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Fiscal policy design and inflation: the COVID-19 pandemic experience*

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Abstract

The significant rise in inflation (nearly) worldwide has been associated with different shocks and a range of policy responses to the COVID-19 pandemic. We study how the design of fiscal support measures helps explain the origins of the post-pandemic inflationary bout by exploring the heterogeneity of fiscal support measures across 10 large economies. Because conventional measures of real activity were distorted in the early stages of the pandemic, we control for the underlying state of the real economy using household sentiment data. We find that five weeks following support announcements, fiscal support measures already had statistically and economically significant, albeit not large, inflationary effects. The magnitude of the effect was twice as large in an environment of improving consumer sentiment and, in that case, the effects did not differ significantly whether the fiscal support targeted consumers or firms. Moreover, the inflationary effect was larger and much more immediate if the support involved cash transfers. Our findings suggest that policy design mattered for the underlying inflationary pressures in the aftermath of the pandemic.

JEL classification codes: E31, E62, E65

Keywords: fiscal policy, inflation, COVID-19, pandemic

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1 Introduction

Most countries saw a significant increase in inflation in the years that followed the COVID-19 pandemic. Policy responses to the pandemic, as well as other shocks, have been shown to have contributed to this rise, to varying degrees. Not surprisingly, policy responses to the crisis differed by country. Fiscal measures, in particular, varied significantly in a number of dimensions. Some countries focused on support in the form of income supplement or debt relief, while others had it directed at housing needs, or disbursed directly to households or indirectly through employers (such as the Paycheck Protection Program in the U.S.). Moreover, the amount of support was also different across countries and it was generally much larger in advanced than in emerging economies.[1] We study how the near-term inflationary effect of fiscal support varied across these different approaches.

Textbook economics tells us that a fiscal expansion may lead to temporary changes to output, employment, and may have effects on prices. The literature has shown that pandemic-related fiscal policies were effective at mitigating some of the economic downturn (see, for example, empirical analysis by Chudik, Mohaddes and Raissi (2021) and theoretical treatment by Guerrieri et al. (2020) and Fornaro and Wolf (2020)).[2] At a disaggregated level, Gourinchas et al. (2020) and Gourinchas et al. (2021) document that fiscal support measures, while poorly targeted, reduced small and medium enterprise failures and alleviated demand constraints, relative to the counterfactual. More generally, many agree that such measures were necessary at the time (*e.g.*, Baldwin and di Mauro, 2020). de Soyres, Santacreu and Young (2022) and Jordà and Nechio (2023) show that fiscal stimulus contributed to inflation in the long run.

Our paper contributes to this literature by studying how different designs of fiscal support help explain *the origins* of the inflation bout that started in the wake of the pandemic, while controlling for the real effects of these measures. We rely on a sample of 10 large economies, which include both advanced and emerging economies. Our approach is distinct in two ways. First, we consider the direct effect of fiscal support measures as well as its amplification through real activity. Because of the widespread lockdowns, conventional measures of economic activity were very sluggish during the COVID-19 economic crisis, which

[1] This difference, in particular, was likely due to differences in fiscal space (*e.g.*, Alberola-Ila et al., 2020; Benmelech and Tzur-Ilan, 2020; and Hürtgen, 2020). The heterogeneity in fiscal support is extensively documented in Hale et al. (2021*a*) which constructed and kept an updated database of government responses to the crisis: the Oxford COVID-19 Government Response Tracker (OxCGRT). Additional analysis, using the same data, is available at Chen et al. (2021). The data are described in Hale et al. (2021*b*).

[2] Given the specifics of the COVID-19 recession, however, the real effects of the stimulus were lower than in a regular recession, at least in the U.S. (Baqaee and Farhi, 2020).

is why we resort to measures of consumer sentiment as reported in surveys conducted by the Morning Consult.[3] These high-frequency sentiment data allow us to proxy for underlying economic conditions in a period when most of the usual measures of activity reflected mandatory or voluntary lockdowns. Second, we analyze differences in outcomes depending on the characteristics of the fiscal support. In particular, we compare the effects of policy measures depending on their main direct beneficiaries — *i.e.*, households versus businesses, and type of transfers, namely those with and without cash transfer components.

We rely on two main sources of data. The Oxford Government Response Tracker (OxCGRT) database is the main source for the data on countries' fiscal support by size and targeted groups. We turn to textual analysis of policy announcements, using supervised machine learning, to construct a breakdown of fiscal policies focused on consumers or businesses. The OxCGRT database is provided at a daily frequency, but we aggregate it to a weekly frequency to avoid unnecessary noise. In addition, we draw sentiment data from the Morning Consult Economic Intelligence Global Consumer Confidence survey, which we aggregate from a daily to a weekly frequency for our analysis. Additional data on main economic aggregates come from standard sources.

We find that fiscal support measures had a positive effect on inflation as early as five weeks following the announcements, even in the early stages of the pandemic, when most economies were still in some form of lockdown. This effect was quite modest in magnitude. Our estimates show that an announcement of fiscal support amounting to 10 percent of GDP is associated with a 40 basis points increase in the inflation rate three months after the announcement.[4] This effect is amplified if the fiscal support is announced at the time of improving consumer sentiment about current conditions — raising the total inflationary effect to about 60 basis points three months following the announcements. This is what we expected — when real demand is already improving, moving it closer to potential, fiscal stimulus is more likely to have an inflationary effect. Interestingly, consumer expectations of future conditions have a much smaller impact, possibly due to the high level of uncertainty about the future in the sample period we study. Moreover, in the absence of improving consumer sentiment, the inflationary effect is larger when the fiscal support was directed at

[3] Coibion, Gorodnichenko and Weber (2020) also rely on consumer sentiment data to document effects of lockdowns across U.S. regions.

[4] We pick 10 percent of GDP for our narrative since in the first two quarters of the pandemic in 2020, initial fiscal support packages (and subsequent, in some cases) were very large relative to history – individual announcements reached about 6% of GDP in Germany and Brazil, 7% of GDP in Australia, 9% of GDP in the U.S., 15% of GDP in the U.K., and 19% of GDP in Japan. Thus, a 10% of GDP fiscal package is a relevant benchmark for magnitudes presentation. For reference, a standard deviation of fiscal support to GDP share in the full sample, conditional on announcement is about 3 percentage points.

consumers, rather than businesses. Once we control for sentiment, however, this difference disappears. We expected the inflationary effect of the fiscal support to consumers to be larger because these measures transfer cash directly in the hands of consumers, whereas support for businesses allowed to avoid furloughs and job separations. However, we conjecture that when consumer sentiment is improving, it is possible that support for businesses translated (to some degree) to additional business spending or expected pay increases, thus being more similar to support for consumers. Unfortunately, we do not have sufficient data to assess this reasoning.

Our findings highlight the importance of controlling for the underlying economic conditions when estimating these relationships.[5] Finally, the inflationary effect of fiscal support that included cash payments is more immediate and is larger, as one would expect, especially when consumer sentiment is improving: we observe an increase in inflation by nearly 70 basis points as early as two weeks following the announcement of a fiscal support of 10 percent of GDP.[6]

In our analysis, we control for a number of factors likely to affect inflation: the severity of the COVID-19 crisis, the extent of lockdowns (Auerbach, Gorodnichenko and Murphy, 2021), monetary policy changes, country fixed effects, and monthly fixed effects. We also show that (*i*) without controlling for consumer sentiment the inflationary effects of fiscal support are biased downwards and are less precisely estimated, and (*ii*) the same results could not be observed by relying on conventional measures of real activity, such as PMI, which shows very little dynamics in most countries. Our results are robust to a variety of specification changes, such as controlling for supply chain disruptions using Cavallo and Kryvtsov (2021) index of stockouts, excluding some of our controls, including additional controls, or varying the sample of countries. Our results show that even in the short run, despite various restrictions on economic activity, fiscal support measures had inflationary effects.[7]

A large number of papers have studied the economic impact of the pandemic and the

[5] In normal times, when economies are not subject to lockdowns, one would control for economic activity to try and estimate the effects of policy on inflation. Since this is not the case, we resort to sentiment to extract such information. As we further discuss in the paper, while economies were subject to severe lockdowns and real activity could not respond to announcements, sentiment continued to be responsive to policy announcements.

[6] This latter finding is in line with the vast literature that studies the effects of cash transfer programs on households' consumption patterns (*e.g.*, Hsieh, 2003, Shapiro and Slemrod, 2009, Parker et al. (2013), Kueng, 2018, among others.)

[7] Auerbach, Gorodnichenko and Murphy (2021) show that restrictions likely delayed the inflationary effects of fiscal support during the pandemic.

effectiveness of mitigation policies. In addition to many country-specific studies,[8] there are a few cross-country studies that are closely related to the topic of our analysis. Furceri et al. (2021) study effectiveness of fiscal support measures for a large set of countries, including analysis by measure type, using fiscal measures classification methodology that is very different from ours. Jordà and Nechio (2023) study the impact of the rise in real disposable income, due to pandemic-related fiscal transfers on OECD-countries price and wage inflation. They find that countries that were more aggressive in their policies during the early stages of the pandemic, experienced a disproportionate rise in inflation rates in late-2021. Makin and Layton (2021) divide fiscal policies into "stimulus" and "relief" and show that relief measures worked better to address short-term unemployment. These results are consistent with predictions of the theoretical contribution by Faria-e-Castro (2021). Karakaplan (2021) shows that the Paycheck Protection Program helped small businesses obtain credit, while Aizenman, Jinjarak and Spiegel (2022) show that fiscal support measures stimulated bank lending globally. Kahn and Wagner (2021) show that the ability of liquidity provision to address externalities depends on whether funds are distributed through banks or directly to non-financial firms.

While our estimated magnitudes of the effects of fiscal transfers on inflation are relatively small when compared to some literature findings (*e.g.*, de Soyres, Santacreu and Young, 2022 and Jordà and Nechio, 2023), the latter relied on accumulated effects on a longer time sample that included late-2021 through 2023, when most economies had reopened and inflation started to pick up for various reasons. Our estimates, on the other hand, are focused on the early stages of the pandemic, from 2020 to mid-2021. Therefore, our estimates can be seen as providing evidence of underlying inflationary pressures brought by pandemic-related fiscal measures, that is, the fiscal origins of inflationary pressures that most countries faced up to 2023. Moreover, we highlight the role of the design of fiscal support and show how its effects on inflation varied depending on targeted beneficiaries and type of transfers.

In all respects, while the COVID-19 pandemic time period was unique, our analysis does provide some policy lessons. In particular, for the future cases when both aggregate demand and supply might be affected by an external shock simultaneously, fiscal policy is likely to be less inflationary when consumer sentiments are low. This conjecture is in line with Figueres (2015), which shows the importance of consumer confidence in assessing the effects of fiscal news shocks at other times. Our findings and those of the literature suggest that since consumer sentiment measures are available for many countries at high frequency, they

[8] Outside of the U.S. studies, Andersen et al. (2022) study the effects of lockdowns on consumer spending in Denmark.

can make a valuable input into fiscal decision-making. Moreover, our results point to the importance of policy design and its effects on the dynamics of inflation following shocks.

We proceed by describing our data sources and variable construction in Section 2. Section 3 describes our empirical methodology and findings. Section 4 concludes.

2 Data

Our sample includes data from February 19, 2020 to September 10, 2021 for 10 countries: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, the United Kingdom, and the United States. This yields an unbalanced panel with either 77 (Australia, Brazil, Japan, Russia) or 82 weekly observations per country.

Table A1 provides summary statistics while Figure A1 plots time series of all variables used in our estimates for each country.

2.1 Sentiment data

The time period we explore is characterized by compulsory and voluntary economic shutdowns, with drastic declines and changes to the composition of aggregate demand. During the early stages of the COVID-19 pandemic, lockdowns were preventing or delaying the responses of real economic activity to policy measures.[9] For this reason, standard measures of real economic activity might not have been reflecting the true underlying state of the economy.

To bypass this issue, in our empirical analysis, we rely on measures of consumer sentiment extracted from surveys. These measures remained responsive to economic news, while real activity measures were sluggish or non-responsive due to lockdowns. As we show below, these measures can provide good proxies for underlying economic activity — they are both strongly correlated and also serve as good leading indicators of real activity.

We obtain consumer sentiment data from Morning Consult, which currently surveys about 19,000 adults per day across 43 countries.[10] This paper relies on data from 10 of those countries. In the survey, households are asked about their views on current and expected

[9]For example, Auerbach et al. (2021) show that fiscal support was ineffective in U.S. cities that were subject to stricter lockdown measures.

