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COVID-19 and Corporate Balance Sheet Vulnerabilities

A Simple Stress-Test Approach

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Abstract

This paper conducts a simple stress test to gauge the ability of listed nonfinancial corporates to withstand shocks to earnings and receivables. It targets two basic accounting ratios that capture a firm's ability to cover its short-term liabilities and interest expenses. The sample consists of almost 17,000 firms in 73 countries and represents US$22.1 trillion in total assets and US$6.05 trillion in total debt. The findings show that, prior to the pandemic, almost 60 percent of the debt was associated with firms that already exhibited vulnerabilities according to at least one ratio. A 30-percent shock to earnings and receivables raises this to 88 percent, of which 29 percentage points is vulnerable in terms of both indicators, a 230-percent increase compared with before to the pandemic. Firms in East Asia and Pacific, the Middle East and North Africa, and South Asia appear to be the most exposed. Some countries with vulnerable corporate sectors also display weaknesses in insolvency frameworks, which may impede restructurings and write-downs and contribute to a surge in socially inefficient liquidations of cash-strapped but otherwise viable firms.

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1. Introduction

The COVID-19 pandemic has inflicted unprecedented damage on the global economy. It represents a massive macro-economic supply and demand shock with significant adverse ramifications for global economic growth, employment, and poverty. Its full magnitude and duration as well as its economic and social impacts remain difficult to predict. However, at the current juncture, it appears that the peak impact and second round effects are still to come in many countries, particularly in those with fragile health care infrastructures, weaker policy buffers, and pre-existing macro-financial sector vulnerabilities such as high corporate and sovereign debt levels, sizeable exposures to movements in global financial markets, and weaker prudential and crisis management frameworks.

Broadly speaking, the non-financial corporate (NFC) sector in emerging markets and developing economies (EMDEs) entered the pandemic with already elevated financial vulnerabilities. Non-financial private sector debt in EMDEs was already at a historical high following a wave of debt accumulation since the global financial crisis (Kose et al (2020)). In the wake of the global financial crisis, the "lower-for-longer" interest rate environment contributed to the rapid debt accumulation by NFCs. In addition to high levels, the currency composition and maturity structure has deteriorated in some countries, giving rise to debt sustainability and refinancing concerns.

External debt issuance by NFCs in EMDEs has increased in volume and riskiness in the last decade. During January 2015 - May 2020, EMDE NFCs issued a total of US$ 2.94 trillion of syndicated loans and bonds in international capital markets (7.5 percent of GDP for the median country). Almost 60 percent of this amount was non-investment grade (4 percent of GDP for the median country), a pattern that is consistent across regions. In absolute terms, EAP is the largest issuer, accounting for 55 percent of total issuance. Such debt is susceptible to sudden stops, although foreign currency revenues and other hedges reduce corporate vulnerabilities.

Emerging market credit markets were heavily affected by the COVID-19-induced financial market volatility in March although sentiment has improved recently. This was driven by a recovery in US credit markets induced by central bank measures. Median emerging market corporate primary market external issuances (bonds and loans) for the first 5 months of 2020 were 0.3 percent of GDP, compared with 0.9 percent for the same period in 2019. While March saw a minimal level of external debt issuance, issuance picked up again in April and May, particularly for investment grade issuers in the bond market.

Corporate credit ratings in emerging markets (EM) have come under renewed pressure, which is leading investors to focus on "fallen angel risk". JP Morgan forecasts that 14 percent of EM corporate Investment Grade bonds in the CEMBI Broad index will be downgraded to below investment grade in 2020. This estimate is substantially higher than the 3.7 percent for US non-investment grade (5.0 percent non-financials only) and 4.3 percent for EUR investment grade and is driven by the poorer sovereign rating backdrop in emerging markets. With the current backdrop, market pricing expects corporate default rates to rise with the level of defaults largely dependent on the nature of the economic rebound.

Notwithstanding large-scale policy interventions to address corporate liquidity challenges, a prolonged period of reduced earnings and tighter financial conditions may give rise to substantial corporate solvency problems. To address immediate liquidity concerns, many EMDEs have taken temporary and extraordinary policy measures to support the flow of credit to the corporate sector including by: allowing banks to run down capital buffers, launching debt moratoria and guarantee schemes, providing direct lending to the corporate sector, facilitating debt restructuring, and preventing liquidations of otherwise viable firms (also see IMF and World Bank (2020)). Swift containment and a subsequent strong economy recovery could mitigate the ultimate adverse impact on corporate balance sheets. However, a less optimistic scenario that consists of a prolonged economic contraction, enduring changes in consumer demand and preferences, tighter funding conditions, and higher post-pandemic corporate debt levels could produce a wave of debt restructurings, non-performing loans, lower market valuations, credit rating downgrades, and defaults, potentially with pro-cyclical effects. Sectors heavily impacted by the pandemic such as hospitality, aviation, transportation, and energy appear most at risk. In the face of reduced earnings and tighter financing conditions, EMDE firms may therefore have to cover operational costs and short-term liabilities with cash buffers and liquid assets. In a sample of advanced economies and several major EMDEs, Banerjee et al. (2020) find that that if revenues fall by 25 percent in 2020, then in the absence of any refinancing, debt service and operating expenses will exceed cash buffers and revenues in more than half of the firms in their sample.

To gauge the vulnerability of corporate balance sheets of listed firms to the pandemic, we conduct a simple stress test which focuses on debt service capacity and rollover risks in about 70 countries. Prior to the pandemic, a large fraction of the debt of listed firms in our sample could be considered "at risk" according to basic accounting formulas such as the interest coverage and quick ratios. In this paper, we consider scenarios with different shocks to corporate earnings and receivables to assess how these accounting ratios respond and what the corresponding impact is on the total amount of debt at risk. It is important to note that we focus on listed firms only, which tend to have better access to bank credit and can more readily tap into in domestic and international capital markets, although such capacity is more limited for smaller and non-investment grade firms. Our results can therefore not readily be extrapolated to small and medium-sized firms, which typically face higher constraints to obtain external funding and are often more reliant on banks.

Insolvency frameworks matter. As earnings fall and liquidity challenges surface, firms are more likely to become "cash-flow insolvent", a situation where short-term obligations (e.g., interest expenses, debt amortization, and payables) cannot be met by liquid assets. Some firms may try to take on more debt to avoid becoming cash-flow insolvent. This however may weaken their balance sheet and increase the likelihood becoming "balance sheet insolvent", a situation where the value of debt outweighs the value of assets. Many EMDEs already exhibited weaknesses in their corporate insolvency frameworks, which may lead to the socially costly liquidation of otherwise viable firms and trigger a wave of bankruptcies (Menezes, Muro, Uttamchandani (2020)). Well-calibrated, temporary measures targeting key provisions of the insolvency framework can play an

important role to facilitate firm restructuring [2]; reduce liquidations of cash-strapped, but otherwise viable businesses; and "flatten" the bankruptcy curve. Taken together, such measures can also mitigate the shock of widespread default in the corporate sector on banks' balance sheets, which could impede them from supporting the economic recovery.

