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Demand-Supply imbalance during the COVID-19 pandemic: The role of fiscal policy*

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Abstract

To mitigate the health and economic fallout from the COVID-19 pandemic, governments worldwide engaged in massive fiscal support programs. We show that generous fiscal support contributed to an increase in the demand for consumption goods during the pandemic, but industrial production did not adjust quickly enough to meet the sharp increase in demand. This imbalance between supply and demand across countries led to high inflation. Our findings suggest a sizable role for fiscal policy in affecting price stability.

Keywords: Covid, Fiscal Policy, Inflation, Supply Chains.

JEL Classification: E2, E6, F4

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1 Introduction

In 1970, Milton Friedman famously said, "*Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output.*" The recent concurrence of a surge in inflation in many countries around the world and large fiscal stimulus provided in the face of the COVID-19 pandemic has renewed interest in analyzing the potential role of large fiscal spending as a driver of price increases.

There is a long line of literature about the relationship between monetary policy and fiscal policy, and the *unpleasant arithmetics* of government debt monetization. A distinction that has become central in that literature is between fiscal dominance and monetary dominance. Sims (2011) used the fiscal theory of the price level to remind us that when rational, forward-looking agents believe that newly issued nominal government debt is only partially backed by future taxes, debt issuance is inflationary. After a careful analysis of fiscal policy in the United States in the 1970s, he concludes that "*fiscal policy can be a primary transmission mechanism or a primary source for changes in the inflation rate.*" Given the large fiscal support implemented in the face of the COVID-19 pandemic, and associated large increase in public debt, a possible shift from monetary to fiscal dominance raises the risk of more persistent inflation (Goodhart and Pradhan (2021), Cochrane (2021)).

In this paper, we bypass the role of government debt and money creation and focus directly on the association between fiscal spending and aggregate demand.[1] We start by using cross-country data and estimating the impact of fiscal support on economic fluctuations during the pandemic. While the successive waves of the pandemic and associated changes in mobility were the main drivers of economic activity throughout 2020 and 2021, we argue that fiscal stimulus policies might have shaped the response of consumption and production to mobility changes. Indeed, we show that countries behaved differently to lockdowns and reopenings: Countries with a larger stimulus experienced a smaller consumption decrease when mobility went down, and a stronger rebound in periods of reopening. However, fiscal stimulus did not have any noticeable impact on industrial production. By stimulating demand without boosting supply, our results suggest that fiscal support contributed to increased excess demand pressures in good markets.

Motivated by this observation, and based on the premise that a fiscally induced imbal-

[1] We presented an earlier version of our analysis in de Soyres et al. (2022).

ance between demand and supply could lead to price tensions, we then move to examine the association between exposure to fiscal stimulus, both domestic and foreign, and excess inflation, defined as inflation in excess of the country-specific pre-pandemic average. Given the delay in transmission and the continued increase in inflation from early 2021 onward and across several waves of the virus, we focus on a cross-sectional analysis. Using data on trade in value added, we construct country-specific values of exposure to both domestic and foreign fiscal stimulus, where the latter is composed of two components: (i) a "vertical" component, defined as a trade-weighted average of other countries' stimulus measures, and (ii) a "horizontal" component capturing the exposure of each country's import partners to a third country's fiscal stimulus.[2]

We find that excess inflation is significantly correlated to each country's own domestic stimulus and to various exposures of foreign stimulus. A back-of-the-envelope calculation suggests that U.S. fiscal stimulus during the pandemic contributed to an increase in inflation of about 2.6 percentage points in the U.S., 2.3 percentage points in Canada, and 0.6 percentage points in the United Kingdom.

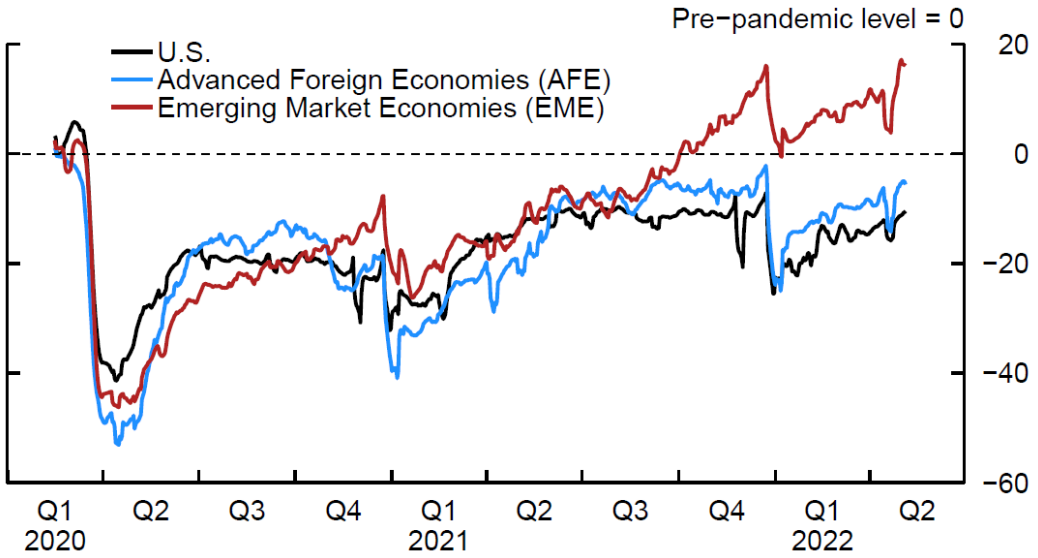
The rest of the paper is organized as follows. In section 2, we present some stylized facts about the COVID-19 pandemic and how it impacted economic activity around the world. Section 3 investigates the association between the size of total fiscal stimulus and the path of consumption and industrial production during the COVID-19 pandemic. We find that fiscal support during the pandemic was associated with a boost in goods consumption demand without any noticeable impact on the supply of goods, hence contributing to growing imbalances between supply and demand in the goods market. In section 4 we turn to the role of domestic and foreign factors on a country's inflation. Our results suggest that excess inflation is significantly correlated to each country's own domestic stimulus and to various exposures of foreign stimulus. Section 5 takes stock of the previous findings and highlights high-level risks to the inflation outlook in the next few quarters, and section 6 concludes.

[2]The analysis of global value chains in the transmission of inflation is related to many papers in recent years, including Auer et al. (2019), de Soyres and Franco Bedoya (2019), Baldwin and Freeman (2021) or Santacreu and LaBelle (2022).

2 The Covid Crisis and fiscal policy responses around the world

The COVID-19 pandemic gave rise to unprecedented global economic conditions. Due to a mix of government-imposed restrictions and voluntary personal decisions, mobility levels, as measured by Google's geo-location tracking data from smartphones, collapsed in March 2020. Since then, mobility has improved, albeit with some volatility that tracked closely the successive waves of the pandemic (see Figure 1).

Figure 1. Evolution of Mobility during the Pandemic

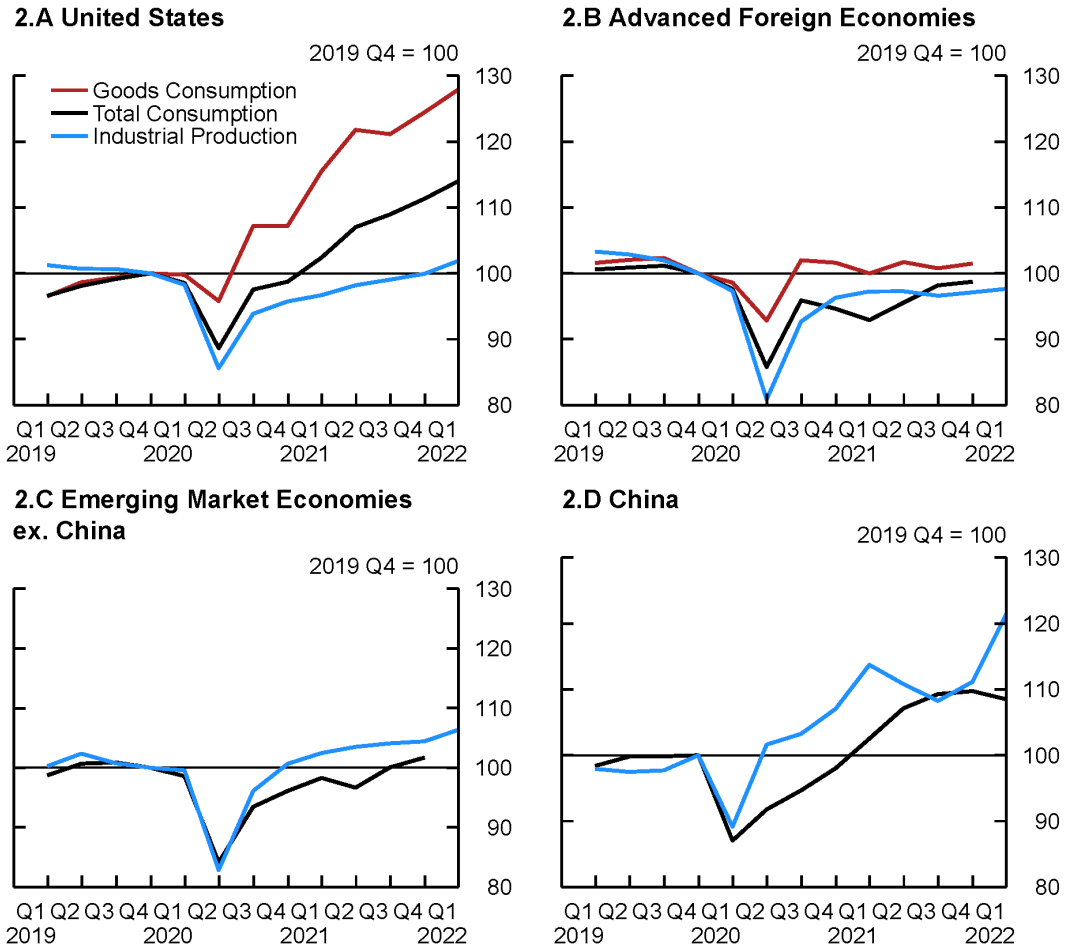


Note: Mobility is a simple average of Google's grocery, workplace, retail, recreation, and transportation mobility. Series are smoothed using a seven-day moving average, and aggregates are weighted by population. Aggregates are constructed using Federal Reserve Board country classifications. AFE comprise Canada, France, Germany, Italy, Japan, Spain, and the United Kingdom. EME comprise Argentina, Brazil, Chile, Colombia, Hong Kong, Korea, Indonesia, Malaysia, Philippines, Singapore, Taiwan and Thailand. Series end on May 5, 2022.
Source: Google Community Mobility Reports.

