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Explaining Differences in Pandemic Inflation Across Countries

Steve Kamin, John Kearns, and Michael R. Strain*

May 26, 2022

I. Introduction and Summary

Consumer price inflation in the United States registered 8.2 percent in April 2022, as measured by the consumer price index (CPI). Core CPI inflation, which excludes the costs of energy and food, printed at 6.1 percent. These are the highest rates since the early 1980s, and have understandably been the focus of concern among policymakers, observers, businesses, and households.



Chart 1: U.S. Headline and Core CPI 12-Month Inflation

Source: Federal Reserve Bank of St Louis FRED

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A rough consensus has emerged over the causes of this inflationary surge, although

different observers place different weights on these factors:

- The global surge in energy and other commodity prices;
- Supply-chain disruptions caused by the COVID-19 pandemic;
- Surges in demand resulting from the easing of the pandemic combined with fiscal transfers to households;
- Sectoral bottlenecks that emerged as the pandemic triggered changes in the composition of demand: higher demand for goods relative to services, higher sales of information technology products, etc.;
- Reductions in labor supply caused by pandemic fears, child-care needs, and work disincentives due to pandemic-related fiscal support; and
- Highly accommodative monetary policy.

To assess the relative importance of these factors in driving the surge in inflation, analysts have generally relied on models of inflation estimated during the preceding, pre-pandemic period.¹ This is a reasonable approach, but it is complicated by the possibility that the dynamics of the inflationary process may have changed since the advent of the pandemic.

In this paper, we explore an alternative approach that is rooted in the fact that the United States is not the only country experiencing a sharp increase in inflation. We assess the relative importance of the factors described above in explaining the variation in inflation across countries. We focus on core inflation because the boost to energy and food prices is a global shock affecting all economies (albeit to varying degrees). And we focus on the advanced economies, excluding emerging market and developing economies, in order to limit our dataset

¹ See, among others, Gagnon (2022) and Reifschneider and Wilcox (2022).

to a more homogeneous group of countries whose experiences are more likely to shed light on the causes and correlates of inflation in the United States.²

U.S. inflation is at or near the top of advanced economies, but its surge is hardly unique. The charts below compare U.S. headline and core (excluding food and energy) inflation to that in other advanced economies (AEs), based on March 2022 data.





In the next section of this paper, we present estimation results for cross-sectional

regressions relating core inflation rates to a suite of potentially relevant explanatory variables,

taken one by one. This analysis is used to identify a set of key variables that we then use in

² A number of analyses have addressed the international surge in inflation, including IMF (2021), World Bank (2021), Akinci et al. (2022), and Jorda et al. (2022). However, these analyses generally lean on models estimated in the pre-pandemic period; this is the first research we are aware of that exploits the cross-country variation in inflation to identify its correlates.

multivariate regressions, described in Section III. We compare the predictions of these multivariate regressions to actual inflation rates, and we decompose their predictions into the contributions of the separate explanatory variables. Section IV concludes.

To preview our results, after estimating 32 bivariate cross-country regressions, we found that the variable that was most robustly correlated with core inflation across advanced economies is the economies' pre-pandemic rate of core inflation. Chart 3 below shows the relationship in a bivariate regression between trend pre-pandemic core inflation — which we define as the average 12-month inflation rate from January 2017 through December 2019—and the 12-month inflation rates recorded in March of this year among the advanced economies we consider.

Chart 3: Core Inflation and Pre-Pandemic Trend Core Inflation



 $y = 1.37 + 1.76 \cdot x$, pvalue = 0.00, $R^2 = 0.45$

Source: OECD, CEIC

We estimate that a 1 percentage point rise in pre-pandemic inflation is correlated with a 1.76 percentage point rise in March 2022 inflation. Thus, the wide dispersion in pre-pandemic core inflation rates shown on the X-axis — from nearly zero for Japan and Switzerland to over 2 percent for the United States and United Kingdom — translates into an even wider range of inflation outcomes more recently. Much of the high inflation in the United States is statistically explained by its relatively high inflation in the years preceding the pandemic.

The 1.76 slope of the regression line indicates that higher rates of pre-pandemic inflation are not only associated with higher current inflation, but also with larger increases in current inflation over pre-pandemic inflation. This may be seen more clearly in the chart below, which relates its pre-pandemic trend to the latest core inflation reading minus its trend. Although the significance and explanatory power of the trend line is lower, the magnitude of the slope coefficient is large.



