

The Re-Emergence of Sovereign Spread in Emerging Countries in the Post-Covid–19 Economy

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SUMMARY

The Covid-19 crisis and its economic consequences for emerging countries have highlighted the role of robust, inclusive, and equitable elements of multiple contingency lines to keep these economies away from falling into a devastating cycle of rising sovereign spread. This study first summarizes the crisis-fighting performance of the IMF and eight major RFAs since the outbreak of Covid–19. Then our theoretical model focuses on the deterioration of market expectations (namely about future global economic growth, funding conditions in key currencies and public default) influence on the sovereign spread, by employing a structural panel Vector Autoregression. The results showed that sovereign spread depended not only on the global and local growth or the external funding environment but on the market sentiment as well. Also, the results pointed out the importance of financial supports by international actors like the IMF and partially the RFAs in managing the sovereign spread.

KEYWORDS: sovereign spread, emerging countries, Regional Financial Arrangements, panel SVAR, Covid-19, IMF

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Sovereign spreads are valuable indicators of the fragility of the countries' financial structure and in the case of emerging market economies (EME), these are typically applied to measure the risk of market failure and to assess the external financing conditions (Czczeli et al., 2020). Sovereign bond markets have an important role in the financing structure of EMEs, where yield spreads estimate the premium enforced by investors to hold securities issued by EME borrowers. This premium shows the difference between the yield on a bond of an emerging economy and the yield on a bond of a risk-free economy. However, the spread is affected by the resilience of the economy, which is complex to assume by its susceptibility, temporal and societal dimensions (Halmai, 2021). The question is about the role of market sentiment changes, driven by expectations about funding, growth and default on global and local scales.

Given that debt contracts can't be enforceable by international financial markets (Eaton et al., 1986) if the country fails to maintain its commitment to repaying its loans, it is temporarily excluded from credit markets. Therefore, the international creditors consider the probability of the country default risk in their lending programs and charge the country sovereign risk premium accordingly (Fink – Scholl, 2016). Sovereign debt funding depends mainly on domestic (like savings accumulation directly on the bond markets and indirectly through intermediaries) and foreign funding conditions (e.g. sentiment towards risk and funding costs) as well as investors' expectations about future growth and risks (Kocsis – Monostori, 2016). Therefore, the event of a sovereign default can be interpreted as the inability of the state to renew its debt at a reasonable price (Sávai, 2016). The occurrence of such an

event is not just triggered by the sheer size of the debt, but mostly due to changes in the collective sentiment as the flight of the investors to safe assets, or the sudden scarcity of funding in key currencies. The divergence of government bond yields is also a mild but recurring phenomenon on the markets when the previous (and sometimes decade-long) homogeneity among the different sovereigns' yields deteriorates due to some newly emerged country-specific issues (Bearce, 2002).

To highlight the most current shock, the Covid-19 pandemic disrupted the global supply chains in many industries, causing a more abrupt fall in the aggregate supply than in the aggregate demand, which gap can contribute to the re-emergence of inflation after the post-2008 nearly deflation period. Since the pandemic spread governments' expenditures have risen to combat the consequences of the pandemic while their revenue has decreased intensively due to automatic stabilizers. Therefore, according to *Balima and Sy* (2020), it is expected that compared to pre-pandemic expectations, median debt raised in advanced economies by about 17% of GDP, in emerging economies by 12%, and in low-income countries by 8%. According to *Arellano et al.* (2020), by integrating the standard epidemiological dynamics into a model of sovereign debt and default, they found that due to significant output losses, the elevated death toll of 0.16% of the population, and a prolonged debt crisis lasting four years, the welfare cost of a pandemic for an emerging country is about 28% of annual output and about 7% for its lenders. Also, they compared their model with an otherwise equivalent one with perfect financial markets and found that about a third of these costs come from sovereign default risk. Moreover, *Espino et al.* (2020) developed a framework that integrates Covid-19 as an

unexpected combination of shocks into a model of sovereign default to study optimal fiscal and monetary policies for emerging markets and they found that the economic impact of the epidemic led to increasing the default risk.

From the second half of the twentieth century, a system of international financial institutions was established to consolidate possible near-bankruptcy situations and to temporarily replace market financing. At this time multiple ad-hoc and institutionalized contingency-lines were established to backstop the self-reinforcing market processes towards the previously mentioned yield divergence or sovereign default:

① First (domestic institutional) line: sustainable fiscal policy, credible monetary policy, macro prudence of the financial sector (IMF, 1999; Sági – Ferkelt, 2020).

② Second (ad-hoc, central bank) line: International reserves, Sovereign Wealth Funds, foreign exchange SWAP lines among central banks (Sohn – Chung, 2016; Fritz – Mühlich, 2019).

③ Third (multilateral institutionalized) line: Regional Financial Arrangements, International Monetary Fund (Sohn – Chung, 2016).

Regional financing arrangements have become increasingly important over the past decade, especially after the subprime crisis. They have also affected the role of the IMF as a crisis lender, which has again become more important in the wake of the coronavirus, so it is important to examine the effects of these agreements and the Fund's lending on various financial markets. Also a few papers studied the default risk impact of Covid-19 for emerging countries (Arellano et al., 2020). Evaluating the effects of their sovereign risks is also justified by the fact that emerging countries are affected more by financial turbulences even if they have not defaulted, but they have

experienced bigger exposure towards foreign funding and the balance sheet of financial intermediaries (Czelleng, 2020).

