Government Stimulus and Inflation: Fiscal Policy During the COVID-19 Pandemic

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Abstract

This thesis investigates the link between fiscal stimulus provided in response to the COVID-19 pandemic and inflation. Using a two-pronged analytical approach, this study measures both the direct connection between stimulus and inflation, primarily through the aggregate demand channel, and examines how fiscal stimulus affected consumption patterns during lockdowns. The findings suggest a positive association between fiscal spending and inflation, particularly in relation to wage support. This research highlights the significant role of fiscal policy in explaining the inflation differentials observed in 2021, with wage support notably contributing to excess inflation levels. Additionally, the analysis shows how fiscal stimulus amplified the lockdown effects on consumption and saving, playing a crucial role in the subsequent release of pent-up demand. By analyzing cross-country data from 53 developed countries, this study offers a comprehensive understanding of the multifaceted nature of inflationary pressures following the pandemic lockdowns, emphasizing the critical influence of fiscal policy on macroeconomic stability.

Keywords: fiscal stimulus, inflation, consumption, COVID-19

JEL: E2, E6, F4

1 Introduction

In response to the global COVID-19 pandemic, governments worldwide implemented some of the largest fiscal stimulus measures in modern history. As lockdowns gripped economies, policymakers responded quickly and decisively, enacting large support measures for households and businesses. While these fiscal interventions stabilized economies, consumer prices began to rise steadily from early 2021, following a decade of structurally low levels, and reached heights in many countries not seen since the 1970s. By mid-2022, US inflation had risen to 9.1%, with the Eurozone experiencing double-digit inflation rates by the end of the year. The considerable differences in the level and timing of inflation across countries highlight the potential role of fiscal policy in explaining these variations. While various other factors have contributed to this inflation surge, the substantial stimulus measures stand out as particularly noteworthy (Binici et al., 2022).

In this thesis, I investigate the link between fiscal stimulus provided in response to the COVID-19 pandemic, in this study spanning the time period 2020Q1-2021Q2, and inflation. I employ a two-pronged analytical approach, measuring both the direct link between stimulus and inflation, primarily through the aggregate demand channel, and how fiscal stimulus affected consumption patterns during lockdowns. The findings suggest a positive association between fiscal spending and inflation, particularly for wage support. The results indicate a significant role for fiscal policy in explaining inflation differentials in 2021, with wage support notably contributing to excess inflation levels. Furthermore, the analysis shows how fiscal stimulus amplified the lockdown effects on consumption and saving, which played an important role in the subsequent release of pent-up demand. In a panel data setting, fiscal stimulus also appears to amplify changes in consumption patterns during and after lockdowns, stimulating consumption, especially of durable goods. The interaction effect of lockdowns and fiscal spending appears to significantly alters these patterns. The analysis combines cross-country data from 53 mostly developed countries on fiscal stimulus provided from March 2020 to June 2021 and excess inflation levels in the subsequent period of 2021.

Fiscal policy decisions have long been shown to affect price levels, particularly when there is a risk of a shift from monetary to fiscal dominance, where fiscal stimulus acts as a driver of aggregate demand (Cevik and Miryugin, 2023; Cochrane, 2023; Leeper, 1991). Given the titanic-sized fiscal support packages during the COVID-19 pandemic, it is important to examine the role these stimuli played in fueling the subsequent inflation burst. Of particular importance is the role of direct stimulus involving cash transfers or other means of direct support to disposable income (Parker et al., 2013; Coenen et al., 2012)). Wage support and cash handouts were significant components of state support packages, directly supporting household incomes. Thus, the literature indicates a strong link between fiscal stimulus and post-pandemic inflation. Additionally, other factors have been identified as

contributing to post-pandemic inflation, including supply chain disruptions, commodity price shocks, and labor market constraints (Del Negro et al., 2022); Comin, Johnson, and Jones, 2023). These elements, alongside fiscal policy, highlight the multifaceted nature of inflationary pressures following the pandemic lockdowns.

The COVID-19 lockdowns offer a unique context for the operation of fiscal policy. Given the extensive fiscal stimulus and the dynamic interplay of demand factors, this study extends the main analysis to explore how fiscal stimulus amplified changes in consumption. With consumers unable to spend on services and many non-durable goods, the demand for durable goods rose sharply in response to the easing of lockdowns. This framework builds on the work by De Soyres, Santacreu, and Young (2023), who highlighted how fiscal stimulus stimulated consumption patterns, resulting in more severe shortages and increased inflation. They demonstrated that substantial fiscal support programs boosted demand for consumption goods without a corresponding rise in industrial production, leading to higher inflation. I test this role of fiscal stimulus, showing how stimulus interacting with lockdowns amplified consumption patterns. During the COVID-19 pandemic, the global economy encountered unprecedented disruptions, necessitating novel economic responses and presenting unique challenges.

he impact of policy interventions during this period is relatively unexplored and warrants careful examination. This research differentiates between domestic fiscal stimulus provided by a nation's government and foreign fiscal policy imported through trade linkages. This distinction is critical for understanding the interaction between various sources of fiscal stimulus and their influence on domestic economic conditions and inflationary pressures. The findings of this study indicate that the magnitude and timing of domestic fiscal stimulus significantly influence inflation dynamics. By analyzing the differential effects of various fiscal measures, such as cash transfers, wage support, and tax cuts, this research offers a nuanced understanding of how these instruments affect aggregate demand and price levels. This detailed analysis is crucial for policymakers seeking to design effective fiscal policies that stabilize the economy without causing excessive inflation. Additionally, by demonstrating how fiscal policy can amplify consumption, this study shows that stimulus during periods of supply restrictions can exacerbate inflationary pressures. These findings collectively underscore the risks associated with excessive fiscal support, highlighting the potential for such measures to induce inflation when they are not necessary.

Furthermore, my research contributes to the existing academic literature by dissecting the specific types of fiscal policy and their potentially varied effects. The results of my analysis reveal a relatively strong association between higher levels of fiscal spending and increased inflation early on, but these effects tend to dissipate over time as other factors, such as energy prices, become the primary underlying drivers of inflation. This is in line with recent work by Di Giovanni et al., 2023, Gourinchas et

al., 2021, and Di Giovanni et al., 2023. Furthermore, this study highlights how fiscal policy can amplify consumption shifts during periods of constrained supply and output. This temporal aspect of inflationary impact underscores the importance of considering both short-term and long-term effects of fiscal policies.

The remainder of this thesis is organized as follows. In Section 2, I discuss the academic background on the effects of fiscal policy on the economy, particularly inflation, and how this leads to the predictions tested in the analysis. Section 3 provides a detailed discussion of the methodology and data, particularly the construction of the fiscal policy variable using a newly-constructed IMF database. In Section 4, the results of the analysis are presented and discussed, followed by a final section that concludes.

2 Literature review

The review of academic literature encompasses three primary areas of focus: the general impact of fiscal policy on inflation, the effects of various types of economic stimulus and their pass-through effects on inflation, and the literature concerning the causes of global inflationary trends following the COVID-19 pandemic. Together, these establish the foundation of this thesis and provide a key direction for the expectation tested in the analysis.

The literature search incorporates three main sources. First, access to the Erasmus University (EUR) digital library database enables the review of a wide range of journals. Second, Google Scholar supplements the core selection from the EUR database. Third, especially important for more recent work, publications from policy institutions such as the European Central Bank (ECB), the US Federal Reserve (FED), and the International Monetary Fund (IMF) are used as additional sources. The search terms include various combinations of 'fiscal policy,' 'stimulus,' 'spending,' 'government response,' 'inflation,' 'price level,' 'COVID-19,' 'consumption,' and 'shocks.' This search approach yields a substantial body of relevant studies, which are further elaborated upon in the following sections. A summary of the key literature linking fiscal policy and inflation, the main topic of interest in this thesis, can also be found in table 1.

2.1 The role of discretionary fiscal policy in shaping inflation

Fiscal policy can be defined as the use of government spending and taxation policies to influence economic conditions. As a critical component of aggregate demand, government finances play an important role in shaping macroeconomic outcomes, and as such also inflation. Consequently, the effects of fiscal policy on inflation have been a central theme in economic literature. Broadly, two primary

directions exist in fiscal-based theories of inflation. The first, more common in the context of developing countries, posits that fiscal stimulus leads to inflation through inflation-inducing seigniorage revenue. This refers to the profit made by the government from issuing currency, particularly when the face value of money exceeds the production costs. Such intertwining between monetary and fiscal authorities has been attributed as the main culprit in inflation-basket cases like the hyperinflation during the Weimar republic and more recent infamous cases like Zimbabwe and Argentina (Brunnermeier et al., 2023; Maute, 2018; McIndoe-Calder et al., 2019). Central bank independence and other checks and balances prevent this mechanism from taking place directly in most of the developed world and is not a primary concern during the COVID-19 period. Therefore, the second direction of the direct impact of government spending via the aggregate demand channel, is the primary focus of the examined literature. A rich body of work explores the dynamics of inflation and its relationship with fiscal policy, often in conjunction with other macroeconomic variables such as deficits, money supply, external balance, and interest rates.

Early theoretical views on inflation posited that it is solely determined by money supply growth, without a significant role for fiscal policy in the longer run. Friedman (1970) famously asserted that "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," thereby excluding fiscal policy from the inflation equation. This doctrine was widely accepted throughout much of the second half of the 20th century. However, this perspective has been challenged by the fiscal theory of the price level, which posits that an unsustainable fiscal policy stance can induce higher inflation as the price level adjusts to ensure fiscal solvency (Cochrane, 2023; Leeper, 1991; Sims, 1994). According to this theory, as perceived real wealth increases, consumption rises, leading to higher prices. If the present value of future primary surpluses falls below the outstanding nominal debt, prices must rise to maintain the sustainability of current and future debt obligations. In New Keynesian theory, increased employment boosts aggregate demand, prompting further output increase until capacity constraints cause inflation (Blinder, 1987; Gordon, 1990; Michau, 2020). This contrasts with cost-push inflation that occurs when the cost of goods and services increases. The New Keynesian models further show that discretionary fiscal policy can effectively stabilize short-run macroeconomic conditions, including inflationary periods (Eggertsson, Mehrotra, and Robbins, 2019; Michau, 2020). Successful fiscal policy intervention necessitates reducing the oversupply of savings through tax increases, thereby raising the natural interest rate. Michau (2020) similarly demonstrates that escaping a period of secular stagnation requires a temporary increase in government spending to de-anchor inflation levels. Theoretical model-based results also indicate that conventional fiscal policy interventions are substantially more influential under constrained monetary policy (Christiano, Eichenbaum, and Rebelo, 2011; Erceg and Lindé,

2013). This is particularly relevant in scenarios involving lower bound effects and when countries share a common currency, as observed within the Eurozone.

As aggregate demand is the theoretical transmission channel through which fiscal policy impacts inflation, we can further derive the theoretical mechanism behind this. Fiscal spending (G) increases, leading to a rise in aggregate demand (AD). Aggregate demand is given by:

$$AD = C + I + G + (X - M) \tag{1}$$

where C represents consumption, I represents investment, G is government spending, X denotes exports, and M denotes imports. An increase in government spending ($G \uparrow$) results in an increase in aggregate demand ($AD \uparrow$). As aggregate demand increases, it leads to higher resource utilization. Output (Y) is a function of capital (K) and labor (L), represented by:

$$Y = F(K, L) \tag{2}$$

With the increase in aggregate demand, there is pressure to increase production. However, due to supply constraints, output (Y) cannot increase proportionately, resulting in higher resource utilization (Olivier Blanchard and Sheen, 2013). Higher resource utilization then leads to demand-pull inflation. The inflation rate (π) is a function of output (Y) and the rate of resource utilization (U):

$$\pi = f(Y, U) \tag{3}$$

When aggregate demand increases, it often results in demand-pull inflation because higher demand for goods and services in the economy pushes prices up, especially if the economy is near or at full employment. Businesses respond to increased demand by raising prices, leading to higher inflation. If the economy is producing below its potential output, increased fiscal spending can lead to higher production without significant inflation. However, if the economy is at or near its potential output, further increases in demand primarily result in higher prices rather than increased output (Galí, 2015). Thus, as aggregate demand increases ($AD \uparrow$), resource utilization ($U \uparrow$) rises, leading to an increase in inflation ($\pi \uparrow$), further exacerbated under supply constraints. This sequence can be summarized:

$$G \uparrow \rightarrow AD \uparrow \rightarrow U \uparrow \rightarrow \pi \uparrow$$

The empirical examination that has investigated this theory has been extensive and is largely confirming the impact of the aggregate demand channel. A substantial part of this empirical literature has focused on the multiplier effect of fiscal policy on macroeconomic variables such as GDP, con-

sumption, wages, and inflation. In measuring such effects of government spending, two main empirical approaches can be distinguished: Vector Autoregression (VAR) analysis and the Ramey-Shapiro narrative approach (Ramey, 2011). One of the most influential works utilizing the VAR approach to estimate fiscal shocks is by Olivier Blanchard and Perotti (2002). In their analysis they find that a positive government spending shock has a positive effect on output while positive tax shocks have a negative effect. Furthermore, this shows as a response to the spending shock consumption also increases. Cevik and Miryugin (2023) examined the impact of fiscal shocks using VAR on inflation using a panel of 139 countries over the period 1970-2021. The authors that both headline and core inflation increase in response to expansionary fiscal policy, particularly in developing countries. However, the impact of such policy is contingent on the prevailing economic and monetary conditions at the time of the shock. Applying the narrative approach to identify the size, timing, and objective of fiscal shocks, Ramey (2011) underscores the importance of timing in determining the impact of government spending. By deconstructing government spending news variables from 1939 to 2008, she estimates a fiscal multiplier range from 0.6 to 1.2 for fiscal stimulus impulses. These estimates are further refined by subsequent work, with new estimations by Ramey and Zubairy (2018) providing a multiplier range of 0.3 to 0.8. Alesina, Favero, and Giavazzi (2015) find that expenditure-based fiscal adjustments are less harmful to economic output compared to tax-based adjustments, which often lead to prolonged recessions. It utilizes a narrative approach to identify and construct multi-year fiscal plans from 17 OECD countries over the period 1978-2009, based on historical records and official documents.

