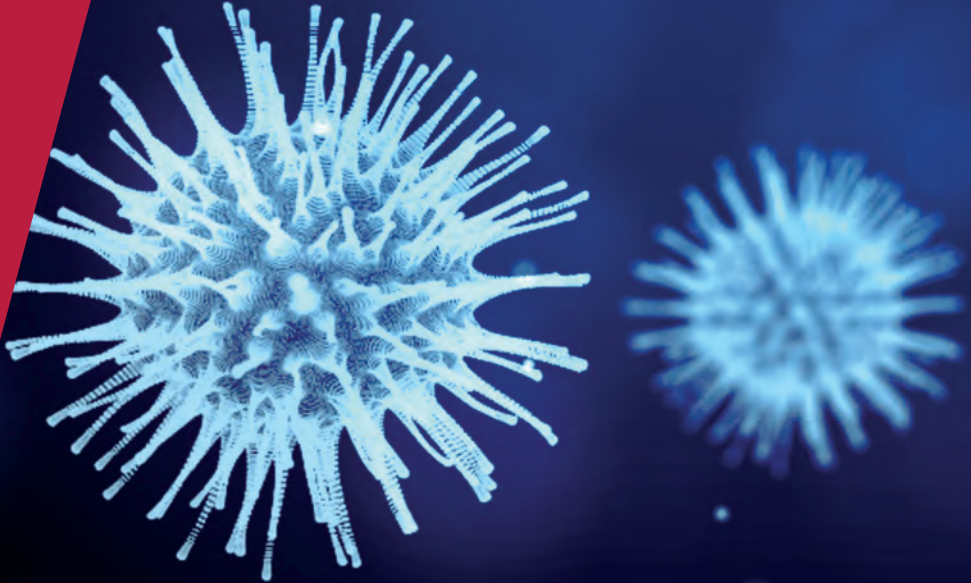


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Covid Economics

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Issue 3, 10 April 2020

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Economic policy responses to a pandemic: Developing the Covid-19 economic stimulus index

Ceyhun Elgin,¹ Gokce Basbug² and Abdullah Yalaman^{3,4}

Date submitted: 1 April 2020; Date accepted: 3 April 2020

In this paper, we conduct a comprehensive review of different economic policy measures adopted by 166 countries as a response to the COVID-19 pandemic and create a large database including fiscal, monetary, and exchange rate measures. Furthermore, using principle component analysis (PCA), we construct a COVID-19 Economic Stimulus Index (CESI) that combines all adopted policy measures. This index standardises economic responses taken by governments and allows us to study cross-country differences in policies. Finally, using simple cross-country OLS regressions we report that the median age of the population, the number of hospital beds per-capita, GDP per-capita, and the number of total cases are all significantly associated with the extent of countries' economic policy responses.

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⁴ Our dataset will be regularly updated every week and the latest version is available at www.ceyhunelgin.com.

1 Introduction

The coronavirus (COVID-19) outbreak emerged in Wuhan, China in December of 2019 and still persists globally. The COVID-19 pandemic has spread to 199 countries and territories causing 777,798 cases and 37,272 deaths as of March 31, 2020. (Roser, Ritchie, and Ortiz-Ospina, 2020). In addition to human suffering and loss of lives, the outbreak generated a major global economic downturn. The world's largest economies (G7 and China) are among the ones that have been most affected by the pandemic (Baldwin and Weder di Mauro, 2020).

The COVID-19 pandemic has direct negative effects on the economy in several different ways. To name a few, infected workers who are isolated or hospitalized cannot join the workforce, which has several demand and supply-side implications. Furthermore, the psychological effect of the pandemic leads to withdrawal from economic activity by agents who prefers to adopt “wait and see” approach.

To decrease the transmission rate of COVID-19 and to reduce burden on healthcare systems, governments have adopted a wide range of stringent public health measures including school and factory closures, travel restrictions, and city lockdowns (Atkeson, 2020). These measures have been effective in slowing down the growth of new infections, as seen in the cases of Singapore and Hong Kong (Anderson et al. 2020). However, these non-pharmaceutical measures also distort economic activity by limiting human mobility and business operations (Eichenbaum, Rebelo, and Trabandt, 2020). Specifically, the COVID-19 pandemic and associated public health controls have disrupted supply chains and diminished activity in manufacturing and service sectors, which in turn led to increased layoffs. The stock markets crashed worldwide and the number of unemployment claims rose to unprecedented levels.

To mitigate the negative effects of public health controls on the economy and to sustain public welfare, governments adopted economic packages including fiscal, monetary, and financial policy measures (Gourinchas, 2020). These economic measures targeting households, firms, health systems and banks vary across countries in breadth and scope (Weder di Mauro, 2020).

