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POLICY PACKAGES AND POLICY SPACE: LESSONS FROM COVID-19

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Abstract

This paper uses the onset of COVID-19 to examine how countries construct their policy packages in response to a severe negative shock. We use several new datasets to track the use of a large variety of policy tools: fiscal stimulus (both above- and below-the-line), monetary policy (through interest rates, asset purchases, liquidity support and swap lines), foreign currency intervention, adjustments to macroprudential regulations (including the CCyB) and changes in capital controls (on inflows and outflows). The results suggest that pre-existing policy space was usually more important than other country characteristics and the extent of "stress" (in economic, financial, and health measures) in determining how a country responded to COVID-19. The notable exception is for fiscal stimulus, for which existing policy space did not act as a significant constraint in advanced economies. This is a sharp contrast to results for earlier episodes—although advanced economies with higher debt levels may have been constrained in how they provided stimulus (with more below-the-line commitments). Moreover, the use of (and space available) for each policy tool usually did not affect a country's use of other policies. This suggests that countries are not coordinating their tools optimally in an integrated framework, especially when policy space is limited for certain tools.

JEL Classification: E5, E6, F3, H5, H6

Keywords: COVID-19

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Policy Packages and Policy Space: Lessons from COVID-19 *

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Abstract: This paper uses the onset of COVID-19 to examine how countries construct their policy packages in response to a severe negative shock. We use several new datasets to track the use of a large variety of policy tools: fiscal stimulus (both above- and below-the-line), monetary policy (through interest rates, asset purchases, liquidity support and swap lines), foreign currency intervention, adjustments to macroprudential regulations (including the CCyB) and changes in capital controls (on inflows and outflows). The results suggest that pre-existing policy space was usually more important than other country characteristics and the extent of "stress" (in economic, financial, and health measures) in determining how a country responded to COVID-19. The notable exception is for fiscal stimulus, for which existing policy space did not act as a significant constraint in advanced economies. This is a sharp contrast to results for earlier episodes—although advanced economies with higher debt levels may have been constrained in how they provided stimulus (with more below-the-line commitments). Moreover, the use of (and space available) for each policy tool usually did not affect a country's use of other policies. This suggests that countries are not coordinating their tools optimally in an integrated framework, especially when policy space is limited for certain tools.

Key words: COVID-19, pandemic, policy space, fiscal, monetary, macroprudential, capital controls

JEL codes: E5, E6, F3, H5, H6

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I. Introduction

When an economy is under stress—whether from slower growth, rising unemployment, a financial crisis or pandemic—policymakers respond by choosing from a variety of tools. Traditional economic responses often include some combination of: fiscal policy, monetary policy, foreign currency (FX) intervention, and adjustments to macroprudential regulations and/or capital controls. During a pandemic, policymakers may also choose to restrict activity and adopt other measures to restrain the spread of the disease. This paper tests what determines a country's policy package, including whether the choice of tools is constrained by the available "policy space"[1]. If pre-existing policy space affects a country's ability to use beneficial tools during periods of stress, countries may need to place greater weight on adjusting policy sooner to create space (such as by reducing debt levels, raising interest rates, building foreign exchange reserves, and/or adjusting macroprudential policy and capital controls).

The results in this paper suggest that pre-existing policy space is usually more important than other country characteristics and the extent of "stress" (in economic, financial, and health measures) in determining how a country responds to a shock. More specifically, policy space was the most important determinant of the extent to which countries used FX intervention, lowered interest rates, and loosened macroprudential policy to support their economies during the initial phase of COVID-19. Policy space affected not only the magnitude by which specific tools were adjusted, but also the form of adjustment—such as whether monetary easing was pursued more through reductions in interest rates or asset purchases, or whether fiscal stimulus was pursued more through on-budget measures or "below-the-line" measures (such as loans, equity, and credit guarantees). Policy space was generally not important, however, in determining the magnitude of fiscal stimulus in advanced economies during the early stage of the pandemic (especially for the extent of below-the-line fiscal policy). This finding contrasts with research focusing on other periods, which generally finds that fiscal policy space significantly constrains a country's ability to respond to negative shocks (Romer and Romer, 2018; Romer and Romer, 2019; Jordá et al., 2016). The results also suggest that the space available to use one type of policy tool usually did not affect a country's decision to use other policies during COVID-19. For example, the amount of space a country had for conventional monetary policy (i.e., lowering interest rates) had no significant impact on the size of its fiscal response to COVID-19, the amount of any FX

[1] This paper assesses why countries adopted different policies. An important question for future research is the efficacy of these policies, including whether they were used optimally. For an example of this type of analysis, see Wieland (2022), which assesses the impact of the fiscal response to COVID-19 in the Euro area.

intervention, or its adjustments to macroprudential regulations. This finding is in contrast to standard theoretical models, which suggest that certain policies could partially substitute for others whose use is constrained.[2]

This paper begins by analyzing the policy responses to COVID-19 in the first half of 2020. This is a unique case study as the pandemic resulted from an external shock that did not reflect domestic policies or imbalances, allowing for a cleaner identification of how policy space affects policy responses than during most negative shocks (which often reflect domestic imbalances and policy choices). The severity of the shock also motivated large and multifaceted policy responses, as well as the creation of detailed cross-country data sets tracking these responses. We focus on six sets of policy tools: fiscal stimulus (measured in aggregate, above-the-line, and below-the-line); monetary stimulus (through policy interest rates, asset purchases, liquidity support, and swap lines); FX intervention (including the decision to intervene and corresponding magnitude); macroprudential regulation (defined broadly or focusing on the CCyB); capital controls aimed at reducing net capital outflows (on either gross inflows or outflows) and various "containment" measures targeting the spread of the virus.

We document the prevalence and magnitudes of these different policy responses to COVID-19 in advanced economies and emerging markets, drawing heavily on the IMF's Policy Tracker, IMF's Fiscal Monitor, and Oxford's Coronavirus Government Response Tracker. Almost all countries enacted a large fiscal stimulus, averaging about 11% of GDP, and split evenly (on average) between above-the-line measures (i.e., on-budget increases in spending and foregone revenue) and below-the-line measures (i.e., loans, equity infusions and credit guarantees).[3] Countries also provided monetary stimulus through a range of tools; most central banks lowered their policy interest rates (albeit by a relatively small 1.7pp on average) and over 85% of the sample provided some type of liquidity support for banks. In addition, 43% used quantitative easing (including 62% of advanced economies and 33% of emerging markets) and 42% used swap lines. Another widely used policy response was easing macroprudential regulations—with 72% of advanced economies and 61% of emerging markets reporting some loosening in regulations (including reductions in the CCyB in about 30% of the sample). Using FX reserves to support the exchange rate was employed in just over half of the emerging markets, but only in three advanced

[2] See Aizenman et al. (2017), Adrian et al. (2020), Basu et al. (2020), Bergant et al. (2020), and Mano and Sgherri (2020).

[3] As discussed in Section III, these measures include the support that was announced, even if not fully utilized.

economies. The one policy that was not widely adjusted in any group of countries during this period was capital controls—with only four countries reducing controls on capital inflows and two tightening controls on capital outflows. In addition to these standard economic policy responses to negative shocks, all countries adopted containment measures to address the health aspects of the pandemic. Emerging markets adopted stricter health and containment measures on average, including mobility restrictions, restrictions of public events, and testing and tracing regimes.

One striking result from this analysis of the policy responses to COVID-19 is the substantial variation in how different countries responded. Taking the example of fiscal policy, although all countries enacted some fiscal stimulus, the size of the stimulus ranged from 1% to 37% of GDP, and the share of stimulus that was above-the-line ranged from only 3% to 100%. For monetary policy, most countries lowered their policy interest rates, but the average reduction of 166bp includes one country that lowered its rate by 2277bp and another that raised by 25bp. Of the emerging markets that used FX reserves to intervene in currency markets, some used large amounts of reserves to mitigate depreciation pressures (with the largest loss equal to 8.3% of GDP), while others accumulated reserves to mitigate appreciation pressures (with the largest gain reaching 3.6% of GDP).[4] The variation for advanced economies was even larger, with the change in FX reserves (relative to GDP) ranging from a loss of 5.7% to a gain of 12.6%. What explains this variation in policy responses to the COVID-19 pandemic?

To better understand this variation, the paper focuses on three sets of factors determining a country's policy response to COVID-19: policy space (for the given tool as well as for other policy tools), the extent of economic, financial, and health stress during the early stages of the pandemic, and other country characteristics. We find that the extent of "health stress" (i.e., the reported number of COVID-19 cases) is a significant determinant of the extent of health and containment measures, and the extent of "financial stress" can impact whether countries report using FX intervention. In contrast, the extent of "economic stress" (as measured by the change in forecast GDP growth for the current year), is not significantly correlated with any policies—including the extent of fiscal or monetary stimulus. In a few cases, certain country characteristics are also significantly correlated with the use of some policies, such as countries with stronger institutional quality being more likely to provide stimulus through above-the-line measures and less likely to use FX intervention.

[4] As discussed in more detail below, this is based on data from Adler et al. (2021), which only includes reserve sales/accumulation intended for FX intervention.

The most important and consistently significant determinant of the use, form, and magnitude of most policy tools, however, is the extent of "policy space" for the given tool. Countries with a higher policy interest rate before the pandemic lowered this policy rate by more and relied less on other forms of monetary stimulus, such as asset purchases and liquidity provision to banks. Countries with a tighter macroprudential stance (or higher CCyB) were more likely to ease macroprudential regulation (and lowered the CCyB by more). Countries with a larger reserve stockpile (relative to GDP) were more likely to use FX intervention (although not always in the expected direction). In sharp contrast, advanced economies with less fiscal policy space (as measured by debt-to-GDP ratios or other standard metrics) were not constrained in their use of fiscal stimulus, especially in their use of below-the-line fiscal policy. This differs from results in previous work showing that fiscal space is a significant constraint on the fiscal response to periods of stress and crises (Romer and Romer, 2018 and 2019; Jordà et al., 2016). Emerging markets with higher pre-existing debt levels, however, were more constrained in their use of fiscal policy in response to COVID-19, especially in their use of below-the-line measures.

In addition to these results on the importance of "own-policy space" in the use of most policy tools, another key set of results is that "other-policy space" (i.e., for other policy tools) was usually not significant in determining the use of individual tools in response to COVID-19. While most countries adjusted a range of tools simultaneously (with an average adjustment of 6.8 tools in our sample), there seemed to be little coordination between the use of these tools[5]—despite recent arguments and economic models suggesting that the ability to use other tools should factor into policy choice (Basu et al., 2020). For example, countries with less space to lower interest rates did not use fiscal policy more aggressively, and countries with higher debt levels did not use any form of monetary policy more aggressively. This suggests that countries are not following the predictions of standard economic models suggesting that they should rely more on fiscal stimulus when monetary policy is constrained and/or when interest rates are low, and that they should rely more on monetary stimulus when debt levels are high (i.e., Aizenman et al., 2019; Auerbach and Gorodnichenko, 2017; Bartsch et al., 2020). In the same spirit, the loosening of macroprudential tools (especially the CCyB) only depended on how high countries set their buffers before the pandemic, but not on the monetary stance or the level of capital

[5] It is important to highlight that using more (or stronger) policies is not always desirable, and using many policies at once is not necessarily a sign of policy coordination. We consider the use of policies as coordinated if the use (or space to use) one policy affects the use of another.

flow measures, and a more stringent macroprudential stance did not influence monetary policy actions (as suggested in Aizenman et al., 2017; Bergant et al., 2020). Some countries even used policies that seemed to work in opposite directions (such as lowering interest rates while intervening to appreciate the currency). This series of results suggests that countries are not making optimal use of their tools as substitutes or compliments, and not considering their policy tools in an integrated framework, even for tools that are often implemented by the same organization.[6]

This paper's findings are subject to one important caveat; our analysis focuses on the determinants of different policy responses but does not analyze the efficacy of these responses, including how the use of other policies could affect this efficacy or whether the policies were used optimally.[7] For example, the literature on fiscal multipliers (summarized in Ramey, 2019) finds that fiscal stimulus is less effective in countries with higher debt levels. Another set of papers argues that fiscal policy is more effective when interest rates are low and the output gap is larger (Bouakez et al., 2017; Eggertsson, 2011; Woodford. 2011; Drautzburg and Uhlig, 2015). We do not consider these interactions, many of which will take time to fully assess (such as the impact on borrowing costs and productivity). Instead this analysis focuses on what factors affected which policies were announced and adopted in the early stages of COVID-19, as well as the magnitude and form by which each policy was implemented.

To conclude, the results in this paper suggest that for most policy responses to shocks, policy space is an important determinant of not only whether a country uses a tool, but the form and extent by which it adjusts that tool. More specifically, countries that raised policy interest rates, tightened macroprudential policy, and accumulated FX reserves before 2020 were more able to adjust these respective instruments to support their economies when COVID-19 spread. Countries that had more space to provide monetary stimulus through the "conventional" tool of reducing policy interest rates relied less on other forms of monetary policy, such as by enacting smaller asset purchase programs and being less likely to provide liquidity to banks. This suggests that as countries recover from negative shocks, they should place some weight on unwinding and tightening these different tools when appropriate, so that they will have the ability to use these tools to respond to shocks in the future.

[6] For example, central banks are often responsible for, or play a key role, in implementing both monetary and macroprudential policy in many countries.

[7] For an evaluation of how the fiscal response to COVID-19 affected debt sustainability, growth and labor market institutions in the Euro area, see Wieland (2022). For an evaluation of the impact of fiscal transfers on inflation and wages, see Jordà and Nechio (2022).

Finally, the noteworthy exception to this key result on the importance of policy space is for the size of fiscal stimulus enacted in the first half of 2020. It is unclear if the reduced constraint of fiscal space during the initial response to COVID-19 was temporary and related to unique aspects of the pandemic or a longer lasting phenomenon. This is an important topic for future research.

The remainder of the paper is as follows. Section II summarizes several streams of related literature. Section III describes policy responses to COVID-19—including new data sources and patterns across countries. Section IV analyzes the factors determining the use of individual policy tools during the pandemic—including the methodology, baseline results, sensitivity tests, and a closer look at the results for fiscal policy. Section V extends this analysis to incorporate the joint use and interactions between different policies and the policy space available for multiple tools. Section VI concludes.

II. Related Literature

The analysis in this paper draws on four related veins of literature: on policy responses to shocks; on the role of policy space (which primarily focuses on fiscal policy); on the interaction between policy space and the use of different policy tools; and on policy responses to COVID-19.

The literature on policy responses to shocks is extensive, although most papers only consider a subset of the policy tools analyzed in this paper and often focus on the multiplier effects of individual policies rather than the choices between different policy tools.[8] Most closely related to this paper, Aizenman and Jinjarak (2011) examines the wide variation in fiscal and exchange rate responses to the 2008-2009 crisis and shows that countries with greater trade openness had smaller fiscal stimulus and larger depreciations—as predicted in a neo-Keynesian open-economy model. Aizenman et al. (2019) focuses on different fiscal policy responses and includes an excellent summary of this literature, including the role of fiscal space. A branch of this literature focuses on the responses of emerging markets to periods of sharp capital outflows (such as Forbes and Klein, 2015) or large capital inflows (such as Ghosh et al., 2017). These papers are similar to this analysis in incorporating a larger set of policy responses (including exchange rate intervention, currency adjustments, capital controls and macroprudential policy, in additional to monetary and fiscal policy), but generally do not incorporate the

[8] For an overview of the literature on fiscal multipliers, including the role of country characteristics and policy space, see Ramey (2019).

role of policy space or include advanced economies. Ongoing work at the IMF on the Integrated Policy Framework also focuses on emerging markets and ties together much of this literature by modelling how country characteristics determine the optimal combination of policy responses to a range of different shocks.[9]

A second (and closely related) strand of literature focuses on the constraints from prior policy actions and policy space. More specifically, as interest rates fell to near zero in many countries in the 2010s, there was increased attention to the space available for monetary policy to adjust to shocks and the potential for unconventional tools to provide stimulus if traditional tools were constrained (Bernanke, 2020). Another branch of this literature focuses on how fiscal space can constrain the use of fiscal policy. Ghosh et al. (2013) and Kose et al. (2017) discuss different approaches for defining fiscal space, and Auerbach and Gorodnichenko (2017) provides an excellent review of the literature, including an analysis of the interaction between fiscal stimulus and fiscal space at different stages of the business cycle. Aizenman and Jinjarak (2011) finds that countries with more fiscal space, as measured by the inverse of the average tax-years it would take to repay the public debt, responded to the 2008-2009 crisis with larger fiscal stimulus. Romer and Romer (2018, 2019) consider longer time horizons and show that countries with more fiscal and monetary policy space (measured by debt to GDP and if interest rates are above zero, respectively) have significantly better economic performance after periods of stress, partly because monetary and fiscal policy can be used more aggressively to support the economy. Romer and Romer (2019) argues that this constraint from fiscal space occurs partly because of the impact on market access, and partly through policymaker decisions (such as the need to abide by EU or IMF conditionality rules). These conclusions agree with Jordà et al. (2016), which analyzes a longer period to show that countries with lower debt ratios respond to crises with more aggressive fiscal stimulus (through financial rescues as well as conventional tax cuts and spending increases), leading to smaller output losses. The conclusion from this literature is that maintaining fiscal space during normal times can be a valuable insurance that allows for stronger responses to financial crises and recessions.

