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Survival of Firms during Economic Crisis

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Abstract

We estimate the survival time of nearly 7,000 firms in a dozen of high-income and middle-income countries in a scenario of extreme economic distress, using the World Bank's Enterprises Surveys. Under the assumption that firms have no incoming revenues and cover only fixed costs, the median survival time across industries ranges within 8 to 19 weeks, while on average firms have liquidity to survive between 12 and 38 weeks. Schumpeter's (1934) theory of creative destruction is not corroborated in the data, as potential exit is not predicated on the size of firms, their age or their productivity.

[1] The authors are from the World Bank; the London School of Economics; the World Bank and George Mason University; and the World Bank, respectively. We thank Alan Golding and Aart Kraay for comments on an earlier draft, and David C. Francis and Joseph Lemoine for input on the data and analysis.

Introduction

Economists explain the closure of firms during recessions with Schumpeter (1934)'s creative destruction theory, where during downturns small and less efficient firms are the ones to exit the market. In times of extreme economic distress, however, firms in every country are reeling from the inability to do business as usual. To make things worse, many sectors see collapsed demand and economic uncertainty stretching months, if not years. In the current pandemic governments rightly focus on dealing with the health aspects first, and only then on the recovery of the economy once the immediate danger of the pandemic is over.

In the meantime, businesses are rapidly running out of cash. In the United States, half of small firms – those with less than 500 employees – have cash reserves for less than a month, and another quarter of businesses may run out of cash in two months. For service industries, the period to illiquidity is even shorter. Restaurants, for example, have less than a month of cash in hand (Didier et al., 2020).

This breathing period is extended with government programs already in place to support worker retention through subsidizing jobs, freezing interest payment on loans, and extending new bank credit. This extension differs across industries – it helps labor-intensive sectors more; firms with established lines of credit benefit more as well. Still, other payments – like rent and cost of materials – are weighing on businesses. Exporters are unable to ship goods due to disrupted transport links. Even when transport is possible, new trade restrictions may apply or demand has simply collapsed.

New analysis on twelve high-income and middle-income economies across Africa, Central Asia, Europe, Latin America, and the Middle East reflects similar patterns. The analysis uses a sample of 6,345 firms from the World Bank's Enterprises Surveys in Colombia, Greece, Italy, Jordan, Kazakhstan, Kenya, Morocco, Peru, Portugal, Russia, Turkey, and Ukraine. All surveys were conducted within the last three years and have wide scope, covering a representative sample of at least six hundred firms in each country.[2] The share of firms responding to the financial questions, however, varies.

[2] We use this sample from an overall sample of 75 economies with recent data, as it is broadly representative of Southern Europe and upper middle-income emerging markets. We intentionally shy away from lower middle-income

In a hypothetical scenario fashioned after the current pandemic period – where firms have no revenues due to a lockdown or collapsed demand – the median firm has retained earnings and other sources of financing to last 8 (in retail) to 19 weeks (in other manufacturing), while the average firm does so within 12 (in construction) to 38 weeks (in manufacturing of chemical, plastic and mineral products).

Across countries, the median Ukrainian firm is the most liquidity constrained, while the median Peruvian firms has the most breathing space. The former has 7 weeks buffer in retained earnings and other sources of financing, the latter 16 weeks. The same is true when we turn to the analysis of means, the average Ukrainian firm has a 10-week buffer in retained earnings and other sources of financing, while the average Peruvian firm has 27 weeks.

Our analysis does not support the Schumpeterian view that economic crises cleanse the private sector from inefficient firms. The evidence suggests that firms suffer untimely illiquidity regardless of age, size and productivity levels. In particular, survival times are not associated with higher firm productivity, with the exceptions of firms in Greece, Kenya and Peru. Larger firms have longer survival times only in Kazakhstan. Older firms are more resilient only in Jordan and Morocco.

The results here complement recent work by Bachas and Brockmeyer (2020), who use corporate tax records to show that even small revenue shocks push the majority of firms in developing economies into loss-making territory.

Section II describes the data, section III outlines the methodology, section IV illustrates the base results, section V delineates the hypotheses used, section VI presents regression results and Section VII details initial policy measures. Section VIII concludes.

II. Data

The calculations use data for 11,759 businesses from the World Bank's Enterprise Surveys conducted in a dozen economies across Africa, Central Asia, Europe, Latin America, and the

and low-income economies where the informal sector constitutes a large share of economic activity. In future research we intend to advance the methodology to account for informality.

Middle East that have a survey completed in the last three years, and have a large sample size of over six hundred firms in order to construct sectoral breakdowns.

The World Bank Enterprise Surveys are establishment-level surveys conducted on a stratified random sample of small (5-19 employees), medium (20-99 employees), and large establishments (over 100 employees). The questionnaire includes a wide range of topics from infrastructure, management practices to labor, and performance. The survey is administered to businesses with at least 1 percent private ownership, that are not cooperatives, and were in full operation for the entirety of the last completed fiscal year. The sector of coverage includes all manufacturing (ISIC 3.1 Rev 15-37); Wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods (50-52); Hotels and restaurants (55); Transport, storage and communications (60-64); and Computer related activities (72). The sample contains a total of 11,759 interviews with top managers or owners; and approximately half of sampled firms (6,897) submitted income statement and balance sheet data (Table 1). Exporters account for 7 percent (Kazakhstan) to 31 percent (Morocco) of the sample.

Table 1: Sample Details

Country	Survey Year	Last Completed Fiscal Year	Survey Sample Size	Number of firms with full income statement data	Share of Exporters in the Sample
Colombia	2017	2016	989	535	258
Greece	2018	2017	559	538	270
Italy	2019	2018	610	498	268
Jordan	2019	2018	380	169	166
Kazakhstan	2019	2018	1,377	640	139
Kenya	2018	2017	961	696	304
Morocco	2019	2018	755	458	345
Peru	2017	2016	976	415	275
Portugal	2019	2018	1,057	630	432
Russia	2019	2018	1,284	736	235
Turkey	2019	2018	1,506	894	501
Ukraine	2019	2018	1,305	688	417
Total			11,759	6,897	3,610

The estimation of survival times that we discuss is based on several survey questions (Table A1). Available liquidity is calculated using profits and external financing. In particular, the question on sales (question D.2) asks: "In the last completed fiscal year, what were this establishment's total annual sales for all products and services?" External financing of working

capital is calculated as any channel of financing that does not come from retained earnings. The survey instrument asks (question K.3A): "Over last completed fiscal year, please estimate the proportion of this establishment's working capital, that is the funds available for day-to-day operations, that was financed from internal funds or retained earnings?"

The cost information varies by sector. Manufacturing firms are asked a question on total goods sold (question N2.P) that is phrased as follows: "From this establishment's Income Statement for the last completed fiscal year, please provide the total cost of goods sold." Similarly, the question on labor costs (question N2.A) asks: "From this establishment's Income Statement for the last completed fiscal year, please provide the Total annual cost of labor including wages, salaries, bonuses, social security payment." As a robustness measure of access to finance, we use question K.8: "At this time, does this establishment have a line of credit or a loan from a financial institution?"