Monetary polices adopted by countries usually consist of liquidity support to banks (IMF, 2020). Typical fiscal policies include transfers to households and businesses, extension of social safety benefits, and funds for the healthcare system. For example, South Korea introduced cash transfers for quarantined individuals, consumption coupons for low-income households, and wage and rent support for small businesses. Germany expanded access to short-term work subsidy, increased childcare benefits for low-income parents, and provided grants to small business owners and self-employed persons who were affected by the outbreak. United Kingdom provided funding for the National Health Service, introduced measures to support businesses including property tax holidays, direct grants for small firms, and

compensation for sick pay leave, and strengthened the social safety net to support vulnerable people.

In this paper, we conduct a comprehensive review of different economic policy measures adopted by 166 countries as a response to COVID-19 pandemic and create a large database including fiscal, monetary and exchange rate measures. Next, using the principle component analysis (PCA), we construct a COVID-19 Economic Stimulus Index (CESI) that combines all adopted fiscal, monetary, and exchange rate measures. This index standardizes the economic responses taken by governments, thus allows to study cross-country differences in policies. We further investigate to what extent countries' economic responses are shaped by several country characteristics, pandemic-related variables and public health measures (Correia, Luck, and Verner, 2020). Our findings show that the median age of the population, the number of hospital beds per-capita, GDP per-capita and the number of total cases are significantly associated with the extent of countries' economics policy responses.

The rest of the paper is organized as follows: The next section includes a description of our data sources as well as a short characterization of the PCA. The third section presents our results. Finally, in the last section we conclude.

2 Data and Methodology

2.1 Data Sources

To construct a comprehensive database of countries' policy measures, we used the information provided by the International Monetary Fund (IMF COVID-19 Policy Tracker, 2020). To improve data validity, we cross-checked this information using different sources. When the reported information was not up-to-date, we replaced it with most recent information gathered from various sources such as news channels and government websites. The current version of our dataset uses all available information by March 31st, 2020.

The economic policy package database we created includes six policy variables classified under three categories. These categories are, fiscal policy, monetary policy and balance of payment/ exchange rate policy. Fiscal policy package includes all the adopted fiscal measures and is coded as a percentage of GDP. The monetary policy category includes three different variables: 1) Interest rate cut¹ by the monetary policy authority (coded as a percentage of the ongoing rate on February 1st, 2020), 2) The size of the macro-financial package (coded as a percentage of GDP), and 3) Other monetary policy measures (coded as a dummy variable taking the value of 1 if there are such measures and 0, otherwise). Finally, the balance of payment (BoP) and exchange rate policy category includes two variables. The first one reports

¹Whenever possible we used the rate cut in the policy rate. When there are multiple rate cuts, we calculated an arithmetic average of all rate cuts.

specific BoP measures coded as a percentage of GDP and the second one is a dummy variable taking the value of 1 if there are other reported measures and 0, otherwise.

In addition to economic policy measures, we gathered data on up-to-date public health measures and pandemic-related variables using different sources on the Internet. This data include countries' 2019 median age and COVID-19 infection rate (defined by the ratio of total COVID-19 cases to population). Moreover, data on hospital beds (per 1,000 people) and current health expenditures (as a percentage of GDP) are obtained from the World Bank. Finally, we use the recently reported government response stringency index of Hale and Webster (2020) as an additional explanatory variable in our analyses.

2.2 Developing the COVID-19 Economic Stimulus Index (CESI)

There are several different methodologies used for index development and each has different advantages and disadvantages. In this paper, we use the PCA² that is one of the most frequently used method for index development. Specifically, the PCA helps reduce the number of variables in an analysis by describing a series of uncorrelated linear combinations of the variables that contain most of the variance. Moreover, the eigenvectors associated with the PCA give significant information about the different variables used to create the index. We report the principle components as well as the eigenvalues and the proportion of the variance explained in Table A.4 in the appendix³. Depending on the PCA, we simply use all six policy variables in our dataset to create a composite index as a predicted variable with the fiscal policy stimulus and interest rate cut having the largest weights in the overall index.