A third focus of this literature has been how constraints on the use of one policy tool can affect not only the use of that specific tool, but also the selection of other policy tools. This interaction of space and tools received increased attention as countries struggled to raise interest rates and reduce debt

[9] See IMF website for a list of related papers.

burdens after the stimulus in response to the 2008-2009 crisis. More specifically, several papers highlight the increased role for countercyclical fiscal policy when interest rates are near zero (Bouakez et al., 2017; Eggertsson, 2011; Woodford, 2011; Drautzburg and Uhlig, 2015, Bernanke, 2020; and Furman and Summers, 2020). Related research also shows how monetary policy that affects borrowing costs can affect fiscal space and therefore a country's ability to use fiscal stimulus (Aizenman et al., 2019; Auerbach and Gorodnichenko, 2017). Bartsch et al. (2020) provides an overview of issues around the optimal mix of countercyclical fiscal and monetary policy, highlighting how the tradeoffs change when policy rates are at their effective lower bound. This analysis also discusses the institutional constraints in attaining the optimal fiscal-monetary policy mix. Aizenman et al. (2017) and Bergant at al. (2020) show that a tighter macroprudential stance enables countries to use a more independent monetary policy when hit by global financial shocks. This literature, however, generally focuses on the interaction of two individual policy actions, but ignores the range of other policy tools that are included in this paper. The one notable exception is the IMF's recent work on the Integrated Policy Framework, which focuses on the interactions of various policy tools for emerging markets under certain conditions (IMF, 2020b).

Finally, a very recent and rapidly growing literature examines policy responses to the COVID-19 pandemic.[10] A few prominent examples showing the range of this research include: English et al., (2022), which discusses the different monetary and macroprudential responses around the world; Wieland (2022) which assess the fiscal response in the Euro area; Kirti et al. (2022a) which provides detailed information for a wide set of policies adopted by over 70 countries during 2020; Bigio et al. (2020), which models the advantages of lump-sum transfers versus credit policy; Auerbach et al. (2020), which models how different fiscal policies interact with inequality; Jordà and Nechio (2022) which analyzes the impact of fiscal transfers on inflation; Altavilla et al (2020a) which analysis the impact of various policies on bank lending conditions; Gourinchas et al. (2020), which focuses on how different policies impact business failures; Eichenbaum et al. (2020), which models the efficacy of containment policies; and Guerrieri et al. (2020), which models the efficacy of various fiscal and monetary policies.[11]

[10] For an excellent set of papers analyzing effects of the pandemic and policy responses, see the CEPR/EC/EER conference on "The COVID-shock and the New Macroeconomic Landscape: Taking Stock and Looking Ahead," in Brussels, 6-7 October 2022. In addition, Kirti et al. (2022b) analyze the impact of fiscal, monetary, and prudential policies during the COVID-19 pandemic on bank lending.

[11] Also see the Macroeconomic Model Database at https://www.macromodelbase.com/ for an archive of over 150 structural macroeconomic models that can be used to assess the impact of policy responses.

Benmelech and Tzur-Ilan (2020) is the paper closest to the first section of this paper. It explores the fiscal and monetary responses to COVID-19 and is the only other paper to date (to our knowledge) to incorporate some analysis of the role of policy space. It finds that high-income countries announced larger fiscal policies and did not appear to be constrained by high debt-to-GDP ratios (as we also find for advanced economies, but in contrast to most of the literature examining earlier shocks). Benmelech and Tzur-Ilan (2020) also finds that countries with low interest rates before 2020 lowered their interest rates by less and were more likely to use unconventional monetary policy tools. In contrast to our results, they also find evidence that countries with lower interest rates were more likely to relax macroprudential regulations and enact larger fiscal stimulus (primarily through government guarantees). While Benmelech and Tzur-Ilan (2020) focuses primarily on the factors affecting the use of fiscal and monetary policy, our paper analyzes the determinants of a broader set of tools (FX intervention, capital controls, macroprudential policies and containment measures), as well as the role of different measures of stress (financial, economic, and health). This allows a more comprehensive assessment of the focus of this paper: how the policy space for each tool and different forms of stress affected the choice of (and interaction between) a greater range of policy responses.

III. Policy Choices During the COVID-19 Pandemic: The Data

As the severity of COVID-19 became apparent and financial markets reacted sharply, governments around the world evaluated how best to support their economies and minimize the damage to health, employment and incomes. This section documents the use of six sets of policies used during the early stage of the pandemic. The severe global nature of the shock prompted the creation of several new data sets, particularly the IMF's Policy Tracker, which provides a wealth of detailed, cross-country information on policy choices during this period.[12]

To assess how countries responded to COVID-19, we focus on six sets of responses: fiscal policy, monetary policy, FX intervention, macroprudential policy, capital controls, and "containment" measures. For the first five policies, we concentrate on actions aimed at providing stimulus, easing monetary conditions, and/or stabilizing the economy, such as any fiscal stimulus, monetary stimulus, using FX reserves to stabilize exchange rate movements, loosening macroprudential regulations and

[12] In some cases, the data in the IMF's Policy Tracker differs from other sources. In these cases, and to be consistent across countries, we rely on the data in the IMF's Policy Tracker unless noted explicitly in the text.

alleviating pressures from net capital outflows. For "containment" measures, we focus on economic and health policies aimed at containing the spread of the virus, namely restrictions on activity and test-and-tracing requirements. We include as large a sample as possible for each policy response, with the resulting dataset covering up to 75 countries. Appendix Table 1 provides more detail on the data discussed in this section and used throughout this paper.

A first, and widely used, response to the pandemic was fiscal policy. To measure the fiscal response, we use the change in the 2020 fiscal balance in response to COVID-19 (as a share of 2019 GDP), as measured in June 2020 relative to end-2019.[13] This measures the additional fiscal support relative to what was planned at end-2019 and can be broken into above-the-line commitments (additional spending and foregone revenue) and below-the-line commitments (loans, equity injections, asset purchases, debt assumption and contingent liabilities). These fiscal measures only include discretionary measures and do not incorporate any support through automatic stabilizers or revenue losses from slower growth. These measures also include the announced fiscal support—even if the program was not fully utilized or drawn down.[14] Figure 1 shows the fiscal stimulus for 40 countries using these measures, with more detailed statistics in Table 1. Most countries enacted a large stimulus, with an average size of 11% of GDP across the sample, and 17 countries provided stimulus over 10% of GDP and 5 with stimulus or at least 20% of GDP. On average, countries split this stimulus almost evenly between above-the-line and below-the-line measures. There is a large variance in each of these measures, however, with the overall stimulus ranging from only 1% of GDP (for Mexico) to 37% of GDP (for Germany), and the share of stimulus that is above-the-line ranging from only 3% (for Turkey) to 100% (for Georgia).

A second, and also widely used, policy response was monetary policy—both "conventional" changes in policy interest rates and several forms of "unconventional" policy. To measure the "conventional" response, we focus on the change from 2019Q4 through 2020Q2 for two measures: the central bank's main policy interest rate (from Haver) and the same measure except substitute the shadow interest rate

[13] From the Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic, with data through June 12. Also see IMF (2020a). We have also collected data on above-the-line fiscal stimulus as a share of GDP from the IMF's Policy Tracker. Our key results reported below are unchanged with this alternate measure when holding the sample constant, but Section IV.C discusses how some results can change based on the sample composition.

[14] For example, Wieland (2022) shows that only a small percentage of the announced fiscal support for businesses was drawn down in certain Euro area countries.

for countries at their lower bound (from Leo Krippner's website[15]). To measure monetary stimulus through "unconventional tools" we use four different measures: the amount of asset purchases scaled by GDP (also referred to as quantitative easing or QE)[16]; a dummy for the announcement of new asset purchases; a dummy if the country injected liquidity into its banking system; and a dummy if the country activated a swap line. These dummy variables are constructed by scrapping information from the IMF's Policy Tracker.[17] For all of these policy tools, we exclude countries that do not have independent monetary policy (i.e., members of the Euro area), but include the Euro area as an independent entity.

Figure 2 graphs changes in the policy interest rates (including shadow rates when applicable), with more detailed information in Table 1. Most countries lowered their main policy rate, with the exceptions of Sweden and Kazakhstan (which raised their rates 25 basis points), and six other countries which had no changes. The magnitude of most reductions in policy rates was small, with 41 of the 52 countries lowering their rates between 0 and 4 percentage points (pp). The exceptions were Pakistan and Ukraine, which had much larger reductions of over 5pp.[18] For the eight countries with data on shadow rates, those rates declined by an average of 1.2pp, about twice as much as for policy rates in the same countries. The right side of Figure 3 (with supporting data in Appendix Table 2) provides more information on the "unconventional" monetary responses. It reports the share of countries that implemented the three forms of unconventional monetary policy based on the dummy variable indicators, broken into advanced economies (AEs) and emerging markets (EMs). Over 80% of both AEs and EMs implemented liquidity support for banks, and AEs also made widespread use of asset purchases (62%) and swap lines (71%). Although fewer EMs used asset purchases and swap lines, the 33% of EMs adopting asset purchases is noteworthy as most EMs had not previously used asset purchases and all had policy interest rates above zero (including ten with interest rates above 1%). Table 1 provides more information on these asset purchase programs. The average size over the first six months of 2020 was 2.3% of GDP, and purchase programs were larger in AEs (4.6% of GDP) than EMs (1.0% of GDP). The use of asset purchases during the pandemic by many countries that had interest rates above zero suggests

[15] Available at: International SSR estimates (ljkmfa.com). For more information on the calculation of these shadow rates, see Krippner (2015). We include shadow rates for eight entities: Australia, Canada, Euro area, Japan, New Zealand, Switzerland, UK, and US.
[16] The magnitude of asset purchases is from Fratto et al. (2021).
[17] Available at: Policy Responses to COVID19 (imf.org).
[18] Argentina reduced its policy rate by 22pp over this window but is not shown on the graph or included in the statistics or analysis below as it can distort the graph and affect some of the empirical estimates.

that QE was no longer treated as a policy that could only be implemented after all of the policy space available to lower interest rates had been exhausted.

A third policy response is FX intervention aimed at moderating sharp currency movements. We use two measures of FX intervention: net changes in FX reserves over 2020q1 and q2 (from Adler et al., 2021) as a percent of 2019 GDP and a dummy variable equal to one if a country reports adjusting FX reserves in the IMF's Policy Tracker. It is important to note that these measures could capture different aspects of FX intervention. The first measure reports intervention through all sales and purchases of reserve assets, including not only spot operations, but also derivatives and other transactions aimed at affecting the exchange rate by altering the central bank's foreign currency position. This proxy was created by Adler et al. (2021) and is a substantial improvement over the traditional approach of just using changes in a country's flow of international reserves as reported in the Balance of Payments.[19] The second measure is a dummy indicating whether the country reports conducting any FX intervention, which should include any purchases or sales of reserves as well as any activity through derivative markets. This measure does not capture the direction of the intervention (i.e., whether the country increased or decreased reserve holdings) and is self-reported, so may not agree with the Adler et al. (2021) measure. We continue to exclude individual members of the Euro area (which do not use FX reserves with the intent of affecting their currency) but include the Euro area as a single entity.

Figure 4 (with summary statistics in Table 1) shows the magnitudes of changes in FX reserves according to Adler et al. (2021), and Figure 3 (with summary statistics in Appendix Table 2) shows the share of the sample reporting any FX intervention according to the IMF Tracker. Although only three AEs report using any FX intervention during the first half of 2020 (Iceland, Israel, and Switzerland), the majority of EMs reported engaging in some type of FX intervention (58% of this sample). A comparison with the Adler et al. (2021) data on FX intervention, however, suggests that FX intervention was more widespread than that reported in the IMF Policy Tracker, and the directions and magnitudes of this intervention varied substantially across countries. More specifically, of the 56 countries in the Adler et al. (2021) dataset, 25 sold FX reserves and 24 bought reserves. Some countries that increased FX reserves were traditional safe-haven economies (such as Switzerland, which increased reserves by

[19] Simply using changes in FX reserves as reported in the Balance of Payments (a method often employed in the literature), also captures changes in FX reserves unrelated to exchange rate management, including large movements in countries that do not actively intervene in foreign exchange markets.

10.8% of GDP), while others were EMs that are not obvious safe-haven economies (such as Colombia, Peru, Russia, Thailand, and Uruguay). These countries could have been increasing FX reserves to improve competitiveness in response to a depreciated dollar or to build reserve buffers.

A fourth policy response is to adjust macroprudential regulations. We focus on any loosening in macroprudential policy aimed at supporting lending and access to credit.[20] More specifically, we measure changes in macroprudential policy using three variables: 1) a dummy if the country reports any loosening in macroprudential policy in the IMF Policy Tracker; 2) a dummy if the country reports adjusting its counter-cyclical capital buffer (CCyB) in the IMF Policy Tracker; and 3) the magnitude of changes in the CCyB.[21] The CCyB is the one macroprudential regulation with a magnitude that is comparable across countries and reported on a timely basis, although it is only used in a subset of economies. Figure 3 shows the share of countries reporting any adjustment in macroprudential policy or the CCyB, with more detailed statistics in Appendix Table 2. A large proportion of countries report adjusting macroprudential policy (72% of AEs and 61% of EMs). Just the CCyB was loosened in 44% of AEs, but only 16% of EMs. Table 1 provides additional information on the magnitude of changes in the CCyB; the mean loosening was 27bp, although this includes many countries that did not have a CCyB in place to adjust. Of the 16 countries that adjusted their CCyBs, the size of adjustment ranged from 25bp in Germany to 250bp in Sweden.

A fifth policy is adjustments to capital controls. We focus on two types of capital flow measures (CFMs) aimed at reducing net capital outflows and the corresponding pressure for currency depreciation. More specifically, we use dummy variables to capture if countries reduced controls on capital inflows or increased controls on capital outflows.[22] Both measures are based on country

[20] Altavilla et al. (2020a) show that macroprudential regulation was crucial for supporting bank lending during the early months of the pandemic.

[21] Data for changes in the CCyB are from the BIS (www.bis.org/bcbs/ccyb/) and ESRB (www.esrb.europa.eu/national_policy/ccb/html/index.en.html) and then cross-checked with Chen and Friedrich (2020). Several countries report a loosening in counter-cyclical buffers in the IMF Policy Tracker, but are not reported as loosening in the BIS and ESRB data. We check these examples with country specific sources. In most cases, this reflects countries which reduced some buffer on selected institutions, but not a macroprudential CCyB on the entire banking system. For example, the Netherlands reduced a CCyB for selected SIFIs, with different changes for different institutions. In these cases, we do not adjust the raw data. The only exceptions are for two countries not included in the BIS and ESRB data: Morocco (which lowered its CCyB from 2.5% to 2.0%) and Kazakhstan (which lowered its CCyB by 1pp for all institutions, starting from a higher level for SIFIs).

[22] Although members of the Euro area are restricted in their ability to use capital controls with respect to other Euro area countries, they can enact controls in certain circumstances and with respect to non-Euro area countries, so we include countries in this region as individual entities.

responses to the IMF Policy Tracker. Since these measures are self-reported, they may understate the use of capital controls, as some countries may not report adjustments to controls or use a different terminology in order to avoid any perceived negative stigma from the use of these measures. Figure 3 (with additional information in Appendix Table 2) shows that very few countries report making these adjustments to capital controls—with only 8% of EMs reducing controls on capital inflows (Peru, India, and China) and 5% tightening controls on capital outflows (Turkey and Argentina). The only AE that reported changing its capital flow measures is Korea, which adjusted controls on capital inflows.

The final policy response included in this paper is steps aimed at containing the spread of COVID-19 through targeted health measures, mobility restrictions, and testing, tracing, and vaccine policies. The focus of "containment" measures is different than the other policy tools that are used to respond to a variety of economic shocks or periods of financial stress. Nonetheless, it is useful to include these policies as they were important for stabilizing economies and their use may have interacted with other policy choices and the extent of policy space (a focus of this paper). For example, if countries had less space to support incomes and employment through fiscal or monetary stimulus, they may have felt more urgency to take steps to contain the spread of the disease, or they may have been more reticent to restrict economic activity as people would have less support on which to survive. To measure these containment and health policies, we use Oxford's Coronavirus Government Response Tracker (OxCGRT).[23] We focus on the "Containment and Health measure", which includes school closings, workplace closings, cancellation of public events, restrictions on gatherings, stay-at-home requirements, restrictions on international movement, public information campaigns, testing policy, contact tracing, facial coverings, and vaccination policies. Figure 5 graphs this index through the end of 2020Q2 for AEs and EMs. All countries adopted health and containment policies, with an average index of 56.6. This average, however, reflects a wide variance in responses. The weakest response was in Estonia (24.3) and strongest was in Colombia (87.5). More generally, EMs introduced stricter measures than AEs in the first half of 2020.