In Section VI of the regression analysis, we use additional variables to estimate the effect of the size of the median firm on survival times. Three different variables are used. First, the conservative estimation of employment relies on the total number of full-time permanent workers, based on question L.1: "At the end of the last completed fiscal year, how many permanent, full-time individuals worked in this establishment? Please include all employees and managers." Permanent, full-time employees are defined as all employees that are employed for a term of one or more fiscal years and/or have a guaranteed renewal of their employment and that work a full shift.

The two alternative measures of the size of the firm include the addition all temporary employees derived from question L.6: "How many full-time seasonal or temporary employees did this establishment employ during the last completed fiscal year?" and the adjustment of full-time equivalent workers using the average duration of the contract of temporary workers (question L.8): "What was the average length of employment of all full-time seasonal or temporary employees in the last complete fiscal year?"

The age of the firm is measured through the year of establishment (question B.5).

Firms that export are defined as any establishment that has sales through direct or indirect exports. We assign exporter status to companies based on their response to the following questions:

"In the last completed fiscal year, what percentage of this establishment's sales were: (a) National sales; (b) Indirect exports (sold domestically to third party that exports products); (c) Direct exports," where the respondent's affirmative answers to option b) or c) yield an exporter designation.

The productivity measures used in the analysis are both revenue-based, as only monetary (not physical) output and inputs are observed (World Bank, 2017). The first measure calculates TFP based on a Cobb-Douglas value added production function, where value added is proxied by the difference between the total annual sales of the establishment and total annual cost of inputs, capital is proxied by the replacement value of machinery, vehicles, and equipment, and labor is proxied by the total annual cost of labor. Factor shares in the Cobb Douglas production function are based on econometric estimation.

The second measure calculates TFP based on a gross output production function, where output is proxied by total annual sales of the establishment; capital and labor are the same as in the value-added specification, and intermediate goods is proxied by the total annual cost of inputs. Again, factor shares in the Cobb Douglas production function are based on econometric estimation.

As a third proxy for productivity, we use capacity utilization, a variable that is only available for manufacturing firms.[3] In particular, question F.1. asks "In the last completed fiscal year, what was this establishment's output produced as a percentage of the maximum output possible if using all the resources available (capacity utilization)?".

III. Methodology

As direct measures of cash-on-hand or cash accessible with ease are not available, we make several assumptions. In all cases, our assumptions are conservative: they serve to increase survival times. The reason for this choice is to have a lower bound on the possibility of firms resorting to bankruptcy.

[3] The capacity utilization measure is taken as a proxy for labor productivity as the latter should rise when the same labor is using more of the available fixed capital.

To calculate the survival time of firms we take net retained earnings for the past year as the numerator, assuming that all such earnings have been saved and are liquid and available for businesses to use. We expand the numerator with the availability of firms to tap credit. In particular, we keep the ratio of retained earnings to external financing – as reported for the previous year – constant and assume that the same amount of external financing is available throughout periods of economic distress.

Next, we assume that wages and other employee expenses are covered fully by government crisis-response programs. The denominator is hence only fixed costs – rent, machinery maintenance and cost of materials.

While total sales and cost of labor are available for all firms in the sample, the total cost of goods sold is available only for manufacturing businesses. Therefore, certain assumptions are made in order to conduct the estimates for construction and services firms. In particular, we assume a 9 percent net profit rate for these sectors. In other words, the profit is part of fixed costs. This is again a conservative assumption, meant to increase survival times.

The fixed weekly cost can be written as:

$$FC_i = TC_i - LC_i \tag{1}$$

where ***TC*** is the total cost incurred by a firm in the last fiscal year, and ***LC*** is labor cost. Divided by the number of weeks.

Using the cost specification in equation 1, we calculate the survival time of businesses using the following formula:

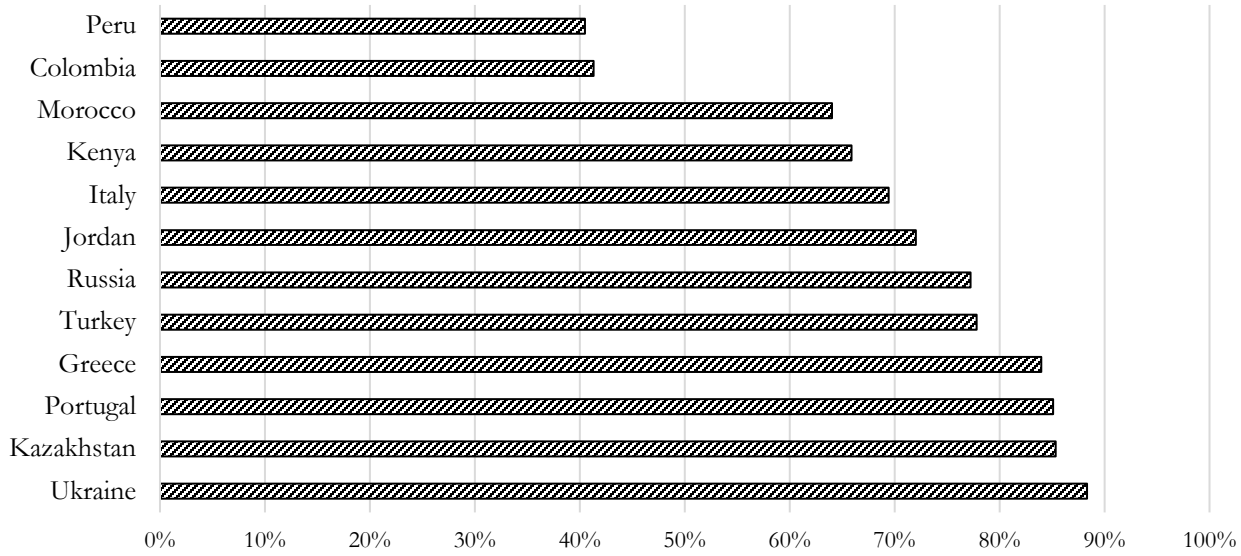
$$s_i = \frac{\pi_i + W_i}{FC_i} \tag{2}$$

where ***s*** is the survival time, $\boldsymbol{\pi}$ represents the net retained earnings from the full previous year, ***W*** is the available liquidity from external sources. Subscript ***i*** represents a firm.

As profits are given in the data as gross profit margin for manufacturing firms, we reduce it by subtracting the statutory corporate income tax rate, 15 percent dividends and 10 percent depreciation expenses.[4] For the services sector, where total costs are unobservable due to data restrictions, an assumption of 9 percent net profit margin is imposed.

The channels through which businesses finance their working capital indicates the reliance on profits. In Ukraine, for example, about 88 percent of the day-to-day operations of an average firm are financed through retained earnings. Firms in Kazakhstan, Greece and Portugal also finance their operations out of retained earnings (Figure 1). In contrast, firms in Colombia and Peru rely substantially on external financing. On average, retained earnings finance about two-thirds of working capital (Table A2).