3 Results

Table 1 reports descriptive summary statistics of all economic policy variables as well as the COVID-19 Economic Stimulus Index (CESI) constructed using the PCA. The whole data series are reported in Tables A.1 to A.3 in the Appendix. In Figure 1, we illustrate the histogram of the CESI and the associated fitted kernel and normal distributions. Accordingly, the index has a right-skewed distribution, which is also apparent in Figures A.1 and A.2. This is largely because there are several countries with significant interest rate cuts and fiscal policy packages increasing the mean; however, at the same time a large number of countries also have not yet

²PCA originated from the works of Pearson (1901) and Hotelling (1933). For many different applications, see Rencher and Christensen, 2012; Li et. al., 2019; Kumar and Anbanandam, 2019; Deutsch and Beinker, 2019; Bala et. al., 2019; Obeng-Ahenkora and Danso, 2020.

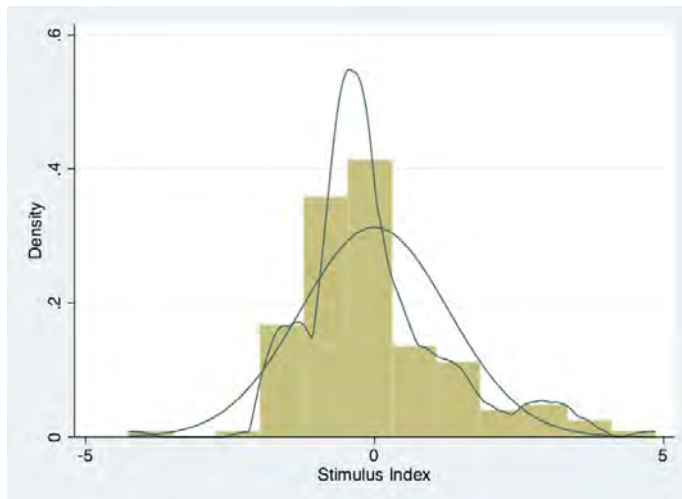
³The index that comes out of the PCA analysis is satisfactory in explaining the overall variance with more than two component and also satisfies other desirable criteria needed in a PCA analysis. Nevertheless, later, we are planning to use several other methods such as the structural equation modelling or factor analysis to supplement the PCA.

Table 1: Summary Statistics of the Dataset

| | Mean | Median | Std. Dev. | Min | Max |
|--|-------|--------|-----------|--------|--------|
| COVID-19 Economic Stimulus Index(CESI) | 0.00 | -0.31 | 1.28 | -4.25 | 4.85 |
| Fiscal Policy Stimulus (%) | 2.09 | 0.48 | 3.60 | -7.20 | 17.80 |
| Interest Rate Cut (%) | 11.63 | 0.00 | 21.47 | -29.73 | 100.00 |
| Macro-Financial Package (% of GDP) | 1.87 | 0.00 | 4.02 | 0.00 | 26.00 |
| Other Monetary Measures(0-1 dummy) | 0.85 | 1.00 | 0.36 | 0.00 | 1.00 |
| BoP Measures (% GDP) | 0.10 | 0.00 | 0.58 | 0.00 | 6.00 |
| Other BoP Measure (0-1 dummy) | 0.19 | 0.00 | 0.40 | 0.00 | 1.00 |

implemented any stimulus packages. This is also apparent in the level of standard deviations, which exhibits a sizable amount of variation across countries.

Figure 1: The COVID-19 Economic Stimulus Index (CESI): Histogram and Cumulative Distribution



Next, we conduct some simple cross-country regressions with our stimulus index as the dependent variable and country characteristics, several public health measures as well as the real GDP per-capita as independent variables. We report the results of six regression analyses in Table 2.

In the first regression, we regress the CESI score on the median age of population. The results show that the median age has a significant positive relationship with the economic responses, indicating that countries with older populations introduced larger stimulus pack-

Table 2: Cross-Country OLS Regressions

| Dep. Var. | CESI | CESI | CESI | CESI | CESI | CESI | CESI |
|-----------------------------|--------|--------|----------|----------|----------|----------|----------|
| Median Age | 0.07* | 0.10* | 0.09* | 0.09* | 0.06* | 0.05* | 0.05* |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Hospital Beds (per-capita) | | -0.15* | -0.13* | -0.12** | -0.11* | -0.11* | -0.11* |
| | | (0.04) | (0.04) | (0.04) | (0.06) | (0.04) | (0.04) |
| Infection Rate (%) | | | 546.25* | 224.83 | -69.56 | -149.34 | -151.30 |
| | | | (211.49) | (237.44) | (196.50) | (220.96) | (225.97) |
| Stringency Index | | | | 0.004 | | | |
| | | | | (0.006) | | | |
| GDP per-capita (000 USD) | | | | | 0.03* | 0.03* | 0.03* |
| | | | | | (0.001) | (0.001) | (0.001) |
| Total Cases | | | | | | 0.007** | 0.008** |
| | | | | | | (0.003) | (0.004) |
| Health Expenditures (% GDP) | | | | | | | -0.03 |
| | | | | | | | (0.04) |
| R-squared | 0.27 | 0.31 | 0.34 | 0.30 | 0.43 | 0.43 | 0.43 |
| Observations | 146 | 146 | 143 | 69 | 140 | 140 | 139 |
| F-Test | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

All regressions include a constant. Robust standard errors are reported in parentheses. *, **, *** denote 1, 5 and 10% confidence levels, respectively.

ages. It is important to note that the median age is significantly and positively associated with the level of economic response in a consistent manner throughout all regression models.