2. Market Conditions: NFC's Market Access and Credit Ratings

Emerging market (EM) credit markets were heavily affected by the COVID-19-induced financial market volatility in March 2020, although sentiment has improved recently, driven by a recovery in US credit markets induced by central bank and other policy measures (also see Gurhy et al (2020)). Median emerging market corporate primary market external issuances (bonds and loans) for the first 5 months of 2020 were 0.3 percent of GDP, compared with 0.9 percent for the same period in 2019. This was primarily driven by a retrenchment in the syndicated loan market, due to both the structural nature of this market segment, a reduction in bank risk taking, as well as the fact that many corporate entities reverted to usage of bank revolving credit lines. While March saw a minimal level of external debt issuance, issuance picked up again in April and May, particularly for investment grade issuers in the bond market. Despite this, many NFC issuers remain particularly exposed to sudden shifts in investor risk sentiment, and associated EM currency depreciation. The increased issuances by some NFCs during April and May 2020 can be viewed as a balance sheet reinforcing exercise. In addition, several companies already pre-financed their upcoming maturities during the record gross issuance year of 2019 and first two months of 2020, which helps to moderate near-term refinancing concerns.

EM corporate credit ratings have come under renewed pressure[3] as the fallout from the pandemic affects both corporate and sovereign fundamentals, leading to a material worsening in the credit metrics of most issuers (Exhibit 1). The numerous sovereign rating downgrades in recent months also have direct implications for corporate issuers.[4] Sovereign driven rating actions have negative implications on credit spreads through the relative value comparisons to lower rated credits, while wider sovereign spreads will also affect corporate funding costs. In addition, a sovereign downgrade implies a more challenging macro environment which eventually has negative repercussions on the standalone fundamentals of the corporates.

[2] See World Bank and INSOL International COVID-19 Global Guide on Emergency Measures to Support Distressed Businesses, available at: http://pubdocs.worldbank.org/en/194131592248086470/global-guide.pdf.

[3] The number of rating downgrades so far in 2020 is at circa 250 against just 20 upgrades, with a sizable magnitude of negative watches and outlooks portending further cuts for the foreseeable future. Sovereign driven rating actions accounted for about one-third of the YTD downgrades.

[4] The regional rating trends for EM corporates show the biggest deterioration in Latin America where there have been 110 downgrades year to date, with half driven by negative sovereign rating downgrades. This is also the case in the Middle East & Africa where only 18 of 41 downgrades are not government driven. By contrast, most of Asia's 76 downgrades are due to standalone fundamentals without sovereign pressure.

The pressure on credit ratings is leading to a renewed focus on "fallen angels".[5] JP Morgan, for example, expects about 14 percent of EM corporate investment grade (IG) bonds in the CEMBI Broad and EMBIG quasi to migrate to non-investment grade in 2020. This compares to the previous peak reached in 2015, when the sovereign downgrades of the Russian Federation and Brazil triggered a large magnitude of "fallen angels". So far in 2020, over 7 percent of the investment grade universe has fallen to non-investment grade, which has also been driven by the downgrade of Pemex, the Mexican state-owned oil company in April 2020. A more adverse case assuming all BBB-rated bonds fall to non-investment grade would result in circa 20 percent of investment grade issuers migrating to non-investment grade.

The downgrade to non-investment grade can lead to forced selling by investors whose investment decisions are indexed to various investment indices. Based on the latest JP Morgan figures, benchmarked investors hold around 15 percent of EM corporate BBB bonds outstanding or about US$ 93 billion. In a downgrade scenario, and assuming investors could retain some of these now non-investment grade bonds, one can estimate that forced selling for the remainder of year could amount to at most US$ 6 billion.[6]

The number of downgrades during negative rating cycles tends to be dominated by high-yield (HY) issuers, which is not surprising given the greater vulnerability in times of stress (Exhibit 1) that generates higher risk premiums. This was the case in both major downgrade periods of 2008/2009 and 2015/2016 and is also evident in the current cycle.[7] Given the latest changes in market conditions, investment banks and credit rating agencies expect the average EM corporate HY default rate over the next 12 months to be between 5 and 13 percent, which compares to the 10.5 percent reached in 2009. Corporate default rates are driven by particular geographical regions, with corporates exposed to the pandemic in Middle East & Africa (also oil) and Latin America likely to see the highest defaults. Based on market analysis, the volume of bonds trading at or below US$70 now accounts for 10.6 percent (14.7 percent in March 2020) of non-defaulted EM HY corporate bonds versus 13.9 percent at the peak of the 2016 sell-off. Bonds trading at or below US$ 50 now account for 4.0 percent, which is still somewhat lower than 6.0 percent at the 2016 peak. The main difference from the 2008 crisis is that the current episode is not triggered by a banking or financial crisis, although default rates could increase in the event of a more systematic crisis or prolonged lockdown scenario.

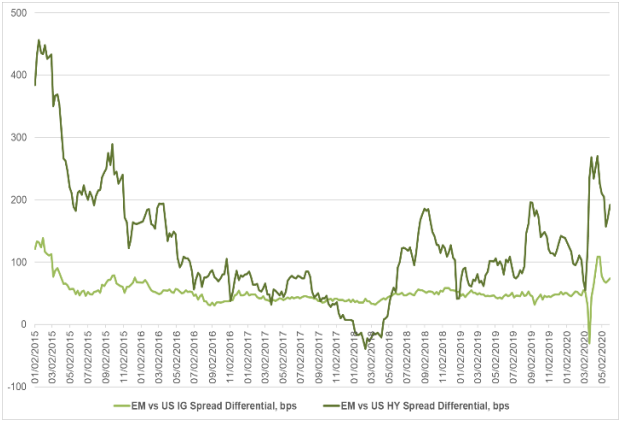
[5] Some developed market central banks (CBs) have or are looking at ways of alleviating the impact of such downgrades. For example, some CBs have already loosened collateral requirements monetary policy operations to account for such downgrades, which may help limit excessive market volatility following a rating action. Extending such central bank arrangements to EMDEs may be challenging given more constrained monetary policy frameworks and central bank balance sheets.

[6] Dependent on valuations and market conditions.