Chart 4: Gap between Recent and Pre-Pandemic Core Inflation, and Pre-Pandemic Core Inflation

We do not have a strong explanation for the correlations depicted in Charts 3 and 4. Our aim in this paper is simply to document this empirical correlation. We speculate that economies with higher inflation might have more loosely anchored inflation expectations, as well as wageand price-setting mechanisms that are more closely influenced by those expectations. Therefore, countries with higher rates of pre-pandemic inflation may have exhibited greater inflationary pressures in response to the many factors pushing up prices over the past year, including the global surge in commodity prices, fiscal policy that boosted aggregate demand, supply-chain disruptions, and production bottlenecks. However, further research is needed to assess whether that hypothesis is the appropriate explanation for the correlations indicated above.

The fact that the U.S. inflation is well above of that of most other advanced economies could be taken to mean that wage and price dynamics in the United States are especially inflationary. However, U.S. inflation averaged only 1.77 percent (and core inflation only 1.85 percent) in the decade preceding the pandemic, suggesting no indication of a bias toward inflationary excess. Our view is that rather than the United States being especially inflationary, many of the other advanced economies exhibited a bias toward insufficient or below target inflation, and this may help to explain their much lower inflation as of late.

In addition, as may be seen in Charts 3 and 4, U.S. inflation lies well above the regression line, so at least some of its inflationary surge seems attributable to factors other than pre-pandemic inflation. We explore those other factors in the rest of this paper. We estimate a series of bivariate regressions, as noted above, and find that among a broad array of indicators, only a few measures help to further explain differences in core inflation rates among

advanced economies: the change in job vacancies, the growth in real private consumption, a measure of "excess saving" during the pandemic period, and the growth of M2. These factors suggest a substantial role for fiscal and monetary stimulus in explaining current U.S. inflation by stimulating demand in labor and product markets.

Our preferred model is parsimonious, and predicts (in sample) U.S. 12-month core inflation of 6.6 percent, close to its actual March value of 6.4 percent. Of that prediction, 3.4 percentage points represents the contribution of pre-pandemic inflation and 2.6 percentage points stems from the rise in U.S. job openings over the past couple of years, which has been driven in part by fiscal stimulus and accommodative monetary policy.³ Another model, which also explains cross-country variations in inflation well but is less parsimonious, attributes about 2.9 percentage points of U.S. core inflation to pre-pandemic inflation, 2.0 percentage points to M2 growth, and 2.0 percentage points to the rise in vacancies.

In sum, our research supports the views of other economists that much of the rise in U.S. inflation owes to strongly rising demand.⁴ However, as noted earlier, it highlights an additional factor largely ignored in recent commentary: the role of our moderately high (compared to other advanced economies) pre-pandemic inflation in also supporting current high inflation rates. This finding does not excuse policymakers from their responsibility to contain and reduce current high inflation rates. It also does not absolve them from having contributed to inflation by boosting demand more than was appropriate or advisable. However,

³ Barnichon, Oliveira, and Shapiro (2021) find that the vacancies-to-unemployment ratio plays a key role in the Philips curve relationship linking inflation to economic activity, and contributed to the recent inflationary surge. High job vacancies have also been cited by Federal Reserve Chair Jerome Powell as a factor in recent high inflation rates.

⁴ See, among others, Furman (2021), Blanchard (2021, 2022), Gagnon (2022), Strain (2021a, 2021b, 2022) and Summers (2021a, b).

it does emphasize that much of the surge in inflation in the United States and elsewhere was not solely the result of policy choices: it likely resulted from the interaction of pre-existing inflationary dynamics with shocks to aggregate supply and demand, and to commodity prices. As we noted above, we do not have a clear understanding of the exact nature of that interaction, and further research is needed.

II. Identifying Predictors

In this section, we aim to take a more systematic approach to identify the strongest predictors of the pandemic surge in inflation in advanced economies (AEs). We examine roughly thirty economic indicators summarizing aggregate economic activity (e.g., the output gap), consumer demand (e.g., real durables consumption and excess saving), labor market conditions (e.g., the unemployment rate, labor force participation, job vacancies, wage growth), supply chain disruptions (e.g., shipping delays, COVID cases), and fiscal and monetary stimulus (e.g., government expenditures, M2). The results of these regressions will be used to inform the construction of multivariate equations, to be described in the next section below.

Table 1 below summarizes the results of this analysis. Each row presents a different cross-sectional regression of the March 2022 print of 12-month core CPI inflation on its pre-pandemic average for 2017-2019 and a single predictor. (The first row is for a regression that includes only pre-pandemic inflation as an explanatory variable.) The first column of the table shows the estimated coefficient on the variable being examined. The second column shows the estimated coefficient on the pre-pandemic core inflation rate, while column 3 shows the R².