[10]Additional description of the survey questions, data collection methods and details on the indices construction are available at Morning Consult Economic Intelligence (2022).

personal financial conditions, future business conditions, and current buying conditions. Morning Consult uses a stratified sampling process based on age and gender to reach a broad and nationally representative audience in each country. The interviews are conducted online through multiple nationally recognized vendors.

The survey includes five questions:

1. Personal Finances – Current Conditions: "We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?"

2. Personal Finances – 12-month Expectations: "Now looking ahead — do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?"

3. Business Conditions – 12-month Expectations: "Now turning to business conditions in the country as a whole — do you think that during the next twelve months we'll have good times financially, or bad times, or what?"

4. Business Conditions – 5-year Expectations: "Looking ahead, which would you say is more likely — that in the country as a whole we'll have continuous good times during the next 5 years or so, or that we will have periods of widespread unemployment or depression, or what?"

5. Current Buying Conditions: "Thinking about the big things people buy for their homes — such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or bad time for people to buy major household items?"

From these questions, Morning Consult produces three consumer confidence indices for each country:

- Index of Consumer Sentiment (ICS) that captures consumers' views regarding current and future personal financial conditions and business conditions in the country as a whole.

- Index of Consumer Expectations (ICE) measures consumers' expectations of their future personal financial conditions and business conditions in the country as a whole.

- Index of Current Conditions (ICC) reflects consumers' views of their current personal financial conditions and of current buying conditions for large household goods.

All three indices rely on the net scores of the five individual questions. For a given question, the net score equals the percentage of weighted positive values minus the percentage of weighted negative values plus 100. The Index of Consumer Sentiment (ICS) is a simple average of all five net scores. The Index of Consumer Expectations (ICE) is a simple average of the net scores of questions 2, 3, and 4. Finally, the Index of Current Conditions (ICC) is a simple average of the net scores of questions 1 and 5.

In our estimations, we focus on consumers' answers from the aforementioned 10 countries. The responses are highly correlated across all five questions and across the indices. Therefore, our results are robust to using any of the above measures. However, the contemporaneous correlation between ICC and ICE is somewhat lower, 66%. While we rely on all three sentiment indices for our analysis, for brevity, in the main text we focus on results based on ICC, and only report on the ICS and ICE when noteworthy. The appendix provides results for all three indices.

2.2 Fiscal measures data

The data on fiscal support measures were obtained from the Oxford University "COVID-19 Government Response Tracker." More specifically, we rely on the indexes of economic support and on measures of crisis severity, such as the number of deaths and the stringency of health and mobility restrictions.

In addition, we turn to the notes associated with each country's fiscal measure to obtain details of policy announcements.[11] We conducted a textual analysis of these announcements using a supervised machine-learning algorithm. This allows us to further classify the types of fiscal support provided and get information on the duration of each measure. As a result, we classify fiscal measures as focused on consumers, businesses, or both. The data are available at a daily frequency, which we aggregate to weekly for our analysis. Moreover, we inspect each data point of our fiscal series to make sure that fiscal package data are reported in U.S. dollars, as detailed below. For further details on this dataset, see Hale et al. (2021*b*).

The data provide four indexes for economic support. The first is an ordinal index of the presence and scale for income support with 0 indicating no income support, 1 indicating income support replacing less than 50% of lost salary, and 2 indicating income support replacing more than 50% of lost salary. The lack of data is indicated by missing values. This index is accompanied by a binary variable indicating whether only formal sector workers or

[11] At times, the notes provide links to the policy announcements which we use to obtain additional details or clarifications.

all workers are affected. The second index measures whether this is a debt contract relief for households, which also entails an ordinal index that equals 0 to indicate no debt/contract relief, 1 to indicate a relief specific to a particular contract, and 2 for a broad relief. The third variable is the monetary value in U.S. dollars of the fiscal stimuli, only reflecting new spending announced on a particular day, with 0 indicating no new announcements.[12] The fourth index provides information on financial aid to other countries, which we do not use.

We further analyzed the narrative information provided in the notes associated with the package to gather additional information when possible. Using these notes, we are able to identify whether particular fiscal support is disbursed directly to consumers or if it is distributed to businesses, even if for the purpose of payroll support. We were also able to flag any support that is related directly to medical or health expenses, whether at the individual or medical establishment level, which we exclude from fiscal support measures. The details of our textual analysis procedure are reported in Appendix A.

We scale the support measures by the country's nominal 2019 GDP, which we obtained from the OECD Quarterly National Accounts and from the St. Louis Fed FRED.

2.3 Crisis severity data

We also draw on "COVID-19 Government Response Tracker" data to control for the pandemic severity in each country. These data include the stringency index, which reflects the severity of lockdown policies, a containment health index that reflects measures addressing the spread of the virus, and the number of confirmed deaths due to COVID-19 virus, which serves as a proxy for the severity of the pandemic in the country. We believe the number of deaths is a good measurement of the pandemic severity in cross-country analysis, as other measures such as the number of confirmed cases or hospitalizations could reflect countries' differences in infrastructure and testing availability. Moreover, another candidate measure, test positivity rates, is not available for the full sample we consider. Many of these measures are highly correlated, and we find that only the number of deaths has a significant coefficient in our regressions, thus we retain this as the control variable.

Finally, we collect data on the 2019 population from The World Bank "World Development Indicators Database" to scale the number of deaths by country.

[12]Some data points are reported in local currency. For those, we used the average exchange rate of the corresponding month to convert the announced value to U.S. dollars.

2.4 Macroeconomic data

We obtain year-on-year inflation rates from the International Monetary Fund database and interpolate them linearly from monthly to weekly frequency.

To assess whether sentiment measures provide a good forward-looking proxy for real economic activity, we collect data for the purchasing managers index (PMI) for the manufacturing and service sectors from Bloomberg.

We also collect from Bloomberg data on 3-month and 2-year government bond yields for each country in the sample. We use both the 3-month rates and the difference between 2-year and 3-month yields as measures of monetary policy stance, which we include as control variables in our regressions. We do not use policy rates because some countries have hit their effective lower bounds and relied on unconventional monetary policies during the pandemic. The aforementioned yields have been shown to better reflect the monetary policy stance in such cases (*e.g.*, Swanson and Williams, 2014*a* and Swanson and Williams, 2014*b*).

3 Empirical analysis

We conduct our analysis using local projections (Jordà, 2005) at weekly frequency, using a panel of 10 countries, i, over about 80 weeks, t, and a forecast horizon of 16 weeks, j. We consider a series of regression specifications, which we detail below. In all of them, we include 4 lags of dependent and explanatory variables.[13] Our outcome variable is year-on-year inflation π and our main explanatory variable is a measure of fiscal support ($Fiscal$). We also rely on a set of control variables (X), which include, without lags, the number of COVID-related deaths per capita, the severity of the lockdowns, the 3-month government bond rate, and the difference between 2-year and 3-month government bond rates, as well as country and time (monthly) fixed effects. The latter fixed effects absorb all time-invariant country-level factors as well as other common trends and fluctuations. Robust standard errors ε are clustered by country to allow for autocorrelation in error terms at each country.

We first verify that our sentiment measures are indeed correlated with real activity. Appendix Figure A3 shows that all three sentiment indexes are strong predictors of PMI, with the latter reacting with a lag of about 2 weeks and the effect persisting through week 4. The peak effect of ICC on PMI is about twice as large as the ICE. This suggests that at short

[13] We estimated the same set of regressions with 8 lags and the results are robust to this change. However, lags over 4 are not statistically significant and the resulting coefficients of interest are less precisely estimated.

horizons, sentiment measures, especially those reflecting current conditions, can provide a good proxy for real activity. This is particularly important for our estimates since during the pandemic real activity was severely impacted by lockdowns.[14]

We also find that fiscal support had no real effect in the short run, as measured by consumer sentiment indexes. We analyze separately the effects of total fiscal support, fiscal support to consumers, and fiscal support to firms. The results are reported in Appendix Figure A4 for the overall sentiment index (ICS), and for the effect on current (ICC) and expectation components of sentiment (ICE). The figure shows that fiscal support slightly improves consumer sentiment (especially its current conditions component) with a lag of about two weeks, but by a small and not statistically significant amount. As we would expect, given the lockdowns in place early during the COVID-19 recession and later due to supply chain constraints, we also find no effect of fiscal support on PMI, as shown in the top panel of the Appendix Figure A5.[15] The lack of response of real activity to the fiscal stimulus, with the lockdowns which constrained the response of the production sector, suggest that the fiscal stimulus could put pressure on inflation, which is what we turn to assess next.[16]

3.1 Fiscal support and inflation

We turn now to the question of whether the fiscal package announcements had effects on inflation. While the literature emphasizes the importance of distinguishing between anticipated and unanticipated fiscal shocks. More specifically, the literature has emphasized the real economic effects of anticipated fiscal spending policies (*e.g.*, Forni and Gambetti, 2016, Mertens and Ravn, 2012 and Ramey, 2011). Figueres (2015) goes a step further and shows that the strength of these effects is affected by consumer confidence, highlighting the importance of consumer confidence in understanding the transmission of fiscal news shocks. This is something we also explore in this paper, albeit we are restricted to the COVID-19 period. Unfortunately, we do not have sufficient data to distinguish between these anticipated and unanticipated announcements cases in our sample. To some extent, the pandemic itself was

[14] This holds despite the low contemporaneous correlation (about 10%) between PMI and sentiment measures in the sample.

[15] This result is in contrast with that in Furceri et al. (2021) who find an effect of fiscal support on PMI. However, our analysis is based on different data sources, sample, and methodology. Moreover, since this correlation is not central to our analysis we do not delve into the exact reason for such differences.

[16] A simple way to think about the constrains faced during this period is to consider an extreme case in which the aggregate supply curve is vertical (due to a complete lockdown, for example). In this case, as fiscal spending increases and the aggregate demand curve shifts to the right, demand pressures are fully transmitted to inflation and output is unchanged.

unanticipated and the magnitudes of the fiscal support were both unprecedented and likely hard to predict. From that perspective, it would not be a reach to interpret these shocks as unanticipated. However, once fiscal packages were announced (and given the time between announcements and disbursements), we could be capturing some anticipated effects in our estimates.

First, we estimate the effect of fiscal measures on inflation without accounting for their effect on sentiment, our proxy for real activity. In particular, we estimate:

$$\pi_{it+s} = \alpha_i + \sum_{r=1}^{4} \beta_{\pi,r}\pi_{it-r} + \sum_{r=1}^{4} \beta_{F,r}\text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 16], \tag{1}$$

where $\pi_i t$ stands for inflation in country i ad time t, $Fiscal_i t$ is the change in cumulative fiscal support as a share of GDP, $X_i t$ is a set of controls, which in this case, includes a trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. The time period t is a week and α_i corresponds to country fixed-effects.

Next, we add sentiment among the control variables ($S_i t$). This additional control allow us to get closer to the effects of fiscal stimulus on inflation through demand channels:

$$\pi_{it+s} = \alpha_i + \sum_{r=1}^{4} \beta_{\pi,r}\pi_{it-r} + \sum_{r=1}^{4} \beta_{F,r}\text{Fiscal}_{it-r} + \sum_{r=1}^{4} \beta_{S,r}S_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 16]. \tag{2}$$

The results are reported in Figure 1. The left-hand-side panel reports results for the estimation of equation (1), while the right-hand-side chart reports results for the estimation of equation (2). They show the response of inflation to a 1 percentage point of GDP increase in fiscal support. For brevity, we only report results using ICC.[17]

Figure 1 shows that on impact, the effect of fiscal support on inflation is negative but not statistically significant. However, with about a three-month lag (13 weeks), the effects turn positive and statistically significant. The figure shows that a one standard deviation increase in fiscal support (1.3 percent of GDP) leads to about 2.5 basis points increase in the inflation rate. Turning to the right panel, we can see that simply controlling for consumer sentiment, apart from increasing the precision of estimates somewhat, does not alter the results of the naive specification (1) — fiscal support appears to have only a small, delayed, and non-persistent effect on inflation.

