Economic impact patterns of COVID-19 on emerging market sovereigns, January to April 2020 *

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With the global outbreak of COVID-19, many countries initially tried to contain a further spread of the virus and to change the dynamics of the pandemic with lockdowns and social distancing measures. This had two immediate effects; On the one hand, global demand collapsed and lead to a precipitous drop in the price for oil and other resources. On the other hand, governments had to mitigate the economic consequences on individuals which resulted directly from the virus or indirectly from the government imposed lockdowns, thereby expanding government deficits and bulking up sovereign debt. In the light of financial fragility of emerging markets during previous global crises, this paper examines the economic impact of the COVID-19 pandemic on government finances. Specifically, this paper traces the cross-country associations between COVID-19 mortality, economic fundamentals, policy interventions, and their impact on sovereign spreads. Our results suggest…

Keywords: COVID-19, pandemic, emerging markets, sovereign debt

Introduction

Overview

This paper takes stock of the data gathered during the first four to six months of the year 2020. We say "four to six" because at the time of writing this document (early June), the data for June is not available yet. However, as soon as that data is available we will rerun the analysis and see if the results remain stable. In a nutshell: we explain the change in spread between 12/31/2019 - 04/30/2020 (and 12/31/2019 - 06/30/2020 as soon as the June data is out) through structural, macroeconomic, and epidemiologic variables.

Defining the sample of countries

In a first step, we had to choose which emerging markets we want to investigate. Since we are interested in the effect of COVID-19 on governments' ability to finance deficits in a sustainable way–that is, without increasing spreads beyond reasonable levels–we are primarily intersted in emerging markets which are "investible". As a starting point, we defined a country's "investibility" as being a constituent of the JPMorgan EMBI (Emerging Market Bond Index). This index gives investors exposure to U.S. dollar-denominated government bonds issued by emerging market countries. The index comprises more than 30 emerging market countries in a single fund. Specifically, when we looked up the constituent countries of the fund, it appears as if 31 countries

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are in the index as of 25 April 2020 (cf. https://www.ishares.com/us/products/239572/ishares-jp-morgan-usd-emerging-markets-bond-etf). However, some relatively large and potentially important countries were not represented in the EMBI so that we added India and Thailand to the sample. This results in a sample of 33 countries. We call it the "EMBI+2" sample. This stands in contrast to the other project we are working on that looks at data of a 155 countries and which we call the "extended" sample. See the graph and table below for an overview of the countries in the sample.