Figure 1: Percent of Working Capital Financed Through Retained Earnings on Average



Note: Data is extracted from the World Bank Enterprise Surveys. Number of Observations: 11,759

We use these data to expand the numerator, by taking the ratio of internal to external financing of working capital as constant over the period of extreme economic distress. In reality, financing may dry up if banks are unwilling to lend. Alternatively, government-sponsored

[4] The data on the statutory corporate income tax rate is taken from the PWC's *Worldwide Tax Summaries*.

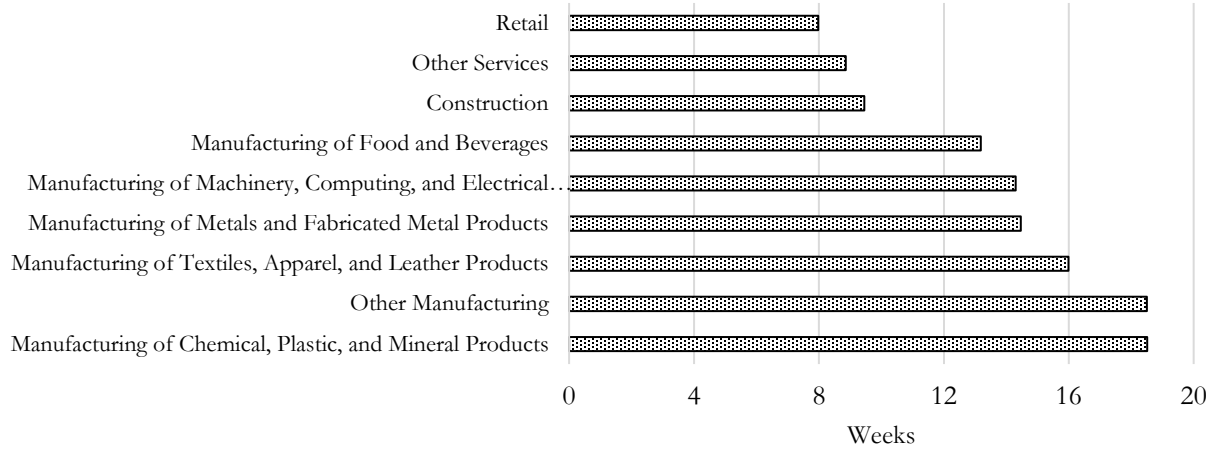
programs may expand access to external finance. We return to these possibilities in the Section VII.

IV. Baseline Results

This section presents basic descriptive statistics of median and mean survival times by sector and by country. In calculating these statistics, we cut the sample at the 5th and 95th percentile of survival times, a simple way to eliminate outliers that reduces the sample of firms from 6,897 to 6,345.

Retailers have the shortest survival time, whereby the median business runs out of savings in about 8 weeks of no revenues (Figure 2). Firms in the manufacturing sector have higher survival times on average – between 13 (metals and fabricated metal products) and 19 weeks (other manufacturing) – as profit margins (and hence retained earnings) tend to be higher. The median firm in the construction sector has liquidity to last 9 weeks, while firms in the manufacturing of chemical, plastics and mineral products can last 16 weeks.

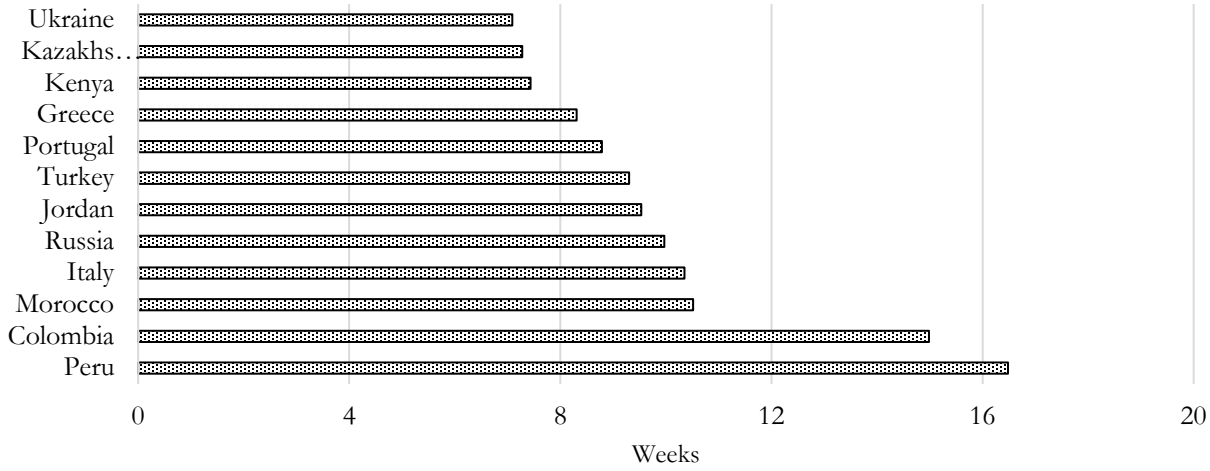
Figure 2: Median Survival Time based on Fixed Costs by Sector



Note: Data is extracted from the World Bank Enterprise Surveys. Number of Observations: 6,345

Figure 3 shows the median survival time by country, which ranges between 7 (Ukraine) and 16 weeks (Peru). Kazakh and Kenyan firms are as cash constrained as Ukrainian firms (also at 7 weeks) and have a survival time that is less than half that of the median Colombian firm (15 weeks). The median business in Italy, Jordan, and the Russian Federation can last 10 weeks, one week longer than the median business in Portugal and Turkey (9 weeks).

Figure 3: Median Survival Time based on Fixed Costs by Country

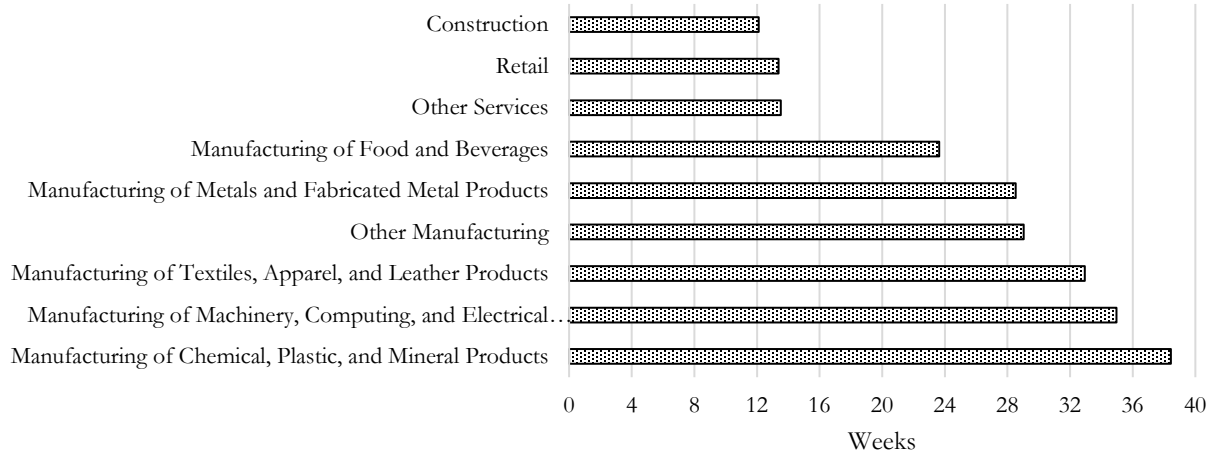


Note: Data is extracted from the World Bank Enterprise Surveys. Number of Observations: 6,345

The median survival time has significant variation across countries within a given sector (Table A3). The median Portuguese firm in the manufacturing of food and beverages, for example, has a survival time of 7.6 weeks, whereas the median firm in the same sector in Colombia can last 26.3 weeks. Variation is even larger in the manufacturing of metals and fabricated metal products. The median Ukrainian firm can survive for just a little over 8 weeks, while the median Turkish firm has sufficiency liquidity for more than 10 months (44.1 weeks). Great variation is also present across sectors within a given country. In Kenya, for example, the median firm in the manufacturing of chemical, plastic and mineral products cannot even last a week, while a firm in the manufacturing of food and beverages can last for 16.8.