These changes in mobility affected both the supply and demand side of the economy, hampering firms' ability to produce, as well as consumers' ability to consume. On the supply side, government-imposed mobility restrictions and personal decisions from workers resulted in a dramatic decrease in the volume of production. On the demand side, public health restrictions and high uncertainty from both economic and health conditions contributed to a large decrease in total real consumption in the early part of the pandemic. Consumption of goods and services behaved very differently than in previous recessions (see Figure 2). In advanced economies, where the data allow us to analyze real consumption expenditures between goods and services separately, consumption of services fell dramatically and then started recovering slowly as containment policies eased and vaccines were made widely available. In contrast,

goods consumption fell by less during the beginning of the pandemic and experienced a strong recovery thereafter.[3] Industrial production, however, was slow to adjust, creating a discrepancy between supply and demand in goods' markets that likely played a role in the depletion of inventories and ultimately in recent price tensions.[4]

Figure 2. Real Consumption and Industrial Production during the Pandemic



Note: United States and China consumption series end in 2022 Q1, whereas Advanced Foreign Economies and Emerging Market Economies ex. China series end in in 2021 Q4. All industrial production series end in 2022 Q1 and are aggregated to the quarterly frequency by taking the respective average of the monthly values. Aggregates are constructed using real GDP weights. China consumption data are expressed in per capita terms. Total industrial production excluding construction series are used when possible, but some series use manufacturing industrial production instead due to data limitations. Goods consumption data are available only for the United States and Advanced Foreign Economies.
Source: Bureau of Economic Analysis; OECD National Quarterly Accounts; Haver Analytics.

In this paper, we mostly focus on the goods market to investigate the imbalance between

[3]See Santacreu and LaBelle (2022).

[4]Several aspects of this line of reasoning, including the role of semiconductors and the importance of supply-chain bottlenecks, have been documented in recent contributions, such as Amiti et al. (2021), Leibovici and Dunn (2021), Santacreu and LaBelle (2021a), Santacreu and LaBelle (2021b), Santacreu and LaBelle (2022)

consumption and production. In the service sector, anecdotal evidence suggests that the production of many services was heavily hampered throughout 2020 and up until today – in part due to the difficulty of finding workers in an environment of health uncertainty and limited daycare options. However, the absence of production data in the service sector precludes us from quantifying the aggregate mismatch between supply and demand.[5]

To mitigate the health and economic fallout of the pandemic, many governments engaged in massive fiscal support programs. Using the IMF's World Economic Outlook data for 52 advanced and emerging market economies, we define each country's fiscal stimulus during the pandemic as the percentage deviation between government spending and the country-specific pre-pandemic trend. This measure can be constructed for both 2020 and 2021 separately. As illustrated in Figure 3 (left panel), the cross-sectional correlation between 2020 and 2021 fiscal stimulus is high, which means that generous fiscal support in 2020 is also a good predictor of fiscal stimulus in 2021.

The right panel of Figure 3 uses the average of 2020 and 2021 values to illustrate the heterogeneity of fiscal support across countries.[6] Chile, the United Kingdom, the United States, Canada, and Japan are among the countries that displayed the most generous fiscal support. More precisely, in our sample, the average of 2020 and 2021 government spending was 9.45% above each country's pre-pandemic trend in advanced economies, while it was only 4.95% above trend in emerging market economies.

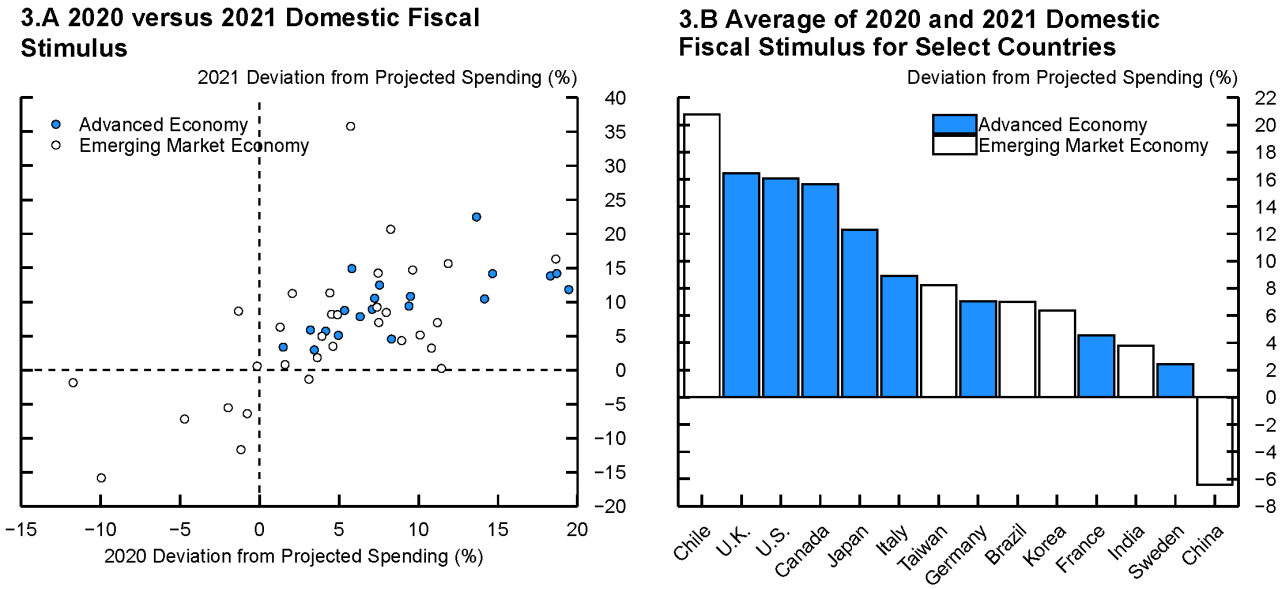
3 Fiscal Support, Consumption, and Production During Recovery Periods of the Pandemic

While the pandemic and associated restrictions were the main drivers of economic fluctuations over the past two years, fiscal stimulus policies might have shaped the response of consumption and production to lockdowns and consumer preferences, as reflected by changes in mobility. Here, we investigate the association between the size of total fiscal stimulus and the path of consumption and Industrial Production during the COVID-19 pandemic by evaluating (i) the elasticity of demand and supply to lockdowns and reopenings, as measured by

[5]Note that, according to the Bureau of Labor Statistics, service sectors are on average more labor intensive than good sectors, implying that labor shortages observed in several countries could have been exacerbated if demand for service consumption had grown at a faster rate.

[6]To be more precise: the WEO data have much larger country coverage, and we have estimates of Domestic Fiscal Stimulus for more than 100 countries. However, other data used below restrict our sample size, with coverage ranging from 23 to 52 countries depending on the analysis.

Figure 3. Pandemic Fiscal Support



Note: Deviation from Projected Spending is constructed by calculating the percent change between each government's fiscal spending in 2020 and 2021 against a projected value, respectively. The projected value is calculated by taking the average fiscal spending growth rate for 2015–2019 and forecasting out a year or two years, depending on the base year. Federal Reserve Board country classifications are used to group countries into Advanced Economy and Emerging Market Economy categories.
Source: IMF World Economic Outlook January 2022; Authors' calculations.

mobility movements, and (ii) the impact of fiscal stimulus on this elasticity.

3.1 Empirical Setup and Identification Strategy

We use cross-country data to investigate the effect of fiscal stimulus on consumption and on Industrial Production during the COVID-19 pandemic. Our conjecture is that fiscal stimulus supported the increase in consumption during periods of increased mobility but had only a limited impact on countries' supply as measured by Industrial Production. Our empirical strategy consists of projecting quarterly real consumption and production growth on changes in mobility in the same quarter, as well as on the interaction of these changes with country-specific fiscal stimulus. Our objective is to analyze how fiscal support affected country-level consumption and production in response to mobility fluctuations.

Our fiscal stimulus variable is constructed as discussed in Figure 3 and varies across countries and time. For all quarters of 2020, it takes into account government spending in excess of each country's pre-pandemic trend. For all quarters of 2021, the variable takes into account fiscal support provided in both 2020 and 2021. This choice allows us to consider, for

each country, the whole stimulus implemented throughout the first and second year of the pandemic, which we then relate to the way countries reacted to the different waves of the pandemic for both 2020 and 2021. As widely noted, the transmission from fiscal stimulus to household consumption can take some time (see Ramey (2011) or Ramey and Zubairy (2018) for an extensive discussion of the timing of transmission). As a result, 2020 fiscal support is likely to impact consumption decisions for both 2020 and 2021, which implies that one needs to take into consideration fiscal stimulus disbursed in 2020 for data in 2021.[7] We also note that this construction accounts for the slow unwinding of savings, which may be attributed to consumers spending significantly more once restrictions were relaxed in 2021 with the proliferation of vaccines.

To account for possible non-symmetric effects during periods of tightening or relaxation of public health restrictions, we split quarter-on-quarter mobility changes into two variables, separating positive and negative movements. As will be clear from our results below, such an asymmetric empirical specification is in line with the pattern observed in the data.[8] All told, our empirical model can be written as:

$$\begin{aligned} \text{Cons\_Growth}_{ct} \quad = \quad & \beta_1 \text{Mob\_Increase}_{ct} + \beta_2 \text{Mob\_Decrease}_{ct} \\ & + \beta_3 \text{Mob\_Increase}_{ct} \times \text{Fiscal\_Stim.}_{ct} + \beta_4 \text{Mob\_Decrease}_{ct} \times \text{Fiscal\_Stim.}_{ct} \\ & + FE_c + \varepsilon_{ct} \end{aligned} \tag{1}$$

In the above specification, β_1 and β_2 capture the impact of mobility changes on consumption growth for countries without fiscal stimulus. The interaction terms, whose effects are measured by β_3 and β_4 , capture how fiscal support changed the way consumption reacted to mobility movements. Recall that our fiscal stimulus variable is country-specific and time-invariant. Hence, our identification strategy relies on comparing the elasticity of consumption to mobility changes for countries with different levels of fiscal support: β_3 will be different from zero if fiscal stimulus modifies this elasticity during mobility decrease (i.e., lockdowns), and β_4 will be different from zero if fiscal stimulus modifies this elasticity during periods of mobility increase (i.e., reopenings).