Another direction in the empirical literature has focused on specific economic circumstances applicable to the period of intervention. These studies have shown that such circumstances significantly influence both the magnitude of stimulus impact and the timing of transmission effects. A comparative analysis by Checherita-Westphal, Leiner-Killinger, and Schildmann (2023) examines the role of fiscal policy in inflation differentials across 19 Eurozone countries from 1999 to 2019. The authors find evidence suggesting that fiscal policy can influence inflation differentials, with fiscal tightening exerting downward pressure on inflation. Gourinchas et al. (2021) investigated the reaction of price levels under a steeper aggregate demand curve in a tight labor market. They demonstrated that large transfers during the COVID-19 pandemic had a minimal impact on output, with a fiscal multiplier of only 0.06, but a significant effect on prices. At the global level, the injected stimulus did set off about 8% of the economic downturn, reducing unemployment in specific demand-constrained sectors. Poorly designed fiscal support reached firms that did not need it, highlighting the importance of good policy design. This implies that fiscal consolidation might play a crucial role when an economy is overheating, potentially reducing inflation with minimal cost to economic output. Conversely, under supply constraints, fiscal stimulus would likely do little to stimulate growth but would exacerbate price

pressures by fueling demand. Other empirical work on the COVID-19 stimulus impact by Di Giovanni et al. (2023) indicates that aggregate demand shocks accounted for approximately two-thirds of total model-based inflation in the US, with fiscal stimulus contributing half or more of the total aggregate demand effect.

Overall, the literature underscores the significant role of fiscal stimulus in stimulating aggregate demand, which subsequently increases price pressures. Empirical studies examining the direct relationship between fiscal policy and inflation indicate that the impact of fiscal measures is highly sensitive to prevailing economic conditions, such as supply constraints observed during the COVID-19 pandemic. As such, the literature provides a critical foundation for the primary hypothesis tested in this thesis: that heightened fiscal stimulus leads to elevated levels of inflation.

2.2 Differentiating fiscal policy instruments

In the literature examining the effects of fiscal policy, the fiscal stance is typically measured by the overall net budgetary impact of fiscal policy. However, research on specific fiscal instruments indicates that the composition of fiscal policy plays a crucial role in determining its impact on inflation. The risk to inflation arising from higher fiscal spending, particularly fiscal deficits, conceptually occurs when it is used to stimulate consumption demand (Khundrakpam and Pattanaik, 2010). For instance, increased spending on infrastructure and a decrease in indirect taxes may have equivalent budgetary effects. Nonetheless, direct spending on infrastructure increases aggregate demand as it involves additional purchases of materials and the hiring of labor, which drives prices upward. Conversely, a reduction in indirect taxes, such as the Value-Added Tax (VAT), results in increased profits for businesses, which are likely to pass these savings on to consumers to maintain competitiveness. This scenario does not lead to increased inflation and may even exert deflationary pressure, despite the same overall budgetary expenditure. Therefore, further investigation into the differential effects of various fiscal instruments is warranted to fully understand the impact of fiscal policy on inflation.

The effects of such individual measures have indeed been an important topic in the literature. There is ample evidence in the extend literature for a relatively high pass-through effect of VAT changes into inflation. Benedek, De Mooij, and Wingender (2015) investigate the pass-through of VAT changes to consumer prices using monthly data from 17 Eurozone countries between 1999 and 2013. On average, the pass-through is incomplete and varies by type of VAT change: approximately 100%for standard rate changes, 30% for reduced rates, and zero for reclassifications. The analysis also highlights differences in pass-through dynamics between durable and non-durable goods, no significant difference between rate increases and decreases, non-monotonic relationships with the consumption base, and both anticipation and lagged effects around reforms. With similair results, Correa-López, García-

Serrador, and Mingorance-Arnáiz (2014) perform panel regressions on 20 OECD countries (1960-2006) and find a positive and significant relationship between the indirect tax wedge and inflation. On an euro area analysis using core HICP inflation rates, Bańkowski, Christoffel, and Faria (2021) find in a VAR analysis a positive inflation response to indirect tax shocks. Core inflation continued to be at an elevated level in the following quarters, with a peak 2 years after the initial shock. However, they do find little evidence of inflation differentials across countries resulting from the impact of an indirect tax change.

Moreover, next to tax changes, other fiscal instruments receive significant attention in the literature, particularly focusing on the effects of wage support and cash handouts. Bénétrix and Lane (2013) estimate a panel VAR model on real exchange rate movements using annual data from 1970 to 2008 from euro area member countries. They document that shocks to the wage component of government consumption lead to more persistent real appreciation than shocks to the non-wage component, with the effect working through an increase in inflation differentials. Parker et al. (2013) examine the impact of cash transfers to households during the 2008 financial crisis in the United States. Their study finds that households consume a significant portion of the cash transfers they receive, indicating that such fiscal measures can stimulate consumption and potentially contribute to inflationary pressures by boosting aggregate demand. This provides evidence that fiscal policies involving direct cash payments to households can have a substantial stimulative effect on consumption. Coenen et al. (2012) show that in New Keynesian models, stimulative fiscal policy that increases households' disposable income has a larger impact on total consumption and inflation when there are more "hand-to-mouth" households, who consume based on current income rather than permanent income. Their analysis suggests that fiscal measures like tax cuts and transfers that enhance disposable income can have significant inflationary effects by raising consumption demand, especially in economies with a higher proportion of liquidity-constrained households.

In addition to specific fiscal instruments, public investment and spending are highlighted as significant components of government expenditure that can substantially affect aggregate demand. These effects are often quantified using the fiscal multiplier, which measures the impact of increased fiscal spending on a country's economic output, typically measured as GDP. An increase in spending leads to a rise in output, marginal production costs, and consequently, inflation. Empirical estimates of fiscal multipliers primarily rely on VAR models, following the seminal work of Olivier Blanchard and Perotti (2002). As Kraay (2012) notes, different types of government spending may have varying short-run effects on output. However, identifying dis aggregated multipliers is limited by imperfect data on the composition of spending. Developing a plausible identification strategy for total spending is already challenging; distinguishing the effects of different sub-components of government spending requires sep-

arate instruments for each type, complicating the analysis further. Ramey (2011) survey the literature following the 2009 financial crisis and find fiscal spending multipliers for developed economies ranging from 0.5 to 2. These estimates were later refined to a narrower range of 0.6 to 1. A comprehensive review of the effects of public infrastructure spending by Vagliasindi and Gorgulu (2021) indicates that COVID-19-related spending might yield different outcomes for fiscal stimulus due to the unique effects of lockdowns and the size of fiscal packages. These findings underscore the complexity and variability of fiscal policy impacts, particularly in the context of unprecedented economic conditions such as those induced by the COVID-19 pandemic.

Overall, the literature clearly distinguishes between the types of government spending used in fiscal policy. Notably, it highlights that measures directly impacting aggregate demand, such as direct wage support, cash transfers, and infrastructure spending, have a stronger effect on inflation compared to measures like indirect tax reductions. The key factor is the extent to which fiscal spending translates into a rise in aggregate demand. This provides a crucial direction for the second hypothesis: fiscal instruments with a more direct impact on aggregate demand have a more pronounced effect on inflation. Table 1 provides a comprehensive overview of key works examining the relationship between fiscal policy and inflation, summarizing the most important empirical studies, their findings, methodologies, and data from sections 2.1 and 2.2.

Table 1: Summary of Empirical Literature on Fiscal Policy and Inflation

Author(s)	**Summary of Findings**	**Methodology & Data**
Alesina, Favero, and Giavazzi (2015)	Fiscal adjustments based on spending cuts are much less costly in terms of output losses than those based on tax increases, with permanent adjustments being more effective than stop-and-go changes.	Simulation of fiscal plans using data from 16 OECD countries over 30 years.
Benedek, De Mooij, Keen, and Wingender (2015)	Estimates the pass-through of VAT changes to consumer prices, finding less than full pass-through on average, with significant differences across types of VAT changes and products.	Analysis using a unique dataset of monthly prices and VAT rates for 17 Eurozone countries from 1999-2013.
Blanchard & Perotti (2002)	Fiscal shocks have a significant effect on economic activity, and there is a substantial lag before these effects are reflected in inflation.	Structural vector autoregression (SVAR) model using postwar U.S. data.
Cevik & Miryugin (2023)	Investigates the role of fiscal policy in influencing inflation dynamics, highlighting the significant effects through demand-pull and cost-push mechanisms and the importance of the fiscal-monetary policy mix.	Panel dataset of 139 countries from 1970-2021; various econometric models, including fixed-effects and instrumental variable approaches.
Correa-López & Doménech (2013)	Product market competition and monetary policy regimes significantly affect inflation dynamics, with stronger competition leading to lower inflation persistence.	Econometric analysis using data from OECD countries.
de Soyres, Santacreu, and Young (2023)	Generous fiscal support during the COVID-19 pandemic increased the demand for consumption goods, but industrial production did not adjust quickly enough, contributing to high inflation.	Cross-country data analysis.
di Giovanni, Kalemli-Özcan, Silva, and Yıldırım (2023)	Quantifies the contribution of fiscal policy to U.S. inflation during the COVID-19 pandemic, finding that aggregate demand shocks explain two-thirds of total inflation, with fiscal stimulus contributing half or more of the aggregate demand effect.	Multisector macro-network model; Federal Reserve Bank of New York Staff Reports.
Gourinchas, Kalemli-Özcan, Penciakova, and Sander (2023)	Studies the effects of fiscal policy in response to the COVID-19 pandemic at firm, sector, country, and global levels, finding that fiscal policy helped offset 8% of the economic downturn, although it was poorly targeted and primarily benefited firms that did not need support.	Analysis using firm-level financial data from 50 sectors in 27 countries, a detailed input-output network, real-time data on lockdown policies and mobility patterns, and a global intertemporal general equilibrium I-O model.
Kalemli-Özcan (2022)	Examines the impact of fiscal policy on macroeconomic stability, focusing on fiscal multipliers and their variation across different economic conditions.	Empirical analysis using data from various countries and econometric modeling.
Ramey (2011)	Government purchases can stimulate the economy, but the effects vary significantly depending on the state of the economy and the type of spending.	Analysis using historical data on U.S. government purchases and their macroeconomic effects.

2.3 Views on post-pandemic inflation

Applying the conceptual relationship between fiscal stimulus and inflation to the COVID-19 pandemic period reveals notable features. The aftermath of the global COVID-19 pandemic has been marked by significant inflationary pressures across global economies. Initially perceived by policymakers as transitory, this sharp increase in inflation soon proved to be more resilient, leading to the highest inflation rates across the developed world since the 1970s. Various causes have been suggested for post-pandemic inflation, focusing on both supply-side and demand-side factors. Key supply-side factors include supply chain disruptions, commodity price shocks, particularly in energy and food, and labor shortages. On the demand side, factors include fiscal stimulus, accommodative monetary policy, shifts in consumption patterns, and labor market tightness (Cascaldi-Garcia, Orak, and Saijid, 2023; Arce et al., 2024; Del Negro et al., 2022; Comin, Johnson, and Jones, 2023; De Soyres, Santacreu, and Young, 2023).

A growing body of literature has focused on the underlying causes of the post-pandemic inflation surge. Comin, Johnson, and Jones (2023) examined the impact of binding capacity constraints on firms' price-setting behaviors. They found that these constraints accounted for half of the inflation increase during 2021-2022, with tight capacity amplifying the effects of loose monetary policy in 2021, setting the stage for inflation to escalate. As economies reopened, pent-up consumer demand surged, exacerbating the imbalance between demand and supply (De Soyres, Santacreu, and Young, 2023; Del Negro et al., 2022). This excess demand was further fueled by unprecedented fiscal stimulus measures, including cash transfers and income support, which significantly boosted household consumption. O.J. Blanchard and Bernanke (2023) utilized a dynamic model to analyze the causes of post-pandemic inflation. Their analysis indicated that the initial inflation spike was predominantly driven by commodity price shocks, reflecting strong aggregate demand and sectoral price spikes due to changes in demand composition and supply constraints. Their results suggested that labor market tightness played a smaller role, significantly impacting inflation only from late 2021 onwards.

A substantial focus has been on fiscal policy as a catalyst behind the inflation surge. Notably, the initial debt levels of countries did not correlate with the magnitude of their fiscal response, a departure from previous crises such as in 2008, where highly indebted countries responded less aggressively (Romer, 2021). Di Giovanni et al. (2023) employed a multi-country multi-sector New Keynesian model to quantify the drivers of the recent inflation surge. Their findings demonstrated that inflation was initially triggered by pandemic-related supply shocks in factor markets, further exacerbated by expansionary fiscal and monetary policies that stimulated aggregate demand. These shocks were amplified by sectoral consumption reallocation combined with energy shocks. Del Negro et al. (2022) from the Federal Reserve Bank of New York used model calibrations to quantify inflation drivers from

December 2019 to June 2022. They found that the fiscal stimulus enacted during the COVID-19 pandemic contributed at least half of the aggregate demand effect, explaining around two-thirds of the total model-based U.S. inflation over this period. This underscores the inflationary impact of the unprecedented fiscal support. De Soyres, Santacreu, and Young (2023) analyse how fiscal stimulus during the COVID-19 pandemic affected the demand-supply balance across countries. They concluded that generous fiscal support helped sustain goods consumption during lockdowns but also amplified the rebound in demand as economies reopened, outpacing industrial production's ability to adjust supply. This imbalance, where demand exceeded supply due to fiscal stimulus, significantly contributed to high global inflation. The U.S. exhibited one of the largest impacts due to its massive fiscal response. Their results suggest that unprecedented fiscal policy played a sizable role in overheating demand relative to supply constraints, driving the inflation surge. These findings largely align with what was found in the earlier literature sections, considering the specific lockdown situation.