The mean survival time is longer, suggesting heterogeneity among firms and the likelihood that some firms can persist even in extreme economic hardship. The construction sector, for example, can survive a total lack of revenues for 12 weeks, while businesses in manufacturing sectors can survive on average for up to 38 weeks (Figure 4).

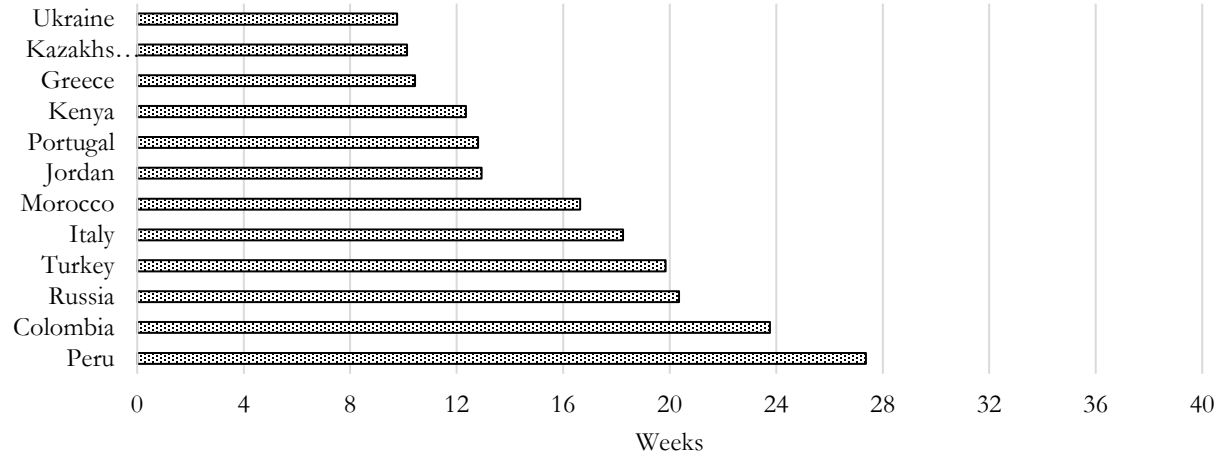
Figure 4: Mean Survival Time based on Fixed Costs by Sector



Note: Data is extracted from the World Bank Enterprise Surveys. Number of Observations: 6,345

The differences across countries between the average and median survival time persist (Figure 5). While the median business in Turkey is estimated to run out of cash in 9 weeks, businesses on average have the means to survive for about 20 weeks, or nearly twice as long. Results for other countries are more similar: in both Kazakhstan and Ukraine the median and the average firm will run out of cash in about 10 weeks.

Figure 5: Mean Survival Time based on Fixed Costs by Country



Note: Data is extracted from the World Bank Enterprise Surveys. Number of Observations: 6,345

V. Hypotheses

The literature on firm survival in distress rests on two hypotheses: first, that firm survival occurs primarily on the basis of productivity differentials, i.e. small and less efficient firms, as well as younger firms, have lower chances of surviving than their more efficient counterparts (Jovanovic, 1982; Hopenhayn, 1992; Melitz, 2003; Melitz and Ottaviano, 2008); and second, that during economic downturns the collapse in aggregate demand raises competitive pressures and thus makes productivity differentials an even bigger factor in determining exit patterns (Hall, 1995; Caballero and Hammour, 1994; Gomes at al., 2001).

The empirical studies, however, suggest a different pattern. Some papers find that the "creative destruction" effect is weaker than expected. Barlevy (2003), for instance, shows that during times of economic distress this effect may not hold in presence of credit constraints, because efficient firms may be hurt disproportionally due to their higher financial needs. Ouyang (2009) provides evidence that times of economic distress destroy high-productivity firms during their infancy. A number of studies also suggest that labor market regulations and policies governing firm dynamics can be particularly relevant in distorting the process of firm selection in presence of negative shocks, because they allow relatively inefficient firms to survive (Foster et al., 2008).

A second strand of the literature is based on an observation that times of extreme economic distress create hostile business environment (Cefis and Marsili, 2019). During such periods, a collapse in consumer expenditures often goes along with an increase in uncertainty, which makes economic transactions more difficult to accomplish (Bloom, 2014). Firms' relationships with buyers and suppliers become less reliable (Accetturo and Giunta, 2019). Financial institutions lack sufficient information to correctly evaluate credit merit, with the consequent rise of credit constraints (Djankov et al., 2007, Ivashina and Scharfstein 2010).

A third strand of the literature looks at systemic financial distress. If governments take no action during periods of severe economic downturns, significant sections of the economy may remain distressed for a long period of time, resulting in large, socially unacceptable losses in output and employment. This realization has led to the search for arrangements that would automatically trigger orderly processes to resolve systemic financial distress, as in Mexico during the 1996-1998 crisis (Mulás, 2001) or Indonesia and Thailand during the East Asia crisis (Claessens et al., 2001).

In a systemic crisis, the government's first role is to define rules that lead to efficient private restructuring efforts. Creditors profiles are important, as in the case of Indonesia where corporate sector debt was largely owed to foreign investors (Claessens et al., 2000). Some studies have shown that acquisitions by foreigners usually end up in fire sales, resulting in a net transfer of wealth from the crisis economies (Pulvino 1998). Even high-productivity companies lose value and end up liquidated or sold piecemeal. In the event that these private initiatives prove insufficient for acceptably resolving distress, the government's second role lies in providing direct assistance to keep firms operating as going concerns (Claessens et al., 2001).

The previous literature leaves us with two testable hypotheses: either economic distress periods are associated with mass exit of inefficient firms and hence beneficial for long-term productivity and economic growth; or such periods result in indiscriminate exit of firms due to collapsed demand and increased uncertainty, resulting in deleterious long-term effects. We take these two hypotheses to the data in the next section.

VI. Regression Results

Testing of the two hypotheses on the survival patterns presented in Section V is based on a cross-sectional estimation in a dataset of 12 countries and 9 industries, with country and industry fixed effects added.

A graphical representation shows that the data tend to be clustered around young, small and unproductive firms (figure 6). This clustering may bias our results against finding statistical significance.