Appendix Table 3 provides a summary of which countries used each of the tools discussed above.[24] Green indicates that the tool was used to provide stimulus and red indicates that the tool was not used.

[23] Compiled by the University of Oxford and available at: Coronavirus Government Response Tracker | Blavatnik School of Government (ox.ac.uk)

[24] This table uses the measure of fiscal policy from the IMF Policy Tracker, instead of the IMF Fiscal Monitor (which is the focus of Figure 1, Table 1 and the discussion above) in order to include information for a larger set of

Yellow denotes that the tool was used—but not in the direction typically associated with stimulus or easing financial conditions (i.e., raising interest rates or accumulating FX reserves) and white indicates that no data was available or the tool is not available for that country.[25] This table and the series of figures and tables discussed above (Figures 1-5, Table 1, and Appendix Table 2) confirm that countries used an array of different policy tools to respond to COVID-19, with substantial variation in which policies each country selected. Moreover, even for countries that chose to use the same type of tool (such as fiscal policy), there was substantial variation in not only the extent to which they employed each tool, but how it was implemented. For example, for countries intervening in FX markets, some used reserves to slow currency depreciations (in green), while others added to their reserve stockpiles to moderate currency appreciations (in yellow). For countries using monetary stimulus, some only shifted to unconventional tools (such as asset purchase programs) after lowering interest rates, such that their policy interest rates were at their lower bounds, while others used unconventional tools actively even when their policy interest rates were well above zero. What explains this substantial cross-country variation in the choice of tools, intensity by which each tool was used, and form by which each tool was implemented during COVID-19?

IV. Factors Determining Policy Choice during the COVID-19 Pandemic

This section analyzes what factors determined the use of each of the policy tools discussed in Section II: pre-existing policy space, the extent of stress in financial, economic and health measures, and other country characteristics. The onset of COVID-19 is a useful case study as the pandemic was an exogenous shock and did not reflect prior policy choices or economic imbalances, thereby providing cleaner identification of the factors driving policy responses. This is also a useful case study as COVID-19 was a global shock that affected all countries simultaneously (at least in terms of the realization of the shock, if not the actual spread of the disease), prompting reactions during the same time period and facilitating cross-country comparisons.

countries. As discussed in more detail in the sensitivity analysis in Section IV.C, the IMF Policy Tracker includes a larger sample of countries, but the size of the stimulus is only available relative to 2020 GDP, which generates concerns about endogeneity and could bias empirical analysis. For the color-coding in Appendix Table 3, however, we can augment data from the Fiscal Monitor with this flawed data from the IMF Policy Tracker without affecting any key results, as the table just shows the direction of any fiscal stimulus and not the magnitude.

[25] For example, the tool of adjusting interest rates is not available for individual countries that are the member of a currency union and/or that are dollarized.

A. Methodology and Variables

What determined these different policy responses to the COVID-19 pandemic? For policy responses for which there are quantitative indicators, what determined the size of the response? And for policies that can be delivered in different forms (such as the type of fiscal or monetary stimulus), what determined the specific tools utilized? To answer these questions, this section estimates the use of a *policy tool* (PT) for each country *i* as function of three sets of variables: initial *policy space* (PS), country-specific *stress* (ST), and other *country characteristics* (CC):

$$PT_{i,t} = \alpha + \beta \cdot PS_{i,t-1} + \gamma \cdot ST_{i,t} + \delta \cdot CC_{i,t-1} + \varepsilon_{i,t}. \quad (1)$$

The *policy tool* and *stress* variables are measured during the initial phase of the pandemic (with *t* defined as 2020q1-2020q2, unless noted otherwise above) and the *policy space* and other *country characteristics* variables measured before the pandemic (with *t-1* defined as year-end 2019, or the latest date before that if end-2019 is not available). Equation (1) is estimated using OLS when *policy tool* is a continuous variable, or as a probit when PT is a dummy variable. All regressions include robust standard errors.

In each regression, *policy space* is measured using an indicator that corresponds to the *policy tool* on the left-hand side. More specifically, for regressions predicting the use of fiscal stimulus, we follow Romer and Romer (2019) and measure *policy space* as general government gross debt to GDP.[26] For regressions predicting the use of monetary stimulus, *policy space* is measured using the level of the policy interest rate, as well as the shadow rate – where available – as a robustness test. For regressions predicting the use of FX intervention, *policy space* is measured as the level of FX reserves as a percent of GDP.[27] For regressions predicting the use of macroprudential tools, *policy space* is measured as an index of three popular macroprudential tools (the level of the CCyB, the level of the LTV ratio, and an index of FX regulations).[28] For regressions predicting changes in the CCyB, *policy space* is measured by the initial

[26] There are other measures for fiscal space proposed in the literature, a number of which we explore in the sensitivity analysis. We focus on debt to GDP ratios as Romer and Romer (2019) point out that these variables present a useful measure of *policy space* as they are slow moving and less cyclically sensitive (as compared to measures such as budget balances or financing costs). They also capture past policy decisions and "more long-run features of a country's policymaking process".

[27] For the Euro area, *policy space* for FX intervention is Eurosystem FX reserve holdings (relative to Euro area GDP).

[28] The index is constructed following the methodology in Bergant and Forbes (2023) and Chari et al. (2022) in order to more precisely measure the intensity of macroprudential policy while including a range of policies targeting key vulnerabilities (for banks, the housing market, and FX exposures). The index combines the two quantitative

level of the CCyB. For regressions predicting adjustments in controls on capital inflows or outflows, *policy space* is measured using an index of controls on inflows or outflows, respectively, from Fernandez et al. (2016).[29] Finally, for regressions predicting the use of containment tools, there is a less obvious measure of *policy space*, so we use the output gap to capture the stage of the business cycle and thereby whether the economy was starting from a relatively stronger position to absorb any containment in activity. Each of these measures is written so that a positive value indicates more *policy space* (i.e., lower debt ratios, higher interest rates, higher FX reserves, tighter macroprudential regulation or capital controls, and a smaller output gap).

The second set of variables, measuring country-specific *stress* (ST), are the same for the regressions predicting the use of each *policy tool*. More specifically, we focus on capturing the "stress" from COVID-19 in terms of financial markets, economic activity, and health outcomes. We measure *financial stress* based on changes and percent changes from end-2019 to the date of "peak stress" for each country in the first half of 2020 for sovereign CDS spreads (5-year, US$) from Bloomberg, and if this is not available, from the EMBI+ bond index.[30] We measure *economic stress* as the change in each country's forecast 2020 real GDP growth between January and June, according to the IMF's *World Economic Outlook* updates.[31] We measure *health stress* as the number of reported cases of COVID-19 as a share of the population, as reported in Oxford's Coronavirus Government Response Tracker (OxCGRT). In each case, a higher value indicates more stress (i.e., greater increase in financial market spreads, greater reduction in forecast GDP growth, or greater incidence of COVID cases).

The final set of variables (CC_i) controls for other *country characteristics* before the spread of COVID-19. Given the limited degrees of freedom in this cross-section analysis, we only include four controls in our baseline for each *policy tool*. We include a dummy variable equal to one for countries with a fixed

measures of specific macroprudential policies that are comparable across countries (the CCyB and LTV ratio) with a constructed FX index. Each of the three components is written so that a higher value is a more stringent policy and then scaled so that each component receives equal weight. The FX index is constructed using data in Alam et al. (2019), updated in Oct. 2020, as the cumulated change in FX regulations since 2000 (as done in Bergant et al., 2020 and Forbes, 2021). Data on the CCyB is discussed above, and data on the LTV ratio is from Alam et al. (2019), updated in Oct. 2020.

[29] Updated as of June 2019, with data through 2017. We use the 2017 value as a pre-COVID-19 level.

[30] We combine both the change and percent change in order to better compare stress across countries with different starting points (i.e., focusing only on percent changes for countries with very low CDS/spreads can overstate the degree of stress).

[31] Measured as the change from the Jan 2020 forecast (which was prepared in Dec 2019) through the June 2020 forecast.

exchange rate (based on the classification in Ilzetzki et al., 2019[32]) and another dummy for emerging markets (based on IMF definitions). We also include a broad measure of institutional quality (the ICRG index) from the Worldwide Governance Indicators and a measure of trade openness (exports plus imports as a share of GDP, from the IMF). For sensitivity tests, we include a range of other control variables, such as the Chinn-Ito measure of financial openness (Chinn and Ito, 2006), changes in credit ratings (based on Fitch ratings), GDP per capita, and exposure to commodity prices.[33] These changes in the controls for *country characteristics* have no impact on the key results discussed below. Appendix Table 1 provides additional information on each of the variables.

B. Baseline Results

Table 2 reports results for estimates of equation (1), with separate panels for different groups of *policy tools* for which there are sufficient degrees of freedom to produce meaningful estimates.[34] In each table, we begin with the simple correlation between the *policy tool* and corresponding *policy space*, and then add a control for *financial stress*, then the other two *stress* variables, and then the full set of control variables.[35] On the far right for each tool, we also add an interaction between the *policy space* variable and the *EM dummy* in order to assess if *policy space* is more or less important in emerging markets. Many of the regressions have a high adjusted-R^2, reaching 41% for the size of fiscal stimulus, about 60% for adjustments in policy interest rates, and 87% for use of the CCyB. This suggests that these simple cross-country regressions can explain a meaningful share of the variation in policy responses to the COVID-19 pandemic.[36]

The coefficient estimates show that *policy space* is the most consistently significant determinant of the use of most *policy tools* (albeit not always in the expected direction). As expected, countries with higher interest rates before the pandemic reduced interest rates by significantly more (panel B). Also

[32] The data ends in 2016, and we assume the exchange rate regime did not change through 2019. We define a fixed exchange rate regime using the "coarse classifications" and define all countries as fixed if they have a moving band that is narrower than or equal to +/- 2% (classification #11) or anything more restrictive.
[33] Exposure to commodity prices is measured as the volatility in the commodity terms-of-trade index from 2008-2018, based on the data in Gruss and Kebhaj (2019).
[34] For example, there is not sufficient variation to estimate equation (1) for reduced controls on capital outflows.
[35] We abridge the results reported for liquidity provision to banks and FX swaps as there are no meaningful changes in the additional specifications, and this allows us to combine these results with those for FX intervention in one panel.
[36] The tables and discussion below focus on results when the interest rate is measured using the policy interest rate instead of the shadow rate. Key results are unchanged when using the shadow rate—so we do not report or discuss the later set of results to save space.

not surprising, countries with a tighter macroprudential stance before the pandemic, or with a higher CCyB ratio, were more likely to loosen macroprudential regulation and lower the CCyB, respectively (panel D). Countries with more FX reserves (relative to GDP) before 2020 were significantly more likely to report using some form of FX intervention, although the estimates that incorporate the direction and magnitude of intervention (instead of just self-reporting some form of intervention) suggest that countries with greater reserve holdings tended to increase (instead of decrease) reserves in response to the pandemic (panel C). This could reflect a number of influences: (1) some countries experienced sharp appreciation pressures after March and intervened by accumulating reserves to slow this appreciation; (2) countries with larger "war chests" of reserves may not have needed to use as many reserves to support their exchange rates as they had greater credibility or stronger fundamentals; and (3) countries which were more conservative in accumulating reserves may also have been more conservative in using them during the pandemic. Although a less precise measure of *policy space*, the stage of the economic cycle before the pandemic did not appear to constrain the ability of governments to enact containment measures to restrain the spread of the virus, and countries with weaker economies before the pandemic may have enacted stronger containment policies (panel E).

The most surprising result for the estimated coefficients on *policy space* in Table 2 are the negative and significant coefficients on fiscal space (panel A). Taken at face value, this would imply that countries with more fiscal space before the pandemic (i.e., lower debt ratios) provided significantly less fiscal stimulus.[37] This is the opposite result than in previous research analyzing pre-COVID-19 samples (Romer and Romer, 2018, 2019; and Jordà et al., 2016), and agrees with the results in Benmelech et al. (2020). The estimates that also include fiscal space interacted with the EM dummy (column 5), however, suggest that this lack of constraint of fiscal space on the fiscal response to COVID-19 may only apply to AEs. When the coefficient on the interaction with the *EM dummy* is combined with the coefficient for *policy space*, the combined relationship for fiscal stimulus is positive. This indicates that EMs with smaller debt ratios before COVID-19 had a larger fiscal response during the initial phase of the pandemic.

[37] Section IV.C explores these results in more detail. It shows that the significant negative coefficient on fiscal space is affected by sample composition (and especially if Japan is included in the analysis). Adjustments to the sample and measurement of fiscal space often render the coefficient on fiscal space insignificant, but it rarely becomes positive and does not become positive and significant as found in past work. See the next section for more details.

The estimated coefficients on *policy space* also provide information on whether the space available for a given broad category of policies (i.e., fiscal or monetary) affected how the policy was implemented. For fiscal policy, the estimates (on the right of Table 2, panel A) show that the negative relationship between fiscal space and the fiscal response to COVID-19 primarily occurs through below-the-line stimulus for AEs. In other words, AEs with higher debt levels (less space) before the pandemic adopted significantly more stimulus in the form of loans, equity and credit guarantees, but did not adopt significantly more stimulus through traditional on-budget spending increases and revenue losses. This suggests that even if countries with high debt levels were not constrained in the size of the stimulus, they enacted in response to COVID-19, they may have been constrained in the amount of stimulus they could offer on-budget, and therefore were more likely to construct the stimulus in ways that would not as directly contribute to reported debt burdens. This shifting of stimulus spending to "below-the-line", however, only applied to AEs. Column 15 suggests that EMs with higher debt levels used significantly less—instead of more—below-the-line stimulus. In other words, EMs with higher debt levels appear to have been more constrained than AEs in announcing stimulus through below-the line measures, but neither set of countries was significantly constrained in their use of above-the-line measures.[38]

For monetary policy, there is also some evidence that the space available contributed to how the policy was implemented. Countries with higher policy interest rates before the pandemic were not only more likely to lower policy interest rates, but less likely to enact certain forms of "unconventional" monetary easing (Table 2, panel B). More specifically, countries with more space to lower interest rates were less likely to enact any form of asset purchases (columns 6-10) and announced smaller asset purchase programs (columns 11-15). Panel C shows that countries with more space to lower interest rates were also less likely to enact a program providing liquidity to banks. The significance of many of these estimated relationships between monetary *policy space* and the use of unconventional monetary *policy tools* varies across specifications,[39] but when the baseline is adjusted to take into account the simultaneous use of different policy tools and the *policy space* available for the full set of tools, the relationships are more consistently significant (Section V). Combining these estimates, the results are consistent with arguments that countries with more space to provide monetary stimulus through

[38] As discussed in Section III, this captures fiscal stimulus that was announced, even if not fully utilized.
[39] This may reflect the high correlation between these country characteristics and the level of the policy interest rate (i.e., monetary *policy space*), as countries with stronger institutions and flexible exchange rates had lower policy rates before the pandemic.

reductions in policy interest rates are less likely to use unconventional monetary tools, and if they do use tools such as asset purchase programs, do so in smaller magnitudes.

Next, shifting from the coefficients on *policy space* to those on the *stress* variables, greater *financial stress* (but not *economic* or *health stress*) is correlated with less fiscal stimulus (in aggregate as well as for above- and below-the-line measures) in specifications that do not control for other country characteristics, but becomes insignificant when adding these additional controls. There is some evidence that greater *financial stress* is correlated with a lower probability of using FX intervention in either direction, but there is no evidence it is significantly correlated with the size of FX intervention, suggesting this may just represent a hesitancy to self-report intervention for countries experiencing substantial *financial stress*. The extent of *economic stress* and *health stress* are not significantly correlated with any of the policy responses, except for a strong correlation between *health stress* and the use of health and containment policies. This is not surprising—countries with more reported COVID-19 cases tended to impose stricter mobility restrictions and have more extensive testing and tracking regimes.

Finally, shifting to the *country characteristics* other than *policy space* in Table 2, some variables are consistently significant. Countries with stronger *institutional quality* did more of their fiscal stimulus above-the-line, were significantly less likely to use FX intervention, and more likely to loosen controls on capital inflows. Countries with more *trade openness* were less likely to use asset purchase programs or loosen controls on capital inflows. Emerging markets were significantly more likely to loosen controls on capital inflows, as well as to enact health and containment measures, but were otherwise not significantly different than advanced economies in the use of other policies (at the 5% significance level)—except for the relationship with *policy space* (as discussed above). None of these *country characteristics* were as consistently important across the different *policy tools*, however, as found for *policy space*. We also performed a series of sensitivity tests with additional control variables (the Chinn-Ito measure of financial openness, changes in credit ratings (based on Fitch ratings), GDP per capita, and exposure to commodity prices), with no meaningful impact on the key results.