Next, we test for the possibility that the inflationary effect of fiscal support may be am-

[17]Controlling instead for ICE produces similar results that are available upon request. The Appendix Table A2 reports coefficient estimates associated with equation (1) for the first six forecast horizons. All other detailed estimation results are available upon request.

plified (or dampened) when accompanied by an improvement in consumer sentiment. Thus, we depart from equation (2) to include the interaction of fiscal and consumer sentiment:

$$\begin{aligned}\pi_{it+s} = \quad & \alpha_i + \sum_{r=1}^{4} \beta_{\pi,r}\pi_{it-r} + \sum_{r=1}^{4} \beta_{F,r}\text{Fiscal}_{it-r} + \sum_{r=1}^{4} \beta_{S,r}S_{it-r} \\ + \quad & \sum_{r=1}^{4} \beta_{FS,r}S_{it-r} * \text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 16].\end{aligned} \tag{3}$$

The results are reported in Figure 2, which shows the effects of fiscal support (β_F), the effect of sentiment as measured by ICC (β_S), and their interaction (β_{FS}). We find that all three effects are positive and statistically significant, that is, fiscal support measures as well as improving sentiments had a positive effect on inflation, with the fiscal support effect amplified by improving sentiment.[18] The results show that, in the absence of consumer sentiment changes, inflationary effects are about 2 basis points per 1 percent of GDP stimulus after five weeks, and it increases to about 4 basis points in the following months. If an increase in fiscal support is accompanied by an improvement in consumer sentiment, there is an additional inflationary effect: a combination of a one percent of GDP increase in fiscal support with one standard deviation increase in ICC (which is 2.23) leads to an overall effect on inflation of about 6 basis points.

To make proper sense of these magnitudes, however, one should consider the actual extent of the fiscal support observed during the COVID-19 crisis in each country, which were quite large relative to historical practices.[19] During that period, some countries announced fiscal packages that amounted to more than 10 percent of GDP in most cases. In fact, some countries' announcements were as large as 25 percent of GDP (Appendix Figure A1). Therefore, in Figure 3 we plot the predicted effect of a 10 percent of GDP fiscal support on inflation with and without a simultaneous one standard deviation increase in ICC or the same increase in ICE.[20] The figure shows that a 10 percent of GDP fiscal support, which is relatively modest during the COVID-19 crisis has inflationary effects of about 40 basis points in the absence of any changes to ICC. When this effect is combined with an increase in ICC, the inflationary effect reaches as high as 60 basis points. The increase in ICE by the same amount has a

[18] Importantly, the same effect is not observed when we, instead, include an interaction of fiscal support with the change in PMI rather than sentiment in equation (3). As Appendix Figure A6 shows, the interaction of fiscal support with PMI does not show any additional effect on inflation.

[19] Jordà and Nechio (2023) illustrate this point by reporting real disposable income in the U.S. from a historical perspective. Figure 10b in their paper show how disproportionate the U.S. response to COVID-19 was relative to its own history.

[20] In some countries announcements exceeding 10 percent of GDP more than once, resulting in cumulative fiscal support over the course of our sample as high as 48 percent of GDP for total support, 33 percent of GDP for support to consumers and 32 percent of GDP for support to firms, Figure A2.

much smaller amplification effect.

Overall, our results show that the direct inflationary effect of fiscal policy is amplified when conducted in an environment of improving consumer sentiment, especially, for consumers' perceptions of current conditions. It is worth noting that in our analysis we include monthly time fixed effects, therefore, our results are not driven by inflationary trends.

3.2 Heterogeneity of fiscal support

Given the variety of forms fiscal support took across countries and at different times, it is natural to question whether the form of fiscal support matters for its inflationary effect. Here we focus on two dimensions: fiscal support target (consumers vs. firms) and fiscal support form (cash transfers included or not). We repeat our main analysis, focusing on the ICC measure of sentiment and including the same set of control variables as for the main regression.

Consumers vs. firms Figure 4 replicates our main analysis for the two subsets of fiscal support measures: those directed at consumers and those directed at firms.[21] We find that in the absence of improving consumer sentiment, fiscal support to consumers had a larger effect on inflation, reaching 40 basis points after 12 weeks following a fiscal support announcement of 10 percent of GDP. The corresponding effect of fiscal support to firms is only about 35 basis points. However, conditional on improving consumer sentiment, fiscal support to both consumers and firms had a similar effect, reaching 60 basis points 12 weeks following the announcement.

Role of cash transfers Figure 5 replicates our main analysis for fiscal support announcements that included cash transfers and those that did not. Not surprisingly, we find that cash transfers had a larger and much more immediate inflationary effect. In the absence of improving consumer sentiment, inflation increased by 30 basis points as early as 2 weeks following the announcement of fiscal support in the amount of 10 percent of GDP that included cash transfers. If fiscal announcements did not include cash transfers, the effects were smaller and more delayed. In the environment of improving consumer sentiment, the inflationary effect of fiscal support with cash transfers was doubled, reaching nearly 70 basis

[21] When fiscal support packages included both payments to consumers and payments to firms, the support is counted for both subsets.

points 2 weeks following the announcement. The inflationary effect of fiscal support that did not include cash transfers was only minimally amplified by improving consumer sentiment.

3.3 Robustness tests

In this section we consider a few variations of our main estimates to test for the robustness of our findings.

First, we turn to our proxy for economic conditions. Given that we found no strong contemporaneous correlation between ICC and PMI, we can include both measures, simultaneously, in our regressions. We depart from equation (3) to include PMI (and its lags) both directly and interacted with the fiscal variable:

$$\begin{aligned}\pi_{it+s} = \quad & \alpha_i + \sum_{r=1}^{4}\beta_{\pi,r}\pi_{it-r} + \sum_{r=1}^{4}\beta_{F,r}\text{Fiscal}_{it-r} + \sum_{r=1}^{4}\beta_{S,r}S_{it-r} \\ + \quad & \sum_{r=1}^{4}\beta_{FS,r}S_{it-r} * \text{Fiscal}_{it-r} + \sum_{r=1}^{4}\beta_{PMI,r}\text{PMI}_{it-r} \\ + \quad & \sum_{r=1}^{4}\beta_{FPMI,r}\text{PMI}_{it-r} * \text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 16].\end{aligned} \tag{4}$$

The results are reported in Appendix Figure A7.

In a recent paper, Cavallo and Kryvtsov (2021) show that stockouts tend to have inflationary effects. Therefore, stockouts might be an omitted variable in our analysis. In Figure A8 we show that for the sample for which stockout data are available (6 out of 10 countries), the response of sentiment measures or PMI is minimal. Thus, we are not too concerned about omitted variable bias. However, we test for the robustness of our results by including "all stockouts" indicator as a control variable, along with others. The results for the main effect are reported in Figure A9 and show smaller standard errors but basically the same response of inflation to fiscal support. Note that the differences between these and benchmark results are driven by both the change to the sample of countries and by the inclusion of an additional control. Because of the more limited sample of the stockout data, we do not include it as control in our benchmark results.

We also assessed the robustness of our findings with respect to the regression specifications.[22] We find that:

- Our results are robust to including up to eight lags in the regression (instead of four),

[22]The results of these tests are available upon request.

with lags above four showing coefficients that are not statistically significant.

- We include a contemporaneous measure of the stringency of lockdowns in all regressions. However, in most specifications, it does not result in a significant coefficient. Our results are robust to excluding this measure from the list of controls.

- In our main specification we included monetary policy as a control variable.[23] Our results are robust to excluding monetary policy controls, which are also not statistically significant in most specifications. Without such controls, the effects are slightly smaller in magnitude (by about 0.5 basis points on the main effect at the peak) and are less precisely estimated.

- Our results are robust to including fixed effects for years instead of months or to including quadratic trends. However, we believe that monthly fixed effects are the most flexible specification.

- Our results do not change if we exclude the U.S. from our sample.

We also considered alternative measures of real activity and inflation. First, we estimated the effect of fiscal support on core inflation, as reported in Figure A10 and found that the results are very similar to those with headline inflation. Next, instead of PMI, we used the growth rate of industrial production (IP). The bottom half of Figure A5 and Figure A11 show the effects of fiscal support and of the sentiment index on IP. We can see that the IP does not increase due to fiscal support and, in fact, shows a lagged decline that is small in magnitude. The response of IP to sentiment is similar to that of the PMI shown in Figure A3. Thus, our results are robust to these alternative measures.

4 Conclusion

We study the role of pandemic-related fiscal support in the origins of the post-pandemic inflationary bout experienced (nearly) worldwide. We show that two refinements to the analysis are important. First, while some estimates suggest that most of the inflationary

[23] Ascari et al. (2023), Eggertsson and Kohn (2023), Cochrane (2024), Forbes, Ha and Kose (2024), and Giannone and Primiceri (2024), among others, have highlighted the importance of the interplay between the fiscal and monetary policy responses to the pandemic and their role in driving main economic variables. One consideration is that we work with a relatively short sample during which most countries kept their policy rates near or at their effective lower bounds. Therefore, the interplay between fiscal and monetary policies are likely to be more muted in our sample.

effect of fiscal support occurs when measures are directed at consumers rather than firms,[24] when we control for real economic conditions, proxied with measures of consumer sentiment, the differences in the inflationary effects of measures targeting consumers versus businesses disappear. Second, we find that the inflationary effects of fiscal measures differ by the type of disbursement it entails: measures that involved cash transfers had both a quicker and larger effect on inflation readings, particularly when accounting for the effects of the fiscal announcements on consumer sentiment.

Overall, our analysis shows that the inflationary effect of fiscal support was relatively quick to ensue but moderate in the early stages of the pandemic. Importantly, fiscal support conducted in an environment of improving consumer sentiment about current economic conditions was 50 percent more inflationary than in the absence of improving sentiment. Note that our analysis focuses on the early stages of the rise in inflation experienced since the pandemic. Therefore, our findings are not designed to explain the recent increase in inflation globally. For that reason, our estimates do not capture the significant rise in inflation that followed the economies' reopening after mid-2021, when most fiscal support measures were discontinued and other shocks gained prominence. Because we focus on the weeks following the announcements of fiscal packages and rely on sentiment data to measure underlying economic conditions, we are able to assess the inflationary effects of fiscal measures even when economies were still partially or completely shut down.

Our results highlight the importance of fiscal policy design in its inflationary effects. More specifically, our findings show that fiscal disbursements in the form of cash can have larger effects on inflation. Moreover, given the timely availability of sentiment data in a number of countries, in assessing the size and type of disbursement associated with fiscal policies, taking sentiment data into account may be informative. Our estimates suggest that if sentiment is improving on its own, more limited fiscal stimulus might be appropriate.

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[24] These findings are in line with Didier et al. (2020), which shows that fiscal support to firms may allow for firm "hibernation," and argue that the support was important to avoid externalities associated with firm failures and is less likely to be inflationary.

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Figure 1: Effect of Fiscal Support on Inflation

Notes: Local projections regressions are estimated by OLS: $\pi_{it+s} = \alpha_i + \sum_{r=1}^{4} \beta_{\pi,r}\pi_{it-r} + \sum_{r=1}^{4} \beta_{F,r}\text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 20]$. Time period t is a week. All regression include country fixed effects. Fiscal is a change in cumulative fiscal support as a share of GDP. X includes trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. For the right panel, X also includes sentiment measured as ICC. Unbalanced panel includes 77 (Australia, Brazil, Japan, Russia) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.. Robust standard errors are clustered on country.

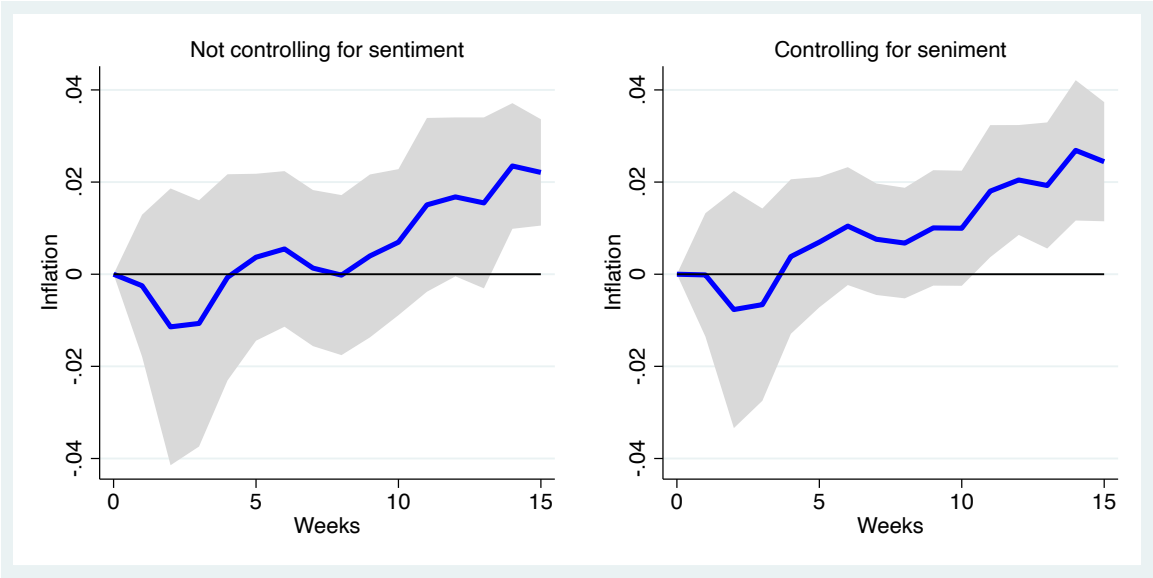


Figure 2: Effect of Fiscal Support and Sentiment on Inflation

Notes: Reported are β_F, β_S and β_{FS} effects from local projections regressions estimated by OLS specified in equation (3) Time period t is a week. All regression include country fixed effects. Fiscal is a change in cumulative fiscal support as a share of GDP. Sentiment is measured by ICC. Controls include trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. Unbalanced panel includes 77 (Australia, Brazil, Japan, Russia) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.. Robust standard errors are clustered on country.