In a separate set of regressions, we perform the same analysis using Industrial Production

[7] Note, however, that any fiscal stimulus implemented in 2021 cannot affect the elasticity of consumption to lockdowns in 2020. Hence, it would not make sense to use 2021 fiscal support for quarters in 2020 in our panel data set.

[8] We discuss this point more precisely and present the results of the symmetric case in Appendix B.1 Table 13.

growth as the dependent variable, which allows us to assess the effect of fiscal support on the country-level supply of goods. In our baseline specifications, we use country fixed effects to account for observable factors such as heterogeneous trend growth across countries. Our results are qualitatively similar with the addition of several fixed effects.

3.2 Baseline Consumption and Industrial Production Results

Our main results are presented in Table 1. We find that governments that provided generous fiscal support mitigated the drop in goods consumption in periods of mobility decrease, while they boosted consumption in periods of increased mobility. The effect of fiscal stimulus on services consumption, however, is insignificant. Finally, our results reveal that generous fiscal spending did not significantly contribute to supply expansion: Countries with larger fiscal support did not have a significantly different association between mobility and Industrial Production. In other words, supply did not adjust quickly enough to meet the sharp increase in demand for goods.

Looking at the first column in Table 1 reveals that a one standard deviation increase in fiscal stimulus, which is an increase of government spending of about 6.7% compared with the pre-pandemic trend, raises the responsiveness of total consumption to positive mobility movement by about 16 percent. More precisely, for countries without fiscal stimulus, consumption growth increased by 0.25 percentage points in response to a 1 percentage point increase in mobility. For countries with government spending 6.7% above their trend, this elasticity increased to 0.25+0.04 = 0.29 percentage points.

Separating goods and services consumption in columns 2 and 3, respectively, we note that the effect of fiscal stimulus on total consumption is entirely driven by goods consumption, where a one standard deviation increase in fiscal support is associated with a 26 percent surge in the link between consumption growth and mobility rebound (from 0.19 to 0.19+0.05=0.24), while it reduced the drop in goods consumption during periods of mobility decline by 13 percent (from -0.31 to -0.31+0.04=-0.27).

In a robustness exercise presented in appendix B, we use an alternative construction of our fiscal stimulus variable, which focuses on 2020 government spending only. The rationale for this exercise is that fiscal support in 2021 might have been disbursed late in that year and hence would not be relevant for understanding consumption behavior in most of the year. Such a time-invariant version of our fiscal stimulus variable for each country means that the identification of interaction terms relies on comparing countries with each other, assessing if

Table. 1. Consumption and IP's relationship with mobility movements, and country level's Fiscal Stimulus

	(1) Total Consumption	(2) Goods Consumption	(3) Service Consumption	(4) Industrial Production
Mob. Increase	0.25***	0.19***	0.32***	0.20*
	(0.04)	(0.03)	(0.06)	(0.12)
Mob. Decrease	-0.38***	-0.31***	-0.43***	-0.64**
	(0.04)	(0.05)	(0.06)	(0.26)
Mob. Increase ×	0.04*	0.05***	0.02	0.00
Domestic Fiscal Stimulus	(0.02)	(0.01)	(0.03)	(0.06)
Mob. Decrease ×	-0.01	0.04***	-0.05*	0.20
Domestic Fiscal Stimulus	(0.02)	(0.01)	(0.03)	(0.15)
Country FE	✓	✓	✓	✓
R^2	0.74	0.51	0.67	0.21
Observations	184	184	184	352
Number of Countries	23	23	23	44

Note: Left-hand-side variables and mobility variables are quarterly growth rates. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3, but for a given country in 2020, the value solely takes the 2020 deviation from projected fiscal spending. However, in 2021 the value is constructed by averaging the 2020 and 2021 values of deviation from projected spending. The variable is then standardized by dividing by the variable's standard deviation. The constant and standalone Domestic Fiscal Stimulus variables are omitted from the table for brevity. Data extend from 2020 Q1-2021Q4. Standard errors are clustered at the country level and shown in parentheses.
** p<0.01, ** p<0.05, * p<0.1

countries with large fiscal stimulus in 2020 were associated with different elasticity of consumption to mobility. Results show that, with this specification, all of our results are both qualitatively and quantitatively similar to those in Table 1.[9]

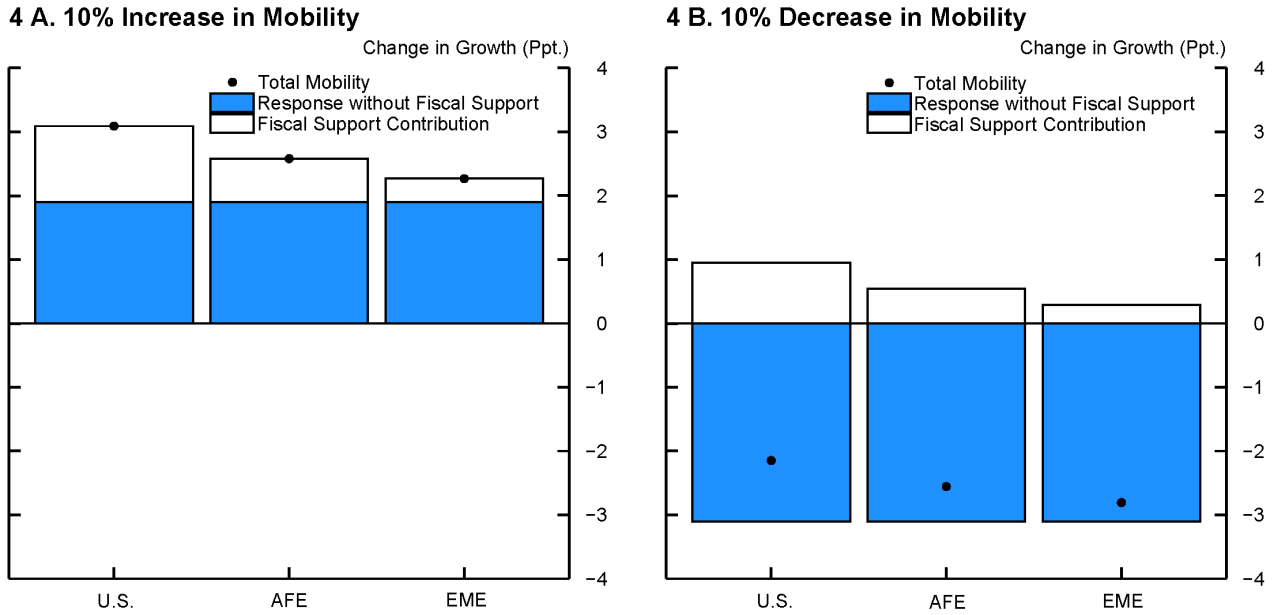
In summary, our results point to an asymmetric effect of fiscal spending on how consumption reacted to mobility changes. In periods of economic reopening and mobility rebound, fiscal support amplifies the increase in consumption. In periods of mobility decline, however, fiscal support helps households "soften the blow" of reduced activity, implying a smaller decline in consumption in countries with large fiscal stimulus. Hence, in these periods, fiscal support is expected to counterbalance the effect of mobility, and the interaction term has the

[9]This consistency is not surprising because the cross-sectional correlation between 2020 and 2021 fiscal stimulus is 0.63, which means that generous fiscal support in 2020 is also a good predictor of fiscal stimulus in 2021. On average in our sample of 52 countries, government spending was 6.19% above pre-pandemic trend in 2020, while it was 7.23% above of the trend in 2021.

opposite sign of the standalone mobility variable.

Using our point estimates and country-specific values of fiscal support, Figure 4 quantifies the role of fiscal support in shaping the response of goods consumption to fluctuations in mobility in several groups of countries. As expected, the United States is one of the countries where consumption behavior was the most impacted by fiscal stimulus during the pandemic, with consumption decreasing significantly less when mobility drops and rebounding significantly more when mobility increases.

Figure 4. Change in the Growth Rate of Goods Consumption in response to mobility changes



Note: The AFE aggregate comprise 19 countries and the EME aggregate comprise 32 countries. Countries are equally weighted within the aggregates. Countries are classified using Federal Reserve Board country classifications.
Source: Authors' calculations.

3.3 A Look at Employment Recovery

In order to further explore the finding that fiscal support did not increase the rebound in industrial production during periods of mobility increase, we extend our analysis to study the impact of fiscal stimulus on the labor market, using data on both employment and labor force participation. We first use employment data for 29 countries, separated between goods and services employment, and assess the effect of fiscal spending on employment growth

using a similar framework:

$$\begin{aligned} \text{Emp\_Growth}_{ct} &= \beta_1 \text{Mob\_Increase}_{ct} + \beta_2 \text{Mob\_Decrease}_{ct} \\ &+ \beta_3 \text{Mob\_Increase}_{ct} \times \text{Fiscal\_Stim.}_{ct} + \beta_4 \text{Mob\_Decrease}_{ct} \times \text{Fiscal\_Stim.}_{ct} \\ &+ FE_c + \varepsilon_{ct} \end{aligned} \tag{2}$$

The results are presented in the first three columns in Table 2. We find that employment was less sensitive to mobility than either consumption or Industrial Production. We also note a strong asymmetry in the sensitivity to mobility changes, with employment contracting strongly in periods of restrictions while only picking up modestly in periods of reopening. Related to our previous point, country-specific fiscal stimulus does not appear to have any significant impact on the relationship between employment and observed mobility, which is consistent with our previous observation that while fiscal stimulus boosted consumption, it had a limited impact on production.

In column 4, we also investigate how labor force participation (LFP) changed during the subsequent waves of the pandemic, and how this elasticity changed for countries with larger fiscal support. Consistent with previous observations, LFP decreased strongly during periods of lockdowns and recovered only modestly in periods of reopening. However, it is interesting to note that countries with larger fiscal stimulus experienced a smaller decline in LFP in periods of mobility decline, as revealed by the positive and significant coefficient for the interaction between mobility decrease and fiscal support. This result is especially interesting when compared to the insignificant effect of fiscal stimulus on the way employment reacted to mobility changes, as seen in columns 1 to 3. This contrast highlights that while government support did not significantly modify people's willingness or ability to work during the pandemic, it seems to have helped maintain workers in the labor force.