In the second regression, we included the number of hospital beds per-capita into the model, which is significantly and negatively associated with the size of the economic stimulus. After controlling for other variables in the following regressions, the number of beds per capita consistently remains negatively associated with the size of the economic stimulus. This result implies that countries where the number of beds per capita is lower, more stringent economic stimulus is adopted.

In the third regression model, we add the infection rate which refers to the ratio of total positive cases to population. After controlling for median age and hospital beds, the infection rate is positively associated with the economic response, indicating that countries with higher infection rates adopted stronger economic measures.

Then, we regress the Stringency Index on the CESI score. The Stringency Index consists of public health controls adopted by governments in response to the pandemic. The analysis show that after controlling for median age, the number of beds, and the infection rate, the

Stringency index does not predict the economic stimulus package. It is important to note that due to data availability, we lose half of the sample when we introduce the Stringency Index.

Finally, in the remaining models, we introduce GDP per capita, the number of total cases, and health expenditure. The first two of these variables are significantly associated with the CESI score, indicating that countries with higher GDP per capita and a higher number of cases, announced larger economic stimulus packages.

4 Conclusion

In this paper, we first introduced a large database where we quantified the economic policies adopted by national governments throughout the global COVID-19 pandemic. Second, using PCA methodology, we developed the COVID-19 Economic Stimulus Index (CESI) which allowed us to aggregate and standardize varying economic responses across countries. Finally, we presented some preliminary results on the predictors of governments' economic responses. Our findings, without establishing any causality, show some significant correlations of population characteristics, public health-related, and economic variables (e.g., GDP per capita, health expenditures) with economic stimulus packages announced by governments. Specifically, we find that in countries where the median age is higher (which is highly relevant in the case of the COVID-19, as it disproportionately affects older patients), the number of hospital beds per-capita is lower and GDP per-capita is higher, the stimulus is more pronounced.

In our analyses, the Stringency Index which measures countries' public health controls such as school closures and travel restrictions did not predict the level of economic responses. Although we lose a significant number of cases when we introduce the Stringency Index, this non-significant finding implies that governments' economic responses are more motivated by reacting to the pandemic (i.e., infection rate), rather than mitigating the negative economic implications of public health controls.

Although our study has some limitations (e.g. endogeneity, omitted variable bias), we believe that it contributes to our understanding of the economics of the COVID-19 pandemic mainly in two ways. First, we believe that the economic stimulus package database which will be updated on a daily basis and the index will be helpful to other researchers while studying the outcomes of economic responses. Secondly, our study sheds some light on the predictors of the economic responses adopted by governments.

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A Appendix

In three tables below, we report the comprehensive database we constructed. It includes six economic policy variables as well as the Economic Stimulus Index. Our dataset will be regularly updated every week and the latest version is available at www.ceyhunelgin.com.