The comparison of R² across regressions is difficult, since different numbers of observations are available for different explanatory variables. To provide a sense of the

additional explanatory power associated with each variable, column 4 shows that regression's R^2 minus the R^2 of a regression using the same observations, but including only pre-pandemic inflation as an explanatory variable.

The results indicate, first, that the coefficient on pre-pandemic inflation is robustly significant across all regressions, and usually is near 2. This means that advanced economies with higher pre-pandemic core inflation than their neighbors not only have experienced higher 2022 inflation, but also a larger increase in their inflation from the pre-pandemic period.

Besides pre-pandemic core inflation, very few other variables we consider help to explain differences in inflation rates across countries. First, measures of household spending: changes in real private consumption between 2019 and 2021, and the cumulative amount of excess saving during 2020 and 2021. Second, the two measures of job vacancies — scaled by population and by labor force—are statistically significant and add materially to the regression R². Finally, the percent change in M2 is a significant and substantial explainer of cross-country variations in core inflation.

The change in real wage growth is also significant, but as it has the wrong—negative sign, we interpret this as an outcome rather than driver of differences in inflation across countries. The fact that measures of job vacancies are significant explainers of inflation while measures of wage growth are not could indicate that the rise in vacancy ratios is proxying for heavy demand and is leading to rising markups rather than wage-push inflation.

The results point to differences in demand growth rather than supply constraints driving differences in inflation across countries. Measures of supply disruptions — pandemic spreads, pandemic lockdown restrictions, waiting time in ports, changes in labor force participation — do not have explanatory power.

		Covariate Coef.	Trend Inflation Coef.	R ²	Added R ²	# Obs.
		(1)	(2)	(3)	(4)	(5)
(1)	Trend 2017-2019 Core Inflation	-	1.8***	0.45	-	28
	Aggregate economic activity					
(2)	Δ Real GDP 2019 to 2021	0.045	1.8***	0.47	0.02	28
(3)	2021 average output gap	-0.012	1.7***	0.45	0	28
(4)	Δ output gap 2019 to 2021	-0.026	1.7***	0.45	0	28
	Consumption demand					
(5)	Δ Real durables consumption 2019 to 2021	0.025	1.6***	0.46	0.03	21
(6)	Δ Real private consumption 2019 to 2021	0.12**	1.6***	0.52	0.07	28
(7)	Δ Real disposable income 2019 to 2020+2021	0.085	1.6**	0.4	0.03	19
(8)	Aggregate excess saving in 2020 + 2021	0.18***	0.66	0.51	0.24	18
	Labor market tightness					
(9)	Average 2021 unemployment rate	0.14	2***	0.52	0.07	22
(10)	Δ Unemployment rate 2019 to 2021	0.14	1.6**	0.46	0.01	22
(11)	Average 2021 EPOP	-0.072	2***	0.5	0.03	24
(12)	Δ EPOP 2019 to 2021	-0.14	1.7**	0.47	0	24
(13)	Δ LFPR 2019 to 2021	-0.15	1.6***	0.49	0.03	26
(14)	Δ Job vacancies/population 2019 to 2021	2.4***	1.6***	0.76	0.15	18
(15)	Δ Job vacancies/unemployed 2019 to 2021	0.023	2.2***	0.65	0.04	18
(16)	Δ Job vacancies/labor force 2019 to 2021	1.5***	1.6***	0.76	0.15	18
	Wage growth					
(17)	2021 Nominal wage growth	0.13	1.5***	0.43	0.03	25
(18)	Δ Nominal wage growth 2019 to 2021	-0.15	1.8***	0.44	0.04	25
(19)	2021 Real wage growth	-0.15	1.7***	0.44	0.04	25
(20)	Δ Real wage growth 2019 to 2021	-0.37***	1.8***	0.65	0.25	25
	Supply chain disruptions					
(21)	Δ Durables/consumption ratio 2019 to 2021	26	1.6***	0.45	0.02	21
(22)	2021 average Oxford Stringency Index level	0.024	1.8***	0.47	0.02	27
(23)	Δ Days spent in port (all ships)	1.7	1.8***	0.49	0.01	24
(24)	Δ Days spent in port (Container ships)	1.1	1.7***	0.45	0.01	23
(25)	Total COVID-19 cases per million	3.40E-06	1.8***	0.46	0.01	27
(26)	Total COVID-19 deaths per million	0.00023	1.7***	0.46	0.01	27
	Fiscal and monetary stimulus					
(27)	COVID-19 Fiscal Stimulus (IMF measure)	0.042	1.6***	0.47	0.03	27
(28)	Δ Government Expenditure 2019 to 2020+2021	0.076	1.7***	0.47	0.02	27
(29)	Δ Government net lending 2019 to 2020+2021	0.0025	1.8***	0.45	0	27
(30)	Δ M2/GDP 2019 to 2021	0.06*	1.8**	0.47	0.07	21
(31)	Δ M2 2019 to 2021	0.071***	1.6***	0.57	0.11	24
	Corporate greed					
(32)	2016 price markup	0.061	1 9**	0 41	0	22