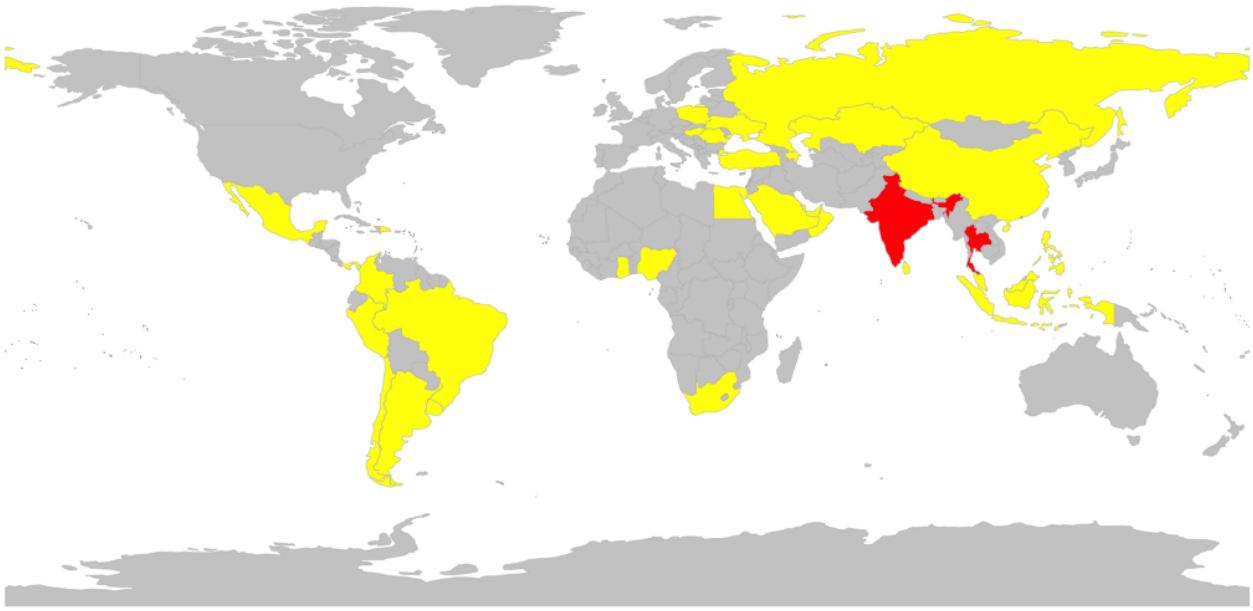

Figure 1: EMBI+2 (Thailand & India)

Country	JPM EMBI constituent (1 = yes)
Content Cell	Content Cell
Argentina	1
Azerbaijan	1
Bahrain	1
Brazil	1
Chile	1
China	1
Colombia	1
Dominican Republic	1
Egypt	1
Ghana	1
Hungary	1
India	0
Indonesia	1
Kazakhstan	1
Malaysia	1
Mexico	1
Nigeria	1

Country	JPM EMBI constituent (1 = yes)
Oman	1
Panama	1
Peru	1
Philippines	1
Poland	1
Qatar	1
Romania	1
Russian Federation	1
Saudi Arabia	1
South Africa	1
Sri Lanka	1
Thailand	0
Turkey	1
Ukraine	1
United Arab Emirates	1
Uruguay	1

In addition, we wanted to make sure that all the countris in the sample are not only investable by being in the EMBI but that they also have a certain amount of debt outstanding. To that end, we inspected the Debt/GDP ratio of all EMBI+2 countries in the IMF's global debt database and checked if all countries have at least a ratio of 20%. This was indeed the case so that we didn't drop any of the countries out of the sample.

The rest of this document is structured as follows: The second part outlines the data used for the analysis. The third part shows preliminary results of correlations between the variables. The fourth part shows regression results and graphical analyses. Part 5 concludes.

2. Data

In the second step, we obtained data for the outcome variable(s) and the explanatory variables.

Outcome variable(s)

- the spread of such bonds over 1-year US treasuries
- the yield of 1-year U.S. dollar-denominated bonds
- the exchange rate vis-à-vis the U.S. dollar
- CDS Specifically, our outcome variables are the changes of these four variables between the end of December 2019 and the end of April 2020 (June 2020). While our main outcome variable of interest is the change in spread over U.S. bonds over 4/6 months, we also look at the other variables as a robustness check.

Explanatory variable(s)

There are a host of explanatory variables in the dataset. Many of them are diretly sourced from the IMF World Datamapper or from the World Bank. However, due to the recency of the period of analysis and the lack of officially published data, we had to hand-code a decent chunk of the data. To do so, we looked at the IMF's country by country summary of policy responses to COVID-19

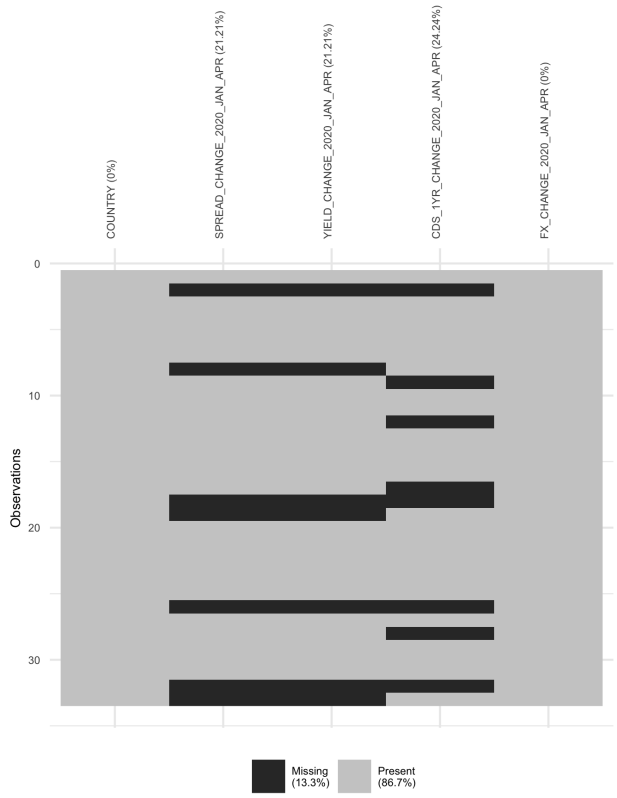

Figure 2: Data availability for dependent variables

https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19. While the following graph does not depict all explanatory variables that are in the dataset, it does show the most important ones which we also expect to be the ones that show a clearn pattern in explaning the economic fragility of emerging markets.