C. A Closer Look: Did Fiscal Space Matter during COVID-19?

In order to further explore these results, and especially the finding that the aggregate fiscal response to COVID-19 was not significantly constrained by fiscal space in advanced economies, we

estimate an extensive series of sensitivity tests. We focus on whether this relationship depends on the measure of fiscal space; is sensitive to outliers and the sample composition; or is sensitive to the choice of other controls. A subset of these results is reported in Table 3.

To begin, we test if the results are sensitive to how *fiscal space* is measured. Although the debt to GDP ratio is the most common measure used in the literature, several papers argue that other statistics better capture the concept of fiscal space. For example, measures of the fiscal balance (especially if adjusted for the stage of the business cycle) could more accurately capture any continuing imbalances than debt measures (which reflect past imbalances). Also, scaling any measure of *fiscal space* by tax revenues could better capture a country's ability to repay. Ghosh et al. (2013) and Kose et al. (2017) provide excellent summaries of this discussion. To explore if the measurement of *fiscal space* affects our key results, we use several alternatives that are available for most of our sample: gross (instead of net) debt as a percent of GDP; the fiscal balance as a percent of GDP; the primary fiscal balance as a percent of GDP; the cyclically-adjusted, primary fiscal balance as a percent of GDP; gross government debt as a percent of average tax revenues; and the fiscal balance as a percent of average tax revenues.[40] A selection of these results is reported in columns 1-4 of Table 3, with each column including an interaction between the *EM dummy* and *fiscal space* (as well as an *EM dummy*) to allow for different relationships between the new measures of *fiscal space* and the fiscal response for these two groups of countries.

The signs and significance of the coefficients on *fiscal space* in Table 3 vary meaningfully across measures. The coefficients are usually negative and significant when some form of debt is incorporated in the numerator of the *fiscal space* variable (as found in our baseline), but become insignificant (and often positive), when some form of the fiscal balance is used instead.

Next, we examine the impact of outliers and sample composition. We begin by replacing our current measure of the fiscal response to COVID-19 (from the IMF's Fiscal Monitor) with another measure reported in the IMF's Fiscal Tracker.[41] This has the advantage of expanding the sample size (from 39 to 65), but has the disadvantage that the fiscal response is self-reported and expressed relative to 2020

[40] All new measures of fiscal space are from Kose et al. (2017) and the corresponding data set.
[41] The sample of countries for the regressions of fiscal policy in the baseline analysis are constrained by the data available in the IMF's Fiscal Monitor. See Section III for a discussion of this data.

GDP (which could introduce endogeneity as 2020 GDP was affected by the size of the fiscal response in 2020). Column 5 of Table 3 shows that the resulting coefficient on *fiscal space* is about half as large and becomes insignificant when using this new measure for the larger sample of countries. To test if this reflects the change in the measure of *fiscal space* or the sample, column 6 uses the new measure but restricts the sample to the smaller group of countries used in the baseline analysis in Table 2 (panel A). The coefficient on *fiscal space* becomes significant and very close to in the baseline (-0.105 as compared to -0.101 in the baseline). This suggests that sample composition is the key driver of the change in significance, and in a larger sample of countries, the relationship between fiscal space and the fiscal response to COVID-19 is insignificant.

As an additional test for the impact of sample selection, we exclude outliers in our baseline sample (instead of trying to expand the sample with imperfect data). More specifically, we exclude outliers with very large debt to GDP ratios: just Japan, or the five countries with debt/GDP>100%. Results are reported in columns 7 and 8 in Table 3. Once again, the significant negative relationship between *fiscal space* and the *fiscal response* to COVID-19 disappears. In fact, the negative and significant coefficient on *fiscal space* appears to be driven by one outlier: Japan. Japan had a very high debt ratio before the pandemic (237% of GDP, compared with the sample average of 61%) and responded to the pandemic with a fiscal stimulus (relative to GDP) about three times greater than the sample average. To further highlight the role of this outlier, we replicate other results reported earlier that found a significant negative relationship between *fiscal space* and the *fiscal response* to the pandemic, but now exclude Japan. In each case the coefficient on *fiscal space* becomes insignificant, although it usually remains negative. Column (9) and (10) report a sample of these results to highlight the role of this one outlier.

Finally, we also estimate each of the baseline regressions with additional controls (while maintaining the controls for *policy space*, *stress*, and other *country characteristics*). More specifically, we estimate sensitivity tests with control variables that are widely available and therefore do not change the sample size: (1) a dummy if the country had an IMF program at any point in 2020 (which includes five countries with existing programs, plus seven countries with programs started during the pandemic); (2) a variable measuring country sensitivity to commodity prices;[42] (3) country credit ratings from Fitch[43]; and (4)

[42] Calculated as the volatility in the commodity terms-of-trade index, with the index capturing reliance on commodity exports or imports as reported in Gruss and Kebhaj (2019).
[43] Based on Fitch Ratings converted to a numerical scale, with a higher number indicating a stronger credit rating.

nominal per capita GDP (in US$).[44] For some of these tests, we are not able to replicate all of the baseline results as there are insufficient degrees of freedom (especially for the regressions in which the *policy tool* is a dummy).[45] For all the regressions with sufficient degrees of freedom, however, these additional variables do not change the main results and are usually insignificant. The only additional control that is significant in more than one of these tests is the dummy indicating if the country had an IMF program. This coefficient is positively correlated with a country reducing the policy interest rate, reducing the CCyB, putting controls on capital inflows, and enacting stricter health containment measures.

To conclude, this series of robustness tests suggests that the significant negative relationship between *fiscal space* and the *fiscal response* to COVID-19 found in the baseline for AEs is not consistently significant and is particularly sensitive to outliers and the sample. When Japan is dropped from the sample, the relationship between *fiscal space* and the fiscal response to COVID-19 is no longer significant and negative (although it is still often negative for advanced economies), and the role of *policy space* is usually not significantly different for EMs (although the interaction coefficient is still usually positive). While these estimates suggest that having more fiscal space did not correspond to a significantly greater fiscal response to COVID-19, there is also little evidence that having less fiscal space acted as a significant constraint in how countries responded to the pandemic—especially in AEs. This is a sharply different result than in earlier research, which generally finds that fiscal space was a significant constraint on the fiscal response to negative shocks before the COVID-19 pandemic (i.e., Romer and Romer, 2018, 2019; and Jordà et al. 2016) and during the 2008 Global Financial Crisis (Aizenman and Jinjarak, 2011).

Has something changed in the relationship between fiscal space and a country's ability to enact fiscal stimulus? This is an important topic for future work, but it is worth briefly considering several possible hypotheses. First, the exogenous nature of the COVID-19 pandemic may have reduced concerns about a country's ability (or willingness) to repay additional debt, as it did not reflect prior policy

[44] We also estimate a series of tests to explore if the relationship between *fiscal space* and the fiscal response to COVID-19 is affected by the financial market response, as suggested in Romer and Romer (2019). More specifically, we exclude the control for *financial stress* or interact this with *fiscal space*. In these extensions, the coefficient on *fiscal space* remains negative and significant, and the additional interaction with *financial stress* is insignificant.
[45] For example, we also estimate sensitivity tests with two additional variables that have been highlighted in other papers: the size of the financial sector and real credit growth. These reduce the sample size and make meaningful estimation impossible for a number of *policy tools*.

mistakes or domestic imbalances. Second, market participants may have expected that most of the negative impact of the pandemic would be relatively short-lived—which is the standard situation when a large and temporary stimulus to smooth incomes is the optimal policy response to act as a "bridge" and reduce scarring (IMF, 2020a). Third, the low interest rate environment in 2020 (and expectations for policy interest rates to remain low for an extended period, especially in AEs), would have increased countries' debt capacity through the decrease in expected debt service costs. Fourth, the nature of the health shock, for which fiscal policy was the most effective tool to save lives, address the inequities from the pandemic, and help economies recover, may have reduced concerns about large stimulus packages. Fifth, norms about the risks from large debt burdens may have changed for a number of reasons: from country experiences (with countries such as Japan carrying debt at levels previously believed to be unsustainable); increased expectations that central banks could hold more debt in the future; or increased concerns about "secular stagnation" that merited more front-loaded fiscal stimulus (Eggertson et al., 2016). Finally, and closely related, the easing of rules and requirements that had previously constrained fiscal policy in high debt countries—such as IMF programs and EU treaties—may have reduced constraints in these countries (e.g., Romer and Romer, 2019).

Several of these reasons why fiscal space may not have constrained fiscal policy during the COVID-19 pandemic, however, suggest that this relationship may not persist or apply in future situations. For example, if a country's next negative shock is seen as related to domestic policies or expected to be longer lasting, financial markets may become more concerned about an increase in debt. Or, if several countries default on their debt, investors could quickly demand higher interest rates and cause self-fulfilling debt spirals (Aguiar et al., 2017). Fiscal space could also act as more of a constraint on fiscal responses if borrowing costs increase, such as if inflation picks up and inflation-targeting central banks tighten monetary policy more aggressively than expected.

V. Interactions between Policy Choices during the COVID-19 Pandemic

The estimates in the last section (Tables 2 and 3) show the factors that are correlated with a country's use of each policy individually, ignoring any possible interactions between different policy choices. As discussed in Section II, however, countries could use certain policies as substitutes or compliments to other policies, such that the decision to use a specific policy could depend on the use of (or space to use) others. More specifically, countries that use one tool actively (such as fiscal stimulus),

might have less need to use other tools to provide stimulus. Or, if a country does not have the policy space to use a preferred tool (such as being unable to lower the policy interest rate if it is already at the lower bound), it could resort to using other tools to provide stimulus that are less attractive for other reasons (such as reducing macroprudential requirements that could undermine the resilience of the financial system). Similarly, if a country does not have FX reserves available to defend the currency against depreciation pressures, it could rely on tools such as adjusting macroprudential policy or capital controls. The decision to use certain policies could also be affected by the impact of other policies, such as if reducing interest rates increased the fiscal multiplier and thereby reduced concerns about debt sustainability, thereby making fiscal policy more attractive. For all of these reasons, the policy space available to use one tool may also affect a country's decision whether to use other tools. This section explores these possible interactions between different policy choices, a number of which have been modelled in the theoretical literature (discussed in Section II).

To begin, Appendix 3 documents the joint use of different policies. This table combines the information on individual policy tools from Section III to show simultaneously which tools were used (to any extent) by each country in the sample. The table is color coded as follows: white is no data; green indicates the tool was used to provide stimulus or ease financial conditions; red indicates the tool was not used; and yellow indicates the tool was used in a direction not usually associated with stimulus or easing of financial conditions (i.e., raising interest rates or accumulating FX reserves to dampen a currency appreciation). The right side of the table reports how many of tools were used by each country—summing the number of tools providing stimulus as well as the number used in any direction. These totals include how many categories of tools were used by each country (i.e., only counting one for monetary policy even if several types of monetary tools were adjusted) as well as how many individual tools were used. The latter allows for two forms of fiscal policy (both above- and below-the-line), four forms of monetary policy (the policy rate, asset purchases, liquidity provision to banks, and swap lines), two forms of macroprudential policy (overall and just the CCyB), and two forms of capital controls to ease net outflow pressures (on inflows and outflows).

Evaluating these actions simultaneously provides more detail on the patterns observed in Section III; most countries used a range of policies in response to COVID-19. All countries in the sample used at least two categories of tools: fiscal stimulus and containment measures. On average (and at the sample median), countries used tools from four of the six categories to stimulate their economies, with thirteen

countries using tools from five of the categories, and two using tools in all of the categories (China and Turkey). When considering whether countries used a tool in any direction (and not just to provide stimulus or ease financial conditions), the joint use of tools was even larger—mainly because over half of the countries using FX intervention accumulated reserves (instead of the usual response to a shock of spending reserves to slow currency depreciation). More specifically, 28 countries used tools from five of the six broad categories and four countries used all six types of tools in some direction (India and South Korea, in addition to China and Turkey).

Even more impressive is the range of policies activated when focusing on individual tools instead of broad policy categories. When allowing for the different forms of each policy category, countries averaged 6.4 individual tools to provide stimulus or ease financial conditions during the first six months of 2020, or 6.8 tools in any direction. The numbers would be even higher if the data on below-the-line stimulus was more widely available. (It is missing for just over one-third of the sample.) Most impressive was the multifaceted use of monetary policy; about 60% of the countries adjusted at least three of the four monetary policy tools. Most of these countries that used multiple monetary tools also used other tools. For example, of the countries using at least three forms of monetary policy, all of them (for which data is available) also provided fiscal stimulus, 84% used FX intervention (in some direction), and 65% adjusted macroprudential policy (as measured by the index).

Also noteworthy is the incidence of countries that did not simultaneously use popular policies to provide stimulus—or that simultaneously used tools pushing in different directions. For example, although all countries used some form of monetary policy to provide stimulus and/or ease financial conditions, about one-third of these countries did NOT ease macroprudential regulations[46], a policy which would also be expected to further ease financial conditions. Also, about one-third of the countries providing some form of monetary stimulus simultaneously purchased FX reserves to slow the appreciation of their currencies—a policy which would have worked in the opposite direction of monetary easing by tightening financial conditions and reducing inflation. Of the 25 countries using FX intervention to slow the depreciation of their currencies, only two (China and Turkey) tightened controls on capital outflows or eased controls on capital inflows—two policies which would also be expected to slow currency depreciation. In fact, the three other countries which reported using capital controls

[46] Granted, our index of macroprudential policy only includes adjustments in the LTV ratio, CCyB, and FX-related measures, so could miss adjustments in macroprudential regulation that are not included in these categories.

(India, Peru and South Korea), used them in a direction that would work against that of their FX interventions. More specifically, each of these three countries reduced controls on capital inflows (which would lead to net inflows and appreciation pressures) while simultaneously increasing FX reserves (which would depreciate the exchange rate).

In order to more formally analyze these interactions between the use of different policies during COVID-19, we begin by testing if the use of each policy is affected by the policy space available for other policies (which was shown to be a key determinant of policy use in Section IV). We repeat the baseline regression in equation 1 for each of the policy tools with the full set of control variables (including the three *stress* variables and other *country characteristics)*, but also include the amount of policy space for each of the other four categories of tools ("*other-policy space"*), as well as continuing to include a control for the *policy space* available for the corresponding dependent variable ("*own-policy space*").[47] We do not report results for the use of capital controls because the limited use of this policy prevents meaningful estimation, but we can control for the *policy space* to use capital controls. We also exclude Japan from the analysis given the impact of this one outlier on the role of fiscal space (as shown in Section IV.C and Table 3).

The results are reported in Table 4, with the coefficients on *own-policy space* that correspond to the analysis in Tables 2 and 3 in grey. The results on *own-policy space* agree with the baseline results, and the new coefficients suggest that *other-policy space* is generally insignificant (at the 5 percent level). For example, the size of fiscal stimulus (or just the size of below-the-line stimulus) is not significantly affected by the *policy space* available for any other tools—including the level of the policy interest rate, level of FX reserves, macroprudential stance, level of capital controls, or even the pre-COVID output gap. The use of macroprudential policy is also not significantly affected by the *space* to adjust interest rates, and the use of FX intervention and macroprudential regulation is not affected by the space to ease capital controls. These generally insignificant results for *other-policy space* are a striking contrast to the significant results for *own-policy space*. They suggest that countries do not rely more on fiscal stimulus or macroprudential easing to support the economy when they are constrained in their ability to provide

[47] We measure *policy space* in 2019 for each category of tools using: the ratio of debt to GDP for fiscal policy; the policy interest rate for monetary policy; the ratio of FX reserves to GDP for FX intervention; the index of the macroprudential policy stance for macroprudential policy; the index of controls on inflows and outflows for capital controls; and the output gap for containment measures.

monetary stimulus through reducing policy rates (as suggested in other papers).[48] Countries with a tighter macroprudential stance or more stringent capital controls did not make greater use of monetary policy tools (as suggested in Aizenman et al., 2017). The results also provide little evidence that macroprudential policy, foreign exchange intervention, and adjustments to capital controls are used as substitutes, even when the use of one policy is constrained, as suggested in the IMF's Integrated Policy Framework (IMF, 2020b). All in all, the use of individual policies generally does not appear to reflect the space available to use other policies, or the level at which other tools/regulations were set prior to COVID-19. The use of different types of policy tools does not appear to be well coordinated.

The one area where there may be more coordination across tools based on the policy space available, however, is in the choice of which type of tool to use to provide monetary stimulus. Columns 4 and 5 of Table 4 show that countries with higher policy interest rates before COVID-19 were significantly less likely to announce new asset purchases and adopted smaller quantitative easing programs.[49] In other words, countries with more space to use the "conventional" monetary tool of lowering policy interest rates were less likely to resort to the "unconventional" tool of asset purchases. For central banks that would prefer to adjust monetary policy through adjustments to policy rates (and not asset purchases), this is an important reason to raise interest rates to create this policy space when feasible.