This paper focuses on the following research question: assuming that sovereign spread is a sign of the deteriorating resilience for a country (as a result of Covid-19), can we determine which financial and macro-variables have an influence on this process in emerging countries which later can trigger the involvement of the third line of contingency measurements (like the IMF and RFA)?

For this reason, the examined period runs from the first quarter of 2005 to the first quarter of 2021 – during some serious turbulences emerged, like the subprime crisis, the sovereign debt crisis, and the pandemic as well. The analyzed sample represents the group of emerging market economies, covering Europe (N=4), Asia (N=8), Americas (N=5), and Africa (N=2). To analyse the sovereign spread in the post-Covid-19 economy when macro- and financial conditions are changing in emerging countries, this paper employs a structural panel Vector Autoregression to show the dynamic interactions among the variables on the long run.

Our results support the idea that sovereign spread for emerging economies is determined by both domestic and global growth expectations and external funding conditions (mainly the swap markets). Also, the results emphasis on the importance of involvement of the international actors (like the IMF and RFAs).

The study is structured as follows: the first section summarizes the theoretical background of contingency lines (the IMF & RFAs) and sovereign debt crisis and contains our theoretical model. The second section presents the examined dataset and the summary of structural panel Vector Autoregression models, while the third

contains the results of the model testing. Finally, the fourth section summarizes the main purpose and conclusions of our study.

THEORETICAL BACKGROUND

The Covid–19 pandemic required extraordinary measures not just on the country level but on the level of the institutionalized multilateral actors as well, to avoid a widespread systemic meltdown. In this section, we explained the efforts by the IMF and the RFAs in the management Covid–19 crisis and a theoretical model is formed to represent the impact of internal and external variables on the sovereign spread and to underline the importance of the existence of the multilateral actors.

IMF and the RFAs

The IMF provides lending facilities for member countries under concessional and non-concessional arrangements, also it can provide outright loans for them which both require approval by the IMF Executive Board. The lending arrangements are subject to periodic review, so member countries must meet specific terms to access them. But to access the outright loans, the members do not have to observe specific terms (IMF, 2021a).

Non-concessional financial support is available for all IMF members through the IMF's resources in the General Resources Account (GRA). However, the concessional term is arranged (currently at zero interest rates from June 2021) for members with low income through the Poverty Reduction and Growth Trust (PRGT). GRA-supported programs are usually for solving the balance of payment (BOP) problems during the program period, but PRGT programs are expected to

address the member's BOP problems for a longer duration (IMF, 2021b).

To meet a broad range of urgent needs which can arise from commodity price shocks, natural disasters, and domestic fragilities, IMF also provides rapid and low-access assistance through the Rapid Financing Instrument (RFI) on non-concessional arrangements for all member countries with urgent BOP needs. Those member countries which are eligible for the PRGT can use the corresponding Rapid Credit Facility (RCF) on concessional arrangements as well. So RCF is available only to low-income countries which are eligible for concessional financing (IMF, 2021b).

The IMF launched the Catastrophe Containment and Relief Trust (CCRT) in 2015 to respond Ebola outbreak and introduce a set of reforms to the CCRT and expanded it in March 2020 since the Covid–19 outbreaks. The Total Debt Service Relief by IMF for 29 Countries since the pandemic outbreaks is equal to SDR 351.53 million / \$ 488.7 million which includes two tranches (1st Tranche: SDR 183.13 million / \$ 251.24 million and 2nd Tranche: SDR 168.40 million / \$ 237.46 million) (IMF 2021c).

To respond to Covid–19 liquidity problems, first, the IMF increased temporarily the limit on annual access to RFI and RCF from 50% to 100% of the quota, and the cumulative limit was raised from 100% to 150% of quota (Balima – Sy, 2020). It then increases the overall limit on annual access on GRA by 245% and on PRGT to 150% of quota. But it does not represent an increase in the underlying resource pool of GRA even PRGT. If low-income countries which are eligible for PRGT use all their increased access, the available resources of lending would reach their limits then the IMF must request fundraising to replenish PRGI for further concessional financing (Stubbs et al., 2020).

The IMF has approved approximately

\$250 billion in various lending facilities and debt service relief which is equal to a quarter of its total lending capacity available for its members. From this total amount of financial support approved by IMF, about \$105.5 billion financial assistance was disbursed to 85 member countries under different types of emergency financings like the RFI, the corresponding RCF etc. Chile obtained the largest loan (\$23.9bn under FCL), followed by Colombia (\$16.9bn under both FCL and AFCL) Peru (\$11 bn under FCL), and Egypt (\$7.9bn under both RFI and SBA); Ecuador, Ukraine, South Africa, Nigeria, Jordan, Pakistan, and Ghana also had loans of over \$1bn approved (IMF 2021c, IMF 2021d).

According to an estimation by both the IMF and the United Nations' conference on trade and development, Emerging Markets and Developing Economies (EMDEs) need \$2.5tn immediate financial support to overcome the economic consequences of Covid-19. Therefore, the speed and the volume of liquidity provision are becoming more important to minimize the economic and social damage from the pandemic. However, the IMF faces some limitations in its efforts to combat the financial crisis. According to *Marino and Volz* (2012), the first limitation is the political stigma problem. Due to the stigma problem, member countries must tolerate the political pressures and severe conditionality and economic interventions to meet the IMF qualifications and its strict surveillance program (Sohn – Chung, 2016). Another critique of the IMF's performance is regarding its insufficient credit volume to address the major crisis (Stubbs et al., 2020).