[7] Based on JP Morgan analysis of credit rating actions as of May 31, 2020. The number of 12-month rolling downgrades from investment grade is now around 50 compared to between 100 and 150 in early 2016. For HY, the corresponding number is at 304 which exceeds the peak level reached in 2016 and is close to the GFC peak of 414.

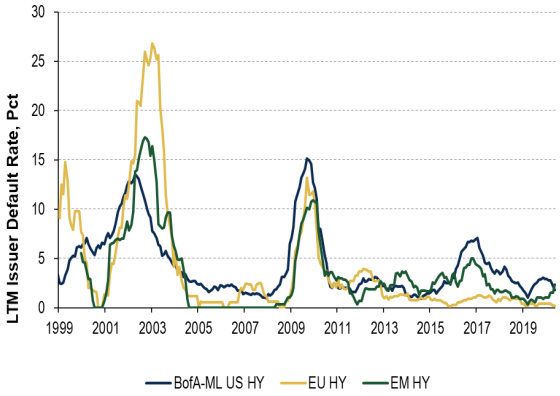
Exhibit 1. Market conditions

EM IG and HY spread differential to US IG and HY



Source: Bloomberg

Annual US, EU and EM HY default rates based on BAML HY index



Source: Bloomberg, BAML[8]

3. Methodology

Our stress test scenarios are deliberately simple to maintain transparency and consist of negative shocks of increasing magnitude to both corporate earnings and receivables. The objective of our stress tests is not to produce precise impact estimates, but rather to identify the sensitivity of corporate balance sheets to shocks of increasing magnitude. A typical scenario consists of an x percent reduction in earnings before income and taxes (EBIT) and a y percent reduction in receivables for every firm. Although many other factors contribute to financial vulnerabilities, such as currency composition and leverage, we focus on two widely used metrics: the Interest Coverage Ratio (ICR), a measure of a firm's debt service capacity, and the Quick Ratio (QR), a measure of a firm's ability to cover short-term liabilities -- a negative shock to EBIT reduces the ICR and a negative shock to receivables reduces the QR.

We focus on the impact of these shocks to the total amount of Debt at Risk (DaR) according to the ICR or QR in a country (or region). Firms that perform poorly on these metrics are more likely to become cash-flow insolvent, a situation in which a firm cannot service its debts and short-term liabilities out of earnings and liquid assets. We evaluate how much debt is associated with firms that are "at risk" according to the ICR, the QR, or both (this approach is analogous to Feyen et al. (2018)). Specifically, we calculate the total debt at risk (DaR) at the country level by aggregating the firm-level data.

- The ICR is defined as EBIT divided by interest expenses. A firm's debt is considered "at risk" if the ICR is less than or equal to 1, namely, profit cannot cover interest expenses coming due.

- The QR is defined as (current assets – inventories) / current liabilities. We estimate receivables by subtracting inventories and cash and cash equivalents from current assets,

[8] Default rate is based on BofAML indexes and calculated at an issuer level on a last 12 months basis.

and hence the quick ratio is alternatively (receivables + cash and cash equivalents)) / current liabilities. A firm's debt is considered "at risk" if the QR is less than or equal to 1, namely liquid current assets cannot cover current liabilities. In normal times, firms may be able to operate with a QR less than 1 in the expectation that they can raise funds quickly through lines of credit with banks or by issuing in capital markets to cover short-term obligations. However, the pandemic has impaired funding conditions considerably, particularly in EMDEs.

We define $DaR_{Y,Ct}$ as the total debt associated with companies that are "at risk" in country *C* in quarter *t* according to indicator *Y* (i.e. ICR or QR). Next, we define $DaR_{1,Ct}$ as the debt at risk in country *C* in quarter *t* according to one or more indicators.

$$DaR_{ICR,Ct} = \frac{\sum_i D_{i,t} 1(ICR_{i,t} \leq 1)}{\sum_i D_{i,t}} \; \forall i \; in \; country \; C$$

$$DaR_{Quick,Ct} = \frac{\sum_i D_{i,t} 1(Quick_{i,t} \leq 1)}{\sum_i D_{i,t}} \; \forall i \; in \; country \; C$$

$$DaR_{1,Ct} = \frac{\sum_i D_{i,t} 1(ICR_{i,t} \leq 1 \; OR \; Quick_{i,t} \leq 1)}{\sum_i D_{i,t}} \; \forall i \; in \; country \; C$$

$$DaR_{2,Ct} = \frac{\sum_i D_{i,t} 1(ICR_{i,t} \leq 1 \; AND \; Quick_{i,t} \leq 1)}{\sum_i D_{i,t}} \; \forall i \; in \; country \; C$$

Where *i* denotes individual firms and 1(.) is an indicator variable which is equal to one if the logical statement inside the bracket is true and zero otherwise. To quantify the impact of COVID-19 related earnings and liquidity shocks on non-financial corporate vulnerabilities, we calculate $DaR_{ICR,Ct}$, $DaR_{Quick,Ct}$ and $DaR_{1,Ct}$ for each shock scenario.

4. Data

Our sample consists of 2019Q4 balance sheet and income statement data of 16,934 listed non-financial companies in 8 industries in 73 countries spanning all six World Bank regions (see Annex). We use pre-pandemic, 2019Q4 data as the basis of our stress tests since this is the latest, most complete information available. Bloomberg is our primary data source.

The companies in our full sample represent US$ 22.1 trillion in total assets and US$ 6.05 trillion debt. **For the median country, total assets and total debt of these companies stand at 25 percent to GDP and 7 percent to GDP, respectively.** Exhibit 2 shows our sample coverage by region: EAP and SA regions stood out as having the highest debt and total assets, both in terms of absolute level and in terms of importance relative to country GDP. Although our sample contains a large number of firms in ECA and SSA, the shares of their debt and total assets relative to GDP are low.

Notwithstanding some regional and sectoral heterogeneity, we find that prior to the pandemic, the ICR is well above 1, the QR is at or around 1, and current liabilities slightly

exceed cash for the median firm. Exhibit 3 provides the main descriptive statistics of these financial vulnerability indicators and Exhibit 4 breaks them down by region and by sector.

- In 2019Q4, the median firm in our sample has an ICR of 2.57, and the 75th percentile of ICR is well above 1, suggesting that most firms in this sample are able to cover their interest expenses. At the same time, the 25th percentile is well below 1, suggesting that a sizeable portion of firms experience difficulties.

- In contrast, the median firm's QR is only slightly above 1, and firms between the 25th and 75th percentile have similar quick ratios slightly below or above 1. This suggests that many firms may be vulnerable to rollover risks if a sudden drop in liquid assets were to occur.