As a final analysis of joint policy decisions, we extend this framework but estimate the use of multiple *policy tools* using a Seemingly Unrelated Regression (SUR) model. This adjusts for the correlation in the contemporaneous errors for each of the equations predicting each policy choice, but has the disadvantage of limiting the sample size to countries with data for each *policy response*. For *policy tools*, we focus on the five quantitative measures (instead of the dummy variables) for each of the main policies used in response to COVID-19 in order to have sufficient degrees of freedom to estimate the equations jointly. These five *policy tools* are: the size of the fiscal stimulus, the reduction in the policy interest rate, the reduction in FX reserves relative to GDP (according to the Adler et al., 2021 measure), the reduction in the CCyB, and the change in the health and containment index (from Oxford). We continue to control for the same set of *policy space* variables used in the baseline analysis (including for capital controls) and the three measures of *stress* and controls for other *country characteristics.*

[48] For example, see Eggertsson (2011), Woodford (2011), Drautzburg and Uhlig (2015), Bouakez et al. (2017), Bernanke (2020), and Furman and Summers (2020).
[49] This is similar to the comparable coefficient estimates in Table 2, except these relationships between monetary *policy space* and the "unconventional" monetary policy tools are now consistently significant.

The results from estimating these five policy choices simultaneously are reported in Table 5. They support the key results from when each policy choice is estimated individually (Tables 2-4) and when controls for *other-policy space* are included in Table 4. Given the sensitivity of the results for fiscal space to the inclusion of Japan, the left side of the table reports results for the largest sample possible, and the right side of the table excludes Japan. Although the results are very similar across the two sides of the table, this comparison again highlights the role of this outlier. When Japan is included in the sample, there is a significant, negative correlation between *policy space* and the size of fiscal stimulus. When Japan is excluded, the coefficient becomes insignificant and positive, although there still appears to be no significant constraint of fiscal space on the size of the fiscal response to COVID-19. All of the other coefficients agree with the earlier estimates and support the important role for *policy space* for the use of most *policy tools* (other than fiscal policy). More specifically, countries with higher policy rates and a higher CCyB before the pandemic then lowered interest rates and the CCyB more aggressively in response to COVID-19. Countries with higher FX reserve ratios intervened in FX markets by more, albeit building reserves on average instead of depleting them. The *policy space* for the other tools usually had an insignificant effect, continuing to suggest little coordination between policy responses.

VI. Conclusions

This series of results suggests that policy space is an important determinant of how a country responds to a shock—and especially the policy space for the given tool (albeit less so for the policy space available for other tools). More specifically, having more policy space is a significant determinant of a country's ability to: provide monetary stimulus by lowering interest rates; engage in FX intervention to support the exchange rate; and ease macroprudential buffers (including the CCyB) to support lending and access to credit. These results are not surprising. For countries with very low interest rates, it is more difficult to lower interest rates further (even when measured using the shadow rate). For countries that had not previously tightened or even used macroprudential buffers (such as raising a CCyB above zero), it is difficult to lower these buffers to provide support. For countries that had not accumulated FX reserves, it is more challenging to use FX intervention in any direction.[50] There is also evidence that countries with more space to adjust monetary policy through the "conventional" tool of

[50] For countries that do not often intervene in FX markets, it can be more difficult to accumulate reserves (as well as to use reserve stockpiles) as the institutional framework and expertise is not as well developed.

reducing interest rates are significantly less likely to use "unconventional" forms of monetary policy (such as asset purchase programs and liquidity provision to banks). This suggests that the traditional hierarchy of central bank tools (of first using interest rates to provide monetary stimulus, and then shifting to asset purchases when interest rates are near zero) was still a consideration during the COVID-19 pandemic, even though some countries with policy rates above their lower bounds also adopted unconventional monetary responses.

More noteworthy are the results on the policy tool that did not appear to be significantly constrained by policy space: fiscal policy. Advanced economies with higher debt to GDP ratios were not significantly constrained in their ability to provide large fiscal stimulus packages, and emerging markets only appeared to be constrained in some specifications. Advanced economies with higher debt burdens, however, did provide more of this fiscal stimulus through below-the-line policies (such as announcements of credit guarantees and loan programs). This suggests that countries with less fiscal space had a stronger impetus to moderate further increases in debt by keeping more of the stimulus off-balance sheet. Moreover, the total size of the fiscal stimulus announced in response to COVID-19 not only appeared to be unaffected by a country's debt ratios, but also appeared to be unaffected by any other variables. More specifically, the magnitude of a country's fiscal stimulus in the first half of 2020 appears to be unrelated to its policy responses via other tools, to its policy space available for other tools, to its output gap before the pandemic, to its degree of financial market stress, to its contraction in GDP growth, and even to the number of COVID-19 cases.

These results that a country's fiscal space did not seem to constrain its aggregate fiscal response to the pandemic in advanced economies, and that a country's fiscal response seemed unrelated to many standard economic and financial variables, suggests that these relationships changed relative to earlier financial crises and recessions (i.e., Romer and Romer, 2018, 2019; and Jordà et al. 2016). A better understanding of what caused these changes is an important topic for future work, and Section IV.C discusses several possible explanations. Many of these explanations, however, suggest that the apparent lack of relationship between fiscal space and the size of the fiscal stimulus during COVID-19 in advanced economies may not persist and should not be counted on in future situations.

Finally, fiscal stimulus was not the only policy pursued largely independent of other policy choices, as well as independent of the space available to use other policy tools. Adjustments to monetary policy

were largely independent of the space available to provide fiscal stimulus, to ease macroprudential regulations, to intervene in FX markets, and to modify capital controls. Adjustments to macroprudential policy were largely independent of the space to loosen monetary policy, intervene in FX markets, and to modify capital controls. In fact, in some cases different policies seemed to be used in directions that would counteract each other, such as some countries lowering interest rates while using reserves to appreciate the exchange rate. A number of papers have modelled how different policy tools should optimally be used as substitutes and/or compliments to other tools—a degree of coordination that did not seem to exist during COVID-19. This suggests that there could be substantial room to improve the efficacy of policy responses to future shocks by better incorporating the interactions between policy choices, including the constraints from the space available to use different tools.

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Table 1
Policy Responses: Summary Statistics

Policy Measure	Unit	Mean	Median	St. Dev.	Min	Max	Sample
Full Sample							
Total Fiscal Measures	% of GDP	10.90	8.82	8.41	0.92	37.21	40
of this "Above the Line"	% of total fiscal spending	49.55	49.12	24.18	2.55	100.00	40
Change in Monetary Policy Rate	Percentage points	-1.66	1.00	3.28	-22.77	0.25	53
Shadow Rate where available	Percentage points	-1.24	-1.97	1.68	-2.99	1.72	8
Central Bank Asset Purchases	% of GDP	2.31	0.00	4.40	0.00	22.40	55
Net FX Purchases	% of GDP	-0.16	0.00	3.04	-12.60	8.34	57
Change in CCyB	Percentage points	-0.27	0.00	0.59	-2.50	0.00	70
Health & Containment measures	Index	56.62	56.25	16.25	24.31	97.50	73
Advanced Economies							
Total Fiscal Measures	% of GDP	15.93	12.97	8.87	7.41	37.21	20
of this "Above the Line"	% of total fiscal spending	43.01	36.18	23.84	9.35	83.41	20
Change in Monetary Policy Rate	Percentage points	-0.74	-0.65	0.71	-2.00	0.25	19
Shadow Rate where available	Percentage points	-1.24	-1.97	1.68	-2.99	1.72	8
Central Bank Asset Purchases	% of GDP	4.61	2.80	6.54	0.00	22.40	19
Net FX Purchases	% of GDP	-1.59	-0.07	4.09	-12.60	5.65	19
Change in CCyB	Percentage points	-0.46	0.00	0.75	-2.50	0.00	35
Health & Containment measures	Index	48.90	47.23	14.00	24.31	72.22	36
Emerging Markets							
Total Fiscal Measures	% of GDP	5.87	4.72	3.63	0.92	14.21	20
of this "Above the Line"	% of total fiscal spending	56.10	58.97	23.27	2.55	100.00	20
Change in Monetary Policy Rate	Percentage points	-2.17	-1.00	3.99	-22.77	0.25	34
Shadow Rate where available	Percentage points	.	.	.	.	.	.
Central Bank Asset Purchases	% of GDP	1.09	0.00	1.87	0.00	5.80	36
Net FX Purchases	% of GDP	0.55	0.20	2.07	-3.58	8.34	38
Change in CCyB	Percentage points	-0.71	0.00	0.25	-1.00	0.00	35
Health & Containment measures	Index	64.31	67.36	14.82	29.17	87.5	37

Notes: Reports magnitudes of announced policy responses over 2020q1-2020q2. Statistics for each group only include countries that have the ability to adopt each set of policies, i.e., individual countries in the Euro area can not pursue monetary policy or FX intervention, but can adopt other policies. The Euro area is included as a "country" that can pursue monetary and FX policy, but not other policies.

Sources: Fiscal policies are from the *IMF Fiscal Monitor* . Changes in the policy rate are from Haver and the shadow rate are from Krippner (2015). Data on Central Bank Asset Purchases is from Central Bank websites and Fratto et al. (2021). FX purchases are from Adler et al. (2021). Data on the CCyB are from the BIS and ESRB. Data on the Heatlh and Containment measures is from Oxford. See Appendix Table 1 and notes to Figures 1-5 for additional information.

Table 2

Regression Results: *Policy Responses* as a Function of *Policy Space* , *Stress* and Other *Country Characteristics*

PANEL A: FISCAL STIMULUS

	Fiscal Stimulus / GDP					Above-the-Line Fiscal Stimulus/GDP					Below-the-Line Fiscal Stimulus/GDP				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Policy Space Variables															
Policy space	-0.114***	-0.120***	-0.118***	-0.0868***	-0.101***	-0.0252*	-0.0269*	-0.0268**	-0.0193	-0.0193	-0.0884***	-0.0921***	-0.0889***	-0.0689***	-0.0808***
	(0.0200)	(0.0188)	(0.0194)	(0.0246)	(0.0196)	(0.0136)	(0.0135)	(0.0131)	(0.0149)	(0.0161)	(0.0227)	(0.0234)	(0.0207)	(0.0229)	(0.0196)
Policy space					0.130***					-0.000101					0.107***
* EM dummy					(0.0429)					(0.0236)					(0.0383)
Stress Variables															
Financial		-0.863***	-0.854***	-0.169	0.184		-0.271**	-0.240**	0.0512	0.0510		-0.589***	-0.611***	-0.322	-0.0319
		(0.202)	(0.221)	(0.297)	(0.277)		(0.113)	(0.108)	(0.0935)	(0.113)		(0.180)	(0.184)	(0.276)	(0.256)
Economic			0.217	0.392	0.566			-0.160	-0.0487	-0.0488			0.480	0.254	0.398
			(0.349)	(0.419)	(0.378)			(0.207)	(0.221)	(0.225)			(0.321)	(0.330)	(0.306)
Health			0.0327	-0.0512	-0.203			0.254	0.116	0.116			-0.228	-0.108	-0.232
			(0.239)	(0.294)	(0.273)			(0.204)	(0.211)	(0.212)			(0.229)	(0.290)	(0.278)
Other Country Characteristics															
Fixed ER				-0.209	-0.745				-2.256	-2.256				2.646	2.205
dummy				(2.598)	(2.608)				(1.522)	(1.548)				(2.113)	(2.090)
Insitutional				0.300	0.365				0.280**	0.280**				-0.118	-0.0642
quality				(0.344)	(0.313)				(0.105)	(0.105)				(0.295)	(0.273)
Trade				-1.460	-1.369				0.713	0.713				-2.323	-2.248
openness				(1.577)	(1.477)				(1.322)	(1.343)				(1.853)	(1.749)
EM dummy				-4.179	2.314				0.547	0.543				-5.840*	-0.500
				(3.511)	(3.602)				(1.630)	(2.288)				(3.384)	(3.339)
Observations	***40***	***40***	***40***	***39***	***39***	***41***	***41***	***41***	***40***	***40***	***40***	***40***	***40***	***39***	***39***
Adj. R-squared	***0.296***	***0.351***	***0.319***	***0.388***	***0.414***	***0.051***	***0.061***	***0.052***	***0.246***	***0.220***	***0.254***	***0.284***	***0.278***	***0.308***	***0.331***

PANEL B: MONETARY STIMULUS (POLICY RATES AND ASSET PURCHASES)

	Change in Policy Interest Rates					Asset Purchases (dummy)					Asset Purchases (% of GDP)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Policy Space Variables															
Policy space	0.307***	0.344***	0.366***	0.348***	0.604***	-0.140*	-0.135	-0.129	-0.161*	0.177	-0.410***	-0.370***	-0.312***	-0.252	0.279
	(0.0795)	(0.0875)	(0.0862)	(0.102)	(0.103)	(0.0754)	(0.0838)	(0.0857)	(0.0937)	(0.280)	(0.131)	(0.119)	(0.109)	(0.179)	(0.902)
Policy space					-0.276					-0.371					-0.573
* EM dummy					(0.164)					(0.311)					(0.916)
Stress Variables															
Financial		-0.244	-0.282*	-0.0756	-0.0409		-0.0594	-0.0744	-0.248	-0.207		-0.403	-0.513	-0.754	-0.682
		(0.154)	(0.155)	(0.191)	(0.200)		(0.174)	(0.176)	(0.269)	(0.271)		(0.334)	(0.371)	(0.526)	(0.526)
Economic			0.120*	0.115	0.107			0.0448	0.0379	0.0263			0.335	0.386	0.370
			(0.0703)	(0.0689)	(0.0730)			(0.0826)	(0.0867)	(0.0910)			(0.257)	(0.244)	(0.251)
Health			0.00703	0.0181	0.0180			0.00499	-0.0336	-0.0277			-0.00504	-0.146	-0.146
			(0.0402)	(0.0522)	(0.0512)			(0.0633)	(0.0676)	(0.0673)			(0.178)	(0.229)	(0.234)
Other Country Characteristics															
Fixed ER				0.478	0.451				-0.596	-0.636				-2.654*	-2.709**
dummy				(0.393)	(0.391)				(0.409)	(0.421)				(1.321)	(1.331)
Insitutional				-0.0489	-0.0546				-0.00595	-0.0140				-0.0690	-0.0807
quality				(0.0523)	(0.0533)				(0.0601)	(0.0603)				(0.165)	(0.169)
Trade				-0.0841	-0.0828				-0.996**	-0.974**				-1.332**	-1.329**
openness				(0.205)	(0.204)				(0.484)	(0.457)				(0.602)	(0.619)
EM dummy				-0.959	-0.717				-0.171	0.160				-3.035	-2.534
				(0.644)	(0.640)				(0.696)	(0.778)				(2.061)	(2.209)
Observations	***52***	***49***	***49***	***48***	***48***	***51***	***49***	***49***	***48***	***48***	***52***	***49***	***49***	***48***	***48***
Adj. R-squared	***0.520***	***0.542***	***0.565***	***0.591***	***0.595***	***0.0844***	***0.0954***	***0.101***	***0.215***	***0.231***	***0.078***	***0.079***	***0.071***	***0.224***	***0.210***

PANEL C: LIQUIDITY SUPPORT, SWAPS AND FX INTERVENTION

	Liduidity to Banks		Swaps		FX Intervention Dummy					FX Intervention / GDP				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Policy Space Variables														
Policy space	-0.0475	-4.402**	0.0670	-0.606	-0.000338	0.000723	0.000902	0.0408***	0.0438***	-0.0708**	-0.0702**	-0.0708**	-0.0535*	-0.0542*
	(0.0678)	(2.157)	(0.0866)	(0.376)	(0.00757)	(0.00778)	(0.00773)	(0.0123)	(0.0116)	(0.0322)	(0.0334)	(0.0319)	(0.0273)	(0.0282)
Policy space		4.489**		0.734*					-0.0242					0.0105
* EM dummy		(2.173)		(0.389)					(0.0336)					(0.0460)
Stress Variables														
Financial	0.0332	-0.190	-0.127	-0.224		0.00905	0.00493	-0.0824**	-0.0967**		0.0478	0.0396	-0.0458	-0.0399
	(0.360)	(0.351)	(0.313)	(0.322)		(0.0425)	(0.0433)	(0.0351)	(0.0386)		(0.0518)	(0.0484)	(0.0442)	(0.0513)
Economic	0.0197	0.0271	-0.108	-0.0956			0.0664	0.0769	0.0855			0.103	0.135	0.128
	(0.0875)	(0.106)	(0.0890)	(0.0893)			(0.0769)	(0.0870)	(0.0904)			(0.116)	(0.115)	(0.122)
Health	-0.0492	-0.0374	0.0601	0.0850			-0.00378	0.0811	0.0711			-0.208	-0.164	-0.159
	(0.0706)	(0.0624)	(0.0959)	(0.0985)			(0.0610)	(0.0858)	(0.0880)			(0.147)	(0.134)	(0.136)
Other Country Characteristics														
Fixed ER	-0.608	-0.160	-0.166	0.0542				0.121	0.152				-0.721	-0.727
dummy	(0.437)	(0.464)	(0.481)	(0.498)				(0.513)	(0.518)				(0.687)	(0.694)
Insitutional	-0.0137	0.0685	0.0607	0.0889				-0.139**	-0.133**				-0.184*	-0.189*
quality	(0.0481)	(0.0912)	(0.0635)	(0.0657)				(0.0606)	(0.0628)				(0.104)	(0.101)
Trade	-0.206	-1.590*	0.124	0.0880				-1.459***	-1.472***				0.260	0.267
openness	(0.364)	(0.847)	(0.334)	(0.334)				(0.493)	(0.492)				(1.481)	(1.487)
EM dummy	-0.0207	-8.501**	-0.507	-1.210				0.177	0.797				-0.173	-0.457
	(0.932)	(4.136)	(0.766)	(0.869)				(0.768)	(1.266)				(1.171)	(1.518)
Observations	***48***	***48***	***45***	***45***	***55***	***53***	***53***	***52***	***52***	***55***	***53***	***53***	***52***	***52***
Adj. R-squared	***0.0639***	***0.337***	***0.194***	***0.240***	***2.63e-05***	***0.000731***	***0.0120***	***0.336***	***0.344***	***0.274***	***0.290***	***0.303***	***0.390***	***0.375***