Figure 6: Scatterplots of explanatory variables and survival time

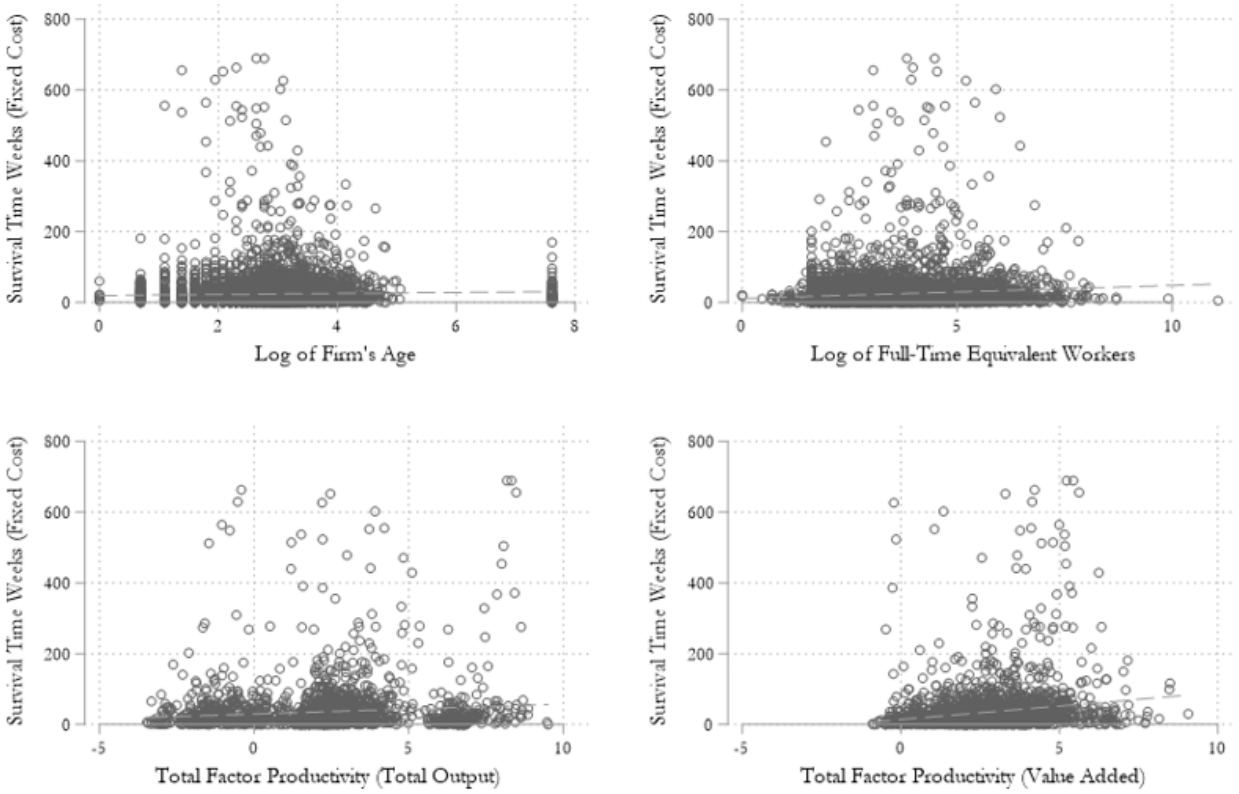


Table 2 provides two further tests of the Schumpeter theory, by accounting for productivity differences across firms. The measures used in both tests are revenue-based. The first specification shows the coefficient on capacity utilization (column 1), while the second specification presents total factor productivity estimates (column 2). In addition, we present value added productivity, a third proxy for productivity (column 3).

Table 2: Regression Results using measures of productivity.
Dependent Variable: Survival Time in Weeks (Fixed Cost)

	(1)	(2)	(3)
Capacity Utilization	0.468		
	(0.302)		
Total Factor Productivity		0.232	
		(1.129)	
Value Added Productivity			6.496*
			(3.915)
Constant	-16.992	7.992	0.694
	(34.439)	(20.541)	(22.346)
Country Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Number of observations	2,819	2,446	2,446
Adjusted R2	0.09	0.09	0.11

Note: Capacity Utilization and TFP is available only for manufacturing firms. Huber-White robust standard errors in brackets and clustered at the country-sector level. Significance is denoted by *** (1%), ** (5%), * (10%)

The productivity measures apply only to manufacturing sectors. The Schumpeter theory is not upheld. Across the various proxies, the coefficients on productivity are not statistically significant when proxied by capacity utilization and total factor productivity, while the coefficient on value added productivity is weakly significant at the 10% level.

The measures of productivity are all noisy and do not give a sense of which firms are "good." Given the large standard errors reported in the table, there is low-powered failure to reject the null hypothesis that survival times are associated with the quality of firms. We therefore go further in testing this hypothesis, by using easier-to-report indicators and the firm's age and size. We interpret age and size as alternative proxies for productivity, though Figure 6 suggests that they could be just as noisy a proxies for "true" productivity as measured TFP.

The estimations using the three measures for the size of the business produce no significant results on the association between size of firms, their age and their survival times (Table 3). The coefficient on the log of the number of permanent workers is presented in column 1. The measure in column 2 adds the number of temporary workers to permanent workers. The estimates on the total number of workers regardless of the length of the contract is presented in column 3.

Next, we regress firm survival times on the log age of firms (column 4). Again, the results are statistically insignificant, suggesting that in periods of extreme economic distress the Schumpeter theory does not hold.

Table 3: Regression Results Across Different Labor Measures and Age.
Dependent Variable: Survival Time in Weeks (Fixed Cost)

	(1)	(2)	(3)	(4)
Log of Permanent	2.375			
Workers	(1.961)			
Log of Full-time		2.401		
Equivalent Workers		(1.899)		
Log of Full-time			2.272	
Permanent and Temporary			(1.819)	
Log of Firm's Age				-0.112
				(0.642)
Constant	8.619	9.826	8.382	16.278***
	(9.587)	(8.283)	(9.687)	(6.272)
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Number of observations	6,332	6,178	6,178	6,341
Adjusted R2	0.14	0.13	0.13	0.13

Note: Huber-White robust standard errors in brackets and clustered at the country-sector level. Significance is denoted by *** (1%), ** (5%), * (10%)

The results with all characteristics of the firms are presented in Table 4. The results now show that there is no statistically significant effect associated with the size of the firm. Even when controlling for the different measures productivity, the size of the firm or the age do not appear to have statistically significant results, showcasing the vulnerabilities of the private sector as a whole. Again, there is weak evidence for productive firms being more resilient (column 5).