Overall, the sluggish employment recovery suggests lingering labor market constraints. Many possible explanations have been discussed in recent months, including childcare issues, health concerns, early retirement, great resignation, lower migration, etc.

3.4 From Supply and Demand Imbalance to Bottlenecks and Inflation

The previous section highlighted that fiscal support during the pandemic boosted goods consumption demand without any noticeable impact on the supply of goods. All told, the large

Table. 2. Employment's relationship with mobility movements, and country level's Fiscal Stimulus

	(1) Total Employment	(2) Goods Employment	(3) Service Employment	(4) Labor Force Participation
Mob. Increase	0.01	0.06	-0.02	0.03
	(0.02)	(0.06)	(0.03)	(0.04)
Mob. Decrease	-0.22***	-0.13***	-0.25***	-0.24***
	(0.06)	(0.06)	(0.08)	(0.06)
Mob. Increase ×	0.01	-0.04	0.03	0.00
Domestic Fiscal Stimulus	(0.02)	(0.04)	(0.02)	(0.02)
Mob. Decrease ×	0.06	0.00	0.08	0.06**
Domestic Fiscal Stimulus	(0.05)	(0.04)	(0.06)	(0.03)
Country FE	✓	✓	✓	✓
R^2	0.32	0.19	0.31	0.31
Observations	232	232	232	245
Number of Countries	29	29	29	31

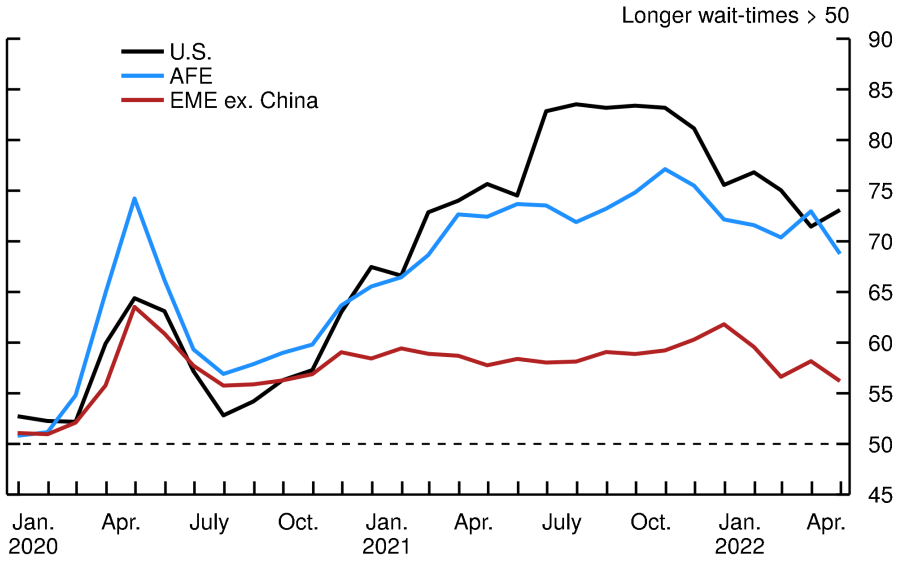
Note: Left-hand-side variables and mobility variables are quarterly growth rates. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3, but for a given country in 2020, the value solely takes the 2020 deviation from projected fiscal spending. However, in 2021, the value is constructed by averaging the 2020 and 2021 values of deviation from projected spending. The variable is then standardized by dividing by the variable's standard deviation. The constant and standalone Domestic Fiscal Stimulus variables are omitted from the table for brevity. Data extend from 2020 Q1-2021Q4. Standard errors are clustered at the country level and shown in parentheses.
** p<0.01, ** p<0.05, * p<0.1

increase in demand triggered by the fiscal stimulus policy, together with the slow pace of adjustment in production, likely contributed to the current imbalance in the goods market.

The timing of transmission from fiscal support to inflation is, however, uncertain. As aggregate demand was supported by government transfers, goods-producing firms first started to dig into inventories and increase orders to suppliers, both domestic and foreign. Such an increase in demand coupled with limited production and shipping capacity first led to "supply chain bottlenecks." As an illustration, the Supplier Delivery Time component of Manufacturing PMIs across 30 countries, plotted in Figure 5, shows the presence of supply chain delays across the world, especially in the United States and other advanced economies.[10]

[10]Purchasing Managers' Indices (PMIs) are indices of the prevailing direction of economic trends. They summarize whether market conditions, as viewed by purchasing managers, are expanding, staying the same, or contracting. In our analysis, we focus on the component related to supplier delivery times.

Figure 5. Supplier Delivery Times' component of PMIs



Note: Values larger than 50 denote longer supplier delivery times. AFE and EME ex. China aggregates are constructed using bilateral U.S. merchandise export weights. Data end in April 2022.
Source: S&P Global; Haver Analytics.

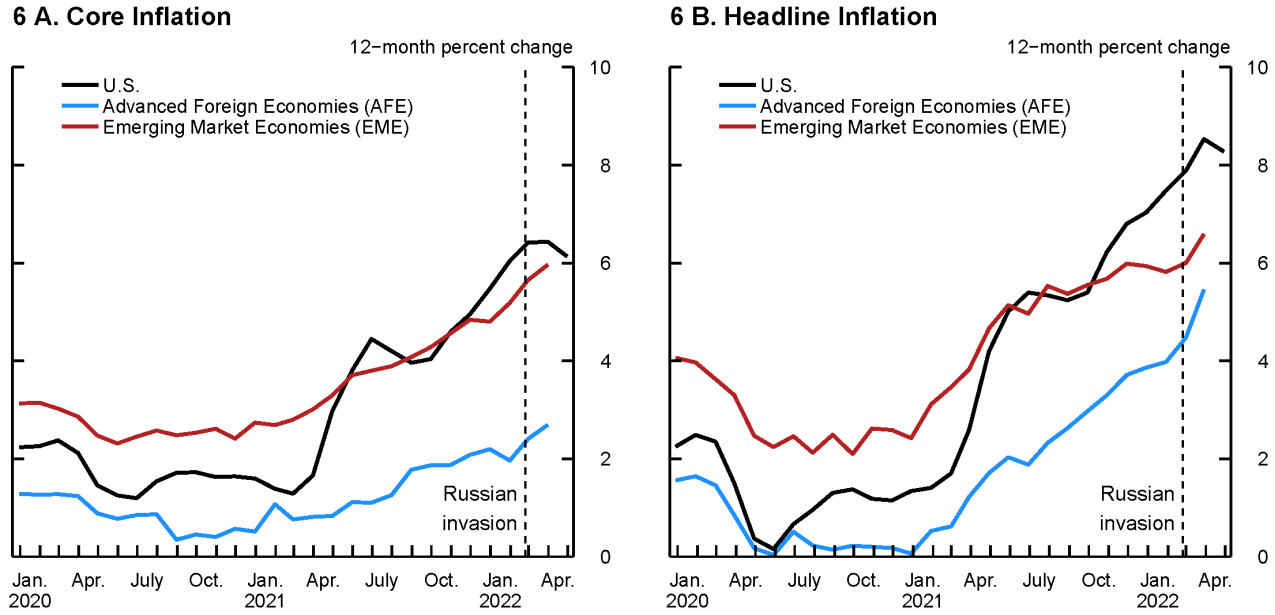
Ultimately, the surge in aggregate demand contributed to the surge in inflation, which we discuss in the next section. However, given the delay in transmission and the continued increase in inflation from early 2021 onward and across several waves of the virus, we focus on a cross-sectional analysis, instead of a within-country time variation. Indeed, while this section was devoted to quarter-on-quarter changes in mobility and how they impacted demand and supply in countries with different levels of fiscal support, our next section takes stock of the imbalance and investigates the "end result" of this process in terms of inflation, using data up until February 2022 (which, for reference, is prior to the invasion of Ukraine).

4 Fiscal Support and Inflation

As the pandemic disrupted the economy for longer than many expected, inflation started to display a strong upward trajectory. Figure 6 plots the evolution of both headline and core inflation during the pandemic. After an initial decrease in the midst of the first Covid-19 wave, both headline and core inflation increased steadily from the end of 2020 and throughout 2021. The first few months of data for 2022 reveal a continued surge, especially core inflation in advanced economies, which suggests a persistent imbalance between high aggregate demand and constrained aggregate supply. In our subsequent analysis, we focus on inflation data

up until the invasion of Ukraine (i.e., until February 2022), in order to avoid taking into account large movements in commodity prices that arose from the war and could have been a confounding factor in our analysis.

Figure 6. Evolution of Inflation during the Covid-19 pandemic



Note: The AFE and EME aggregates are weighted by U.S. bilateral import shares and comprise countries forecasted by the Federal Reserve Board. The U.S. series end in April, whereas AFE and EME aggregates end in March 2022.
Source: Haver Analytics.

As we have previously shown, countries with large fiscal support experienced substantial increases in consumption of goods. Moreover, the steep surge in goods consumption in those countries may have also created extra demand in other countries through an increase in demand for imports. This demand surge was met by limited supply capacity and bottlenecks. Indeed, while both production, transportation, and shipping capacity have adapted to increasing global value chain participation over the past few decades, the necessary infrastructure appeared to be quite inelastic in the short run.

We investigate the role of domestic and foreign factors on a country's inflation by conducting a cross-country regression analysis. For each country, we compute a measure of "excess inflation" by taking the February 2022 12-month inflation rate and subtracting the average rate of inflation each country experienced during 2015-2019. We then construct several measures of exposure to domestic and foreign fiscal stimulus and project excess inflation on such measures.

First, Domestic Fiscal Stimulus captures each country's fiscal support, as discussed in Section 2. Second, Total Exposure to Foreign Fiscal Stimulus measures a country's exposure to foreign stimulus and contains two parts: (i) a "vertical" component, defined as a trade-weighted average of other countries' stimulus measures, and (ii) a "horizontal" component capturing the exposure of each country's import partners to a third country's fiscal stimulus. Intuitively, the United States can be exposed to fiscal stimulus from Canada, both through a high import share (i.e, imported inflation) and through a high export share (i.e., higher demand from Canada). This captures vertical foreign exposure. Moreover, the price of Canada's exports to the United States may be pushed up by Canada's exposure to Mexico's fiscal stimulus. This captures horizontal foreign exposure.