PANEL D: MACROPRUDENTIAL POLICY AND CAPITAL CONTROLS

	Loosen Macroprudential Regulation (dummy)					Loosen CCyB (pp change)					Loosen Controls on Capital Inflows				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(1)	(2)	(3)	(4)	(5)
Policy Space Variables															
Policy space	6.899***	5.677***	5.677***	6.256***	10.08*	0.677***	0.674***	0.674***	0.654***	0.775***	1.047	1.049	1.220	0.813	0.369
	(1.989)	(1.921)	(1.921)	(2.050)	(5.780)	(0.0959)	(0.0939)	(0.0939)	(0.0984)	(0.0887)	(0.953)	(1.021)	(0.966)	(0.881)	(0.973)
Policy space					-5.591					-0.390***					0.584
* EM dummy					(6.353)					(0.145)					(1.611)
Stress Variables															
Financial		-0.0953	-0.0953	-0.112	-0.135		-0.00213	-0.00213	0.00204	-0.00157		-0.0702	-0.0787	-0.589*	-0.620
		(0.0605)	(0.0605)	(0.0761)	(0.0847)		(0.00170)	(0.00170)	(0.00361)	(0.00241)		(0.133)	(0.108)	(0.349)	(0.379)
Economic		-0.0184	-0.0184	-0.0632	-0.0781		-0.00327	-0.00327	-0.0118	-0.00901			-0.000818	0.0564	0.0594
		(0.0676)	(0.0676)	(0.0705)	(0.0764)		(0.0136)	(0.0136)	(0.0152)	(0.0123)			(0.127)	(0.138)	(0.140)
Health		-0.0292	-0.0292	-0.00541	-0.00627		0.0262*	0.0262*	0.0255*	0.0194			0.0438	-0.0630	-0.0570
		(0.0615)	(0.0615)	(0.0619)	(0.0631)		(0.0156)	(0.0156)	(0.0141)	(0.0122)			(0.0611)	(0.0611)	(0.0586)
Other Country Characteristics															
Fixed ER				0.166	0.223				0.0717	0.0371				0.138	0.148
dummy				(0.410)	(0.428)				(0.0785)	(0.0611)				(0.457)	(0.466)
Insitutional				-0.0713*	-0.0666				0.00580	0.00504				0.165**	0.163**
quality				(0.0432)	(0.0448)				(0.00702)	(0.00748)				(0.0703)	(0.0691)
Trade				0.0565	-0.0898				-0.0998	-0.112				-3.766**	-3.721***
openness				(0.435)	(0.525)				(0.0611)	(0.0699)				(1.463)	(1.389)
EM dummy				-1.057**	-0.114				-0.121	-0.00177				1.932**	1.773**
				(0.536)	(1.030)				(0.0873)	(0.0592)				(0.895)	(0.841)
Observations	***73***	***69***	***69***	***68***	***68***	***70***	***65***	***65***	***64***	***64***	***62***	***61***	***61***	***60***	***60***
Adj. R-squared	***0.213***	***0.230***	***0.230***	***0.279***	***0.292***	***0.798***	***0.804***	***0.804***	***0.812***	***0.867***	***0.0579***	***0.0622***	***0.0694***	***0.349***	***0.351***

PANEL E: CONTAINMENT POLICIES

	Containment and Health Index				
	(1)	(2)	(3)	(4)	(5)
Policy Space Variables					
Policy space	-3.279**	-2.503*	-2.372*	-1.096	-0.581
	(1.361)	(1.387)	(1.339)	(1.065)	(1.385)
Policy space					-0.991
* EM dummy					(2.068)
Stress Variables					
Financial		0.962**	0.984*	0.280	0.262
		(0.471)	(0.505)	(0.243)	(0.238)
Economic			-0.415	0.157	0.110
			(0.696)	(0.580)	(0.574)
Health			1.403**	1.528**	1.467**
			(0.534)	(0.687)	(0.699)
Other Country Characteristics					
Fixed ER				-6.441*	-6.541*
dummy				(3.718)	(3.730)
Insitutional				-0.359	-0.352
quality				(0.318)	(0.314)
Trade				-4.224	-4.008
openness				(2.745)	(2.849)
EM dummy				10.31**	10.72***
				(4.021)	(3.901)
Observations	***68***	***64***	***64***	***63***	***63***
Adj. R-squared	***0.084***	***0.128***	***0.155***	***0.423***	***0.414***

Notes: Regressions predicting the *policy response* listed at the top as a function of *policy space* , *stress* , and other *country characteristics* . Regressions are estimated using OLS for quantitative measures of *policy responses* and a probit for dummy variable measures of *policy responses* . See text, Table 1 and Appendix Table 1 for details on variable definitions. Regressions for each *policy response* only include countries that have the ability to adopt each *policy tool* , i.e., individual countries in the Euro area can not use monetary policy or FX intervention, but can adopt other policies. The Euro area is included as a "country" that can pursue monetary and FX policy, but not other policies. All regressions include a constant (not reported) and robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 3
Sensitivity Tests: Fiscal Stimulus

	Different Measures of Fiscal Space				Impact of Outliers and Sample				Exclude Japan	
	Gross Debt/GDP	Cyclically-adj primary bal.	Gross Debt/Tax Base	Fiscal Balance/Tax	Alternate Stimulus	Alt Stimulus + Base Sample	Exclude Japan	Exclude Debt/GDP>100	Gross Debt/GDP	low- the-lir
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Policy Space Variables										
Policy space	-0.0997***	0.521	-0.0159***	0.113	-0.0597	-0.105***	-0.0868	-0.00648	-0.0841	-0.0671
	(0.0195)	(0.677)	(0.00236)	(0.220)	(0.0383)	(0.0231)	(0.0635)	(0.0687)	(0.0626)	(0.0673)
Policy space	0.127***	-0.230	0.0283***	-0.0960	0.0787	0.128**	0.114	0.0392	0.110	0.0917
* EM dummy	(0.0436)	(0.675)	(0.00801)	(0.198)	(0.0512)	(0.0527)	(0.0783)	(0.0739)	(0.0767)	(0.0781)
Stress Variables										
Financial	0.180	0.195	0.210	0.147	0.0578	0.153	0.150	0.111	0.144	-0.0638
	(0.276)	(0.379)	(0.265)	(0.384)	(0.264)	(0.319)	(0.293)	(0.274)	(0.289)	(0.254)
Economic	0.563	0.433	0.762**	0.472	0.0900	0.737*	0.582	0.603	0.582	0.413
	(0.382)	(0.435)	(0.340)	(0.413)	(0.329)	(0.423)	(0.357)	(0.364)	(0.360)	(0.288)
Health	-0.201	-0.0423	-0.285	-0.0498	0.201	-0.126	-0.154	-0.0562	-0.148	-0.187
	(0.274)	(0.299)	(0.278)	(0.308)	(0.288)	(0.313)	(0.329)	(0.277)	(0.329)	(0.294)
Other Country Characteristics										
Fixed ER	-0.749	-0.930	-0.515	-1.005	-2.398	-0.922	-0.633	-1.276	-0.631	2.310
dummy	(2.643)	(2.612)	(2.533)	(2.479)	(2.250)	(2.934)	(2.617)	(2.454)	(2.650)	(2.065)
Insitutional	0.361	0.306	0.285	0.241	0.377*	0.393	0.314	0.230	0.305	-0.113
quality	(0.314)	(0.399)	(0.291)	(0.416)	(0.197)	(0.337)	(0.375)	(0.344)	(0.374)	(0.312)
Trade	-1.396	-0.118	-2.389	0.177	-1.604	-1.663	-1.107	-1.230	-1.104	-2.001
openness	(1.484)	(2.476)	(1.517)	(3.149)	(1.695)	(1.644)	(2.090)	(2.785)	(2.114)	(2.294)
EM dummy	2.112	-7.206	1.003	-7.646	-0.0900	1.372	0.948	-4.007	0.655	-1.788
	(3.624)	(4.972)	(3.460)	(4.669)	(3.558)	(3.933)	(6.060)	(5.950)	(5.956)	(5.630)
Observations	***39***	***38***	***39***	***39***	***65***	***39***	***38***	***35***	***38***	***38***
Adj. R-squared	***0.412***	***0.186***	***0.419***	***0.200***	***0.287***	***0.409***	***0.270***	***0.152***	***0.269***	***0.209***

Notes: Regressions of the total fiscal stimulus in response to COVID-19 over the first six months of 2020, using the baseline specification from Table 2, panel A, column 5, except as noted. Columns (1)-(4) use alternate measures of fiscal space from Kose et al. (2017): gross government debt to GDP; the cyclically-adjusted primary fiscal balance; gross government debt as a percent of average tax revenues; and the fiscal balance as a percent of tax revenues. Columns (5) and (6) measure fiscal stimulus using data from the *IMF Policy Tracker* , which is self-reported stimulus in 2020q1-q2 as a share of 2020 GDP, with the full set of countries for which this variable is available in column (5) and then limited to the smaller sample in the baseline analysis in column (6). Columns (7), (9) and (10) exclude Japan, and column (8) excludes all countries with a net debt/GDP ratio >100%. Column (10) uses the below-the-line portion of the fiscal balance. All regressions include a constant (not reported) and are estimated with robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 4
Regressions Results: Policy Responses as a Function of Other Policy Space

	Fiscal		Monetary			FX	Macropru		Oxford
	Stimulus/GDP	Below-Line	Δ interest rate	QE dummy	QE as %GDP	Δ Reserves/GDP	Dummy	CCyB	Containment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Policy Space Variables									
Fiscal	**-0.0473**	**-0.0440**	-0.000653	-0.00348	0.0135	0.0122	0.00349	0.000636	0.0215
	(0.0614)	**(0.0589)**	(0.00243)	(0.00701)	(0.0250)	(0.0160)	(0.00652)	(0.000894)	(0.0758)
Monetary	0.0249	0.123	**0.387*** **	**-0.276** **	**-0.420***	-0.119	0.105	-0.00159	-0.535
	(0.501)	(0.340)	**(0.0974)**	**(0.115)**	**(0.210)**	(0.141)	(0.0729)	(0.0109)	(0.539)
FX	-0.0214	-0.00819	-0.0100	-0.0660***	-0.0807**	**-0.0505***	0.0181*	-0.00201*	-3.33e-05
	(0.0819)	(0.0682)	(0.00780)	(0.0239)	(0.0369)	**(0.0250)**	(0.0108)	(0.00111)	(0.0667)
Macroprudential	-2.160	1.636	-2.537*	-1.946	-2.212	5.493	**7.901*** **	**0.642*** **	14.64
	(11.39)	(9.670)	(1.332)	(2.936)	(7.371)	(3.314)	**(2.789)**	**(0.135)**	(12.58)
Capital Controls	-1.046	-2.703	0.731	1.040	1.903	0.337	0.879	0.175	3.525
	(5.501)	(5.184)	(0.638)	(0.784)	(1.691)	(1.353)	(1.182)	(0.137)	(7.302)
Output Gap	-0.345	-0.354	-0.102	0.111	0.492	-0.273	-0.421**	0.0341	**-0.114**
	(0.787)	(0.823)	(0.154)	(0.178)	(0.349)	(0.271)	(0.197)	(0.0237)	**(1.202)**
Stress Variables									
Financial	-0.355	-0.903	-0.351	-0.278	-0.112	0.379	-0.565**	0.0332	3.006
	(2.010)	(1.451)	(0.244)	(0.352)	(0.673)	(0.514)	(0.288)	(0.0392)	(2.073)
Economic	0.528	0.450	0.0838	0.0283	0.376	0.0690	-0.0644	0.00146	0.378
	(0.419)	(0.373)	(0.0686)	(0.0928)	(0.287)	(0.116)	(0.0931)	(0.0174)	(0.676)
Health	-0.0705	-0.142	0.0309	0.00941	-0.119	-0.119	-0.00488	0.0268	1.489*
	(0.319)	(0.334)	(0.0396)	(0.0673)	(0.268)	(0.128)	(0.0761)	(0.0162)	(0.743)
Other Country Characteristics									
Fixed ER	0.280	3.274	0.558	-0.129	-2.268*	-1.068	0.481	0.0143	-6.615
dummy	(2.941)	(2.480)	(0.513)	(0.501)	(1.241)	(0.855)	(0.557)	(0.0902)	(3.966)
Insitutional	0.224	-0.180	-0.0145	-0.0694	-0.109	-0.235*	-0.0654	0.00712	-0.680
quality	(0.425)	(0.350)	(0.0531)	(0.0919)	(0.220)	(0.136)	(0.0710)	(0.0105)	(0.421)
Trade	-0.0974	-1.881	0.332	0.437	1.293	-0.339	0.0544	-0.0269	-2.965
openness	(3.129)	(2.879)	(0.316)	(0.719)	(1.076)	(1.400)	(0.606)	(0.0496)	(3.284)
EM dummy	-4.570	-5.361	-0.903	-1.154	-4.647*	-1.007	-1.758*	-0.205	5.273
	(4.219)	(3.806)	(0.693)	(0.872)	(2.406)	(1.260)	(0.957)	(0.128)	(5.525)
Observations	***37***	***37***	***42***	***42***	***42***	***43***	***56***	***52***	***56***
Adjusted R-squared	***0.108***	***0.062***	***0.674***	***0.389***	***0.184***	***0.413***	***0.386***	***0.830***	***0.368***

Notes: Regressions predicting the use of each *policy response* to COVID-19 as a function of *policy space* for the given policy (shaded) and the space available for other policies. Japan is excluded from the fiscal regressions. See notes to Table 1 and Appendix Table 1 for variable definitions. P*olicy space for each* category listed at the left is measured as: for fiscal is the net debt/GDP ratio; for monetary is the policy interest rate; for FX is the ratio of FX reserves to GDP; for macoprudential is the level of the macroprudential index of the CCyB, LTV ratio and FX intensity; for capital controls is the index of the intensity of controls on inflows and outflows; and for output gap is the output gap at end-2019. All regressions include a constant (not reported) and are estimated with robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5
Regression Results: Policy Responses as a Function of Other Policy Space Using SUR

