Inflation Surprises and Asset Returns: a Macrohistory Perspective*

Chi Hyun Kim[†] Lorenzo Ranaldi[‡] Moritz Schularick[§]

November 26, 2025

Abstract

We examine the relationship between inflation surprises and asset returns across 18 advanced economies from 1870 to 2023 using newly constructed historical inflation surprise data. We document that stocks, housing, and government bond returns decline persistently following unexpected inflation increases, with this relationship intensifying after the 1970s when central banks began responding more aggressively to inflation. Leveraging long-run variation across exchange rate regimes, we test monetary policy responses as the key channel explaining the inflation-asset return nexus. Under fixed exchange rates with open capital accounts, where monetary policy is constrained, real asset returns decline substantially less. Consistent with this mechanism, real dividends and profits fall sharply after inflation surprises in floating regimes but remain stable in pegged countries. These findings demonstrate that inflation affects asset returns primarily through the proxy effect, as monetary tightening depresses future economic activity and cashflows.

*We thank Klaus Adam, Carola Binder, Massimiliano Croce, Yuriy Gorodnichenko, Sydney Ludvigson, Martin Kornejew, Pablo Ottonello, Carolin Pflueger, Vincenzo Quadrini, Farzad Saidi, Frank Schorfheide, Donghai Zhang and participants of the Princeton JRCPPF Annual conference, St Louis Fed Financial & Monetary History Conference, BCFM Conference, CEBRA Annual Meeting, Kiel-CEPR Monetary Policy Conference, EEA Annual meeting, ASSA 2025, and seminar participants at University of St. Gallen, University of Pennsylvania, National University of Singapore, Schumpeter Seminar Berlin, and internal seminars for useful comments and suggestions. This project is generously supported by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy – EXC 2126/1-390838866 and the CRC TR 224 (Project C02-A03).

[†]Humboldt University Berlin

[‡]University of Bonn, Kiel Institute

[§]Kiel Institute, Sciences Po, CEPR

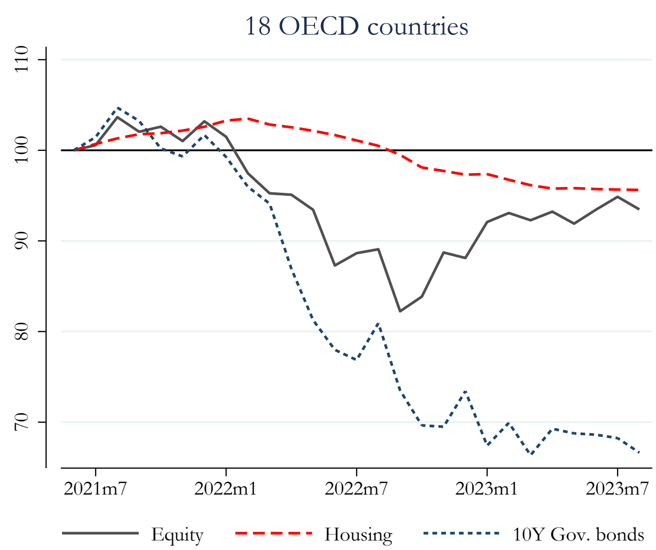
JEL Classification: E31, E44, E52, G12, G15, N12

Keywords: Inflation Hedge, Inflation Expectations, Asset Returns, Monetary Policy

1 Introduction

The global inflation surge of 2021 was followed by large negative responses in real returns of major asset classes, as shown in Figure 1 – a result that traces back to the influential finding of Fama and Schwert (1977). This has revived an old but important question in economics and finance: why do we observe this negative relationship between CPI inflation and asset returns? Despite its importance, the literature has yet to converge on the key driver of this nexus. The main reason for this disagreement lies in the usage of different sample periods and countries, which differ in institutional framework and economic conditions. Moreover, such heterogeneity results in mixed findings in terms of sign, magnitude, and persistence of the relationship between inflation and asset returns, further complicating the search for a comprehensive understanding of this nexus.

Figure 1: Asset price developments during the 2021 inflation surge



Notes: Real indices for equity, housing and 10-year government bonds from June 2021 to August 2023. The lines present the average of 18 OECD countries, i.e. Australia, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, UK, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, and the USA. All indices have been adjusted for inflation using CPI and normalized to 100 in June 2021. Equity: National stock market total return indices. Housing: National house price indices (OECD database). Bonds: Total return indices, 10Y government bonds. Source: Datastream.

Motivated by this heterogeneity, we take a macrohistorical perspective to study the effects of inflation surprises on asset returns. We construct a new dataset of inflation surprises for 18 advanced economies from 1870 to 2023, where we define inflation surprises as the unanticipated difference between realized and expected inflation. We use this dataset to analyze how unexpected inflation affects real returns of three core asset classes: stocks, housing, and long-term government bonds. We digitize archival inflation forecasts from the OECD Economic Outlook for 18 countries, dating back to 1965, covering around 60 years of data. In addition, we estimate inflation expectations based on macroeconomic and financial variables of the Jordà-Schularick-Taylor Macrohistory Database during 1870-2023 using a forecasting model that combines various time series methods. This allows us to increase the sample window considerably. We show that inflation forecasts from these two sources are consistent with the major narrative evidence and mostly overlap in the recent sample.

Using this new dataset, we follow the literature and first estimate the so-called *inflation beta*, which measures the contemporaneous effect of inflation surprises on asset returns (Bekaert and Wang, 2010). A key contribution of our analysis, however, is to move beyond this static measure and study the persistence of this effect. By applying panel local projection methods, we estimate impulse response functions of cumulative asset returns to inflation surprises, which we interpret as *dynamic inflation betas*. This dynamic perspective reveals that real stock returns respond negatively not only on impact but also over the medium run, with only partial recovery in the long run. Government bond returns display a similar pattern, implying that the real stock–bond correlation becomes more positive after inflation surprises.[1] Housing offers a better but still incomplete hedge: while real returns are resilient on impact, they decline persistently in the medium to long run.

How can we explain this negative persistent relationship between inflation and real asset returns? Our long-run analysis indicates that the negative response of real assets intensified after the 1970s, a period during which short-term interest rates exhibited a stronger reaction to inflation surprises. This pattern points to monetary policy as a key driver of the inflation-asset returns nexus, in line with the literature that highlights the general importance of monetary policy in asset price fluctuations (Bernanke and Gertler, 2000; Rigobon and Sack, 2004; Gurkaynak, Sack, and Swanson, 2005). To assess this channel, we exploit the long-run variation in exchange rate regimes in our sample. Specifically, we draw on the trilemma of international finance (Obstfeld and Taylor, 1997; Jordà, Schularick, and Taylor, 2020) and compare the effect of inflation on asset returns in (i) pegged economies with open capital accounts (*open pegs*), where central banks are constrained and cannot freely adjust interest rates, and (ii) floating exchange rate regimes, where monetary authorities retain policy autonomy. Our results confirm the dominant role of monetary policy: in open peg economies, cumulative equity returns barely move after an inflation surprise, while returns are *persistently* affected once the central bank raises interest rates. The absent central bank

[1] This result is at the core of the debate about the changing co-movement of these two asset classes over time (see e.g., Campbell, Pflueger, and Viceira (2020) and David and Veronesi (2013)).

response prevents the economy from falling into a recession, leading to a more favorable outlook for future income flows such as corporate profits, dividends, and rents than in floating economies. This finding supports the proxy effect hypothesis of Fama (1981): returns on real physical assets decline in response to inflation because higher inflation proxies for weaker *future* economic activity. We show that the conduct of monetary policy—aimed at reducing inflation—is the driving force behind this proxy effect. Our empirical results thus support the growing theoretical literature showing how monetary policy generates persistent effects on asset prices through regime changes in policy rules combined with adaptive expectations (Bianchi, Lettau, and Ludvigson, 2022) or forward-looking stabilization that ties asset prices to expected future macroeconomic shocks (Caballero and Simsek, 2024).

An alternative explanation attributes the inflation–asset return relationship to the source of inflation: demand-driven surprises raise returns through stronger economic activity and cash flows, while supply-driven surprises depress them via higher costs and weaker output (Cieslak and Pflueger, 2023). Shifts in this relationship may thus reflect changes in the mix of demand- versus supply-driven shocks rather than monetary policy alone. We test this channel by exploiting the joint correlation between inflation surprises and GDP surprises in pegged countries, where short-term interest rates do not respond to inflation. Similar to our inflation surprise measure, we construct GDP surprises for 18 OECD countries over 1870-2023 using model- and OECD-based forecasts. We find no significant long-run differences in how real physical assets respond to demand- versus supply-driven surprises. On impact, returns do react more positively to demand shocks, but in both cases the overall effect is negative. This can be explained by two factors: first, cashflows adjust only gradually to a change in GDP (Leary and Michaely, 2011). Second, after a supply shock, GDP falls initially but recovers from $t+1$ onward, while after a demand shock, GDP booms on impact but slows down thereafter. The initial benefit of demand shocks is therefore offset by the slow cashflow adjustment coupled with weaker *future* GDP growth. These factors can rationalize both the differential impact response and the similar cumulative response of asset returns after a demand- vs. supply-driven inflation surprise. This result challenges the conclusion of prior studies claiming the source of inflation being the key driver of the inflation-asset returns relationship (Hess and Lee, 1999; Fang, Liu, and Roussanov, 2022; Cieslak and Pflueger, 2023).

Our paper contributes to the literature in three different dimensions. Our first contribution stems from our new long-run dataset of inflation expectations and inflation surprises, which serves as a new source for studying inflation dynamics in the long run for various developed economies. As commonly known, inflation expectations data start only from the late 20th century.[2] Previous literature estimated inflation expectations for historical samples using models or financial markets data for limited time- or country-samples (Hamilton, 1992; Cieslak and Povala, 2015; Ellison, Lee, and O'Rourke, 2024). We digitized archival inflation expectations from the OECD Economic Outlooks, and complement them with forecasts from an auxiliary model that replicates those estimates. Our final inflation surprise series is available for researchers[3] and opens the door for future research on inflation expectations proxies in both modern and historical contexts, which is proved to be essential in studying inflation dynamics (Schmitt-Grohé and Uribe, 2024).

Second, our macro-historical approach clarifies key macroeconomic channels driving the inflation-asset returns relationship by exploiting various regime shifts in policy and economic conditions. So far the literature has focused on two distinct macroeconomic channels.[4] First, Fama (1981) and Geske and Roll (1983) provide evidence on how inflation serves as a proxy for deteriorating economic conditions through monetary aggregates. Alternatively, Hess and Lee (1999) and Cieslak and Pflueger (2023) emphasize the role of the underlying demand and supply disturbances of inflation. Our results show that the primary macroeconomic channel driving the relationship between inflation and asset returns is monetary policy. Our study is the first to supply empirical evidence on this channel despite its relevance, as previously available macroeconomic datasets have precluded a formal test. Specifically, our paper is the first to explicitly model cumulative responses up to five years, thereby capturing the "long and variable lags" of monetary policy (Friedman, 1961) necessary to pin down this channel empirically. Our results thus have important implications for central banks, highlighting how monetary policy reactions to inflation spikes can significantly and persistently disrupt financial markets.

Finally, our long-run cross-country dataset allows us to comprehensively assess not only the sign and magnitude but also the *persistence* of the effect of inflation on asset returns. While Fama and Schwert (1977) were the first to document a negative contemporaneous relationship between unexpected inflation and stock returns, later studies such as Boudoukh and Richardson (1993) emphasized that the correlation turns positive at longer horizons. Other

[2] The earliest comes from the Livingston survey that provides inflation forecast data for the USA from 1951 onward. For other countries, similar data start only in the 1990s (e.g., Consensus economics, central bank forecasts) or they are only in a qualitative format (e.g., EU Business and Consumer survey).

[3] See e.g., Federle, Mohr, and Schularick (2024) for the use of our series in a political economy context.

[4] There exists also behavioral explanations of the negative relationship between inflation and asset returns linked to investors' discount rates. The so-called money illusion (Modigliani and Cohn, 1979) suggests that investors incorrectly discount real cash flows using nominal rates during inflation episodes. Katz, Lustig, and Nielsen (2017) similarly argue for investors' slow adjustments to changing inflation expectations. We do not directly address these channels given the aggregate nature of our data, but we provide suggestive evidence that discount rate channels play only a minor role in the overall negative response.

contributions highlight high-/low-inflation regime dependence (Barnes, Boyd, and Smith, 1999), cross-country heterogeneity (Engsted and Tanggaard, 2000; Bekaert and Wang, 2010), or asset-specific differences, such as housing as a partial hedge (Fehrle, 2023). More recent work shows that the sign of the response turned positive in the post-2000s (Chaudhary and Marrow, 2022), that energy and core inflation matter differently (Fang, Liu, and Roussanov, 2022), and that markets interpret inflation as a cost shock for firms (Knox and Timmer, 2025). Our contribution is to go beyond static betas by estimating dynamic long-run inflation betas, which reveal that the effect of inflation surprises on asset returns is not only negative on impact but remains persistently so across time and countries, with the magnitude of this effect increasing substantially since the 1970s.

The structure of the paper is as follows. In Section 2, we present the construction of our data on inflation surprises and asset returns. In Section 3 we investigate the effects of inflation on asset returns. Section 4.1 presents results on the pivotal role of monetary policy. Section 4.2 analyzes the real effects of demand and supply sources, while Section 5 concludes.

2 Data

2.1 Construction of long-run surprises

In order to analyze the effect of inflation on asset prices, we need to identify unanticipated changes in inflation rates, namely "inflation surprises". In the spirit of Auerbach and Gorodnichenko (2012b) and Auerbach and Gorodnichenko (2013), we identify this as the difference between actual inflation and inflation expectations – the component of inflation that economic agents were not able to predict given the information on economic fundamentals. Given our focus on the long-run and across-countries, our main challenge is thus to find a consistent measure of inflation expectations that goes back 150 years in history for 18 OECD countries. Survey data are unsuitable for this purpose since, apart from the notable exception of the US, no developed country has forecasts available before the 1990s. Even in the US, both consumer and professional forecasts are unavailable before the 1950s.[5] Also, implicit inflation expectations based on financial instruments traded in financial markets, like futures or TIPS, face the problem that their prices or rates include more than implied inflation expectations, e.g. default risk or liquidity risk.[6]

[5]In the US, the Survey of Professional Forecasters (SPF) starts in 1968. The Michigan consumer survey asks about prices in the 1960s. The Livingston survey begins after WWII.

[6]For example, Treasury inflation-protected securities (TIPS) suffered, especially in their early days, from scarce liquidity in the market, implying that their rates incorporated a significant liquidity premium which

2.1.1 OECD Economic Outlooks

We digitize historical data from archived OECD Economic Outlook reports, extracting semi-annual (June and December) forecasts of 1-year-ahead inflation covering the extensive period from 1965 to 2023. This newly digitized dataset allows us to investigate the relationship between inflation and asset returns for a rich set of countries for more than 50 years.[7] Apart from the long time span, one big advantage of using these series is that all forecasts are prepared using a unified methodology such that the series are comparable across countries. Furthermore, the OECD leverages its local presence to engage with government experts and policymakers, resulting in forecasts that incorporate significant local knowledge and insights into future policy changes. Reviews of the OECD's forecasts by Vogel (2007) report that they are comparable to private sector forecasts and have a number of desirable properties.

Specifically, we digitize 1-year-ahead inflation forecasts using the Consumer Price Index (CPI) inflation or the Gross National Product (GNP)/Gross Domestic Product (GDP) deflator as primary indicators. We always use the first in our estimation, and include the latter in the rare cases when CPI forecasts are not available. The dataset encompasses inflation forecasts for the following 18 countries: Australia, Belgium, Canada, Switzerland, Spain, Finland, France, Denmark, Germany, Ireland, Italy, Japan, Netherlands, Norway, Sweden, the United Kingdom, and the United States.[8] We present the forecasts in Appendix Figures A.1 and A.2. In addition, we also digitize 1-year-ahead GDP/GNP growth forecasts from the same OECD Economic Outlook documents with same country coverage, which we later use in Section 4.2 to disentangle the effect of demand- and supply-driven inflation.

2.1.2 A model of inflation expectations

As an auxiliary model to extend our sample into the late 19th century, we apply a time series approach to forecast future inflation rates. Although forecasts may not be equivalent to expectations, time series approaches use the former as a proxy for the latter, mimicking what a rational investor would expect. Various studies have used models to estimate

is hard to estimate (e.g. Gürkaynak, Sack, and Wright (2010)).

[7] So far, only part of these forecasts were made public through the OECD's Statistics and Projections database (e.g. Auerbach and Gorodnichenko (2012a) use this dataset to exploit GDP and government spending forecasts starting in 1985). Data on inflation forecasts that are digitized and publicly available on the OECD database at `https://data.oecd.org/price/inflation-forecast.htm` overlap almost entirely with ex-post realized inflation, such that they should not be used as a reliable real-time source. Indeed, the forecast series that we digitized from the Economic Outlook significantly diverge from these values.

[8] Country coverage differs by "core" and remaining countries. 1965-2022: Canada, France, Germany, Italy, Japan, United Kingdom, United States. 1974-2022: Australia, Belgium, Netherlands, Denmark, Ireland, Finland, Norway, Sweden, Switzerland, Spain.

inflation expectations in historical settings: Ellison, Lee, and O'Rourke (2024) estimate inflation expectations for many countries during the Great Depression by training a dynamic factor model on historical data; Cieslak and Povala (2015) estimate inflation expectations as a simple dynamic moving average (DMA) of past core inflation to reflect how sluggishly individuals update their expectations over time.[9]

If the rationality imposed in forecasting inflation may seem too strict for a common economic agent in the 20th century economy, it has instead more solid ground in view of the task at hand. When considering asset classes traded in financial markets, such as stocks or bonds, only few investors were able to participate in those markets and are likely to process macroeconomic information in a close-to-rational manner when forming their future expectations. However, there might be several possible expectation measures among investors in a particular time, such that the resulting market-wide inflation expectations are a weighted average of this distribution.

To address the latter point, we combine different forecasting techniques in order to significantly reduce model misspecification and bias (Timmermann, 2006; Elliott and Timmermann, 2016) instead of relying on one single forecast method. Such procedure is mimicking what is normally carried out in the US Survey of Professional Forecasters, where different forecasters use their own (simple or more complicated) model and each estimate is then aggregated into a single measure of market expectations. Hendry and Clements (2004) show that the pooling of forecasts dominates other estimates even in presence of structural breaks, which have taken place throughout history for inflation expectations (Bataa et al., 2013).

Our model can be written as

[9] Even though investors in the early 20th century may not have explicitly used time series methods to forecast inflation before these methods were invented, they certainly used rules of thumb that in principle resemble the results of such methods. In its *Theory of Interest*, Fisher (1930) hints at such implicit mechanism in the common business man, as he writes "*Few business men have any clear ideas about it. [...] Yet it may be true that they do take account, to some extent at least, even if unconsciously, of a change in the buying power of money [...] If inflation is going on, they will scent rising prices ahead [...] And today especially, foresight is clearer and more prevalent than ever before. The business man makes a definite effort to look ahead not only as to his own particular business but as to general business conditions, including the trend of prices*". For more on the relation between inflation expectations and realized inflation in historical terms, see for example Binder and Kamdar (2022).

$$
\mathbb{E}_t[\pi_{i,t+1}] = \quad \boldsymbol{\omega'} \quad \hat{\boldsymbol{\Pi}}_{\boldsymbol{t+1|t}} = \boldsymbol{\omega'} \begin{pmatrix} \hat{\pi}^1_{t+1|t} \\ \vdots \\ \hat{\pi}^j_{t+1|t} \\ \vdots \\ \hat{\pi}^n_{t+1|t} \end{pmatrix} \tag{1}
$$

$$
\hat{\pi}^j_{t+1|t} = \quad \boldsymbol{A'} \quad \boldsymbol{X_{t:t-k}} + \varepsilon^j_t. \tag{2}
$$

For any model $j = 1, \ldots, n$ that we use in the pooling exercise, where $\boldsymbol{\omega}$ is the vector of weights assigned to each single model, $\hat{\boldsymbol{\Pi}}_{\boldsymbol{t+1|t}}$ is the vector containing all inflation forecasts $\hat{\pi}^j_{t+1|t}$ for each model j. $\mathbb{E}_t[\pi_{i,t+1}]$ is then the resulting forecast obtained by combining those estimates. We estimate a variety of univariate and multivariate time-series and panel data models, the latter to exploit possible spillover effects for inflation between countries, e.g. imported inflation. We present the complete list of models in the Appendix Table A.1 and Table A.3. These are compactly represented in the matrix $\boldsymbol{X_{t:t-k}}$, which takes information from present and past values of various macroeconomic variables. [10]

All data to estimate inflation expectations and surprises are taken from the Jordà-Schularick-Taylor (JST) Macrohistory database by Jordà, Schularick, and Taylor (2017) and Jordà, Knoll, et al. (2019). This dataset contains yearly data of main aggregate macroeconomic variables such us GDP, inflation, interest rates and aggregate asset returns for 18 advanced economies for a period that spans from 1870 until 2020.[11] Since we want to include the recent inflation surge during the COVID-19 pandemic, we extend the JST database for the years 2021-2023. We present the resulting inflation expectations for the full historical sample in Appendix Figures A.3 and A.4. Appendix Figure A.5 presents all twenty inflation forecasts estimated with the single-models that we use to construct our benchmark inflation forecasts for the USA. Finally, we compare the OECD forecasts and our model forecasts for all countries in Appendix Figures D.3 and D.4, finding a correlation of 0.95+ between the two measures in the overlapping post-1965 sample.

[10]Given the emphasis in this literature on equally-weighted forecasts as best combination, we use both mean and median forecast, finding comparable results. We prefer the latter as to avoid outliers driving results. In Appendix D.1 we visualize the difference between the mean and median forecast measure, producing very close estimates.

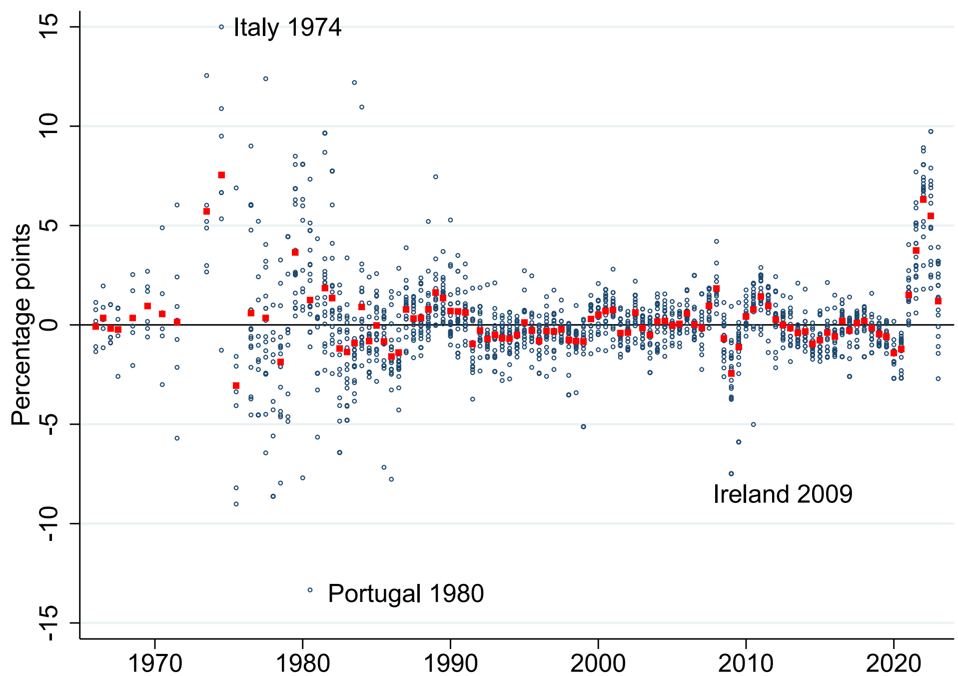
[11]The 18 advanced economies are the USA, Japan, Germany, France, United Kingdom, Ireland, Italy, Canada, Netherlands, Belgium, Sweden, Australia, Spain, Portugal, Denmark, Switzerland, Finland, Norway. See Appendix B for a detailed description of the dataset.

2.1.3 Inflation surprises

Our main variable of interest – the unexpected component of inflation – is the residual between realized inflation and inflation expectations one year before, at time $t - 1y$, for each country i. We define it as *inflation surprise* – a measure of inflation that could not be predicted in the previous period:

$$\varepsilon^{\pi}_{it} = \pi_{it} - \mathbb{E}_{t-1y}[\pi_{it}] \tag{3}$$

Figure 2: OECD-based inflation surprises: 1966-2023



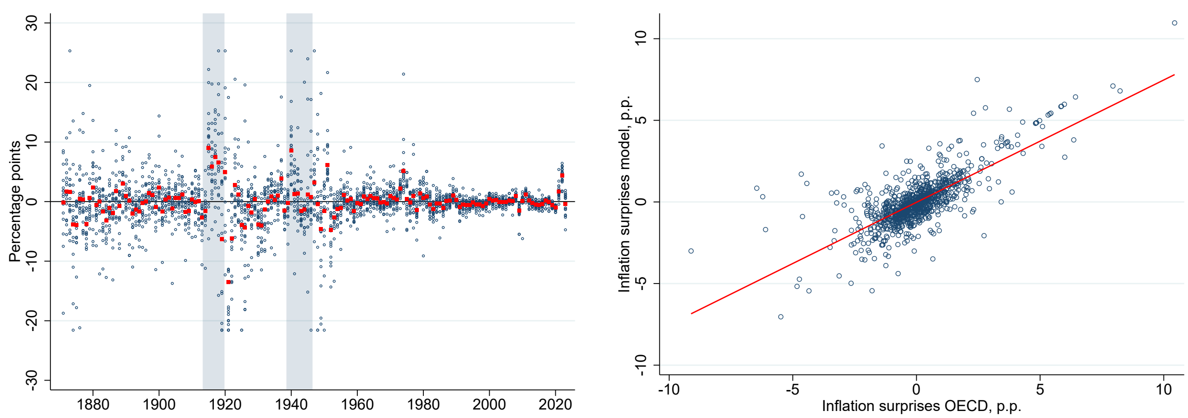
Notes: Surprises from OECD 1y-ahead forecasts, half-yearly frequency, 1966-2023. Inflation surprises are computed as the difference between realized inflation and expectations from the previous period, i.e. $\varepsilon^{\pi}_{it} = \pi_{it} - \mathbb{E}_{t-1y}[\pi_{it}]$. Inflation is measured in %, surprises in percentage points. Red dots represent the average surprise across the 18 OECD countries. Inflation surprise series of each of the countries are presented in Figure A.6 and Figure A.7 in the appendix.

Figure 2 presents our post-1965 inflation surprises of all countries derived from the OECD outlooks (blue dots), together with the average across the 18 countries (red dots). In summary, only one period over the past six decades was comparable to the recent inflation spike in terms of significant inflation surprises: the Great Inflation of the 1970s and early 1980s. Since then, inflation surprises have been relatively minor and more consistent across different countries. Appendix Figure A.6 and Figure A.7 present the inflation surprise series of all

18 countries, together with realized inflation rates. Consistent with Blanco, Ottonello, and Ranošová (2025), we observe how large surges in inflation/deflation are initially unexpected, followed by a gradual catch-up. Since the Great Moderation, surprises in inflation in all countries seem to have experienced a significant reduction in volatility overall and across countries.

In Figure 3 we present the full sample model-based inflation surprises during 1870-2023 (left panel). Our long-run view shows how inflation surprises have been overall larger during the pre-1965 period, with large surprises being mostly concentrated around world wars, with spikes higher than 20 percentage points. Moreover, the volatility of inflation surprises seems to have decreased significantly in the post-WW2 period. To test for the validity of our model-based inflation surprise measures, we compare them with the inflation surprise measures derived from inflation forecasts of the OECD for the post-1965 period (right panel of Figure 3). Reassuringly, we observe a strong correlation betwen the two inflation surprise measures (correlation ≈ 0.75).

Figure 3: Model-based inflation surprises: 1870-2023



Notes: Left panel: Surprises from model 1y-ahead forecasts, yearly frequency, 1870-2023. Right panel: scatterplot of model surprises and OECD surprises (end-of-the-year), yearly frequency, 1965-2023. Inflation surprises are computed as the difference between realized inflation and expectations from the previous period, i.e. $\varepsilon^{\pi}_{it} = \pi_{it} - \mathbb{E}_{t-1}[\pi_{it}]$. Inflation is measured in %, surprises in percentage points. Red dots represent the average surprise across the 18 OECD countries. Inflation surprise series of the other countries are presented in Figure A.6 and Figure A.7 in the appendix.