The effects of lockdowns and fiscal stimulus have been notable observations, although not as widely discussed in the literature as the general association between stimulus and inflation. Bishop, Boulter, and Rosewall (2022) highlight the large changes in household spending behavior during the COVID-19 pandemic. As overall consumption slowed significantly during lockdowns, the drop in services consumption was considerably steeper compared to the drop in goods consumption. This phenomenon can be observed across developed countries, with services and goods consumption not converging even when lockdowns ended. This aligns with the findings by dDe Soyres, Santacreu, and Young (2023), highlighting how fiscal stimulus amplified consumption shifts from services to durable goods.

Relating these findings to the earlier model from section 2.1, which depicted the transmission mechanism from fiscal policy to inflation, it becomes clear how the pandemic altered this equation. Labor shortages and higher input costs shifted the supply curve higher, with stimulus effects offsetting this shift, thereby increasing services prices. As supply chain bottlenecks limited the supply of goods, the aggregate supply curve steepened. Fiscal stimulus, in combination with the shift in consumption from services to goods, shifted the demand curve further right, thereby increasing prices as the supply curve started binding. From this, the third hypothesis to be tested can be derived: fiscal stimulus amplified the shift in consumption patterns during lockdowns from services towards goods, particularly durable goods. This follows from the established pattern where the literature suggests an important role for fiscal stimulus in stimulating goods consumption. Together with the findings from part 2.1 and 2.2 the main hypotheses can be found in table 2.

Table 2: Summary of Hypotheses

Hypothesis	Description
H1	Fiscal stimulus is associated with an increase in inflation.
H2	Countries that implemented fiscal stimulus measures that more directly increased aggregate demand experienced a stronger effect on inflation.
H3	Fiscal stimulus amplified shifts in consumption patterns, particularly by increasing demand for durable goods.

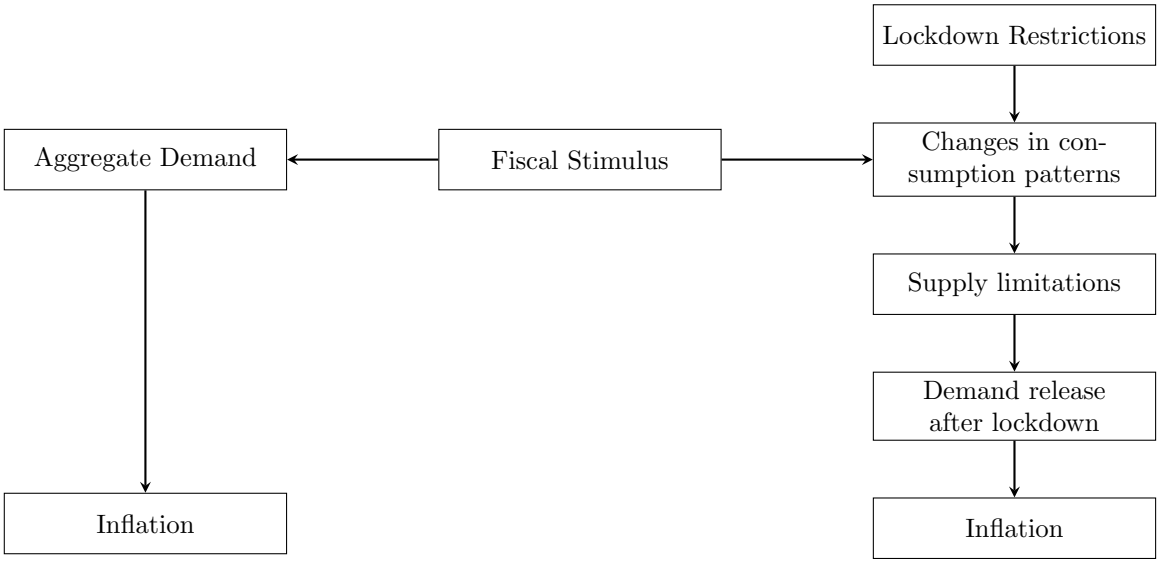
3 Methodology & Data

3.1 Methodology

This thesis investigates the impact of fiscal stimulus provided in response to the COVID-19 pandemic on inflation. I employ a two-pronged analytical approach, differentiating between the overall long-term effects of government stimulus and its more immediate short-term impacts. The methodology is informed by existing economic literature, which emphasizes the delayed transmission mechanisms of fiscal policy (e.g., Ramey, 2011; Ramey and Zubairy, 2018). The first part of the analysis quantifies the overall impact of the fiscal stimulus on inflation, making use of these established frameworks that assess the relationship between fiscal shocks and inflation. This approach enables a direct evaluation of the effects of fiscal policy measures implemented during the pandemic on inflation. The second part focuses on the short-term effects of fiscal stimulus on consumption patterns, using quarterly data. Given the literature's consensus that fiscal policy transmission to the real economy, particularly on inflation, has a delayed effect, short-term impacts on inflation can be examined indirectly. I explore how shifts in consumption, especially via increased demand for durable goods during lockdowns and after lockdowns, contributed to inflationary pressures. This analysis highlights the role of fiscal policy in altering consumption and savings behaviors during the pandemic period.

This methodological approach is illustrated in Figure 1. On the left side, the first, longer-term part of the analysis is depicted, demonstrating the direct effect of fiscal stimulus on inflation through aggregate demand as a transmission mechanism. On the right side, the more immediate impact of fiscal stimulus on consumption shift patterns during the lockdowns is illustrated. Initially, the lockdowns induced a shift in consumption patterns, and the extant literature suggests that fiscal stimulus likely exacerbated this relationship. These shifts, particularly towards durable goods, resulted in increased demand amidst already severely constrained supply chains, thereby fueling price increases. Upon the cessation of lockdowns, the release of pent-up demand further heightened pressure on still-recovering production and supply chains, consequently contributing to inflation. These two mechanisms will be examined separately.

Figure 1: Two-pronged analytical approach to assessing fiscal stimulus impact on inflation



To measure the association between fiscal policy decisions and inflation, most empirical studies employ time series analysis, specifically VAR models (e.g., Olivier Blanchard and Perotti, 2002; Cevik and Miryugin, 2023; Di Giovanni et al., 2023). However, the short duration of the study period (2020-2021) combined with the unprecedented scale of budgetary impulses renders this approach infeasible. Alternative identification strategies, such as Difference-in-Differences (DiD) and Instrumental Variables (IV), offer robust frameworks for causal inference but face significant challenges in this context. The DiD approach necessitates distinct treatment and control groups, which are difficult to establish globally during the COVID-19 pandemic, while IV strategies encounter difficulties in identifying valid instruments that are unaffected by the pandemic's widespread economic impacts.

To circumvent these methodological limitations, in the first part of the analysis, I assess the association between fiscal stimulus and inflation using cross-country regression analysis. For each country, I take the level of inflation and project this on the total accumulated fiscal stimulus provided by that specific country during the period from January 2020 to June 2021. Several additional control variables, reflecting monetary policy changes and trade variables, are included as independent variables in the analysis. In an extension of this analysis, I incorporate the exposure of each country to foreign fiscal stimulus to get the full impact, including both domestic and foreign stimulus. This approach is intuitive, as countries with higher exposure to foreign trade are likely to experience the impact of foreign fiscal stimulus through changes in their import and export prices.

In the second part of the analysis, I measure the impact of fiscal stimulus on amplifying changes in consumption behavior, based on quarterly projections. The identification strategy follows the empirical approach by De Soyres, Santacreu, and Young (2023), leveraging interaction terms within a regression

framework to isolate the effects of fiscal stimulus on inflation during the COVID-19 pandemic. By exploiting variations in mobility changes due to lockdowns and reopenings, and interacting these with the levels of fiscal stimulus across different countries, the methodology effectively differentiates the impact of fiscal policy on consumption from other confounding factors. This approach is particularly suited to the unique context of the pandemic, where unprecedented fiscal interventions and mobility restrictions created significant economic disruptions. By incorporating country fixed effects, the strategy controls for unobserved heterogeneity and country-specific characteristics that likely influence both fiscal policy and economic outcomes, thereby addressing potential biases arising from simultaneous shocks.

3.2 Data description

The main variable of interest is fiscal stimulus, which is also the primary focus in both analyses. To measure fiscal stimulus I utilize a relatively novel dataset constructed by Porcher (2023). This dataset comprises a combination of government interventions aimed at addressing various aspects of economic distress caused by the COVID-19 pandemic. The measures are coded as a percentage of each country's 2019 GDP, facilitating effective cross-country comparisons. The data were collected on a daily frequency from January 1, 2020, to June 30, 2021. This daily frequency allows for flexible modification into the specific time frames required for the analysis. The range of fiscal interventions includes the following measures:

- *Wage Support*: This category includes measures related to wage replacement due to COVID-19-induced unemployment. It encompasses subsidies for job retention schemes, short-time work schemes, bonuses for essential workers, and pension increases.

- *Cash Transfers*: Targeted at individuals rather than employment, with transfers that may be universal or directed towards vulnerable populations such as the elderly, students, and single mothers. Cash transfers can be conditional on income and are distributed through various methods, including digital transfers, direct deposits, or physical distribution of cash or checks.

- *In-Kind Transfers*: This category involves the provision of goods and services rather than monetary payments. Typical examples include food baskets, food vouchers, free public housing, and subsidies for utilities such as electricity.

- *Tax Cuts*: Representing a reduction in tax revenues, these cuts affect various types of taxes, including value-added tax (VAT), income taxes for individuals, and corporate taxes.

- *Sectoral Support*: This encompasses financial assistance directed at specific sectors severely impacted by the pandemic, such as tourism, airlines, and cultural sectors. It also includes support

for local governments and the health sector, particularly to bolster vaccination efforts and other health-related expenditures.

- *Credit Schemes*: Governments provide guarantees and lines of credit to both firms and individuals to mitigate the economic downturn's effects.

The timing of fiscal stimulus coincided with the implementation or tightening of lockdowns. The largest peak in stimulus occurred in March and April of 2020, during the initial months when COVID-19 was rapidly spreading, as shown in figure 3 in the appendix. Notably, this peak was much lower in the winter and early spring of 2021, likely due to the continuation of spending programs from the first peak and decreased necessity of further support. The dataset measures the disbursed amount of a measure on the stated starting day of the plan, considering only actual disbursed amounts. Some measures likely remained active into the winter of 2020-2021, when COVID-19 lockdowns became stricter again, making new measures less necessary and explaining the significantly smaller amounts during the second COVID winter. Overall, the largest single stimulus category was *sectorial*. There are notable regional differences in the type of support provided (see figure 4). In Europe, wage support was the largest component of the stimulus, whereas cash transfers were relatively small. In the Americas, cash transfers were comparatively larger, with lower wage support levels. For the purpose of this analysis, the measures are further transformed into accumulated and quarterly figures to align with the overall model. Figure 5 in the appendix depicts the total amount of fiscal stimulus provided by countries in the sample base from February 2020 to June 2021. The US provided the largest amount of fiscal stimulus (22% of GDP), followed closely by Singapore (21%) and, with some more distance, Australia (17%) and the UK (16%). Overall in the sample, support among Western European countries was also relatively high, while Eastern Europe and especially developing countries received relatively low amounts of fiscal stimulus.

The correlation matrix presented in table 3 summarizes the relationships between various measures of fiscal stimulus across during the COVID-19 pandemic. The matrix reveals several significant correlations. Notably, fiscal spending is strongly correlated with sector-specific aid ($r = 0.703$) and wage support ($r = 0.644$), indicating that countries with higher overall fiscal spending tended to allocate more funds to these areas. Additionally, there is a moderate correlation between fiscal spending and credit interventions ($r = 0.549$), suggesting a link between direct fiscal measures and financial support mechanisms. The correlations between other variables, such as cash transfers and tax cuts, are generally weaker, reflecting more diverse approaches to fiscal stimulus among different countries. This correlation matrix helps to understand the interplay between different fiscal measures and provides insights into the comprehensive nature of fiscal responses during the pandemic.

Table 3: Correlation Matrix

Variable	fiscal	fwage	fcash	finkind	ftaxc	fsecteur	fcreditin
fiscal	1.0000						
fwage	0.6435	1.0000					
fcash	0.3461	0.0624	1.0000				
finkind	0.1373	-0.1238	0.1045	1.0000			
ftaxc	0.3115	0.0296	-0.0759	0.0149	1.0000		
fsecteur	0.7030	0.4563	0.0044	0.0190	0.1828	1.0000	
fcreditin	0.5493	0.3107	0.2296	-0.0537	0.1814	0.3156	1.0000

Note: This table presents the correlation matrix for the variables. Each cell shows the correlation coefficient between the variables.