The great uncertainty surrounding the ability of the IMF in overcoming the crisis has made the role of RFAs more important. RFAs became a major component of the global financial safety net such that the sum of their lending capacity is comparable with the IMF's

– almost \$1tn (Stubbs et al. 2020). Also, Financial and economic crises stemming from Covid-19 have raised the need for countries to face the financial consequences of the crisis in a more prompt and efficient manner. So, for those economics that is not able to meet the new type of pre-conditional IMF lending, RFA is a relevant financial safety element (Mühlich – Fritz, 2018).

Moreover, geographically RFAs are closer to their members, and they have deeper local knowledge than the IMF, so they can provide targeted support and implement policies that help a member overcome a crisis. Also, as the number of RFA's members is limited, financial decisions by an RFA can be done quicker than the IMF that can be considered as aid to facilitate immediate disbursement of funds during a crisis (Centralny, 2016). So, RFAs are expected to provide more efficient and flexible support in the cases of temporary liquidity or financial market crisis within a region.

By strengthening RFAs, the costs of maintaining foreign exchange reserves and overcoming temporary financial distress are reduced for emerging countries since they provide timely financial support. Also, RFAs can be more flexible in supporting countries in a crisis situation and adjust conditionality based on the economic and political circumstances of member countries. While we can see the complete opposite side with the IMF when it imposed stringent sanctions on Asian countries with bailout packages during the Asian financial crisis. *Table 1* shows whatever has been done from the start point of the pandemic to February 2001 by six major RFAs.

McKay et al. (2011) analyzed how the IMF and the RFA programs fulfilled the criteria for optimal financing arrangements and how these contribute to the stability of the international monetary and financial system. They found

Table 1

**RFAS STRUCTURE AND THEIR ACTIVITIES
(MARCH 2020–FEBRUARY 2021)**

	Eligible members	Lending capacity	EMDE's share of lending capacity	Total approved or disbursed
European Stability Mechanism (ESM)	Members of the euro area	Maximum €500 billion	-	€240 billion
Chiang Mai Initiative Multilateralization (CMIM)	Brunei Darussalam, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, Philippines, Singapore, South Korea, Thailand, Vietnam	\$240 billion from 2012	\$201.6 billion	None
BRICS Contingent Reserve Arrangement	Brazil, China, India, Russia, South Africa	\$100.0 billion	\$100.0 billion	None
Eurasian Fund for Stabilization and Development (EFSD)	Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia and Tajikistan	\$8.5 billion	\$ 5.4 billion	\$650 million (includes \$50 million to Tajikistan, \$100 million to The Kyrgyz Republic, 500 million to the Republic of Belarus)
Arab Monetary Fund (AMF)	Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, Yemen	\$4.8 billion	\$4.8 billion	– \$639million loan to Egypt – \$127million loan to Morocco – \$59million loan to Tunisia – Disbursement on preexisting arrangement to Jordan for \$38 million – Disbursement on preexisting arrangement to Sudan for \$45 million
Latin American Reserve Fund (FLAR)	Bolivia, Colombia, Ecuador, Peru and Venezuela, Costa Rica, Uruguay and Paraguay	\$3.1 billion	\$3.1 billion	Negotiated with Ecuador for \$418 million
South Asian Association for Regional Cooperation (SSARC)	Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka	\$2.0 billion	\$2.0 billion	\$150 million swap activated by Maldives under \$400 million swap arrangement \$400 million swap arrangement signed by the Reserve Bank of India and Sri Lanka and swap pending

Source: authors' compilation, based on EFSD (2020), FLAR (2020) and ESM (2020)

some similarities between them in terms of organization, governance structure, decision-making processes, and lending facilities, but on a smaller scale, but they also showed that RFAs have comparative advantages, such as quicker access to data, and RFAs can have superior information about an economy in crisis and react more quickly to address effectively the economic environment. On the other hand, RFAs have smaller lending amounts than the IMF, and RFAs are less equipped with technical expertise (McKay et al., 2011). Volz (2012) examined the ways of cooperation between RFAs and the IMF, and he demonstrated that prior cooperation between them should reduce the risk of failure to cooperate in the midst of the crisis, and prevent the IMF from weakening in its role as the main guardian of global financial stability, too.

Theoretical Model

The objective of the paper is to describe, how the tides of market sentiment can turn and push emerging economies out from market-based public debt funding towards supranational, RFA or IMF funding in crisis scenarios. Our theoretical model (1) focuses on the country-specific sovereign spread ($10Y_{i,t} - 10Y_{US,t}$), which represents both the higher anticipated risk of the underlying country and the external exposure of this economy. On the one hand, a slight and moderate premium represents country-specific issues, like the savings-investment balance, expectations about growth and future inflation, and convergence towards economic regions (Boros – Sztanó, 2021; Hubert, 2017). However, on the other hand, their significant increase can be the sign of rapid changes in funding behaviour and appearance of the flight to safety anomaly. This model identifies the

following market-specific aspects to describe the changing sentiment that drives sovereign spread of the emerging economies. Namely, they are expectations about global economic growth (captured through commodity prices), funding conditions in key currencies (which determines the cost of foreign funding (Botos, 2016)), and willingness of the investors to purchase emerging currencies and their expectations about the likelihood of public default – while the domestic economic growth remained a solely country specific factor. Funding conditions can deteriorate significantly under systemic crises even if there were no changes neither in the economic policy nor in the macroeconomic conditions. Therefore, monetary policy decisions are appearing indirectly only, compared to Füzessi et al. (2017). Our approach focuses only the market-driven variables (similarly to Saadaoui – Boujelbene, 2014), what differs from the others when mostly domestic variables were considered by looking where countries made their policy-mistakes (Mongelli – Camba-Mendez, 2018).