Table 4: Regression Results using full-time equivalent workers.
Dependent Variable: Survival Time in Weeks (Fixed Cost)

	(1)	(2)	(3)	(4)	(5)
Log of Full-time	2.401	2.480	10.356	14.081	13.244
Equivalent Workers	(1.899)	(1.977)	(9.448)	(10.411)	(10.098)
Log of Age of Firm		-0.516	1.268	4.274	4.492
		(0.854)	(5.267)	(4.495)	(4.450)
Capacity Utilization (%)			0.467		
			(0.289)		
Total Factor Productivity				0.396	
				(1.224)	
Value Added Productivity					5.847*
					(3.323)
Constant	8.186	9.365	-45.473	-36.454	-53.238
	(9.775)	(9.034)	(50.681)	(33.904)	(41.429)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of observations	6,178	6,175	2,778	2,412	2,412
Adjusted R2	0.134	0.134	0.103	0.128	0.138

Note: Capacity Utilization and TFP is available only for manufacturing firms. Huber-White robust standard errors in brackets and clustered at the country-sector level. Significance is denoted by *** (1%), ** (5%), * (10%).

As robustness checks, we consider three scenarios: (1) businesses maintain 25 percent of sales for twelve weeks, (2) business can shed 25 percent of their fixed cost too, for example by negotiating down rent payments, and (3) exporters lose access to external financing, as it is linked to export receipts.

The comparison of the survival time by country using the two different scenarios indicate that partial revenues extend the survival time by more than a reduction in fixed costs (Figure A1). The survival time of Italian firms, for example, increases from 10 to 15 weeks with a hypothetical 25 percent increase in sales, and from 10 to 14 weeks with a hypothetical reduction of their fixed costs. Across sectors, a hypothetical 25 percent increase in sales extends the survival time of the most vulnerable sector – retailers – by five weeks, while a hypothetical reduction of their fixed costs extends the survival time by three weeks (Figure A2). The manufacturing sector, which is typically more capital intensive, benefits relatively more from a hypothetical reduction in fixed cost. For example, the survival time of firms in manufacturing of metals and fabricated metal products increases from 14 to 26 weeks with a hypothetical 25 percent increase in sales, and from 14 to 19 weeks with a hypothetical reduction of their fixed costs.

As further robustness checks, we run the regressions in Tables 3 and 4 by country. In Colombia, larger firms have longer survival times. In Kenya, larger, older and higher productivity firms (using TFP and value-added measures) have longer survival times. In Greece and Peru, high productivity firms also have\ higher survival times.

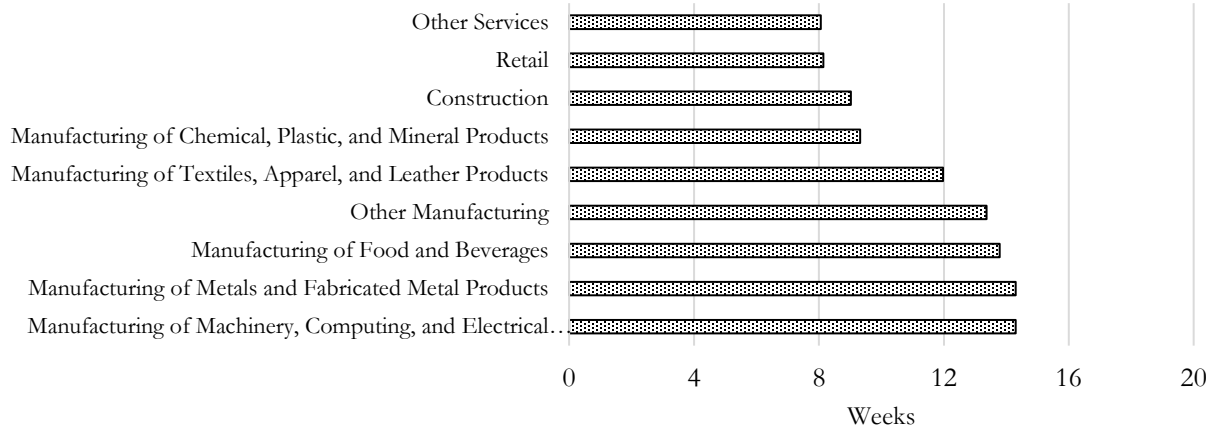
As regards firms' age, there is a positive correlation with survival times in Jordan and Morocco, but negative in Kazakhstan.

Repeating the same robustness exercise across the sectors of analysis yields inconclusive results. While larger food and chemicals manufacturers, as well as providers of other services have longer survival time, smaller businesses in the construction sector are better off relatively to large firms. Younger manufacturers of machinery and computing products, manufacturers of chemicals, and firms engaging in services have longer survival time. Older firms in other manufacturing are

more resilient. More productive firms have longer survival times in the manufacturing of metal products, chemical products, food and beverages, and machinery and computing products.

Finally, we redo the analysis shown in Figures 2 and 3, this time assuming that exporters lose access to their external financing, as such financing is likely related to receipts in foreign currency or is in the form of letters of trade credit. Figure 7 shows that manufacturers of metals and metal products and manufacturers of machinery and computing products are most adversely affected by the collapse of export demand, with survival times reduced from 19 to 14 weeks. Conversely, retailers and the provision of other services are unaffected and remain the two sectors where firms are estimated to run out of working capital the fastest.

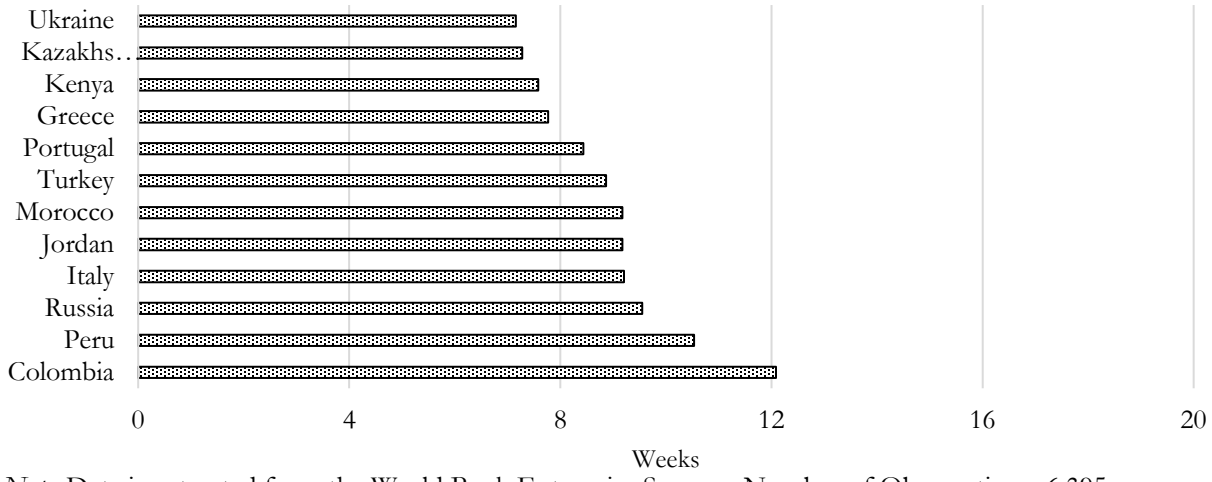
Figure 7: Median Survival Time (adjusted for exporters) based on Fixed Costs by Sector



Note: Data is extracted from the World Bank Enterprise Surveys. Number of Observations: 6,395

Firms in Colombia and Peru are the most negatively affected by the hypothetical loss in external financing. Both countries see a reduction of their median survival time by over one month, going from about 4 months (16 and 15 weeks respectively), down to 11 and 12 weeks (Figure 8). Kazakhstan, which has the lowest trade exposure of about 7 percent and has among the highest proportion of working capital financed through retained earnings (85 percent), remains with a median survival time of 7 weeks under this scenario. Italy, Russia, and Jordan see a reduction of their median survival time by about 1 week relative to the baseline scenario in Figure 3.