3.2.1 Fiscal stimulus and inflation

The first analysis focuses on the association between fiscal stimulus and inflation. The fiscal stimulus variable is based on the fiscal stimulus data, transformed in monthly data. The inflation data are sourced from a global database of inflation provided by the World Bank. This database offers monthly indices for inflation, core inflation, and energy inflation globally. I adjust these data to get the average inflation rates per month over the previous 12 months. This measure is selected for its ability to provide a more stable and comprehensive view of inflation dynamics than single-point annual inflation figures. Monthly inflation rates are often subject to significant volatility due to seasonal variations, temporary shocks, and other anomalies, which can obscure the underlying trends and complicate the analysis of fiscal policy impacts. Averaging the inflation rates over a 12-month period smooths out these short-term fluctuations, thereby reducing their distortive effect on our results. This method thus offers a more consistent and reliable depiction of inflation trends, reflecting cumulative changes over a longer horizon and enabling a more accurate assessment of both the immediate and sustained effects of fiscal policy measures. By employing this averaged measure, the study aims to capture a more nuanced and dependable picture of inflation trends during a period marked by significant economic upheaval. This measures can be defined as:

$$\pi_{\text{12-month average},t} = \frac{1}{12} \sum_{i=0}^{11} \pi_{t-i} \tag{4}$$

where π_{t-i} represents the monthly inflation rate for month $t-i$. The monthly inflation rate π_{t-i} itself is derived from the Consumer Price Index (CPI) using the formula:

$$\pi_i = \frac{\text{CPI}_{t-i} - \text{CPI}_{t-i-12}}{\text{CPI}_{t-i-12}} \times 100 \tag{5}$$

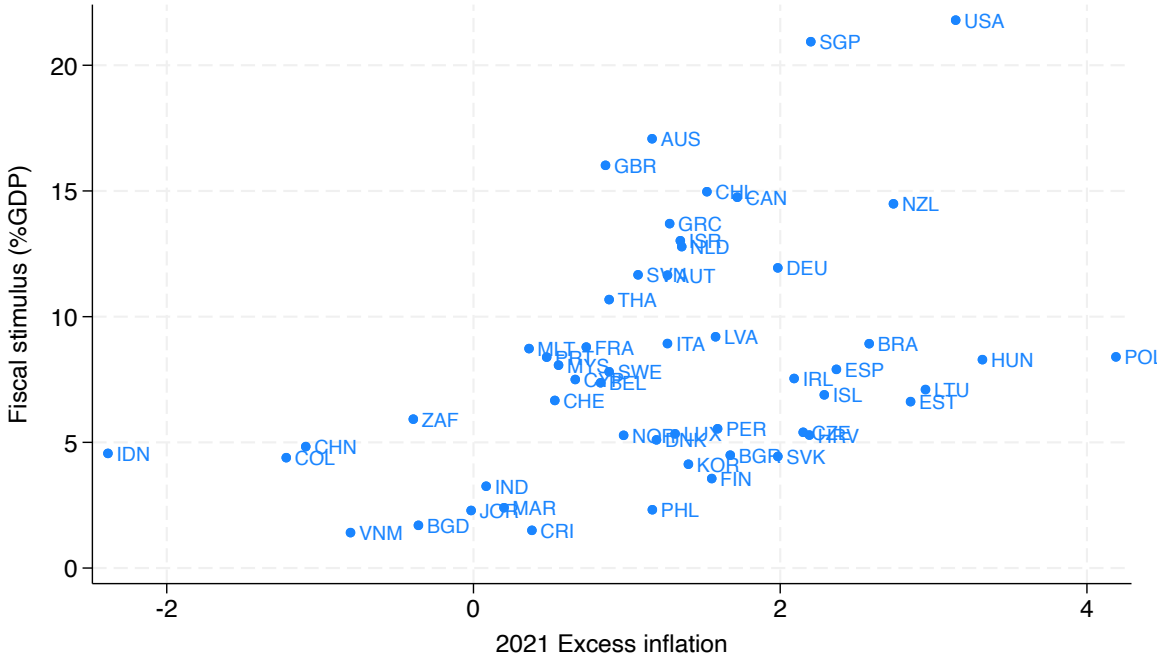
with CPI_{t-i} representing the Consumer Price Index in month $t-i$ and CPI_{t-i-12} is the Consumer Price Index 12 months prior to month $t-i$. In the analysis from this rolling-average inflation measure the average 2015-2019 inflation number is substracted for each respective country.

Inflation initially escalated in the United States and Canada starting in 2020 (see annex table 6). However, from early 2022 onwards, European countries experienced elevated inflation rates, while inflation in the United States began to decline. This period coincides with the Russian invasion of Ukraine, which drove energy prices in European countries—the predominant sample in this study—to unprecedented levels. Although energy prices typically exert limited influence on headline Consumer Price Index (CPI) figures, sustained high energy prices can permeate the broader economy, thereby elevating the prices of a wide range of goods and services. Kilian and Zhou (2022) demonstrated a similar phenomenon, showing that an unexpected rise in gasoline prices precipitated a sharp increase in

US headline consumer price inflation, an effect that persisted for only two months before diminishing to negligible levels. When these effects extend to other economic sectors, inflation transcends the energy prices alone. This study hypothesizes a comparable effect, positing that higher energy prices began to diffuse through the economy from the first half of 2021. Coupled with additional factors such as labor shortages cited in the literature, this suggests that the statistical relationship between fiscal stimulus and headline inflation will attenuate over time. To account for this, the 2021 headline inflation rate is used as baseline in the analysis thereby minimizing the distorting impact of energy prices on the results.

Plotting these two variables we see a clear pattern in the data. Figure 2 presents a scatterplot showing the relationship between inflation in 2021 and fiscal stimulus. Countries with higher fiscal stimulus tend to also have higher levels of excess inflation. Notable is also the US, which provided the highest fiscal support packages, which also had one of the highest levels of 2021 excess inflation.

Figure 2: Scatter plot of fiscal spending versus inflation



In addition to fiscal stimulus, the analysis incorporates two additional control variables: money supply growth (M3) and trade as a percentage of GDP. These follow the suggestions by Cevik and Miryugin (2023). The growth rate of broad money supply (M3) is obtained from the World Bank and includes currency in circulation, demand deposits, time deposits, and other liquid assets. As a comprehensive measure of monetary aggregates, M3 serves as an effective proxy for monetary policy, reflecting central bank actions influencing economic liquidity and interest rates. Trade as a percentage

of GDP, also sourced from the World Bank, measures the total value of exports and imports of goods and services relative to GDP in 2019. This approach avoids distortion due to lockdown effects on GDP measurement. This indicator measures economic openness, highlighting the degree of integration into the global market. Higher trade openness can affect inflation through imported goods and services, exposing the domestic economy to international price movements. GDP data for 2019 is taken from the World Bank database.

In addition to the domestic fiscal stimulus variable described in the previous section, I also measure the effect of imported fiscal stimulus. Also imported fiscal stimulus is a variable. The foreign fiscal stimulus variable is expressed as:

$$F_i = \sum_{j=1}^{n} \frac{T_{j \to i}}{\text{GDP}_i} S_j \tag{6}$$

where i denotes the home country and j denotes the foreign country. $T_{j \to i}$ represents the trade flow in added value from country j to the home country i, and S_j represents the fiscal stimulus provided in the foreign country. For measuring the trade flow I use both imported trade flow and exported trade flow. To measure imported inflation, I utilize the TiVA database provided by the World Bank. For a more detailed overview and description of the variables, please refer to the overview table in Annex 13.

Table 4: Summary Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
fiscal	53	8.146	4.737	1.410	21.794
wage	53	1.975	1.664	0.000	6.300
cash	53	0.795	1.310	0.000	6.780
inkind	53	0.077	0.184	0.000	1.060
taxc	53	0.703	0.894	0.000	3.850
secteur	53	2.168	1.724	0.000	6.590
creditin	53	0.536	1.006	0.000	4.200
M3supply	53	21.588	7.056	8.210	43.491
trade	53	107.405	74.204	26.451	382.348
Fstm.I.	53	2.541	5.214	0.001	32.304
Fstm.X.	53	2.408	5.669	0.002	37.370
inflation2021	53	2.910	1.494	0.492	8.302
GDP2019	53	1323556	3481288	15992	21400000

Note: This table presents summary statistics for the variables. Obs refers to the number of observations, Mean is the average value, Std. dev. is the standard deviation, Min is the minimum value, and Max is the maximum value. Fstm.I. refers to the foreign stimulus imported to home country via added value import linkages, Fstm.X. refers to the foreign stimulus imported to home country via added value export linkages.

3.2.2 Fiscal stimulus and consumption

In the second part of the analysis I study the effects of fiscal policy in amplifying consumption pattern changes during lockdowns. For this I make us of a panel dataset combined on a quarterly basis. The analysis uses the same fiscal stimulus variable as in the first analysis, only now augmented to quarterly time frequency. These data are supplemented with a measure for lockdown strictness, consumption and savings data. The main analysis of this paper is based on a sample of 36 countries, including both advanced and emerging economies. Table 5 reports summary statistics for the variables used in this study.

To measure the degree of lockdown strictness I make use of the Stringency Index by Oxford Coronavirus Government Response Tracker (OxCGRT). This is a composite measure designed to track the strictness of government responses to COVID-19 across countries. It incorporates nine policy indicators: school closures, workplace closures, cancellation of public events, restrictions on public gatherings, closures of public transport, stay-at-home requirements, public information campaigns, restrictions on internal movements, and international travel controls. Each indicator is scored from 0 to 100, with the index calculated as their average. A higher index value indicates a more stringent response. Importantly, the index measures the intensity of policies, not their effectiveness or appropriateness.

Table 5: Descriptive monthy data

Variable	Obs	Mean	Std. dev.	Min	Max
fiscal	216	1.449	2.325	0	14.640
secteur	216	0.391	0.843	0	6.000
inkind	216	0.010	0.076	0	1.050
cash	216	0.120	0.473	0	4.600
taxd	216	0.395	1.382	0	13.800
taxc	216	0.128	0.369	0	2.700
wage	216	0.379	0.832	0	6.300
Cnon-durable	162	101.867	6.052	84.475	126.196
Cdurable	216	100.490	16.330	56.152	203.985
Cservices	162	90.573	7.377	67.889	108.962
stringency	216	54.039	19.466	12.101	88.437

Regarding the consumption data, including durable, non-durable, and services consumption, a notable pattern emerges. As illustrated by Figure **??** in the annex, there is a discernible trend towards increased consumption of durable goods. While overall consumption declined during lockdown periods and rose when lockdowns were lifted, durable goods consumption declined comparatively less and increased much faster compared to non-durable goods and services consumption. The extend to which fiscal stimulus plays a role in this will be tested in the following section.

4 Results

4.1 The association between fiscal stimulus and inflation

The baseline regression examines the relationship between fiscal stimulus and excess inflation. Specifically, I investigate whether the fiscal support provided during 2020 and the first half of 2021 is positively associated with the level of inflation. Given that the impact of fiscal support typically takes time to permeate the economy, I utilize the total accumulated fiscal stimulus and its effect on the overall inflation rate of 2021 in the baseline regression model. To empirically test this hypothesis, I employ the following specification, where i denotes the country:

$$\pi_i = \alpha_i + \sum_{j=1}^{6} \beta_j S_i^{(j)} + \Theta' X_i + \epsilon_i \tag{7}$$

The dependent variable π_i is the 12-month excess inflation in December 2021. This variable is constructed by subtracting the average inflation for each country during the period 2015-2019, which is the five-year period prior to the COVID-19 pandemic, from the inflation over the period December 2020 to December 2021. This adjustment controls for country-specific inflation levels and characteristics, thereby normalizing the effect and enabling better interpretation.

The main independent variable of interest is the fiscal stimulus, represented by the sum of different types of fiscal policies, denoted by $\sum_{j=1}^{6} \beta_j S_i^{(j)}$, where $j = 1, 2, 3, 4, 5, 6$ represents the six different types of fiscal policies as identified in the literature and specified in the data set. These include wage support, cash transfers, in-kind transfers, sectoral support, tax cuts, and credit schemes. The fiscal stimulus is expressed as the sum of these six components, all expressed as the percentage of GDP for each country spent in response to COVID-19. The control variables follow suggestions by Cevik and Miryugin (2023) and include broad money supply and trade as a percentage of the country's GDP. The monetary aggregate of M3 broad money supply serves as a proxy for monetary policy. The variable of trade linkages serves as an indicator of the exposure to global markets, controlling for global price pressures through supply chain linkages. Finally, ϵ_i is the error term.

In an extension of the baseline regression, I split the fiscal policy effect into domestic and foreign variables. This model keeps the domestic variable intact and adds the imported fiscal stimulus of each respective country. This can be specified as:

$$\pi_i = \alpha_i + \beta_{1i} S_i + \beta_{2i} F_i + \Theta' X_i + \epsilon_i \tag{8}$$

Where the dependent variable π_i is the same as in the first model. The domestic variable S_i measures only the total fiscal stimulus, with no further dissection into the specific type of stimulus.

The control variables are also the same as in the first model. The foreign fiscal stimulus variable is constructed as explained in section 3.2.1.

4.1.1 Results

The baseline results are shown in Table 6. The first and second columns show a significant correlation between fiscal stimulus and excess inflation. Among the different components of the fiscal stimulus constructions, only wage shows a significant association with excess inflation. Notably, wage as an independent variable has a higher explanatory value, measured by the R-squared, and a stronger effect (0.59) with a high significance level below 1%. This is consistent with the hypothesis that fiscal measures that directly increase disposable income of consumers will have the strongest direct impact on inflation. Absent in this regard is the measure of cash transfers, which were notably higher in the US. A possible explanation for this could be the relative absence of this measure, with only 23 countries providing some form of direct cash transfer at varying levels.