The sovereign spread can be derived from the Brent oil price (Oil_t) as a general global economic growth proxy variable following Guesmi (2013); from the dollar-funding market tensions, captured with the currency basis swap rate ($CBS_{i,t}$) where the negative values are indicating an increasing scarcity in dollar-funding (Kick et al., 2018); from the external balance, what is represented by the foreign exchange rate ($FX_{USD,i,t}$), which can represent shock spillover effects; from the economic output, described by the GDP ($GDP_{i,t}$) which also represents the efficiency of public spending (Kutasi – Marton, 2020); and the a market sentiment about the likelihood of the public default, represented by the Credit Default Swaps of the 5-year government bonds ($CDS_{i,t}$) (Kocsis – Monostori, 2016). While CDS should approximate the difference

between the risk-free and the risky bond as *Kunovac and Ravnik* (2017) suggested, data is generated by trading activity, therefore it represents investors' expectations about the probability of future defaults.

The exogenous shocks are represented by the dummy variables ($dummy_{d,i,t}$), namely the recession in the Eurozone (based on the European Commission Business Cycle Clock) and in the US (based on the NBER business cycle database) in general, as well as the country-specific IMF loans (Stand-By Arrangements, Flexible Credit Line and Rapid Financing Instrument) and simultaneous RFA support, fixed and stabilized exchange rate regime dummies (from the IMF AREAER database) and the EU-membership was used to sign the assumably higher resilience of these countries.

$$\Delta(10Y_{i,t} - 10Y_{US,t}) = const. + \beta_1 \Delta \ln Oil_t + \beta_2 \Delta CBS_{i,t} + \beta_3 \Delta \ln FX_{USD,i,t} + \beta_4 \Delta \ln GDP_{i,t} + \beta_5 \Delta \ln CDS_{i,t} + \beta_{6:10} dummy_{d,i,t} \quad (1)$$

The model represents each i^{th} ($i=\{1:18\}$) countries in t quarter (Q) of years ($t=\{1:65\}$) between 2005 Q1 and 2021 Q1.

Intuitively we can expect the following anticipated findings: increasing oil prices are representing the market expectations about future global growth, so they can have a moderate contribution towards a moderate increasing risk behaviour ($\beta_1 > 0$). A decreasing currency basis swap rate represents a growing scarcity in USD funding, therefore a growing sovereign spread ($\beta_2 < 0$) can be associated with it. A depreciating currency contributes to higher premium, even though indirect interventions under a pegged or dirty floating regime ($\beta_3 > 0$). Meanwhile an increasing economy activity can contribute to calmer pricing ($\beta_4 < 0$). Public default can be associated with poor domestic funding of the public debt and the disappearance of the

foreign funding under times when domestic institutions are not able to withstand systemic shocks – therefore they are not able to renew the expiring debt under reasonable yields. Increasing CDS values are representing a more cautious attitude towards sovereign risk with a higher sovereign spread ($\beta_5 > 0$).

DATA AND METHODS

Data

This section summarizes the main information about the sources of the variables (described in the theoretical model) and the sampling. Since we are using quarterly data from 2005 Q1 to 2021 Q1 to model the developments of the sovereign spread in emerging economies, we had to combine multiple data sources – but mostly we used the Refinitiv Eikon database for financial time series (*Table 2*). Business cycles were downloaded from the European Commission and the NBER databases, which can be considered official sources. Meanwhile, IMF-data was used to determine the arrangement and expiration of the different lending facilities for each country and to decide that the de-facto exchange rate arrangement is floating- or pegged-like.

Since the list of emerging economies is too wide for such an analysis and some of the financial market data is not available for them (especially in the case of currency base swap), to minimize the number of missing variables in the later-described unbalanced panel regression models, we defined a reasonable set of countries, following mainly *Hanedar et al.* (2014). In this case, our database (*Table 3*) incorporated 18 countries from 4 continents (in a 4 countries per continent breakdown, except the continent-size India and China), to

Table 2

DATA SOURCES

Variable (2005Q1-2021Q1)	Notation	Source
10-year sovereign bond yield of the i^{th} country	$10Y_{i,t}$	Refinitiv Eikon
US 10-year sovereign bond yield	$10Y_{US,t}$	Refinitiv Eikon
Crude Oil Brent – ICE	Oil_t	stooq.com
3-month currency basis swap rate against USD	$CBS_{i,t}$	Refinitiv Eikon
currency in USD denomination	$FX_{USD,i,t}$	Refinitiv Eikon
GDP	$GDP_{i,t}$	IMF
Credit Default Spread of the 5Y sovereign bond	$CDS_{i,t}$	Refinitiv Eikon
recession in the US	dummy_rec_US	NBER Business Cycle Dating
recession in the Eurozone	dummy_rec_EU	European Commission Business Cycle Clock
stand-by, extended, flexible and rapid arrangements	dummy_IMF_RFA	IMF Lending Commitments, RFA program
pegged and stabilized (non-floating) exchange rate regime	dummy_FX	IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)
European Union membership	dummy_EU	European Commission

Source: authors' compilation

Table 3

SAMPLE COUNTRIES

Region	Countries
Europe	Hungary, Czech Republic, Poland, Russia
Americas	Mexico, Brazil, Chile, Colombia, Peru
Asia	South-Korea, India, Indonesia, China (People's Republic of), Turkey, Philippines, Malaysia
Africa	Egypt, South Africa

Source: authors' compilation

represent both the commodity¹ and the manufacturing² exporter countries and to look further than the usual BRICS-sampling in the literature. The common characteristics of these countries that they presented rapid GDP per capita growth since the 1990s, but still lagging behind the advanced economies, while in the past they

were supported by the IMF and nowadays they are participating in one RFA or joined the EU. Some emerging economies were left out from the panel since they joined to the Eurozone (like Slovakia or Slovenia), or similar countries were already included into the sample as well as some of them did not had sufficient financial derivative data.