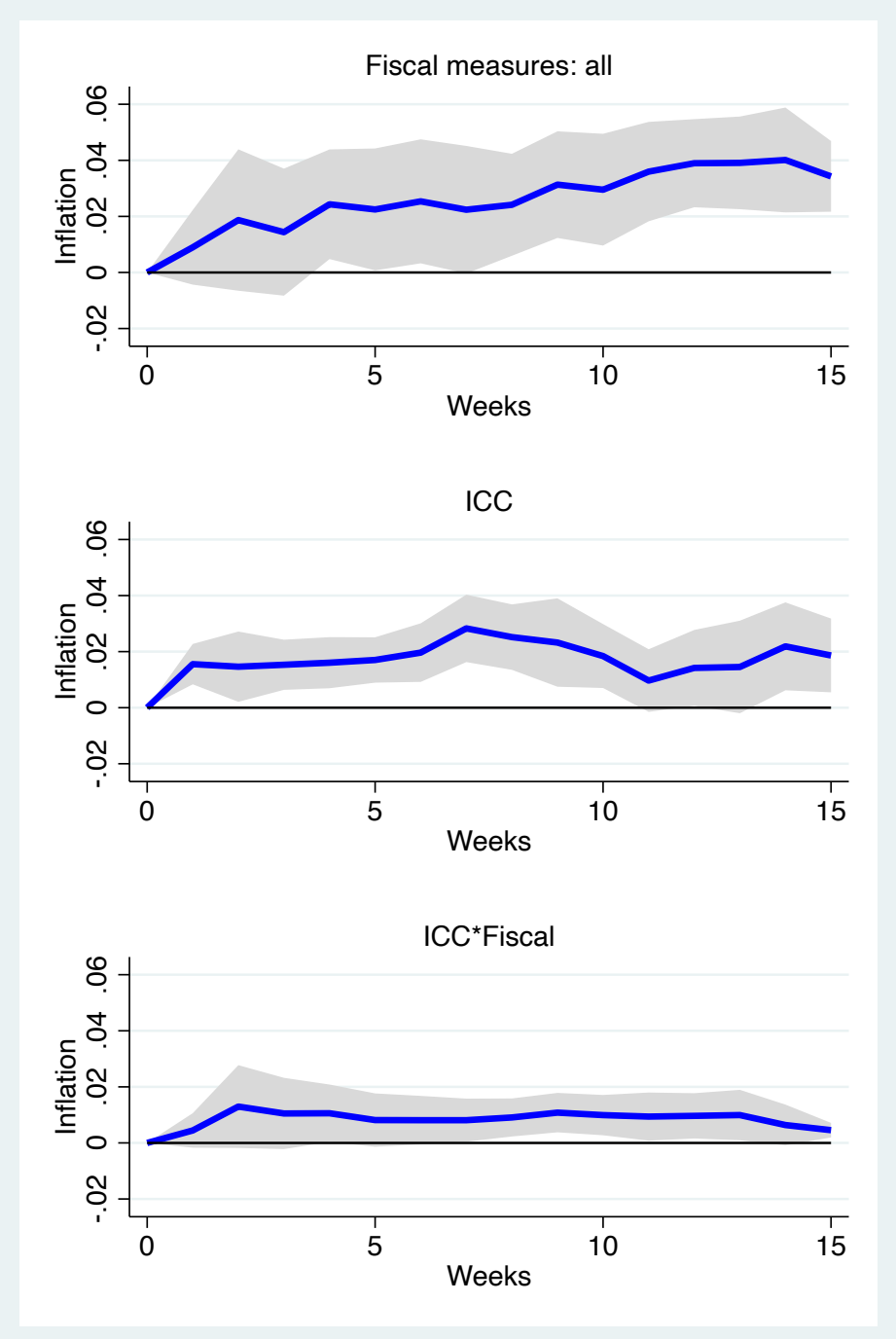


Figure 3: Magnitudes of the Effects of Fiscal Support on Inflation, Interactions with Sentiment

Notes: Reported is the predicted effect of total fiscal support of 10 percent of GDP on inflation, from equation (3). 1 s.d. of ICC is 2.23 and the same change is applied to ICE and ICS. The ICC predictions correspond to impulse response functions in Figures 2.

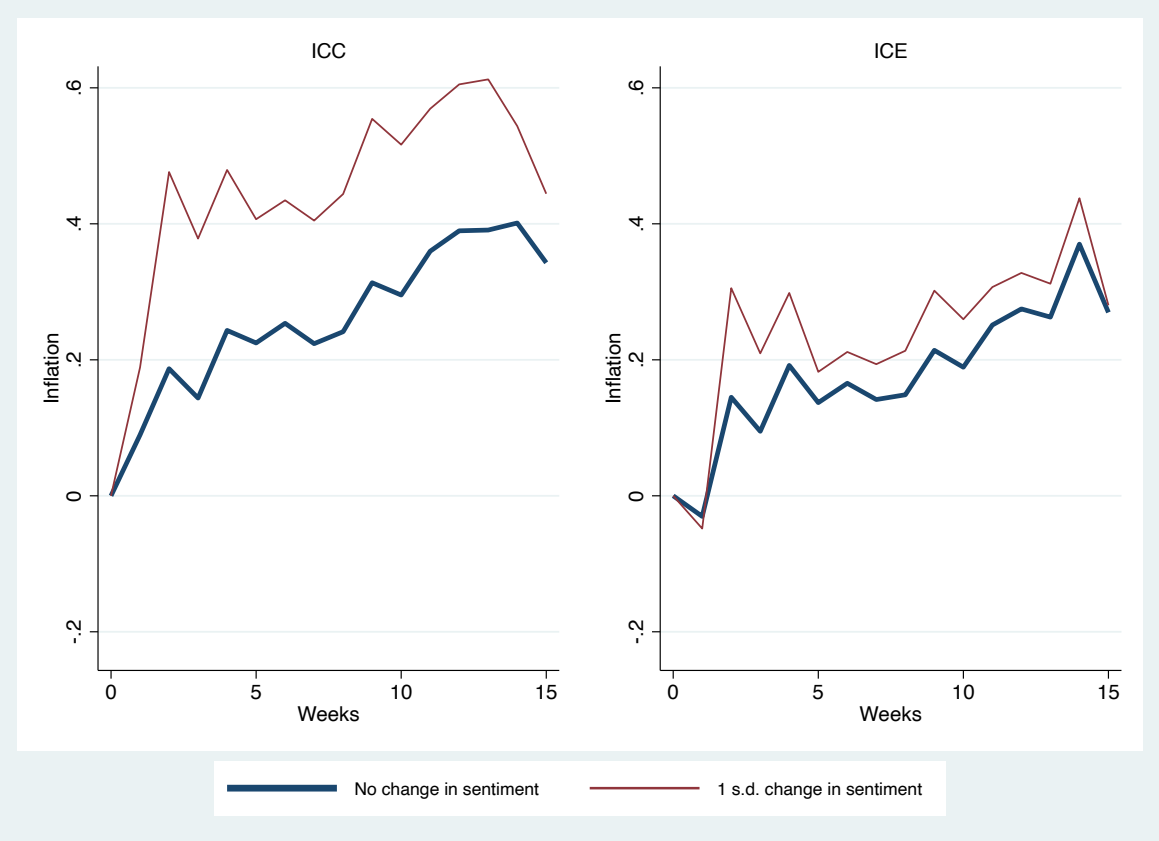


Figure 4: Magnitudes of the Effects of Fiscal Support on Inflation, Interactions with Sentiment: Firms vs. Consumers

Notes: Reported is the predicted effect of total fiscal support of 10 percent of GDP on inflation, from equation (3). Sentiment is measured by ICC: 1 s.d. of ICC is 2.23.

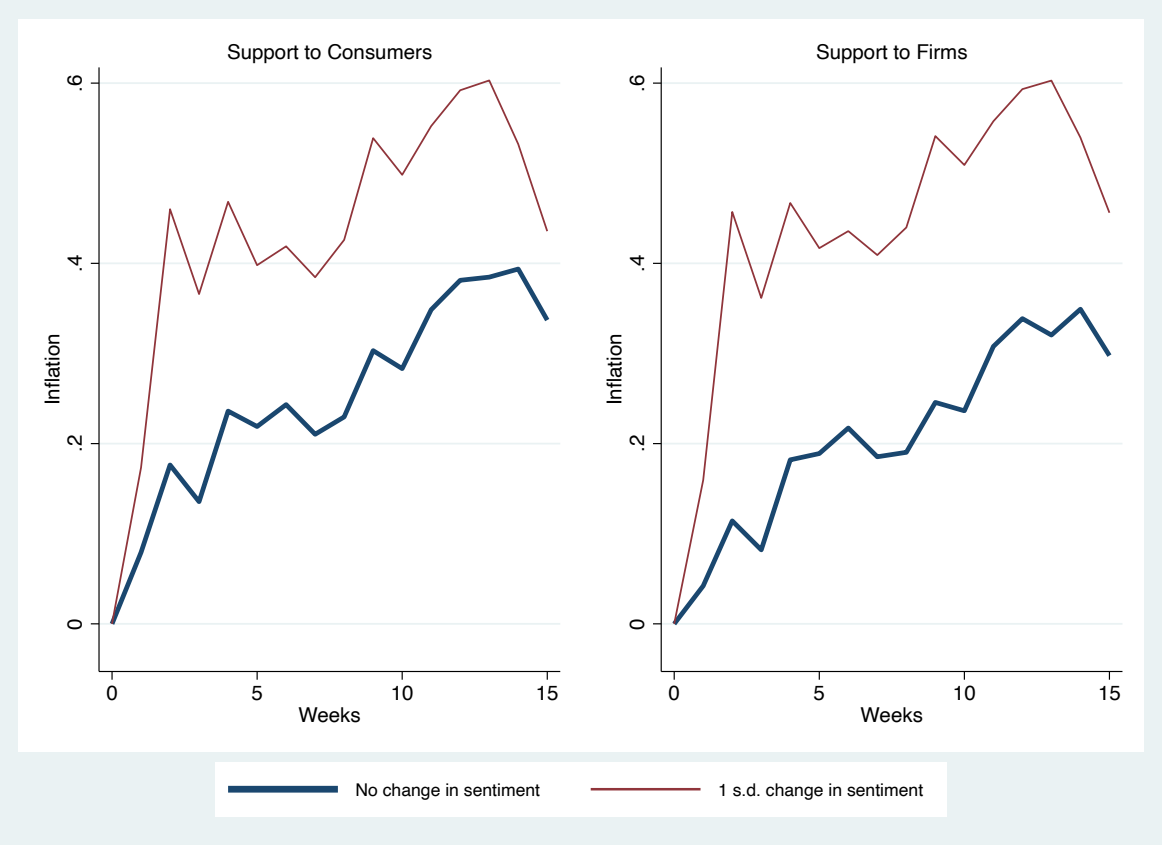
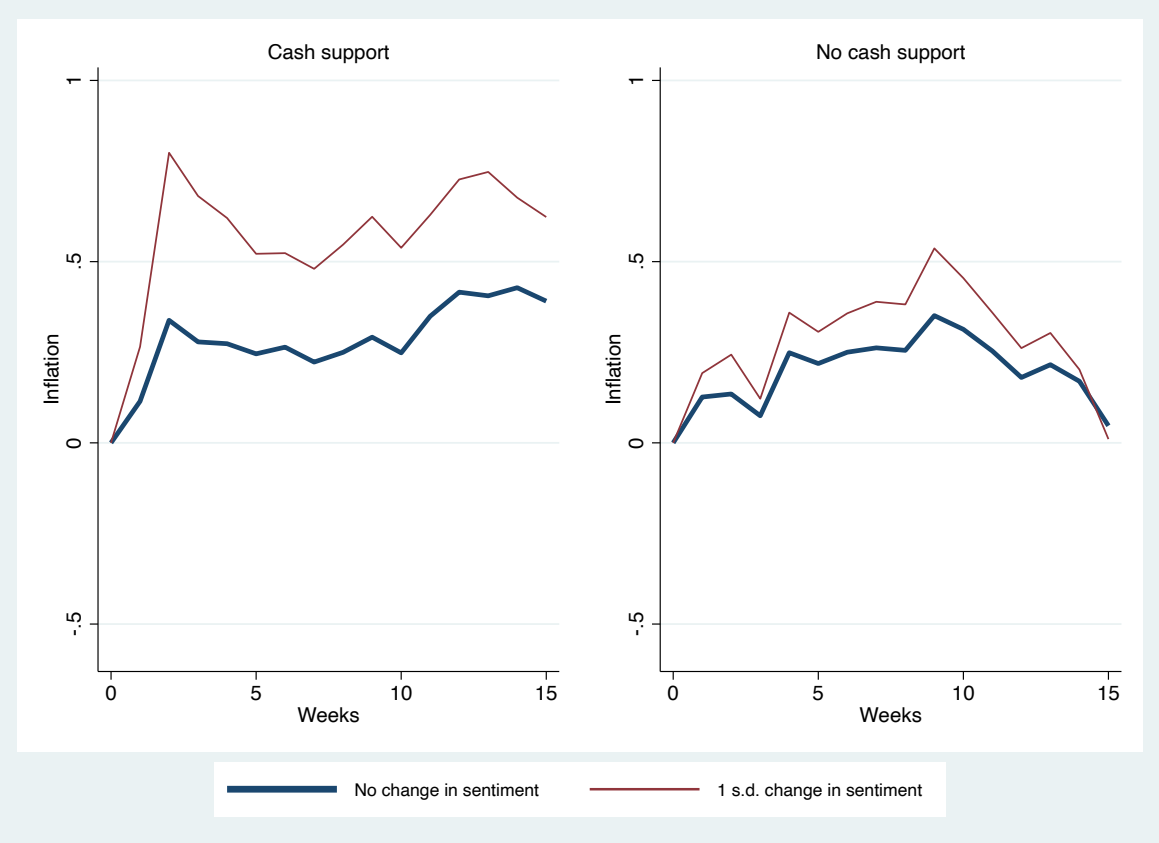