	Full Sample with all Tools (excludes Euro Area)					Also Excludes Japan				
	Fiscal Stimulus	**Monetary Policy Rate**	**FX Interven.**	**Macropr: CCyB**	**Oxford Containment**	**Fiscal Stimulus**	**Monetary Policy Rate**	**FX Interven.**	**Macropr: CCyB**	**Oxford Containment**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Policy Space Variables										
Fiscal	**-0.0740*** **	-0.000164	0.0124	0.00133	0.0123	**0.0113**	0.00144	0.0437**	0.00641*	-0.250***
	(0.0243)	(0.00213)	(0.0123)	(0.00201)	(0.0885)	**(0.0314)**	(0.00464)	(0.0178)	(0.00338)	(0.0846)
Monetary	-0.284	**0.378*** **	0.0251	-0.0374	-0.638	-0.229	**0.376*** **	-0.0145	-0.0398	-0.306
	(0.583)	**(0.0796)**	(0.154)	(0.0302)	(0.782)	(0.492)	**(0.0789)**	(0.151)	(0.0303)	(0.622)
FX	0.0223	-0.0129**	**-0.0484** **	-0.00269	0.0249	-0.0221	-0.0142*	**-0.0739*** **	-0.00712*	0.239**
	(0.0491)	(0.00638)	**(0.0202)**	(0.00369)	(0.123)	(0.0455)	(0.00769)	**(0.0175)**	(0.00431)	(0.116)
Macroprudential	3.433	-2.862**	5.775**	**2.902*** **	22.97	0.776	-2.964**	3.784	**2.575*** **	39.67**
	(8.746)	(1.127)	(2.583)	**(0.647)**	(16.54)	(7.759)	(1.240)	(2.508)	**(0.707)**	(17.26)
Capital Controls	-5.507**	0.747	-0.0529	0.0817	3.238	0.104	0.821	1.396	0.346	-8.920
	(2.451)	(0.509)	(1.185)	(0.265)	(7.154)	(2.496)	(0.574)	(1.117)	(0.308)	(5.812)
Output Gap	-0.180	-0.0975	-0.185	0.0855*	**-0.783**	-0.328	-0.0928	-0.0938	0.0959*	**-1.550**
	(0.498)	(0.122)	(0.224)	(0.0498)	**(1.305)**	(0.364)	(0.123)	(0.201)	(0.0501)	**(1.086)**
Stress Variables										
Financial	1.067	-0.342*	0.940**	0.0391	1.941	-1.373	-0.355*	0.702	-0.00549	3.937**
	(1.756)	(0.194)	(0.426)	(0.125)	(2.447)	(1.632)	(0.196)	(0.525)	(0.123)	(1.921)
Economic	0.397	0.0930	0.0845	0.0572*	0.647	0.635**	0.0948	0.119	0.0642**	0.355
	(0.332)	(0.0568)	(0.0958)	(0.0305)	(0.603)	(0.297)	(0.0578)	(0.0901)	(0.0314)	(0.479)
Health	-0.184	0.0275	-0.130	0.0289	1.492**	0.0918	0.0319	-0.0450	0.0429*	0.782**
	(0.264)	(0.0338)	(0.110)	(0.0247)	(0.735)	(0.228)	(0.0347)	(0.0749)	(0.0254)	(0.381)
Other Country Characteristics										
Fixed ER	-1.798	0.534	-1.221*	0.184	-7.137*	-1.700	0.544	-1.039	0.214	-8.670***
dummy	(2.179)	(0.411)	(0.691)	(0.182)	(3.889)	(1.807)	(0.410)	(0.639)	(0.186)	(3.353)
Insitutional	0.0965	-0.0212	-0.167	-0.0199	-0.752*	-0.0434	-0.0232	-0.208*	-0.0213	-0.411
quality	(0.383)	(0.0444)	(0.122)	(0.0225)	(0.444)	(0.292)	(0.0448)	(0.111)	(0.0237)	(0.374)
Trade	0.510	0.451*	-0.149	-0.126	-4.546	2.240	0.502	0.847	0.0441	-12.90***
openness	(1.900)	(0.261)	(1.220)	(0.170)	(5.312)	(2.080)	(0.326)	(0.970)	(0.169)	(3.986)
EM dummy	-2.601	-1.072*	-1.039	-0.641**	7.367	-5.216**	-1.108*	-1.749	-0.726**	13.32**
	(2.958)	(0.580)	(1.110)	(0.311)	(6.731)	(2.306)	(0.589)	(1.070)	(0.297)	(6.384)
Observations	***41***	***41***	***41***	***41***	***41***	***40***	***40***	***40***	***40***	***40***

Notes: Regressions predicting the *policy response* listed at the top column as function of *policy space* , *stress* measures, and other *country characteristics* . Each set of five policy responses are estimated jointly using Seemingly Unrelated Regression (SUR). Fiscal stimulus is the stimulus relative to GDP; Monetary Policy Rate is the change in the policy interest rate; FX intervention is the change in FX reserves relative to GDP from Adler et al. (2021); Macropr:CCyB is the change in the CCyB and Oxford Containment is the change in the Oxford Containment measure. All dependent variables are for 2020 Q1-Q2. Columns 6-11 exclude Japan. All regressions include a constant (not reported) and robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Appendix Table 1
Data Sources and Definitions

	Variable	Measure	Source	Link
Covid-19 Policies (from 01/01/2020 until 06/30/2020 unless stated otherwise)	Fiscal (incl. split ATL and BTL)	Fiscal interventions until 06/12/2020 in percent of GDP	Fiscal Monitor Database of Country Fiscal Measures in Response to COVID-19 and IMF Policy Tracker for Responses to Covid-19 (6/30/2020 vintage)	https://www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19 and https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19
	Monetary - change policy rate	Change	Haver Analystics; official CB website (Costa Rica); BIS (China)	not public
	Monetary - change shadow rate	Change	Krippner (2018)	https://www.ljkmfa.com/test-test/international-ssrs/
	Monetary QE	Dummy	IMF Policy Tracker for Responses to Covid-19 (6/30/2020 vintage)	https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19
	Monetary QE/Asset purchases	Net Purchases in percent of GDP	For AE: CB websites; for EMs: Fratto et al. (2021);	https://www.imf.org/en/Publications/WP/Issues/2021/01/22/Unconventional-Monetary-Policies-in-Emerging-Markets-and-Frontier-Countries-50013
	Monetary - Liquidity Provision	Dummy	IMF Policy Tracker for Responses to Covid-19 (6/30/2020 vintage)	https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19
	Monetary - Swap Line	Dummy	IMF Policy Tracker for Responses to Covid-19 (6/30/2020 vintage)	https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19
	Macroprudential	Dummy	IMF Policy Tracker for Responses to Covid-19 (6/30/2020 vintage)	https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19
	CCyB	Dummy	IMF Policy Tracker for Responses to Covid-19 (6/30/2020 vintage)	https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19
	CCyB	Change	ESRB and BIS; national sources (Morrocco & Kazahstan)	https://www.bis.org/bcbs/ccyb/ and https://www.esrb.europa.eu/national_policy/ccb/html/index.en.html
	FX Intervention	Dummy	IMF Policy Tracker for Responses to Covid-19 (6/30/2020 vintage)	https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19
	FX Intervention	Net Purchases in percent of GDP	Adler et al. (2021)	https://www.imf.org/en/Publications/WP/Issues/2021/02/19/Foreign-Exchange-Intervention-A-Dataset-of-Public-Data-and-Proxies-50017
	Capital Controls on Inflows	Dummy	IMF Policy Tracker for Responses to Covid-19 (6/30/2020 vintage)	https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19
	Capital Controls on Outflows	Dummy	IMF Policy Tracker for Responses to Covid-19 (6/30/2020 vintage)	https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19
	Containment and Health Policies	Change	Oxford's Coronavirus Government Response Tracker	https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker
Policy Space Variables (latest available observation before 2020)	Fiscal Space	Fiscal Balance in percent of GDP	IMF Financial Monitor Database	https://data.imf.org/?sk=4be0c9cb-272a-4667-8892-34b582b21ba6
	Monetary Space - policy rate	Policy Rate	Haver Analystics; official CB website (Costa Rica); BIS (China)	not public
	Monetary Space - shadow rate	Shadow Rate	Krippner (2018)	https://www.ljkmfa.com/test-test/international-ssrs/
	CCyB space	CCyB	ESRB and BIS complemented with official national sources	https://www.bis.org/bcbs/ccyb/ and https://www.esrb.europa.eu/national_policy/ccb/html/index.en.html
	Macroprudential Space	Index composed of (i) FX Restriction, (ii) LTV ratio, and (iii) CCyB (all equally weighted)	Alam et al. (2019) for (i) and (ii); ESRB and BIS for (iii)	https://www.imf.org/en/Publications/WP/Issues/2019/03/22/Digging-Deeper-Evidence-on-the-Effects-of-Macroprudential-Policies-from-a-New-Database-46658
	FX Reserves Space	Stock of FX Reserves in percent of GDP	IMF BoP Database, ECB website for euro area	https://data.imf.org/?sk=7A51304B-6426-40C0-83DD-CA473CA1FD52 https://www.ecb.europa.eu/stats/balance_of_payments_and_external/international_reserves/templates/html/201912eur.en.html
	Capital Controls Inflows Space	Index	Fernandez et al. (2016)	http://www.columbia.edu/~mu2166/fkrsu/
	Capital Controls Outflows Space	Index	Fernandez et al. (2016)	http://www.columbia.edu/~mu2166/fkrsu/
	Output Gap	Real GDP - potential real output	World Economic Outlook	https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases#sort=%40imfdate%20descending
Stress during COVID-19	Financial Stress	Change from Pre-Covid value (12/31/2019) to Peak (from	CDS from Bloomberg and if not available: EMBIG index from JPMorgan	not public
	Real Stress	Change in GDP forecast for 2020 from Jan 20 - Jun 20)	World Economic Outlook (in between updates for Jan and Jun 2020)	not public
	Health Stress	Reported cases from 01/01/2020 until 06/30/2020	Oxford's Coronavirus Government Response Tracker	https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker
Country Characteristics (latest available observation before 2020)	EM	Dummy	World Economic Outlook	https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases#sort=%40imfdate%20descending
	Fixed ER	Dummy	Ilzetzki et al. (2019)	https://www.ilzetzki.com/irr-data
	Institutional Quality	Composite Index	The PRS Group	not public
	Trade Openness	(Imports+Exports)/GDP	IMF BoP Database	https://data.imf.org/?sk=7A51304B-6426-40C0-83DD-CA473CA1FD52

Note: Most of the data collected in October and November 2020, unless published later. FX Reserves and GDP data was updated in July 2022 as these variables are sensitive to revisions. Please note that some of these databases, e.g. World Economic Outlook, are live databases and data revisions can occur.

Appendix Table 2
Share of Countries Reporting Use of Each Policy

Policy Type	Instrument	Share of Full Sample	Share of AE	Share of EM	Total Observations
Monetary	Asset Purchases/QE	42.6%	62.1%	33.3%	54
	Liquidity to Banks	85.7%	83.3%	86.8%	56
	Swap Line activated	41.5%	70.6%	27.8%	53
External	FX Intervention	44.6%	16.7%	57.9%	56
	CFM on inflows	5.4%	2.8%	7.9%	74
	CFM on outflows	2.7%	0.0%	5.3%	74
Macroprudential	Overall Index	66.2%	72.2%	60.5%	74
	CCyB	29.7%	44.4%	15.8%	74

Notes: Share of countries that report using each policy during 2020q1 and 2021q2 according to a 0/1 dummy variable. Statistics for each group only include countries that have the ability to adopt each set of policies, i.e., individual countries in the Euro area can not pursue monetary policy or FX intervention, but can adopt other policies. The Euro area is included as a "country" that can pursue monetary and FX policy, but not other policies. CFM is capital flow measures and CCyB is the countercyclical capital buffer. AE is advanced economies and EM is emerging markets, according to IMF definitions.

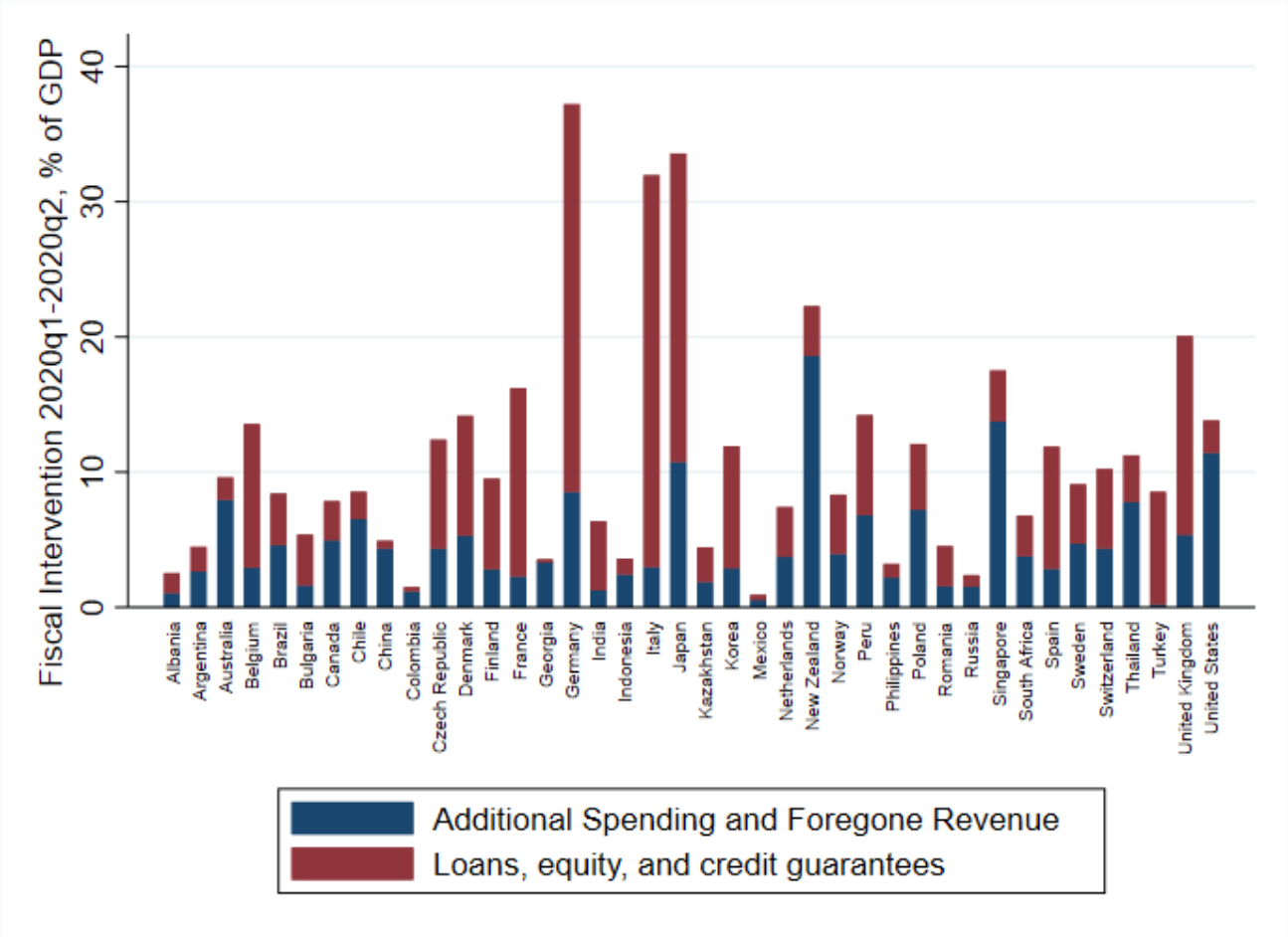
Sources: Reported use of each policy is from the IMF Policy Tracker.

Appendix Table 3: Joint Use of Policies

Country	Fiscal		Monetary				FX	Macroprudential		CFMs		Contain-	Total by Groups		Total by Tools	
	ATL	BTL	Δ Rate	APP	Liquidity	Swaps	Purchases	Overall	CCYB	Inflows	Outflows	ment	Stimulus	Any Form	Stimulus	Any Form
Albania													4	4	6	6
Argentina													5	5	7	7
Australia													3	3	7	7
Austria													3	3	5	5
Belarus													4	4	4	4
Belgium													4	4	8	8
Bosnia and Herzegovina													2	2	2	2
Brazil													5	5	8	8
Bulgaria													4	5	6	7
Canada													4	4	8	8
Chile													3	4	6	7
China													6	6	8	8
Colombia													3	4	8	9
Costa Rica													4	5	6	7
Croatia													4	4	7	7
Cyprus													4	4	6	6
Czech Republic													4	5	6	7
Denmark													4	5	7	8
Dominican Republic													4	4	6	6
Ecuador													3	3	3	3
El Salvador													4	4	4	4
Estonia													4	4	7	7
Finland													4	4	7	7
France													4	4	8	8
Georgia													5	5	6	6
Germany													4	4	8	8
Greece													4	4	6	6
Hong Kong SAR													4	5	7	8
Hungary													2	3	5	6
Iceland													4	5	6	7
India													5	6	8	9
Indonesia													5	5	7	7
Ireland													4	4	7	7
Israel													4	5	8	9
Italy													3	3	6	6
Jamaica													4	4	5	5
Japan													3	3	6	6
Jordan													4	4	5	5
Kazakhstan													5	5	7	8
Korea													5	6	8	9
Latvia													3	3	6	6
Lithuania													4	4	8	8
Luxembourg													3	3	5	5
Macao SAR													4	4	4	4
Malaysia													3	4	4	5
Malta													3	3	6	6
Mexico													3	3	6	6
Morocco													4	5	6	7
Netherlands													3	3	8	8
New Zealand													4	4	7	7
Northern Macedonia													5	5	6	6
Norway													4	5	9	10
Pakistan													5	5	8	8
Paraguay													4	5	5	6
Peru													4	5	6	7
Philippines													3	4	6	7
Poland													5	5	8	8
Portugal													4	4	6	6
Romania													4	4	8	8
Russia													4	5	6	7
Serbia													5	5	6	6
Singapore													4	5	7	8
Slovak Republic													4	4	7	7
Slovenia													4	4	6	6
South Africa													5	5	7	7
Spain													3	3	6	6
Sweden													4	5	8	10
Switzerland													4	5	7	8
Taiwan Province of China													3	3	3	3
Thailand													4	5	7	8
Turkey													6	6	10	10
Ukraine													5	5	6	6
United Kingdom													4	4	8	8
United States													3	3	7	7
Uruguay													4	5	4	5

Notes: Green indicates the country used used the *policy tool* to provide stimulus/ease financial conditions; red indicates the tool was not used; yellow indicates the tool was used in a direction that does not provide stimulus/ease financial conditions; and white indicates no data was available (in which case the country might have used the policy) or that the tool is not available in the country (e.g. interest rate changes and QE in fully dollarized countries). Data is based on the IMF's *Covid-19 Policy Tracker* when available, and otherwise is based on the continuous variables in Appendix Table 1.