Figure A.1: Fiscal Stimulus Packages: Histogram and Cumulative Distribution

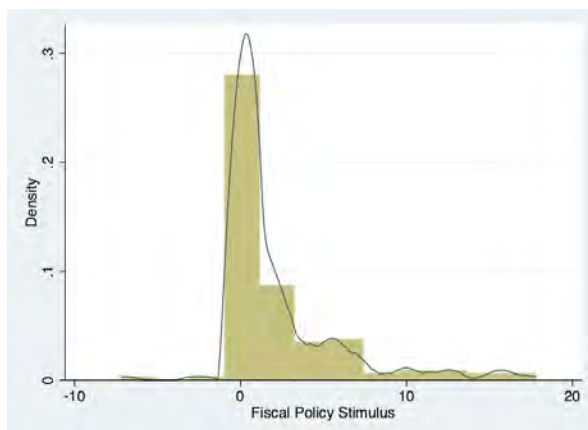


Figure A.2: Interest Rate Cuts: Histogram and Cumulative Distribution

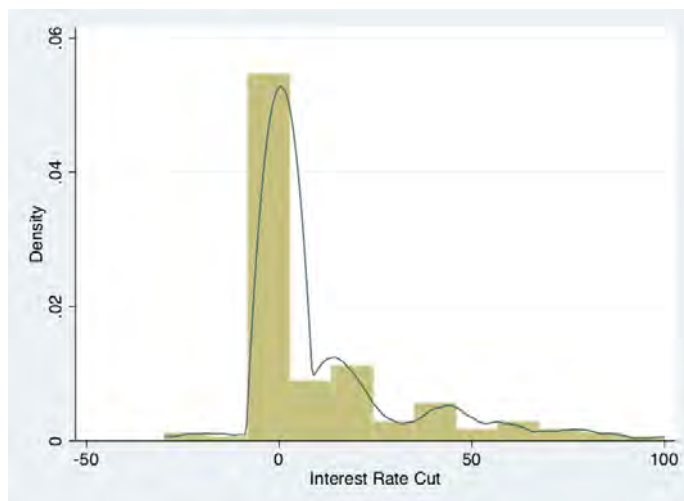


Table A.1: Economic Policy Packages and the CESI

| Country | Fiscal (% GDP) | Rate Cut (%) | Macro-Financial (% GDP) | Other Monetary | BoP (% GDP) | Other BoP | Stimulus Index |
|---------------|----------------|--------------|-------------------------|----------------|-------------|-----------|----------------|
| Afghan | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.60 |
| Albania | 1.30 | 50.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.58 |
| Algeria | -7.20 | 13.57 | 0.00 | 0.00 | 6.00 | 0.00 | -4.25 |
| Angola | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.62 |
| Argentina | 1.00 | 5.00 | 0.00 | 1.00 | 0.22 | 0.00 | -0.35 |
| Armenia | 0.00 | 4.55 | 0.00 | 0.00 | 0.00 | 0.00 | -1.53 |
| Australia | 9.70 | 0.67 | 4.71 | 1.00 | 0.00 | 0.00 | 1.69 |
| Austria | 17.8 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 3.34 |
| Azerbaijan | 1.01 | 11.36 | 0.00 | 1.00 | 0.00 | 1.00 | -0.57 |
| Bahamas | 0.20 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.50 |
| Bahrain | 5.30 | 52.27 | 26.00 | 1.00 | 0.00 | 0.00 | 4.85 |
| Bangladesh | 0.01 | 7.27 | 0.00 | 1.00 | 0.00 | 0.00 | -0.40 |
| Barbados | 1.40 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.31 |
| Belarus | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | -0.94 |
| Belgium | 12.3 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 2.46 |
| Belize | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.37 |
| Benin | 0.10 | 0.00 | 0.03 | 1.00 | 0.00 | 0.00 | -0.51 |
| Bhutan | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.62 |
| Bolivia | 0.46 | 0.00 | 1.18 | 1.00 | 0.00 | 0.00 | -0.30 |
| Bosnia | 3.25 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.01 |
| Botswana | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.57 |
| Brazil | 3.50 | 28.46 | 3.17 | 1.00 | 1.69 | 1.00 | 0.09 |
| Brunei | 0.21 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.50 |
| Bulgaria | 2.00 | 0.00 | 8.60 | 0.00 | 0.00 | 0.00 | -0.11 |
| Burkina Faso | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Burundi | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.54 |
| Cabo Verde | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.62 |
| Cambodia | 1.34 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.32 |
| Cameroon | 0.10 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.52 |
| Canada | 6.00 | 57.14 | 2.60 | 1.00 | 0.00 | 0.00 | 1.82 |
| CAR | 1.90 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.23 |
| Chad | 0.23 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.50 |
| Chile | 4.70 | 42.86 | 1.36 | 1.00 | 0.00 | 1.00 | 0.78 |
| China | 1.20 | 0.00 | 14.14 | 1.00 | 0.00 | 1.00 | 1.20 |
| Hong Kong | 5.30 | 57.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.35 |
| Colombia | 0.40 | 0.00 | 1.17 | 1.00 | 0.43 | 1.00 | -0.84 |
| Congo, DR | 0.30 | 16.67 | 0.00 | 1.00 | 0.00 | 0.00 | -0.18 |
| Congo, R | 0.32 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.48 |
| Costa Rica | 0.00 | 44.44 | 0.00 | 1.00 | 0.00 | 1.00 | -0.14 |
| Cote Ivory | 0.30 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.49 |
| Croatia | 0.30 | 75.00 | 1.25 | 1.00 | 2.94 | 0.00 | 0.20 |
| Cyprus | 3.30 | 0.00 | 7.77 | 1.00 | 0.00 | 0.00 | 1.07 |
| Czech | 2.00 | 22.22 | 0.00 | 1.00 | 0.00 | 0.00 | 0.19 |
| Denmark | 5.30 | -20.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.04 |
| Djibouti | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Ecuador | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.37 |
| Egypt | 2.00 | 23.53 | 0.00 | 1.00 | 0.00 | 0.00 | 0.21 |
| El Salvador | 1.34 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.32 |
| Equit. Guinea | 0.07 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.52 |
| Eritrea | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.62 |
| Estonia | 7.00 | 0.00 | 7.71 | 1.00 | 0.00 | 0.00 | 1.66 |
| Eswatini | 0.14 | 17.88 | 0.00 | 0.00 | 0.00 | 0.00 | -1.27 |