Table 1: Cross-Section Regressions for Core Inflation

Note: This table uses date from CEIC, OECD, Dong, Du and Gardner (2020), Hale et al. (2021), IMF, ILO, United Nations, and De Loecker and Eeckhout (2021). This table presents quasi-bivariate regression results for the following model: Recent core inflation (March 2022) on average core inflation from 2017 through 2019 and an economic variable of interest. Column 1 presents the coefficient on economic variable listed to the left in the quasi-bivariate regression model. Column 2 presents the coefficient on trend core inflation. Column 3 presents the R² of the regression while Column 4 shows the added explanatory power over a regression with the same observations and trend inflation as the only regressor. Standard errors (in parentheses) are heteroscedasticity-robust. Definitions of variables can be found in Appendix 1. *p < 0.10; **p < 0.05; **p < 0.01

III. Decomposition Analysis

In Table 2 below, columns 1 through 5 provide additional detail on those regressions already presented in Table 1 where explanatory variables were statistically significant. Columns 6, 7, and 8 assess the effect of combining some of the variables into the same regression. The interpretation is, again, complicated by the very small number of observations. However, it appears that, besides pre-pandemic inflation, two indicators are the most robust predictors of differences in inflation across countries: vacancies and M2. Both the excess savings and real private consumption growth variables become insignificant when combined with the vacancies variable, but M2 remains significant. These correlations indicate a potentially significant role for fiscal and monetary stimulus in explaining the inflationary surge.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(Intercept)	1.37 ^{**} (0.63)	0.68 (0.58)	1.46 ^{**} (0.59)	1.85 ^{***} (0.63)	0.14 (0.68)	1.75 ^{**} (0.77)	0.77 (0.59)	0.16 (0.50)
Trend 2017-2019 Core Inflation (%)	1.76 ^{***} (0.46)	1.63*** (0.46)	0.66 (0.44)	1.59*** (0.44)	1.58 ^{***} (0.43)	0.50 (0.73)	1.65*** (0.50)	1.39*** (0.51)
Change in job openings rate (vacancies/labor force) from 2019 to 2021 (%)		1.48*** (0.39)				1.01* (0.52)	1.35** (0.57)	1.17** (0.48)
Aggregate excess saving to 2019 GDP (through Q4 2021)			0.18 ^{***} (0.06)			0.11 (0.07)		
Percent change in real private consumption from 2019 to 2021 (%)				0.12 ^{**} (0.05)			0.04 (0.09)	
Percent change in M2 from 2019 to 2021 (%)					0.07 ^{***} (0.02)			0.05 ^{**} (0.02)
Mean Absolute Error	0.89	0.64	0.65	0.82	0.77	0.57	0.63	0.58
Adj. R ²	0.43	0.73	0.45	0.48	0.53	0.52	0.72	0.75
Num. obs.	28	18	18	28	24	14	18	17
RMSE	1.16	0.90	0.86	1.10	1.12	0.86	0.93	0.89

Table 2: Additional Detail on Cross-Section Regressions for Core Inflation

Note: This table uses date from CEIC, OECD, IMF, and the ILO. This table presents multivariate regression results for the following model: Recent core inflation (March 2022) on average core inflation from 2017 through 2019 and economic variables of interest. Standard errors (in parentheses) are heteroscedasticity-robust. *p < 0.10; *p < 0.05; ***p < 0.01

The regression results shown in Table 2 suggest that two similar models best explain differences in core inflation across advanced economies: equation (2), which includes prepandemic inflation and job vacancies, and equation (8), which adds M2 to the explanatory variables. The charts below use these regressions to decompose core inflation rates in each country into the contributions of each of the explanatory variables as well as a residual. As shown in the first chart, equation (2) does an excellent job of explaining U.S. core inflation. The contribution of the intercept is negligible. Pre-pandemic inflation is the main contributor to U.S. inflation, accounting for 3.4 percentage points, while the vacancy ratio accounts for 2.6 percentage points.



Decomposition chart for Regression 2

Source: OECD, CEIC, ILO, Dong, Du, and Gardner (2020)

The decomposition using equation (8), shown in the next chart below, includes M2 growth as an explanatory variable in addition to pre-pandemic inflation and vacancies. Despite applying three significant explanatory variables to a slightly smaller set of observations, it overpredicts U.S. inflation by 0.6 percentage point. In this model, pre-pandemic inflation accounts for about 2.9 percentage points of inflation, M2 growth 2 percentage points, and vacancies 2 percentage points.