2.2 Data on asset returns

We focus on three asset classes: equity, housing and long-term government bonds. We gather data on their total returns at both semi-annual and annual frequency. We use annual data as our benchmark and semi-annual data as robustness exercises in Appendix, as OECD-based inflation surprises post-1965 are available at semi-annual frequency, while the model-based inflation surprises during 1870-2023 have annual frequency.[12] We use annual data from the Jordà-Schularick-Taylor Macrohistory Database (Jordà, Knoll, et al. (2019)).[13] We employ the total returns for housing and stocks, which include both capital gains and yields (dividends and rents, respectively), while for government bonds we target the total returns of long-term bonds (mostly at the 10 year maturity). We compute real returns by deflating the series with CPI. When analyzing returns at annual frequency, we only use end-of-the-year inflation surprises from the OECD outlooks. Finally, we add data on corporate profits from the World Inequality Database (Alvaredo et al., 2021).[14]

Table 1: Real asset returns, mean (and standard deviation), in percent, 1870-2023

	Overall	Pre-WWI	1919-1938	World Wars I-II	Post-WWII	Post-1982
Equity	4.27	5.64	5.28	-3.87	4.99	7.20
	(21.76)	(11.04)	(21.96)	(29.13)	(23.65)	(22.75)
Housing	6.18	6.98	7.19	0.70	6.51	6.08
	(9.09)	(8.03)	(11.03)	(14.44)	(7.67)	(6.16)
Bond	1.28	3.85	6.07	-12.03	1.05	3.59
	(13.10)	(6.83)	(14.30)	(24.72)	(11.05)	(10.81)

Notes: Average real annual returns, in percent, with standard deviation in parenthesis, for each subsample. Sample: 18 countries from the JST database, 1870-2023, yearly frequency. We exclude outlier years, i.e. hyperinflation periods.

Table 1 reports the average returns and its standard deviations for different historical subsamples. Historically, equity and housing returns are not very different in real terms, even though equity appears to be more profitable starting from the Great Moderation. Government bonds returns are significantly lower compared to equity and housing. Finally, government bonds and housing returns have significantly lower volatility than equity.

[12] For semi-annual data, we utilize the stock market index of Monnet, Puy, et al. (2016) and Monnet and Puy (2021) (MP), who digitize the quarterly measure from the IFS statistics, which we convert into semi-annual frequency to be matched with our OECD surprise series. The house price index is downloaded from the OECD online database.

[13] While Jordà, Knoll, et al. (2019) provides only data until 2015, the Jordà-Schularick-Taylor (JST) Macrohistory database by Jordà, Schularick, and Taylor (2017) has extended series until 2020. We further extend this series until 2023 using data for indices of house prices, rents, stock market and 10-year government bonds from IMF, OECD and Refinitiv.

[14] Specifically, we use as profits the corporate gross operating surplus. For most countries, the data are available starting in 1900.

3 Inflation surprises and asset returns

In this section, we investigate the effect of inflation surprises on real asset returns. We start by focusing on the post-1965 period, where we are able to derive inflation surprises using inflation forecasts of the OECD. In Section 3.1, we estimate the so-called *inflation beta*, which captures the contemporaneous effect of inflation on asset returns. In Section 3.2, panel local projection methods are employed to investigate the dynamic effect on cumulative returns, i.e. a *dynamic* inflation beta, highlighting the persistent consequences of inflation on future asset returns. Finally, in Section 3.3 we take a long-run perspective and complement our OECD-based inflation surprises with model-based inflation surprises to analyze the full 1870-2023 sample. By doing so, we investigate the time-varying role of inflation on asset returns during the last 153 years.

3.1 Contemporaneous effect of inflation surprise on asset returns

We begin by conducting a static analysis, where we regress real asset returns on inflation surprises to examine the immediate impact of an unexpected increase in inflation on asset returns – measuring the so-called *inflation beta*. This approach has been the most commonly adopted framework in the literature, from Fama and Schwert (1977) to more recent studies such as Bekaert and Wang (2010) and Fang, Liu, and Roussanov (2022). The model we estimate is the following:

$$r_{it}^{k} = \beta^{k} \varepsilon_{it}^{\pi} + \gamma^{k} \mathbf{X}_{it} + \mu_i + \epsilon_{it}^{k}, \tag{4}$$

where r_{it}^{k} is the real annual return of asset k in country i at time t, with k being either equity, housing, or long-term government bonds, and ε_{it}^{π} is the inflation surprise of the same country at time t. Note that most of the inflation betas estimated in the previous literature regress on realized inflation instead of inflation surprises, therefore conducting an *ex-post* analysis. See for examples Bekaert and Wang (2010).[15] $\mathbf{X}$ contains a set of controls to isolate the effects of business cycles and economic conditions, such as 2 lags of ε^{π}, dependent variable, short-term interest rates, GDP growth, real stock price, inflation, world GDP growth & world equity price.[16] We also include country fixed-effects μ_i. The parameter of interest is β^k, which is defined as the inflation beta for asset k. $\beta^k = 0$ would imply that asset

[15] We run a similar correlation analysis in Appendix C.

[16] The latter is to conservatively control for global business cycle conditions without estimating time fixed effects, which are unfeasible in our setting with a rich set of controls. This is a standard approach in studies using this long T-short N dataset, see e.g. Jordà, Schularick, and Taylor (2020).

k is a perfect inflation hedge, meaning that real returns of asset k fully offset movements in the inflation rate.

Table 2: Inflation beta on real returns, 1965-2023

	Equity		Housing		10Y Gov Bond	
	(1)	(2)	(3)	(4)	(5)	(6)
OECD-based	-4.34***	-2.93**	0.01	-0.11	-2.75***	-2.36**
	(0.90)	(1.28)	(0.25)	(0.25)	(0.89)	(0.65)
Model-based	-4.60***	-3.81***	-0.28	-0.00	-2.88***	-2.48***
	(1.04)	(1.16)	(0.22)	(0.23)	(0.90)	(0.50)
Country FE	No	Yes	No	Yes	No	Yes
Controls	No	Yes	No	Yes	No	Yes

Notes: The first row presents the estimated inflation betas for the period 1965-2023 using OECD-based inflation surprises. Estimates are based on returns and data at yearly frequency, using end-of-the-year OECD surprises. In the second row, we present the inflation betas estimated with model-based inflation surprises during 1965-2023. Column (1), (3), and (5) are inflation betas estimating Equation 4 without country fixed-effects and controls. Column (2), (4), and (6) present the inflation betas by estimating the full model of Equation 4. Controls include: 2-years lags of ε^{π}, dependent variable, short-term interest rates, GDP growth, real stock price, inflation, world GDP growth & world equity price. Driscoll and Kraay (1998) standard errors in parentheses. *, **, and *** present the significance levels at 10%, 5%, and 1%, respectively.

In Table 2 we present the estimated inflation betas for the post-1965 period utilizing both our OECD-based and model-based inflation surprises. Columns (1), (3), and (5) present the results where we only regress our return measures on inflation surprises without country fixed-effects and controls, while columns (2), (4), and (6) show the results with the full set of controls. Overall, inflation betas show a significant negative relationship between inflation and returns for both equities and government bonds, while the housing betas are only insignificantly negative and close to zero, i.e. a near-perfect inflation hedge. The inflation beta for equities declines significantly more than one-to-one, with a beta around -4, whereas for government bonds the estimate falls below -2, indicating a strong inverse relationship. In contrast, the inflation beta for housing is close to 0. Reassuringly, these results remain consistent when we estimate the inflation betas using our model-based inflation surprises for the post-1965 sample (see row 2 of Table 2).

Our estimated inflation betas are qualitatively consistent with others from the literature: Fama and Schwert (1977) first estimated strongly negative unexpected inflation beta for stocks, around -2. Bekaert and Wang (2010) estimate an inflation beta close to zero for *nominal* returns for bonds and stocks, which are in line with the negative inflation betas in *real* terms in Table 2. Fang, Liu, and Roussanov (2022) estimate a similar specification to Equation (4) using a VAR model for the US to get inflation expectations and estimate inflation beta for *excess* returns. They find strongly negative betas for stocks (-1.33) and bonds (-2.53), while housing has a slightly positive but not significant response (0.31), roughly in line with the estimates of Table 2.

3.2 Dynamic inflation beta: panel-LPs on cumulative returns

To highlight the importance of persistence in the negative effects of inflation on asset returns, we now depart from the static framework widely employed in the literature and implement a panel local projections model à la Jordà (2005) to estimate the dynamic response of real asset returns to our inflation surprise measures, i.e. a *dynamic* inflation beta. The panel local projections (panel-LPs) estimate the average impact of a 5 percentage point surprise increase in inflation[17] on the (log) return of each asset k:

$$r^k_{i,t+h} - r^k_{i,t-1} = \beta^k_h \varepsilon^\pi_{it} + \Psi^k_h(L)\mathbf{X}_{i,t-1} + \delta^k_{i,h} + \epsilon^k_{i,t+h} \qquad \text{for} \quad h = 0, 1, 2, \ldots, \tag{5}$$

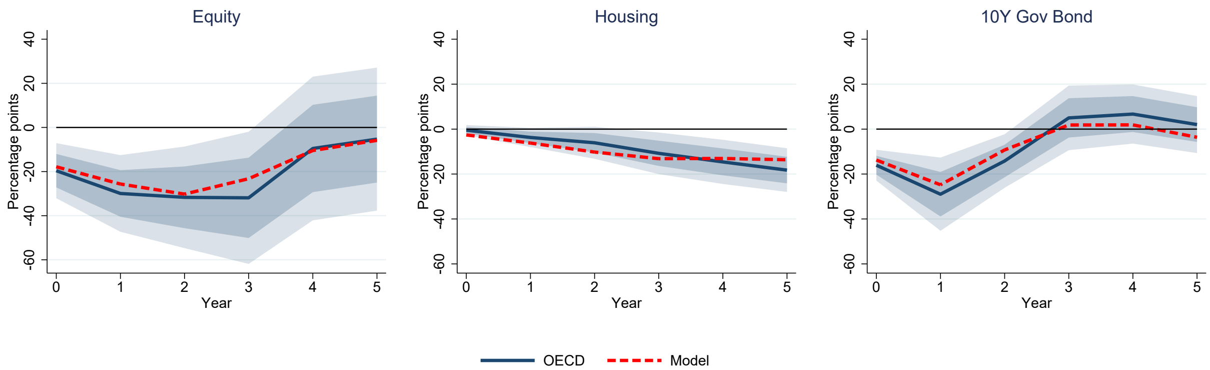
where $r^k_{i,t+h} - r^k_{i,t-1}$ represents the *cumulative* real return over h periods for asset k and ε^π_{it} is the inflation surprise for country i at time t.[18] $\mathbf{X}_{i,t-1}$ is a vector of controls, which includes 2-year lags of ε^π, dependent variable, short-term nominal interest rate, real GDP growth, real stock price, CPI inflation, world GDP growth and world equity price (to parsimoniously control for world business cycles). $\delta_{i,h}$ are horizon-specific country fixed effects. Lag augmented shocks and controls are included to account for any serial correlation and to improve inference, as prescribed by Montiel Olea and Plagborg-Møller (2021). The inflation level is included to account for higher volatility of inflation and its unexpected component when inflation is high. Stock prices are included to capture possible high frequency information implicitly incorporated in stock markets and not yet contained in inflation forecasts. Other macroeconomic variables are included to control for country and world business cycle dynamics.[19]

[17] We scale the surprise to induce a 5 p.p. increase in inflation to simulate a scenario akin to the notable inflation surge experienced in 2022. Moreover, estimates in Blanco, Ottonello, and Ranošová (2025) produce a 4.9 p.p. increase in inflation after a "large" inflation surge.

[18] To make LP estimations on returns more meaningful, we transform the total annual returns of each asset into a *total return index*. In this way, the h-long difference Δ_h of the index is directly interpretable as cumulative (log-)return over h periods.

[19] In robustness exercises, we further extend the set of controls. First, we use interchangeably 1-year or 3-year lags for the vector $\mathbf{X}_{i,t-1}$. Furthermore, we use corporate debt or public debt/GDP to control for leverage and financial market size. Finally, we include time fixed effects (but exclude the rest of the macro

Figure 4: Dynamic inflation betas, 1965-2023



Notes: Impulse responses for cumulative real asset returns estimated with panel-LP across two sources of surprises: OECD surprises and model surprises during 1965-2023. All results are at yearly frequency, using end-of-the-year OECD- or model-surprises. Effects scaled to a 5 p.p. increase in inflation. Driscoll and Kraay (1998) standard errors. Bands are at the 68% and 90% confidence level.

Figure 4 reports the dynamic inflation betas of stocks, housing and bonds for the period 1965-2023. Given that in the post-1965 sample both surprise series are available, we compare the dynamic inflation betas of asset returns coming from model-based inflation surprises (red dashed line) with the OECD-based inflation surprises (blue solid line), with comparable results. In line with our estimated inflation betas, we observe a contemporaneous decrease in real returns of equity and long-term government bonds after an inflation surprise. They continue to lose value over time, but equity recovers in value after 4-5 years, while government bonds fully recover after 2-3 years. Compared to this effect, housing real returns are not strongly affected by inflation on impact, but experience persistent losses with a lag, where the returns accumulate losses up to almost -20% after 5 years.

In summary, a 5 percentage points surprise increase in inflation seems to have a significant negative effect on both real physical assets, such as equity and housing, as well as on assets with nominally-fixed cash flows, such as government bonds. Equity is the worst inflation hedge among the three asset classes: during the post-1965 period, the cumulative real response after 3 years is around -30%. In real dollar terms, this means that a 1000$ stock portfolio would lose 300$ in real value three years after a five percentage point inflation surprise compared to a baseline scenario with no surprises in inflation. Housing also proves to be an ineffective inflation hedge: during the modern period, its returns initially withstand the surprise in inflation in real terms at time 0. However, it gradually declines over 1-2 years, dropping by as much as 20% after five years. Finally, government bonds perform

controls, due to limited statistical power). Results are robust to these different specifications.

also poorly after an inflation surprise, especially up to two years after the inflation surprise. Nevertheless, for the post-1965 period, its value converges to steady state in the medium run.

Additional exercises In Appendix Figure A.9, we investigate the effect of inflation surprises on prices and yields separately for equity and housing assets. Dividends and equity prices exhibit a similar pattern, initially reacting strongly negatively and then gradually converging back to zero within 3-4 years. In contrast, the response of house prices and rents diverge. First, real rents drop almost one-to-one with inflation on impact and recover slowly afterwards. This highlights the role of nominal rigidities in rental markets, where contracts are renewed gradually over time. Compared to this, house prices do not change in the immediate aftermath of an inflation surprise, but gradually decline over time, losing 20% over a five-year horizon. Finally, Appendix Figure A.10 reports the dynamic inflation beta for total returns using OECD surprise at semi-annual frequency, with similar magnitudes.

3.3 A long-run view: inflation and asset returns

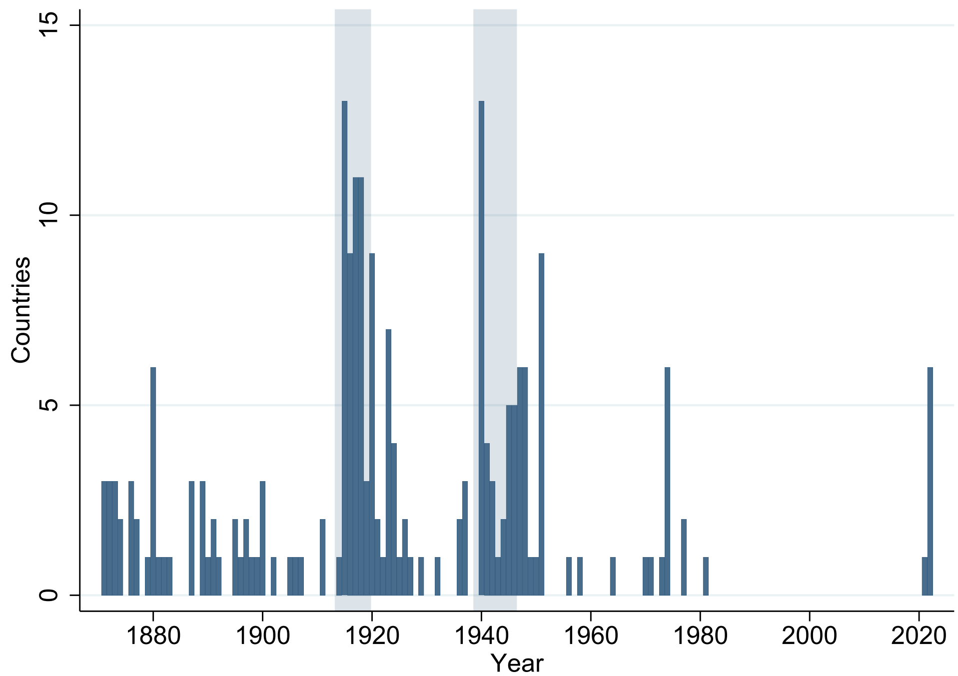
So far we analyzed the effect of inflation on asset returns during the post-1965 period. In this section, we broaden our scope by taking a historical perspective, asking whether the negative relationship between inflation and asset returns is a general pattern across time or a distinctive characteristic of the post-1965 period. Figure 5 highlights the importance of investigating the historical period to analyze the effects of inflation on asset returns. Here, we present the frequency of large inflation surprises, defined as surprises larger than five percentage points during 1870-2023.[20]

In the full historical sample, large inflation surprises were much more frequent than in the post-1965 period. While such large surprises have been rare in recent decades – particularly during the Great Moderation – many countries often experienced inflation surprises exceeding 5 percentage points between 1870 and 1950, with a high concentration around the two world wars. This underscores the importance of studying inflation in a historical context, particularly using pre-World War II samples, as also emphasized by Schmitt-Grohé and Uribe (2024).

We start by estimating the same panel-LP model as in Equation 5 for the full 1870-2023

[20] If not explicitly stated otherwise, our long-run inflation surprise series is a combination of model-based inflation surprises until 1965 and OECD-based inflation surprises afterwards. We choose 5 percentage points as threshold value throughout the paper to be comparable with the recent inflation surge.

Figure 5: Frequency of large inflation surprises: 1870-2023



Notes: Timeline with the frequency of positive inflation surprises above 5 p.p. across the 18 OECD countries, excluding period of hyperinflation. World wars are presented as blue shaded areas. Yearly frequency, 1870-2023.

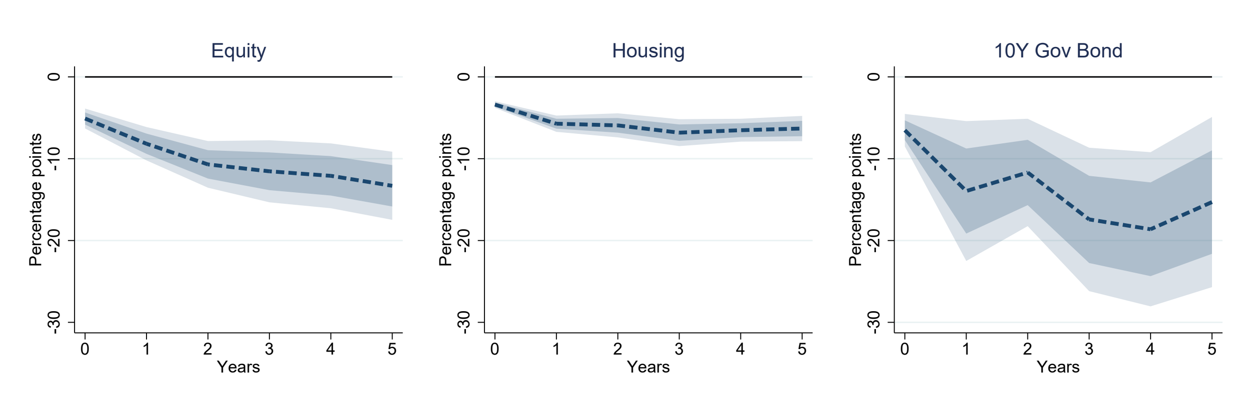
sample.[21] Figure 6 presents the dynamic inflation betas of stocks, housing, and bonds following a 5 percentage point surprise increase in inflation. Similar to the post-1965 sample, returns of equity and government bonds decrease on impact, although with smaller magnitude (less than 10 percentage points for both assets during 1870-2023, while in the post-1965 period, both equity and government bonds decreased by 20 percentage points).[22] In addition, we observe persistent effects of inflation on equity and government bonds during the full historical period, while its effects were rather transitory in the modern sample. Finally, different from the post-1965 period, housing returns drop on impact by around 5 percentage points, which further decreases by 7 percentage points 5 years after the shock. Nevertheless, like equity and government bonds, the magnitude of housing returns' response is also significantly weaker than in the post-1965 period.[23]

[21] We include also periods of World Wars, and only exclude hyperinflation years. We report in Appendix A the same figures excluding World wars, with similar results.

[22] Note that the wide confidence intervals for government bonds are driven by the World War episodes, which were characterized by high volatility in the bond market, see Table 1. In Appendix Figure E.2 we present the IRFs excluding the World War episodes.

[23] In a robustness exercise, we include also time fixed effects in the full-sample local projections. Results align to what shown in Figure 6.

Figure 6: Dynamic inflation betas, 1870-2023



Notes: Impulse responses for cumulative real asset returns estimated with panel-LP using OECD surprises for the period 1965-2020 and model surprises during 1870-1965. Effects scaled to a 5 p.p. increase in inflation. Yearly frequency, OECD surprises are end-of-the-year. Bands are at the 68% and 90% confidence level. World wars are included in the estimation sample.

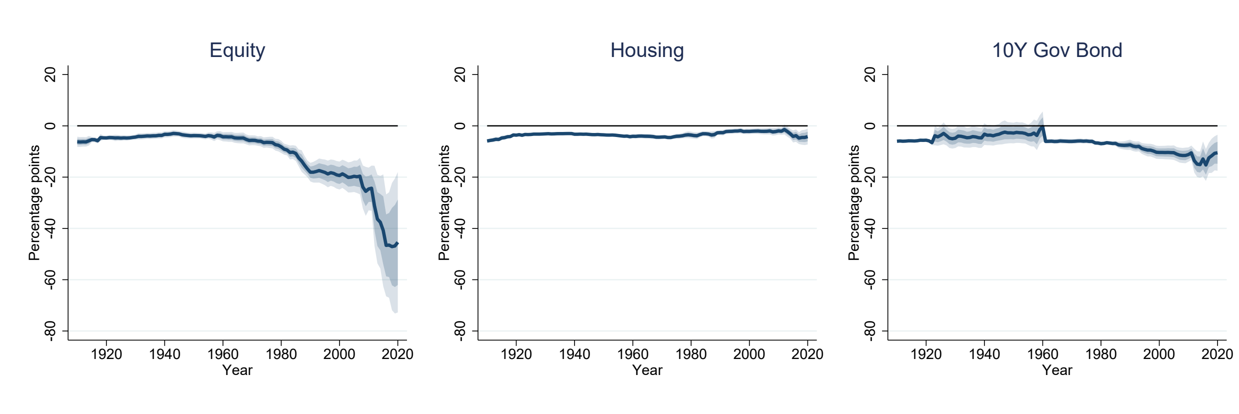
To explain such differences between the full historical sample and the post-1965 period, we now estimate the same impulse response functions in a *dynamic* fashion, using 40-years rolling windows over the full sample 1870-2020.[24] By doing so, we investigate whether the relationship between inflation and asset returns has experienced any structural changes during the last 150 years. In Figure 7 we report in panel (a) the contemporaneous response over time (equivalent to inflation betas), and in panel (b) the response after 4 years to assess how the persistence of responses changed over time.

It is striking how the contemporaneous response of equity dropped over time from $\approx -5\%$ before 1970 and up to -40% in recent times. On the contrary, sensitivity of housing returns has remained relatively stable over time. Regarding persistence, inflation shocks had increasingly lasting effects on equity and housing returns, whereas government bonds recovered substantially more quickly in recent periods.[25] How can we explain this change in the relationship between inflation and asset returns in the mid-20th century? In Figure 8, we present the contemporaneous time-varying response of short-term interest rates and GDP following an inflation surprise, while in Appendix Figure A.8 we report the average response over the modern and the full sample.

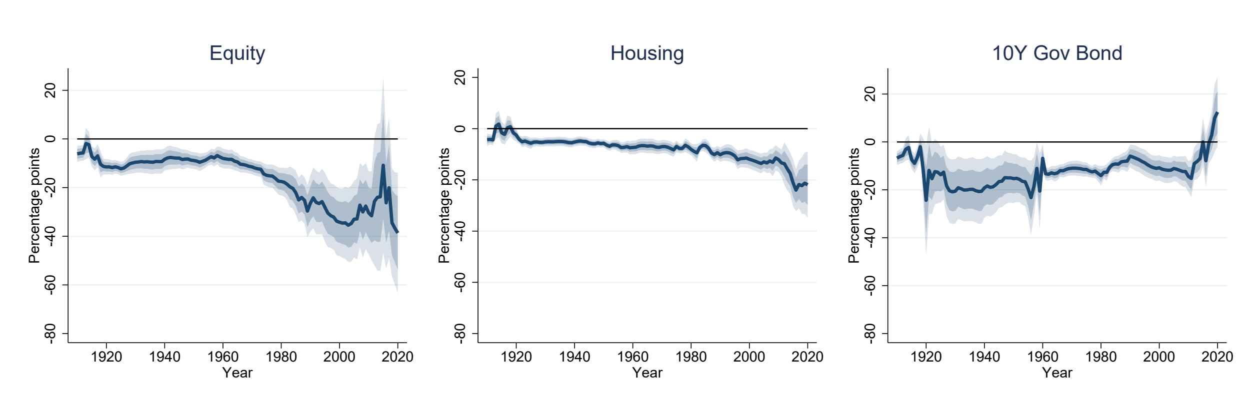
[24]In this exercise, we excluded the last 3 years of sample, as the 2021 inflation spike drives the whole variation in the 40-years rolling window – especially given the fact that the other inflation surprises were minor during the last 40 years.

[25]Results are qualitatively robust when employing 1 (rolling) standard deviation surprises within each 40-years rolling window.

Figure 7: Time-varying inflation beta



(a) Contemporaneous inflation beta ($h = 0$)



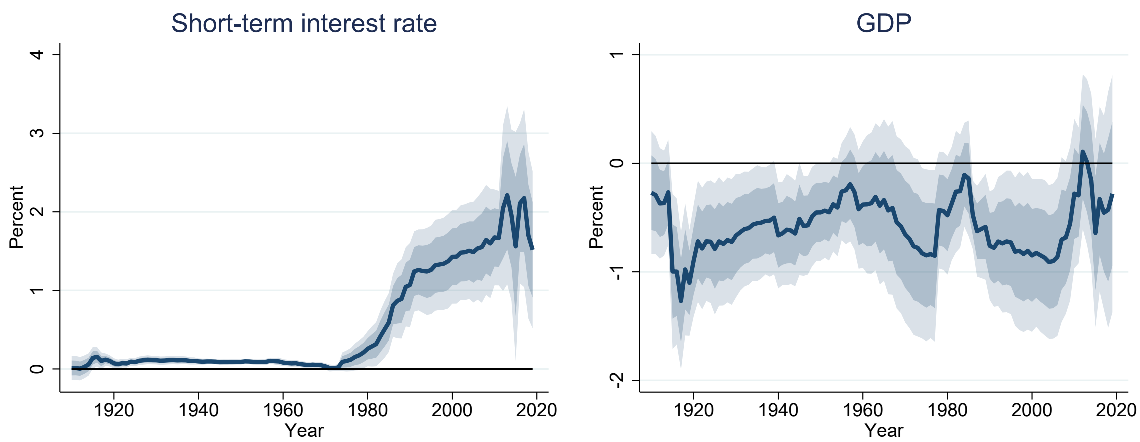
(b) Long-run inflation beta ($h = 4$)

Notes: Estimates of the inflation beta β_h at $h = 0$ (panel a) and $h = 4$ (panel b) over time, using 40-years rolling windows estimation, 1870-2020. Inflation surprises ε^{π} are derived from the model for the period 1870-1965 and from OECD for the post-1965 period and scaled as 5 p.p. increases in inflation. x-axis in the figure present the end-of-the-period year of the rolling window. Bands are at the 68% and 90% confidence level.

Interestingly, the negative response of GDP to inflation surprises reveal no common patterns with the response of asset returns, while we observe a clear structural break in how the short-term interest rate responds to an inflation surprise. Beginning in the 1970s, interest rates began responding much more significantly to inflation, suggesting that the stronger monetary policy response could be a key driver of the time-varying patterns in asset return responses to inflation.[26]

[26] Jordà, Schularick, and Taylor (2020) demonstrate that the responses of house and stock prices to monetary policy remained consistent between the pre- and post-WW2 periods. This suggests that the greater negative impact of inflation on returns in the later period may be due to the increased magnitude of the monetary policy response, rather than to a greater sensitivity to interest rates.

Figure 8: Time-varying inflation beta: macroeconomic variables



Notes: Impulse responses for short-term interest rate and real GDP through panel-LP with a 40-year rolling-window, using OECD surprises and model surprises, 1870-2020. Effects scaled to a 5 p.p. increase in inflation. Yearly frequency, OECD surprises are end-of-the-year. Bands are at the 68% and 90% confidence level.

Robustness exercises In Appendix E we provide a range of robustness exercises to test the validity of the results presented in Section 3. First, in Appendix Figure E.1, we show how baseline results of Figure 4 are robust to excluding the Great Inflation period, starting the sample in 1982, and the recent inflation surge. In Appendix Figure E.2 we show how the historical sample results are mostly unchanged when excluding the two World wars. In Appendix E.2 we use only the largest inflation surprises (i.e. above 5 percentage points) to run an event study analysis. All asset returns largely respond negatively and barely recover in the long run. To prove robustness of our findings using model-based inflation surprises, in Appendix E.3 we present the IRFs from all inflation surprise series derived from the single models that are used in our main pooled model (see Appendix Figure E.4). Reassuringly, most of the impulse responses gravitate around our benchmark result. Nevertheless, some models fail to grasp the persistent negative effect on asset returns in the short term, which further justifies our selection of a pooled model rather than using a single model. In Appendix E.4 we use the inflation surprises as instruments for overall inflation in a LP-IV framework. The estimates are closely aligned with the direct regression used in the main text. In Appendix E.5 we investigate potential asymmetric effects of inflation shocks. Resassuringly, all exercises converge towards the same conclusion as our benchmark results.