Figure 8: Median Survival Time (adjusted for exporters) based on Fixed Costs by Country



Note: Data is extracted from the World Bank Enterprise Surveys. Number of Observations: 6,395

The analysis here also offers a partial answer to the puzzling result in Tables 2-4 that Schumpeter's theory does not find support in our data. Previous analyses have shown that exporters are among the most productive firms in any economy (for example, Wagner 2007). As exports are among the most affected sectors of the economy during economic distress periods that involve health concerns, productive firms are in effect subjected to financial strain more than the average firm. The Schumpeter theory of creative destruction no longer holds.

VII. Policy response

The evidence in Section VI suggests that significant government response is warranted to prevent mass insolvency. Such response can proceed in two steps.

First, governments need to temporarily suspend bankruptcy procedures, which often dictate that illiquid firms' assets get transferred to their secured creditors, mostly banks. A number of countries have already taken this step. For example, in France bankruptcy law normally gives 45 days from the moment a debtor can no longer pay its debts to filing for bankruptcy. The new ordinance says that the firms will have three months after the end of the state of emergency (i.e. as things now stand, until September 2020) to file for bankruptcy if needed. The Germany parliament passed a temporary suspension of the firms' obligation to file for bankruptcy. The suspension is

valid until September 2020, with an extension to March 2021 – a one-year delay so firms can stand on their feet.

Among our sample countries, as of mid-April 2020, Colombia, Italy, Portugal, the Russian Federation and Turkey have implemented similar measures, imposing either a stay on insolvency or a suspension of insolvency procedures. Ukraine is also in the process of introducing such instruments. In Colombia, three provisions that trigger insolvency are suspended for 24 months: (i) imminent inability to pay for insolvency proceedings; (ii) new judicial liquidation processes by adjudication; and (iii) the cause of dissolution by losses. Furthermore, the obligation to report the cessation of payments is suspended until December 31, 2020 whenever such cessation is triggered by the causes that led to the declaration of a state of emergency. Similarly, Portugal has suspended all new insolvency proceedings until the end of the state of emergency.

Italy has suspended all proceedings for the declaration of insolvency or bankruptcy up to June 30, 2020, and all petitions filed between March 9, 2020 and June 30, 2020 are considered inadmissible. Italy has also extended a number of deadlines for pre-insolvency workout agreements with creditors and debt restructuring agreements and, under some circumstances, has introduced the possibility for the debtor to amend/renew the underlying industrial and financial business plan.

The Russian Federation has imposed a temporary stay on the obligation to file for insolvency, and on opening new insolvency proceedings. Furthermore, existing enforcement proceedings against protected debtors are suspended. Creditors who have pledges over property are prohibited from enforcing that security, while enforcement against other forms of security, such as direct debit agreements, guarantees and suretyships, has not been prohibited. All measures are in force until October 4, 2020 (initial period of six months beginning April 4, 2020). The amendments also set out certain additional provisions relating to bankruptcy proceedings against the affected debtors initiated within three months after the moratorium is lifted.

Turkey implemented a temporary stay on obligation to file for insolvency, a stay on opening new insolvency proceedings, and a stay on ongoing insolvency proceedings. These measures are effective until April 30, 2020 (subject to further extensions).

The measures under discussion in Ukraine are similar to the ones adopted by other countries and were submitted for approval on April 10, 2020. Proposed actions include allowing creditors meetings via videoconferences or by written voting, and extending (for all the quarantine period) deadlines for preliminary bankruptcy court hearings, insolvency-related claw back actions, creditors' claims moratorium validity, fire sales announcements, performance of a turnaround plan, and duration of pending insolvency stages (i.e. asset management, turnaround or liquidation). Furthermore, Ukraine proposed the application of a temporary national moratorium on creditors' filing for the debtors' insolvency (if a triggering claim originated after 1 February 2020), extended timing for mandatory filing for insolvency, and introduced the possibility of instalments for overdue payments under a turnaround plan for the whole duration of the national quarantine period, plus an additional 90 days.

Second, governments can design a post-crisis restart procedure, whereby they and all other creditors agree on a formula for reducing the debt burden on businesses. Reduction realistically means writing off a portion of the debt, as no amount of debt restructuring over time is likely to be sufficient. Governments have a hold on all other creditors as the latter will also be indebted to the Treasury either through overdue taxes or through participation in government rescue packages. No country has introduced such a measure yet, and little has been done to plan for management of post-crisis insolvency. Out of the countries in the sample, only the Russian Federation has already included post-moratorium proceedings in its COVID response.

VIII. Conclusions

We use firm level data to produce conservative estimates of the liquidity available to firms under different scenarios of economic distress. We demonstrate that the variation of this survival time is significant across sectors and countries. In all cases, however, the evidence suggests that urgent government action is needed if firms are to survive this unexpected economic downturn.

Perhaps most importantly, our analysis does not find support for the Schumpeterian view that economic crises cleanse the private sector from inefficient firms. In all our hypothetical scenarios, firms suffer untimely death regardless of age, size and productivity levels. We posit that extreme economic distress caused by a hypothetical pandemic is responsible for this result, by

disproportionately hurting exporters, who are otherwise among the most productive firms in an economy. As borders close or become more difficult to cross due to health concerns, productivity is no longer a marker for corporate success.

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Table A1: Descriptive Statistics of Sample