The baseline results in Table 6 show a strong association between fiscal stimulus and excess inflation in 2021, with significant positive coefficients for the fiscal variable in models 1 and 2 (0.49 and 0.44, respectively). This suggests that fiscal policy measures, such as government spending or tax cuts, substantially affect inflation. Among the various components of fiscal stimulus, only the wage variable shows a significant association with excess inflation, particularly in models 4 and 5, where it has a strong effect (0.59) with a high significance level below 1%. This supports the hypothesis that fiscal measures directly increasing consumers' disposable income have the most substantial impact on inflation. The components most likely to directly increase aggregate demand are likely to be both wage and direct cash transfers. The coefficient of this variable is relatively high and significant at 1% level, but not as high as the stand-alone wage component. Other individual measures, such as cash transfers, in-kind transfers, and sectoral support, do not show high or significant effects on inflation. T Control variables like M3 money supply and trade show some significance in influencing inflation, with the M3 money supply variable being particularly noteworthy in several models.

Table 7 shows the effect of foreign stimulus on domestic inflation. The coefficients for export and import variables are not significant, suggesting that direct trade measures do not substantially impact domestic inflation. However, the M3 money supply and standardized trade variables show a more consistent relationship with inflation. The M3 supply variable is positive and significant in models 3 and 4, indicating that an increase in money supply is associated with higher inflation, reinforcing earlier findings from the domestic analysis. The standardized trade variable is significant in models 4 and 6, with coefficients of 0.477 and 0.390, respectively, suggesting that trade volatility can contribute to inflationary pressures, potentially through supply chain disruptions or changes in import prices. The

standardized fiscal variable is significant in models 5 and 6, with positive coefficients (0.427 and 0.408), implying that standardized measures of fiscal policy, perhaps reflecting broader or more consistent fiscal interventions, are associated with higher inflation.

The fitness of the models, measured by R-squared values, ranges from 0.09 to 0.33, indicating varying degrees of explanatory power. The most robust models, incorporating wage variables, suggest that these factors are crucial in explaining the variations in excess inflation. In summary, the regression results emphasize the significant impact of fiscal policy, particularly wage increases, on inflation. Other individual fiscal measures do not show significant effects, highlighting the importance of targeting wage-related policies to manage inflation effectively. The findings on foreign stimulus effects suggest that while direct trade measures may not significantly impact domestic inflation, broader fiscal and trade-related policies can contribute to inflationary pressures. Future research should explore the specific mechanisms of these interactions to provide more detailed policy recommendations.

Table 6: Baseline Fiscal Stimulus and Inflation

Variable	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6	Reg 7	Reg 8	Reg 9	Reg 10
fiscal	0.49^{***}	0.44^{***}								
	(0.15)	(0.16)								
wage				0.54^{***}	0.59^{***}					
				(0.17)	(0.15)					
cash				-0.07		0.04				
				(0.15)		(0.18)				
inkind				0.16			0.03			
				(0.15)			(0.16)			
sectorial				-0.05				0.29^{*}		
				(0.17)				(0.16)		
taxc				0.08					0.13	
				(0.15)					(0.17)	
credit				0.33^{**}						0.41^{**}
				(0.16)						(0.17)
wageXcash			0.46^{***}							
			(0.15)							
M3supply		0.21	0.23		0.33^{***}	0.28	0.29^{*}	0.30^{*}	0.26	0.14
		(0.16)	(0.16)		(0.15)	(0.18)	(0.17)	(0.16)	(0.18)	(0.17)
trade		0.26	0.28^{*}		0.19	0.31	0.30^{*}	0.26	0.31^{*}	0.23
		(0.16)	(0.16)		(0.15)	(0.18)	(0.17)	(0.17)	(0.17)	(0.16)
intercept	1.22	1.21	1.21	1.22	1.22	1.22	1.22	1.22	1.22	1.22
	(0.15)	(0.15)	(0.15)	(0.15)	(0.14)	(0.16)	(0.16)	(0.14)	(0.16)	(0.15)
Observations	53	53	53	53	53	53	53	53	53	53
R-squared	0.16	0.22	0.23	0.33	0.32	0.09	0.09	0.15	0.09	0.19

Note: The dependent variable excess inflation is constructed by subtracting the average 2015-2019 inflation from the 2021 full year inflation. The independent variables are standardized by dividing by their respective standard deviation. Standard errors in parentheses. Significance levels: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 7: Foreign Stimulus and Inflation

Variable	(1)	(2)	(3)	(4)	(5)	(6)
export	-0.00271		-0.0296		-0.0139	
	(0.08)		(0.84)		(0.41)	
import		-0.0116		-0.0538		-0.0402
		(0.39)		(1.56)		(1.22)
M3supply			0.300	0.319	0.216	0.235
			(1.76)	(1.90)	(1.32)	(1.44)
trade			0.373	0.477^{*}	0.290	0.390^{*}
			(1.95)	(2.36)	(1.59)	(2.01)
fiscal					0.427^{*}	0.408^{*}
					(2.67)	(2.59)
intercept	1.227^{***}	1.248^{***}	1.295^{***}	1.349^{***}	1.255^{***}	1.317^{***}
	(6.55)	(6.84)	(6.97)	(7.50)	(7.14)	(7.72)
Observations	53	53	53	53	53	53
R-squared	0.16	0.22	0.23	0.33	0.32	0.09

Note: The dependent variable is average excess inflation over 2021. The independent variables are standardized by dividing by their respective standard deviation. The export and import variables refer to the Trade in Value Added linkages between the respective home country and foreign country. Standard errors are in parentheses. Significance levels: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

4.1.2 Robustness

To test the robustness of the aforementioned results, I conduct several tests focusing on the timing of inflation, measurement of the variables, and sample form. These tests involve altering either one or two variables simultaneously. While the results exhibit some significant changes compared to the baseline results, they do not materially alter the outcome of the baseline tests.

The first robustness test focuses on the timing of inflation. In the baseline model, I use full-year excess inflation for 2021 as the dependent variable. To mitigate the possibility that the results are contingent on this specific time period, I re-run the regression using quarterly inflation data from Q1 2021 to Q4 2022. The results, presented in Table **??**, are consistent with the baseline regression. We observe that as inflation begins to rise, the relationship between fiscal stimulus and the wage component of stimulus becomes positive and statistically significant. It is important to note that the quarterly data does not perfectly align with the 2021 full-year data, likely due to differences in the measurement of quarterly versus annual inflation. Particularly, wage support demonstrates a strong effect across multiple quarters up to Q2 2022. As anticipated, the relationship diminishes after this point, likely due to other factors such as wage developments and energy inflation becoming the dominant influences on inflation. These results confirm the hypothesis and align with the baseline findings.

A potential concern is that headline inflation might be driven by more volatile items, which are less affected by country-specific fiscal stimulus and more by global developments. To address this, I replace the headline inflation variable with the more stable core inflation. The results, presented in

the annex Table **??**, indicate that the relationship is no longer evident, with fiscal and core inflation showing a slight negative correlation that is not statistically significant. Wage support continues to exhibit a similar, albeit weaker, effect on core inflation, particularly in early 2021. This suggests that the association between stimulus and inflation is not as strong as suggested in the previous tests, potentially due to the lagging effect of core inflation. Since core inflation rises later than headline inflation, the relationship may also emerge later, by which time other components could exert a more significant influence. These findings contrast with those of De Soyres, Santacreu, and Young (2023), who report similar effects for both headline and core inflation.

In a third test, I introduce an alternative measurement of fiscal stimulus. The current measurement is based on the IMF database by Porcher (2023), which incorporates all implemented COVID-19 support by governments. However, this measure might be subject to underestimation or overestimation due to labeling issues. Some COVID-19 support might be channeled through existing social support measures, which are not reflected in the COVID-19 stimulus data. Conversely, some support labeled as COVID-19-related might actually replace existing government spending on social or other fiscal subsidies or tax breaks for both households and businesses. This new measure, named *Government spending*, indeed shows somewhat lower fiscal spending compared to the earlier fiscal stimulus measure, suggesting it might provide a more smoothed measure of COVID-19's effects on government budgets. The results for this measure, presented in Table 8, surprisingly show both a stronger effect and overall more statistically significant results. This effect is observable as early as Q2 2021 and remains strong and significant until the last measured period of FY 2023. Although this measure is not perfect due to its coarseness and lack of granularity, the results are nonetheless remarkable. However, extending the same measure to core inflation there is still no significant association, although the direction now does seem to match the headline inflation. These results can be found in the appendix table **??**

Table 8: Regression results total government spending & inflation

Variable	2021Q2	2021Q3	2021Q4	2022Q1	2022Q2	2022Q3	2022Q4	2023FY
government spending	0.27**	0.41***	0.60***	0.91***	1.24***	1.49***	1.65***	0.92**
	(0.12)	(0.12)	(0.15)	(0.21)	(0.31)	(0.43)	(0.54)	(0.41)
M3supply	0.19	0.21	0.24	0.27	0.31	0.35	0.49	0.82*
	(0.13)	(0.13)	(0.15)	(0.21)	(0.31)	(0.44)	(0.54)	(0.42)
trade	0.11	0.10	0.16	0.27	0.40	0.59	0.79	0.75
	(0.13)	(0.13)	(0.16)	(0.22)	(0.32)	(0.45)	(0.56)	(0.43)
intercept	-0.24*	0.34***	1.29***	2.49***	3.92***	5.51***	6.75***	4.31***
	(0.12)	(0.12)	(0.14)	(0.20)	(0.30)	(0.42)	(0.52)	(0.40)
Observations	53	53	53	53	53	53	53	53
R-squared	0.15	0.24	0.31	0.34	0.30	0.26	0.23	0.21

Note: The dependent variables are constructed by subtracting the average 2015-2019 inflation from the 2021 full year inflation. The independent variables are standardized by dividing by their respective standard deviation. Standard errors in parentheses. Significance levels: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Extending this new fiscal policy measure to include imported fiscal stimulus, as shown in Table **??**, reveals that the foreign stimulus effect does seem to exhibit an association with domestic inflation. The import variable shows the strongest association (0.35) and is also significant at a 5% level. It can be expected that the import variable is a better prediction compared to the

4.2 Fiscal spending and consumption shifts

In the second part of the analysis, I measure the effect of fiscal stimulus in amplifying consumption. The panel data consists of 256 observations across 53 different countries in the period Q1 2020 - Q2 2021. The panel model structure allows for an understanding of how changes in lockdown severity and fiscal stimulus jointly influence consumption growth, accounting for both direct and interaction effects while controlling for country-specific characteristics. The stringency index measures the strictness of measures implemented to control the COVID-19 pandemic. The fixed-effects model is as follows:

$$\Delta C_{it} = \alpha + \beta_1 L_{it} + \beta_2 (L \times F)_{it} + \beta_3 F_{it} + \mu_i + \epsilon_{it}, \tag{9}$$

The dependent variable ΔC_{it} represents the change in consumption growth for country i at time t. It captures the quarter-on-quarter change in three types of consumption: durable goods, non-durable goods, and services. This provides a dynamic measure of economic activity and household expenditure patterns over time. The independent variables of interest are L_{it}, which represents the quarter-on-quarter changes in the *de jure* lockdown stringency index for country i at time t, and $(L \times F)_{it}$, which captures the interaction between stringency index changes and fiscal stimulus for country i at time t. The stringency index reflects the severity of public health restrictions, with positive changes indicating increased stringency and negative changes indicating decreased stringency. In an extension, I replace this measure with a mobility index reflecting the *de facto* severity of lockdown measures. This measure is based on Google mobility data that tracks the actual response to lockdown policies. It represents a weighted average of movement trends over time by geography, across different categories of places such as retail and recreation, groceries and pharmacies, parks, transit stations, workplaces, and residential areas. The model controls for the stand-alone effects of fiscal stimulus in the variable F_{it}.

The interaction term $(L \times F)_{it}$ examines how the relationship between changes in the stringency index and consumption growth is modified by fiscal stimulus. The model includes fixed effects (μ_i) to control for unobserved, time-invariant characteristics specific to each country, isolating the effects of the independent variables on the dependent variable more accurately. The fixed-effects (within) regression methodology is employed to account for both within-group and between-group variations, controlling for unobserved heterogeneity by focusing on within-group differences. This approach is particularly

useful for examining the impact of policies within the same country over time, as it removes the bias from time-invariant country-specific factors. Finally, ϵ_{it} represents the error term, capturing all other factors that may affect consumption growth but are not explicitly included in the model. The robustness of the results is ensured by adjusting the standard errors for clustering at the country level, capturing potential correlations within countries over time. Non-linear effects of lockdowns are anticipated, as consumers are likely to react differently to the implementation of lockdowns compared to the easing of restrictions. To address this, I split both the lockdown effects L_{it} and the interaction term $(L \times F)_{it}$ into positive and negative terms. Thus, the effects are separated based on whether lockdown severity increased or decreased in a given quarter.

4.2.1 Results & discussion

The regression analysis in Table 9 provides the results for the relationship between lockdown stringency and its interaction with fiscal stimulus, and consumption patterns. The hypothesized effect was that fiscal stimulus amplifies shifts in consumption patterns caused by the lockdowns. This effect would be particularly strong for the consumption of durable goods. The regression outcomes show that increases in lockdown stringency significantly reduce consumption across all categories. Specifically, stringent lockdowns lead to a substantial decrease in the consumption of durable goods, non-durable goods, and services. These results align with expectations, as stringent lockdowns restrict economic activity, leading to a sharp decline in consumer spending, particularly for durable goods. Conversely, decreases in lockdown stringency are associated with significant increases in the consumption of durable goods and services. The consumption of durable goods and services increases, while the impact on non-durable goods is not statistically significant. This suggests that easing restrictions allows for a rebound in consumer spending on items and services postponed during stricter lockdowns.