4 Uncovering the long-run macroeconomic drivers

4.1 The role of monetary policy: pegged vs. float countries

Motivated by our stylized fact that the sensitivity of both asset returns and the short-term interest rate to inflation dramatically increased starting in the 1970s, we now investigate the role of monetary policy in shaping the impact of inflation surprises on asset returns. Indeed, a recent strand in the theoretical literature emphasizes the relevance of monetary policy conduct on the relationship between asset returns and inflation through sticky inflation expectations (Bianchi, Lettau, and Ludvigson, 2022) or beliefs about future demand and supply shocks (Caballero and Simsek, 2024). However, empirical evidence on this channel is scarce given the limitations of modern macroeconomic samples.[27]

Using our long-run data, we are able to study historical cases where monetary policy reacted differently to inflation due to reasons that are exogenous to business cycle conditions. Specifically, we exploit the long history of fixed exchange rate regimes and empirically investigate the effect of inflation surprises on asset returns in (i) pegged countries with open capital accounts compared to (ii) float countries. Countries peg their currencies for various reasons, such as stabilizing their exchange rates or facilitating trade with major trading partners. To support the pegged currency, the central bank and the government can intervene in several ways (e.g., announcements, buying/selling foreign exchange reserves) but the most sustainable mechanisms rely on capital controls and monetary policy alignment with the base country. However, a combination of these two is excluded by the trilemma of international finance – countries that want to maintain a fixed exchange rate cannot simultaneously have free capital flows and sovereign monetary policy (see e.g., Obstfeld and Taylor (1997) and Obstfeld, Shambaugh, and Taylor (2005)). Consequently, a central bank in a country with a pegged exchange rate system faces limited flexibility in increasing interest rates in response to an inflation shock, due to institutional constraints. In contrast, central banks in countries with floating exchange rate systems are not bound by such limitations. This contrast in monetary policy conduct is limited to short term domestic fluctuations, as the commitment of hard pegs to stable currencies avoids explosive inflation dynamics in the medium-long run.[28]

We now introduce a state-dependent panel local projections framework in the spirit of Ramey and Zubairy (2018), where the states are (i) pegged countries with open capital

[27]A notable exception, using a high-frequency empirical strategy, is Gil de Rubio Cruz et al. (2023).

[28]There is ample empirical evidence that hard pegs are effective in maintaining a low and stable inflation in the medium run, see e.g., Ghosh, Qureshi, and Tsangarides (2014) and Bleaney and Francisco (2005).

accounts and (ii) float countries:

$$r_{i,t+h} - r_{i,t-1} = \mathcal{I}_{i,t-1}\Big\{\beta_{A,h}\varepsilon_{it}^{\pi} + \Psi_{A,h}(L)\mathbf{X}_{i,t-1} + \delta_{A,i,h}\Big\} \\ +(1-\mathcal{I}_{i,t-1})\Big\{\beta_{B,h}\varepsilon_{it}^{\pi} + \Psi_{B,h}(L)\mathbf{X}_{i,t-1} + \delta_{B,i,h}\Big\} + \epsilon_{i,t+h} \quad \text{for} \quad h = 0,1,2,\ldots \tag{6}$$

We suppress the superscript k on estimated coefficients, which refers to the different assets, for readability. $\mathcal{I}_{i,t-1}$ is a dummy variable that indicates whether a country is pegged in t and $t-1$ and in both times it has open capital accounts. The capital account opennes variable $q_{i,t-1}$ is taken from Quinn, Schindler, and Toyoda (2011), where $q_{i,t-1} = 1$ when the country completely allows free capital movements.[29] We condition on being an *open peg* in both time periods t and $t-1$ to avoid cases where the decision of being peg is endogenously determined by economic conditions.[30] The main distinction between the two states of the world lies in the monetary policy conduct: whenever countries have their currency pegged while maintaining their capital accounts open, they are not able to freely react to inflation by raising interest rates. Using this specification, we can directly test the effects of inflation surprises on peg countries with open capital accounts against float countries, i.e. $\beta_{A,h} = \beta_{B,h}$. The rest of the specification is the same as in Equation 5.

Figure 9 presents the results. In the peg country scenario, cumulative real returns of equity and housing (i.e. what we define as real physical assets) respond significantly more positively than those of non-pegged countries. While the results for float countries resemble those of our benchmark estimates in Section 3 – responding negatively in a persistent way – equity and housing returns of pegged countries do react negatively on impact, but recover their real value afterwards in a significantly more positive manner.[31] Most of the negative response of stocks in *open pegs* realizes on impact, while from year 1 onward equity returns have positive dynamics and quickly offset all losses. We argue below that the initial negative impact on real returns is due to the stickiness of dividends, whose policies are slow moving and cannot react to sudden macro shocks within few months in real terms, but do adjust in the medium run (Leary and Michaely, 2011). In float countries, the negative response materializes not only on impact, but unfolds over several years. Compared to these results,

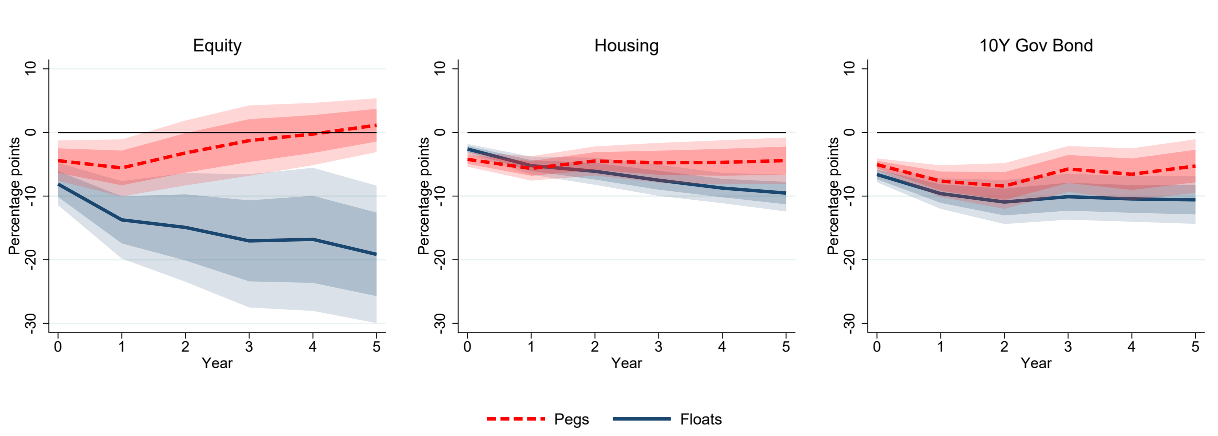
[29] This index is available until 2012, at most. We merge this with the capital account opennes index from Chinn and Ito (2006), up to 2021. Note that the two variables are very close in the recent overlapping period.

[30] As noted in Jordà, Schularick, and Taylor (2020), restrictions on capital mobility have not been used as a high-frequency policy tool by pegging economies since the index is very slow moving in advanced economies.

[31] Appendix Figure A.11 provides the response for equity and house prices, i.e., excluding dividends and rents, respectively. The response of house prices is now aligned to equity, highlighting the paramount role of nominal rigidities in the rental markets as main source of deviation for housing.

we do not observe significantly heterogeneous responses of government bonds: in both cases, government bond returns decrease persistently and the different responses in the two states are essentially one-to-one with the response of the nominal interest rate.

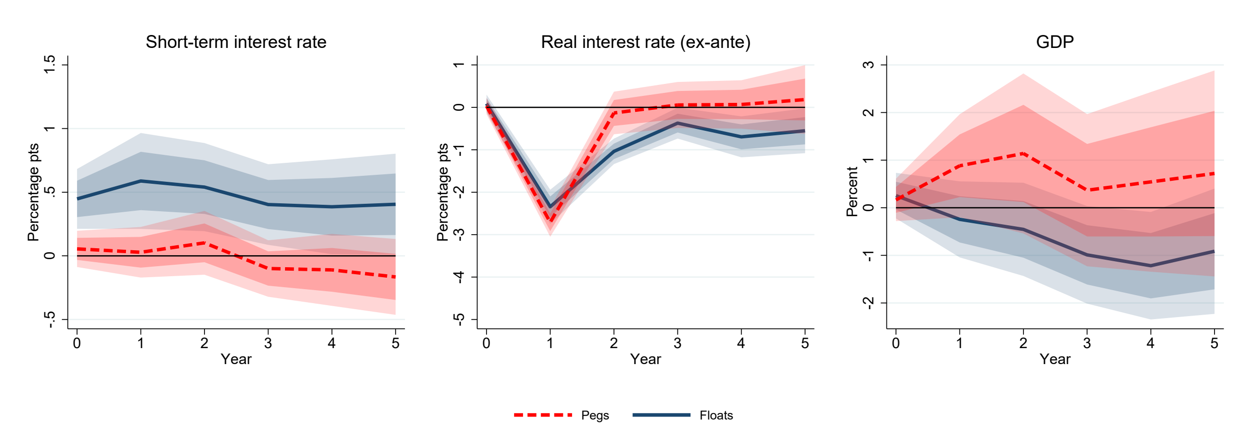
Figure 9: Asset returns responses in pegged vs non-pegged countries



Notes: Impulse responses for cumulative real asset returns on inflation surprises in pegged countries (red dash) and in non-pegged countries (navy line). Model & OECD surprises, scaled to a 5 p.p. increase in inflation. Sample of 18 countries from the JST, 1870-2023, yearly frequency. The two lines represent the estimate of $\beta_{A,h}$ and $\beta_{B,h}$ in the state-dependent LP. Shaded areas are the 90% and 68% confidence intervals.

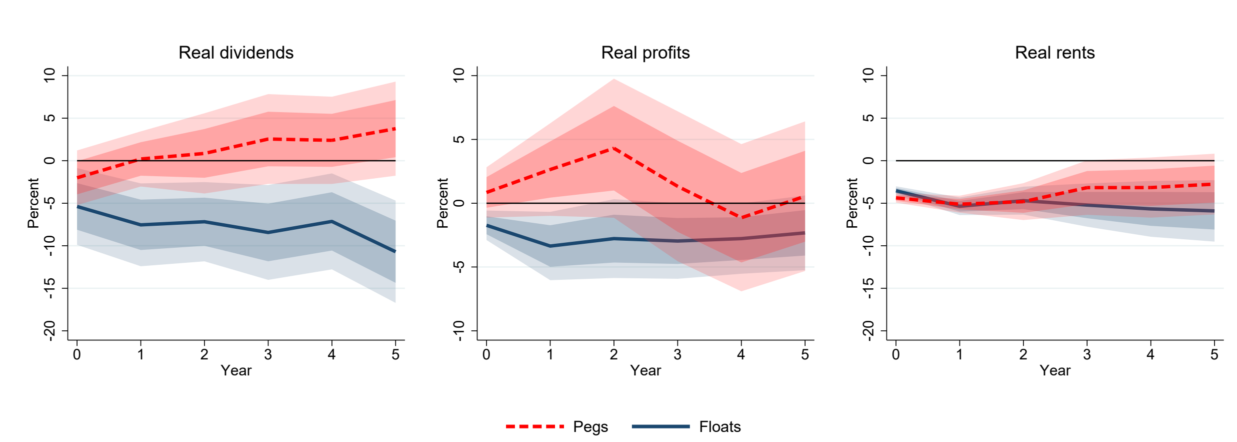
To obtain a better understanding of the mechanisms, we present in Figure 10 the response of macroeconomic variables such as the nominal short-term interest rate, the real interest rate (computed as nominal rate minus future expected inflation, i.e., $\approx i_t - \mathbb{E}_t[\pi_{t+1}]$) and GDP. First, in line with the theory supporting the trilemma, pegged countries do not experience any change in the nominal short-term interest rate, while central banks of float countries increase their policy rate in response to higher inflation. Correspondingly, the development of GDP differs greatly across pegged and float countries. In both scenarios, GDP does not respond significantly on impact to an inflation surprise. However, in float countries GDP follows a recessionary path, while pegged countries experience a mild expansion. Such different paths of GDP have an effect on the future stream of cashflows of real physical assets, see Figure 11: real dividends and rents of pegged countries respond more positively to an inflation surprise compared to float countries, although the effect is larger for equity. Furthermore, we also present the response of real corporate profits to confirm that the dividend effects reflect income generations rather than changes in payout policy – under pegs, corporate profits rise in line with dividends, while both remain depressed under floats. This finding underscores the relevance of the proxy effect proposed by Fama (1981) in explaining the link between inflation and asset returns. According to this hypothesis, higher inflation serves as a proxy for weaker *future* economic activity, which translates into lower cash flows for real physical assets. Our analysis shows that the monetary policy reaction to inflation is the key driver of the subsequent deterioration of economic fundamentals.

Figure 10: Macroeconomic responses in peg vs float



Notes: Impulse responses for nominal interest rate, (ex ante) real interest rate and real GDP on inflation surprises in pegged countries (red dash) and in float countries (navy line). Model & OECD surprises, scaled to a 5 p.p. increase in inflation. Sample of 18 countries from the JST, 1870-2023, yearly frequency. The two lines represent the estimate of $\beta_{A,h}$ and $\beta_{B,h}$ in the state-dependent LP. Shaded areas are the 90% and 68% confidence intervals.

Figure 11: Cash flow and profit responses in peg vs float



Notes: Impulse responses for real dividends, profits and rents on inflation surprises in pegged countries (red dash) and in float countries (navy line). Model & OECD surprises, scaled to a 5 p.p. increase in inflation. Sample of 18 countries from the JST, 1870-2023, yearly frequency. The two lines represent the estimate of $\beta_{A,h}$ and $\beta_{B,h}$ in the state-dependent LP. Shaded areas are the 90% and 68% confidence intervals.

Besides the cashflow channel, monetary policy can also directly influence asset returns through the change in discount rates. We investigate this by presenting the real interest rate responses to a surprise increase in inflation in Figure 10. In both monetary regimes, the real interest rate response mostly overlaps, with only slight differences in later years when the divergent response has already materialized. This equal response can be explained through "sticky" reaction of inflation expectations, in line with empirical evidence by Blanco, Ottonello, and Ranošová (2025) and theoretical contribution of Bianchi, Lettau, and Ludvigson (2022).[32]

We conclude this section by highlighting the importance of studying the *persistent* effects of inflation on asset returns, rather than solely concentrating on contemporaneous responses, in pinning down the monetary policy channel. As shown in previous literature, the "long and variable lag of monetary policy" (Friedman, 1961) causes the full impact of inflation on asset returns to materialize with a lag. Our paper is the first to explicitly model the *cumulative* responses up to 5 years, which allows us to empirically identify the importance of this channel.[33]

Robustness exercises The robustness checks in Appendix Figures F.1 and F.2 confirm that excluding Euro-area countries or restricting the sample to the pre-1972 period leaves our main result unchanged: in economies with open pegs, inflation surprises more strongly boost real asset returns due to milder monetary policy reactions. Appendix Figure F.3 further shows that the gold standard regime itself does not drive our main result. Rather, only countries with genuinely constrained monetary policy — whether or not they were on the gold standard — exhibit muted return responses to inflation.

A detailed note on housing returns Similar to dividends, real rents decrease on impact, irrelevant of the exchange rate regime. Afterwards, in pegged countries, real rents begin to recover some of their value after 2-3 years, but the difference is not strongly significant compared to developments in floating countries. This suggests that heterogeneous monetary policy conduct does not fully explain the short-term negative response of real housing returns to a surprise increase in inflation, unlike the case for stocks.

A key difference between housing and other assets such as equity and bonds lies in trading frequency and rental contract renegotiation. Rental contracts are adjusted infrequently, whereas equity and bonds are traded constantly in the market. This allows the latter to quickly absorb an inflation surprise, while rents and housing returns may experience more

[32] In a Campbell-Shiller decomposition à la Bernanke and Kuttner (2005) we can confirm that future cash flows, rather than discount rate news, drive most of the overall negative response to inflation, similarly to previous findings by Boons et al. (2020).

[33] Other studies that look at the dynamic responses of asset returns to inflation concentrate on high-frequency and short term dynamics, e.g., Chaudhary and Marrow (2022) and Gil de Rubio Cruz et al. (2023)

long-lasting effects. This distinction is evident in Appendix Figure A.11, where we present the IRFs of equity and house prices, excluding dividends and rents. Now, the response of house prices aligns much more with the mechanism obseved for equity. In addition, the effect of monetary policy on housing returns may be limited, as their returns depend on long-term interest rates – attached to mortgage contracts – rather than on short-term interest rates.

All these arguments indicate that, for housing, factors beyond the monetary policy conduct – such as money illusion (Brunnermeier and Julliard, 2008) – may play a more substantial role in driving the negative reaction of returns to inflation surprises as compared to other asset classes. These observations underscore the need for future research in developing a more comprehensive framework that can capture these unique characteristics of the housing market.

4.2 Demand vs. supply driven inflation surprises

Recent literature that seeks to understand the economic consequences of inflation often emphasizes the importance of the underlying source of unexpected price increases. Cieslak and Pflueger (2023) and related studies[34] provide theoretical foundations suggesting that real physical assets should respond differently depending on whether inflation is driven by demand or supply shocks. For example, assets such as stocks are directly influenced by economic activity and the output gap and are therefore expected to react positively to demand-driven inflation. In contrast, a supply-driven inflationary shock is likely to depress returns.

So far, our analysis over the past 150 years shows that inflation surprises have often led to a decrease in GDP, which may indicate that these surprises were mostly supply-driven (see Figure 8). This could explain why real physical assets, such as equities and housing, have consistently reacted negatively to inflation surprises. Notably, this pattern may offer an alternative explanation for the increasingly negative relationship between inflation and asset returns that we documented in previous sections. If supply shocks became more prominent starting in the mid-20th century, they could have played a key role in depressing asset returns in response to inflation.

We test this prediction empirically by disentangling demand- and supply-driven inflation surprises. Normally, such exercise would need to be executed by identifying demand and supply shocks that cause inflation to rise. This approach in practice imposes strong assump-

[34] See, for example, Hess and Lee (1999), Piazzesi et al. (2006), Campbell, Sunderam, and Viceira (2009), Cieslak and Pang (2021), Pflueger (2023).

tions or relies on sign restrictions directly from a VAR that have often severe drawbacks.[35] We therefore introduce a new identification strategy, where we identify GDP growth surprises and exploit their joint correlation with inflation surprises to disentangle demand- and supply-driven inflation surprises. The intuition is that when a positive inflation surprise is coupled with a positive GDP growth surprise, the inflation surprise is demand-driven, while supply-driven when it is coupled with a negative GDP growth surprise. This approach is similar to identification by sign restrictions, although it does not require to impose explicit assumptions on the underlying shock and parametric estimation of reduced form residuals. In particular, our approach does not identify directly the underlying shock, but rather its influence on the inflationary process. This approach is also close in spirit to Shapiro (2022), who decomposes Personal Consumption Expenditures (PCE) inflation into demand- and supply-driven contributions by looking at the sign of changes in quantities and prices at the single category level underlying the PCE basket.

Similar to how we estimate our inflation surprises, we first digitize 1-year ahead forecasts of real GDP growth from the OECD Economic Outlooks during 1965-2023 for the same 18 OECD countries and subtract them from realized GDP growth. In addition, we also estimate 1-year ahead GDP forecasts using the same model as in Equation 1 for the full 1870-2023 sample. We plot GDP surprises and inflation surprises in Appendix Figure A.12.[36] In addition, in Appendix Figure A.13 we present the fraction of demand-driven and supply-driven inflation surprises in our sample of 18 countries during 1870-2023. Interestingly, the proportion of demand-driven and supply-driven inflation shocks is nearly equal, with 51% being demand-driven and 49% supply-driven.[37] Nevertheless, especially in the modern sample, standard deviation of surprises in supply-driven cases is higher (2.03 vs 1.53). All together, these statistics might explain why we observe more often a decrease of real GDP after an inflation surprise, see e.g. Figure 8 and Appendix Figure A.8.

Given our GDP surprise measure ϵ^y_{it}, we then estimate the following panel-LP specification to identify the *additional* effect of demand-driven inflation surprises on cumulative real returns of asset k:

$$\begin{aligned} r^k_{i,t+h} - r^k_{i,t-1} = \beta^k_h \varepsilon^\pi_{it} + \gamma^k_h \times \mathcal{I}\{\varepsilon^y_{it} \times \varepsilon^\pi_{it} > 0\} \times \varepsilon^\pi_{it} \\ + \Psi^k_h(L)\mathbf{X}_{i,t-1} + \delta^k_{i,h} + v^k_{i,t+h} \quad \text{for} \quad h = 0, 1, 2, \ldots \end{aligned} \tag{7}$$

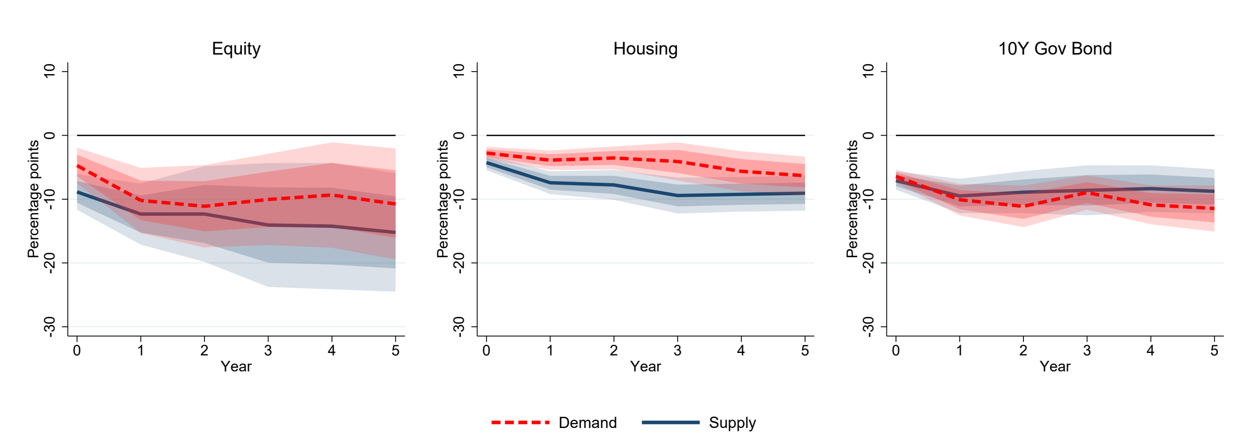
[35] See Wolf (2022) for a discussion.

[36] In our sample, the two series are mostly uncorrelated (≈ -0.11). When regressed against each other and only controlling for lags of each surprise, the contemporaneous coefficient is insignificantly different from zero.

[37] When using only the modern sample and OECD surprises, starting in 1965, this proportion shifts slightly towards supply-driven inflation (48% vs 52%), but it remains quite evenly split.

where ε^{π} is the inflation surprise and $\mathcal{I}\{\varepsilon_{it}^{y} \times \varepsilon_{it}^{\pi} > 0\}$ represents a dummy for when GDP growth and inflation surprises have the same sign, indicating a demand-driven response. Controls include 2 lags of inflation surprises, GDP surprises and changes in the dependent variable, short-term interest rate, real GDP growth, inflation, equity price, measures to control for global trends as world GDP growth and world equity price growth. Finally, we always include horizon-specific country fixed effects. The coefficient γ_h visualizes the *additional* effect of demand-driven inflation, compared to the response identified in β_h, which presents the response in the supply-driven inflation scenario.[38] In this context, ε^{π} is normalized as usual to induce a 5 p.p. increase in inflation.

Figure 12: Asset returns responses to inflation surprises: demand- vs. supply-driven



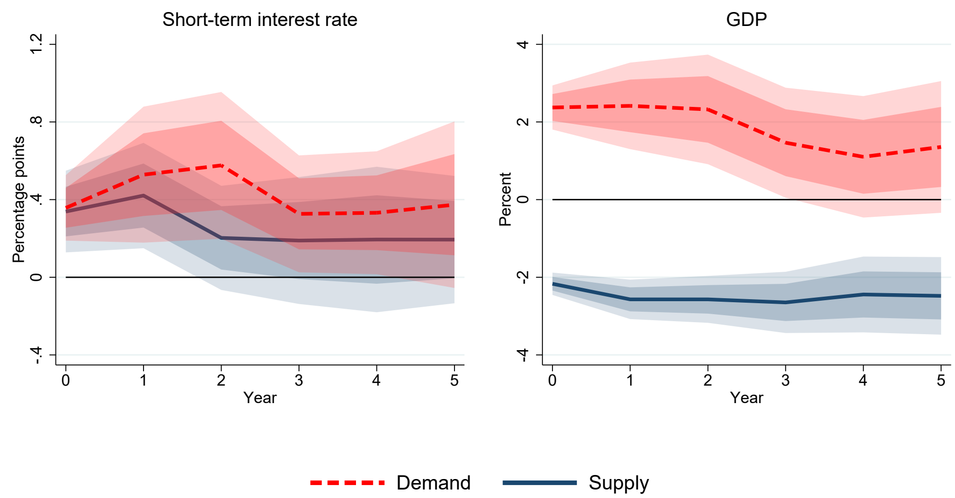
Notes: Impulse responses of cumulative real asset returns on inflation surprises due to demand or supply factors. Inflation surprise is scaled to induce an increase inflation by 5 p.p. The blue line presents estimates of β_h in Equation (11), while the red dashed line presents estimates of $\beta_h + \gamma_h$. Bands are at the 68% and 90% confidence level, based on Driscoll and Kraay (1998) standard errors. Yearly frequency, 1870-2023, using Model and OECD inflation and GDP growth surprises.

Figure 12 presents the cumulative real asset returns in response to demand- and supply-driven inflation during 1870-2023.[39] In Figure 13 we present the response of macroeconomic variables such as GDP and short-term interest rates. In line with theoretical insights, equity and housing returns react more positively on impact when inflation is due to demand factors (equity: -4.71 p.p. vs. -8.86 p.p.; housing: -2.76 p.p. vs. -4.26 p.p.). Nevertheless, the response is overall negative over the five years horizon regardless of the source of inflation. This is true even though real GDP significantly increases on impact after a demand-driven inflation surprise. This result is partially at odds with the prediction of Cieslak and Pflueger

[38]Therefore, $\beta_h + \gamma_h$ shows the overall response after a demand-driven inflation surprise.

[39]In Appendix Figure G.1 we present the results using only the post-1965 sample with OECD-based inflation and GDP surprises. Results are robust.

Figure 13: Macro responses to inflation surprises: demand- vs. supply-driven



Notes: Impulse responses of short-term interest rates and real GDP on inflation surprises due to demand or supply factors. Inflation surprise is scaled to induce an increase inflation by 5 p.p. The blue line presents estimates of β_h in Equation (11), while the red dashed line presents estimates of $\beta_h + \gamma_h$. Bands are at the 68% and 90% confidence level, based on Driscoll and Kraay (1998) standard errors. Yearly frequency, 1870-2023, using Model and OECD inflation and GDP growth surprises.

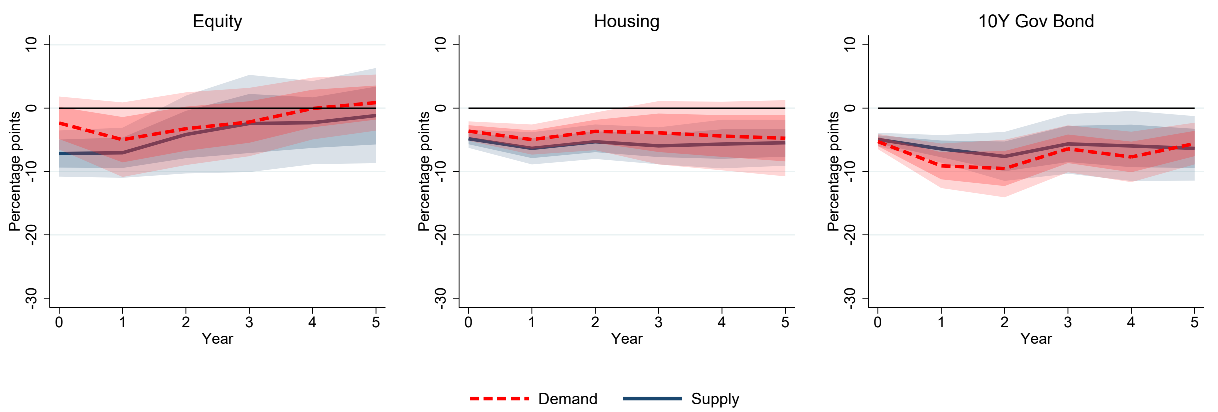
(2023) that a demand-driven inflation surprise leads to an increase in asset returns due to expansionary economic activity.

However, note that the short-term interest rate also increases after an inflation surprise, regardless of the source. In fact, monetary policy responds more strongly to demand-driven inflation surprises.[40] Therefore, one could argue that the results in Figure 13 are not capturing the pure effect of demand vs. supply-driven inflation surprises as it also includes the influence of monetary policy. We therefore purge the responses in demand and supply cases from the role of monetary policy conduct. To do so, we introduce a triple interaction between inflation surprises, GDP surprises, and the monetary policy regime dummy of Equation 6 and analyze how asset returns in *open peg* countries react differently to inflation in the case of demand- vs supply driven surprises. Since the response of the short-term interest is constrained due to the trilemma of international finance, as argued in Section 4.1, we interpret their responses as purely driven by the source of inflation.