- Finally, strong cash buffers are crucial for firms during the economic slowdown. We therefore calculate the difference between cash and cash equivalent assets and current liabilities, scaled by total assets. Similar to Banerjee et al. (2020), we find that this number is slightly negative for the corporate sector . Current liabilities exceed cash and cash equivalents by 0.23 percent of total assets for the median firm, suggesting the specter of financial stress if funding conditions were to tighten and inventories cannot be promptly liquidated.

Our data on corporate insolvency are an index constructed as an average percentile rank of three indicators from Doing Business representing different aspects of the strength of corporate insolvency institutions of a country. The three indicators are Strength of insolvency and Legal rights index, Recovery rate and Quality of judicial process index, representing legal framework, process efficiency and quality of civic and community justice, respectively. We calculate an average percentile rank of these three indicators, where a higher percentile rank indicates weaker corporate insolvency institutions/higher corporate insolvency vulnerabilities.

Exhibit 2. Full sample coverage by region (2019Q4)

	Number of Firms	Number of Countries	Total Corporate Debt (Billions US dollars)	Total Corporate Asset (Billions US dollars)	Median Country Corporate Debt to GDP, percent	Median Country Corporate Asset to GDP, percent
EAP	6,992	9	2,459.3	7,943.2	13.4	44.5
ECA	3,138	20	526.2	2,009.4	4.2	16.2
LAC	932	16	759.3	2,173.5	6.3	25.2
MENA	1,019	12	429.7	1,507.2	11.9	38.6
SA	4,343	4	1,802.3	8,146.8	7.4	25.9
SSA	510	12	76.5	354.1	1.6	13.9
TOTAL	**16,933**	**73**	**6,053.2**	**22,134.3**	**6.9**	**25.0**

Note: EAP = East Asia & Pacific, ECA = Europe & Central Asia, LAC= Latin America & Caribbean, MENA = Middle East & North Africa, SA = South Asia, SSA = Sub-Saharan Africa.

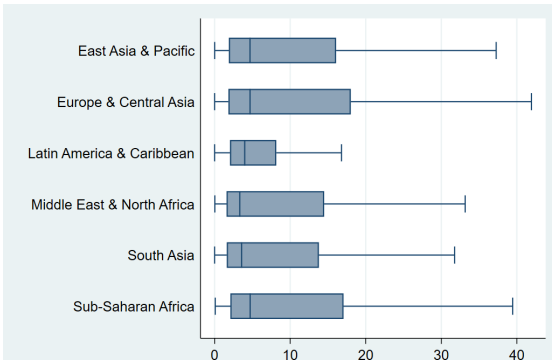
Exhibit 3. Key summary statistics of financial vulnerability indicators (2019Q4)

	Interest coverage ratio	Quick ratio	(Cash and cash equivalents – current liabilities)/total assets
Observations	9,921	16,377	16,802
25th percentile	0.35	0.61	-0.42
median	2.58	1.04	-0.23
75th percentile	9.77	1.88	-0.08

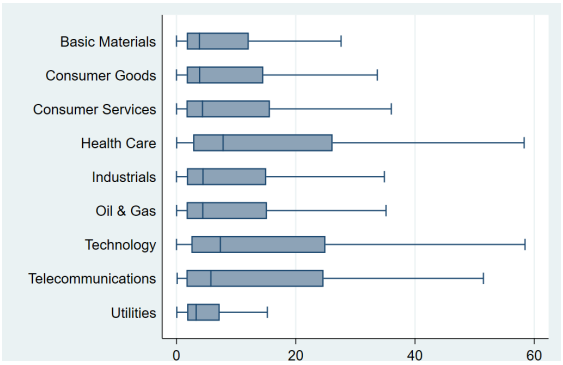
Exhibit 4. Key summary statistics by region and by sector

Interest coverage ratio

By Region

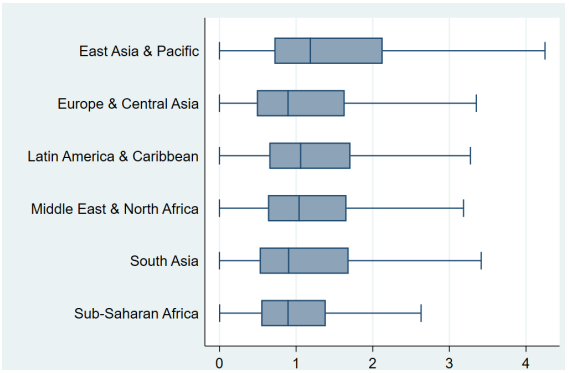


By Sector

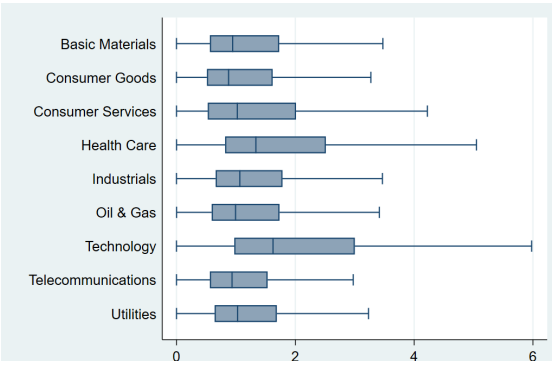


Quick Ratio

By Region

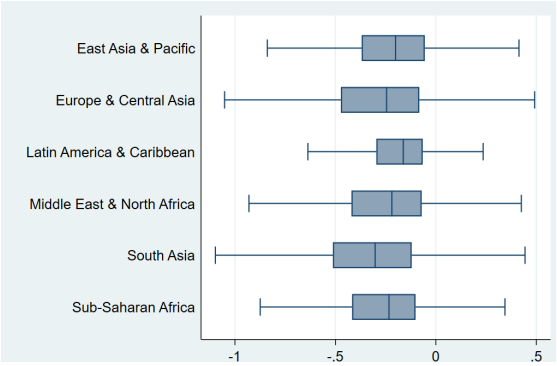


By Sector

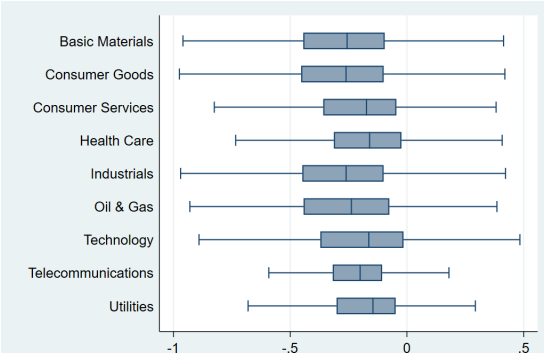


Cash – Current Liabilities, scaled by total assets

By Region



By Sector



Note: box plots show median, 25th and 75th percentile for each indicator; whiskers are upper and lower adjacent values.