Figure 5: Magnitudes of the Effects of Fiscal Support on Inflation, Interactions with Sentiment: Cash vs. No Cash

Notes: Reported is the predicted effect of total fiscal support of 10 percent of GDP on inflation, from equation (3). Sentiment is measured by ICC: 1 s.d. of ICC is 2.23.



Appendix

A Fiscal support measures classification process

We followed the following procedure to classify fiscal support measures into those directed at consumers or firms:

1. We collected from OxCGRT raw data spreadsheet with sources that were either direct text of fiscal support communications or links to such texts. We looked for English versions. [25]

2. We saved each announcement as an individual data field and used textual analysis for harvesting common terms.

3. We manually classified common terms harvested from the data into categories that would allow various classification types. This step produced narrow (overlapping) classification vocabularies. For example, a narrow vocabulary of "support to students" was the following list: "students" "education" "schools" "high school" "public schools" "school students" "learning recovery" "support learning" "students returning" "students work" "college students."

4. We used string search to code whether each policy contained terms from a specific classification vocabulary, assigning 0 or 1, depending on whether such terms were found.

5. We aggregated the results that were based on narrow classification into broader categories — for this project, whether a given measure was directed at consumers, firms, or both. For support for consumers we combined support to students, to poor, to employees, to unemployed, to self-employed, to households, for housing, and for sick leave, unless sick leave was part of the support of the program directed at firms. We also explored classification for whether the support measure included cash payments or not (that, is only fiscal support that included debt forgiveness, payment deferrals, but no cash payments).

[25] During this step we also cleaned the OxCGRT data for errors in the amounts, many of which came from incorrect interpretation of the currency. We used exchange rates on the day of the announcement to translate all amounts to U.S. dollars.

B Data description and additional empirical results

This Appendix contains summary statistics, a representative regression table, and additional impulse response functions.

Table A1: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Inflation rate (π)	2.376	2.399	-1.194	10.74
Fiscal	0.16	1.34	0	25.99
Fiscal^C	0.16	1.33	0	25.99
Fiscal^F	0.13	1.19	0	25.99
Manufacturing PMI	52.59	6.59	30.8	66.7
ΔManufacturing PMI	0.050	1.81	-16.2	13.3
ICS	82.47	15.08	46.5	128.6
ICC	85.24	10.11	58.6	115.3
ICE	80.62	20.89	37.7	137.9
ΔICS (S)	-0.023	2.17	-15.3	6
ΔICC (S)	-0.047	2.23	-15.0	7.4
ΔICE (S)	-0.0074	2.46	-15.5	7.6
Stringency index	57.46	18.04	0	87.96
COVID-related deaths per capita	0.571	0.572	0	2.346
3-month government bond rate	0.78	2.10	-0.96	10.2
2yr-3m government bond rate	0.34	0.84	-0.35	6.02

Notes: Fiscal is a cumulative fiscal support as a share of GDP, Fiscal^C for consumers, Fiscal^F for firms. Deaths per capita is the number of COVID-related deaths per 1000 people. Unbalanced panel includes 1100 observations weekly starting February 19, 2020 and ending September 10, 2021. The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.

Table A2: Effect of Fiscal Support on Inflation

Regression specification: $\pi_{it+s} = \alpha_i + \sum_{r=1}^{4} \beta_{\pi,r}\pi_{it-r} + \sum_{r=1}^{4} \beta_{F,r}\text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, s \in [0, 20]$

LHS:	π_t	π_{t+1}	π_{t+2}	π_{t+3}	π_{t+4}	π_{t+5}
π_{t-1}	0.724***	0.639***	0.745***	0.731***	0.646***	0.588***
	(0.051)	(0.057)	(0.051)	(0.060)	(0.052)	(0.046)
π_{t-2}	-0.003	0.187**	0.098*	0.002	-0.008**	0.063*
	(0.008)	(0.069)	(0.044)	(0.003)	(0.004)	(0.031)
π_{t-3}	0.193**	0.094*	-0.005	-0.007	0.073**	0.131*
	(0.071)	(0.042)	(0.005)	(0.007)	(0.028)	(0.062)
π_{t-4}	-0.007	-0.054	-0.002	0.079	0.056	-0.048
	(0.050)	(0.076)	(0.080)	(0.081)	(0.087)	(0.083)
Fiscal_{t-1}	-0.011	-0.011	-0.001	0.004	0.005	0.001
	(0.018)	(0.016)	(0.014)	(0.011)	(0.010)	(0.010)
Fiscal_{t-2}	-0.007	0.002	0.005	0.010	0.007	0.003
	(0.012)	(0.011)	(0.009)	(0.008)	(0.008)	(0.009)
Fiscal_{t-3}	0.006	0.006	0.009	0.006	0.004	0.005
	(0.007)	(0.007)	(0.007)	(0.008)	(0.009)	(0.010)
Fiscal_{t-4}	0.009*	0.012*	0.010	0.009	0.009	0.011
	(0.005)	(0.006)	(0.008)	(0.009)	(0.010)	(0.010)
Stringency Index	-0.002	-0.003	-0.003	-0.001	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)
Deaths per capita	0.314*	0.432*	0.516*	0.616*	0.742*	0.847*
	(0.152)	(0.217)	(0.258)	(0.313)	(0.376)	(0.431)
3m bond rate	-0.051	-0.075	-0.102	-0.126	-0.154	-0.178
	(0.033)	(0.046)	(0.063)	(0.080)	(0.090)	(0.099)
2y-3m bond rate	0.028	0.044	0.065	0.092	0.118	0.145
	(0.025)	(0.037)	(0.048)	(0.067)	(0.082)	(0.095)
Observations	965	961	957	953	949	939
R^2	0.969	0.961	0.956	0.950	0.940	0.934

Notes: Local projections regressions are estimated by OLS. Only first four regressions (out of 20) are reported. Time period t is a week. π is inflation rate, annualized and interpolated to weeks from months, Fiscal is a cumulative fiscal support as a share of GDP, ICS is Consumer Sentiment Index, Deaths per capita is the number of COVID-related deaths per capita. All regression include country and monthly time fixed effects. Unbalanced panel includes 77 (Australia, Brazil, Japan, Russia) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.. Robust standard errors clustered on country are reported in parentheses. * = significant at 10%, ** = significant at 5%, *** = significant at 1%.

Figure A1: Time series of all variables

Notes: The left-hand-side variables are indices, with PMI centered at 50 and ICS, ICC and ICE centered at 100. The right-hand-side variables are reported as percentages. Inflation rate corresponds to year-on-year change to prices, and the remaining three fiscal variables are reported as shares of 2019 nominal GDP.