Results are presented in Figure 14. Even when monetary policy is unable to intervene, the source of inflation has little impact on cumulative asset returns. The only notable difference

[40] Appendix Figure G.2 shows that interest rates responses are even stronger in the modern period, with short-term rates increasing by as much 4 percentage points in demand-driven case and only 1 p.p. in supply-driven case.

Figure 14: Asset returns responses to inflation surprises in *open pegs*: demand vs. supply



Notes: Impulse responses of cumulative real asset returns on inflation surprises due to demand or supply factors in *open pegs*. Inflation surprise is scaled to induce an increase inflation by 5 p.p. . Bands are at the 68% and 90% confidence level, based on Driscoll and Kraay (1998) standard errors. Yearly frequency, 1870-2023, using Model and OECD inflation and GDP growth surprises and open capital accounts measure by Quinn, Schindler, and Toyoda (2011).

is a more positive (and significant) immediate return for demand-driven surprises in the case of equity (-2.35 p.p. vs. -7.16 p.p.). Response for the longer horizons, however, essentially overlaps.

This can be explained by two factors: first, as shown in Appendix Figure G.6, after a supply shock, GDP falls initially but recovers from $t+1$ onward, while after a demand shock, GDP booms on impact but slows down thereafter. Second, dividends adjust only gradually to a change in GDP (Leary and Michaely, 2011) – see also Appendix Figure G.7. The initial benefit of demand shocks is therefore offset by the slow cashflow adjustment coupled with weaker *future* GDP growth.

For other asset classes the distinction between demand and supply disturbances is largely irrelevant: housing returns drop on impact and show minimal recovery due to infrequent trades and rental contract renegotiations, as discussed in Section 4.1; long-term government bonds, in line with theory, are mechanically affected by inflation in any case, which erodes the value of nominal coupons, yet showing a slightly higher response for supply-driven inflation surprises.[41] All in all, this evidence supports that monetary policy, rather than the source of inflation, is the key factor explaining the shift in the inflation-asset returns relationship.

[41] This result points towards a flight-to-safety mechanism and supports the literature that connects increased convenience yields with supply-driven inflation (Cieslak, Li, and Pflueger, 2024).

Robustness exercises In Appendix Figure G.1 we replicate the results using only OECD-based surprises at the semi-annual frequency. In Appendix Figure G.3 we show and highlight that the *additional* effect of demand-driven surprises is more positive compared to supply-driven surprises. In Appendix Figure G.4 we repeat the demand vs supply decomposition using a continuous interaction between surprises rather than a dummy specification. In Appendix Figures G.5 anf G.6 we show the full set of responses in open pegs and float countries, for both demand- and supply-driven inflation surprises. Results confirm that no matter the source of the surprise, asset returns react negatively to inflation when monetary policy is free to respond to inflation and stabilize the price level.

5 Conclusion

In this paper, we dissect the complex relationship between inflation and asset returns by exploiting 150 years of data for 18 advanced economies. This unique setup with long-run cross-country data helps us address the long-standing debate within the inflation hedge literature. During 1870-2023, our findings show on average a negative relationship between inflation surprises and asset returns, irrelevant of whether the asset has nominally-fixed cash flows or are linked to real physical values. In addition, such negative effects seem to persist, especially for stocks and housing. This suggests that the effectiveness of real physical assets as inflation hedges is much more limited than traditionally assumed. Importantly, we show that the negative asset returns-inflation relationship has increasingly worsened starting in the in 1970s, when explicit inflation targeting policy were adopted by central banks.

Our detailed investigation on the macroeconomic drivers of this relationship reveals the importance of how monetary policy responds to inflation surprises. Regardless of the underlying source of the inflation surprise, which plays only a limited role, the increased prominence of inflation control in central banking practices translates into worsened conditions for financial markets and asset prices. Assets that are actively traded in financial markets, such as equity, adhere to this mechanism, such that when constraining monetary policy actions, inflation has essentially a zero impact on real asset returns. On the other hand, housing deserves further explorations, given the imperfections and rigidities in the renewal of rental contracts, low trading frequencies and dependence on longer-term mortgage rates, rather than the short-term interest rates directly affected by central banks.

In conclusion, our analysis emphasizes the critical role of monetary policy in mediating the impact of inflation on asset returns. As a relevant implication, this mechanism calls for central banks to assess the broader outcomes of their actions on financial markets. Recognizing this amplified effect of policy decisions on asset returns can lead to a strategic shift, where central banks could consider accepting marginally higher inflation levels to mitigate severe disruptions in asset markets. This result underlines the critical balance required between controlling inflation and ensuring financial market stability.

References

Alvaredo, Facundo, Anthony B Atkinson, Thomas Blanchet, Lucas Chancel, Luis Estevez Bauluz, Matthew Fisher-Post, Ignacio Flores, Bertrand Garbinti, Jonathan Goupille-Lebret, Clara Martınez-Toledano, et al. (2021). "Distributional national accounts guidelines methods and concepts used in the world inequality database". PhD thesis. World Inequality Lab.

Auerbach, Alan J and Yuriy Gorodnichenko (2012a). "Fiscal multipliers in recession and expansion". In: *Fiscal policy after the financial crisis*. University of Chicago Press, pp. 63–98.

— (2012b). "Measuring the output responses to fiscal policy". In: *American Economic Journal: Economic Policy* 4.2, pp. 1–27.

— (2013). "Output spillovers from fiscal policy". In: *American Economic Review* 103.3, pp. 141–46.

Barnes, Michelle, John H Boyd, and Bruce D Smith (1999). "Inflation and asset returns". In: *European Economic Review*. DOI: 10.1016/S0014-2921(98)00090-7.

Bataa, Erdenebat, Denise R Osborn, Marianne Sensier, and Dick Van Dijk (2013). "Structural breaks in the international dynamics of inflation". In: *Review of Economics and Statistics* 95.2, pp. 646–659.

Bekaert, Geert and Xiaozheng Wang (2010). "Inflation risk and the inflation risk premium". In: *Economic Policy*. DOI: 10.1111/J.1468-0327.2010.00253.X.

Bernanke, Ben S and Mark Gertler (2000). *Monetary policy and asset price volatility*.

Bernanke, Ben S and Kenneth N Kuttner (2005). "What explains the stock market's reaction to Federal Reserve policy?" In: *The Journal of finance* 60.3, pp. 1221–1257.

Bianchi, Francesco, Martin Lettau, and Sydney C Ludvigson (2022). "Monetary policy and asset valuation". In: *The Journal of Finance* 77.2, pp. 967–1017.

Binder, Carola and Rupal Kamdar (2022). "Expected and Realized Inflation in Historical Perspective". In: *Journal of Economic Perspectives* 36.3, pp. 131–56.

Blanco, Andrés, Pablo Ottonello, and Tereza Ranošová (2025). "The dynamics of large inflation surges". In: *Review of Economics and Statistics*, pp. 1–31.

Bleaney, Michael and Manuela Francisco (2005). "Exchange rate regimes and inflation: only hard pegs make a difference". In: *Canadian Journal of Economics/Revue canadienne d'économique* 38.4, pp. 1453–1471.

Boons, Martijn, Fernando Duarte, Frans De Roon, and Marta Szymanowska (2020). "Time-varying inflation risk and stock returns". In: *Journal of Financial Economics* 136.2, pp. 444–470.

Boudoukh, Jacob and Matthew Richardson (1993). "Stock returns and inflation: A long-horizon perspective". In: *The American economic review* 83.5, pp. 1346–1355.

Brunnermeier, Markus K and Christian Julliard (2008). "Money illusion and housing frenzies". In: *The Review of Financial Studies* 21.1, pp. 135–180.

Caballero, Ricardo J and Alp Simsek (2024). "Central Banks, Stock Markets, and the Real Economy". In: *Annual Review of Financial Economics* 16.

Campbell, John Y, Carolin Pflueger, and Luis M Viceira (2020). "Macroeconomic drivers of bond and equity risks". In: *Journal of Political Economy* 128.8, pp. 3148–3185.

Campbell, John Y, Adi Sunderam, and Luis M Viceira (2009). *Inflation bets or deflation hedges? The changing risks of nominal bonds*. Tech. rep. National Bureau of Economic Research.

Chaudhary, Manav and Benjamin Marrow (2022). "Revisiting the Stock-Inflation Puzzle". In: *Available at SSRN 4154564*.

Chinn, Menzie D and Hiro Ito (2006). "What matters for financial development? Capital controls, institutions, and interactions". In: *Journal of development economics* 81.1, pp. 163–192.

Cieslak, Anna, Wenhao Li, and Carolin Pflueger (2024). *Inflation and treasury convenience*. Tech. rep. National Bureau of Economic Research.

Cieslak, Anna and Hao Pang (2021). "Common shocks in stocks and bonds". In: *Journal of Financial Economics* 142.2, pp. 880–904.

Cieslak, Anna and Carolin Pflueger (2023). "Inflation and asset returns". In: *Annual Review of Financial Economics* 15.1, pp. 433–448.

Cieslak, Anna and Pavol Povala (2015). "Expected returns in Treasury bonds". In: *The Review of Financial Studies* 28.10, pp. 2859–2901.

David, Alexander and Pietro Veronesi (2013). "What ties return volatilities to price valuations and fundamentals?" In: *Journal of Political Economy* 121.4, pp. 682–746.

Driscoll, John C and Aart C Kraay (1998). "Consistent covariance matrix estimation with spatially dependent panel data". In: *Review of economics and statistics* 80.4, pp. 549–560.

Elliott, Graham and Allan Timmermann (2016). "Forecasting in economics and finance". In: *Annual Review of Economics* 8, pp. 81–110.

Ellison, Martin, Sang Seok Lee, and Kevin Hjortshøj O'Rourke (2024). "The ends of 27 big depressions". In: *American Economic Review* 114.1, pp. 134–168.

Engsted, Tom and Carsten Tanggaard (2000). "The Relation Between Asset Returns and Inflation at Short and Long Horizons." In: DOI: 10.2139/SSRN.221669.

Fama, Eugene F (1981). "Stock returns, real activity, inflation, and money". In: *The American economic review* 71.4, pp. 545–565.

Fama, Eugene F. and G.William Schwert (1977). “Asset returns and inflation”. In: *Journal of Financial Economics*. DOI: 10.1016/0304-405X(77)90014-9.

Fang, Xiang, Yang Liu, and Nikolai Roussanov (2022). *Getting to the core: Inflation risks within and across asset classes*. Tech. rep. National Bureau of Economic Research.

Federle, Jonathan, Cathrin Mohr, and Moritz Schularick (2024). “Inflation surprises and election outcomes”. In: *Available at SSRN 5032871*.

Fehrle, Daniel (2023). “Hedging against inflation: housing versus equity”. In: *Empirical Economics* 65.6, pp. 2583–2626.

Fisher, Irving (1930). *Theory of interest: as determined by impatience to spend income and opportunity to invest it*. Augustusm Kelly Publishers, Clifton.

Friedman, Milton (1961). “The lag in effect of monetary policy”. In: *Journal of Political Economy* 69.5, pp. 447–466.

Geske, Robert and Richard Roll (1983). “The fiscal and monetary linkage between stock returns and inflation”. In: *The journal of Finance* 38.1, pp. 1–33.

Ghosh, Atish R, Mahvash S Qureshi, and Charalambos G Tsangarides (2014). “On the value of words: Inflation and fixed exchange rate regimes”. In: *IMF Economic Review* 62.2, pp. 288–322.

Gil de Rubio Cruz, Antonio, Emilio Osambela, Berardino Palazzo, Francisco Palomino, and Gustavo Suarez (2023). “Inflation Surprises and Equity Returns”. In: *Available at SSRN 4280699*.

Gurkaynak, Refet S, Brian Sack, and Eric T Swanson (2005). “Do actions speak louder than words? The response of asset prices to monetary policy actions and statements”. In.

Gürkaynak, Refet S, Brian Sack, and Jonathan H Wright (2010). “The TIPS yield curve and inflation compensation”. In: *American Economic Journal: Macroeconomics* 2.1, pp. 70–92.

Hamilton, James D (1992). “Was the deflation during the Great Depression anticipated? Evidence from the commodity futures market”. In: *The American Economic Review*, pp. 157–178.

Hendry, David F and Michael P Clements (2004). “Pooling of forecasts”. In: *The Econometrics Journal* 7.1, pp. 1–31.

Hess, Patrick J and Bong-Soo Lee (1999). “Stock returns and inflation with supply and demand disturbances”. In: *The Review of Financial Studies* 12.5, pp. 1203–1218.

Jordà, Òscar (2005). “Estimation and inference of impulse responses by local projections”. In: *American economic review* 95.1, pp. 161–182.

Jordà, Òscar, Katharina Knoll, Dmitry Kuvshinov, Moritz Schularick, and Alan M Taylor (2019). "The rate of return on everything, 1870–2015". In: *The Quarterly Journal of Economics* 134.3, pp. 1225–1298.

Jordà, Òscar, Moritz Schularick, and Alan M Taylor (2017). "Macrofinancial history and the new business cycle facts". In: *NBER macroeconomics annual* 31.1, pp. 213–263.

— (2020). "The effects of quasi-random monetary experiments". In: *Journal of Monetary Economics* 112, pp. 22–40.

Katz, Michael, Hanno Lustig, and Lars Nielsen (2017). "Are stocks real assets? Sticky discount rates in stock markets". In: *The Review of Financial Studies* 30.2, pp. 539–587.

Knox, Benjamin and Yannick Timmer (2025). "Stagflationary stock returns". In.

Leary, Mark T and Roni Michaely (2011). "Determinants of dividend smoothing: Empirical evidence". In: *The Review of Financial Studies* 24.10, pp. 3197–3249.

Modigliani, Franco and Richard A Cohn (1979). "Inflation, rational valuation and the market". In: *Financial Analysts Journal* 35.2, pp. 24–44.

Monnet, Eric, Damien Puy, et al. (2016). *Has Globalization Really Increased Business Cycle Synchronization?* Tech. rep. 54. International Monetary Fund.

Monnet, Eric and Damien Puy (2021). "One Ring to Rule Them All? New Evidence on World Cycles". In: *CEPR Discussion Paper* 15958.

Montiel Olea, José Luis and Mikkel Plagborg-Møller (2021). "Local projection inference is simpler and more robust than you think". In: *Econometrica* 89.4, pp. 1789–1823.

Obstfeld, Maurice, Jay C Shambaugh, and Alan M Taylor (2005). "The trilemma in history: tradeoffs among exchange rates, monetary policies, and capital mobility". In: *Review of economics and statistics* 87.3, pp. 423–438.

Obstfeld, Maurice and Alan M Taylor (1997). "The great depression as a watershed: international capital mobility over the long run". In.

Pflueger, Carolin (2023). *Back to the 1980s or not? The drivers of inflation and real risks in Treasury bonds*. Tech. rep. National Bureau of Economic Research.

Piazzesi, Monika, Martin Schneider, Pierpaolo Benigno, and John Y Campbell (2006). "Equilibrium yield curves [with comments and discussion]". In: *NBER macroeconomics Annual* 21, pp. 389–472.

Quinn, Dennis, Martin Schindler, and A Maria Toyoda (2011). "Assessing measures of financial openness and integration". In: *IMF Economic Review* 59.3, pp. 488–522.

Ramey, Valerie A and Sarah Zubairy (2018). "Government spending multipliers in good times and in bad: evidence from US historical data". In: *Journal of political economy* 126.2, pp. 850–901.

Rigobon, Roberto and Brian Sack (2004). "The impact of monetary policy on asset prices". In: *Journal of monetary economics* 51.8, pp. 1553–1575.

Schmitt-Grohé, Stephanie and Martın Uribe (2024). "What Do Long Data Tell Us about the Permanent Component of Inflation?" In: *AEA Papers and Proceedings*. Vol. 114. American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203, pp. 101–105.

Shapiro, Adam Hale (2022). "Decomposing supply and demand driven inflation". In: Federal Reserve Bank of San Francisco San Francisco.

Timmermann, Allan (2006). "Forecast combinations". In: *Handbook of economic forecasting* 1, pp. 135–196.

Vogel, Lukas (2007). "How do the OECD growth projections for the G7 economies perform? A post-mortem". In.

Wolf, Christian K (2022). "What Can We Learn from Sign-Restricted VARs?" In: *AEA Papers and Proceedings*. Vol. 112. American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203, pp. 471–475.

Appendix for
"Inflation surprises and asset returns: a macrohistory perspective"

Appendix A Additional figures and tables

Table A.1: List of models used, part one

Model Name	Description
Univariate Models	
ARMA(1,1)	$\pi_t = c + \phi\pi_{t-1} + \epsilon_t + \theta\epsilon_{t-1}$. 30-year rolling window (RW hereafter).
ARMA(1,1) on transitory π	As above, with 30-year RW, but using $\hat{\pi}_t = \bar{\pi}_t - \pi_t$, where $\bar{\pi}_t$ is trend inflation and follows a random walk, i.e. $\bar{\pi}_t = \bar{\pi}_{t-1} + \epsilon_t$
Backward-looking Phillips Curve	$\hat{\pi}_t = \phi_1\hat{\pi}_{t-1} + \phi_2\hat{y}_{t-1} + \epsilon_t$, where $\hat{\pi}$ and $\hat{y}$ are transitory inflation and output gap, respectively. 30-year RW.
ARMA(1,1) w/o RW	as ARMA(1,1) above but no RW
ARMA(1,1) w/o RW on transitory π	as ARMA(1,1) above but no RW, using $\hat{\pi}$
Random Walk	$\pi_t = \pi_{t-1} + \epsilon_t$
Unobserved component trend-cycle	$\pi_t = \tau_t + \eta_t$, where $\tau_t = \tau_{t-1} + \epsilon_t$ is trend inflation, as in Stock and Watson (2007).
Multivariate Models	
Benchmark VAR(2)	$Y_t = A_1Y_{t-1} + A_2Y_{t-2} + \nu_t$ where $Y_t =$ [inflation, output gap, int. rate]
VAR	As above, but using transitory inflation $\hat{\pi}$
VAR	As the benchmark VAR(2), but using the r^* gap measure of Grimm et al. (2023)
VAR	As above, but on transitory inflation π
VAR on asset prices	$Y_t =$ [inflation, stock price, gov. bond price]
VAR on asset prices & GDP	$Y_t =$ [inflation, stock price, house price, GDP growth]
VAR on asset & commodity prices	$Y_t =$ [inflation, stock price, house price, commodity price]
VAR on GDP components	$Y_t =$ [inflation, consumption, investment, net exports]
VAR on commodities	$Y_t =$ [inflation, grains price, metals price, softs price]

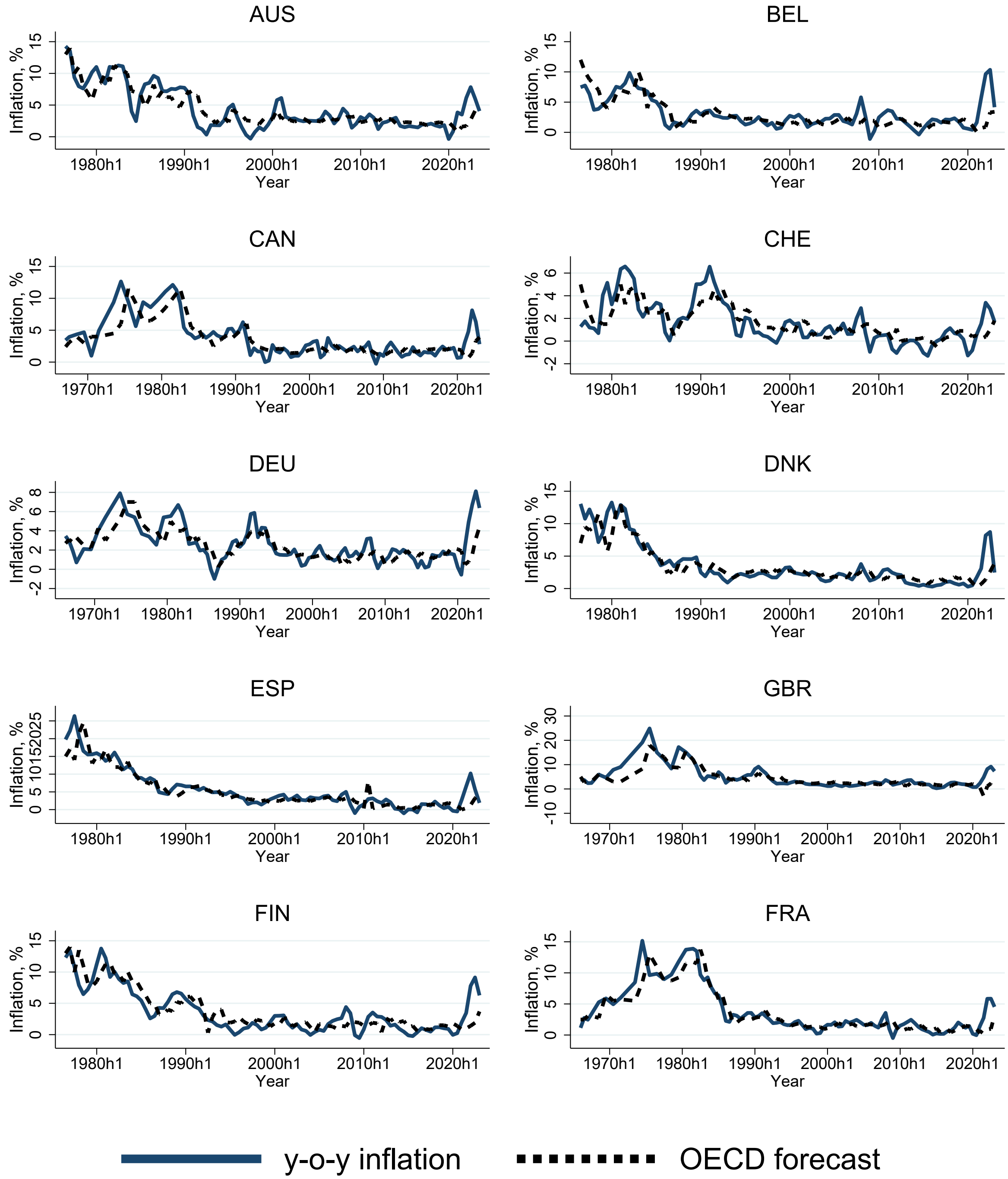
Notes: Variables are in first-differences to ensure stationarity, if needed. Lag length for VARs is equal to 2 and is chosen using information criteria.

Table A.3: List of models used, part two

Model Name	Description
Panel Data Models	
Arellano-Bond (A-B), no covariates	$\pi_{it} = \alpha_1 \pi_{i,t-1} + \alpha_2 \pi_{i,t-2} + u_{it}$, 10-year rolling window
A-B on transitory π	As above, no covariates but using $\hat{\pi}$, while trend inflation follows a random walk, i.e. $\bar{\pi}_{i,t} = \bar{\pi}_{i,t-1} + \nu_{i,t}$. Two lags, 10-year rolling window
A-B with output gap and int. rate	$\pi_{it} = \sum_{j=1}^{2} \alpha_j \pi_{i,t-j} + \phi \mathbf{X_{i,t-1}} + u_{it}$, where $\mathbf{X}$ is output gap and interest rate. 10-year rolling window.
A-B with $\mathbf{X}$ on transitory π	As above, where $\mathbf{X}$ is output gap and interest rate, but using transitory inflation $\hat{\pi}$

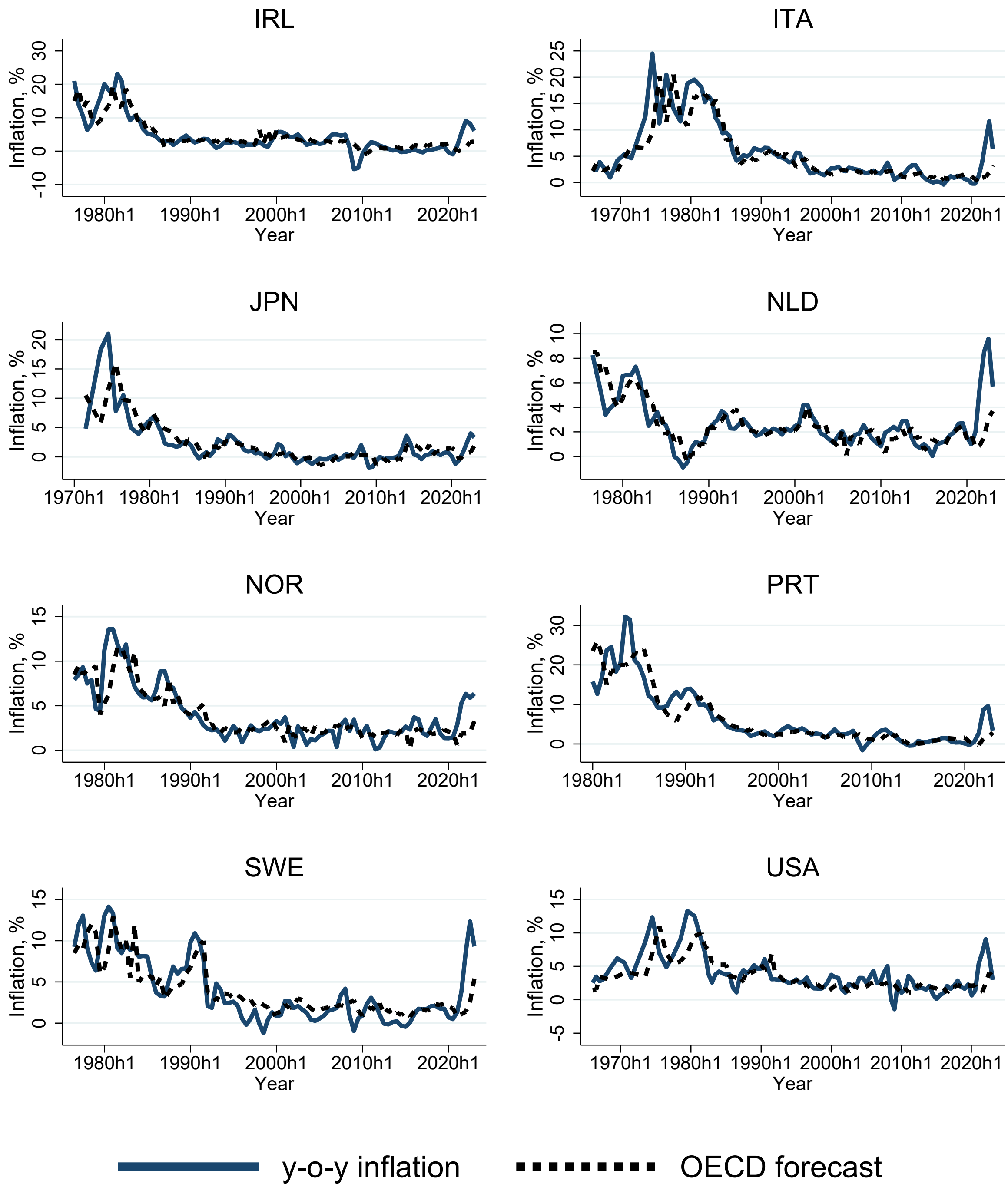
Notes: The 10-year rolling window is kept intentionally short as the Arellano-Bond estimator suffers particularly panels with long T dimension.