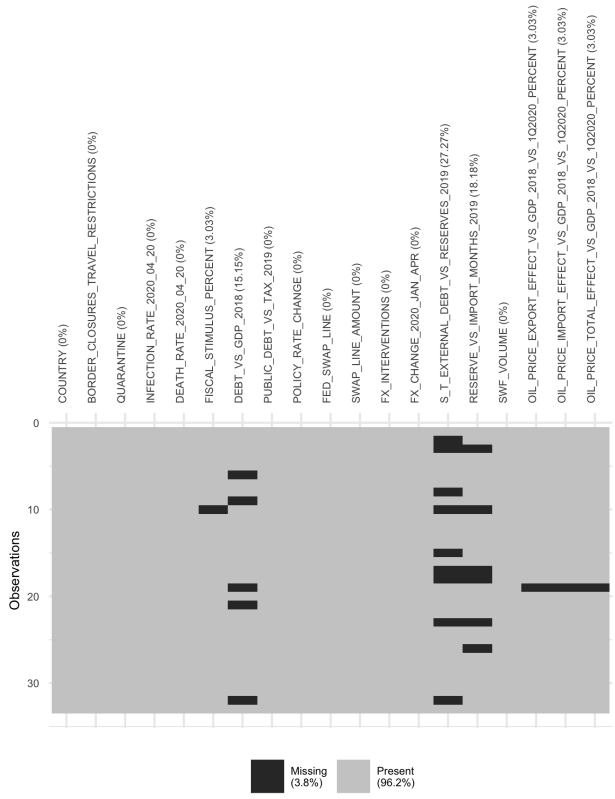

Figure 3: Data availability for explantory variables

Data source

For the specific details on the variable definitions, the sources for each variable, as well as units and further information, see the sheet "codebook" in the document "data.xlsx".

3. Preliminary patterns and correlations

Our dataset comprises more than 100 potential explanatory variables. However, most of them are not of direct interest and are instead only used to calculate variables that we use in our regressions. For example, while both the population size and the mortality is in the dataset, what is ultimately interesting is the standardized mortality rate per 100,000 people. As such, we do not show correlation matrices of all potential explantory variables but focus instead on variables that could be used in the regressions. For ease of overview, we devide the respective explanatory variables into four clusters:

- Variables related to the pandemic such as whether a quarantine is in place, infection rates, mortality rates etc.

- Variables related to fiscal fitness of sovereigns such as debt ratios, reserves etc.
- Variables related to monetary aspects such as whether a sovereign has a swap line etc.
- Variables related to the effect of oil dependence of a sovereign such as the oil share of exports etc.

Correlation matrices

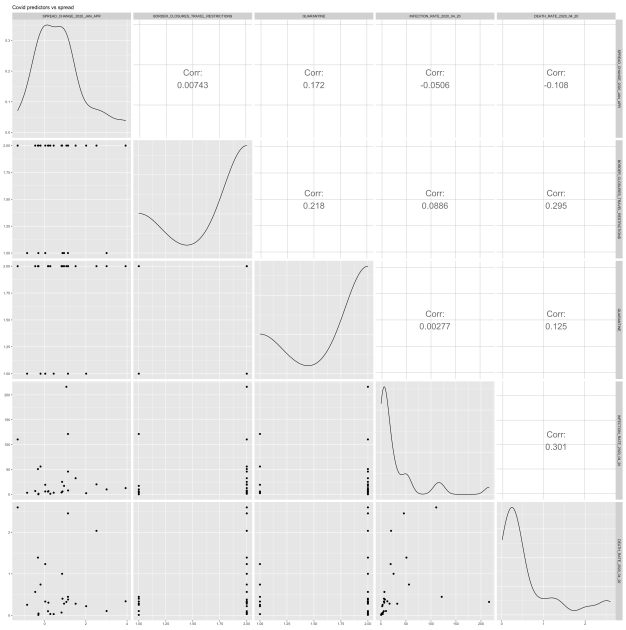

Figure 4: Correlation matrix of spread vs explantory variables from the epidemiologic cluster