Methods

To test the theoretical model, this paper uses a structural panel Vector Autoregression (SVAR) model (with Eviews 11 econometric software) to analyse the endogenous relations among the variables to show the long-term relations through the accumulated impulse response functions and the variance decomposition.

VAR processes describes the data generation process of a smaller amount of time series variable, where a priori endogeneity is assumed for each variable and their dynamics are considered. This procedure accounts the dynamic interactions of a set of N time series variables: $y_t = (y_{1t}, \dots, y_{Kt})'$. The basic VAR model can be defined in the following structural form (2) (Lütkepohl – Kratzig 2004) (with a time lag p and three variables with structural coefficients A and A^s):

$$Ay_t = A_1^s y_{t-1} + \dots + A_p^s y_{t-p} + Bu_t, \text{ where } \varepsilon_t = A^{-1}Bu_t, \text{ and } S = A^{-1}B. \quad (2)$$

In the long-term restriction of Blanchard and Quah (1989) (3), the shock is represented in the row of the F -matrix where the variable appears, and the cumulative long-term effect of the shock is zero and Ψ the long-term multiplier ($F = \Psi S$) is:

$$(I - A_1 - \dots - A_p)^{-1} \varepsilon_t = \Psi \varepsilon_t = Fu_t. \quad (3)$$

The structure of the F -matrix describing long-term effects and in the Eviews 11 econometric programme it is determined by the loading order of the variables into the VAR model – assuming that there will be a shock that will affect each variable, and the last variable of the sequence will be the one which affects itself only. The structure of the F -matrix was determined by our theoretical model with provided the highest, global influence for the oil as a general growth

proxy variable and the smallest, local for the sovereign spread, using the following ordering: $\Delta \ln Oil_{i,t}, \Delta CBS_{i,t}, \Delta \ln FX_{USD,i,t}, \Delta \ln GDP_{i,t}, \Delta \ln CDS_{i,t}, \Delta (10Y_{i,t} - 10Y_{US,t})$.

The impulse response functions can be considered as the effect of a unit shock on a given model variable, where the shock of variable i to variable j , ceteris paribus, is simply the order of the elements in row i and column j . The variance decomposition makes it possible to determine which shocks are decisive in the short- and long-term evolution of certain variables, i.e. the proportion of the uncertainty of variable i that can be attributed to the j^{th} shock after period h .

RESULTS

The actions of the IMF and RFAs can be only observed indirectly in this case since the exogenous shock variables are not visible in the impulse response functions, but necessary to manage excessive changes in the dataset. Meanwhile their actions have a footprint on the country-specific funding conditions (through their currency swap and lending operations) and even on their growth (since GDP is affected by public consumption). In this section, the descriptive statistics of the dataset are presented at first to show that centred, similarly scaled and stationary inputs were used. Then, the impulse response functions and the variance decomposition of the structural panel VAR model were presented to underline the dynamic interactions among the variables – and to show that we were able to meet the requirement of no autocorrelation in the residuals.

Descriptive statistics of the input data (Table 4) shows a centred dataset after the differentiation, while the usage of logarithm provided similarly scaled data. The apparent fat tailedness at some of the variables will require the

Table 4

DESCRIPTIVE STATISTICS OF THE INDIVIDUAL SAMPLES

	$\Delta CBS_{i,t}$	$\frac{\Delta(10Y_{i,t} - 10Y_{US,t})}{10Y_{US,t}}$	$\Delta \ln Oil_t$	$\Delta \ln CDS_{i,t}$	$\Delta \ln FX_{USD,i,t}$	$\Delta \ln GDP_{i,t}$
Median	0.0000	-0.0394	0.0451	-0.0397	-0.0004	0.0311
Std. Dev.	0.8571	0.8227	0.2253	0.2797	0.0635	0.0762
Jarque-Bera (<i>p</i>)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Im, Pesaran and Shin (<i>p</i>)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	344.0000	1009.0000	1152.0000	886.0000	1116.0000	911.0000