Figure A.1: OECD inflation expectations, part one



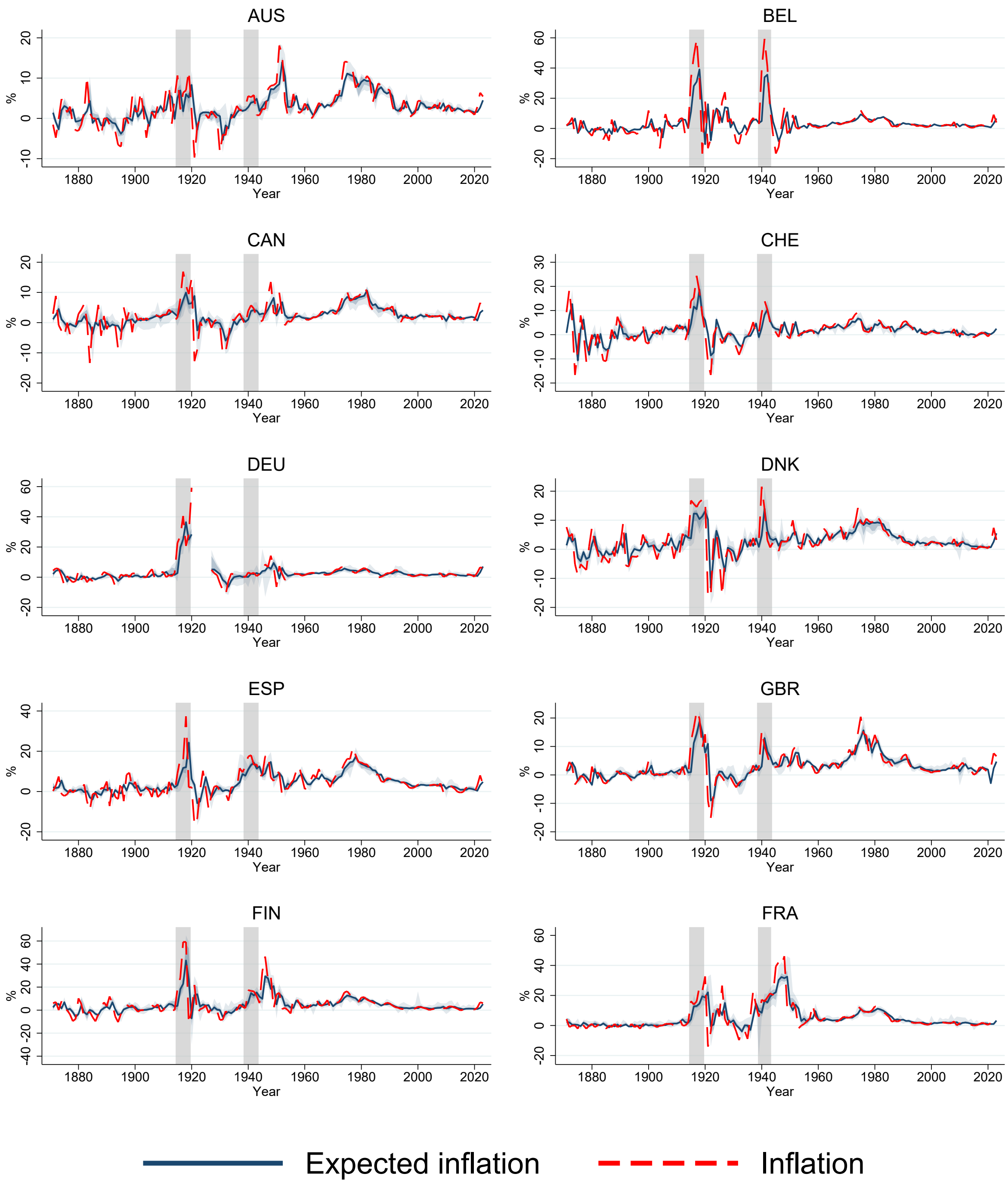
Notes: Black dashed line presents 1Y-ahead inflation expectations derived from the OECD Economic Outlooks as described in Section 2. Blue solid line presents the actual realized inflation rate from Monnet, Puy, et al. (2016). Half-yearly frequency, 1965-2023. Series for Australia, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Great Britain, Finland, and France.

Figure A.2: OECD inflation expectations, part two



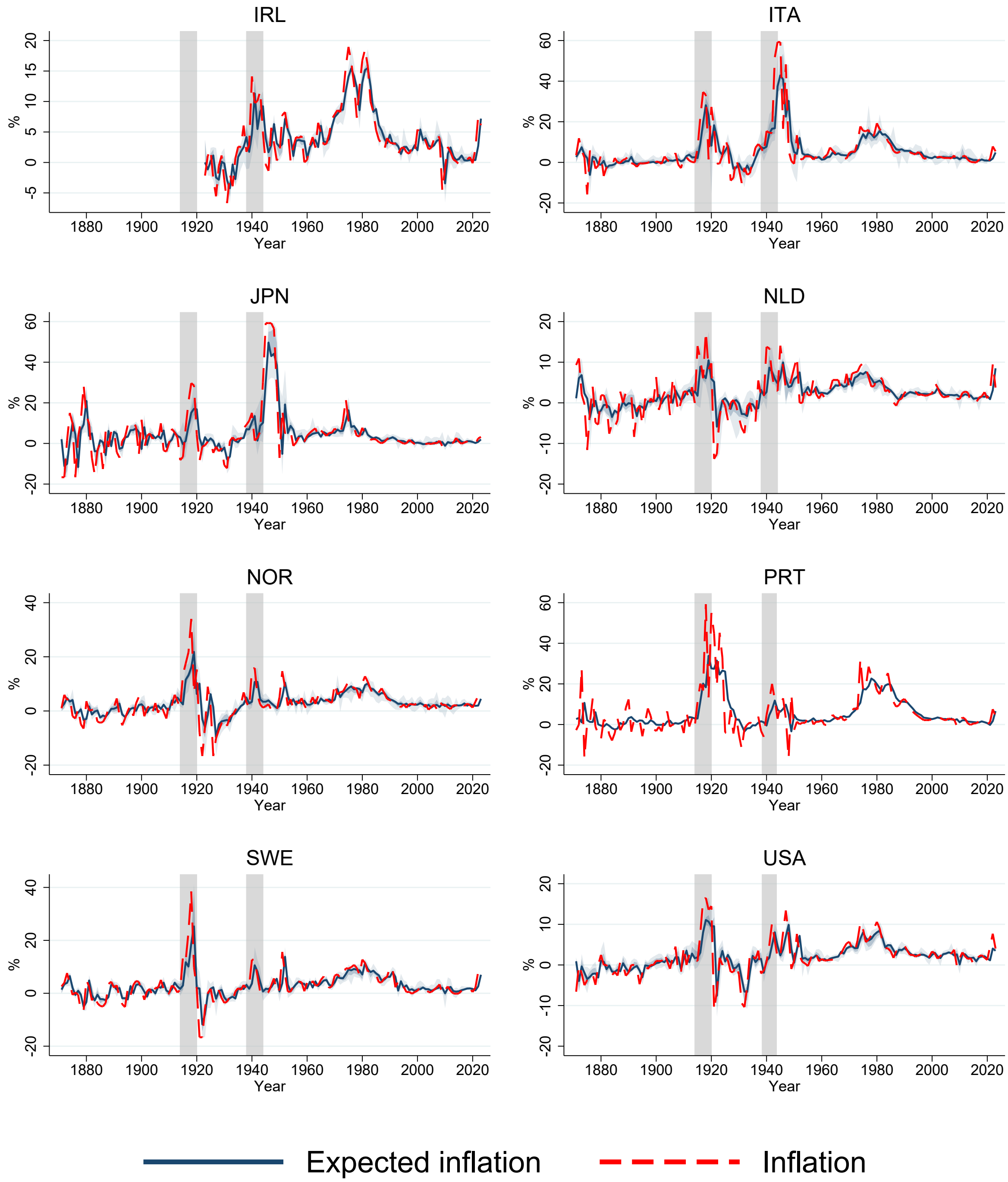
Notes: Black dashed line presents 1Y-ahead inflation expectations derived from the OECD Economic Outlooks as described in Section 2. Blue solid line presents the actual realized inflation rate from Monnet, Puy, et al. (2016). Half-yearly frequency, 1965-2023. Series for Ireland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, and USA.

Figure A.3: Model-based inflation expectations, part one



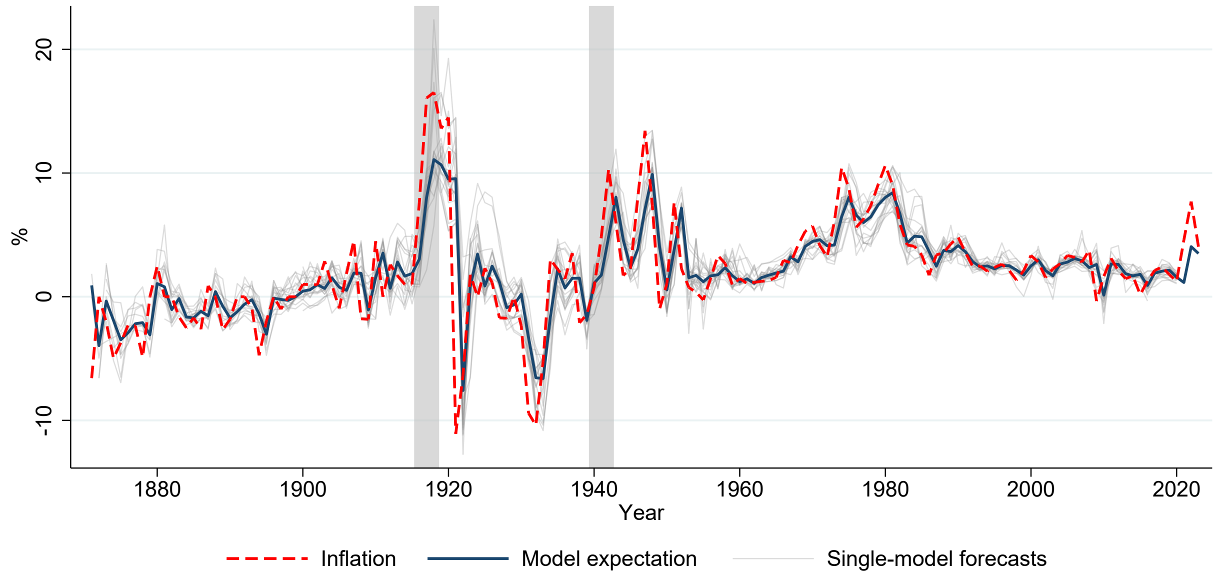
Notes: Blue solid line presents 1Y-ahead inflation expectations derived from the model as in Equation (1), together with bands at the interquartile range and 5th and 95th percentile of the distribution of model estimates. Red dashed line presents the actual realized inflation rate. The gray shaded areas present WWI and WWII. We exclude years around the German hyperinflation. We present the series for Australia, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Great Britain, Finland, and France during 1870-2023. *Data sources*: Authors' own series and the JST database.

Figure A.4: Model-based inflation expectations, part two



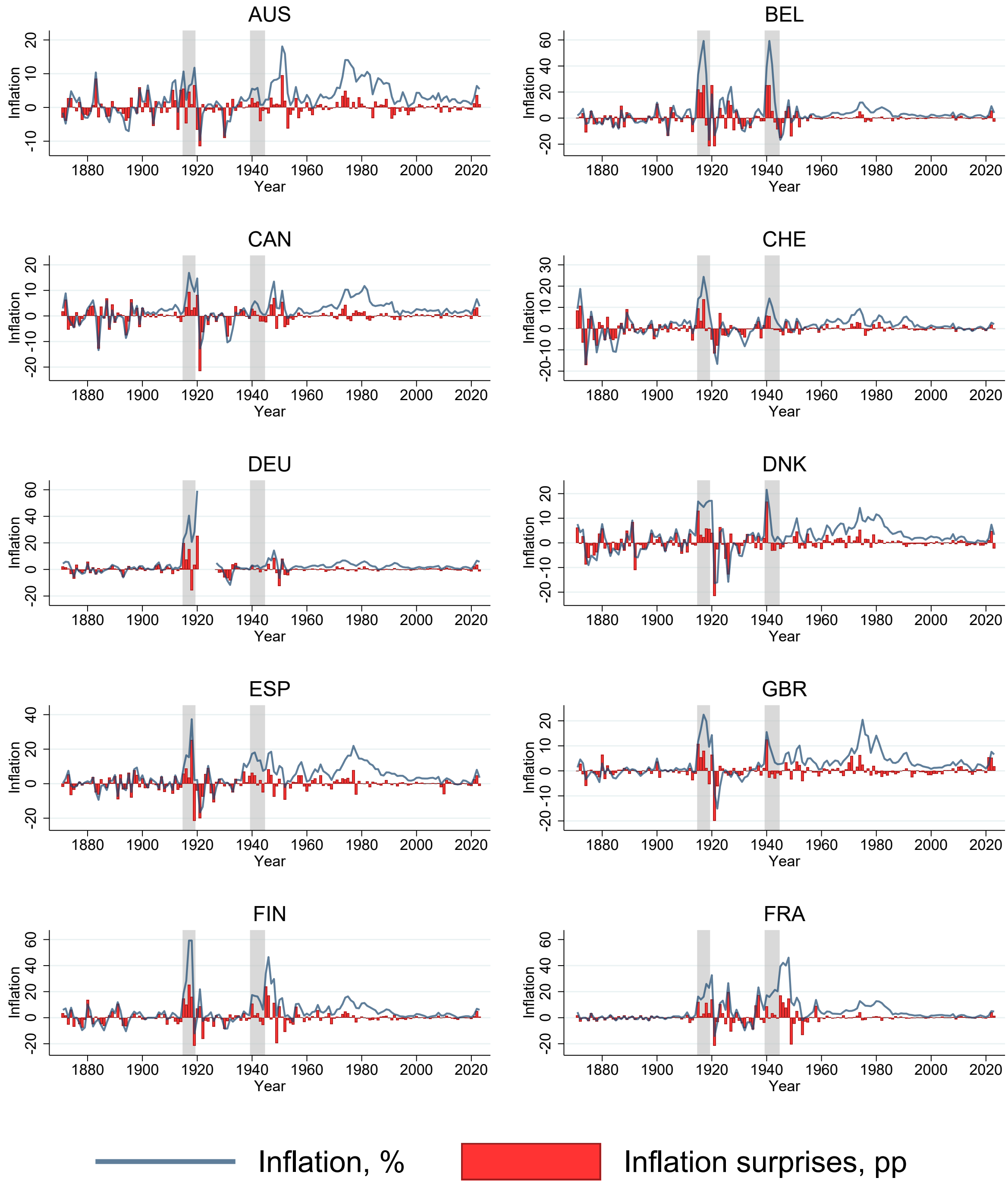
Notes: Blue solid line presents 1Y-ahead inflation expectations derived from the model as in Equation (1), together with bands at the interquartile range and 5th and 95th percentile of the distribution of model estimates. Red dashed line presents the actual realized inflation rate. The gray shaded areas present WWI and WWII. We present the series for Ireland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, and USA during 1870-2023. *Data sources*: Authors' own series and the JST database.

Figure A.5: Model-based inflation expectations for USA, 1870-2023



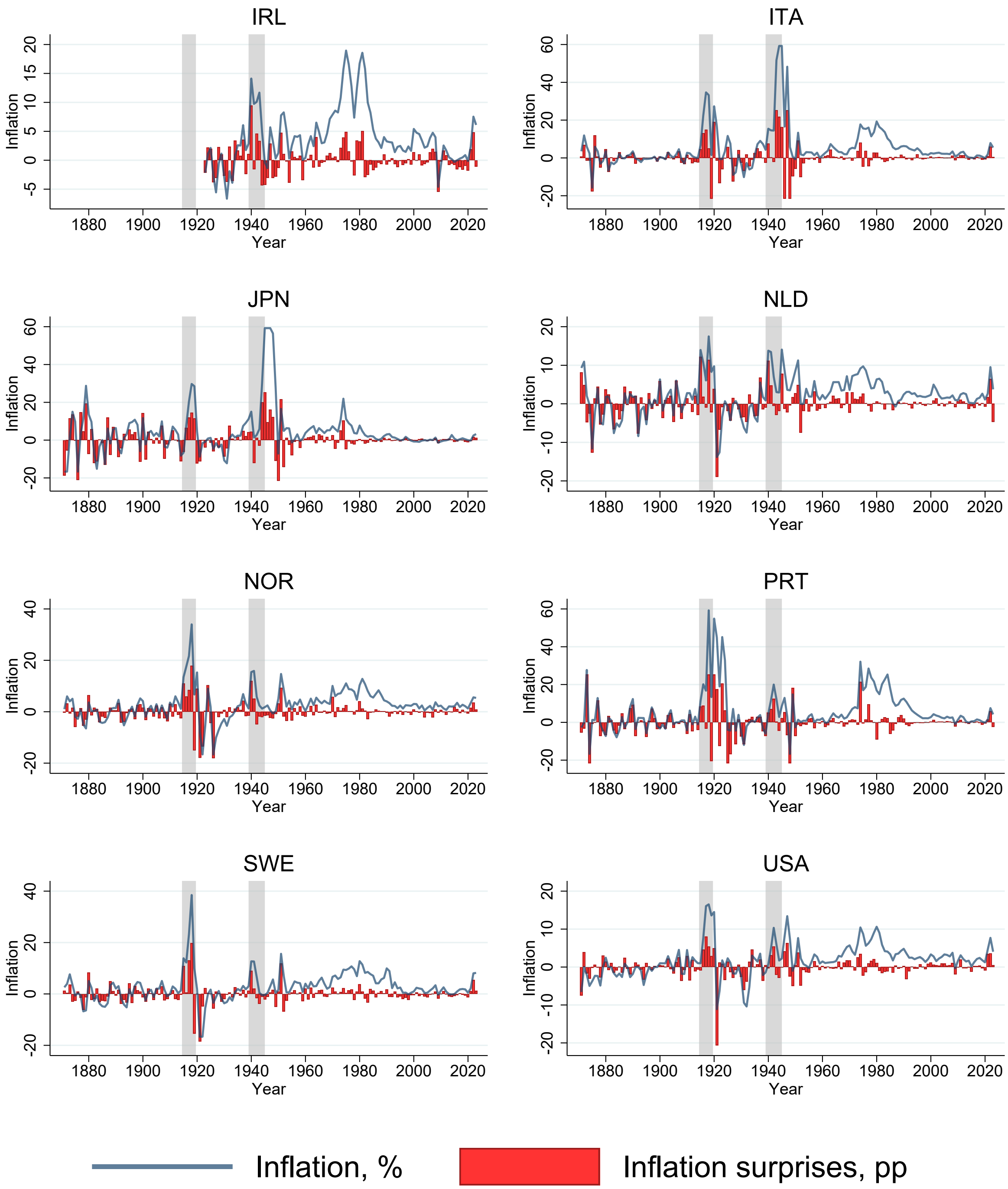
Notes: Blue solid line presents 1Y-ahead inflation expectations derived from our benchmark model as in Equation (1). As comparison, we also plot inflation expectations based on single models as gray lines (see Table A.1 & A.3 for a description of the models). Red dashed line presents the actual realized inflation rate. The gray shaded areas present WWI and WWII. USA, 1870-2023. *Data sources*: Authors' own series and the JST database.

Figure A.6: Inflation surprises, part one



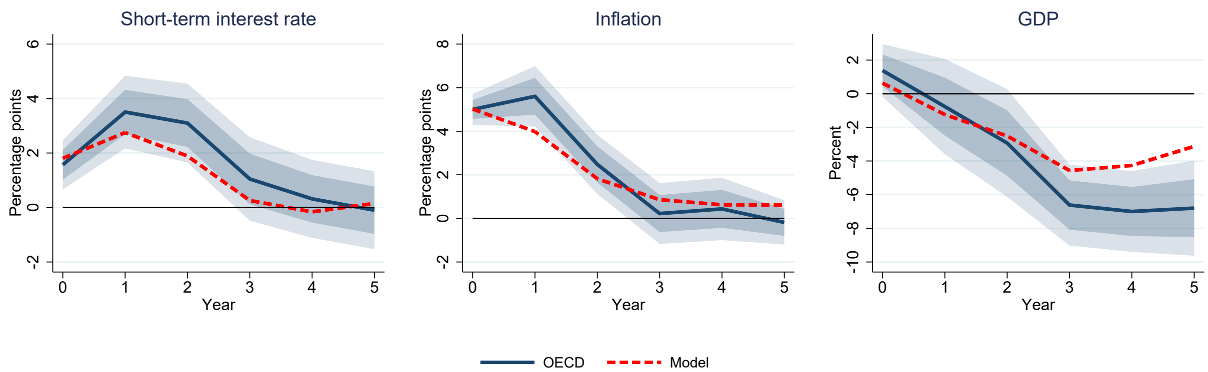
Notes: Inflation surprises (red bars) and realized inflation for Australia, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Great Britain, Finland, and France during 1870-2023. Inflation surprises are computed as the difference between realized inflation and expectations from the previous period, i.e. $\varepsilon^{\pi}_{it} = \pi_{it} - \mathbb{E}_{t-1}[\pi_{it}]$, using model expectations for 1870-1965 and OECD expectations for 1965-2023. Inflation is measured in %, surprises in percentage points. Vertical gray shaded areas present world wars. We exclude the hyperinflation period for Germany.

Figure A.7: Inflation surprises, part two

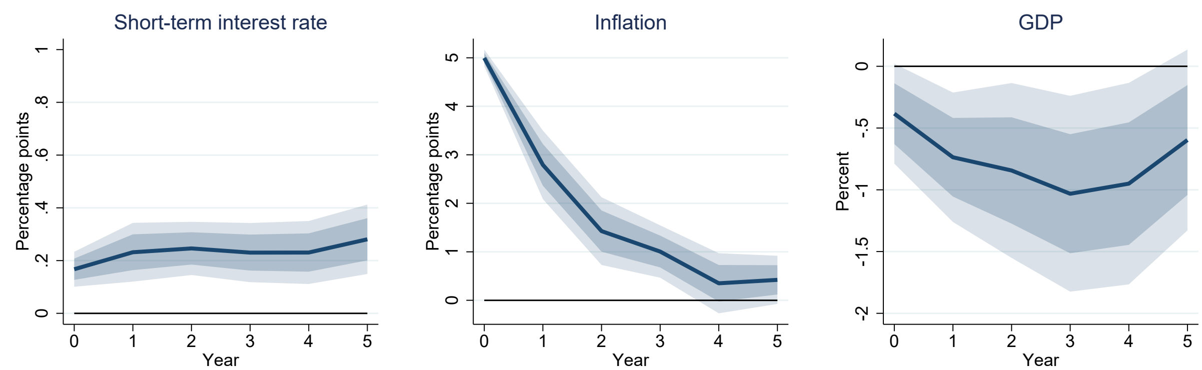


Notes: Inflation surprises (red bars) and realized inflation for Ireland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, and USA during 1870-2023. Inflation surprises are computed as the difference between realized inflation and expectations from the previous period, i.e. $\varepsilon^{\pi}_{it} = \pi_{it} - \mathbb{E}_{t-1}[\pi_{it}]$, using model expectations for 1870-1965 and OECD expectations for 1965-2023. Inflation is measured in %, surprises in percentage points. Vertical gray shaded areas present world wars.

Figure A.8: The effect of inflation surprises on the macroeconomy



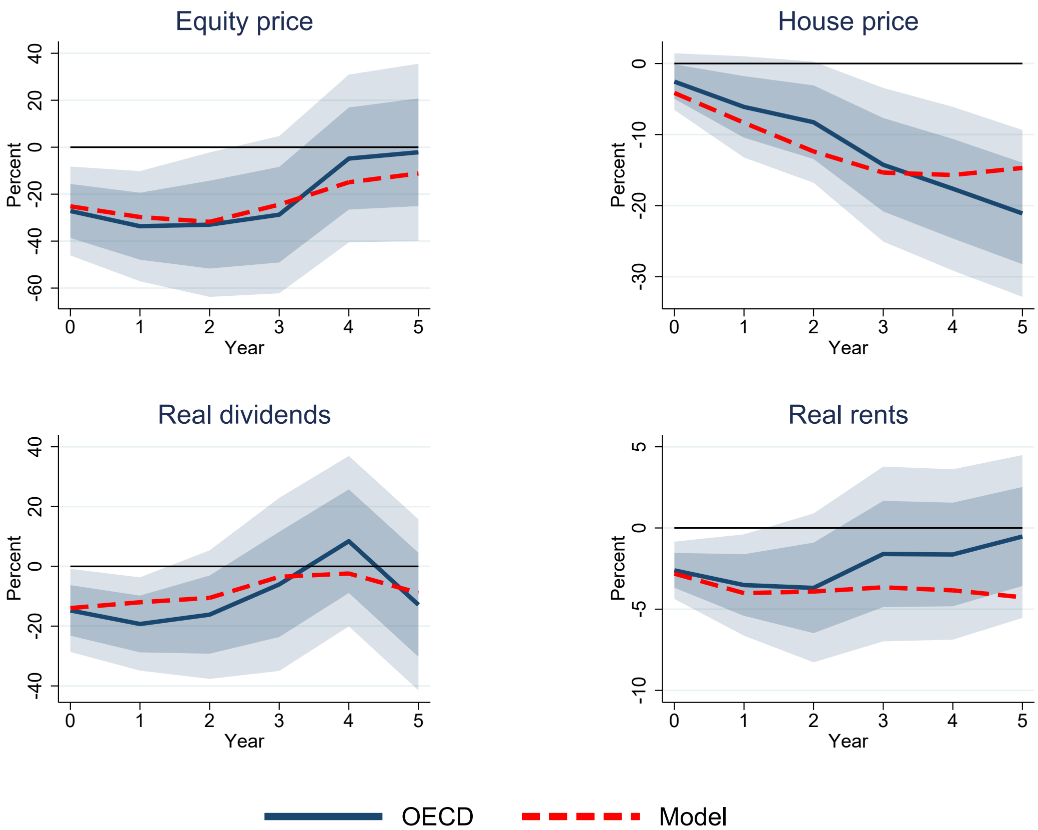
(a) Post-1965



(b) Full-sample

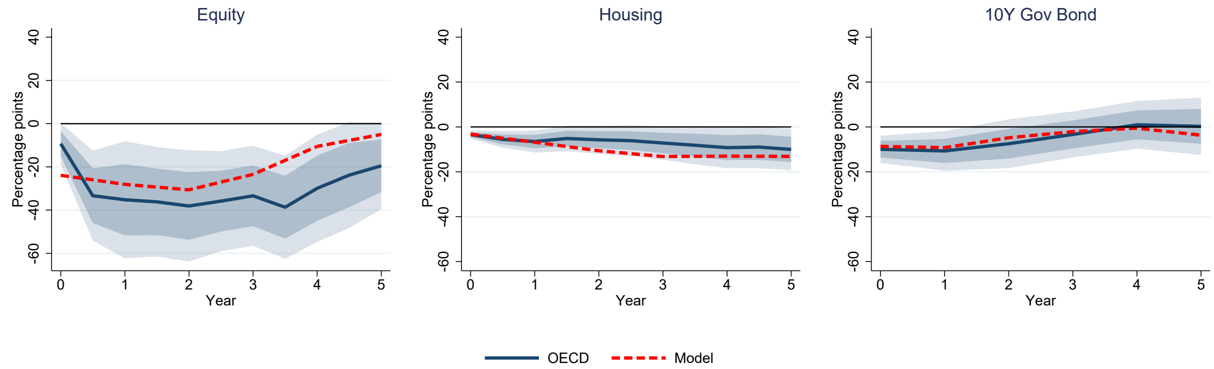
Notes: Impulse responses for nominal short-term interest rate, inflation, and real GDP. Panel (a) presents the IRFs during the modern sample 1965-2023, where we have both set of inflation surprises (OECD-based and model-based, represented as blue solid and red dashed lines, respectively). In Panel (b) we present the IRFs for the full sample 1870-2023, using OECD surprises for the post-1965 sample and model surprises when OECD surprises are not available, i.e. 1870-1965. All effects are scaled to a 5 p.p. increase in inflation. Yearly frequency. Bands are at the 68% and 90% confidence level.

Figure A.9: The effect of inflation surprises on asset prices and yields



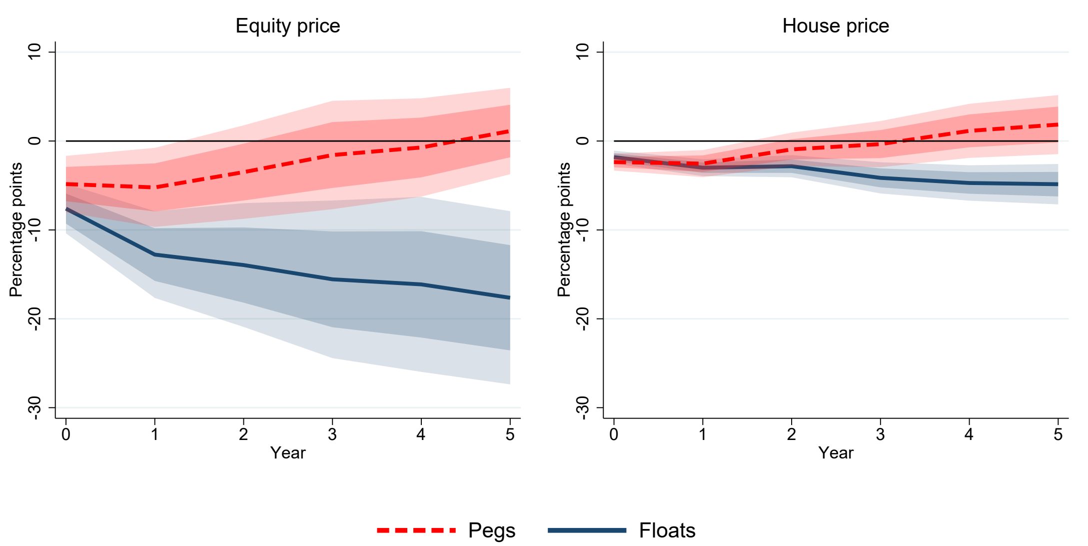
Notes: Impulse responses for real equity price, real house price, real dividends and real rents through panel-LP using OECD (end-of-the-year) surprises and model surprises, 1965-2023, yearly frequency. Effects are scaled to a 5 p.p. increase in inflation. Bands are at the 68% and 90% confidence level.