In practice, we use value-added trade data from OECD's TiVA database, which allows us to account for both direct and indirect linkages through global value chains. We are focusing on 2018 values, which is the latest available year. For any country c, the mathematical definition of our foreign exposure variables can be written as

$$\text{Vertical Exp. to Foreign Stim.}_c = \sum_{j \in Partners(c)} \frac{T_{c \to j} + T_{j \to c}}{GDP_c} \text{ Fiscal Stim.}_j \tag{3}$$

$$\text{Horizontal Exp. to Foreign Stim.}_c = \sum_{j \in Partners(c)} \sum_{k \in Partners(j) - c} \frac{T_{j \to k} + T_{k \to j}}{GDP_c} \text{ Fiscal Stim.}_k \tag{4}$$

Where $T_{c \to j}$ denotes the value-added trade flow from country c to country j. Partners (c) is the set of all trade partners of country c. In the definition of *Horizontal Exposure to Foreign Stimulus*, note that the second summation is done over all trade partners except the country c. In contrast to the panel analysis presented in Section 3, we use cross-country regressions since the timing of transmission from fiscal stimulus to surge in aggregate demand and ultimately to inflation is uncertain. Indeed, fiscal support in any given quarter likely supported consumers' demand both contemporaneously and in the following quarters, with the total effect of fiscal support accumulating throughout the period where fiscal spending remains above trend. Indeed, households savings increased sharply during the pandemic and remained above its pre-pandemic level by mid-2022.

Our identification is not without limitations and our results should be viewed as illustrative, highlighting perhaps the higher end of potential price pressures from fiscal stimulus during the pandemic. We discuss some of these limitations in sections 4.3 to 4.5.

4.1 Baseline Inflation Results

Our main results are presented in Table 3. We find that excess inflation is significantly correlated to each country's own domestic stimulus and to various exposures to foreign stimulus. Both vertical and horizontal exposure to foreign stimulus appear to be significantly correlated with domestic excess inflation, regardless of whether they are taken separately or each used in conjunction with domestic fiscal stimulus, as can be seen in columns 2 to 4. When taking all variables into account, as in column 6, only horizontal exposure remains statistically significant. We interpret this finding with caution, since vertical and horizontal exposure variables are highly correlated. Finally, column 7 shows that excess inflation is also strongly related to our Total Exposure variable.

Table. 3. Fiscal Stimulus and Inflation, the role of both domestic and foreign forces

	(1) Excess Headline Inflation	(2) Excess Headline Inflation	(3) Excess Headline Inflation	(4) Excess Headline Inflation	(5) Excess Headline Inflation	(6) Excess Headline Inflation	(7) Excess Headline Inflation
Domestic Fiscal Stimulus	1.30***			1.12***	1.05***	1.06***	1.09***
	(0.37)			(0.33)	(0.35)	(0.35)	(0.33)
Vertical Exposure to Foreign Stimulus		1.49***		1.34***		0.11	
		(0.44)		(0.43)		(0.60)	
Horizontal Exposure to Foreign Stimulus			1.69***		1.52***	1.42**	
			(0.42)		(0.37)	(0.61)	
Total Exposure to Foreign Stimulus							1.44***
							(0.41)
R^2	0.19	0.25	0.32	0.39	0.44	0.45	0.42
Observations	52	52	52	52	52	52	52

Note: Excess Headline Inflation is computed by subtracting February 2022 12-month inflation from its 2015-2019 average. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3, but it takes the average of 2020 and 2021 deviations from projected fiscal spending. The variable is then standardized by dividing by the variable's standard deviation. Vertical Exposure to Foreign Stimulus is the standardized weighted average of Domestic Fiscal Stimulus of a country's trading partners, and Horizontal Exposure to Foreign Stimulus is the standardized weighted average of Vertical Fiscal Stimulus of a country's trading partners. Total Exposure to Foreign Stimulus is the standardized sum of Vertical and Horizontal Exposure. The constant is omitted from the table for brevity. Robust standard errors are in parentheses.
** $p<0.01$, ** $p<0.05$, * $p<0.1$

4.2 Back-of-the-Envelope Calculation: Quantifying the Impact of Fiscal Stimulus on Inflation

In order to give a more practical interpretation of our findings, we use our point estimates to compute country-specific values for the contribution of fiscal stimulus to inflation, as shown in Figure 7. The left panel (Figure 7.A) presents the impact of domestic and foreign exposure on excess inflation for several regions, based on our regression.[11] The impact of domestic fiscal stimulus on inflation is highest in the United States and in Chile. Canada, a country with strong trade links with the U.S., features a high level of excess inflation related to exposure to foreign fiscal stimulus. In large economies with limited openness to international trade, such as the United States, domestic stimulus is a more important driver of excess inflation that foreign stimulus. However, more open countries, or countries that used limited fiscal stimulus during the pandemic, are relatively more impacted by exposure to foreign fiscal stimulus. In our sample, domestic stimulus is associated with 2.6 percentage points (pp) in excess inflation in the United States and 1.1 pp in Germany.

In the right panel (Figure 7.B), we dig deeper into foreign exposure and derive a measure of "international spillover" of U.S. fiscal stimulus. In particular, we isolate the share of U.S. stimulus in foreign exposure for several countries and compute the associated excess inflation in those countries. Our estimation implies that U.S. fiscal stimulus was associated with excess inflation of about 2.3 pp in Canada and 0.6 pp in the United Kingdom. For reference, we present the inflation impact of exposure to domestic and foreign fiscal stimulus for all countries in the appendix.

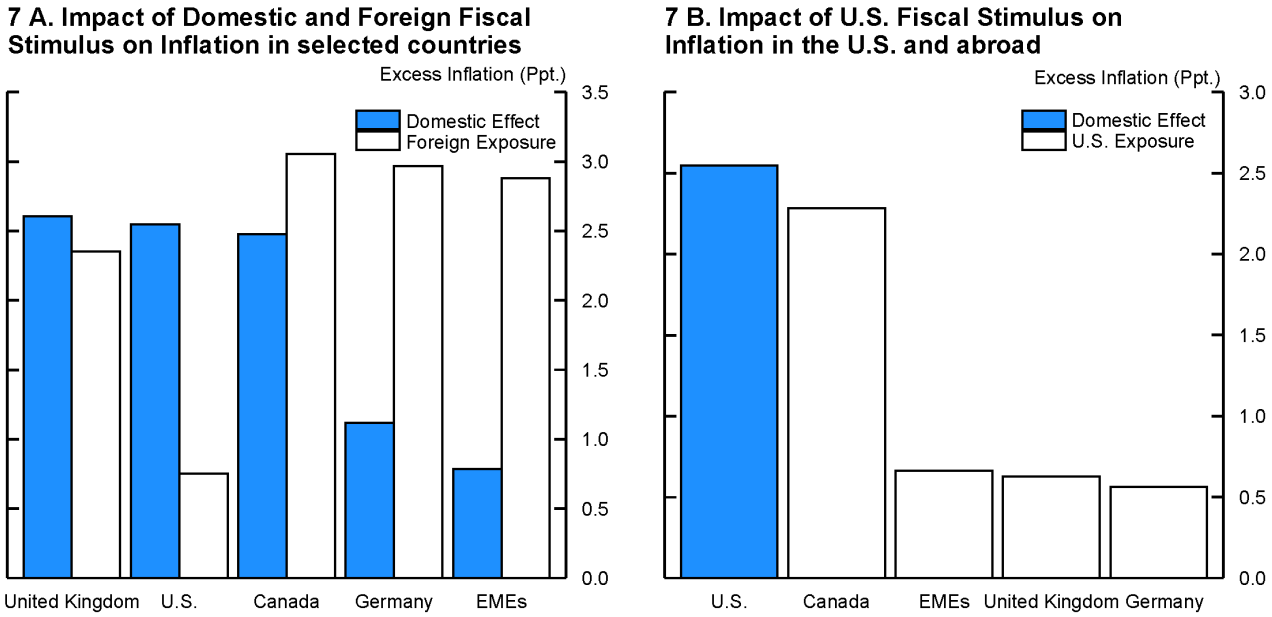
4.3 Robustness: Addressing the omitted variables bias

The estimation relies on the association between excess inflation and exposure to domestic and foreign fiscal stimulus, but it might be the case that countries that engaged in larger fiscal support are also those that have been the worst hit by the pandemic. In such a case, and if the severity of the pandemic is itself positively correlated with excess inflation over and beyond the effect of fiscal support, our results would suffer from an omitted variable bias. Moreover, the bias would be positive because our fiscal stimulus variable would capture both the direct effect of the pandemic and the effect of the fiscal spending. We now address these concerns.

To address this issue, we construct several measures of the "severity" of the pandemic for

[11] For this chart and the table in the appendix, we use the point estimates from Table 4, column 7.

Figure 7. Fiscal Stimulus and Excess Inflation



Note: The Euro area comprise France, Germany, Italy, and Spain. EMEs comprise 32 countries using Federal Reserve Board country classifications. Countries are equally weighted within the aggregates.
Source: Authors' calculations.

each country using different approaches and use them as controls in our main specification. First, we use Industrial Production movements as an indicator of the supply-side impact of the health restrictions and compute, for each country, the sum of all negative growth rates as a proxy for the average strength of production reduction for each country. Since our data are quarterly, we take the sum of all quarters when Industrial Production had negative growth. Moreover, because the "severity" of the pandemic is a multidimensional object, we also experiment with total Industrial Production growth as a measure of production restrictions.

Second, we take a broader view of pandemic-related restrictions and use mobility movements as an indicator of the severity of health restrictions. Here again, we construct two possible measures of severity, first taking the sum of all negative growth rates for each country, and then constructing total growth.

Table 4 presents our results, showing all possible combinations of our controls. Comparing the first column, which simply restates our results in Table 3, to all other specifications in columns 2 to 7, we see that our results are very robust and all point toward a strong association between excess inflation and exposure to both domestic and foreign fiscal stimulus.