The interaction terms between fiscal stimulus and lockdown stringency reveal that fiscal stimulus does not significantly alter the negative impact of increased lockdown stringency on consumption. However, fiscal stimulus significantly enhances the positive effects of decreased stringency on the consumption of durable goods and services. Specifically, when lockdown measures are relaxed, fiscal stimulus boosts the consumption of durable goods and increases services consumption. This indicates that fiscal stimulus plays a crucial role in boosting consumption when lockdown measures are relaxed. The total fiscal stimulus variable does not show a significant direct impact on consumption levels when not interacted with stringency measures, suggesting that its effectiveness is context-dependent and interacts with lockdowns to have a real effect. The R-squared values indicate that the model explains a substantial portion of the variance for each consumption category, especially for services, with an R-squared value of 0.542, suggesting a robust model fit.

Table 9: Fiscal Stimulus & Consumption under Lockdowns

	Durable Goods	Non-Durable Goods	Services
stringency increase	-0.435***	-0.115***	-0.263***
	(0.065)	(0.022)	(0.031)
stringency decrease	0.346**	0.065	0.179**
	(0.129)	(0.043)	(0.062)
fiscal × stringency increase	0.018	-0.010	-0.016
	(0.023)	(0.008)	(0.011)
fiscal × stringency decrease	0.230**	0.018	0.065*
	(0.078)	(0.026)	(0.037)
fiscal	-0.269	0.102	0.348
	(0.646)	(0.214)	(0.309)
intercept	7.386***	2.400***	2.903***
	(1.593)	(0.529)	(0.762)
Number of obs	216	216	216
Number of groups	36	36	36
R-squared (Within)	0.435	0.338	0.542

Note: The dependent variables are calculated based on quarterly growth rates. Stringency represents an index with January 1, 2020, as the baseline (0). The correlation of the random effects with the regressors is assumed to be zero ($\text{corr}(u_i, X) = 0$). Standard errors are shown in parentheses. Significance levels: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

In extending these interaction effects to other relevant variables, similar effects from lockdowns can be observed, but no significant interaction effects. Table **??** shows the effects of fiscal stimulus and lockdown stringency on industrial production, manufacturing, and unemployment. Increased lockdown stringency significantly reduces industrial production and manufacturing output while increasing unemployment. Easing lockdowns positively affects industrial production and manufacturing but also increases unemployment. The interaction terms between fiscal stimulus and lockdown stringency do not show significant effects, suggesting that fiscal stimulus does not substantially modify the impact of lockdown stringency on production and unemployment. The effects on unemployment are non-sensical as both lockdown stringency increases and decreases have a positive effect on unemployment. The degree of lockdown stringency has a clear negative impact on industrial production and manufacturing while increasing unemployment. Easing restrictions helps recover production but does not significantly reduce unemployment. Fiscal stimulus does not significantly alter these relationships, suggesting other factors like supply constraints were potentially more relevant in the fluctuations of production capacity.

Notably, if the stringency index is replaced by actual mobility data, a replication of the first regression shows a stronger and much more aligned effect of fiscal stimulus on consumption patterns. Table 11 uses actual mobility data from Google to measure the effective impact of lockdowns. These data track movement trends over time by geography, across different categories of places such as retail and recreation, groceries and pharmacies, parks, transit stations, workplaces, and residential areas. This data offers a more granular measure of actual mobility changes compared to the de jure lockdown stringency levels. Positive changes in mobility significantly increase the consumption

Table 10: Fiscal Stimulus and Production & Unemployment under Lockdowns

	Industrial Production	Manufacturing	Unemployment
stringency increase	-0.282***	-0.357***	0.052***
	(0.038)	(0.039)	(0.007)
stringency decrease	0.171**	0.155**	0.036***
	(0.071)	(0.078)	(0.014)
fiscal × stringency increase	-0.012	-0.007	-0.003
	(0.012)	(0.014)	(0.002)
fiscal × stringency_decrease	0.013	0.025	0.007
	(0.042)	(0.047)	(0.008)
fiscal	0.214	0.103	0.022
	(0.353)	(0.391)	(0.066)
intercept	4.069***	5.276***	-0.690***
	(0.904)	(0.978)	(0.165)
Number of obs	198	210	204
Number of groups	33	35	34
R-squared (Within)	0.501	0.528	0.302

Note: The dependent variables are calculated based on quarterly growth rates. Stringency represents an index with January 1, 2020, as the baseline (0). The correlation of the random effects with the regressors is assumed to be zero ($\text{corr}(u_i, X) = 0$). Standard errors are shown in parentheses. Significance levels: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

of durable goods, non-durable goods, and services. Conversely, negative changes in mobility reduce the consumption of durable and non-durable goods, while the impact on services is not statistically significant. The interaction terms reveal that fiscal stimulus significantly boosts the positive effects of increased mobility on durable goods and services but does not significantly affect the negative impact of decreased mobility.

These findings underscore the significant influence of mobility and fiscal stimulus on consumption during the pandemic. While increased mobility enhances consumption, fiscal stimulus plays a critical role in amplifying this effect, particularly for durable goods and services. Especially the effect on durable goods is very strong, in line with the hypothesized effects and what could be observed from the data.

Table 11: Consumption & Fiscal Stimulus under Mobility changes

	Durable Goods Growth	Non-Durable Goods Growth	Services Growth
mobility increase	0.385^{***}	0.057^{**}	0.167^{***}
	(0.078)	(0.027)	(0.046)
mobility decrease	-0.241^{**}	-0.107^{***}	-0.084
	(0.094)	(0.032)	(0.055)
fiscal × mobility increase	0.203^{***}	0.012	0.080^{***}
	(0.049)	(0.017))	(0.029)
fiscal × mobility decrease	-0.023	-0.019	-0.030
	(0.036)	(0.012)	(0.021)
fiscal	-0.090	-0.088	-0.150
	(0.557)	(0.193)	(0.327)
intercept	1.883	1.733^{***}	-0.278
	(1.669)	(0.578)	(0.980)
Number of obs	216	216	216
Number of groups	36	36	36
R-squared (Within)	0.441	0.261	0.303

Note: The dependent variables are calculated based on quarterly growth rates. The mobility change represents an index with January 1, 2020, as the baseline (100) This index is smoothed to the rolling 7-day average and represents a weighted average of the individual categories. The correlation of the random effects with the regressors is assumed to be zero ($\text{corr}(u_i, X) = 0$). Standard errors are shown in parentheses. Significance levels: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

4.2.2 Robustness

To determine the robustness of the quarterly results I test the model with the alternative measure of fiscal stimulus, as in section 4.1 called government spending. The results are presented table 12. Unlike in the first analysis, government spending appears to not have any effect on consumption growth. Part of the reason could be that, unlike in the previous section, the government spending variable is not updated on quarterly basis. Potentially this still could have effected the interaction variable, but results show this is not the case. Additionally, in the appendix table 20 both the new government spending variable and the mobility variable are interacted, largely in line with previous results. Only government spending does not seem to significantly impact durable goods growth to the same degree as in the baseline analysis, although the effect of a mobility increase is similarly in size.

Table 12: Consumption & Fiscal Stimulus under Lockdowns

	Durable Goods Growth	Non-Durable Goods Growth	Services Growth
stringency increase	-0.453^{***}	-0.153^{***}	-0.287^{***}
	(0.085)	(0.028)	(0.041)
stringency decrease	0.345	0.169^{**}	0.226^{**}
	(0.214)	(0.071)	(0.103)
govspending × stringency increase	0.003	0.002	−0.000
	(0.008)	(0.003)	(0.004)
govspending × stringency decrease	0.018	-0.012^{*}	−0.001
	(0.022)	(0.007)	(0.011)
govspending	0.446	−0.102	0.104
	(0.400)	(0.133)	(0.193)
intercept	6.845^{***}	2.685^{***}	3.112^{***}
	(1.596)	(0.529)	(0.769)
Number of obs	198	198	198
Number of groups	33	33	33
R-squared (Within)	0.417	0.344	0.522

Note: Standard errors adjusted for clusters in country and expressed in parentheses. The dependent variables are expressed as decimals. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

5 Conclusion

This thesis empirically examines the impact of COVID-19 fiscal stimulus on inflation, applying a two-pronged strategy to address both direct, long-term effects and short-term influences via the consumption channel. I specifically investigate the direct relationship between government stimulus and inflation, as well as the indirect effects through the amplification of lockdown-induced shifts in consumption patterns. The analysis combines a cross-county regression approach in combination with a panel-data methodology.

The results suggest a potentially significant role for fiscal policy in creating upward price pressures. First, the longer-term analysis reveals a robust association between COVID-19 fiscal stimulus and inflation. Using a granular measurement, wage support is shown to have the highest effect on headline inflation, supporting the hypothesis that measures which more strongly and directly increase aggregate demand have a greater impact on inflation. This analysis is further extended by distinguishing between domestic and imported, foreign stimulus. The outcomes indicate some evidence of an imported fiscal stimulus pattern impacting inflation, but this is observed only with a simplified measure of fiscal stimulus. Second, the subsequent analysis indicates that fiscal stimulus significantly altered consumption patterns during and after lockdowns, leading to an increase in durable goods consumption. Fiscal stimulus had the most significant impact on consumption during periods of decreased lockdown severity. This shift underscores the critical role of fiscal stimulus in amplifying consumption trends during the pandemic while also highlighting the potential for over-stimulation of demand, which can lead to inflationary pressures.

The findings provide insights into how fiscal policy influences economic behavior and contributes to inflation during the pandemic. The results suggest that while the extensive COVID-19 support packages were to some degree necessary to support the economy and households, their size and scope may have been excessive. The fiscal support appears to have overshot its aim, creating unnecessary high demand, particularly for durable goods, which fueled inflation in the post-pandemic period. This raises important questions about the balance between providing adequate economic support and avoiding unwanted economic outcomes and incentives.

Moreover, the strong association between wage support and the combination of wage and cash handouts with inflation suggests that a substantial part of these direct transfers to individuals and households was unnecessary. These insights are crucial for policymakers, highlighting the need for more targeted and well-informed government support measures in future economic crises. The interaction between fiscal stimulus and the phases of lockdown elevation and reduction also provides important implications. While fiscal stimulus did not significantly alter the negative impact of elevated lockdowns on consumption, it significantly enhanced the positive effects of reduced lockdowns on the consumption of durable goods and services. This indicates that fiscal stimulus plays a crucial role in boosting consumption when lockdown measures are relaxed, further emphasizing the context-dependent effectiveness of such policies. Overall, these findings validate the understanding of the dynamics of fiscal policy and inflation during the COVID-19 pandemic and provide valuable guidance for future economic policymaking.

In conclusion, this thesis contributes to the broader understanding of fiscal policy's role in economic crises. The findings suggest that while fiscal stimulus is essential for economic stability during unprecedented events like the COVID-19 pandemic, it is equally important to calibrate these measures carefully to avoid excessive inflation. Future research should continue to explore the nuances of fiscal policy impacts, particularly in different economic contexts, to provide more refined policy recommendations for managing economic stability and inflation.

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A Annex

A.1 Data Description

Table 13: Data Description and Sources

Variable Name	Description	Source	Limitations
GDP (current US$)	Gross Domestic Product at current market prices in US dollars.	World Bank	Differences in data collection and reporting practices, exchange rate fluctuations, and potential revisions to historical data.
Inflation Rate (annual %)	Annual inflation rate, measured by the consumer price index (CPI).	World Bank	Variability in calculation methods across countries, potential lags in data updates, and incomplete data for some regions.
M3 Broad Money (annual %)	Annual growth rate of broad money, which includes currency, demand deposits, and other liquid assets.	World Bank	Data may not be available for all countries and years, and discrepancies may exist due to different national accounting practices.
Trade as % of GDP	Measures the total trade (exports + imports) as a percentage of GDP.	World Bank	Trade data may be influenced by exchange rate fluctuations, and some countries may have incomplete trade records.
Global Value Chains (GVC) Participation	Measures the extend of a country's integration into global value chains, based on trade data.	OECD	Data coverage may vary across countries and years, and there may be methodological differences in how GVC participation is measured.
Household Final Consumption Expenditure on Non-durable Goods	Measures the expenditure on non-durable goods within households.	OECD	Differences in national accounting practices, potential time lags in data reporting, and varying definitions of non-durable goods.
COVID-19 Stringency Index	A composite measure of the strictness of COVID-19 government response policies.	Our World in Data	Differences in policy implementation and reporting across countries, and potential delays in data updates.