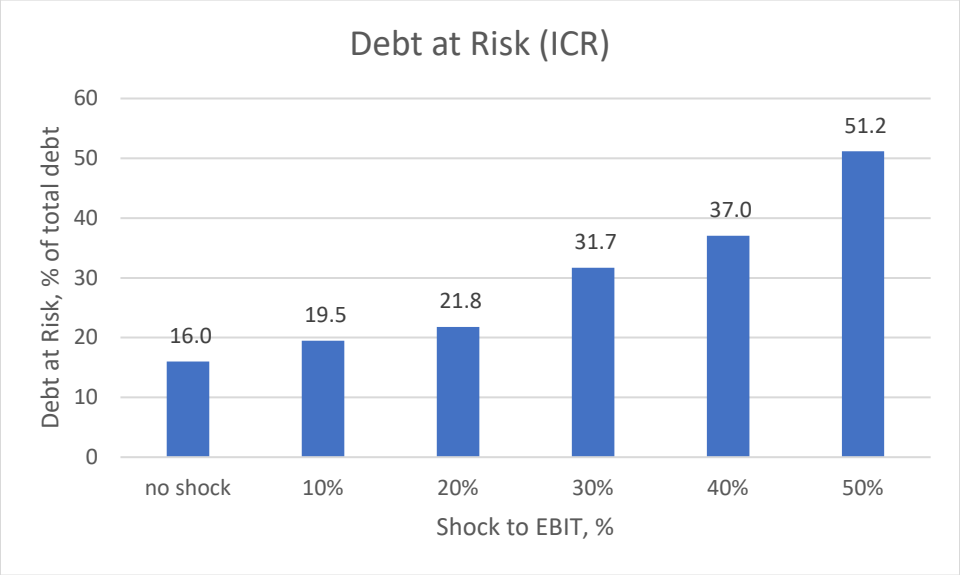
5. Corporate Stress Test Results

We focus on the sub-sample with non-missing ICR and QR, which tends to contain larger, more leveraged corporates. Of these, 9,656 firms in 86 countries do not have missing ICR and QR data (of which 56 countries have five or more firms). Together, these firms represent US$ 15.3 trillion in total assets and US$ 4.31 trillion in debt. Firms that have non-missing ICR or QR data tend to be larger compared to firms that have missing data (total assets of the median firm are US$ 84 million vs. US$ 45 million) and they are also more leveraged (median debt to assets is 17.7 percent vs 9.4 percent).

By the end of 2019, about 15 percent of debt was associated with firms that experience ICR challenges. Progressive shocks to corporate earnings result in a non-linear increase in total debt at risk according to the ICR. Exhibit 5 presents DaR_{ICR} as a function of the magnitude of negative corporate earnings shocks. In the absence of any earnings shock, 16 percent of corporate debt has an ICR less than 1 and is thus considered "at risk". This suggests that interest expenses are relatively small compared to EBIT for most firms. However, debt at risk increases non-linearly with the magnitude of earning shocks. For example, a 10 percent shock to earnings increases the fraction of debt at risk from 16 percent to 19.5 percent, a 19 percent increase. However, a 40 percent shock to earnings almost leads to a doubling of debt at risk. In the case of a 50 percent earnings shock, 52 percent of all corporate debt is considered at risk, an increase of 220 percent.

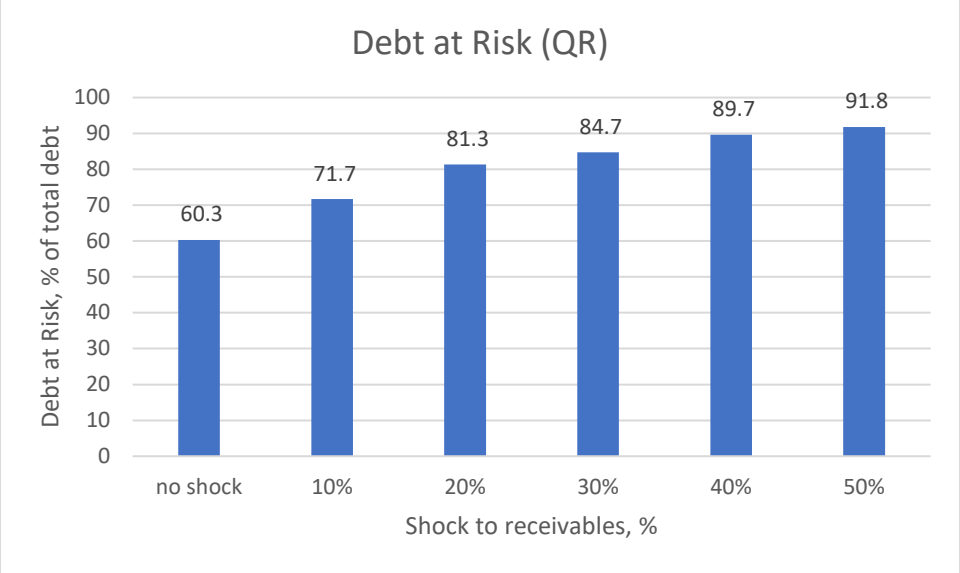
Before the pandemic, relatively weak QRs were a fairly common phenomenon. As a result, total debt at risk according to the QR is less responsive to progressively larger shocks than for ICRs. Exhibit 6 presents DaR_{QR} as a function of the magnitude of negative receivables shocks. Absent a shock to receivables, 60.3 percent of corporate debt is considered vulnerable due to the inability of current assets (minus inventories) to cover current liabilities, suggesting elevated vulnerabilities to liquidity strains. A 10 percent shock to receivables results in the largest relative increase in debt at risk to 71.7 percent, a 35 percent increase. Subsequent larger shocks lead to much smaller relative increments of debt at risk. A 50 percent shock to receivables renders 91.8 percent of corporate debt being at risk, a 52 percent increase.

Exhibit 5. Earnings shocks and debt "at risk" according to the ICR
Fraction of total corporate debt, %



Note: Sample only includes firms with non-missing ICR and QR.

Exhibit 6. Receivables shocks and debt "at risk" according to the QR
Fraction of total corporate debt, %



Note: Sample only includes firms with non-missing ICR and QR.