Table. 4. Fiscal Stimulus and Inflation, controlling for the severity of the pandemic

	(1) Excess Headline Inflation	(2) Excess Headline Inflation	(3) Excess Headline Inflation	(4) Excess Headline Inflation	(5) Excess Headline Inflation	(6) Excess Headline Inflation	(7) Excess Headline Inflation
Domestic Fiscal Stimulus	1.09*** (0.33)	1.18*** (0.39)	0.98*** (0.36)	0.90* (0.47)	1.22*** (0.39)	1.01*** (0.35)	1.07** (0.43)
Total Exposure to Foreign Stimulus	1.44*** (0.41)	1.28*** (0.41)	1.38*** (0.43)	1.12*** (0.41)	1.29*** (0.41)	1.49*** (0.47)	1.29*** (0.45)
Controls							
Sum of Negative Growth							
IP		✓		✓			
Mobility			✓	✓			
Total Growth							
IP					✓		✓
Mobility						✓	✓
R^2	0.42	0.42	0.39	0.39	0.42	0.40	0.37
Observations	52	46	49	44	46	49	44

Note: Excess Headline Inflation is computed by subtracting February 2022 12-month inflation from its 2015-2019 average. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3, but it takes the average of 2020 and 2021 deviations from projected fiscal spending. The variable is then standardized by dividing by the variable's standard deviation. Vertical Exposure to Foreign Stimulus is the standardized weighted average of Domestic Fiscal Stimulus of a country's trading partners, and Horizontal Exposure to Foreign Stimulus is the standardized weighted average of Vertical Fiscal Stimulus of a country's trading partners. Total Exposure to Foreign Stimulus is the standardized sum of Vertical and Horizontal Exposure. The constant and control variables are omitted from the table for brevity. Robust standard errors are in parentheses.
** p<0.01, ** p<0.05, * p<0.1

4.4 Robustness: Core Inflation

An additional concern regarding our analysis could be that headline inflation is more driven by volatile items such as food and energy, which are less affected by country-specific fiscal stimulus and whose prices are fixed at the world level. In such a case, inflation could be driven everywhere by the total world's stimulus and would not be particularly related to exposure through international trade linkages. To address this issue, we also perform an analysis using core inflation instead of headline inflation. Our results are presented in Table 5.

Moreover, similar to the robustness analysis with headline inflation, we also present the

Table. 5. Fiscal Stimulus and Core Inflation, the role of both domestic and foreign forces

	(1) Excess Core Inflation	(2) Excess Core Inflation	(3) Excess Core Inflation	(4) Excess Core Inflation	(5) Excess Core Inflation	(6) Excess Core Inflation	(7) Excess Core Inflation
Domestic Fiscal Stimulus	0.96***			0.79***	0.76**	0.76**	0.77**
	(0.30)			(0.29)	(0.30)	(0.31)	(0.30)
Vertical Exposure to Foreign Stimulus		0.97***		0.84**		0.10	
		(0.33)		(0.33)		(0.59)	
Horizontal Exposure to Foreign Stimulus			1.09***		0.96***	0.87	
			(0.32)		(0.29)	(0.59)	
Total Exposure to Foreign Stimulus							0.90***
							(0.32)
R^2	0.17	0.22	0.27	0.33	0.37	0.37	0.35
Observations	42	42	42	42	42	42	42

Note: Excess Core Inflation is computed by subtracting February 2022 12-month core inflation from its 2015-2019 average. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3, but it takes the average of 2020 and 2021 deviations from projected fiscal spending. The variable is then standardized by dividing by the variable's standard deviation. Vertical Exposure to Foreign Stimulus is the standardized weighted average of Domestic Fiscal Stimulus of a country's trading partners, and Horizontal Exposure to Foreign Stimulus is the standardized weighted average of Vertical Fiscal Stimulus of a country's trading partners. Total Exposure to Foreign Stimulus is the standardized sum of Vertical and Horizontal Exposure. The constant is omitted from the table for brevity. Robust standard errors are in parentheses.
** p<0.01, ** p<0.05, * p<0.1

results of our estimation using varying set of controls, as presented in Table 6. Our main message remains unchanged: In all specifications, we find that core inflation is strongly associated with exposure to both domestic and foreign fiscal stimulus.

4.5 Other Robustness Tests

Finally, we also perform robustness on the definition of our "Fiscal Stimulus" variable. In the baseline results, a country's fiscal stimulus is constructed using both 2020 and 2021 government spending in excess of each country-specific trend. Such a choice ensures consistency with our panel regressions in section 3. However, given the high savings rate in many advanced economies throughout 2021, one could argue that excess inflation as of February 2022 would be mostly related to the 2020 fiscal stimulus and not related to government spending in 2021. To address this concern, we ran all our specifications using a Fiscal Stimulus variable based on the fiscal stimulus in 2020 only. All results are unchanged, which is not surprising

Table. 6. Fiscal Stimulus and Core Inflation, the role of both domestic and foreign forces with controls

	(1) Excess Core Inflation	(2) Excess Core Inflation	(3) Excess Core Inflation	(4) Excess Core Inflation	(5) Excess Core Inflation	(6) Excess Core Inflation	(7) Excess Core Inflation
Domestic Fiscal Stimulus	0.77**	0.76**	0.75**	0.73*	0.75**	0.79**	0.74**
	(0.30)	(0.31)	(0.33)	(0.38)	(0.32)	(0.32)	(0.35)
Total Exposure to Foreign Stimulus	0.90***	0.84**	0.92***	0.84**	0.83**	0.95***	0.87**
	(0.32)	(0.32)	(0.31)	(0.32)	(0.32)	(0.35)	(0.36)
Controls							
Sum of Negative Growth							
IP		✓		✓			
Mobility			✓	✓			
Total Growth							
IP					✓		✓
Mobility						✓	✓
R^2	0.35	0.34	0.32	0.30	0.34	0.36	0.32
Observations	42	39	41	38	39	41	38

Note: Excess Core Inflation is computed by subtracting February 2022 12-month core inflation from its 2015-2019 average. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3, but it takes the average of 2020 and 2021 deviations from projected fiscal spending. The variable is then standardized by dividing by the variable's standard deviation. Vertical Exposure to Foreign Stimulus is the standardized weighted average of Domestic Fiscal Stimulus of a country's trading partners, and Horizontal Exposure to Foreign Stimulus is the standardized weighted average of Vertical Fiscal Stimulus of a country's trading partners. Total Exposure to Foreign Stimulus is the standardized sum of Vertical and Horizontal Exposure. The constant and control variables are omitted from the table for brevity. Robust standard errors are in parentheses.
** p<0.01, ** p<0.05, * p<0.1

given the high correlation between 2020 and 2021 fiscal support.

We also experimented with alternative constructions for the left-hand-side variable in these sets of regressions. Instead of expressing excess inflation as of February 2022, which is our preferred definition, as it avoids considering the effect of the Russian invasion of Ukraine, we constructed a country-specific average of 2022 inflation using data up until either March or April (depending on each country's available data) from which we subtracted the average pre-pandemic inflation rate. Using this definition of excess inflation, we find that the results are robust and qualitatively similar to those in Tables 3 and 4.

All told, despite the robustness tests described above, our analysis could suffer from other

biases. For example, an positive bias could arise in our estimate if there is a positive correlation between fiscal and monetary policy support across our sample countries. In such a case, our fiscal stimulus variable would capture the effect of both fiscal and monetary policy on inflation, and hence should be interpreted as an upper bound of the effect of fiscal stimulus. Future work on this topic would gain from addressing such concerns.

5 The Outlook Ahead: Risks Could Come From Services

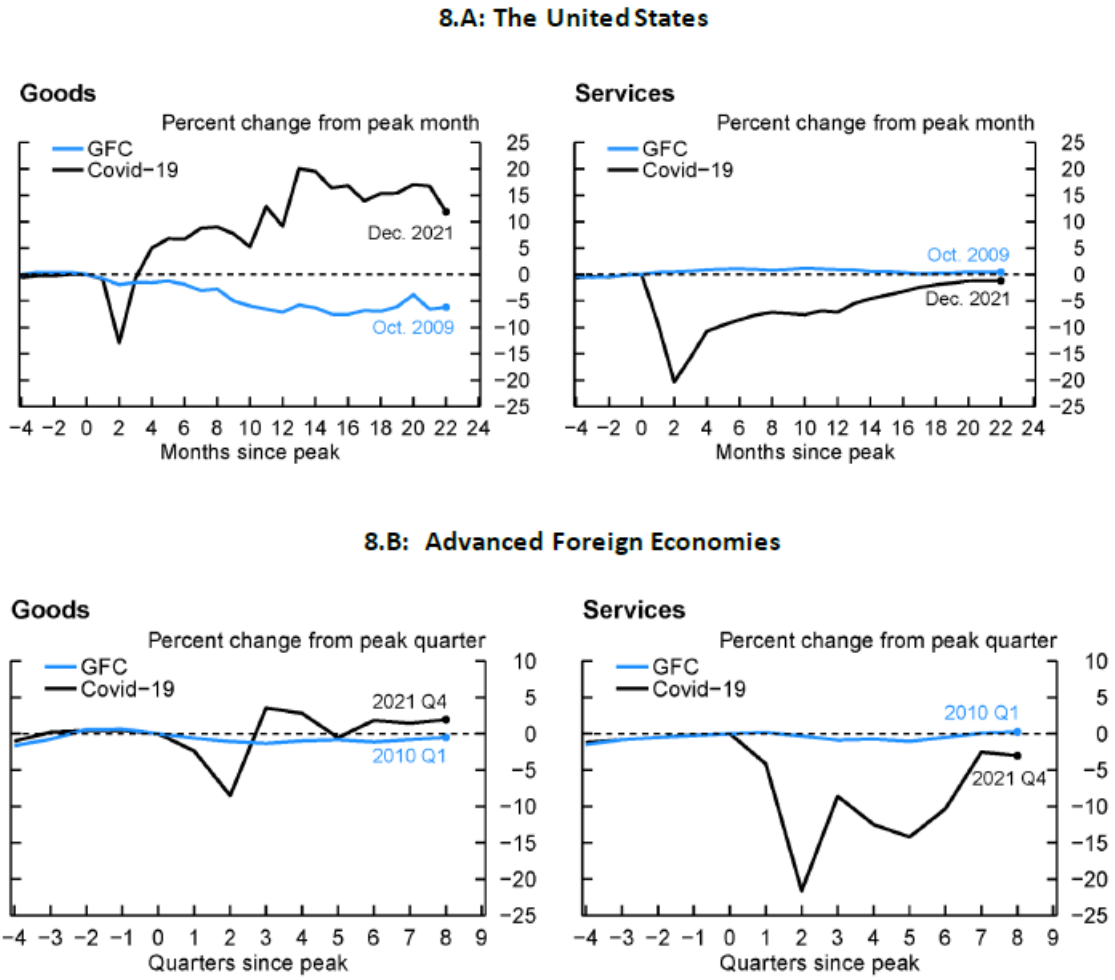
The large swings in goods demand, coupled with limited production and shipping capacity in many countries, gave rise to bottlenecks and ultimately put pressure on goods inflation. Looking at previous recessions, Figure 8 reveals how different the behavior of consumption during the pandemic was from previous recessions. Given data constraints, we focus on the United States (Figure 8.A) and other advanced economies (Figure 8.B). In both cases, it is very clear that services consumption took a very heavy hit throughout the pandemic, while goods consumption decreased only modestly in the midst of the first wave before rebounding extremely strongly and remaining above trend since then.