Correlation heat maps

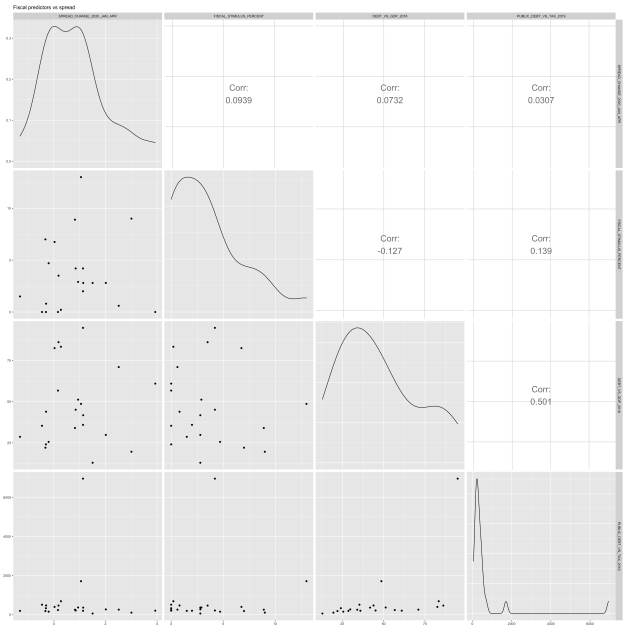

Figure 5: Correlation matrix of spread vs explantory variables from the fiscal cluster

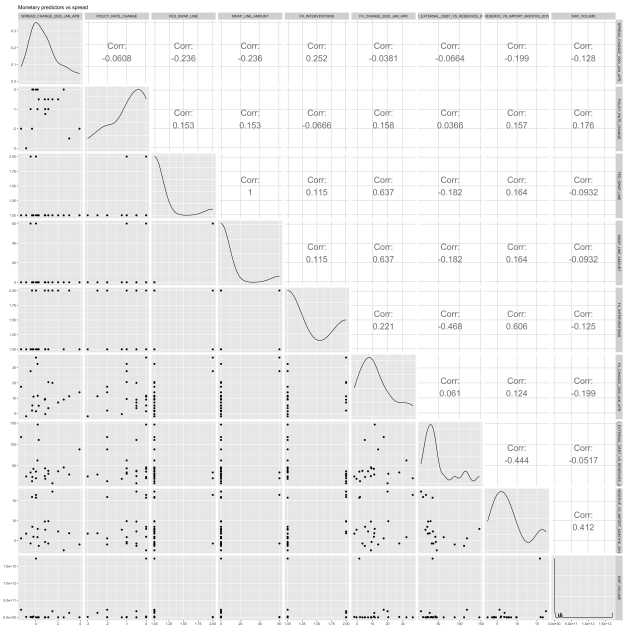

Figure 6: Correlation matrix of spread vs explantory variables from the monetary cluster

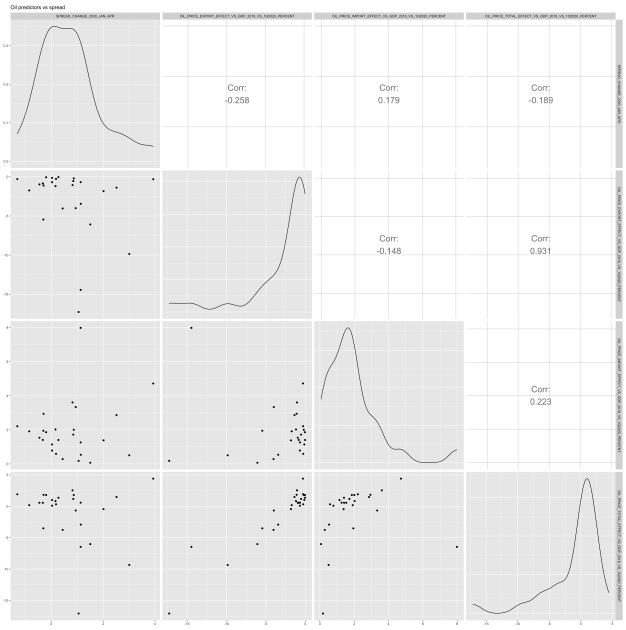

Figure 7: Correlation matrix of spread vs explantory variables from the oil cluster