Continued on next page

Table 13 – *Continued from previous page*

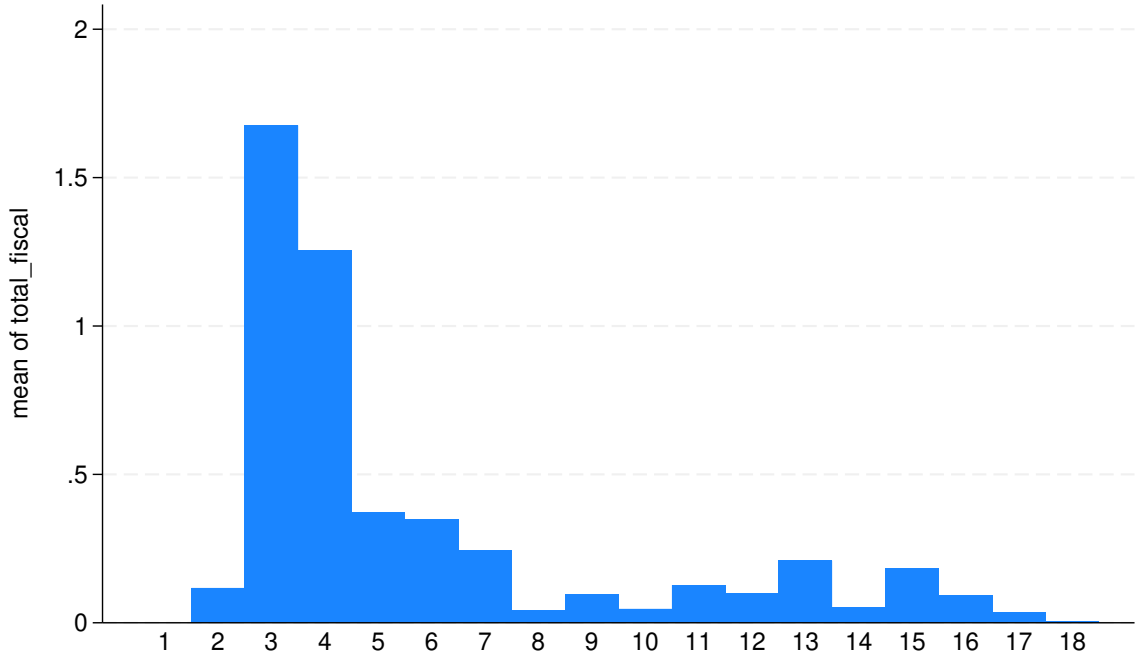
Variable Name	Description	Source	Limitations
COVID-19 Mobility Changes	Measures the changes in mobility trends during the COVID-19 pandemic.	Google COVID-19 Community Mobility Reports	Differences in mobility tracking methods, potential privacy concerns, and variability in data coverage across regions.
OECD Economic Data	Various economic indicators and data collected by the OECD.	OECD Data Explorer	Variability in data collection and reporting across countries, potential time lags, and differing methodologies.
World Economic Outlook (WEO) Database	Economic analysis and data projections.	IMF	Potential discrepancies in data due to different national statistical methods, time lags in data reporting, and revisions of past data.

Table 14: List of Country Codes and Their Corresponding Names

Code	Country	Code	Country	Code	Country
AUS	Australia	HUN	Hungary	PHL	Philippines
AUT	Austria	IDN	Indonesia	POL	Poland
BEL	Belgium	IND	India	PRT	Portugal
BGD	Bangladesh	IRL	Ireland	SGP	Singapore
BRA	Brazil	ISL	Iceland	SVK	Slovakia
CAN	Canada	ISR	Israel	SVN	Slovenia
CHE	Switzerland	ITA	Italy	SWE	Sweden
CHL	Chile	JOR	Jordan	THA	Thailand
CHN	China	KOR	Republic of Korea	USA	United States
COL	Colombia	LTU	Lithuania	ZAF	South Africa
CYP	Cyprus	LUX	Luxembourg		
CZE	Czechia	LVA	Latvia		
DEU	Germany	MAR	Morocco		
DNK	Denmark	MLT	Malta		
ESP	Spain	MYS	Malaysia		
EST	Estonia	NLD	Netherlands		
FIN	Finland	NOR	Norway		
FRA	France	NZL	New Zealand		
GBR	United Kingdom	PER	Peru		
GRC	Greece	PHL	Philippines		
HRV	Croatia				

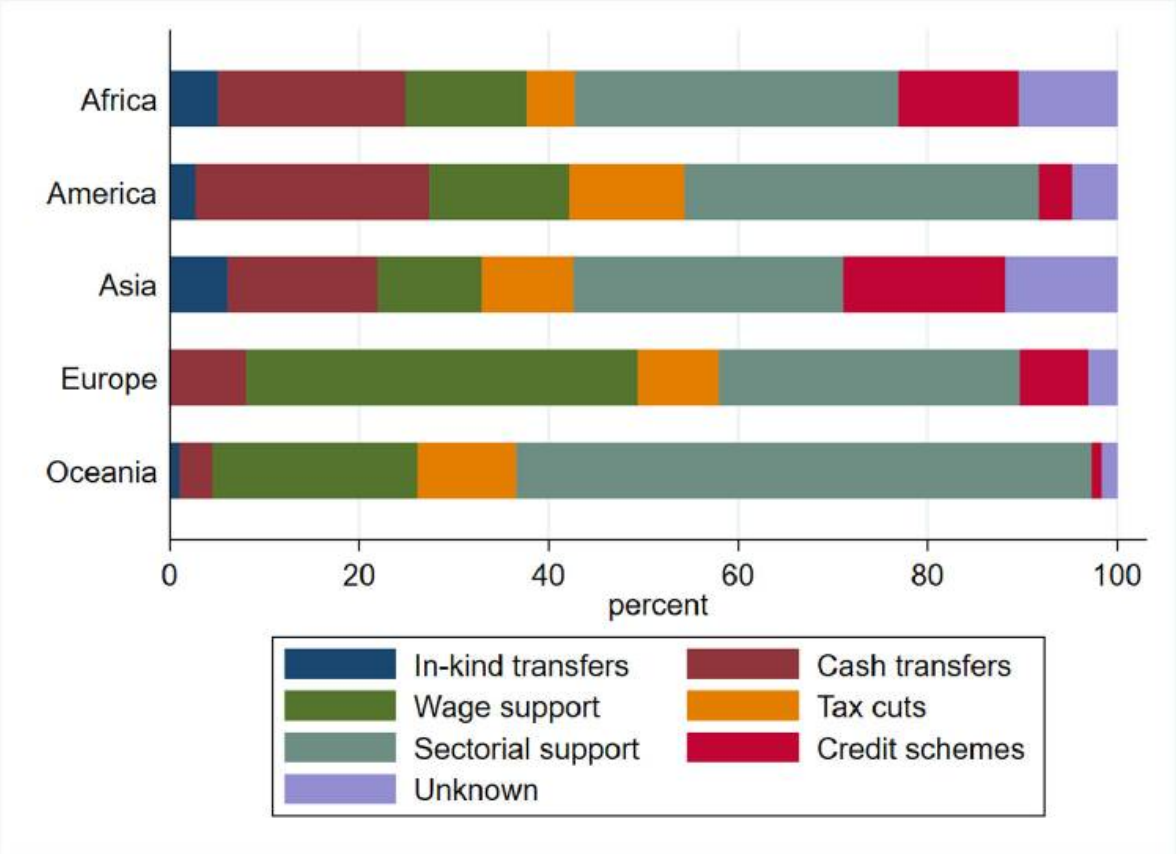
A.2 Additional Figures Data Description

Figure 3: Average Fiscal Stimulus by Month



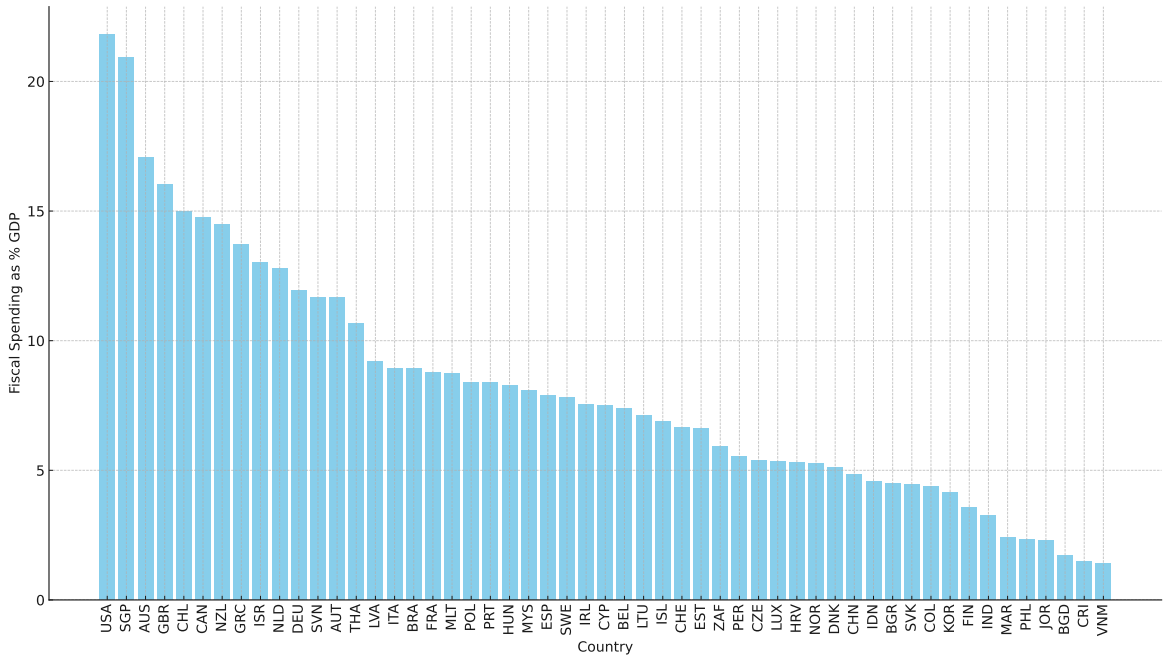
Note: on the X-axis, 1 represents January 2020 with each following month representing the next month. On the Y-axis the average fiscal stimulus is shown

Figure 4: Distribution of Fiscal Spending by Continent



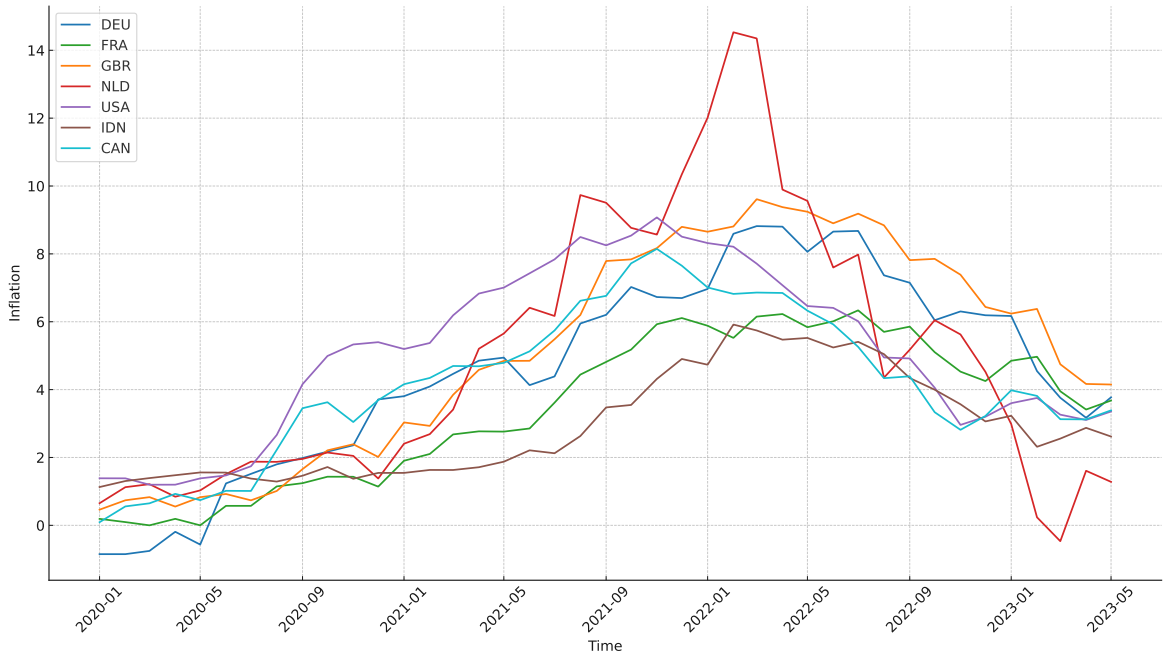
Note: The figure plots the breakdown of fiscal measures in each continent as of June 1, 2021 for 101 countries for which the unknown part of the breakdown is inferior to 1 point of GDP in absolute value. The graphic depiction is taken directly from the original publication by Romer (2021).