All told, rebalancing of consumption was slower in the United States compared with most other advanced economies. While this movement could ease some tensions in the goods market, it also comes with notable risks.

The service sector is more labor-intensive than the goods sector. Indeed, as shown in Figure 9, employment intensity in the service sector, as measured by the employment to output ratio, is more than twice as in the goods sector. Therefore, rebalancing toward services will likely increase labor demand. Given the current tightness in advanced-economy labor markets, increasing labor demand is likely to put pressure on wages and, at the extreme, could create a risk of a wage-price spiral.

That said, wage pressures are currently moderate, and total hours worked are still below their 2019 level, suggesting that labor supply has some room for improvement. Assuming rebalancing is driven by a reduction in fear related to the pandemic, it could be accompanied by further easing of labor supply constraints. Ultimately, the impact of rebalancing on inflation will depend in part on how fast labor supply adjusts to meet higher demand in the labor market. Should the adjustment be too slow, inflation could remain high for longer.

Figure 8. Real Consumption of Goods and Services in the US and other AFEs in recent recessions



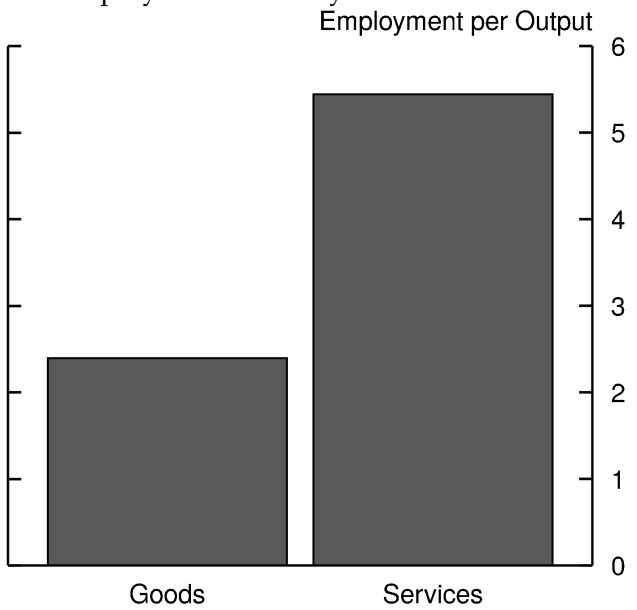
Note: The AFE aggregate is constructed using GDP weights and includes the U.K., France, Germany, and Canada.
Source: Bureau of Economic Analysis; Haver Analytics; C.D. Howe Institute Business Cycle Council; Euro Area Business Cycle Network.

6 Conclusion

The COVID-19 pandemic was a very peculiar economic shock, affecting both firms' ability to produce and consumers' ability to consume, as has been widely noted. In response to this shock, most governments in advanced economies injected large amounts of money into the economy. This policy was successful at boosting consumption, which, together with a relatively inelastic supply, may have led to price tensions. This analysis suggests a potentially sizable role that fiscal policy may have played in contributing to upward price pressures.[12]

[12] In a recent new book, Kehoe and Nicolini (2021) also argue that many countries in Latin America have been experiencing this link between fiscal spending and inflation over the past six decades. Their lesson is that good

Figure 9. Employment Intensity in Goods and Services



Note: Employment Intensity is constructed by dividing 2020 employment (thousands) by 2020 output (billions of chained 2021 dollars). Aggregates are constructed using industry output as weights. The goods aggregate comprise mining, construction, manufacturing, and utilities, while the services aggregate comprise all other non-agricultural and non-government sectors.
Source: Bureau of Labor Statistics.

One caveat to our analysis is that, if the size of fiscal and monetary stimulus was positively correlated across countries, our fiscal stimulus variable could capture some of the effect of monetary policy as well, and hence should be interpreted as an upper bound of the effect of fiscal stimulus.

Finally, one should also recognize the positive role played by generous government support throughout this unprecedented crisis. The large spending supported a strong economic rebound, with both GDP and employment recovering at a remarkable pace, likely preventing worse outcomes despite the price pressures that may have resulted from the spending.

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A Full Country-Specific Results

The table presents our estimate of how fiscal stimulus impacted inflation in all countries. It is based on our point estimates in Table 4, column 7, as well as on country-specific values for the exposure to domestic and foreign fiscal stimulus.

Figure 10. Full country-specific results

Country	Domestic Effect	Foreign Effect
Chile	3.29	2.14
Greece	2.86	2.67
Lithuania	2.77	4.49
United Kingdom	2.61	2.35
United States	2.55	0.75
Canada	2.48	3.05
Slovakia	2.29	4.70
Ireland	2.28	6.61
Slovenia	2.18	4.40
Japan	1.95	1.16
Peru	1.93	1.77
Russia	1.72	1.85
Netherlands	1.64	3.94
Austria	1.61	3.92
Denmark	1.59	3.33
Spain	1.49	2.61
Poland	1.44	3.66
Italy	1.41	2.51
Czech Republic	1.32	4.24
Taiwan	1.30	2.51
Portugal	1.27	3.40
Thailand	1.25	2.62
Kazakhstan	1.21	2.55
Hungary	1.15	4.66
Belgium	1.12	4.73
Germany	1.12	2.97

Country	Domestic Effect	Foreign Effect
Brazil	1.11	1.10
Latvia	1.06	4.47
Israel	1.05	2.32
Croatia	1.03	3.77
Luxembourg	1.02	7.00
Korea	1.01	2.00
Vietnam	0.93	2.70
Iceland	0.80	3.90
Finland	0.78	3.00
France	0.72	2.63
Indonesia	0.70	1.17
Estonia	0.64	4.49
India	0.60	1.39
Bulgaria	0.58	4.08
Norway	0.51	3.71
Romania	0.43	3.22
Sweden	0.39	3.53
South Africa	0.19	1.54
Tunisia	0.14	3.13
Mexico	0.03	3.49
Saudi Arabia	-0.57	2.51
Philippines	-0.59	2.33
Malaysia	-0.94	2.75
China	-1.02	1.54
Colombia	-1.08	1.76
Costa Rica	-2.04	2.83

B Alternative Specifications

B.1 Further discussion of our asymmetric specification

In light of our results, we now provide more discussion of our main specification in (1), which take an asymmetric view and separate positive and negative mobility movements. To bet-

ter understand the value of our asymmetric specification, let us consider what a symmetric/linear model would imply. Consider the following empirical model:

$$\text{Cons\_Growth}_{ct} = \beta_1 \text{Mobility}_{ct} + \beta_2 \text{Mobility}_{ct} \times \text{Fiscal\_Stim.}_{ct} + FE_c + \varepsilon_{ct} \tag{5}$$

For the sake of the argument: what would it mean if one estimates (5) and finds a positive value for β_2? In such a case, countries with large fiscal stimulus would be expected to have larger elasticity of consumption with respect to mobility. In other words: when mobility goes up, consumption is expected to increase more in countries with large fiscal stimulus. Importantly, the symmetric effect would also true: when mobility goes down, consumption is expected to decrease more in countries with large fiscal support – which is a mechanical consequence of using a linear/symmetric model. In this case, fiscal stimulus always amplifies the effect of mobility.

Overall, in a linear/symmetric regression model, if the "stand-alone" term for mobility (β_1) and the interaction between mobility and fiscal stimulus (β_2) have the same sign, then fiscal stimulus amplifies the effect of mobility regardless of the direction of the move. If β_1 and β_2 have opposite signs, then fiscal stimulus dampens the effect of mobility on consumption. In either case, the effect is symmetric, by construction.

Note that such symmetry is at odds with our above investigation: as we show in Table 1, the stand-alone and interaction terms have the same sign when mobility goes up (implying that consumption goes up with mobility, and it does more so for countries with large fiscal stimulus), whereas the stand-alone and interaction terms have opposite signs when mobility goes down (implying that consumption goes down when mobility decreases, but it does less so for countries with large fiscal stimulus).[13]

Taken together, our results in Table 1 suggest that a linear/symmetric specification as in equation (5) is not appropriate. Indeed, in our sample, such a linear/symmetric model yields weak and unstable results, as can be seen in Table 7, which is simply the mechanical consequence of the asymmetry we uncover in Table 1: in periods of lockdowns, fiscal stimulus dampened the drop in consumption, while in reopening fiscal stimulus amplified the consumption rebound.

[13]Recall that, in our asymmetric model, both mobility increase and mobility decrease variables only take positive values. This enables us to have "intuitive" coefficients in the stand-alone terms: a positive coefficient associated with mobility increase, and a negative coefficient associated with mobility decrease.

Table. 7. Robustness test: Consumption and IP's relationship with mobility movements, and country level's Fiscal Stimulus
Alternative specification: no asymmetry.

	(1) Total Consumption	(2) Goods Consumption	(3) Service Consumption	(4) Industrial Production
Mobility	0.31***	0.25***	0.36***	0.39***
	(0.02)	(0.02)	(0.02)	(0.07)
Mobility × Fiscal Stimulus	0.02***	0.01	0.03***	-0.09**
	(0.01)	(0.01)	(0.01)	(0.04)
Country FE	✓	✓	✓	✓
R^2	0.73	0.60	0.66	0.20
Observations	184	184	184	352
Number of Countries	23	23	23	44

Note: Left-hand-side variables and mobility variables are quarterly growth rates. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3, but for a given country in 2020, the value solely takes the 2020 deviation from projected fiscal spending. However, in 2021 the value is constructed by averaging the 2020 and 2021 values of deviation from projected spending. The variable is then standardized by dividing by the variable's standard deviation. The constant and standalone Domestic Fiscal Stimulus variables are omitted from the table for brevity. Data extend from 2020 Q1-2021Q4. Standard errors are clustered at the country level and shown in parentheses.
** $p<0.01$, ** $p<0.05$, * $p<0.1$

B.2 Alternative Fiscal Stimulus definition

In this section, we revisit all estimations presented in the main text but investigate the case where our fiscal stimulus variable is constructed using 2020 fiscal stimulus only. Results show that all our findings hold when using such a definition.