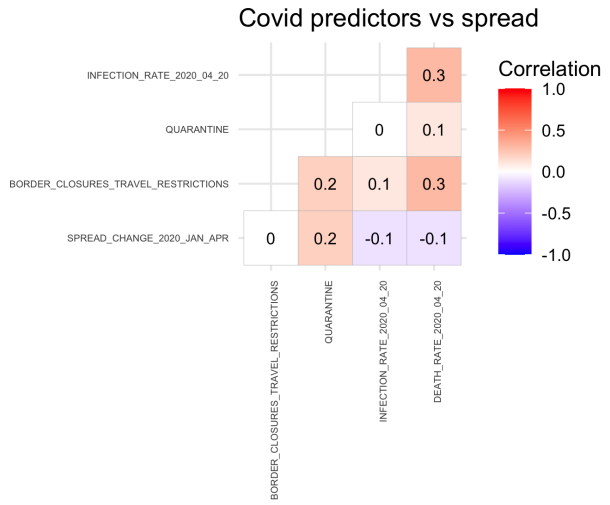

Figure 8: Correlation heatmap of spread vs explantory variables from the epidemiologic cluster

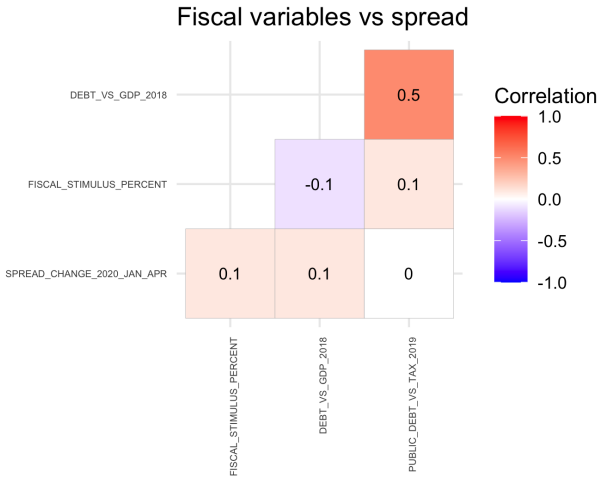

Figure 9: Correlation heatmap of spread vs explantory variables from the fiscal cluster

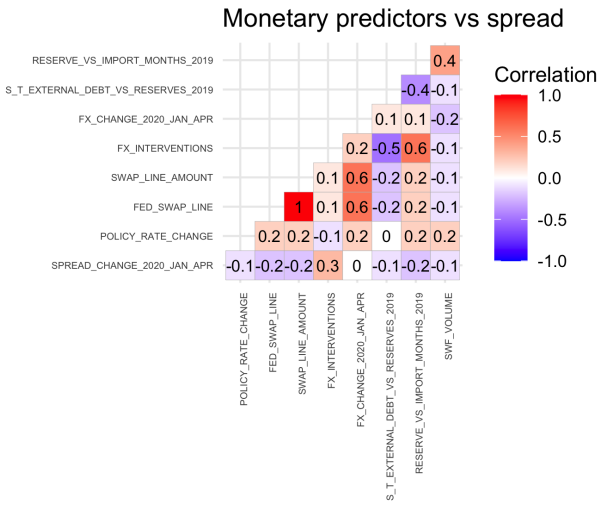

Figure 10: Correlation heatmap of spread vs explantory variables from the monetary cluster

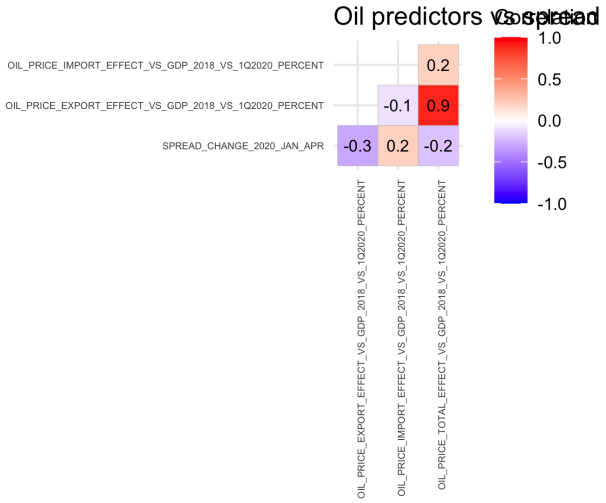

Figure 11: Correlation heatmap of spread vs explantory variables from the oil cluster