All told, however, models using pre-pandemic core inflation, the change in job vacancies, and monetary growth well explain both recent U.S. core inflation and its variation across advanced economies.

IV. Conclusion

This paper attempts to explain differences among countries in the rate of core inflation they have experienced in the past year. We identified a number of economic indicators that *did not* explain differences in core inflation across advanced economies. These include, among others: output growth; output gaps; unemployment rates; changes in labor force participation rates; measures of pandemic spread; lockdown restrictions; port slowdowns; fiscal stimulus measures; and a measure of market competition. However, it would premature to write all of these off as contributing factors to the global surge in inflation. First, supply disruptions in

exporting countries, such as China, are likely reducing supplies and boosting prices in importing countries. These disruptions would not be captured in our indicators, which capture only domestic factors. Moreover, supply disruptions in exporting countries would likely raise prices in all or most advanced economies, and thus would not help explain differences in inflation between them.

Second, fiscal stimulus measures were implemented in different ways in different countries, and thus likely boosted demand to different extents. Accordingly, we think it likely that the surge in U.S. excess saving, consumer demand, and job openings did owe, at least in part, to large fiscal support programs, but it simply does not show up in the data we've examined. More research into the channels through which monetary and fiscal stimulus pass through to consumer demand and thus inflation is clearly needed.

Turning to the factors that *did* help to explain differences in core inflation across countries, we identify a key factor little emphasized by other economists: the rate of core inflation in pre-pandemic times. Higher rates of core inflation prevailing before the pandemic are associated with higher rates in the present, as well as larger increases in inflation relative to pre-pandemic levels. We do not have a firm explanation for this empirical correlation. We speculate that economies with higher inflation before the pandemic may have had more loosely anchored inflation and inflation expectation, and that the inflationary process in higherpre-pandemic-inflation countries may have interacted differently with pandemic-era shocks to aggregate supply and demand and to commodity prices. Because the United States had higher pre-pandemic core inflation than many other advanced economies (which struggled with below-target inflation), it ended up having higher core inflation in the present, as well.

But pre-pandemic inflation does not fully explain the variation in inflation rates across countries, nor the high U.S. inflation of the past year. We found that several measures of demand in product and labor markets also helped to explain differences in core inflation rates among advanced economies: the change in job vacancies, the growth in real private consumption, a measure of "excess saving" during the pandemic period, and the growth of M2 over the course of the pandemic.

Our preferred model predicts U.S. 12-month core inflation of 6.6 percent, close to its actual March value of 6.4 percent. Pre-pandemic inflation contributed 3.4 percentage points and 2.6 percentage points stems from the rise in U.S. job openings over the past couple of years. Another model, which also explains cross-country variations in inflation well but is less parsimonious, attributes about 2.9 percentage points of U.S. core inflation to pre-pandemic inflation, 2 percentage points to M2 growth, and 2 percentage points to the rise in vacancies. These findings support the views of other economists that much of the rise in U.S. inflation owes to strongly rising demand, driven in large part by fiscal and monetary stimulus.

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Appendix 1: Variable Descriptions, Calculations and Sources					
Variable	Description	Calculation	Example	Sources	
(1) Trend 2017-2019 Core Inflation	Average CPI (ex. energy and food) 12-month inflation rate from January 2017 through December 2019.	$\frac{\sum_{i=Jan2017}^{Dec2019} Inflation_i}{36}$	5% trend core inflation is coded as 5.	<u>CEIC</u> (as of May 2, 2022)	
(2) Δ Real GDP 2019 to 2021	The percent change in annual average of seasonally- adjusted real GDP in USD from 2019 to 2021.	$\frac{\$RealGDP_{2021}}{\$RealGDP_{2019}} - 1) * 100$	5% growth in real GDP is coded as 5.	<u>CEIC</u> (as of May 2, 2022)	
(3) 2021 average output gap	Percent difference between actual and trend GDP. Trend GDP is estimated by (1) projecting real, seasonally- adjusted real GDPafter 2019 using an ARIMA function and (2) applying an HP filter to actual data prior to 2020 and forecasted GDP.	(<i>Actual_\$RealGDP</i> ₂₀₂₁ (<i>Trend_\$RealGDP</i> ₂₀₂₁ – 1) * 100	A 5% output gap is coded as 5.	<u>CEIC</u> (as of May 2, 2022)	