Fiscal stands for the fiscal policy package as a percent of GDP, Rate cut is the interest rate cut as a percent of the pre-crisis level, Macro-Financial is the monetary stimulus package as a percent of GDP, other monetary is a dummy variable taking the value of 1 if there are other accompanying monetary measures, BoP is the monetary intervention to control the balance of payments and the exchange rate as a percent of GDP and finally, Other BoP is a dummy variable taking the value of 1 if there are other accompanying measures towards stabilizing BoP and exchange rate.

Table A.2: Economic Policy Packages and the CESI

| Country | Fiscal (% GDP) | Rate Cut (%) | Macro-Financial (% GDP) | Other Monetary | BoP (% GDP) | Other BoP | Stimulus Index |
|---------------|----------------|--------------|-------------------------|----------------|-------------|-----------|----------------|
| Ethiopia | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.59 |
| Fiji | 7.24 | 50.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 |
| Finland | 1.00 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 0.64 |
| France | 15.30 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 2.94 |
| Gabon | 0.25 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.49 |
| Gambia | 0.60 | -8.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.58 |
| Georgia | 2.00 | 0.000 | 0.00 | 1.00 | 0.63 | 0.00 | -0.39 |
| Germany | 4.80 | 0.00 | 12.49 | 1.00 | 0.00 | 0.00 | 1.96 |
| Ghana | 0.15 | 9.38 | 0.00 | 1.00 | 0.00 | 0.00 | -0.34 |
| Greece | 5.00 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 1.28 |
| Guatemala | 1.57 | 18.18 | 0.00 | 1.00 | 0.00 | 0.00 | 0.05 |
| Guinea | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.62 |
| Guinea Bissau | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Guyana | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Haiti | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Honduras | 2.20 | 14.29 | 2.80 | 1.00 | 0.00 | 0.00 | 0.46 |
| Hungary | 0.39 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | -0.33 |
| Iceland | 7.80 | 43.18 | 1.00 | 1.00 | 0.30 | 0.00 | 1.55 |
| India | 0.20 | 0.00 | 1.10 | 1.00 | 0.00 | 1.00 | -0.76 |
| Indonesia | 0.20 | 10.00 | 0.00 | 1.00 | 0.00 | 1.00 | -0.73 |
| Iran | 0.56 | 0.00 | 0.06 | 1.00 | 0.33 | 1.00 | -0.94 |
| Iraq | 0.01 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | -1.48 |
| Ireland | 2.58 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 0.89 |
| Israel | 1.10 | 0.00 | 3.5 | 1.00 | 0.00 | 1.00 | -0.28 |
| Italy | 1.70 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 0.75 |
| Jamaica | 1.40 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.31 |
| Japan | 4.90 | 0.00 | 0.30 | 1.00 | 0.00 | 0.00 | 0.40 |
| Jordan | 0.00 | 37.50 | 1.83 | 1.00 | 0.00 | 0.00 | 0.40 |
| Kazakhstan | 3.45 | -29.73 | 0.00 | 1.00 | 0.00 | 1.00 | -0.92 |
| Kenya | 0.00 | 15.58 | 0.00 | 1.00 | 0.00 | 0.00 | -0.25 |
| Korea | 0.80 | 40.00 | 0.34 | 1.00 | 0.00 | 1.00 | -0.04 |
| Kosovo | 0.08 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.52 |
| Kuwait | 1.40 | 45.45 | 0.02 | 1.00 | 0.00 | 0.00 | 0.52 |
| Kyrgyz Rep. | 0.10 | -17.65 | 0.00 | 1.00 | 0.00 | 1.00 | -1.24 |
| Laos | 0.01 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | -0.94 |
| Latvia | 3.30 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 1.01 |
| Lebanon | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Lesotho | 0.00 | 16.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.25 |
| Liberia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.62 |
| Lithuania | 5.30 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 1.33 |
| Luxemburg | 15.6 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 2.99 |
| Madagascar | 0.03 | 0.00 | 0.30 | 1.00 | 0.00 | 1.00 | -0.89 |
| Malawi | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.58 |
| Malaysia | 16.22 | 9.09 | 0.20 | 1.00 | 0.00 | 0.00 | 2.27 |
| Maldives | 2.80 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | -0.49 |
| Mali | 0.06 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.52 |
| Malta | 12.3 | 0.00 | 13.31 | 1.00 | 0.00 | 0.00 | 3.28 |
| Mauritania | 0.13 | 25.43 | 0.00 | 1.00 | 0.00 | 0.00 | -0.05 |
| Mauritius | 1.38 | 14.93 | 2.00 | 1.00 | 0.00 | 1.00 | -0.17 |
| Mexico | 0.70 | 7.14 | 0.60 | 1.00 | 0.00 | 1.00 | -0.62 |
| Moldova | 0.00 | 40.91 | 0.00 | 1.00 | 0.00 | 0.00 | 0.21 |
| Mongolia | 0.03 | 9.09 | 0.80 | 1.00 | 0.00 | 0.00 | -0.25 |
| Montenegro | 0.02 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | -0.94 |
| Morocco | 0.84 | 12.5 | 0.00 | 1.00 | 0.00 | 1.00 | -0.58 |
| Mozambique | 0.10 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.52 |