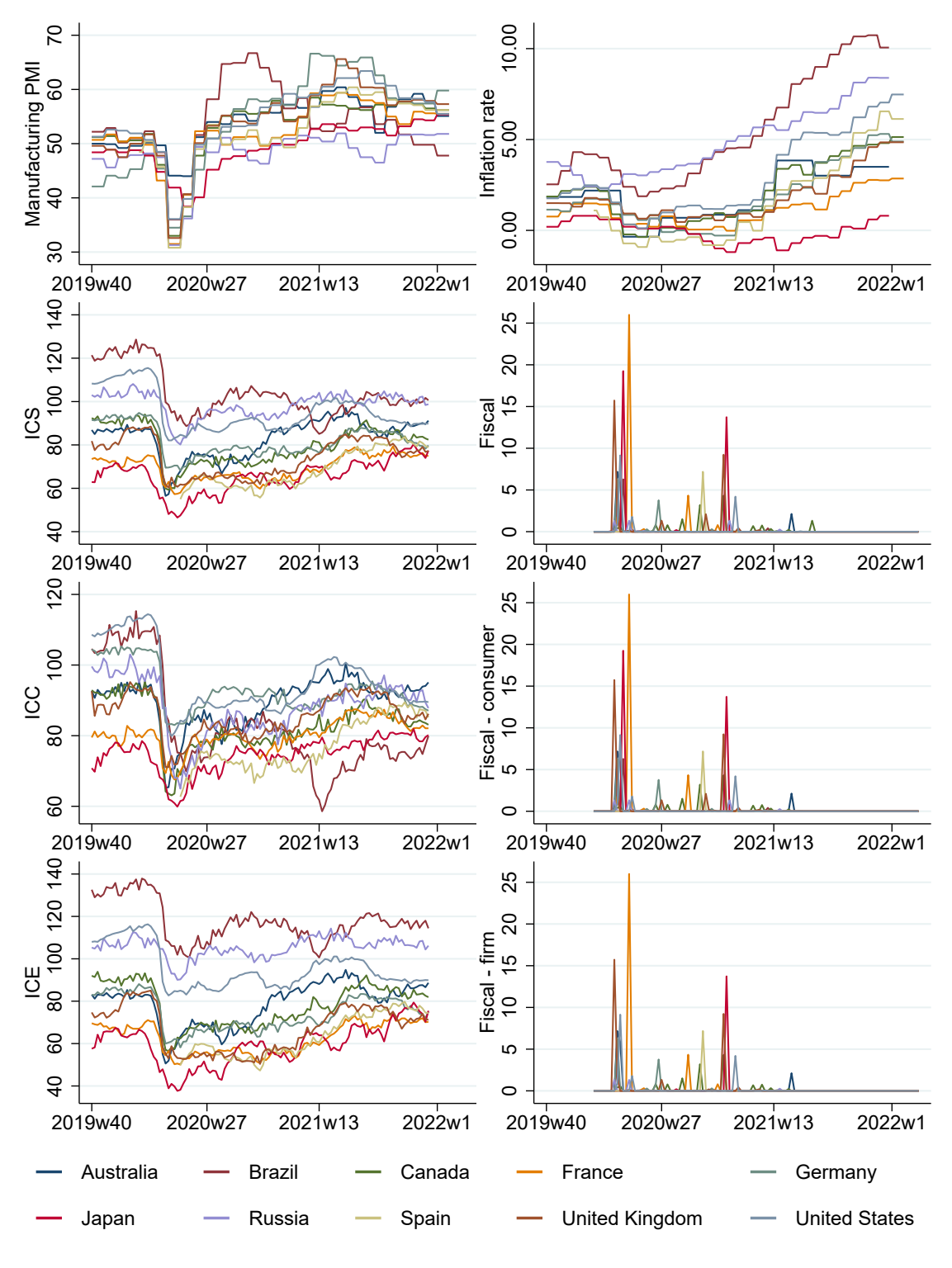
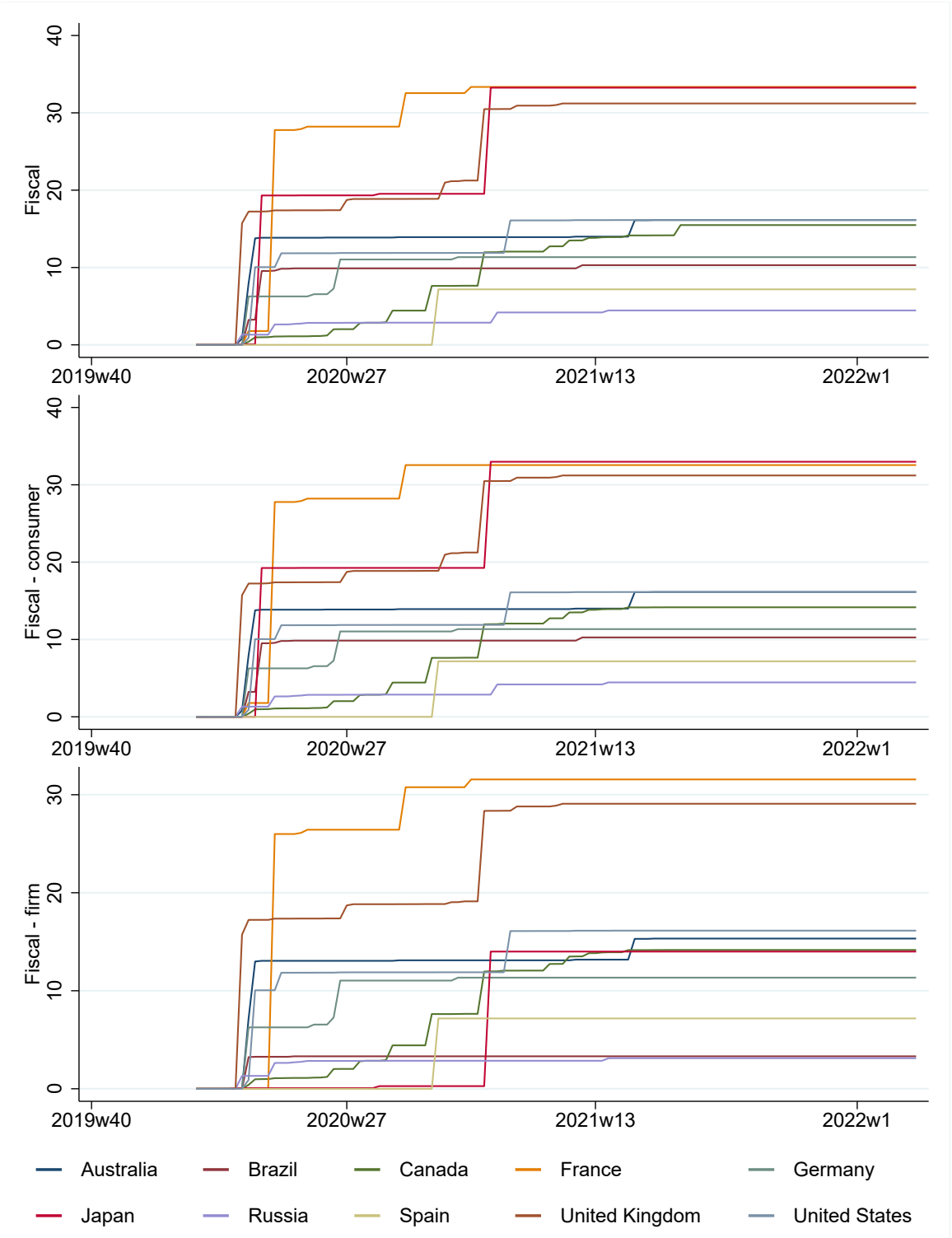


Figure A2: Time Series of Cumulative Fiscal Support



Sentiment measures as a proxy for economic activity

We begin by verifying that sentiment measures are good forward-looking proxies for real activity by estimating a local projection model of the change in PMI on the change in ICS, ICC, or ICE, controlling for the extent of lockdowns as measured by stringency index and COVID-related deaths per capita, at weekly frequency.

$$\text{PMI}_{it+s} = \alpha_i + \alpha_{tm} + \sum_{r=1}^{4} \beta_{PMI,r} \text{PMI}_{it-r} + \sum_{r=1}^{4} \beta_{S,r} S_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 16], \tag{B.1}$$

where α_i is a set of country fixed effects, α_{tm} is a set of monthly time fixed effects, S_{it} is a Consumer Sentiment Index (ICS), or its components, ICC or ICE, and X_{it} is a set of controls.

The results are reported in Figure A3. The figure shows that all three sentiment indexes are strong predictors of PMI, with the latter reacting with a lag of about 2 weeks and the effect persisting through week 4. The peak effect of ICC on PMI is about twice as large as the ICE. This suggests that at short horizons, sentiment measures, especially those reflecting current conditions, can provide a good proxy for real activity. This is particularly important for our next set of estimates since during the pandemic real activity was severely impacted by lockdowns.[26]

Fiscal support and real activity

Next, we assess the effects of fiscal support by testing whether fiscal support measures had any effect on consumer sentiment (our proxy for the underlying economic activity). We estimate:

$$Y_{it+s} = \alpha_i + \alpha_{tm} + \sum_{r=1}^{4} \beta_{Y,r} Y_{it-r} + \sum_{r=1}^{4} \beta_{F,r} \text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 16], \tag{B.2}$$

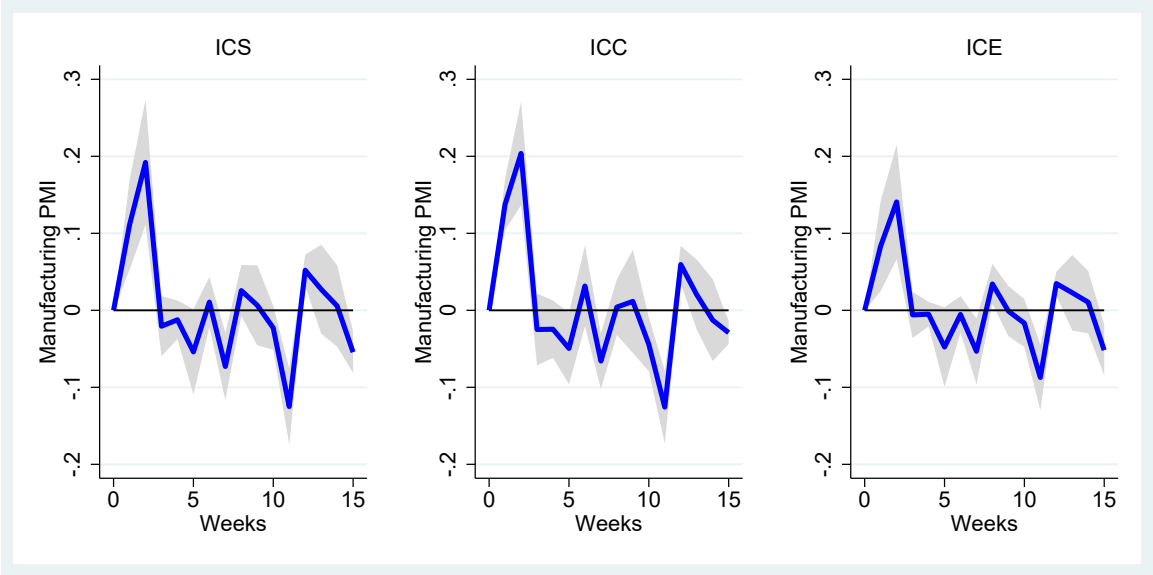
where Y is the change in ICS, ICC, or ICE.

We analyze separately the effects of total fiscal support, fiscal support to consumers, and fiscal support to firms. The results are reported in Figure A4 for overall sentiment index (ICS), and for the effect on current (ICC) and expectation components of sentiment (ICE). The figure shows that fiscal support slightly improves consumer sentiment (especially its

[26] This holds despite the low contemporaneous correlation (about 10%) between PMI and sentiment measures in the sample.

Figure A3: Effect of Sentiment on Manufacturing PMI

Notes: Local projections regressions are estimated by OLS: $\text{PMI}_{it+s} = \alpha_i + \sum_{r=1}^{4} \beta_{PMI,r}\text{PMI}_{it-r} + \sum_{r=1}^{4} \beta_{S,r}S_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 20]$. Time period t is a week. All regression include country fixed effects, trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. Unbalanced panel includes 77 (Australia, Brazil, Japan, Russia) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.. Robust standard errors are clustered on country.



current conditions component) with a lag of about two weeks, but by a small and not statistically significant amount. As we would expect, given the lockdowns in place early during the COVID-19 recession and later due to supply chain constraints, there is no effect of fiscal support on PMI (see the top panel of the Appendix Figure A5).[27] Given this small response in economic activity to fiscal stimulus, it is possible that fiscal support may be inflationary, which is the central question of our analysis and to which we turn next.

[27]This result is in contrast with that in Furceri et al. (2021) who find an effect of fiscal support on PMI. However, our analysis is based on different data sources, sample, and methodology. Moreover, since this correlation is not central to our analysis we do not delve into the exact reason for such differences.

Figure A4: Effects of Fiscal Support on Sentiment

Notes: Local projections regressions are estimated by OLS: $Y_{it+s} = \alpha_i + \sum_{r=1}^{4} \beta_{Y,r} Y_{it-r} + \sum_{r=1}^{4} \beta_{F,r} \text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 20]$. Y is either change in ICS, ICC, or ICE. Time period t is a week. All regression include country fixed effects Fiscal is a cumulative fiscal support overall, to consumers and to firms as a share of GDP. X includes trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. All regression include country and time fixed effects. Unbalanced panel includes 77 (Australia, Brazil, Japan, Russia) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.. Robust standard errors are clustered on country.

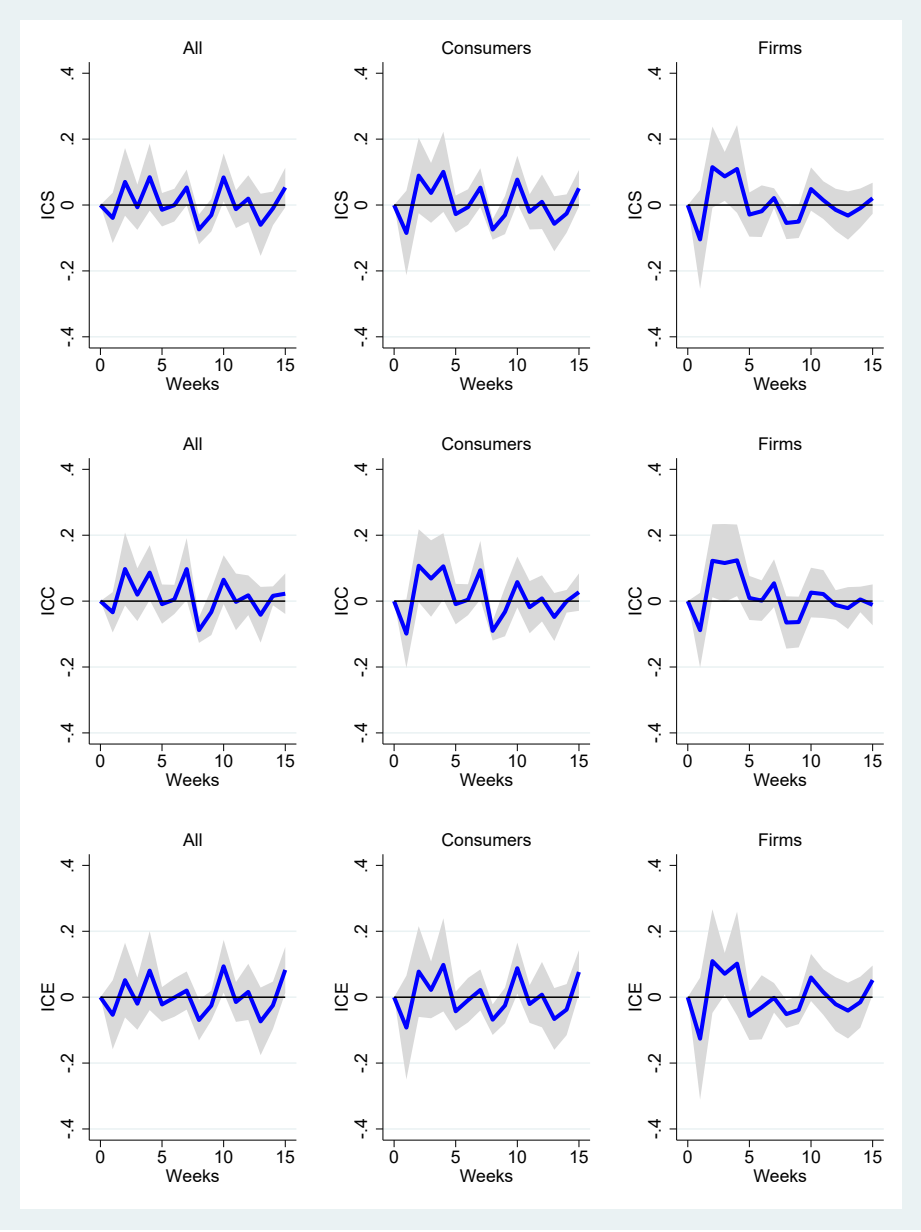


Figure A5: Effects of Fiscal support on PMI and Industrial Production (IP)

Notes: Local projections regressions are estimated by OLS: $Y_{it+s} = \alpha_i + \sum_{r=1}^{4} \beta_{Y,r} Y_{it-r} + \sum_{r=1}^{4} \beta_{F,r} \text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 20]$. Y change in PMI. Time period t is a week. All regression include country fixed effects Fiscal is a cumulative fiscal support overall, to consumers and to firms as a share of GDP. X includes trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. All regression include country and time fixed effects. Unbalanced panel includes 77 (Australia, Brazil, Japan, Russia) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.. Robust standard errors are clustered on country.