Source: authors' calculation in Eviews 11

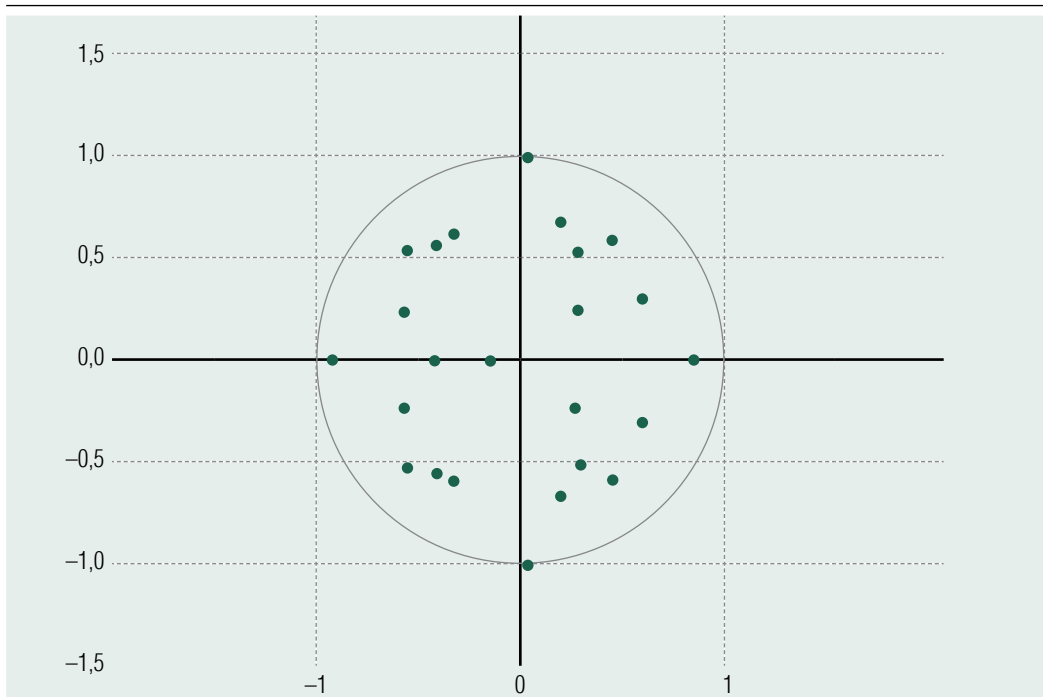
inclusion of the dummy variables to represent the outliers and structural breaks in the model. All input variables have no unit root according to the Im, Pesaran and Shin test ($p < 0.05$).

The Bayesian information criteria (BIC)

suggested the usage of 4 lags, which provided such roots of characteristic polynomial which were inside the unit circle – meaning that the model satisfied the stability condition (*Figure 1*).

Figure 1

INVERSE ROOTS OF AUTOREGRESSIVE CHARACTERISTIC POLYNOMIAL



Source: authors' calculation in Eviews

The accumulated impulse responses are indicating the influence of each variable's shock in the long run on the sovereign spread (*Figure 2*). The oil price acted as a moderating proxy variable for future growth expectations, meaning that its increase reduced sovereign spreads on short run (for the first 4 quarters). Increasing oil prices can indicate stable capital inflow into the emerging markets, directly because they are commodity exporters and indirectly because an expanding world economy demands more manufactured products. Funding conditions in the US (CBS) had a 4 quarter long negative impact, supporting our initial expectations about the relationship between the international funding channels and the domestic conditions. USD private liquidity transfer is organized through these channels (mostly from US money market funds to main regional banks), what can be partially managed by central banks and RFAs. Meanwhile, the foreign exchange rate behaved as the uncovered interest rate parity suggested currency depreciation was followed by an increasing sovereign spread. Floating currency regimes can both act as the absorbers and the indicators of external shocks, by providing some elasticity to the global financial network. Economic growth (GDP) increased sovereign spread only on the short run (4 quarters), showing that economic recovery resets the spread as well. Meanwhile higher anticipated sovereign spread through high CDS values are causing an elevated sovereign spread on the long run – because of a changing market sentiment, where investors desire more insurance against sovereign risk (this result was similar to *Török (2022)*). Meanwhile all the dummy variables were used efficiently to represent the exogenous institutional and market shocks, to overcome to problem of outliers in the dataset.

The variance decomposition (*Figure 3*) of the sovereign spread shows us each variable's

contribution. Namely, the global growth proxy (Brent) had the highest impact, covering more than 30 percent of the variance during the timeframe. Meanwhile, the economic output (GDP) had a constant 20% influence. The CDS had an additional 10% continuous importance, what points on the importance of investors' sentiment. Meanwhile currency base swap and the foreign exchange rate had a poor but constant 3% influence. These results are pointing to the importance of global growth and country specific default expectations as well as country-specific growth rates. However, currency-related variables had lower importance.