Figure 5: Total COVID-19 Fiscal Support by Country February 2020 - June 2021



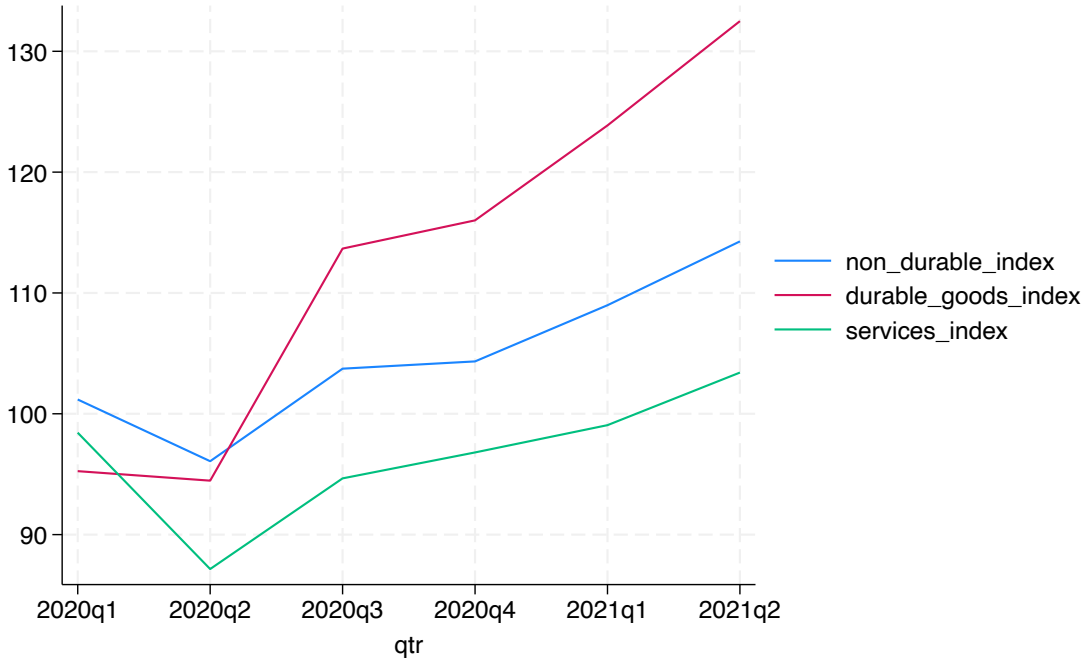
Note: This figure illustrates the total fiscal stimulus measures implemented by various countries from February 2020 to June 2021. Fiscal stimulus is represented as percentage of 2019 GDP

Figure 6: Inflation dynamics 2019-2023 of Selected Countries



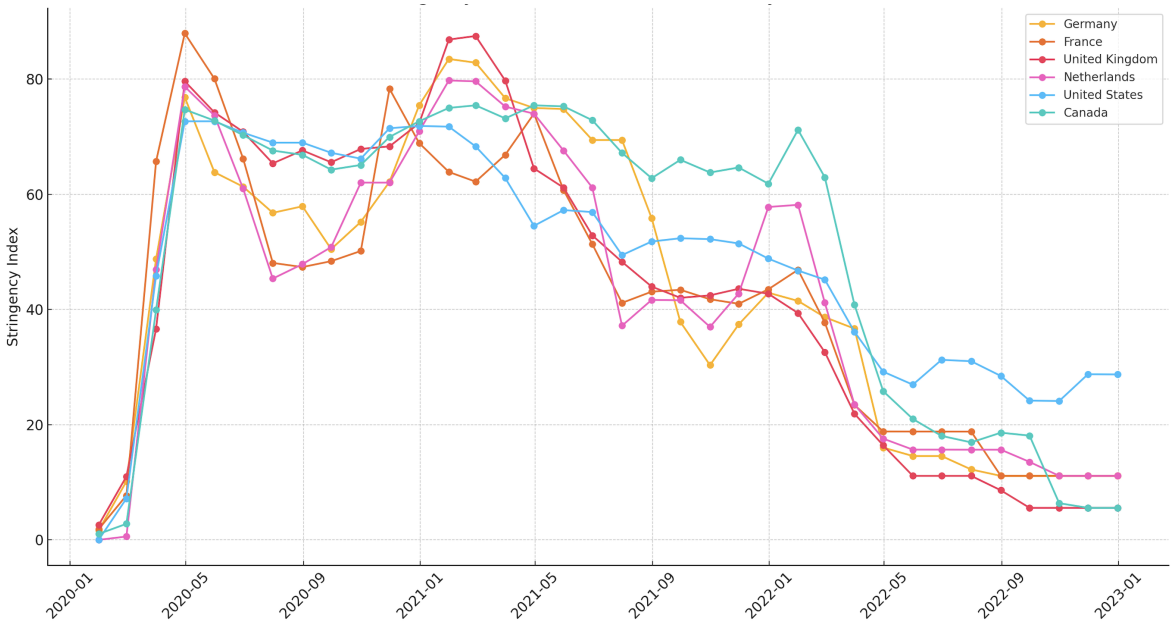
Note: This figure shows the annualized monthly inflation rates from 2020 to 2023 for a selection of countries. The selection is based on an approximate reflection representing regional and developmental sample variation.

Figure 7: Consumption Trends USA



Notes: *Note:* This figure illustrates the relationship between fiscal spending and inflation in the USA. The data points represent monthly observations from January 2020 to June 2021.

Figure 8: Stringency Index for Selected Countries by Month



Note: The stringency index is calculated by taking the average of its sub-categories. This index is smoothed to the rolling 7-day average.

A.3 Robustness tests fiscal policy & inflation

Table 15: Fiscal Stimulus & Headline Inflation on Quarterly Basis

Variable	2021Q2	2021Q2	2021Q3	2021Q3	2021Q4	2021Q4	2022Q1	2022Q1	2022Q2	2022Q2	2022Q4	2022Q4
fiscal	0.12		0.26*		0.40**		0.52**		0.52	0.52	0.35	
	(0.13)		(0.13)		(0.16)		(0.23)		(0.35)	(0.35)	(0.58)	
wage		0.20		0.34**		0.55***		0.78***		0.89**	0.90	0.90
		(0.14)		(0.14)		(0.18)		(0.26)		(0.40)	(0.68)	(0.68)
cash		-0.12		-0.08		-0.10		-0.14		-0.24	-0.62	-0.62
		(0.13)		(0.13)		(0.16)		(0.23)		(0.36)	(0.61)	(0.61)
inkind		-0.02		0.05		0.13		0.19		0.14	-0.16	-0.16
		(0.12)		(0.13)		(0.16)		(0.23)		(0.35)	(0.60)	(0.60)
sectorial		-0.16		-0.10		-0.09		-0.10		-0.10	-0.29	-0.29
		(0.14)		(0.14)		(0.18)		(0.26)		(0.40)	(0.69)	(0.69)
taxc		0.16		0.09		0.06		0.05		-0.03	0.11	0.11
		(0.13)		(0.13)		(0.16)		(0.23)		(0.36)	(0.61)	(0.61)
credit		0.30**		0.30**		0.31*		0.30		0.28	0.49	0.49
		(0.14)		(0.14)		(0.17)		(0.25)		(0.39)	(0.66)	(0.66)
M3supply	0.19		0.18		0.21		0.23		0.29		0.53	
	(0.13)		(0.14)		(0.17)		(0.24)		(0.36)		(0.60)	
trade	0.17		0.17		0.27		0.43*		0.64*		1.16*	
	(0.13)		(0.13)		(0.17)		(0.24)		(0.35)		(0.59)	
intercept	-0.24*	-0.24**	0.34	0.34***	1.29***	1.29***	2.49***	2.49***	3.92***	3.92***	6.75***	6.75***
	(0.12)	(0.12)	(0.13)	(0.12)	(0.16)	(0.15)	(0.22)	(0.22)	(0.34)	(0.34)	(0.58)	(0.58)
Observations	53	53	53	53	53	53	53	53	53	53	53	53
R-squared	0.08	0.20	0.14	0.25	0.19	0.29	0.17	0.25	0.12	0.14	0.09	0.08

Note: The dependent variable excess inflation is constructed by subtracting the average 2015-2019 inflation from the 2021 full year inflation. The independent variables are standardized by dividing by their respective standard deviation. Note that 2021Q4 does not match with the 2021FY regression as for quarterly inflation different statistical measurement is used.Standard errors in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 16: Fiscal Stimulus & Core Inflation

Variable	2021Q2	2021Q2	2021Q3	2021Q3	2021Q4	2021Q4	2022Q1	2022Q1	2022Q2	2022Q2	2022Q4	2022Q4
fiscal	-0.52		-0.38		-0.27		-0.16		-0.17		-0.43	
	(0.39)		(0.40)		(0.42)		(0.43)		(0.47)		(0.54)	
wage		0.05		0.12		0.18		0.26		0.24		-0.03
		(0.35)		(0.36)		(0.38)		(0.41)		(0.46)		(0.54)
cash		-0.44		-0.37		-0.32		-0.25		-0.24		-0.38
		(0.28)		(0.29)		(0.31)		(0.32)		(0.36)		(0.43)
inkind		-0.15		-0.17		-0.16		-0.07		-0.03		-0.05
		(0.29)		(0.31)		(0.32)		(0.34)		(0.39)		(0.46)
sectorial		-0.70*		-0.60*		-0.54		-0.54		-0.58		-0.80
		(0.33)		(0.34)		(0.36)		(0.38)		(0.43)		(0.51)
taxc		0.06		0.15		0.25		0.34		0.37		0.56
		(0.36)		(0.38)		(0.40)		(0.42)		(0.47)		(0.56)
credit		0.89**		0.87***		0.87**		0.89**		0.94**		1.13**
		(0.29)		(0.30)		(0.32)		(0.34)		(0.38)		(0.45)
M3supply	0.25		0.29		0.39		0.52		0.65		1.02**	
	(0.35)		(0.36)		(0.38)		(0.39)		(0.42)		(0.49)	
trade	-0.01		-0.01		0.06		0.15		0.27		0.50	
	(0.33)		(0.34)		(0.35)		(0.36)		(0.39)		(0.45)	
intercept	0.36	0.11	0.51	0.27	0.86	0.66	1.39***	1.22***	2.02***	2.16***	4.06***	3.96***
	(0.41)	(0.34)	(0.42)	(0.35)	(0.44)	(0.37)	(0.45)	(0.40)	(0.44)	(0.49)	(0.57)	(0.53)
Observations	30	30	30	30	30	30	30	30	30	30	30	30
R-squared	0.07	0.38	0.05	0.34	0.05	0.31	0.07	0.30	0.27	0.09	0.16	0.28

Note: The dependent variables are constructed by subtracting the average 2015-2019 inflation from the 2021 full year inflation. The independent variables are standardized by dividing by their respective standard deviation. Standard errors in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 17: Government Spending & Headline Inflation

Variable	2021Q2	2021Q3	2021Q4	2022Q1	2022Q2	2022Q3	2022Q4	2023FY
fiscal (std_govspending)	0.27**	0.41***	0.60***	0.91***	1.24***	1.49***	1.65***	0.92**
	(0.12)	(0.12)	(0.15)	(0.21)	(0.31)	(0.43)	(0.54)	(0.41)
M3supply	0.19	0.21	0.24	0.27	0.31	0.35	0.49	0.82*
	(0.13)	(0.13)	(0.15)	(0.21)	(0.31)	(0.44)	(0.54)	(0.42)
trade	0.11	0.10	0.16	0.27	0.40	0.59	0.79	0.75
	(0.13)	(0.13)	(0.16)	(0.22)	(0.32)	(0.45)	(0.56)	(0.43)
intercept	-0.24*	0.34***	1.29***	2.49***	3.92***	5.51***	6.75***	4.31***
	(0.12)	(0.12)	(0.14)	(0.20)	(0.30)	(0.42)	(0.52)	(0.40)
Observations	53	53	53	53	53	53	53	53
R-squared	0.15	0.24	0.31	0.34	0.30	0.26	0.23	0.21

Note: The dependent variables are constructed by subtracting the average 2015-2019 inflation from the 2021 full year inflation. The independent variables are standardized by dividing by their respective standard deviation. Standard errors in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 18: Government Spending & Core Inflation

Variable	2021Q2	2021Q3	2021Q4	2022Q1	2022Q2	2022Q3	2022Q4
govspending	-0.12	0.01	0.19	0.45	0.69	0.81	0.84
	(0.44)	(0.45)	(0.46)	(0.47)	(0.50)	(0.53)	(0.58)
M3supply	0.19	0.23	0.32	0.43	0.52	0.67	0.82*
	(0.37)	(0.37)	(0.38)	(0.39)	(0.41)	(0.44)	(0.48)
trade	0.02	-0.002	0.05	0.12	0.22	0.36	0.44
	(0.34)	(0.34)	(0.35)	(0.36)	(0.38)	(0.41)	(0.44)
intercept	0.19	0.35	0.70	1.19**	1.89***	2.78***	3.64***
	(0.41)	(0.41)	(0.42)	(0.43)	(0.46)	(0.50)	(0.54)
Observations	30	30	30	30	30	30	30
R-squared	0.01	0.02	0.04	0.09	0.14	0.19	0.20

Note: The dependent variables are constructed by subtracting the average 2015-2019 inflation from the 2021 full year inflation. The variable govspending is calculated by projecting the 2015-2019 trendline in government spending on 2020 and 2021 and substracting this from the real 2020 and 2021 numbers. The independent variables are standardized by dividing by their respective standard deviation. Standard errors in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 19: Foreign Government Spending and Excess Inflation

Variable	(1)	(2)	(3)	(4)	(5)	(6)
import	0.2882	0.3512**				
	(0.1647)	(0.1509)				
export			0.1438	0.2369		
			(0.1684)	(0.1563)		
sumImEx					0.2159	0.2967*
					(0.1669)	(0.1538)
govspending		0.4830***		0.4927***		0.4912***
		(0.1515)		(0.1570)		(0.1543)
M3supply		0.1847		0.1666		0.1762
		(0.1525)		(0.1569)		(0.1549)
intercept	1.2198***	1.2198***	1.2198***	1.2198***	1.2198***	1.2198***
	(0.1631)	(0.1478)	(0.1668)	(0.1522)	(0.1653)	(0.1501)
Observations	53	53	53	53	53	53
R-squared	0.0566	0.2564	0.0141	0.2112	0.0318	0.2325

Note: The dependent variable is average excess inflation over 2021. Standard errors are in parentheses. Significance levels: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

A.4 quarterly regression robustness

Table 20: Consumption and Government Spending under Mobility Changes

	Durable Goods Growth	Non-Durable Goods Growth	Services Growth
mobility increase	0.640***	0.155***	0.268***
	(0.121)	(0.041)	(0.071)
mobility decrease	−0.234*	−0.205***	−0.094
	(0.121)	(0.041)	(0.071)
mobility increase × govspending	0.039	0.012	0.012
	(0.025)	(0.008)	(0.015)
mobility decrease × govspending	−0.055***	−0.009	−0.021**
	(0.016)	(0.005)	(0.010)
govspending	0.021*	−0.003	0.009
	(0.012)	(0.004)	(0.007)
intercept	1.116	1.320***	−0.865
	(1.412)	(0.475)	(0.832)
Number of obs	216	216	216
Number of groups	36	36	36
R-squared (Overall)	0.376	0.261	0.251

Note: Standard errors expressed in parentheses. The dependent variables are expressed as decimals. Significance levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.