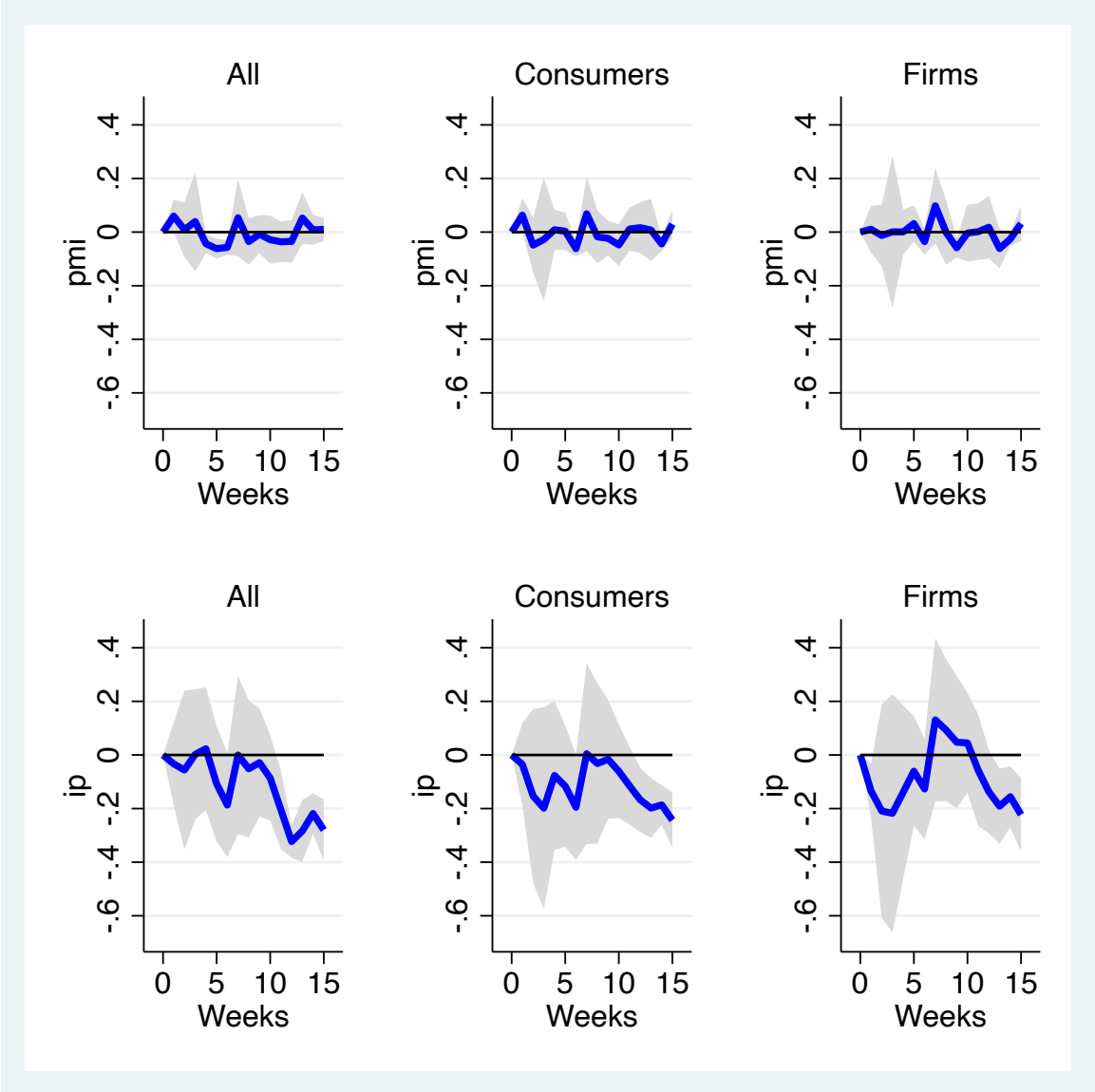


Figure A6: Effects of Fiscal support on Inflation, Interactions with PMI

Notes: Reported are β_F $\beta_F S$, and $\beta_F PMI$ effects from local projections regressions estimated by OLS specified in equation (3) with S replaced with PMI. Time period t is a week. All regression include country fixed effects. Fiscal is a cumulative fiscal support overall, to consumers and to firms as a share of GDP. Controls include trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. Unbalanced panel includes 77 (Australia, Brazil, Japan, Russia) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.. Robust standard errors are clustered on country.

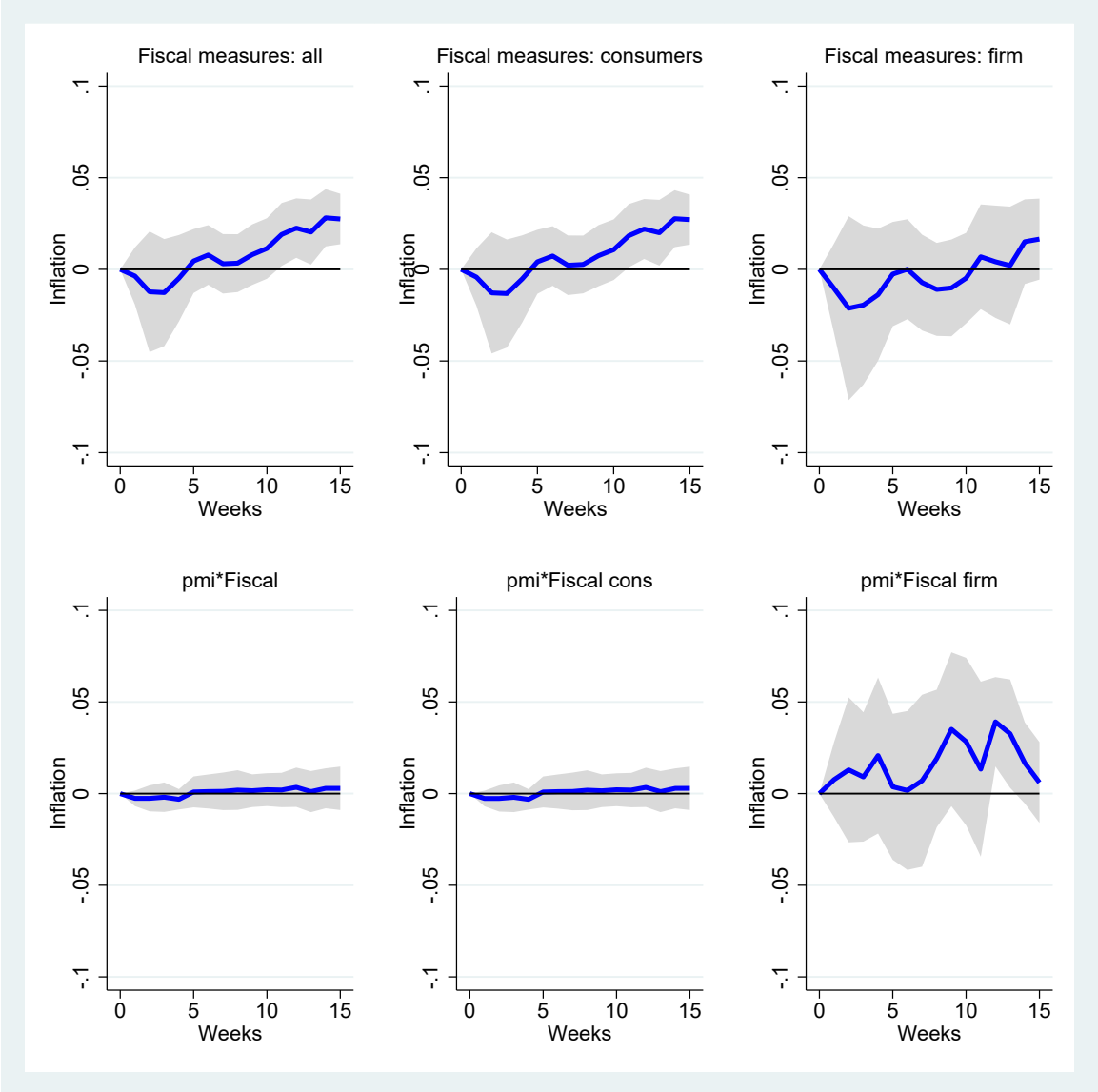


Figure A7: Effects of Fiscal support on Inflation, Interactions with ICC and PMI

Notes: Reported are β_F $\beta_F S$, and $\beta_F PMI$ effects from local projections regressions estimated by OLS specified in equation (4). Time period t is a week. All regression include country fixed effects. Fiscal is a cumulative fiscal support overall, to consumers and to firms as a share of GDP. Controls include trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. Unbalanced panel includes 77 (Australia, Brazil, Japan, Russia) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.. Robust standard errors are clustered on country.