Figure A.10: Inflation surprises on asset returns, half-yearly data during 1965-2023



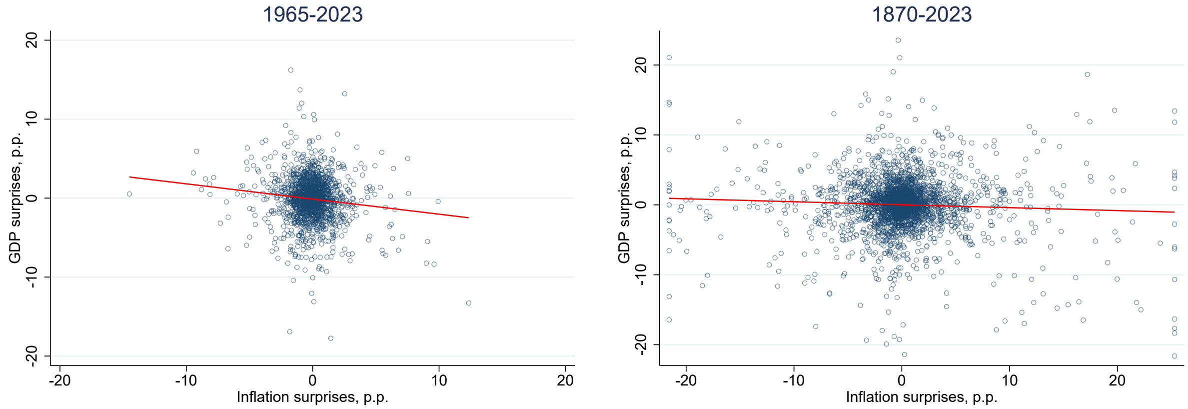
Notes: Impulse responses of cumulative real asset returns following a 5 p.p. surprise increase in inflation during 1965-2023. Results using OECD-surprises are at semi-annual frequency (blue solid line), while the results with model-surprises are at annual frequency (red dashed line). Bands are at the 68% and 90% confidence level.

Figure A.11: Equity and house price responses in peg vs non-peg countries



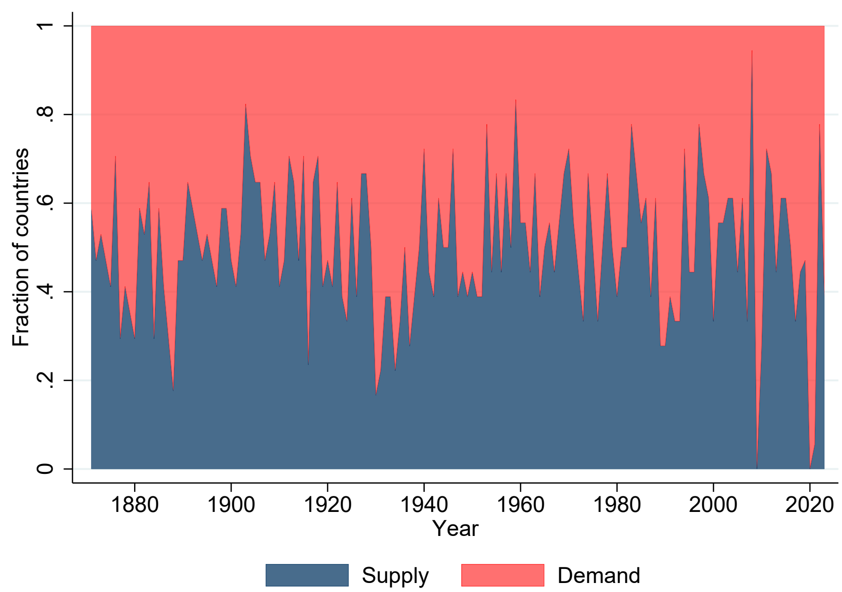
Notes: Impulse responses of real equity and house prices following a 5 p.p. inflation surprise in open-peg countries (red dashed line) and in float countries (blue solid line). Model & OECD surprises, scaled to a 5 p.p. increase in inflation. Sample of 18 countries during 1870-2023, yearly frequency. The two lines represent the estimate of $\beta_{A,h} + \beta_{A',h}$ and $\beta_{B,h}$ in the state-dependent LP. Shaded areas are the 90% and 68% confidence intervals.

Figure A.12: Scatter of GDP surprises and inflation surprises



Notes: Scatterplot of GDP surprises and inflation surprises. *Left panel:* Half-yearly frequency, 1965-2023, using OECD-based inflation and GDP growth surprises. Correlation ≈ -0.11. *Right panel:* Yearly frequency, 1870-2023, using both OECD- and model-based inflation and GDP growth surprises (we used model-based measures for 1870-1965 and OECD-based measures after 1965). Correlation ≈ -0.06.

Figure A.13: Fraction of demand- and supply-driven inflation surprises



Notes: Timeline of the relative frequency of demand-driven (red) and supply-driven (blue) inflation surprises over 18 OECD countries during 1870-2020. Demand- and supply-driven inflation surprises are identified as described in Section 4.2.

Appendix B Data description

In this appendix, we provide a more detailed description of the data we use for our analysis. The first dataset we exploit is the Jordà-Schularick-Taylor (JST) Macrohistory database by Jordà, Schularick, and Taylor (2017) and Jordà, Knoll, et al. (2019). This provides yearly data on key macroeconomic variables as well as returns on equity, housing, and bonds for 18 advanced economies for a period that spans from 1870 until 2020. The 18 advanced economies are the U.S., Japan, Germany, France, U.K., Ireland, Italy, Canada, Netherlands, Belgium, Sweden, Australia, Spain, Portugal, Denmark, Switzerland, Finland, Norway. In order to cover the recent inflation surge episode, we merge this dataset with macroeconomic and financial variables from the IMF and OECD databases, for the years 2021 to 2023.

B.1 Inflation rate

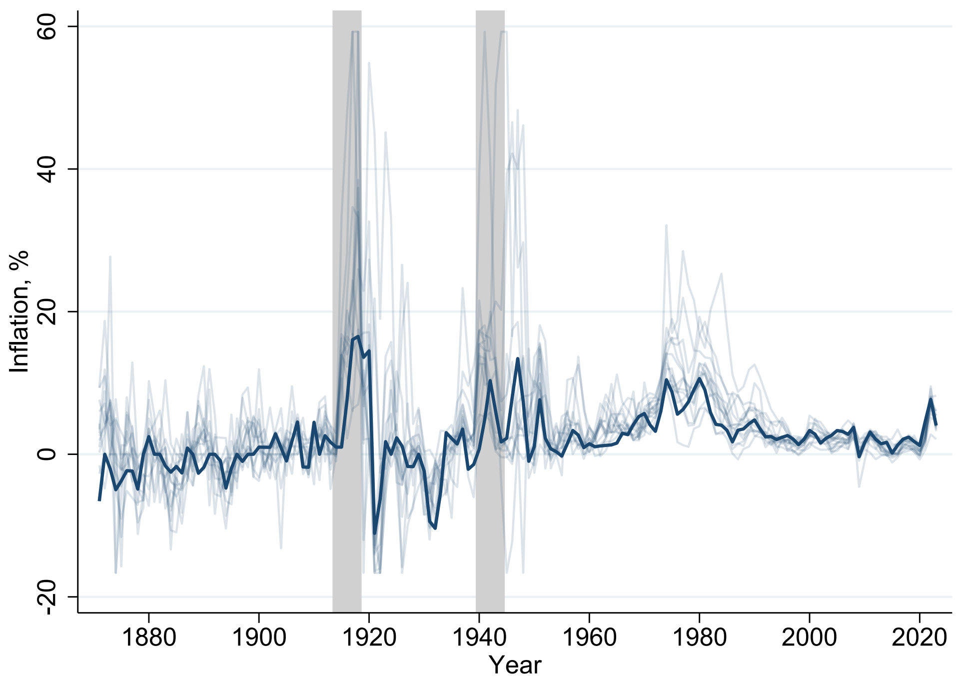
The first key variable that we use from the JST database is the inflation rate. Inflation is derived from the (log) changes in consumer prices, excluding observations where annual inflation exceeded 50% to remove potential outliers driving the results (Gabriel, 2021). Note that the consumer price data for the post-WWII period is the consumer price index (CPI) provided by the IMF, while for the earlier historical period the CPI as we know it today did not exist. Therefore, the JST database includes price indices of Taylor (2002), which draws on different price data such as GDP deflators and consumption deflators.

In Figure B.1 we present the inflation rate of the US , together with the rest of countries in the JST sample (light blue). In addition, in Table B.1 we present the mean and standard deviation of inflation rates by country for different sub-periods. Overall, inflation rates were much lower during the pre-WWI period, which was the era of the gold standard. Between the two world wars, inflation was erratic with several countries moving even into deflation territory, especially during the Great Depression. In the aftermath of WWII, inflation rises remarkably, a period also titled as the Great Inflation period (1965-1982). Since 1982, inflation level has dropped for all countries (Great Moderation).

B.2 Asset returns

The JST database also provides asset returns data for equity, housing and government bonds. We extend returns data for the years 2021-2023 using the same underlying source of the JST. In Figure B.2 we present asset returns of USA as the benchmark (thick solid blue line), together with the results of all remaining countries as thin light blue lines. While

Figure B.1: Historical inflation of 18 OECD countries, 1870-2023



Notes: Thick blue line visualizes the inflation rate in the USA during 1870-2023. Thin blue lines represent inflation rates of the remaining 17 countries of our sample (excluding outlier years, e.g. German hyperinflation), 1870-2023. The vertical shaded areas represent the two World Wars. *Data sources*: JST database & IMF database.

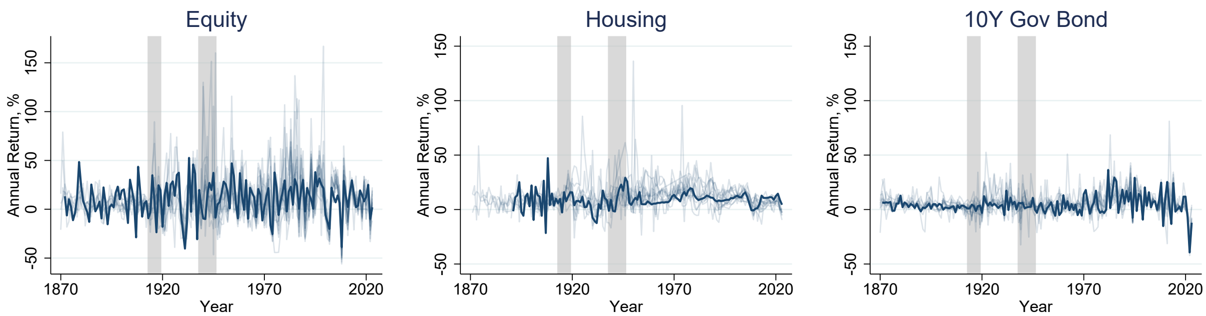
Table B.1: Inflation rate (%) by country, mean (and standard deviation), 1870-2023

	Overall	Pre-WWI	1919-1938	World Wars	Post-WWII	Post-1982
Australia	2.91	0.36	-0.87	4.73	4.87	3.49
	(4.44)	(3.71)	(3.53)	(3.32)	(3.91)	(2.36)
Belgium	3.88	-0.02	3.68	18.73	3.22	2.47
	(10.90)	(4.83)	(10.86)	(27.26)	(3.03)	(1.81)
Canada	2.27	0.49	-1.38	4.65	3.66	2.57
	(4.45)	(3.98)	(6.28)	(5.03)	(3.07)	(1.50)
Denmark	2.73	-0.03	-1.41	8.63	4.09	2.37
	(5.75)	(4.41)	(8.47)	(7.90)	(3.26)	(1.71)
Finland	4.87	0.60	0.61	20.47	5.22	2.64
	(10.06)	(5.20)	(6.38)	(21.35)	(5.63)	(2.14)
France	5.19	0.17	4.62	19.41	5.36	2.26
	(9.13)	(1.46)	(12.82)	(10.59)	(7.35)	(1.86)
Germany	4.33	0.62	14.54	11.06	2.71	2.01
	(10.86)	(2.70)	(25.81)	(13.17)	(2.57)	(1.46)
Ireland	4.07		-0.67	5.93	4.77	2.71
	(5.04)		(3.43)	(5.62)	(4.75)	(2.62)
Italy	5.42	0.41	2.27	22.78	5.58	3.53
	(10.71)	(3.97)	(9.71)	(20.32)	(6.89)	(2.92)
Japan	4.51	2.11	-1.23	17.72	4.61	0.71
	(11.84)	(9.33)	(5.22)	(20.69)	(10.08)	(1.20)
Netherlands	2.24	0.06	-2.51	8.15	3.43	2.13
	(4.86)	(4.47)	(5.61)	(5.62)	(2.64)	(1.63)
Norway	2.92	0.46	-2.35	9.61	4.22	3.11
	(5.88)	(3.24)	(8.19)	(9.75)	(3.19)	(1.98)
Portugal	5.71	0.80	10.20	12.25	6.12	5.23
	(11.21)	(6.75)	(20.23)	(15.26)	(8.04)	(5.97)
Spain	4.46	0.44	-0.40	13.17	6.14	3.71
	(6.76)	(3.93)	(6.99)	(8.67)	(5.06)	(2.84)
Sweden	2.84	0.49	-2.45	9.05	4.19	2.92
	(5.78)	(3.43)	(5.68)	(10.73)	(3.56)	(2.93)
Switzerland	1.58	-0.06	-2.50	8.22	2.16	1.31
	(5.32)	(6.03)	(5.30)	(7.65)	(2.24)	(1.55)
UK	3.04	0.10	-1.56	8.59	4.68	2.91
	(5.15)	(1.90)	(5.78)	(7.27)	(3.88)	(1.83)
USA	2.00	-0.64	-1.02	5.74	3.46	2.71
	(4.30)	(2.39)	(6.08)	(6.13)	(2.74)	(1.39)

Notes: Sample: 18 countries from the JST database, 1870-2023. We exclude outlier periods, i.e. hyperinflation periods.

housing and bond returns have low level of heterogeneity across countries, equity returns are very volatile and heterogeneous, especially after WWI. Nevertheless, country-specific heterogeneity dropped significantly during the last 20 years.

Figure B.2: Historical asset returns



Notes: Equity, housing and 10Y government bond total nominal annual returns in USA (thick blue line). The thin blue lines represent the correspondent asset returns in the remaining 17 countries of our sample. Sample period is 1870-2023. Vertical shaded areas represent world wars. *Data sources*: JST database & IMF database

Appendix C How did asset returns co-move historically with inflation?

In this section, a static *ex-post* analysis is carried out, regressing asset returns on inflation to understand how they co-moved throughout history at different horizons – measuring the so-called *inflation beta*. Even though this relation is not structural, as several confounding factors may drive some of the results, it is true that investors may not recognize the expected and unexpected component of inflation when considering inflation hedging, instead focusing more on the correlation between asset returns and past realized inflation levels (Bekaert and Wang, 2010). A more structural and dynamic analysis, looking at inflation *surprises* is carried out in the main text after introducing a measure of inflation expectations. Here, instead, the real return of asset k in country i at time t, r_{it}^k, is regressed on realized inflation in country i at time t, π_{it}:

$$r_{it}^k = \beta^k \pi_{it} + \gamma^k \mathbf{X}_{it} + \delta_i + \delta_t + \varepsilon_{it}^k, \tag{8}$$

where $\mathbf{X}$ is a set of controls, i.e. (2 lags of) real GDP growth, short-term interest rate, real stock price, CPI inflation, world GDP growth and world equity price, while δ_i and δ_t are country and time fixed effects, respectively. The parameter of interest is β, also called *inflation beta* (Bekaert and Wang, 2010), which represents how much asset k's return changes when realized inflation varies. A perfect inflation hedge would therefore result in $\beta = 0$. When $\beta < 0$, asset k is said to be an imperfect inflation hedge. Given the *long panel* structure of the data, i.e. with $T > 20$, the estimation is run through fixed effects regression with Driscoll and Kraay (1998) standard errors. Table C.1 shows results for the estimation of the panel regression (8).

For each asset, the first column presents the *unconditional* estimation of the inflation beta. In the second column, the estimation is cleaned from other basic macroeconomic factors. Overall, the estimated inflation betas do not change significantly between the unconditional and conditional estimation. Stocks and bonds have a strongly negative inflation beta, very close to -1 and -2, respectively.[42] Housing seems to be the best inflation hedge among these asset classes on impact, even though not perfect, with a coefficient significantly negative around -0.5. This result is similar to Fang, Liu, and Roussanov (2022), who consider Real

[42] Bekaert and Wang (2010) and Fang, Liu, and Roussanov (2022) find that responses of stocks to inflation are ambiguous, lying around zero, due to high standard errors. Nevertheless, note that they measure nominal or excess returns, instead of real returns.

Table C.1: Inflation beta

	Equity		Housing		10Y Gov Bonds	
	(1)	(2)	(3)	(4)	(5)	(6)
Inflation	-0.97***	-0.78***	-0.54***	-0.63***	-2.06***	-1.68***
	(0.18)	(0.18)	(0.07)	(0.08)	(0.76)	(0.38)
Country FE	No	Yes	No	Yes	No	Yes
Time FE	No	Yes	No	Yes	No	Yes
Controls	No	Yes	No	Yes	No	Yes
Observations	2298	2072	1925	1759	2326	2036

Notes: The estimates represent the β in the panel regression (8) for equity, housing and bond annual real returns on (contemporaneous) inflation. 18 countries from the JST panel, 1870-2023, excluding hyperinflation periods. Estimation using Driscoll and Kraay (1998) standard errors (in parentheses). Control variables are (2 lags of) real GDP growth, short-term interest rate, real stock price, CPI inflation, world GDP growth world equity price. *,**, and *** denote significance at the 10%, 5%, and 1% level.

Estate Investment Trust (REIT) only in the US (with quarterly data), finding a (nominal) inflation beta close to zero and non significant, i.e. considering housing as a bad inflation hedge.

Table C.2: Long-run inflation beta

	Equity		Housing		10Y Gov Bonds	
	(1)	(2)	(3)	(4)	(5)	(6)
10Y Inflation	-0.10***	-0.07***	-0.26***	-0.20**	-0.99***	-0.99***
	(0.03)	(0.02)	(0.04)	(0.10)	(0.00)	(0.00)
Country FE	No	Yes	No	Yes	No	Yes
Controls	No	Yes	No	Yes	No	Yes
Observations	2101	1933	1694	1552	2118	1900

Notes: The estimates represent the β in the panel regression (8) for equity, housing and bond 10-year cumulative real (log) returns on 10-year inflation. 18 countries from the JST panel, 1870-2023, excluding hyperinflation periods. Estimation using Driscoll and Kraay (1998) standard errors (in parentheses). Control variables are (2 lags of) real GDP growth, short-term interest rate, real stock price, CPI inflation, world GDP growth world equity price. *,**, and *** denote significance at the 10%, 5%, and 1% level.

As Boudoukh and Richardson (1993) show, extending the analysis to a longer horizon might help reconcile the theory with counter-intuitive empirical findings. Table C.2 presents results considering the 10-year inflation and 10-year asset returns. Results show that all real assets (i.e. equity and housing) tend to converge to an inflation beta of 0 in the long run.

However, point estimates indicate a smaller yet significant negative relation, for all asset classes, and especially for 10Y government bonds, also in the long run.

One interesting feature of our data is the possibility to decompose the total return of housing and equity into capital gains and dividends/rents. Table C.3 shows how the different parts of asset total returns co-moved historically with inflation. Most of the fluctuations of total returns, and the whole ability to hedge against inflation, seems to be driven by capital gains for both equity and housing. This is evident when comparing the capital gains inflation beta with those on the total returns in the previous table. The intuition is, as in the main text, that dividends and rents tend to be slower in adjusting to macroeconomic fluctuations, hence suffering more from volatile inflation.

Table C.3: Inflation beta on capital gains and dividends/rents

	Equity		Housing	
	Cap. gains	Dividends	Cap. gains	Rents
Inflation	-0.78***	-1.42***	-0.85***	-0.87***
	(0.18)	(0.31)	(0.20)	(0.08)
Country FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	2074	2014	1878	1719

Notes: The estimates represent the β in the panel regression (8) for real equity capital gains, real dividends, real housing capital gains and real rents on (contemporaneous) inflation. 18 countries from the JST panel, 1870-2023, excluding hyperinflation periods. Estimation using Driscoll and Kraay (1998) standard errors (in parentheses). Control variables are (2 lags of) real GDP growth, short-term interest rate, real stock price, CPI inflation, world GDP growth world equity. *,**, and *** denote significance at the 10%, 5%, and 1% level.

Appendix D Quality checks for historical inflation expectation

In this appendix we provide a range of robustness checks to test the validity of our inflation forecast measures.

D.1 Mean vs. Median

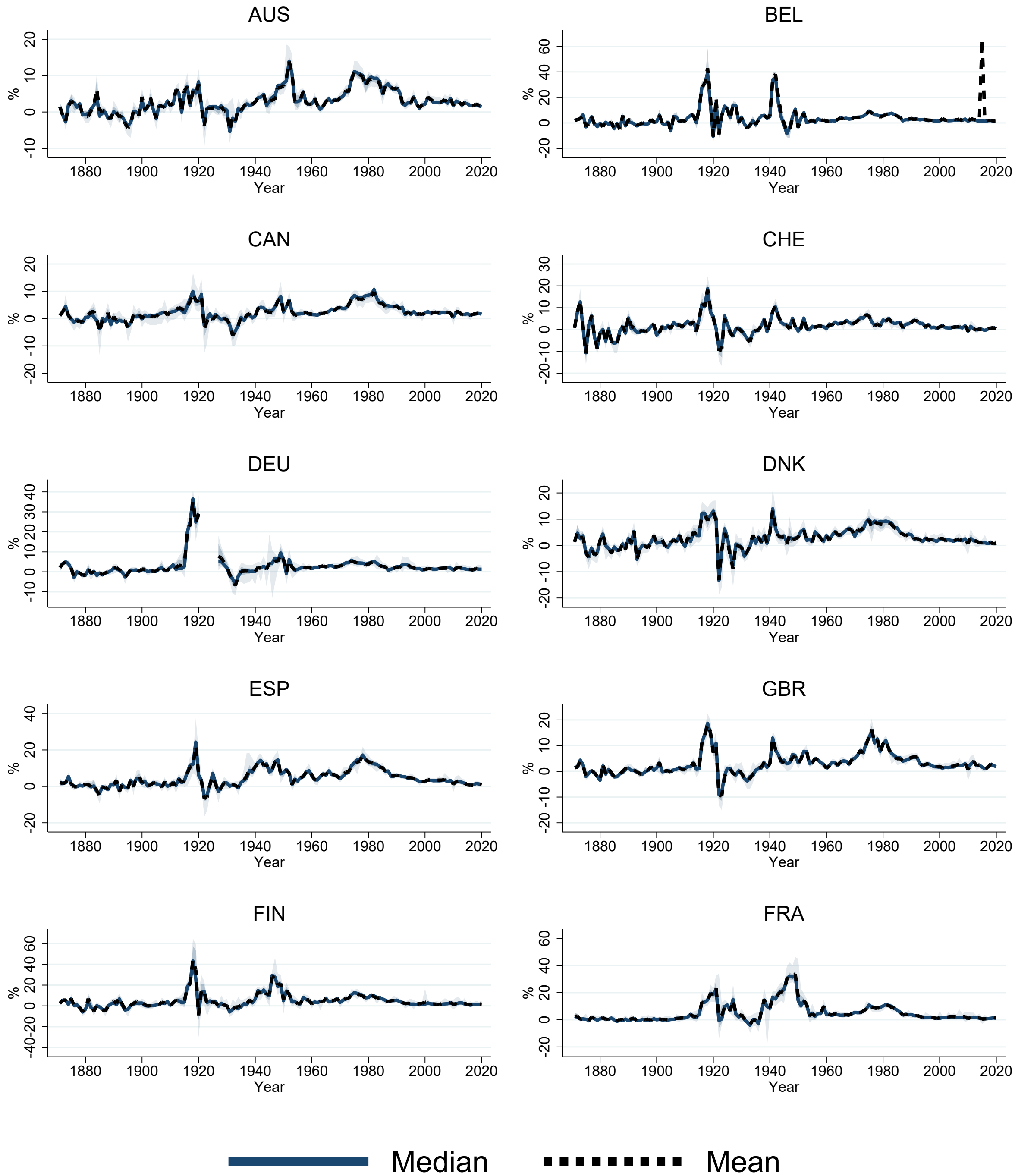
We test the consistency of all forecast models that we use to compute a single measure of inflation expectations by taking the mean instead of the median. In terms of our model, this means that $\omega' = \frac{1}{n}$ in

$$\mathbb{E}_t[\pi_{i,t+1}] = \boldsymbol{\omega'} \quad \hat{\boldsymbol{\Pi}}_{\boldsymbol{t+1|t}} = \boldsymbol{\omega'} \begin{pmatrix} \hat{\pi}^1_{t+1|t} \\ \vdots \\ \hat{\pi}^j_{t+1|t} \\ \vdots \\ \hat{\pi}^n_{t+1|t} \end{pmatrix},$$

$$\hat{\pi}^j_{t+1|t} = \boldsymbol{A'} \quad \boldsymbol{X_{t:t-k}} + \varepsilon^j_t.$$

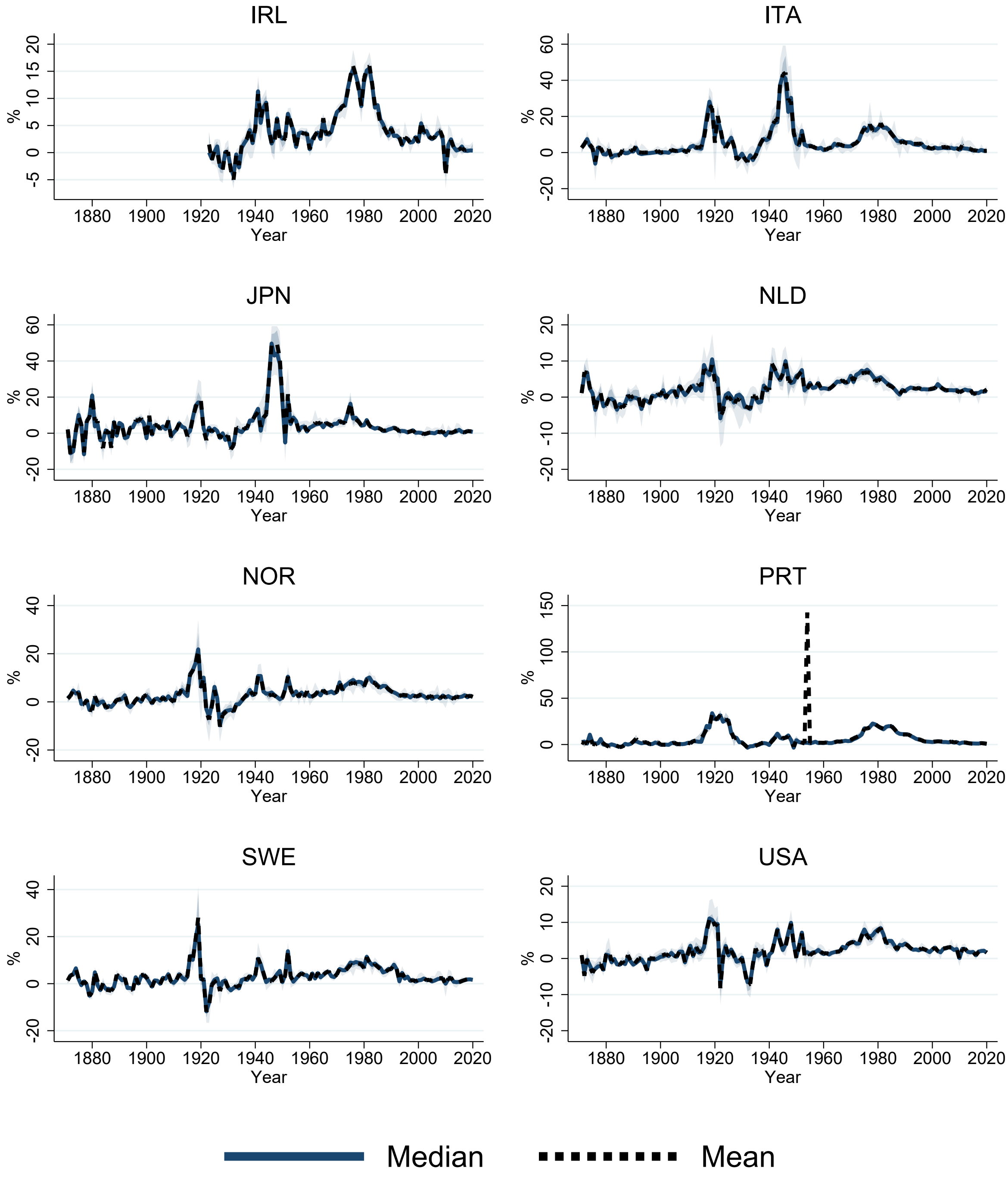
Figure D.1 and Figure D.2 present the results. Overall, the mean forecast measure aligns very closely to the median for all countries.

Figure D.1: Model forecast: median vs. mean weights, part one



Notes: Model estimates of inflation expectations using the median (blue solid line) or the mean (dashed black line) as weights ω for the different models in Equation (1), together with bands at the interquartile range and 5th and 95th percentile of the distribution of model estimates. The ordering is: Australia, Belgium, Canada, Switzerland, Germany, Denmark, Spain, UK, Finland, and France. Sample period is 1870-2023. Data source: Authors' series.

Figure D.2: Model forecast: median vs. mean weights, part two



Notes: Model estimates of inflation expectations using the median (blue solid line) or the mean (dashed black line) as weights ω for the different models in Equation (1), together with bands at the interquartile range and 5th and 95th percentile of the distribution of model estimates. The ordering is: Ireland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, and USA. Sample period is 1870-2023. Data source: Authors' series.