Country	Percent of Working Capital Financed through Retained Earnings			Number of Permanent Workers			Number of Full-Time Equivalent Workers			Number of Permanent and Temporary Workers			Capacity Utilization			Productivity Calculated on Total Output			Productivity Calculated on Value Added			Establishment with more than 1% exports		
	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
Colombia	0.4	0.4	989	120.1	407.0	992	129.4	418.4	973	132.1	417.1	974	0.7	0.2	526	1.9	1.7	409	2.9	1.2	409	0.3	0.4	992
Greece	0.8	0.3	559	63.1	112.6	600	68.0	111.2	595	74.9	118.1	595	0.7	0.2	301	1.3	2.3	311	2.8	1.3	311	0.5	0.5	600
Italy	0.7	0.3	610	69.5	140.4	760	87.6	187.5	747	86.6	176.6	747	0.9	0.1	442	2.2	2.6	284	3.2	1.8	284	0.4	0.5	741
Jordan	0.8	0.3	380	62.1	197.1	601	64.6	198.7	589	67.9	205.2	589	0.6	0.2	233	2.2	2.0	29	3.5	1.9	29	0.3	0.5	582
Kazakhstan	0.8	0.3	1377	61.9	168.4	1446	65.5	173.8	1394	67.2	179.5	1394	0.7	0.2	790	2.4	2.8	420	2.6	1.4	420	0.1	0.3	1426
Kenya	0.7	0.3	961	74.0	252.9	1001	89.7	287.2	986	103.3	310.8	986	0.7	0.2	434	2.0	2.3	268	2.7	1.4	268	0.3	0.5	996
Morocco	0.7	0.3	755	104.5	232.9	1094	113.7	266.0	811	104.9	238.1	811	0.7	0.2	325	3.1	2.2	298	3.5	1.6	298	0.4	0.5	973
Peru	0.4	0.3	976	157.4	653.0	1003	130.5	383.3	971	142.6	447.3	971	0.7	0.2	543	1.8	2.0	280	3.0	1.3	280	0.3	0.4	1003
Portugal	0.8	0.3	1057	74.7	165.2	1062	74.7	163.7	1048	74.7	161.0	1048	0.9	0.1	736	2.2	2.5	534	2.8	1.5	534	0.4	0.5	1062
Russia	0.8	0.2	1284	136.4	722.0	1322	127.2	715.6	1252	127.9	715.7	1252	0.8	0.1	823	2.6	2.7	481	2.8	1.6	481	0.2	0.4	1308
Turkey	0.8	0.3	1506	83.3	231.9	1663	86.0	235.9	1559	86.8	236.3	1559	0.8	0.2	935	2.6	2.1	556	3.6	1.4	556	0.3	0.5	1597
Ukraine	0.9	0.2	1305	141.5	1769.3	1337	145.7	1790.3	1308	148.3	1806.2	1308	0.7	0.2	867	2.3	2.6	428	2.3	1.4	428	0.3	0.5	1332

Table A2: Percent of Working Capital Financed through Retained Earnings of the Average Business												
Sector	**Colombia**	**Greece**	**Italy**	**Jordan**	**Kazakhstan**	**Kenya**	**Morocco**	**Peru**	**Portugal**	**Russia**	**Turkey**	**Ukraine**
Construction	31%	68%	76%	77%	71%	53%	56%	47%	87%	71%	73%	94%
Manufacturing of Chemical, Plastic, and Mineral Products	27%	67%		82%	80%	66%	55%	33%	85%	71%	60%	83%
Manufacturing of Food and Beverages	39%	84%	56%	74%	85%	67%	80%	42%	68%	74%	84%	84%
Manufacturing of Machinery, Computing, and Electrical Products	40%		64%		81%				84%	74%	78%	87%
Manufacturing of Metals and Fabricated Metal Products	29%	71%	59%		93%	77%		42%	87%	72%	81%	91%
Manufacturing of Textiles, Apparel, and Leather Products	43%		64%	82%	90%	70%	80%	36%	88%	81%	72%	75%
Other Manufacturing	23%	66%	63%		86%	62%	44%	37%	85%	72%	79%	92%
Other Services	47%	91%	71%	90%	87%	72%	63%	42%	88%	78%	82%	89%
Retail	45%	77%	75%	35%	92%	62%	72%	43%	81%	84%	83%	85%

Note: Percentages are not calculated for cells with less than 25 observations.

Table A3: Median Survival Time (in weeks) based on Fixed Cost Expenditures

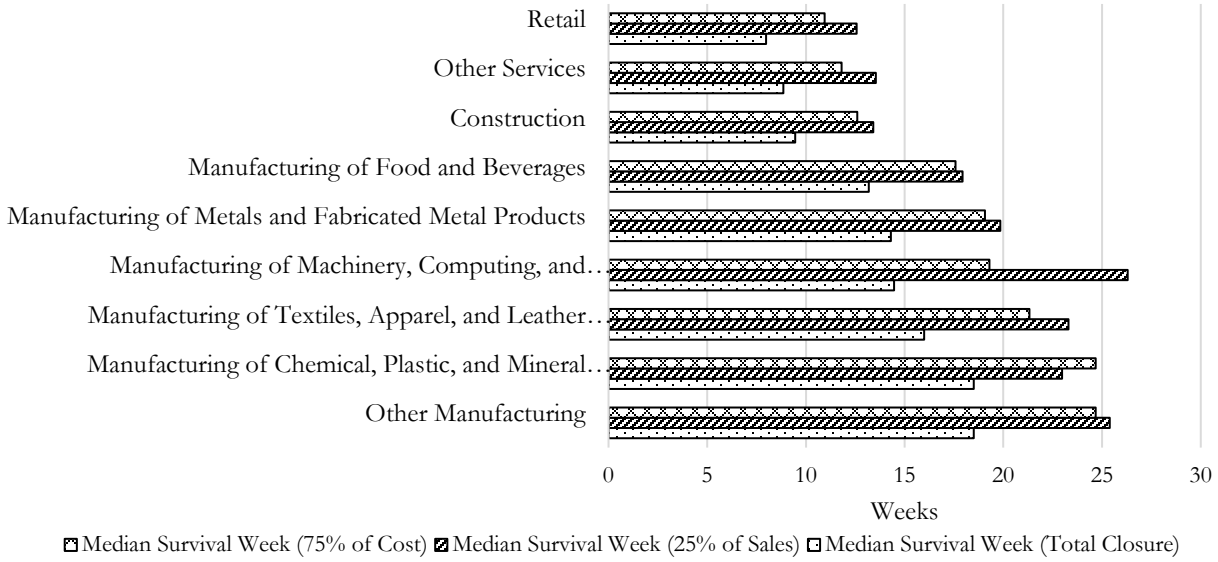
Sector	Colombia	Greece	Italy	Jordan	Kazakhstan	Kenya	Morocco	Peru	Portugal	Russia	Turkey	Ukraine
Construction		11.4	9.9	7.8	8.7	10.2	11.6		8.4	9.6	9.3	7.0
Manufacturing of Chemical, Plastic, and Mineral Products	18.5	21.4			7.2	0.0		28.7	7.0	35.8	53.1	15.9
Manufacturing of Food and Beverages	26.3	8.3	34.0	9.5	6.8	16.8	8.2	17.7	7.6	19.1	33.9	4.0
Manufacturing of Machinery, Computing, and Electrical Products			20.0						10.0	14.3	44.6	13.5
Manufacturing of Metals and Fabricated Metal Products	29.4	9.4	14.5		8.2			26.1	21.6	14.3	44.1	8.5
Manufacturing of Textiles, Apparel, and Leather Products	28.0				12.3	10.6		22.6	6.5	19.7	35.5	11.7
Other Manufacturing		18.9	23.7		11.5	0.0			29.8	18.1	54.0	10.9
Other Services	14.8	8.5	9.2	9.5	7.7	7.7	13.4	13.1	8.4	10.4	7.5	7.0
Retail	11.7	6.9	9.5	22.6	6.1	6.6	6.2	10.3	8.9	8.9	7.1	7.1

Note: Estimations are not calculated for cells with less than 25 observations.

Figure A1: Comparison of Median Survival Week across different Assumptions by Country

Note: Data is extracted from the World Bank Enterprise Surveys. Number of Observations: 6,345

Figure A2: Comparison of Median Survival Week across different Assumptions by Sector



Note: Data is extracted from the World Bank Enterprise Surveys. Number of Observations: 6,345