Prior to the pandemic, 63.9 percent of corporate debt across all countries in our sample was "at risk" according to *either* the QR *or* the ICR (DaR_1) of which 12.4 percentage points was "at risk" according to both (DaR_2). Exhibit 7 presents DaR_1 ("vulnerable") and DaR_2 ("very vulnerable") as a function of the magnitudes of simultaneous earnings shocks and receivables shocks. The DaR_1 is driven by QR and shows the steepest growth as receivables shocks increase when earnings shocks remain relatively low, and vice versa. A 30-30 percent earnings-receivables

shock produces a DaR_1 of 87.9 percent, a 38-percent increase. Analogously, the DaR_2 is driven by the ICR and reaches 28.5 percent at a (30, 30) shock, a 230-percent increase.

Exhibit 7. DaR1 and DaR2 under different shock scenarios to earnings and receivables

Panel 1: DaR1, % of total debt

		Receivables					
		No Shock	**10%**	**20%**	**30%**	**40%**	**50%**
Earnings	**No Shock**	63.9	74.8	84.2	87.1	91.4	92.9
	10%	64.6	75.5	84.4	87.3	91.5	93.0
	20%	64.9	75.8	84.8	87.3	91.5	93.1
	30%	71.6	82.4	85.4	87.9	91.9	93.3
	40%	72.7	83.3	86.1	88.5	92.4	93.8
	50%	81.5	84.1	86.8	89.2	92.8	94.1

Panel 2: DaR2, % of total debt

		Receivables					
		No Shock	**10%**	**20%**	**30%**	**40%**	**50%**
Earnings	**No Shock**	12.4	12.9	13.1	13.7	14.3	14.9
	10%	15.2	15.7	16.4	17.0	17.7	18.3
	20%	17.2	17.7	18.4	19.2	19.9	20.5
	30%	20.3	20.9	27.6	28.5	29.4	30.2
	40%	24.6	25.4	32.3	33.2	34.3	35.0
	50%	30.0	38.8	45.7	46.7	48.0	48.9

Note: Sample only includes firms with non-missing ICR and QR.

These results mask significant regional heterogeneity in pre-existing corporate balance-sheet vulnerabilities and their susceptibility to shocks. Exhibit 8 presents DaR_1 and DaR_2 for each region without any shocks and a 30-30 percent shock to both earnings and receivables. All regions will see a significant increase in DaR_1 in a shock scenario. Firms in EAP and MNA in particular already entered the pandemic with the highest vulnerabilities. Absent any shock, 91.6 percent of debt in MNA was already vulnerable, and 47.2 percent was very vulnerable. A 30-30 shock would see highly vulnerable corporate debt in MNA rise to almost 64 percent. Firms in SA appear the most susceptible to a shock. A 30-30 percent shock would see highly vulnerable debt surge from 10.6 percent to almost 40 percent.

The pandemic disproportionately affects certain sectors such as travel, hospitability, entertainment, tourism, energy and transportation. However, the debt of these firms does not appear to be significantly more vulnerable than in other sectors. We consider the following sectors particularly vulnerable to the pandemic: Aerospace & Defense, Oil & Gas Producers, Oil Equipment, Services & Distribution, and Travel & Leisure. Our sample contains 582 firms identified as belonging to these sectors. Combined, these firms represent US$ 2.3 trillion in total assets and US$ 646 billion in debt. Prior to the pandemic, 9.1 percent of the debt was highly

vulnerable. In a 30-30 shock scenario this increases to 14.9 percent and in a 50-50 scenario it would reach 19.7 percent.

Exhibit 8. DaR_1 and DaR_2 under different shock scenarios to earnings and receivables by region

		DaR1		DaR2	
	N	**(0,0)**	**(30,30)**	**(0,0)**	**(30,30)**
EAP	4,702	78.3	88.4	15.9	29.2
ECA	1,445	59.4	69.1	7.2	14.8
LAC	610	56.7	79.6	3.6	11.4
MNA	193	91.6	95.6	47.2	63.8
SA	2,493	43.0	97.9	10.6	39.5
SSA	207	75.8	93.8	8.8	16.5
Vulnerable sectors	582	73.7	78.9	9.1	14.9
All firms	*9,650*	*63.9*	*87.9*	*12.4*	*28.5*

Note: (0,0) = no shocks to earnings and receivables. (30,30) = 30 percent shock to earnings, 30 percent shock to receivables. Vulnerable sectors = Aerospace & Defense, Oil & Gas Producers, Oil Equipment, Services & Distribution, and Travel & Leisure.

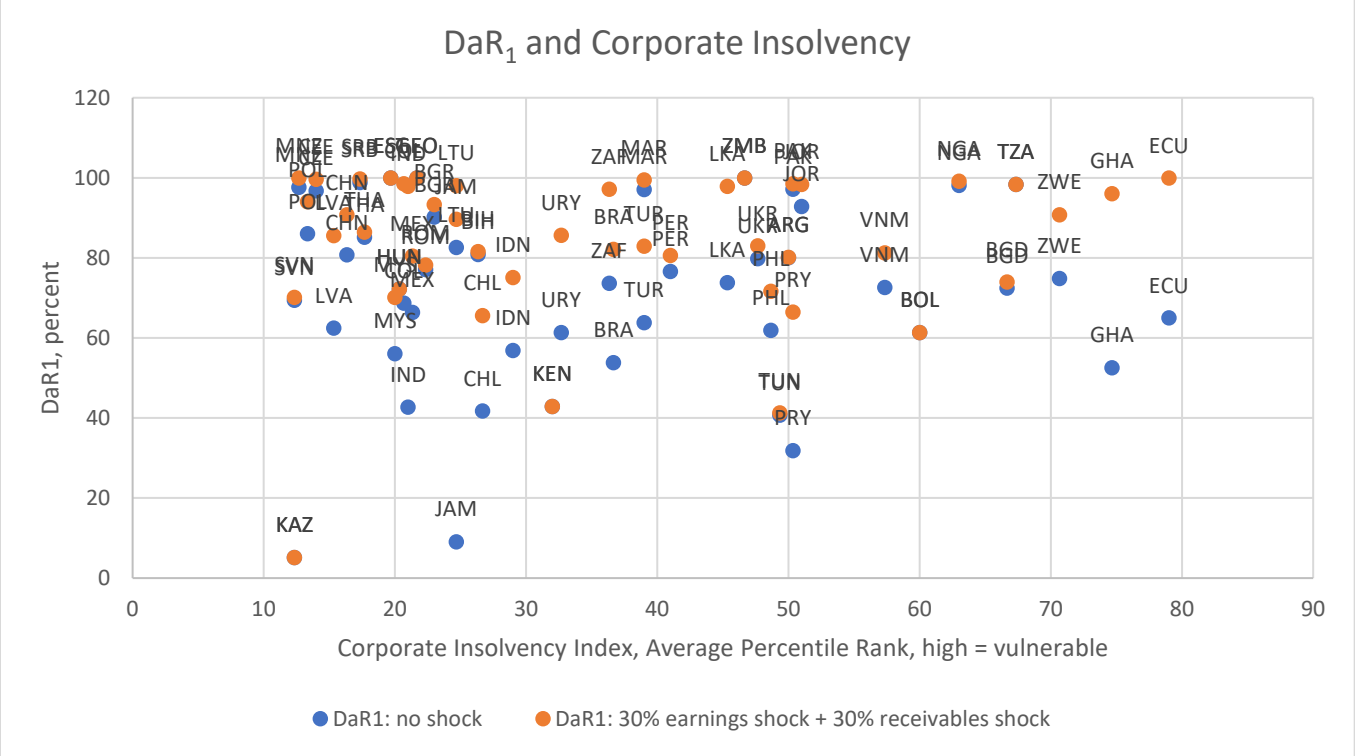
6. Corporate Balance Sheet Vulnerabilities and Corporate Insolvency Framework