(4) Δ Output gap 2019 to 2021	Arithmetic change in output gap from 2019 to 2021.	$ \left(\frac{Actual_{RealGDP_{2021}}}{Trend_{RealGDP_{2021}}} - 1 \right) * 100 \\ - \left(\frac{Actual_{RealGDP_{2019}}}{Trend_{RealGDP_{2019}}} - 1 \right) * 100 $	A 5 percentage point change in the output gap from 2019 to 2021 is coded as 5.	<u>CEIC</u> (as of May 2, 2022)
(5) Δ Real durables consumption 2019 to 2021	Percent change in annual average level of real, seasonally-adjusted private durables consumption from 2019 to 2021.	$(\frac{RealDurablesC_{2021}}{RealDurablesC_{2019}} - 1) * 100$	A 5 percent change in real durables consumption is coded as 5.	<u>OECD</u> (as of May 3, 2022)
(6) Δ Real private consumption 2019 to 2021	Percent change in the annual average level of real, seasonally-adjusted total private consumption from 2019 to 2021.	$(\frac{PrivateC_{2021}}{PrivateC_{2019}} - 1) * 100$	A 5 percent change in real total private consumption is coded as 5.	<u>CEIC</u> (as of May 2, 2022); <u>OECD</u> (as of May 3, 2022)
(7) Δ Real disposable income 2019 to 2020+2021	The percent change in real disposable income of households per capita from 2019 to the average level during 2020 and 2021.	$(\frac{RDI_{2020+2021}/Pop_{2020+2021}}{RDI_{2019}/Pop_{2019}} - 1) * 100$	A 5 percent increase in real disposable income is coded as 5.	<u>OECD</u> (as of May 3, 2022)
(8) Aggregate excess saving in 2020+2021	Total stock of personal saving above 2019 trend, as a share of 2019 nominal GDP. Trend quarterly saving is calculated as the average saving level in 2019.	$\frac{\sum_{i=Q1\ 2020}^{Q4\ 2021} (GrossSaving_i - GrossSaving_{2019})}{NGDP_{2019}}$	Aggregate excess savings equal to 5% of 2019 nominal GDP is coded as 5.	<u>OECD</u> (as of May 3, 2022)
(9) Average 2021 unemployment rate	Average seasonally-adjusted unemployment rate over all months in 2021.	$\frac{\sum_{i=Jan}^{Dec\ 2021} UR_i}{12}$	A 5% unemployment rate is coded as 5.	<u>OECD</u> (as of May 3, 2022)
(10) Δ Unemployment rate 2019 to 2021	Arithmetic change in seasonally-adjusted unemployment rate from 2019 to 2021.	$\frac{\sum_{i=Jan\ 2021}^{Dec\ 2021} UR_i}{12} - \frac{\sum_{i=Jan\ 2019}^{Dec\ 2019} UR_i}{12}$	A 5 percentage point change in the unemployment rate is coded as 5.	<u>OECD</u> (as of May 3, 2022)
(11) Average 2021 EPOP	Average ratio of employed persons to prime-age working population (25-54) in 2021.	$\frac{\sum_{i=Q1\ 2021}^{Q4\ 2021} EPOP_i}{4}$	A 5/100 ratio of employed persons	<u>OECD</u> (as of May 3, 2022)