4. Econometric results

Table 1: Results with intercept

	Dependent variable:	
	spread	
	(1)	(2)
death_rate	−0.386	−0.362
	(0.369)	(0.377)
debt_tax_ratio	−0.003*	−0.003*
	(0.002)	(0.002)
months_of_reserves	−0.106*	−0.098
	(0.056)	(0.058)
oil_export_eff	−0.140	−0.115
	(0.120)	(0.128)
cu_5yr_avg	0.070	0.131
	(0.087)	(0.126)
oil_export_eff:cu_5yr_avg		0.031
		(0.044)
Constant	2.740**	2.755**
	(1.032)	(1.049)
Observations	22	22
R^2	0.447	0.464
Adjusted R^2	0.275	0.250
Residual Std. Error	1.087 (df = 16)	1.106 (df = 15)
F Statistic	2.591* (df = 5; 16)	2.168 (df = 6; 15)
Note:		*p<0.1; **p<0.05; ***p<0.01

Figure 12: Regresson results using debt to tax ratio, with intercept

Table 2: Results without intercept

	Dependent variable:	
	spread	
	(1)	(2)
death_rate	0.249	0.274
	(0.328)	(0.338)
debt_tax_ratio	0.001	0.001
	(0.001)	(0.001)
months_of_reserves	−0.027	−0.020
	(0.055)	(0.058)
oil_export_eff	−0.314**	−0.292**
	(0.117)	(0.127)
cu_5yr_avg	0.083	0.140
	(0.102)	(0.147)
oil_export_eff:cu_5yr_avg		0.028
		(0.052)
Observations	22	22
R^2	0.404	0.415
Adjusted R^2	0.229	0.195
Residual Std. Error	1.266 (df = 17)	1.294 (df = 16)
F Statistic	2.306* (df = 5; 17)	1.891 (df = 6; 16)
Note:		*p<0.1; **p<0.05; ***p<0.01

Figure 13: Regresson results using debt to tax ratio, no intercept

Table 1: Results with intercept when we use debt/GDP instead of debt/tax ratio

	Dependent variable:	
	spread	
	(1)	(2)
death_rate	−0.025	−0.010
	(0.379)	(0.391)
debt_ratio	0.013	0.014
	(0.015)	(0.015)
months_of_reserves	−0.091	−0.077
	(0.068)	(0.074)
oil_export_eff	−0.306**	−0.273
	(0.140)	(0.157)
cu_5yr_avg	0.089	0.155
	(0.100)	(0.158)
oil_export_eff:cu_5yr_avg		0.030
		(0.055)
Constant	0.487	0.484
	(1.169)	(1.202)
Observations	19	19
R^2	0.379	0.394
Adjusted R^2	0.140	0.091
Residual Std. Error	1.217 (df = 13)	1.252 (df = 12)
F Statistic	1.585 (df = 5; 13)	1.300 (df = 6; 12)
Note:		*p<0.1; **p<0.05; ***p<0.01

Figure 14: Regresson results using debt gdp ratio, with intercept

Table 2: Results without intercept when we use debt/GDP instead of debt/tax ratio

	Dependent variable:	
	spread	
	(1)	(2)
death_rate	0.052	0.066
	(0.322)	(0.331)
debt_ratio	0.018*	0.018*
	(0.009)	(0.009)
months_of_reserves	−0.075	−0.062
	(0.056)	(0.062)
oil_export_eff	−0.337**	−0.304**
	(0.116)	(0.133)
cu_5yr_avg	0.086	0.152
	(0.097)	(0.153)
oil_export_eff:cu_5yr_avg		0.030
		(0.053)
Observations	19	19
R^2	0.559	0.570
Adjusted R^2	0.402	0.371
Residual Std. Error	1.181 (df = 14)	1.211 (df = 13)
F Statistic	3.550** (df = 5; 14)	2.869* (df = 6; 13)
Note:		*p<0.1; **p<0.05; ***p<0.01

Figure 15: Regresson results using debt gdp ratio, no intercept

5. Conclusion

As stated in the introduction, this paper is preliminary. As more data becomes avaiable with the relase of June figures, the whole analysis will be rerun to see if the results align more with theoretical expectations or if there's potential variables that we have missed.