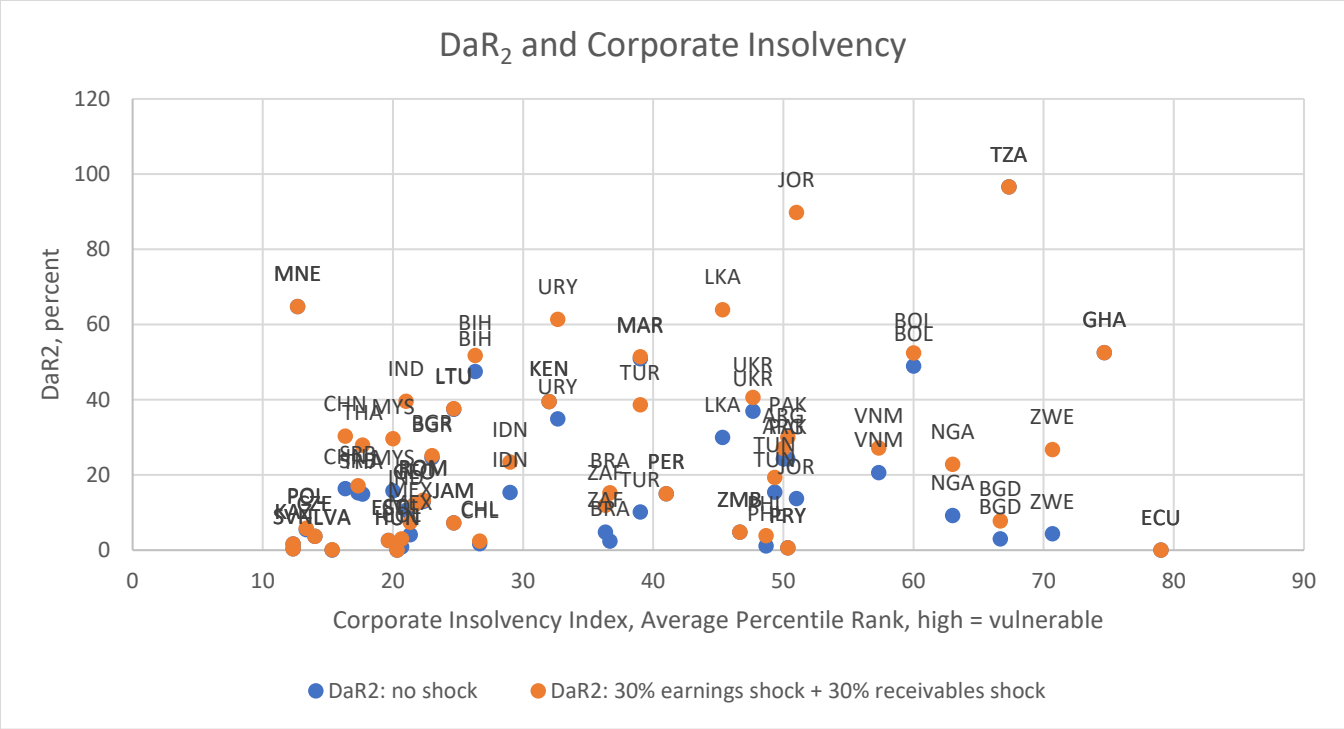
The most vulnerable countries should prepare for a rise in defaults in the corporate sector, which may lead to an increase in bad loans as a result of the COVID-19 crisis. To mitigate these negative effects and ensure a stable recovery, it is critical that countries rely on a strong legal and institutional framework for corporate insolvency. Indeed, the insolvency system can assist countries in responding to the COVID-19 crisis with a critical framework for collective action to save viable firms, maximize debt recoveries and preserve employment. The readiness of the insolvency system to deal with widespread default in the corporate sector is therefore essential in understanding the implications of the acute corporate vulnerabilities identified in our analysis. However, corporate insolvency institutions may weaken during the crisis due to the disruptions to basic operations of courts and insolvency agencies.

We find that a significant fraction of countries in our sample exhibit both elevated corporate vulnerabilities and weaknesses in their corporate insolvency frameworks, setting the stage for a 'perfect storm' of firm failure. While these vulnerabilities were already present by the end of 2019, COVID-19 related shocks may exacerbate these. For example, the insolvency system may become more inefficient due to case overload. Exhibit 9 presents country-level data on DaR_1 and DaR_2 and an index of corporate insolvency that measures the quality and efficiency of the insolvency system. Of the 56 countries in the figure, a significant fraction of countries has over 60 percent (15 percent) of corporate debt considered financially vulnerable according to at least one indicator (both indicators) and a corporate insolvency rank of over 50 percentile prior to the COVID-19 crisis (blue dots). A stress test scenario (orange dots) consisting of 30 percent shocks to both corporate earnings and receivables further raises DaR_1 and DaR_2 for these countries. Firms

exhibiting this double coincidence will have to rely on weak insolvency institutions during financial stress, further amplifying the effect of COVID-19 on corporate balance sheets.

Exhibit 9. DaR and Corporate Insolvency





Note: this figure presents information for 56 countries for which we have data on both Debt at Risk and on corporate insolvency index.

In light of the inefficiencies observed in the insolvency systems across EMDEs, some may turn to out-of-court workouts (OCWs) as a more efficient alternative to court-supervised insolvency proceedings for the resolution of corporate distress. Specifically, governments may need to develop a framework for encouraging negotiations between private debtors and their creditors, which has been a successful tool in past crises. As informal tools, OCWs can be put in place relatively quickly and work as complements or alternatives to the formal insolvency system.[9]

7. References

Banerjee, Ryan, Anamaria Illes, Enisse Kharroubi and José-Maria Serena (2020). Covid-19 and corporate sector liquidity. Bank for International Settlements Bulletin No.10, 2020.