Table. 8. Robustness test: Consumption and IP's relationship with mobility movements, and country level's Fiscal Stimulus

Alternative definition of Fiscal Stimulus: based on 2020 government spending only.

	(1) Total Consumption	(2) Goods Consumption	(3) Service Consumption	(4) Industrial Production
Mob. Increase	0.25***	0.19***	0.31**	0.18
	(0.03)	(0.03)	(0.05)	(0.11)
Mob. Decrease	-0.37***	-0.29***	-0.44***	-0.61**
	(0.03)	(0.04)	(0.05)	(0.26)
Mob. Increase × Fiscal Stimulus	0.04**	0.06**	0.03	0.02
	(0.02)	(0.01)	(0.03)	(0.06)
Mob. Decrease × Fiscal Stimulus	-0.01	0.04***	-0.05*	0.19
	(0.01)	(0.01)	(0.03)	(0.14)
Country FE	✓	✓	✓	✓
R^2	0.73	0.59	0.67	0.18
Observations	184	184	184	352
Number of Countries	23	23	23	44

Note: Left-hand-side variables and mobility variables are quarterly growth rates. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3, but for a given country, the value solely takes the 2020 deviations from projected fiscal spending. The variable is then standardized by dividing by the variable's standard deviation. The constant is omitted from the table for brevity and the standalone Domestic Fiscal Stimulus variable is absorbed by country fixed-effects since it is time invariant. Data extend from 2020 Q1-2021Q4. Standard errors are clustered at the country level and shown are in parentheses.

** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table. 9. Robustness test: Employment's relationship with mobility movements, and country level's Fiscal Stimulus

Alternative definition of Fiscal Stimulus: based on 2020 government spending only.

	(1) Total Employment	(2) Goods Employment	(3) Service Employment	(4) Labor Force Participation
Mob. Increase	0.01	0.06	0.00	0.02
	(0.02)	(0.05)	(0.03)	(0.04)
Mob. Decrease	-0.21***	-0.12***	-0.24***	-0.24**
	(0.07)	(0.06)	(0.09)	(0.05)
Mob. Increase × Fiscal Stimulus	0.00	-0.04	0.02	0.01
	(0.01)	(0.04)	(0.02)	(0.02)
Mob. Decrease × Fiscal Stimulus	0.05	0.00	0.07	0.06**
	(0.05)	(0.03)	(0.07)	(0.03)
Country FE	✓	✓	✓	✓
R^2	0.35	0.17	0.34	0.30
Observations	232	232	232	245
Number of Countries	29	29	29	31

Note: Left-hand-side variables and mobility variables are quarterly growth rates. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3, but for a given country, the value solely takes the 2020 deviation from projected fiscal spending. The variable is then standardized by dividing by the variable's standard deviation. The constant is omitted from the table for brevity and the standalone Domestic Fiscal Stimulus variable is omitted due to using country fixed-effects since the variable is now based on 2020 government spending only. Data extend from 2020 Q1-2021Q4. Standard errors are clustered at the country level and shown in parentheses.

** p<0.01, ** p<0.05, * p<0.1

Table. 10. Robustness test: Fiscal Stimulus and Inflation
Alternative definition of Fiscal Stimulus: based on 2020 government spending only.

	(1) Excess Headline Inflation	(2) Excess Headline Inflation	(3) Excess Headline Inflation	(4) Excess Headline Inflation	(5) Excess Headline Inflation	(6) Excess Headline Inflation	(7) Excess Headline Inflation
Domestic Fiscal Stimulus	0.92**			0.84**	0.78**	0.78**	0.81**
	(0.40)			(0.38)	(0.34)	(0.34)	(0.36)
Vertical Exposure to Foreign Stimulus		1.11***		1.05***		-0.46	
		(0.39)		(0.38)		(0.56)	
Horizontal Exposure to Foreign Stimulus			1.61***		1.54***	1.90***	
			(0.35)		(0.34)	(0.56)	
Total Exposure to Foreign Stimulus							1.26***
							(0.36)
R^2	0.10	0.14	0.29	0.22	0.36	0.37	0.27
Observations	52	52	52	52	52	52	52

Note: Excess Headline Inflation is computed by subtracting February 2022 12-month inflation from its 2015-2019 average. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3 but, for a given country, takes the 2020 deviation from projected fiscal spending. The variable is then standardized by dividing by the variable's standard deviation. Vertical Exposure to Foreign Stimulus is the standardized weighted average of Domestic Fiscal Stimulus of a country's trading partners, and Horizontal Exposure to Foreign Stimulus is the standardized weighted average of Vertical Fiscal Stimulus of a country's trading partners. Total Exposure to Foreign Stimulus is the standardized sum of Vertical and Horizontal Exposure. The constant is omitted from the table for brevity. Robust standard errors are in parentheses.
** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table. 11. Robustness test: Fiscal Stimulus and Inflation, with controls
Alternative definition of Fiscal Stimulus: based on 2020 government spending only.

	(1) Excess Headline Inflation	(2) Excess Headline Inflation	(3) Excess Headline Inflation	(4) Excess Headline Inflation	(5) Excess Headline Inflation	(6) Excess Headline Inflation	(7) Excess Headline Inflation
Domestic Fiscal Stimulus	0.81**	0.85**	0.72*	0.67*	0.90**	0.82**	0.82*
	(0.36)	(0.39)	(0.37)	(0.39)	(0.39)	(0.38)	(0.41)
Total Exposure to Foreign Stimulus	1.26***	1.11***	1.12***	0.85**	1.13***	1.29***	1.08***
	(0.36)	(0.36)	(0.38)	(0.37)	(0.36)	(0.38)	(0.38)
Controls							
Sum of Negative Growth							
IP		✓		✓			
Mobility			✓	✓			
Total Growth							
IP					✓		✓
Mobility						✓	✓
R^2	0.27	0.30	0.26	0.31	0.29	0.27	0.25
Observations	52	46	49	44	46	49	44

Note: Excess Headline Inflation is computed by subtracting February 2022 12-month inflation from its 2015-2019 average. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3 but, for a given country, takes the 2020 deviation from projected fiscal spending. The variable is then standardized by dividing by the variable's standard deviation. Vertical Exposure to Foreign Stimulus is the standardized weighted average of Domestic Fiscal Stimulus of a country's trading partners, and Horizontal Exposure to Foreign Stimulus is the standardized weighted average of Vertical Fiscal Stimulus of a country's trading partners. Total Exposure to Foreign Stimulus is the standardized sum of Vertical and Horizontal Exposure. The constant and controls are omitted from the table for brevity. Robust standard errors are in parentheses.
** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table. 12. Robustness test: Fiscal Stimulus and Core Inflation
Alternative definition of Fiscal Stimulus: based on 2020 government spending only.

	(1) Excess Core Inflation	(2) Excess Core Inflation	(3) Excess Core Inflation	(4) Excess Core Inflation	(5) Excess Core Inflation	(6) Excess Core Inflation	(7) Excess Core Inflation
Domestic Fiscal Stimulus	0.75*** (0.34)			0.66** (0.32)	0.63** (0.30)	0.65** (0.31)	0.65** (0.32)
Vertical Exposure to Foreign Stimulus		0.72** (0.30)		0.64** (0.29)		-0.28 (0.46)	
Horizontal Exposure to Foreign Stimulus			1.01*** (0.29)		0.94*** (0.28)	1.17** (0.47)	
Total Exposure to Foreign Stimulus							0.76** (0.30)
R^2	0.11	0.12	0.23	0.24	0.31	0.32	0.25
Observations	42	42	42	42	42	42	42

Note: Excess Core Inflation is computed by subtracting February 2022 12-month core inflation from its 2015-2019 average. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3 but, for a given country, takes the 2020 deviation from projected fiscal spending. The variable is then standardized by dividing by the variable's standard deviation. Vertical Exposure to Foreign Stimulus is the standardized weighted average of Domestic Fiscal Stimulus of a country's trading partners, and Horizontal Exposure to Foreign Stimulus is the standardized weighted average of Vertical Fiscal Stimulus of a country's trading partners. Total Exposure to Foreign Stimulus is the standardized sum of Vertical and Horizontal Exposure. The constant is omitted from the table for brevity. Robust standard errors are in parentheses.
** p<0.01, ** p<0.05, * p<0.1

Table. 13. Robustness test: Fiscal Stimulus and Core Inflation, with controls
Alternative definition of Fiscal Stimulus: based on 2020 government spending only.

	(1) Excess Core Inflation	(2) Excess Core Inflation	(3) Excess Core Inflation	(4) Excess Core Inflation	(5) Excess Core Inflation	(6) Excess Core Inflation	(7) Excess Core Inflation
Domestic Fiscal Stimulus	0.65**	0.67**	0.61*	0.62*	0.68**	0.79**	0.74**
	(0.32)	(0.33)	(0.33)	(0.34)	(0.32)	(0.33)	(0.35)
Total Exposure to Foreign Stimulus	0.76**	0.70**	0.72**	0.62*	0.70**	0.81***	0.73**
	(0.30)	(0.29)	(0.31)	(0.32)	(0.29)	(0.29)	(0.31)
Controls							
Sum of Negative Growth							
IP		✓		✓			
Mobility			✓	✓			
Total Growth							
IP					✓		✓
Mobility						✓	✓
R^2	0.25	0.26	0.26	0.23	0.26	0.29	0.25
Observations	42	39	41	38	39	41	38

Note: Excess Core Inflation is computed by subtracting February 2022 12-month core inflation from its 2015-2019 average. Domestic Fiscal Stimulus is constructed using a similar definition of deviation from projected spending shown in Figure 3 but, for a given country, takes the 2020 deviation from projected fiscal spending. The variable is then standardized by dividing by the variable's standard deviation. Vertical Exposure to Foreign Stimulus is the standardized weighted average of Domestic Fiscal Stimulus of a country's trading partners, and Horizontal Exposure to Foreign Stimulus is the standardized weighted average of Vertical Fiscal Stimulus of a country's trading partners. Total Exposure to Foreign Stimulus is the standardized sum of Vertical and Horizontal Exposure. The constant and controls are omitted from the table for brevity. Robust standard errors are in parentheses.
** $p<0.01$, ** $p<0.05$, * $p<0.1$