			to population is	
(12) Δ EPOP 2019 to 2021	Arithmetic change in EPOP from 2019 to 2021	$\frac{\sum_{i=Q1\ 2021}^{Q4\ 2021} EPOP_i}{4} - \frac{\sum_{i=Q1\ 2019}^{Q4\ 2019} EPOP_i}{4}$	A 5 percentage point change in EPOP is coded as 5.	OECD (as of May 3, 2022)
(13) Δ LFPR 2019 to 2021	Arithmetic change in Labor Force Participation Rate from 2019 to 2021	$\frac{\sum_{i=Jan2021}^{Dec2021} LFPR_i}{12} - \frac{\sum_{i=Jan2019}^{Dec2019} LFPR_i}{12}$	A 5 percentage point change in LFPR is coded as 5.	OECD (as of May 3, 2022); CEIC (as of May 2, 2022)
(14) Δ Job vacancies/population 2019 to 2021	Arithmetic change in ratio of job vacancies to working-age population from 2019 to 2021	$\left(\frac{\sum_{i=Q1\ 2021}^{Q4\ 2021} Vacancies_i/WPop_i}{4} - \frac{\sum_{i=Q1\ 2019}^{Q4\ 2019} Vacancies_i/WPop_i}{4}\right)*100$	A 5 percentage point change in the vacancies-to- population ratio is coded as 5.	OECD (as of May 3, 2022); CEIC (as of May 2, 2022)
(15) Δ Job vacancies/unemployed 2019 to 2021	Arithmetic change in ratio of job vacancies to unemployed population from 2019 to 2021	$(\frac{\sum_{i=Q12021}^{Q42021} Vacancies_i / Unemployed_i}{4} - \frac{\sum_{i=Q12019}^{Q42019} \frac{Vacancies_i}{Unemployed_i}}{4}) * 100$	A 5 percentage point change in the vacancies-to- unemployed ratio is coded as 5.	OECD (as of May 3, 2022); CEIC (as of May 2, 2022
 (16) ∆ Job vacancies/labor force 2019 to 2021 	Arithmetic change in ratio of job vacancies to labor force from 2019 to 2021	$\left(\frac{\sum_{i=Q12021}^{Q42021} \frac{Vacancies_i}{LF_i}}{4} - \frac{\sum_{i=Q12019}^{Q42019} \frac{Vacancies_i}{LF_i}}{4}\right) * 100$	A 5 percentage point change in the vacancies-to-labor force ratio is coded as 5.	OECD (as of May 3, 2022); CEIC (as of May 2, 2022
(17) 2021 Nominal wage growth	Growth in nominal wages from 2020 Q4 to 2021 Q4. ILO and CEIC use average monthly earnings, while OECD presents average hourly earnings.	$(\frac{NEarnings_{2021Q4}}{NEarnings_{2020Q4}} - 1) * 100$	5% growth in nominal wages is coded as 5.	ILO (as of May 3, 2022); OECD (as of May 3, 2022); CEIC (as of May 2, 2022

 (18) Δ Nominal wage growth 2019 to 2021 	Arithmetic change in nominal wage growth from 2019 to 2021.	$ \left(\frac{NEarnings_{2021Q4}}{NEarnings_{2020Q4}} - 1 \right) * 100 - \left(\frac{NEarnings_{2019Q4}}{NEarnings_{2018Q4}} - 1 \right) * 100 $	A 5 percentage point change in nominal wage growth is coded as 5.	ILO (as of May 3, 2022); OECD (as of May 3, 2022); CEIC (as of May 2, 2022
(19) 2021 real wage growth	Nominal wage growth in 2021 Q4 minus 4-quarter core inflation in 2021 Q4	$\left(\frac{NEarnings_{2021Q4}}{NEarnings_{2020Q4}} - 1\right) * 100 - Inflation_{2021Q4}$	5% real wage growth is coded as 5.	ILO (as of May 3, 2022); OECD (as of May 3, 2022); CEIC (as of May 2, 2022
(20) Δ Real wage growth 2019 to 2021	Arithmetic change in real wage growth from 2019 to 2021.	$\left(\left(\frac{NEarnings_{2021Q4}}{NEarnings_{2020Q4}} - 1\right) * 100 - Inf_{2021Q4} - \left(\left(\frac{NEarnings_{2019Q4}}{NEarnings_{2019Q4}} - 1\right) * 100 - Inflation_{2019Q4}\right)\right)$	A 5 percentage point change in real wage growth is coded as 5.	<u>ILO</u> (as of May 3, 2022); <u>OECD</u> (as of May 3, 2022); CEIC (as of May 2, 2022)
 (21) Δ Durables/consumption ratio 2019 to 2021 	Arithmetic change in the durables to total private consumption ratio from 2019 to 2021	$\left(\frac{Durables_{2021}}{PrivateC_{2021}}\right) * 100 - \left(\frac{Durables_{2019}}{PrivateC_{2019}}\right) * 100$	A 5 percentage point change in durables consumption as a share of total consumption is coded as 5.	<u>CEIC</u> (as of May 2, 2022); <u>OECD</u> (as of May 3, 2022)
(22) 2021 average Oxford Stringency Index level	Average daily level of the Oxford Stringency Index in 2021	$\frac{\sum_{i=Jan}^{Dec \ 31,2021} OSI_i}{365}$	An average level of 50 is coded as 50.	Hale et al. (2021) (as of May 3, 2022)