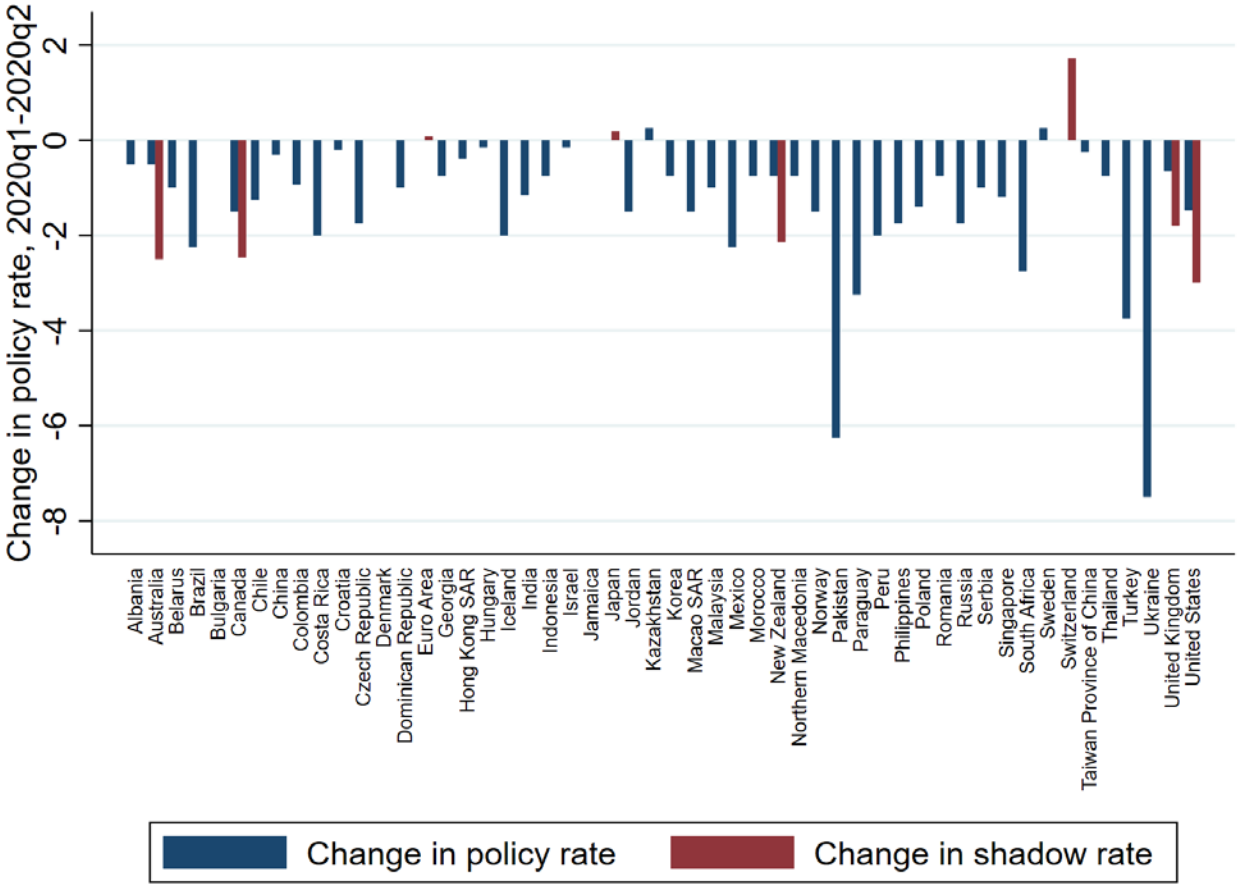
Figure 1
Fiscal Response to COVID-19 as % of GDP



Notes: Fiscal intervention in 2020q1 and 2020q2 in response to COVID-19 as % of 2019 GDP. Fiscal intervention is the announced fiscal support relative to what was planned at end-2019 and is broken into two components: additional spending and foregone revenue (also referred to as above-the-line) and loans, equity and credit guarantees (also referred to as below-the line). These fiscal measures only include discretionary measures and not any support through automatic stabilizers or revenue losses corresponding to slower growth.

Source: Based on data from the IMF's Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic Database.

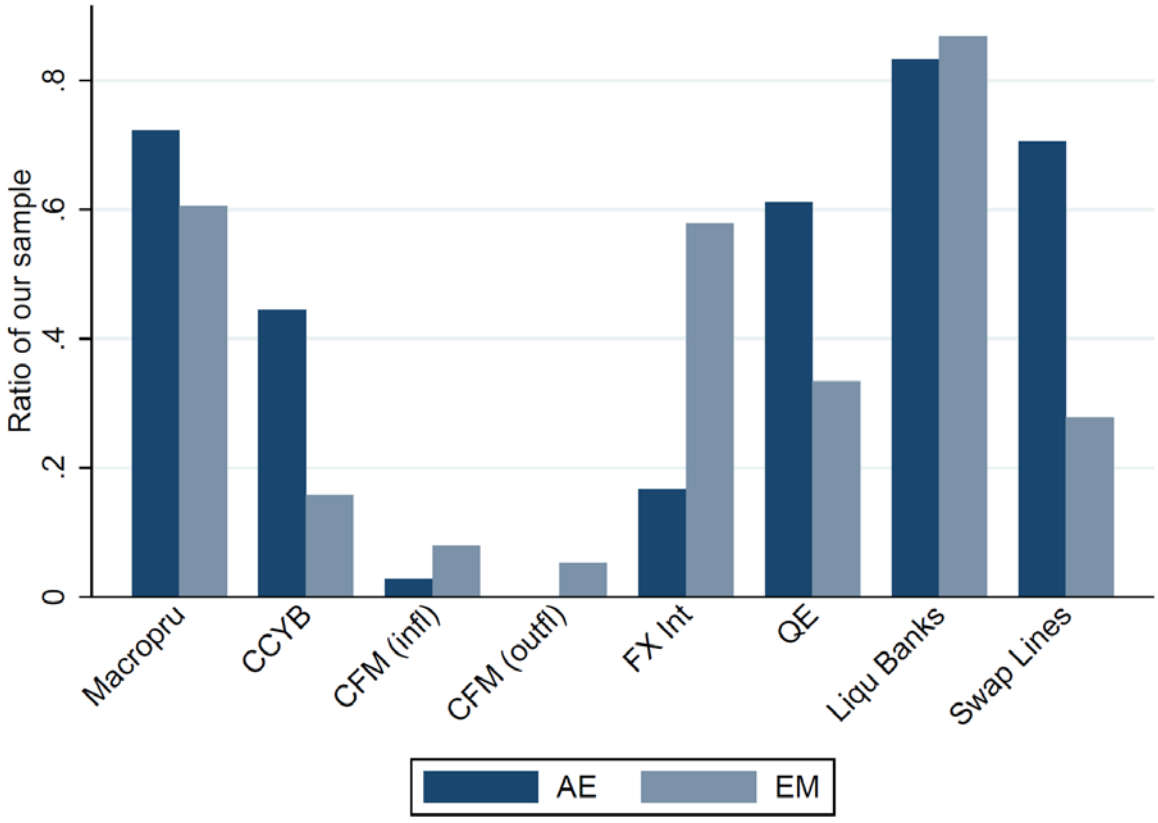
Figure 2
Interest Rate Response to COVID-19



Notes: Blue is the change in the central bank policy interest rate from end-2019 through 2020q2. Red is the change in the shadow interest rate over the same period for countries at their lower bound (Australia, Canada, Euro area, Japan, New Zealand, Switzerland, UK, and US). Argentina is excluded as its 22 percentage point reduction in the policy interest rate is so large it distorts the axis for other countries.

Source: Policy interest rates from Haver and shadow interest rates from Leo Krippner's website, based on calculations in Krippner (2015).

Figure 3
Changes in Macroprudential Policy, FX Intervention, Capital Controls and Unconventional Monetary Policy in Response to COVID-19

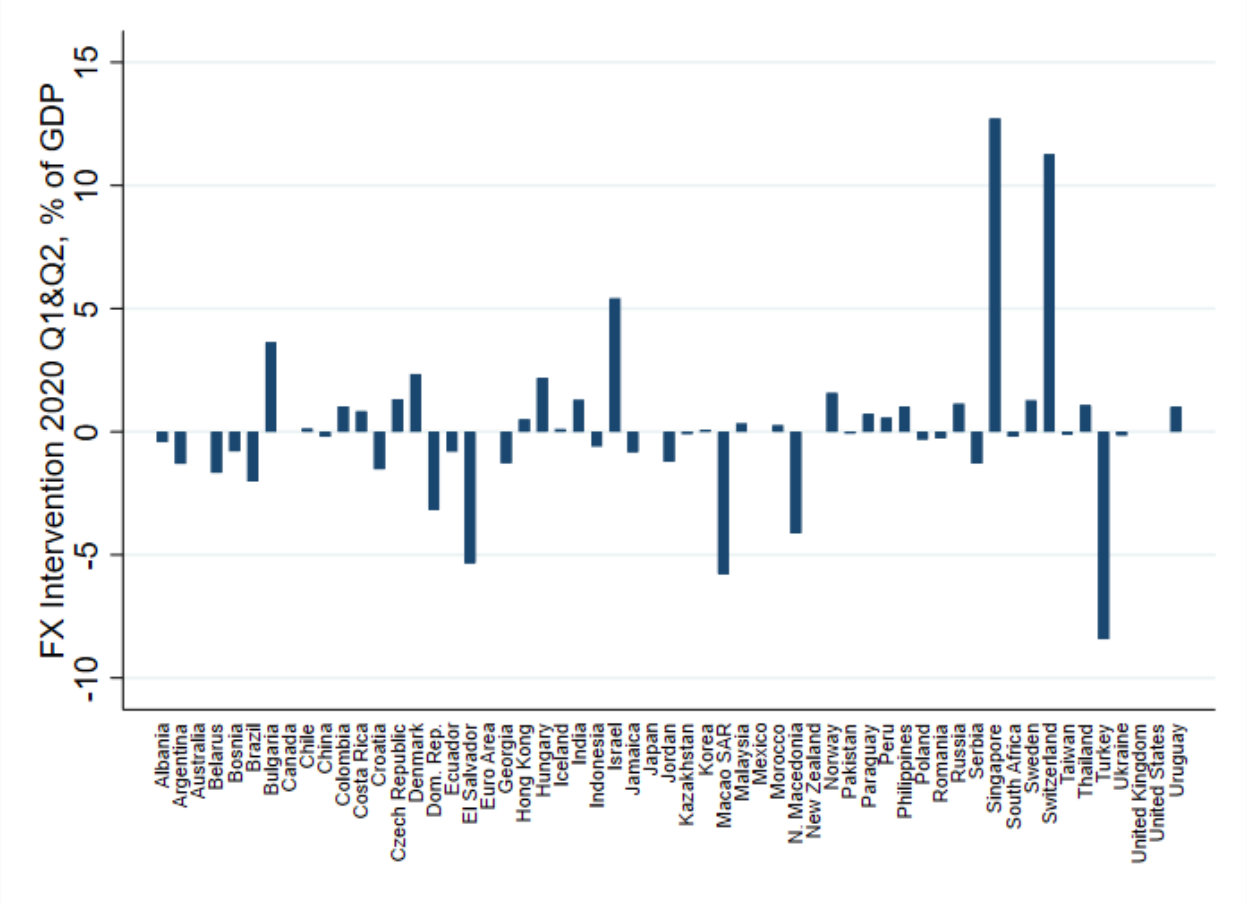


Notes: Share of advanced economies (AEs) and emerging markets (EMs) that used each policy during 2021q1-2020q2. "Macropru" and "CCyB" report any easing in macroprudential regulations and the CCyB, respectively. "CFM (inf)" and "CFM (outfl)" report any easing of inflow controls or tightening of outflow controls. "FX Int" reports any use of FX reserves for exchange rate intervention. "QE", "Liqu Banks" and "Swap Lines" report any use of unconventional monetary policy in the form of asset purchases, liquidity provision to banks, or swap lines, respectively. See Appendix Table 2 for details on magnitudes.

Source: Based on scrapped data from the IMF's Policy Tracker. See Appendix Table 1 for more information on variable definitions.

Figure 4

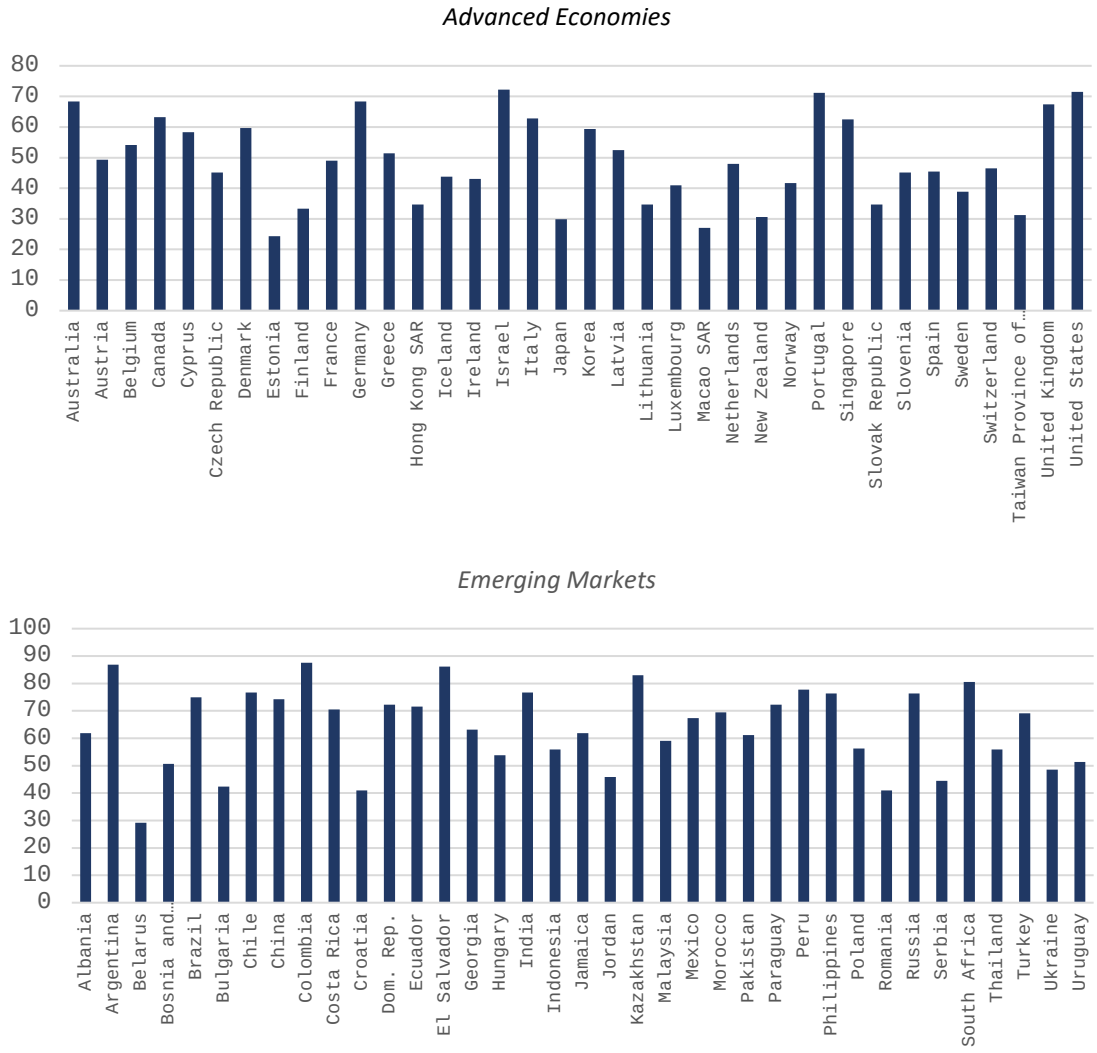
FX Intervention during COVID-19 as % of GDP



Notes: Amount of FX intervention over 2020q1 and 2020q2 as % of 2019 GDP. A positive number indicates reserve accumulation. FX intervention is a proxy that includes not only spot transactions, but also derivatives transactions and other central bank operations that alter the central bank's foreign currency position with the purpose of affecting the exchange rate.

Source: Based on data from Adler et al. (2021).

Figure 5
Health and Containment Measures in response to COVID-19



Notes: Indices measured through 2020q2. This Health and Containment index combines different lockdown restrictions, testing policies, contact tracing, and vaccination policies. A higher value indicates more stringent health and containment measures.[1]

Source: Based on data from the Oxford's Coronavirus Government Response Tracker (OxCGRT) compiled by the University of Oxford and available at: Coronavirus Government Response Tracker | Blavatnik School of Government (ox.ac.uk)

[1] More specifically, the measure includes school closings, workplace closings, cancellation of public events, restrictions on gatherings, stay-at-home requirements, restrictions on international movement, international travel controls, public information campaigns, testing policy, contact tracing, facial coverings, and vaccination policies.