CONCLUSION

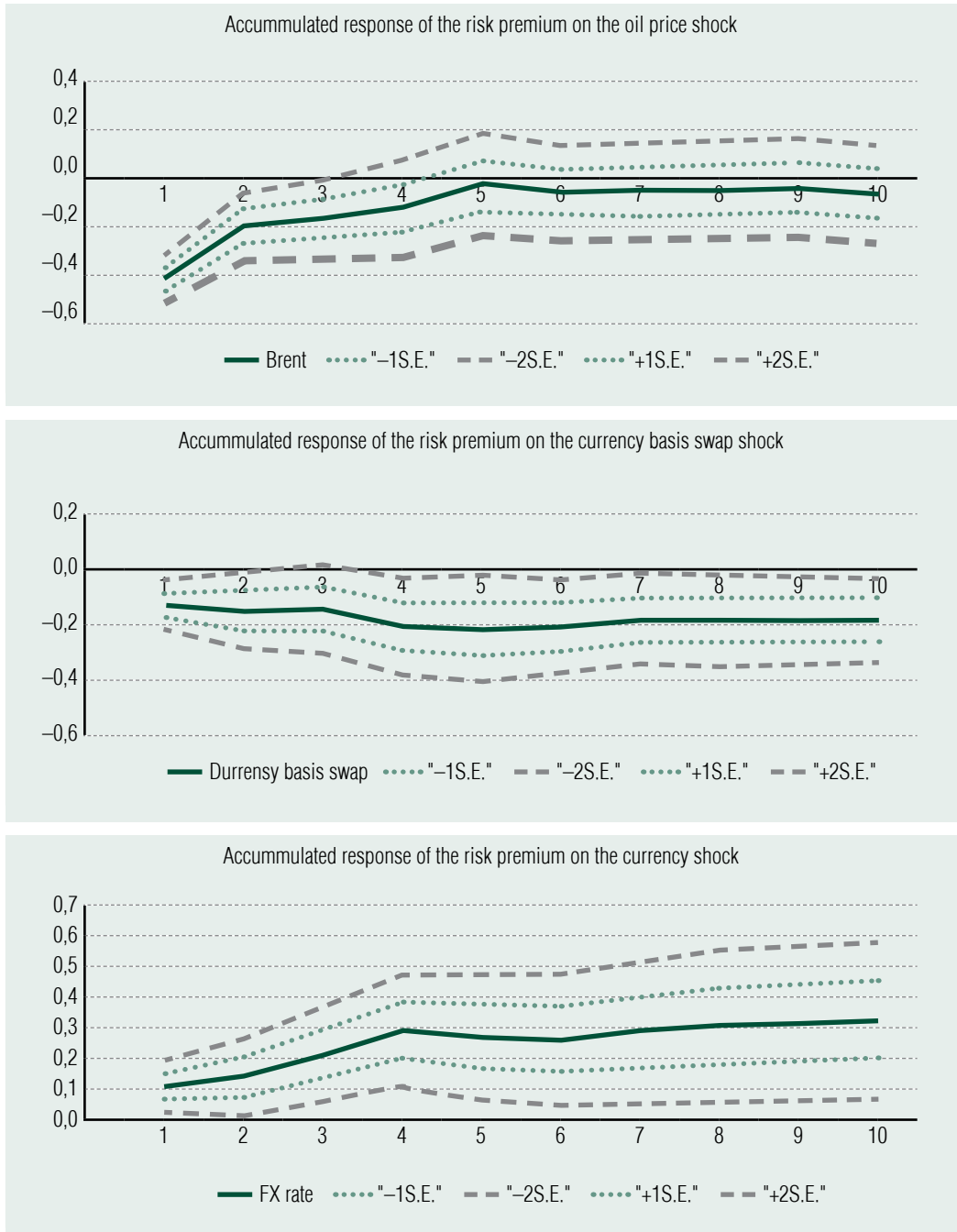
The Covid-19 puts enormous pressure on sovereign finances and increases the default risk in emerging economics. Therefore, if sovereign spread is a sign of the deteriorating resilience for a country as a result of Covid-19, understanding the internal and external determinants of sovereign spread is critical for EMEs.

This paper used a panel vector autoregression to examine the determinants of sovereign spread for a wide set of emerging countries and highlights the importance of financial supports by the IMF and RFAs. The sovereign spread measured by the sovereign risk premium and the likelihood of a default occurring derived from the Brent oil price, the currency basis swap rate, the foreign exchange rate, domestic growth, and the credit default swaps.

The results showed that their sovereign spread depended on the global and local growth expectations, the external funding environment, and the market sentiment about risk-bearing. According to the results, an increase in oil price reduced sovereign spreads

Figure 2

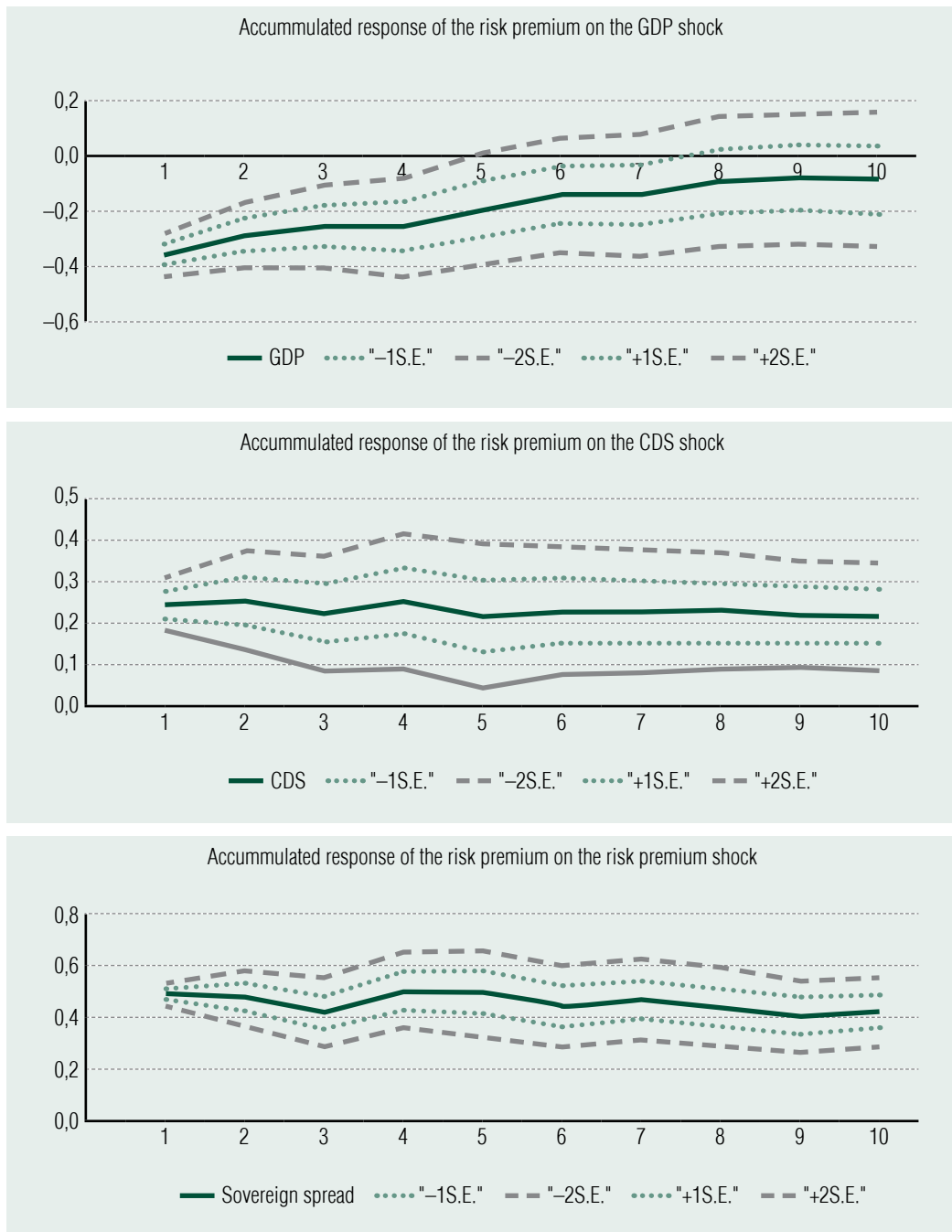
**ACCUMULATED RESPONSE FUNCTIONS OF THE SOVEREIGN SPREAD,
BASED ON THE LONG-TERM STRUCTURAL EQUATION**