(23) Δ days spent in port (all ships)	Arithmetic change in the average number of days spent in port for all ships from 2019 to 2021	$\frac{\sum_{i=H1}^{H2} \sum_{2021}^{2021} DaysinPort}{2} - \frac{\sum_{i=H1}^{H2} \sum_{2019}^{2019} DaysinPort}{2}$	An increase of one day spent in ports is coded as 1.	<u>UNCTAD</u> (as of April 5, 2022)
(24) Δ days spent in port (container ships)	Arithmetic change in the average number of days spent in port for container ships from 2019 to 2021	$\frac{\sum_{i=H1}^{H2} \sum_{2021}^{2021} DaysinPort}{2} - \frac{\sum_{i=H1}^{H2} \sum_{2019}^{2019} DaysinPort}{2}$	An increase of one day spent in ports is coded as 1.	<u>UNCTAD</u> (as of April 5, 2022)
(25) Total COVID-19 cases per million	Total COVID-19 cases per million people in 2020 and 2021	$\sum_{i=Jan1,2020}^{Dec31,2021} NewCases_i / (\frac{Population}{1,000,000})$	50 cases per million is coded as 50.	<u>Dong, Du,</u> <u>and</u> <u>Gardner</u> (2020) (as of May 3, 2022)
(26) Total COVID-19 deaths per million	Total COVID-19 deaths per million people in 2020 and 2021	$\sum_{i=Jan1,2020}^{Dec31,2021} NewDeaths_i / (\frac{Population}{1,000,000})$	50 deaths per million is coded as 50.	<u>Dong, Du,</u> <u>and</u> <u>Gardner</u> (2020) (as of May 3, 2022)
(27) COVID-19 Fiscal Stimulus (calculated by IMF)	Additional spending and foregone revenues in response to the COVID-19 pandemic through October 2021, as a share of 2020 GDP.	-	Spending equal to 50% of GDP is coded as 50.	<u>IMF</u> (as of October 2021)
(28) ∆ Government Expenditure 2019 to 2020+2021	Arithmetic change in total general government expenditure as a share of GDP from 2019 to average of 2020 and 2021	$\frac{GovSpend_{2020+2021}}{NGDP_{2020+2021}} - \frac{GovSpend_{2019}}{NGDP_{2019}}$	A 5 percentage point increase in expenditures as a share of GDP is coded as 5.	<u>IMF</u> <u>October</u> 2021 WEO
(29) ∆ Government Net Lending 2019 to 2020+2021	Arithmetic change in government net lending (revenues minus expenditures) as a share of GDP.	$\frac{GovRevenue_{2020+2021} - GovSpend_{2020+2021}}{NGDP_{2020+2021}} - \frac{GovRevenue_{2019} - GovSpend_{2019}}{NGDP_{2019}}$	A 5 percentage point increase in net lending as a share of GDP is coded as 5.	IMF October 2021 WEO
(30) Δ M2/GDP 2019 to 2021	Arithmetic change in the ratio of the average annual level of	$\frac{M2_{2021}}{NGDP_{2021}} - \frac{M2_{2019}}{NGDP_{2019}}$	A 5 percentage point increase in	<u>CEIC</u> (as of May 2,

M2 to nominal GDP from		the M2 to GDP	2022); <u>IMF</u>
2019 to 2021.		ratio is coded as 5.	(as of May
			3, 2022);
			<u>Condylios</u>
			<u>(2021)</u>
			CEIC (as of
Percent change in annual	M2	A E% increase in	May 2,
average level of M2 from	$\left(\frac{M^2}{M^2}-1\right)*100$	A 5% increase in M2 is coded as E	2022);
2019 to 2021	MZ ₂₀₁₉	IVIZ IS COULU AS 5.	Condylios
			<u>(2021)</u>
The ratio of output price to		The US price	De Loecker
The ratio of output price to		markun is and ad as	and
finanginal cost for a sample of	-	markup is coded as	Eeckhout
tirms in 2016.		1.84.	(2021)
	M2 to nominal GDP from 2019 to 2021. Percent change in annual average level of M2 from 2019 to 2021 The ratio of output price to marginal cost for a sample of firms in 2016.	M2 to nominal GDP from 2019 to 2021.Percent change in annual average level of M2 from 2019 to 2021 $(\frac{M2_{2021}}{M2_{2019}} - 1) * 100$ The ratio of output price to marginal cost for a sample of firms in 2016	M2 to nominal GDP from 2019 to 2021.the M2 to GDP ratio is coded as 5.Percent change in annual average level of M2 from 2019 to 2021 $(\frac{M2_{2021}}{M2_{2019}} - 1) * 100$ A 5% increase in M2 is coded as 5.The ratio of output price to marginal cost for a sample of firms in 2016The US price markup is coded as 1.84.

Appendix 2: Countries Included in Sample						
Australia	Hong Kong	Portugal				
Austria	Iceland	Singapore				
Belgium	Ireland	Spain				
Canada	Italy	Sweden				
Cyprus	Japan	Switzerland				
Denmark	Luxembourg	Taiwan				
Finland	Malta	United Kingdom				
France	Netherlands	United States				
Germany	New Zealand					
Greece	Norway					