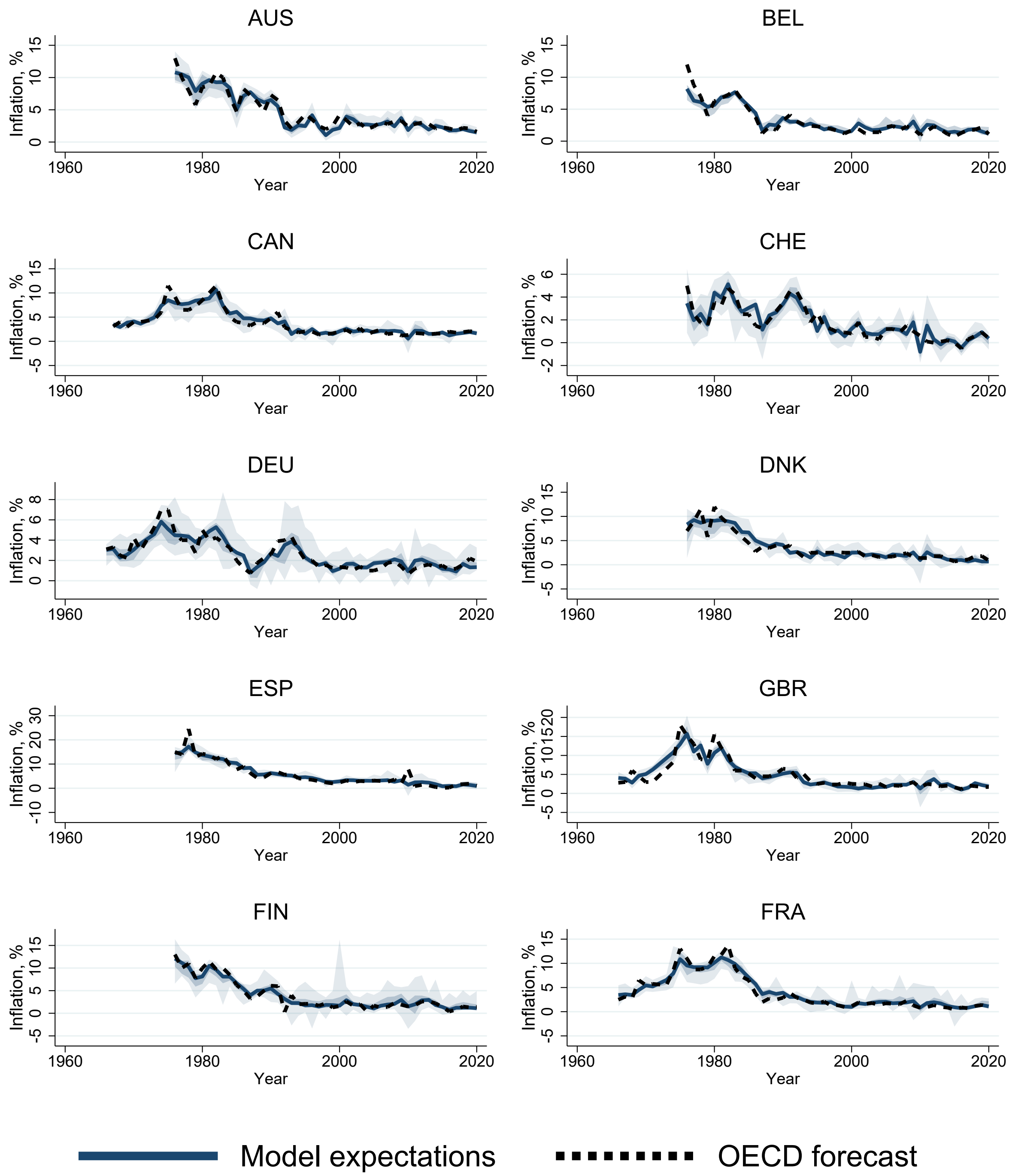
D.2 The OECD Outlook: 1965-2023

We use data from the OECD Outlooks that provide "real-time" inflation expectations. Starting from 1965, the forecast division of the OECD started to provide twice-yearly projections of various economic variables, such as inflation (the first issue published mostly in June/July and the second issue in December). For the first ten years, the OECD provided these forecasts for only Canada, France, Germany, Italy, Japan, UK and USA. After 1975, they started to provide forecasts also for the other countries (Australia, Belgium, Netherlands, Denmark, Ireland, Finland, Norway, Portugal, Sweden, Switzerland, Spain).[43]

To be consistent with our benchmark estimates of inflation expectations, we utilize the one-year-ahead inflation forecasts in the OECD Outlooks. Figure D.3 and Figure D.4 compare the OECD forecasts with our model estimates (together with bands at the interquartile range and 5th and 95th percentile of the distribution of model estimates). Reassuringly, the OECD forecasts are always within the confidence bands and often very close to our model central estimates.

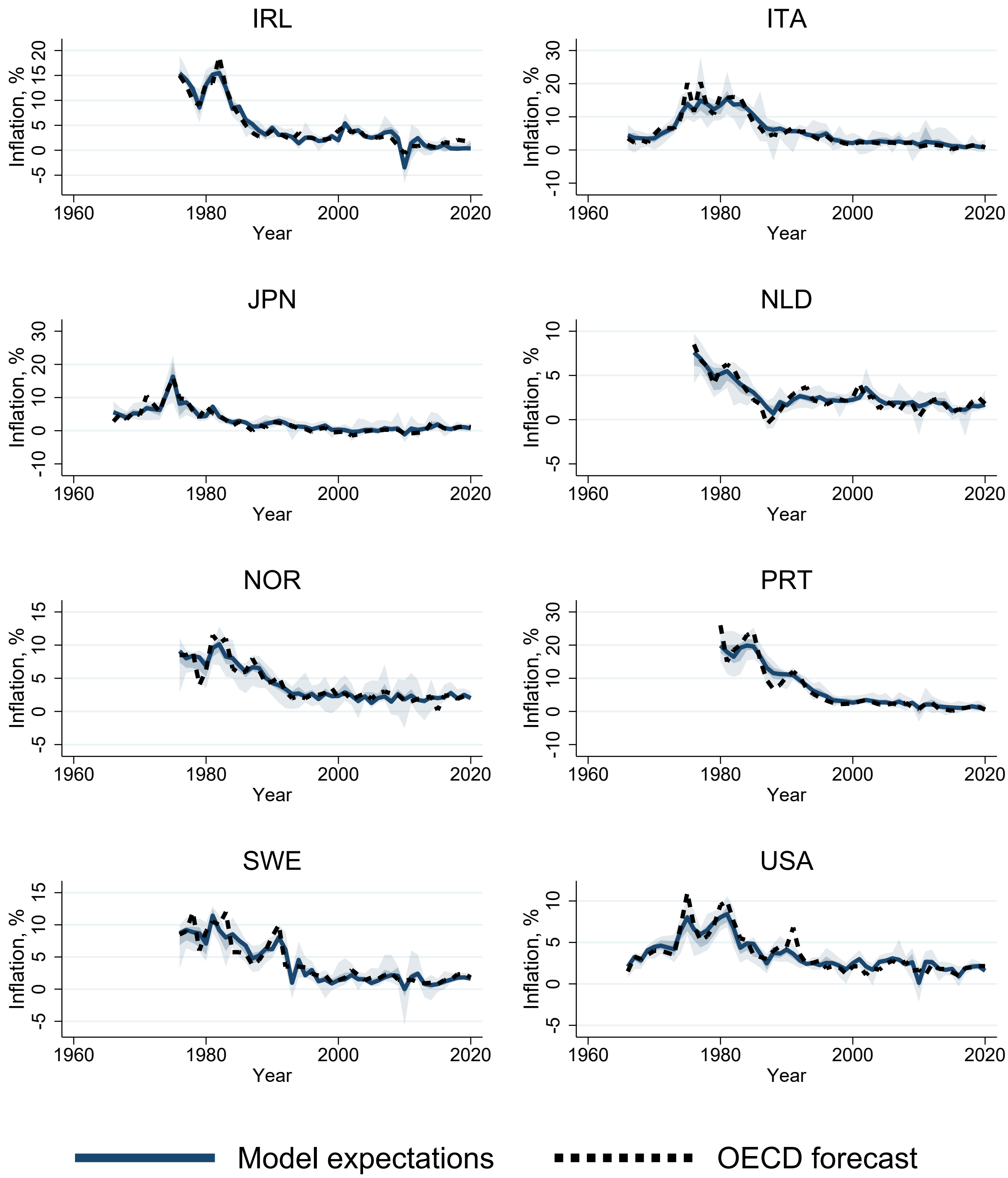
[43] The forecasts include also other countries that we exclude to match the entire sample with the rest of the data in the JST database, i.e. Austria, Greece, Iceland, Luxembourg, New Zealand and Turkey.

Figure D.3: Model-based inflation expectations vs OECD forecasts, part one



Notes: Inflation expectations (blue solid line), derived from the model in (1), together with bands at the interquartile range and 5th and 95th percentile of the distribution of model estimates, compared to OECD historical forecasts from Economic Outlooks (black dashed line). Australia, Belgium, Canada, Switzerland, Germany, Denmark, Spain, UK, Finland, France, 1965-2023.

Figure D.4: Model-based inflation expectations vs OECD forecasts, part two



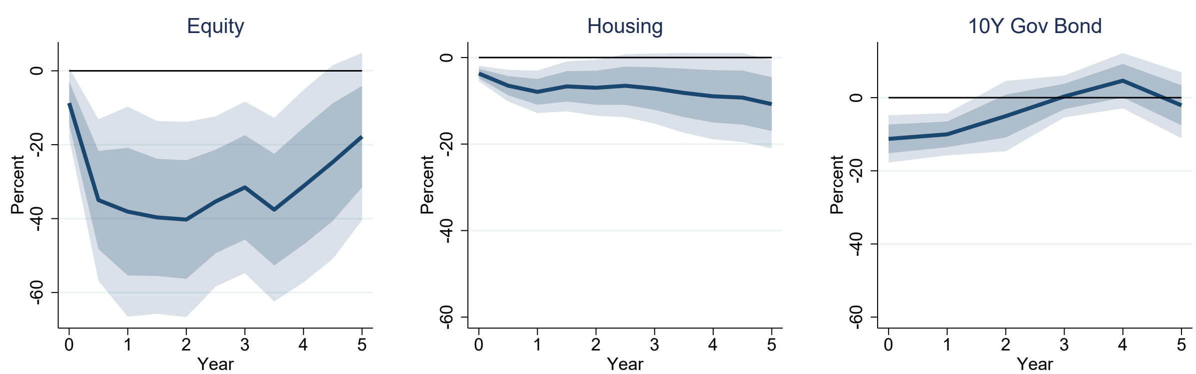
Notes: Inflation expectations (blue solid line), derived from the model in (1), together with bands at the interquartile range and 5th and 95th percentile of the distribution of model estimates, compared to OECD historical forecasts from Economic Outlooks (black dashed line). Ireland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, USA, 1965-2023.

Appendix E Robustness exercises: benchmark analysis

In this appendix, we provide a range of robustness checks of our benchmark analysis in Section 3.

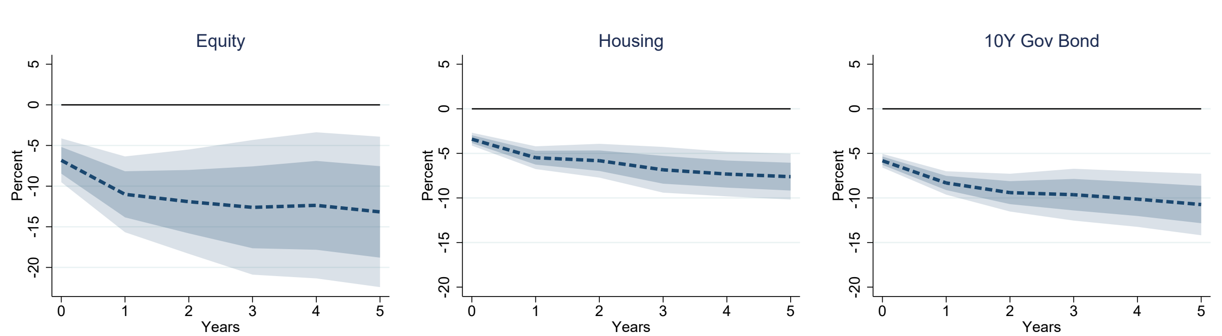
E.1 Impulse responses excluding large global inflation episodes

Figure E.1: Asset responses excluding the Great Inflation and the COVID surge



Notes: Impulse responses of the cumulative real returns of stocks, housing and 10Y government bonds to inflation surprises, using our OECD surprises that are normalized to induce a 5p.p. increase in inflation. We exclude the Great inflation period and the inflation surge during the pandemic. Sample period: 1982h1-2019h2, halfyearly frequency. Shaded areas are the 90% and 68% confidence intervals using Driscoll and Kraay (1998) standard errors.

Figure E.2: Asset responses excluding World wars



Notes: Impulse responses of the cumulative real returns of stocks, housing and 10Y government bonds to inflation surprises. Both model-based and OECD-based surprises that are normalized to induce a 5 p.p. increase in inflation. We exclude World war periods, i.e. 1913-1919 and 1939-1946. Sample period: 1870-2023, yearly frequency. Shaded areas are the 90% and 68% confidence intervals using Driscoll and Kraay (1998) standard errors.

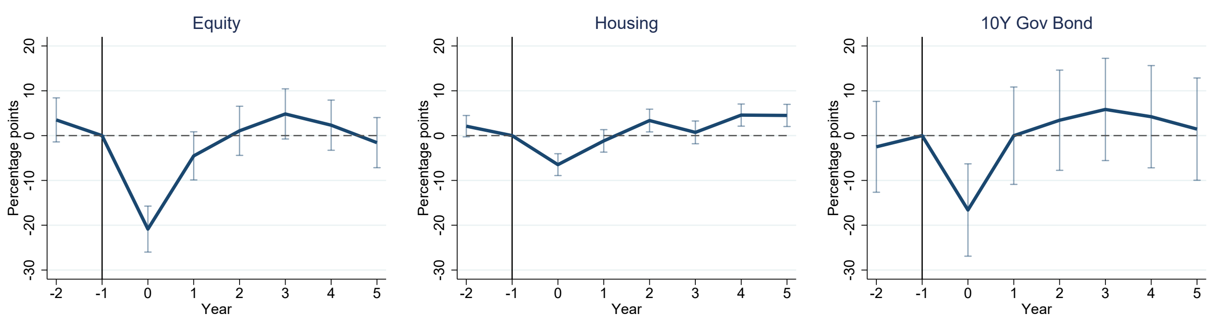
E.2 Event study: large inflation surprises

In this appendix, we exploit an event study framework to investigate the contribution of large inflation surprises to asset return dynamics. The event study we conduct is as follows:

$$r_{it} = \alpha + \sum_{j=2}^{J} \beta_j (\text{lag}_j)_{it} + \sum_{k=1}^{K} \gamma_k (\text{lead}_k)_{it} + \mu_i + \lambda_t + \varepsilon_{it}, \tag{9}$$

where r_{it} is the (log) annual real return for each asset i, with i being either stocks, housing, or long-term government bonds. Notice that the left-hand side of (9) is not the cumulative return, but rather the 1-year real returns, hence results are not directly comparable to local projections in the main text. These returns are regressed with the lead and lag operators around inflation surprises larger than 5 percentage points. Finally, we also control for country- and time fixed effects (μ_i and λ_t, respectively). Figure E.3 presents the results. Signs and magnitudes in year 0 and 1 are comparable to our benchmark results in the main text. Large surprises seem to hit asset returns mostly in the very short run. At the same time, returns hardly recover the past real losses in the long run, consistent with our benchmark results. This result highlights the importance of considering milder fluctuations in inflation and *cumulative* returns for understanding overall responses of asset returns.

Figure E.3: Event study: large inflation surprises and asset returns



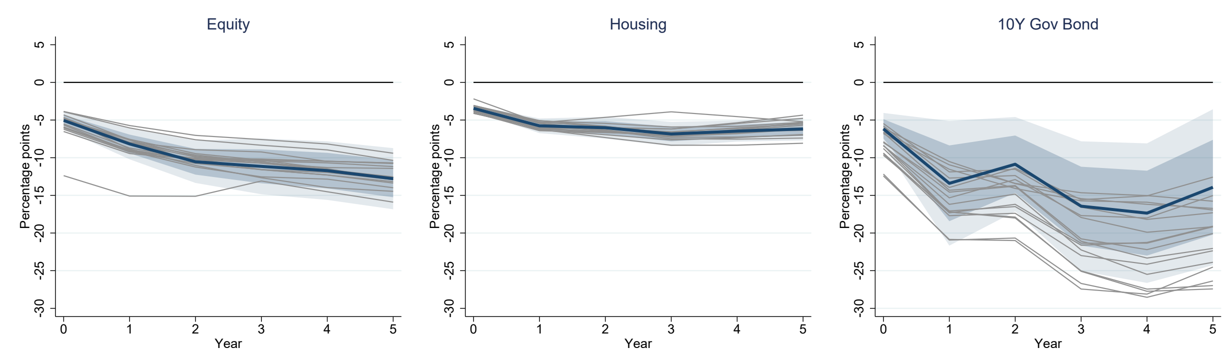
Notes: Yearly asset returns responses after a positive inflation surprise greater than 5 p.p.. Inflation surprises hit at time 0. Yearly frequency, 1870-2023, using model surprises before 1965 and OECD surprises for 1965-2023. World wars are included in the estimation sample while hyperinflation periods are excluded. Bands are at 90% confidence level.

E.3 Responses to single-model inflation surprises

Our benchmark model to estimate inflation expectations exploits a technique called *forecasts combination*, where we estimate a range of different models to forecast inflation. Afterwards, we pool all estimates together and take the median as our final measure for inflation expectations $E_{t-1}[\pi_{it}]$, and use them to derive inflation surprises $\varepsilon_{it}^{\pi} = \pi_{it} - \mathbb{E}_{t-1}[\pi_{it}]$. But in principle, we could have derived ε_{it}^{π} using any of the inflation forecasts from only one model of choice.

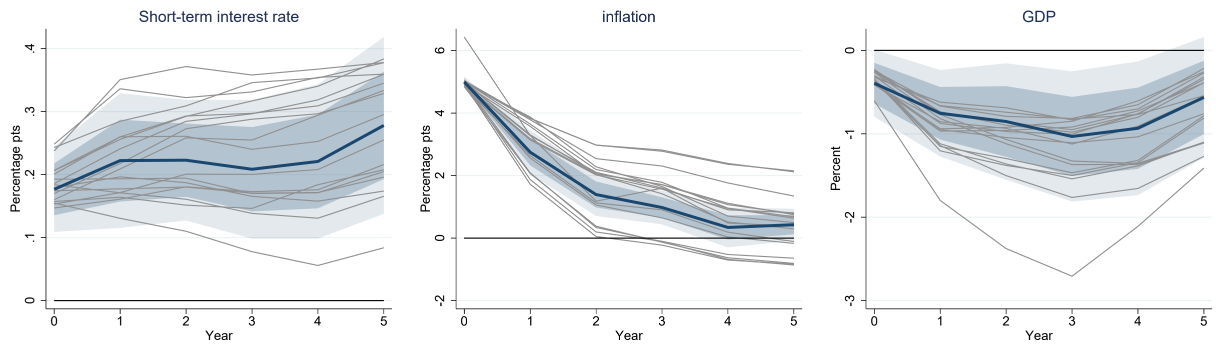
In this appendix, we derive 20 inflation surprise measures using all forecast models listed in Appendix Table A.1 and Table A.3. Afterwards, we run panel local projections using each of these series. Figure E.4 presents the impulse responses of asset returns using inflation surprises based on single models (light gray lines), compared to our benchmark response (thick blue line). Overall, all impulse responses are mostly concentrated around the main response line and within its confidence bands. This confirms the robustness of our results. However, some models consistently underestimate the response of returns, even though complying with the same sign. This result suggests that using single model estimates may not entirely grasp the true response of asset returns to an inflation surprise, thus techniques taking into account structural breaks and possible misspecification are needed. Our benchmark model, which combines a range of forecast models, is much more robust to such deficiencies. The same exercise with similar conclusions is carried out on macroeconomic variables in Figure E.5.

Figure E.4: Asset responses: main model vs single models



Notes: Impulse responses for cumulative real returns of stocks, housing and 10Y government bonds on inflation surprises, using our main model (blue thick line) or the single models (grey thin line) included in Equation (1). Surprises are always normalized to induce a 5p.p. increase in inflation. 1870-2023. Countries: USA, Canada, Germany, France, UK, Italy, Japan, Australia, Belgium, Switzerland, Denmark, Spain, Finland, Ireland, Netherlands, Norway, Portugal and Sweden. Shaded areas are the 90% and 68% confidence intervals.

Figure E.5: Macroeconomic responses: main model vs single models



Notes: Impulse responses for interest rate, inflation and real GDP on inflation surprises, using our main model (blue thick line) or the single models (grey thin line) included in Equation (1). Surprises are always normalized to induce a 5p.p. increase in inflation. 1870-2023. Countries: USA, Canada, Germany, France, UK, Italy, Japan, Australia, Belgium, Switzerland, Denmark, Spain, Finland, Ireland, Netherlands, Norway, Portugal and Sweden. Shaded areas are the 90% and 68% confidence intervals.

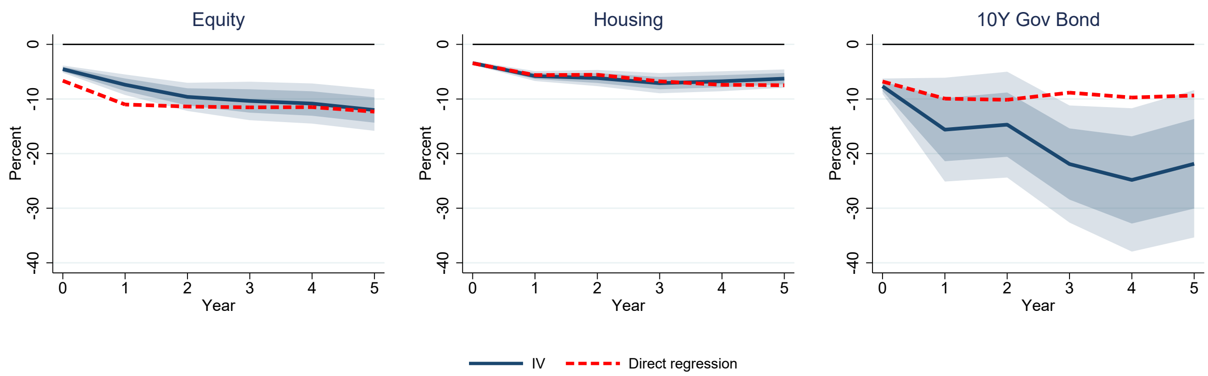
E.4 Impulses responses using LP-IV

Another popular method to draw impulses responses in the macroeconomic literature is to use estimated shocks as proxies for their fundamental counterpart. Using local projections, this method entails using the estimated shocks as instrumental variable for the proxied variable. We adopt such LP-IV methodology as robustness exercise, using our inflation surprise series as an IV for contemporaneous inflation. In practice, we use contemporaneous and (up to 2) lags of the inflation surprise to instrument contemporaneous inflation. The rest of the specification is equal to the one in Equation 5, with the same set of controls. Figure E.6 reports the impulse responses using LP-IV. Estimates align closely to the direct OLS regression, reported also in the main text in Figure 4 – highlighting the robustness of the negative and persistent response of cumulative real asset returns.

E.5 Do asset returns react symmetrically to inflation?

Asymmetric effects of macroeconomic shocks are widely present in the literature, e.g. Ramey and Zubairy (2018). In this appendix, we investigate whether a surprise increase in inflation has a different impact on asset returns compared to a surprise decrease in inflation. Figure E.7 reports the impulse response functions when we estimate our benchmark panel LP model using only positive or negative inflation surprises (blue solid line and red dashed lines,

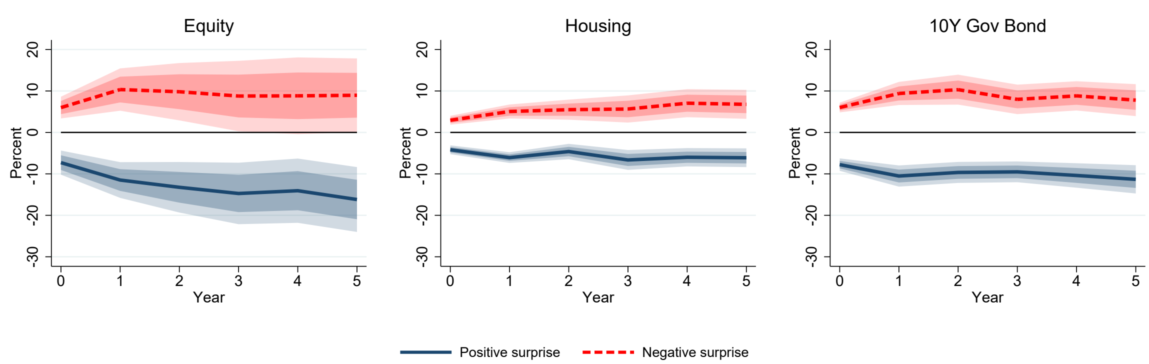
Figure E.6: Inflation surprises as instruments



Notes: Impulse responses for equity, housing and 10Y government bond cumulative real returns on inflation, using (contemporaneous and 2 lags of) inflation surprise as IV. The surprise series is the OECD surprises during the post-1965 period and the model-based surprises for the historical sample 1870-1965. Sample of 18 countries from the JST. Shaded areas are the 90% and 68% confidence intervals.

respectively). Our results show that all three asset classes react in a similar way to inflation surprises of both directions.

Figure E.7: Asset returns and asymmetric responses to inflation



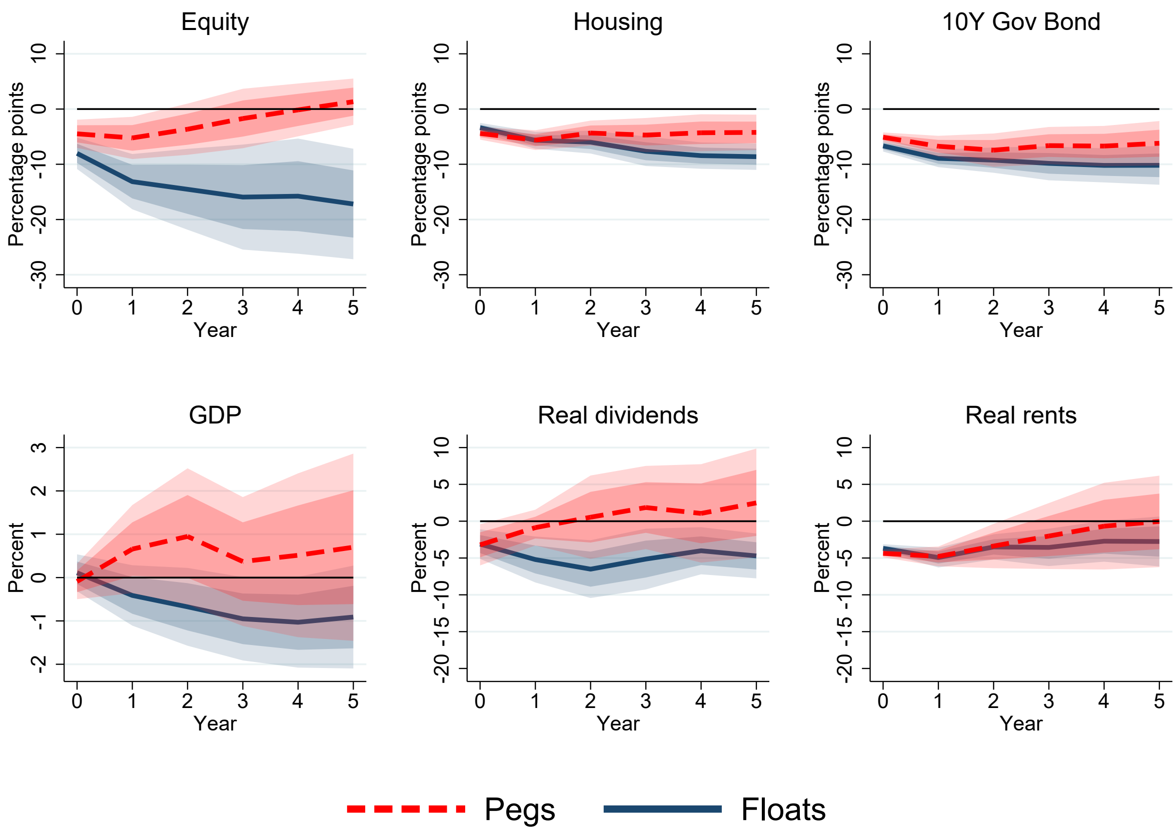
Notes: Impulse responses for equity, housing, bond on positive (blue solid line) and negative (red dash line) inflation surprises. Sample of 18 countries from the JST, 1870-2023, excluding world wars. The two lines represent the estimate of $\beta_{A,h}$ (response to a positive surprise) and $-\beta_{B,h}$ (response to a negative surprise) that we estimate using Equation (6), at various horizons $h = 0, 1, 2, \ldots$. Shaded areas are the 90% and 68% confidence intervals.

Appendix F Robustness exercises: peg vs. float countries

In this appendix we provide the following robustness exercises for Section 4.1. In Appendix Section F.1 we exclude the euro areas from the peg country sample. In Appendix Section F.2 we focus on the pre-Bretton Woods periods and investigate the effect of inflation surprises on asset returns for pegged and float countries. Finally, in Appendix Section F.3 we compare the impulse responses of real asset returns to an inflation surprise in Gold-standard countries vs. non-Gold standard countries.