Fiscal stands for the fiscal policy package as a percent of GDP, Rate cut is the interest rate cut as a percent of the pre-crisis level, Macro-Financial is the monetary stimulus package as a percent of GDP, other monetary is a dummy variable taking the value of 1 if there are other accompanying monetary measures, BoP is the monetary intervention to control the balance of payments and the exchange rate as a percent of GDP and finally, Other BoP is a dummy variable taking the value of 1 if there are other accompanying measures towards stabilizing BoP and exchange rate.

Table A.3: Economic Policy Packages and the CESI

| Country | Fiscal (% GDP) | Rate Cut (%) | Macro-Financial (% GDP) | Other Monetary | BoP (% GDP) | Other BoP | Stimulus Index |
|-----------------|----------------|--------------|-------------------------|----------------|-------------|-----------|----------------|
| Myanmar | 0.10 | 18.75 | 0.00 | 1.00 | 0.00 | 0.00 | -0.18 |
| Namibia | 0.00 | 16.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.33 |
| Nepal | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Netherlands | 2.30 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 0.84 |
| New Zealand | 5.40 | 75.00 | 8.86 | 1.00 | 0.00 | 0.00 | 2.91 |
| Nicaragua | 0.00 | 7.50 | 0.00 | 1.00 | 0.00 | 0.00 | -0.40 |
| Niger | 0.02 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Nigeria | 0.01 | 0.00 | 2.40 | 1.00 | 0.00 | 1.00 | -0.61 |
| N. Macedonia | 0.20 | 12.50 | 0.00 | 1.00 | 0.00 | 1.00 | -0.68 |
| Norway | 2.20 | 83.33 | 0.00 | 1.00 | 0.00 | 0.00 | 1.33 |
| Oman | -2.50 | 60.00 | 25.09 | 1.00 | 0.00 | 0.00 | 3.61 |
| Pakistan | 2.54 | 16.98 | 0.00 | 1.00 | 0.00 | 0.00 | 0.18 |
| Papua N. Guinea | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.61 |
| Paraguay | 6.50 | 18.75 | 0.00 | 0.00 | 0.00 | 0.00 | -0.23 |
| Peru | 0.78 | 44.44 | 0.00 | 1.00 | 0.90 | 0.00 | 0.14 |
| Philippines | 0.15 | 18.75 | 1.60 | 1.00 | 0.00 | 0.00 | 0.05 |
| Poland | 6.50 | 33.33 | 0.00 | 1.00 | 0.00 | 0.00 | 1.12 |
| Portugal | 4.70 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 1.23 |
| Qatar | 13.00 | 43.73 | 1.43 | 1.00 | 0.00 | 0.00 | 2.55 |
| Panama | 3.25 | 0.00 | 2.00 | 1.00 | 0.00 | 0.00 | 0.26 |
| Romania | 3.00 | 20.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.31 |
| Russia | 0.30 | 0.00 | 0.39 | 1.00 | 0.00 | 0.00 | -0.43 |
| Rwanda | 1.50 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.29 |
| San Marino | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Saudi Arabia | 0.80 | 63.49 | 1.90 | 1.00 | 0.00 | 0.00 | 1.00 |
| Senegal | 7.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.59 |
| Serbia | 1.00 | 22.22 | 0.00 | 1.00 | 0.00 | 0.00 | 0.04 |
| Seychelles | 0.00 | 20.00 | 2.27 | 1.00 | 0.00 | 0.00 | 0.14 |
| Sierra Leone | 0.00 | 9.09 | 0.00 | 1.00 | 0.00 | 1.00 | -0.78 |
| Singapore | 10.50 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.16 |
| Slovak Rep. | 0.30 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 0.52 |
| Slovenia | 6.60 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 1.54 |
| S. Africa | 0.20 | 16.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.21 |
| Spain | 1.00 | 0.00 | 7.31 | 1.00 | 0.00 | 0.00 | 0.64 |
| SriLanka | 0.11 | 3.59 | 0.00 | 1.00 | 0.00 | 1.00 | -0.86 |
| Sudan | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.62 |
| Suriname | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.62 |
| Sweden | 9.20 | 73.33 | 9.45 | 1.00 | 0.00 | 0.00 | 3.58 |
| Switzerland | 6.00 | 0.00 | 0.51 | 1.00 | 2.90 | 0.00 | -0.33 |
| Tajikistan | 0.00 | -4.08 | 0.00 | 1.00 | 0.00 | 1.00 | -1.01 |
| Tanzania | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.62 |
| Thailand | 3.00 | 40.00 | 0.58 | 1.00 | 0.00 | 1.00 | 0.35 |
| Togo | 2.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.21 |
| Tonga | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Trinidad Tobago | 3.25 | 30.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.13 |
| Tunisia | 2.00 | 12.90 | 0.99 | 1.00 | 0.00 | 0.00 | 0.16 |
| Turkey | 2.00 | 9.30 | 0.00 | 1.00 | 0.00 | 1.00 | -0.45 |
| Turkmenistan | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | -2.02 |
| Uganda | 0.02 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Ukraine | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| UAE | 1.80 | 62.50 | 6.70 | 1.00 | 0.00 | 0.00 | 1.81 |
| UK | 2.50 | 86.67 | 9.09 | 1.00 | 0.00 | 0.00 | 2.69 |
| United States | 10.50 | 100 | 0.00 | 1.00 | 0.00 | 0.00 | 2.97 |
| Uruguay | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | -0.80 |
| Uzbekistan | 1.50 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.30 |
| Vietnam | 0.33 | 14.48 | 3.30 | 1.00 | 0.00 | 0.00 | 0.24 |
| Yemen | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.62 |
| Zambia | 0.02 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | -0.53 |
| Zimbabwe | 0.21 | 28.57 | 0.03 | 0.00 | 0.00 | 1.00 | -0.39 |