Feyen, Erik, Norbert Fiess, Igor Zuccardi, Igor, Lara Pillonca (2017). Which emerging markets and developing economies face corporate balance sheet vulnerabilities?: a novel monitoring framework (English). Policy Research working paper; no. WPS 8198. Washington, D.C.: World Bank Group.

Gurhy, Bryan, Jing Zhao, Catiana Garcia-Kilroy, Ana Carvajal, Gonzalo Martinez Torres, Jose Antonio Gragnani and Tanya Konidaris (2020). COVID-19 Outbreak: Capital Markets

[9] For a more detailed analysis of OCWs and their benefits, please see a forthcoming FCI Technical Note on Out of Court Workouts and "A Toolkit for Out-of-Court Workouts" WBG (2016).

Implications and Response. COVID-19 Notes - Finance Series. http://pubdocs.worldbank.org/en/776691586478873523/COVID-19-Outbreak-Capital-Markets.pdf

Kose, Ayhan, Peter Nagle, Franziska Ohnsorge, and Naotaka Sugawara (2020). Global Waves of Debt: Causes and Consequences. Advance Edition. Washington, DC: World Bank.

Menezes, Antonia, Sergio Muro, and Uttamchandani (2020). COVID-19 Outbreak: Implications on Corporate and Individual Insolvency, COVID-19 Notes - Finance Series. http://pubdocs.worldbank.org/en/912121588018942884/COVID-19-Outbreak-Implications-on-Corporate-and-Individual-Insolvency.pdf

International Monetary Fund and World Bank (2020). COVID-19: The Regulatory and Supervisory Implications for the Banking Sector: A Joint IMF-World Bank Staff Position Note. https://openknowledge.worldbank.org/handle/10986/33793

8. Annex. Sample Coverage by Country

	Number of Firms	Total Corporate Debt (Billions US dollars)	Total Corporate Asset (Billions US dollars)	Median Country Corporate Debt to GDP, percent	Median Country Corporate Asset to GDP, percent
East Asia & Pacific					
Cambodia	80	0.2	0.9	0.9	3.4
China	7	1897.3	6288.0	13.4	44.5
Indonesia	18	100.7	319.9	9.1	28.8
Laos	205	1.5	2.7	8.0	14.1
Malaysia	15	145.1	439.2	39.7	120.2
Mongolia	294	0.1	2.0	1.0	14.8
Philippines	11	116.0	279.9	32.5	78.4
Thailand	254	159.2	482.0	30.1	91.1
Vietnam	105	39.1	128.6	14.9	49.2
Europe & Central Asia					
Bosnia And Herzegovina	5	2.0	13.9	10.2	69.4
Bulgaria	145	1.3	7.3	1.9	11.0
Croatia	3476	0.3	0.7	0.4	1.1
Czech Republic	46	8.3	32.6	3.4	13.2
Estonia	5	1.4	4.3	4.4	13.9
Georgia	7	0.1	0.3	0.3	1.6
Hungary	10	5.2	25.7	3.1	15.1
Kazakhstan	28	14.4	49.8	8.5	29.2
Latvia	163	0.3	1.4	0.9	3.9
Lithuania	14	2.2	6.7	4.1	12.6
Macedonia	40	0.4	2.2	2.9	17.3
Montenegro	22	0.8	4.6	15.5	84.5
Poland	26	42.6	177.0	7.5	31.3
Romania	3667	4.5	31.3	1.8	12.8
Russia	482	346.6	1357.6	21.2	82.9
Serbia	274	2.2	8.9	4.3	17.3
Slovakia	29	0.5	4.4	0.5	4.1
Slovenia	55	2.8	10.6	5.2	19.6
Turkey	100	81.1	224.0	10.9	30.1
Ukraine	48	9.1	46.2	6.0	30.7
Latin America & Caribbean					

Argentina	36	34.6	94.9	7.8	21.3
Bahamas	63	0.2	1.3	1.6	10.5
Bolivia	5	0.2	4.4	0.4	10.4
Brazil	22	371.5	985.5	20.1	53.4
Chile	29	107.3	342.1	36.5	116.3
Colombia	36	36.7	123.0	11.2	37.5
Costa Rica	5	0.8	2.0	1.3	3.3
Ecuador	807	0.5	4.4	0.5	4.1
Jamaica	53	0.8	4.6	5.3	29.2
Mexico	106	170.3	455.8	13.4	35.8
Panama	28	8.2	28.8	11.9	42.1
Paraguay	88	0.2	1.1	0.5	2.7
Peru	50	25.8	92.4	11.2	40.4
Trinidad & Tobago	102	1.7	26.2	7.3	115.8
Uruguay	77	0.2	1.1	0.4	1.8
Venezuela	275	0.5	7.2	0.7	10.3
Middle East & North Africa					
Bahrain	25	3.9	11.8	10.1	30.8
Egypt	12	10.9	38.6	3.6	12.8
Israel	32	109.4	263.3	28.2	67.9
Jordan	105	4.9	15.1	11.0	34.3
Kuwait	163	17.6	55.4	12.8	40.3
Morocco	518	8.5	28.9	7.1	24.3
Oman	20	13.3	35.8	17.3	46.8
Palestine	151	0.8	3.2		
Qatar	720	22.9	74.0	11.9	38.6
Saudi Arabia	128	178.4	815.4	22.9	104.6
Tunisia	347	12.0	31.6	30.9	81.6
United Arab Emirates	41	47.3	134.0	11.7	33.0
South Asia					
Bangladesh	24	7.8	27.4	2.5	8.6
India	175	1768.3	8025.5	60.2	273.4
Pakistan	196	19.1	70.4	6.7	24.8
Sri Lanka	12	7.1	23.4	8.2	27.1
Sub-Saharan Africa					
Botswana	607	0.1	1.1	0.5	5.7
Ghana	17	0.4	3.7	0.6	5.5
Ivory Coast	55	2.1	9.5	4.8	21.4

Kenya	291	4.4	14.6	4.4	14.8
Malawi	5	0.1	1.2	1.6	16.1
Mauritius	327	2.1	12.5	14.4	87.2
Nigeria	46	7.0	24.9	1.6	5.6
South Africa	7	58.6	271.6	16.3	75.7
Tanzania	18	0.3	1.8	0.4	3.0
Uganda	1419	0.2	0.8	0.5	2.5
Zambia	13	0.3	3.1	1.3	13.0
Zimbabwe	47	0.9	9.2	7.3	71.8