial support was received for this project, and the authors declare no conflicts of interest. Authors are listed in order of last names. The usual disclaimer applies.

[†]Finance and Accounting Area, Indian Institute of Management Ahmedabad, Gujarat, India. Email: balagopalg@iima.ac.in

[‡]Corresponding author. Economics Department, ESSEC Business School Asia Pacific, 5 Nepal Park, 139408, Singapore. Email: jamus@essec.edu

[§]Economics Area, Indian Institute of Management Ahmedabad, Gujarat, India. Email: sanketm@iima.ac.in

Highlights

- Study effects of health system capacity and policy on firm confidence due to COVID-19
- Strong health system capacity improves firms' perceptions of risk and sentiment
- Public and private healthcare expenditures are more complements than substitutes
- High quality government responses also improve firms' perceptions of risk and sentiment
- Effects more pronounced in EMDEs versus AEs, and smaller firms' sentiment more affected than larger ones

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Journal Pre-proof