Fiscal stands for the fiscal policy package as a percent of GDP, Rate cut is the interest rate cut as a percent of the pre-crisis level, Macro-Financial is the monetary stimulus package as a percent of GDP, other monetary is a dummy variable taking the value of 1 if there are other accompanying monetary measures, BoP is the monetary intervention to control the balance of payments and the exchange rate as a percent of GDP and finally,

Other BoP is a dummy variable taking the value of 1 if there are other accompanying measures towards stabilizing BoP and exchange rate.

Table A.4: Principle Component Analysis

| Component | Eigen Value | Difference | Proportion | Cumulative | | |
|-----------------|-------------|------------|------------|------------|--------|--------|
| Component 1 | 1.63 | 0.44 | 0.27 | 0.27 | | |
| Component 2 | 1.19 | 0.10 | 0.20 | 0.47 | | |
| Component 3 | 1.08 | 0.33 | 0.18 | 0.65 | | |
| Component 4 | 0.75 | 0.04 | 0.13 | 0.78 | | |
| Component 5 | 0.71 | 0.07 | 0.12 | 0.89 | | |
| Component 6 | 0.64 | | 0.11 | 1.00 | | |
| Variable | Comp 1 | Comp 2 | Comp 3 | Comp 4 | Comp 5 | Comp 6 |
| Fiscal | 0.58 | -0.04 | -0.22 | 0.15 | -0.22 | 0.73 |
| Rate Cut | 0.39 | -0.21 | 0.54 | -0.67 | 0.2 | 0.05 |
| Macro-Financial | 0.55 | -0.12 | -0.01 | 0.49 | 0.53 | -0.39 |
| Other Monetary | 0.39 | 0.54 | 0.25 | 0.03 | -0.59 | -0.39 |
| BoP | -0.17 | -0.43 | 0.67 | 0.50 | -0.28 | 0.12 |
| Other BoP | -0.16 | 0.68 | 0.38 | 0.17 | 0.44 | 0.38 |