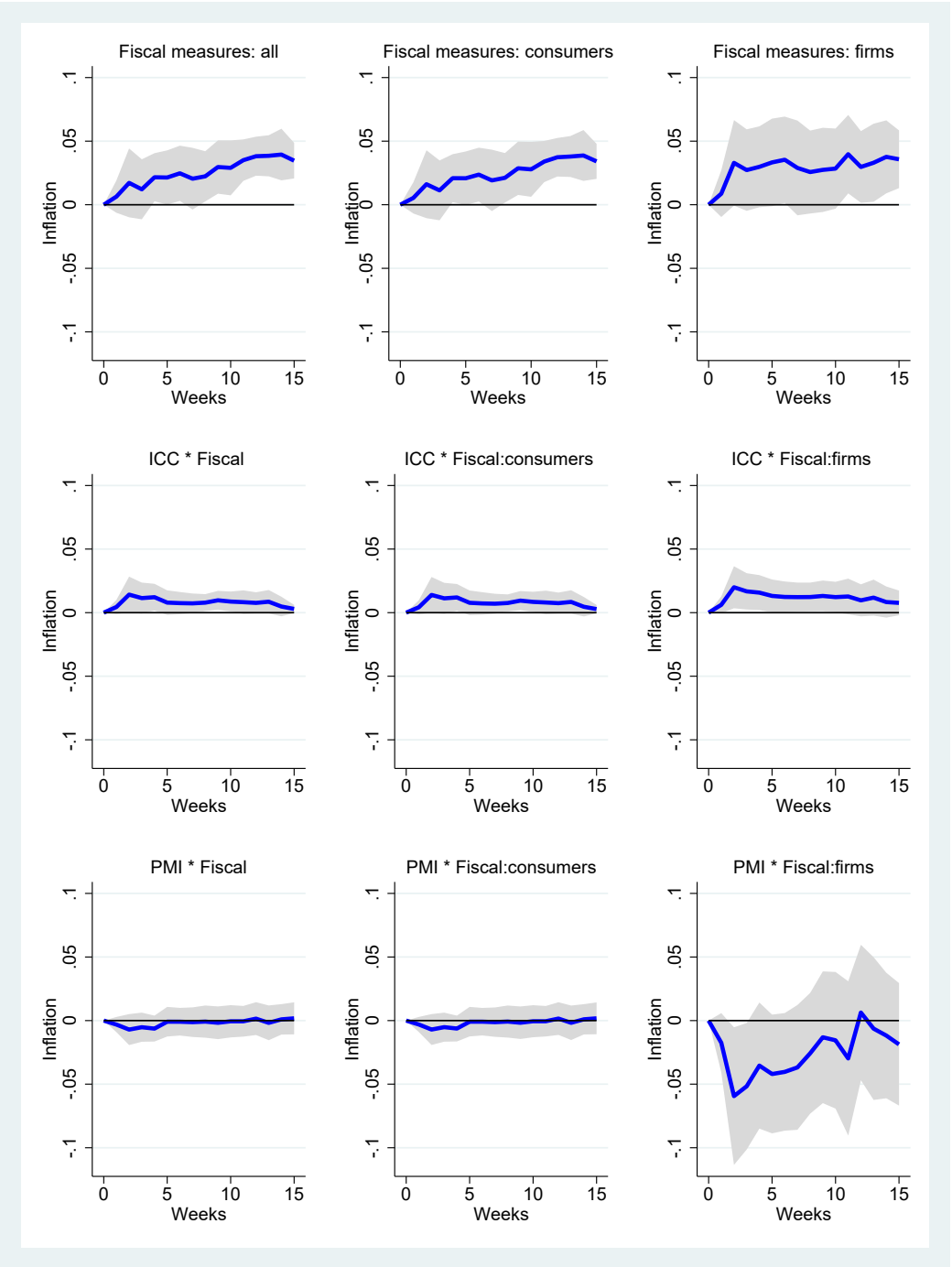


Figure A8: Effects of Stockouts on Sentiment and PMI

Notes: Effects from local projections regressions estimated by OLS. Time period t is a week. All regression include country and monthly time fixed effects. Controls include stringency index and the number of COVID-related deaths per capita. Unbalanced panel includes 85 weeks per country starting January 22, 2020 and ending September 10, 2021. The following countries are included: Canada, France, Germany, Japan, Spain, and the U.S. Stockout data are from Cavallo and Kryvtsov (2021), kindly shared by the authors. Robust standard errors are clustered on country.

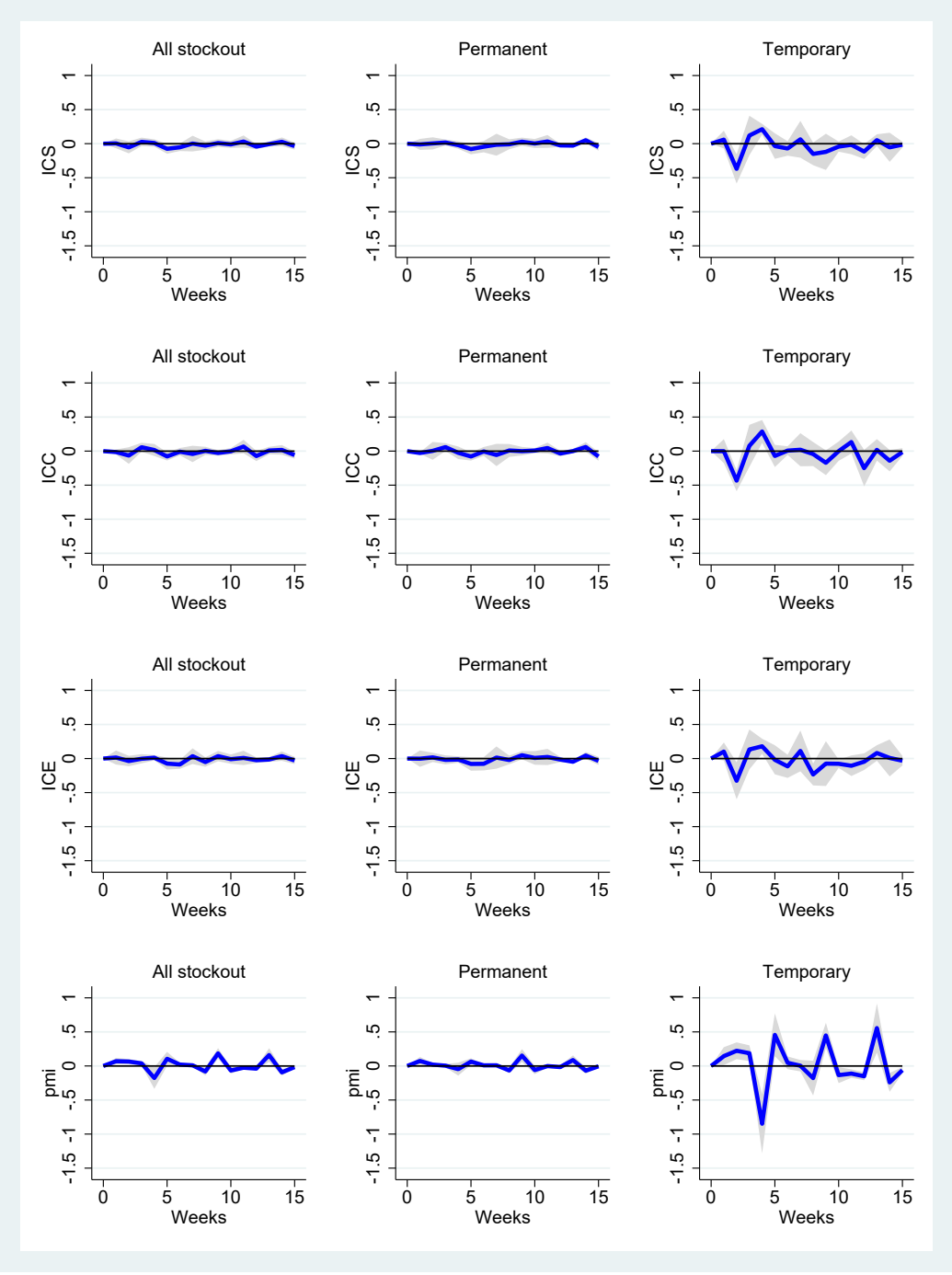


Figure A9: Effects of Fiscal Support on Inflation, controlling for stockouts (smaller sample)

Notes: Local projections regressions are estimated by OLS: $\pi_{it+s} = \alpha_i + \alpha_{tm} + \sum_{r=1}^{4} \beta_{\pi,r}\pi_{it-r} + \sum_{r=1}^{4} \beta_{F,r}\text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 20]$. Time period t is a week. All regression include country and monthly time fixed effects. Fiscal is a cumulative fiscal support overall, to consumers and to firms as a share of GDP. X includes trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. Additional control variable is all stockouts from Cavallo and Kryvtsov (2021), kindly shared by the authors. Unbalanced panel includes 77 (Japan) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: Canada, France, Germany, Japan, Spain, and the U.S.. Robust standard errors are clustered on country.

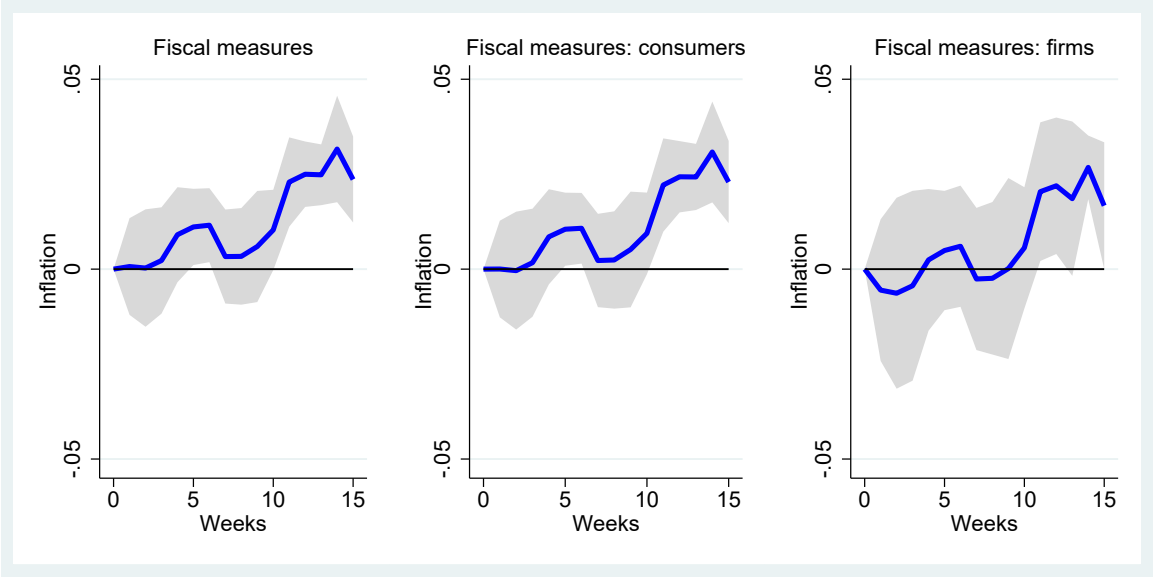


Figure A10: Effects of Fiscal Support on Core Inflation

Notes: Local projections regressions are estimated by OLS: $\pi^{Core}_{it+s} = \alpha_i + \alpha_{tm} + \sum_{r=1}^{4} \beta_{\pi,r}\pi_{it-r} + \sum_{r=1}^{4} \beta_{F,r}\text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 20]$. Time period t is a week. All regression include country and monthly time fixed effects. Fiscal is a cumulative fiscal support overall, to consumers and to firms as a share of GDP. X includes trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. Unbalanced panel includes 77 (Japan) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.. Robust standard errors are clustered on country.

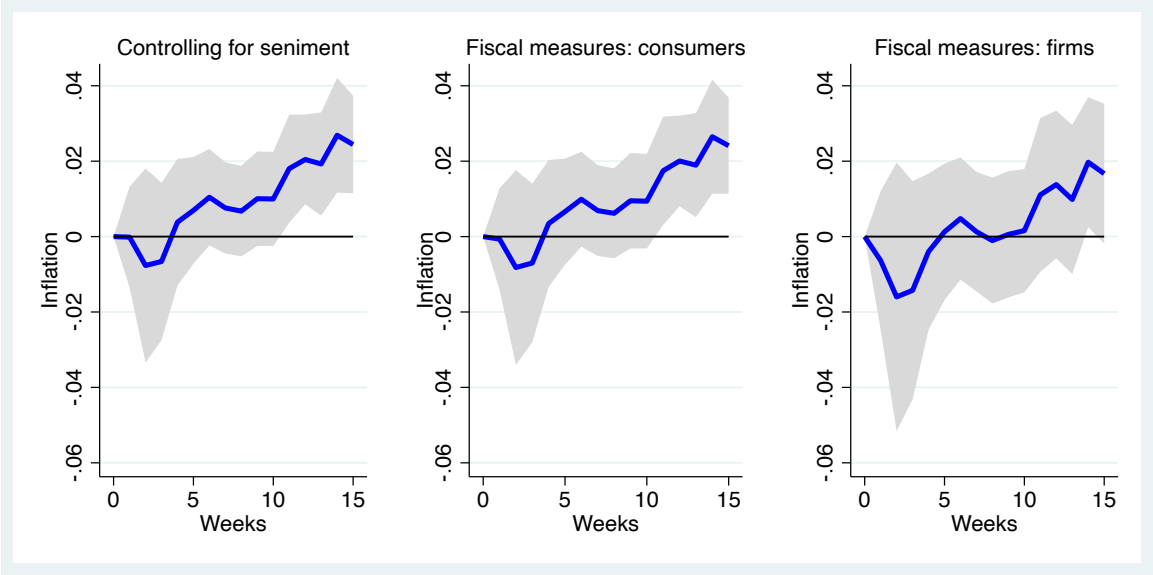


Figure A11: Effects of Sentiment on Industrial Production (IP)

Notes: Local projections regressions are estimated by OLS: $Y_{it+s} = \alpha_i + \sum_{r=1}^{4} \beta_{Y,r} Y_{it-r} + \sum_{r=1}^{4} \beta_{F,r} \text{Fiscal}_{it-r} + X'_{it}\gamma + \varepsilon_{it}, \quad s \in [0, 20]$. Y change in IP. Time period t is a week. All regression include country fixed effects Fiscal is a cumulative fiscal support overall, to consumers and to firms as a share of GDP. X includes trend, an indicator of year 2021, stringency index, and the number of COVID-related deaths per capita. All regression include country and time fixed effects. Unbalanced panel includes 77 (Australia, Brazil, Japan, Russia) or 82 weeks per country starting February 19, 2020 and ending September 10, 2021. The following countries are included: Australia, Brazil, Canada, France, Germany, Japan, Russia, Spain, U.K. and the U.S.. Robust standard errors are clustered on country.