Source: authors' calculation in Eviews 11

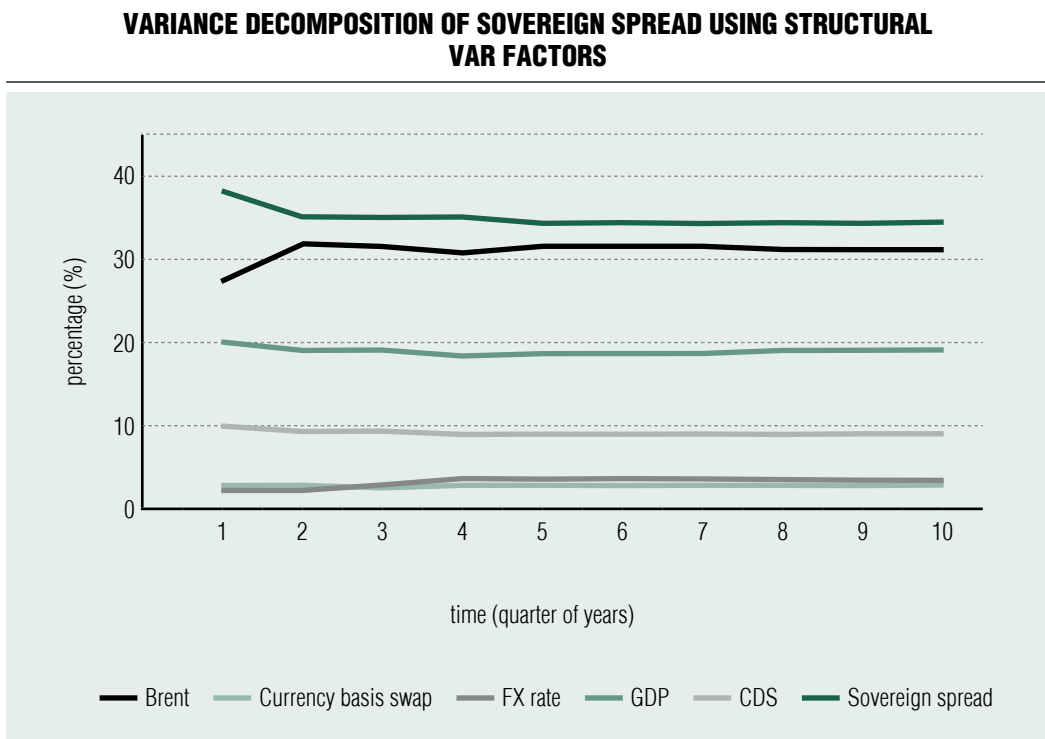
Continuation of Figure 2

**ACCUMULATED RESPONSE FUNCTIONS OF THE SOVEREIGN SPREAD,
BASED ON THE LONG-TERM STRUCTURAL EQUATION**



Source: authors' calculation in Eviews 11

Figure 3



Source: authors' calculation in Eviews 11

while GDP growth increased it on the short run. Also, some of the sovereign spread was determined by global factors, originated from the SWAP markets (both from the CDS and the currency basis swap rate against USD). Moreover, supporting the results of *Balima and Sy* (2020), the turbulence in sovereign funding can be limited by financial programs of the international actors (like the IMF) in an inflationary environment which shows the importance of the non-monetary channels of contingency liquidity provision and funding, like the IMF (and partially the RFAs) due to their multilateral and institutionalized nature. These actors were mainly responsible in the avoidance of any deeper emerging market crisis in the emerging markets due to their

abilities to fine-tune funding conditions on the international swap markets and by stabilizing international investors' confidence by funding readiness to avoid liquidity dry-ups.

The Covid-19 pandemic disrupts the global supply chains and creates a mismatch between the aggregate supply and demand with such an inflationary pressure. Sovereign spreads shall emerge, which could undermine the sustainability of the public debt of some small and open emerging economies. Therefore, both the IMF and RFAs should be prepared more in the near future to mitigate situations when countries (which are accustomed too long to a low-interest rate environment) are not able to finance themselves at reasonable interest rates. ■

NOTES

- ¹ Especially: Russia, Mexico, Brazil, Chile, Colombia, Peru, Indonesia, South Africa
- ² Especially: Hungary, Czech Republic, Poland, Mexico, South-Korea, China (People's Republic of), Turkey, Philippines, Malaysia

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