F.1 Open pegs vs floats: excluding Euro countries

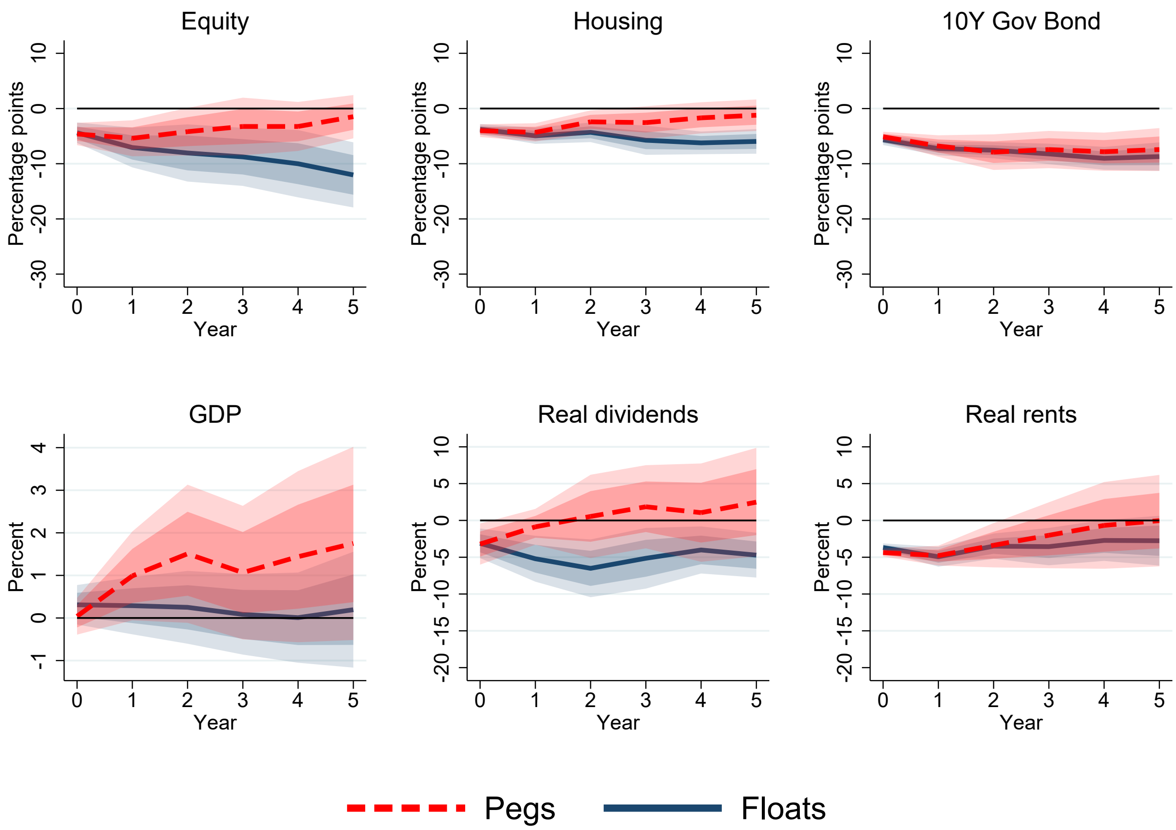
Figure F.1: Asset returns and macroeconomic responses in peg vs non-peg, excluding euro



Notes: Impulse responses for real asset returns, real GDP, and real dividends to inflation surprises in open-peg countries (red dash line) and in float countries (blue solid line). We exclude Belgium, Germany, Spain, Finland, France, Ireland, Italy, Netherlands and Portugal as pegs starting from introduction of the euro (i.e. year 2000). Model & OECD surprises, scaled to a 5 p.p. increase in inflation. Sample of 18 countries from the JST, 1870-2023, yearly frequency. The two lines represent the estimate of $\beta_{A,h}$ and $\beta_{B,h}$ of the state-dependent LP model. Shaded areas are the 90% and 68% confidence intervals.

F.2 Open pegs vs floats: pre-Bretton Woods

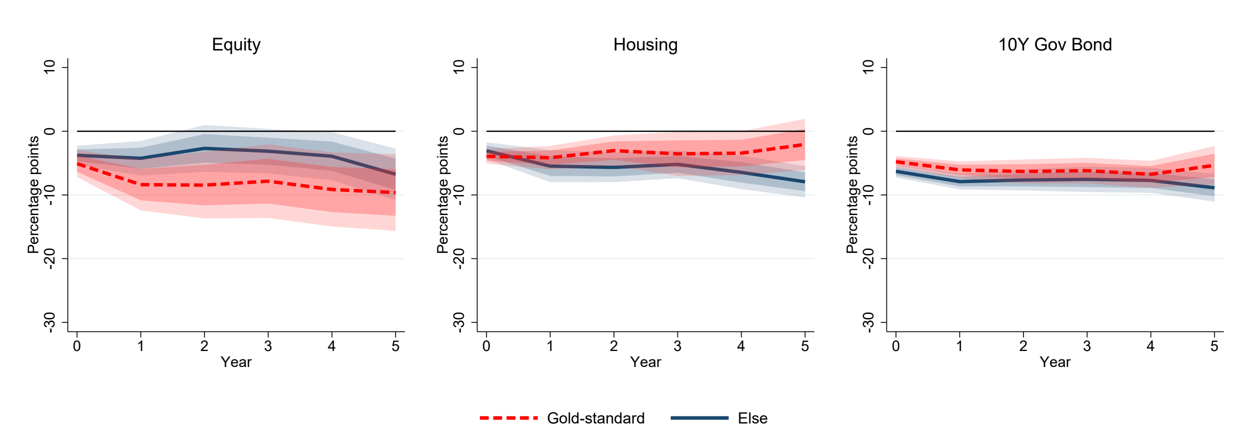
Figure F.2: Asset returns and macroeconomic responses in peg vs non-peg, pre-1973



Notes: Impulse responses for real asset returns, real GDP, and real dividends to inflation surprises in open-peg countries (red dash line) and in float countries (blue solid line) for the period pre-1973. Model & OECD surprises, scaled to a 5 p.p. increase in inflation. Sample of 18 countries from the JST, 1870-1972, yearly frequency. The two lines represent the estimate of $\beta_{A,h}$ and $\beta_{B,h}$ of the state-dependent LP model. Shaded areas are the 90% and 68% confidence intervals.

F.3 The (non-)influence of Gold-standard

Figure F.3: Asset returns responses with or without the Gold Standard



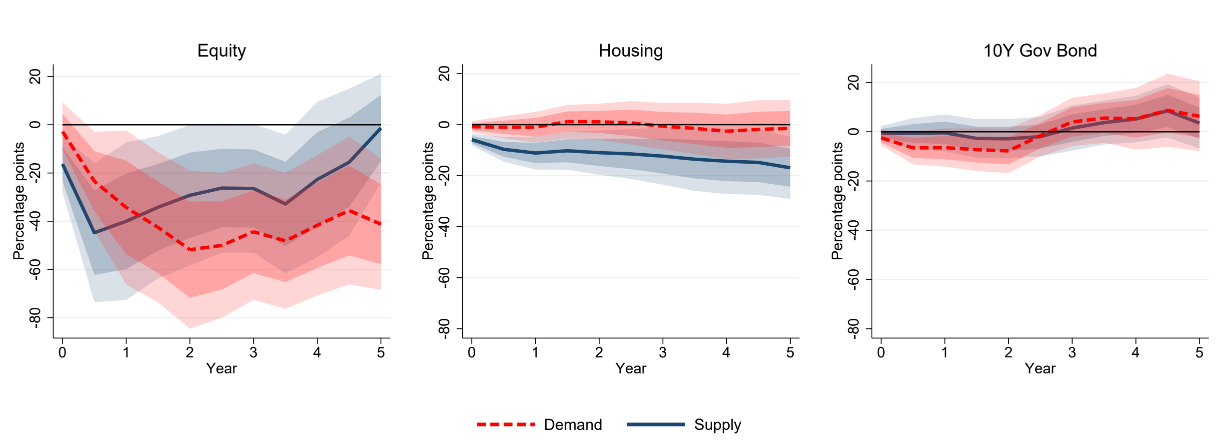
Notes: Impulse responses of real asset returns to inflation surprises in Gold-standard countries (red dash line) and in non-Gold standard countries (blue solid line) during the pre-1973 period. Model & OECD surprises, scaled to a 5 p.p. increase in inflation. Sample of 18 countries from the JST, 1870-1972, yearly frequency. The two lines represent the estimate of $\beta_{A,h}$ and $\beta_{B,h}$ using the state-dependent LP model. Shaded areas are the 90% and 68% confidence intervals.

Appendix G Robustness exercises: Demand- vs. supply-driven inflation surprises

In this appendix we provide the following robustness exercises for Section 4.2. In Appendix Section G.1 we exclude the historical period and focus only on post-1965 sample. In Appendix Section G.2 we modify the dummy specification of Equation 11 and introduce a continuous interaction between inflation and GDP surprises. Finally, in Appendix Section G.3, we combine the demand-supply exercise of Section 4.2 with the open peg and float exercise of Section 4.1.

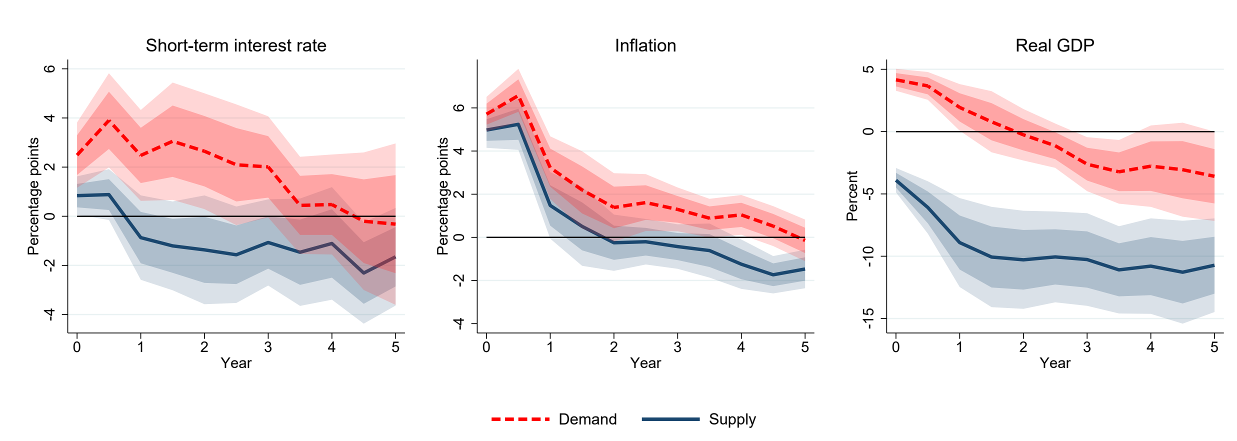
G.1 Demand- and supply-driven surprises: Post-1965 sample

Figure G.1: Asset returns responses to inflation surprises, 1965-2023: demand vs. supply



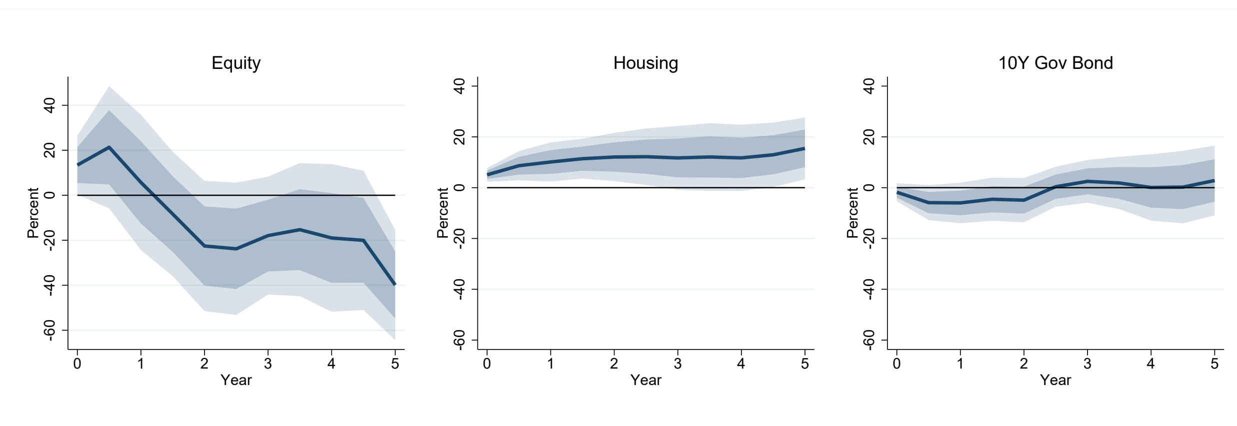
Notes: Impulse responses of cumulative real asset returns to demand-driven vs. supply-driven inflation surprises (red dashed lines and blue solid lines, respectively). Inflation surprise is scaled to increase inflation by 5 percentage points. Bands are at the 68% and 90% confidence level, based on Driscoll and Kraay (1998) standard errors. Half-yearly frequency, 1965-2020, using OECD inflation and GDP growth surprises.

Figure G.2: Macroeconomic responses to inflation surprises, 1965-2023: demand vs. supply



Notes: Impulse responses of nominal interest rate, inflation, and real GDP to demand-driven vs. supply-driven inflation surprises (red dashed lines and blue solid lines, respectively). Inflation surprise is scaled to increase inflation by 5 percentage points. Bands are at the 68% and 90% confidence level. Half-yearly frequency, 1965-2020, using OECD inflation and GDP growth surprises.

Figure G.3: The additional effect of demand-driven inflation surprises on asset returns



Notes: The blue line presents estimates of γ_h in Equation (11), i.e. the *additional* effect of a demand-driven inflation surprise compared to a supply-driven baseline case. Bands are at the 68% and 90% confidence level, based on Driscoll and Kraay (1998) standard errors. Half-yearly frequency, 1965-2020, using OECD inflation and GDP growth surprises.

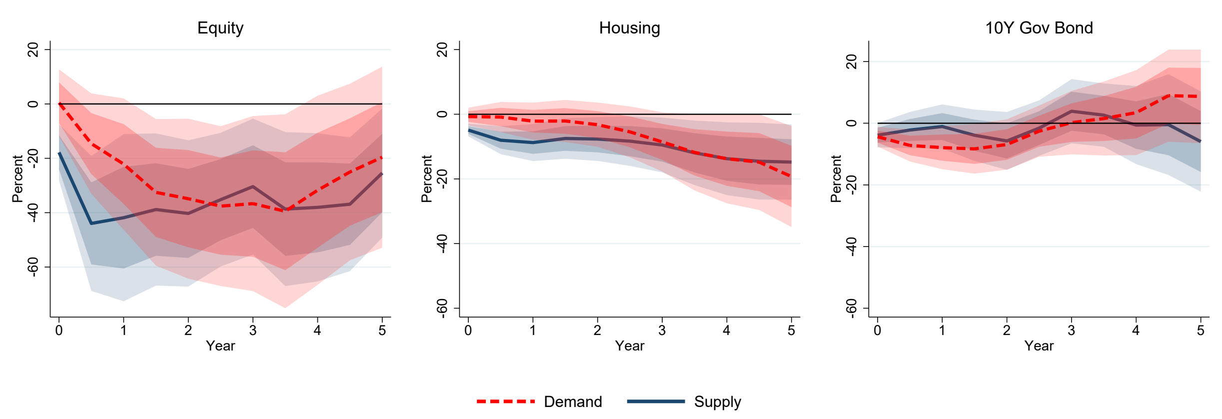
G.2 Demand- and supply-driven surprises: continuous interaction

In this appendix we run a similar LP specification as in Equation (11), but now we directly exploit the joint correlation of the GDP growth and inflation surprises as a continuous interaction. The specification is as follows:

$$\begin{aligned} r^k_{i,t+h} - r^k_{i,t-1} = \beta^k_h \varepsilon^\pi_{it} + \gamma^k_h \quad \varepsilon^y_{it} \times \varepsilon^\pi_{it} \\ + \Psi^k_h(L)\mathbf{X}_{i,t-1} + \delta^k_{i,h} + v^k_{i,t+h} \quad \text{for} \quad h = 0, 1, 2, \ldots \end{aligned} \tag{10}$$

We normalize ε^π to induce a 5 p.p. increase in inflation and ε^y to induce a 1 p.p. increase in GDP growth. In this setting, β_h represent the average response to an inflation surprise, $\beta_h + \gamma_h$ the response to a demand-driven surprise, and $\beta_h - \gamma_h$ the response to a supply-driven surprise. The rest of the specification is unchanged with respect to Equation 11.

Figure G.4: Asset returns responses to inflation surprises using continuous interaction



Notes: Impulse responses of cumulative real asset returns on inflation surprises due to demand or supply factors. Inflation surprise is scaled to increase inflation by 5 percentage points. The blue line presents estimates of $\beta_h - \gamma_h$ in Equation 11, while the red dashed line presents estimates of $\beta_h + \gamma_h$. Bands are at the 68% and 90% confidence level, based on Driscoll and Kraay (1998) standard errors. Half-yearly frequency, 1965-2020, using OECD inflation and GDP growth surprises.

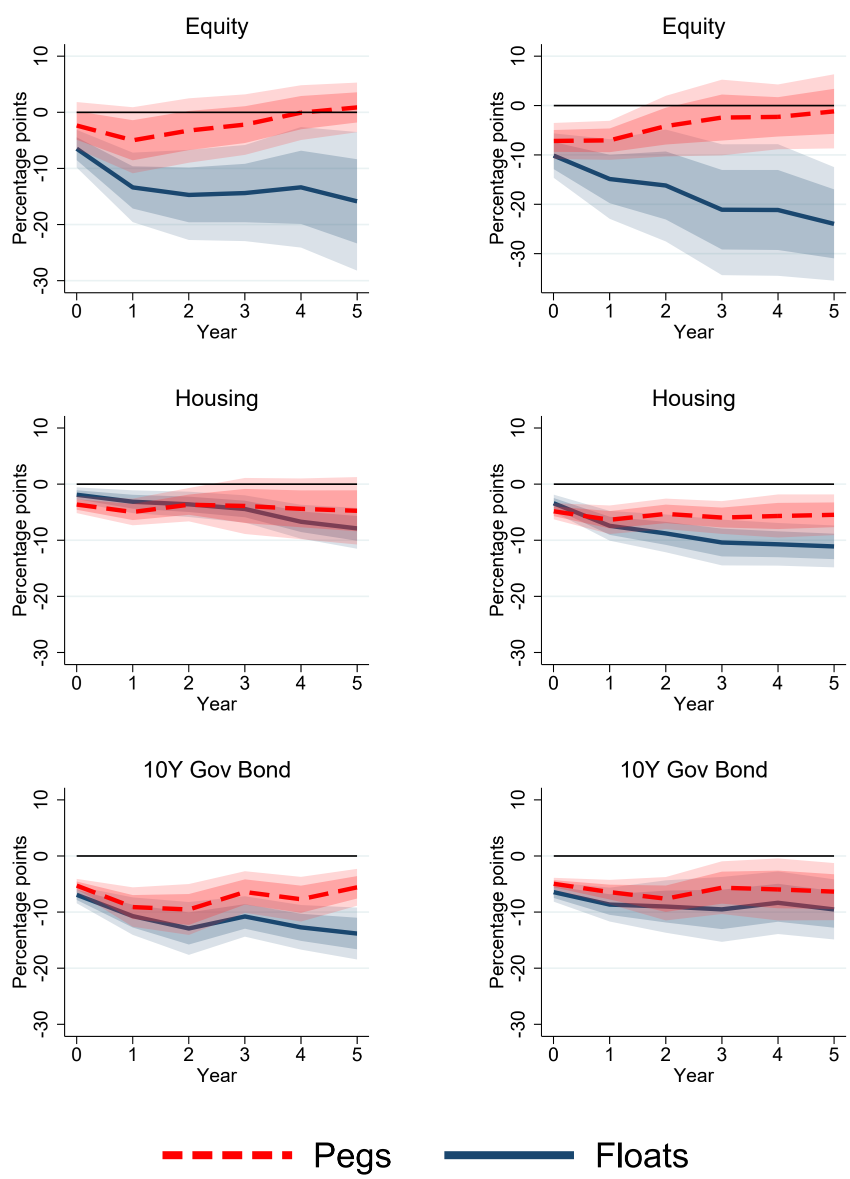
G.3 Demand- vs. supply-driven inflation surprises in peg and float countries

To jointly test for the source of inflation surprises and isolate the response of monetary policy, we apply the following LP model:

$$
\begin{aligned}
r^k_{i,t+h} - r^k_{i,t-1} = \quad & \mathcal{I}_{i,t-1}\Big\{\beta^k_{A,h}\varepsilon^\pi_{it} + \gamma^k_{A,h} \times \mathcal{J}\{\varepsilon^y_{it} \times \varepsilon^\pi_{it} > 0\} \times \varepsilon^\pi_{it} + \Psi^k_h(L)\mathbf{X}_{i,t-1}\Big\} \\
& +(1-\mathcal{I}_{i,t-1})\Big\{\beta^k_{B,h}\varepsilon^\pi_{it} + \gamma^k_{B,h} \times \mathcal{J}\{\varepsilon^y_{it} \times \varepsilon^\pi_{it} > 0\} \times \varepsilon^\pi_{it} + \Psi^k_h(L)\mathbf{X}_{i,t-1}\Big\} \\
& + \delta^k_{i,h} + v^k_{i,t+h} \quad \text{for} \quad h = 0, 1, 2, \ldots,
\end{aligned} \tag{11}
$$

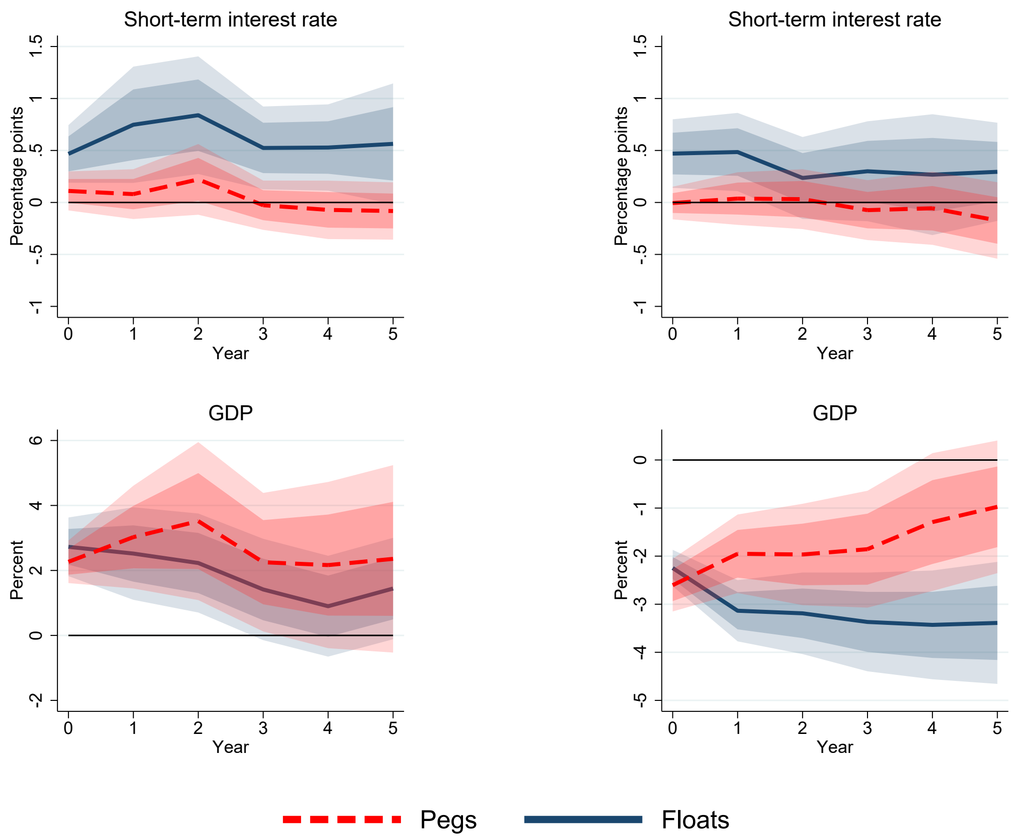
where $\mathcal{I}$ is the open peg dummy as in Section 4.1 while $\mathcal{J}\{\varepsilon^y_{it} \times \varepsilon^\pi_{it} > 0\}$ is the dummy for the additional effect of demand-driven inflation surprises. All in all, $\beta_{A,h}$ will show the response of asset returns in an open peg country to a supply-driven inflation surprise, while $\beta_{A,h} + \gamma_{A,h}$ will show the response of asset returns in open peg countries to a demand-driven inflation surprise. On the other hand, $\beta_{B,h}$ will show the response of asset returns in an float country to a supply-driven inflation surprise, while $\beta_{B,h} + \gamma_{B,h}$ will show the response of asset returns in float countries to a demand-driven inflation surprise.

Figure G.5: Asset returns responses in *open pegs* and float: demand vs. supply



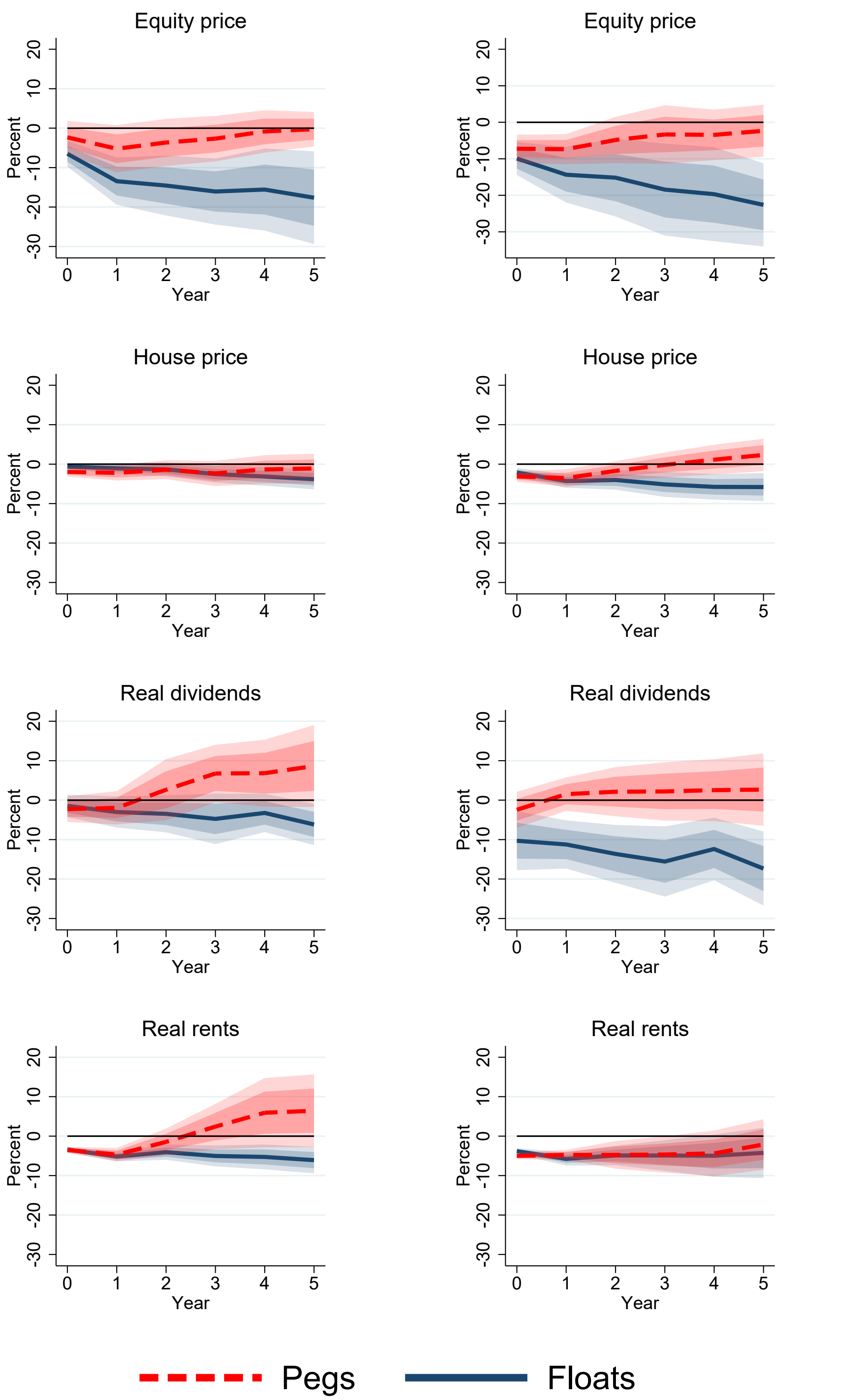
Notes: Impulse responses of cumulative real asset returns to inflation surprises in *open pegs* (red dashed line) and float countries (blue solid line) due to demand (left column) or supply factors (right column). Inflation surprise is scaled to induce an increase inflation by 5 percentage points. Bands are at the 68% and 90% confidence level, based on Driscoll and Kraay (1998) standard errors. Yearly frequency, 1870-2023, using Model and OECD inflation and GDP growth surprises and open capital accounts measure by Quinn, Schindler, and Toyoda (2011).

Figure G.6: Macroeconomic responses to inflation surprises in *open pegs*: demand vs. supply



Notes: Impulse responses of short-term interest rates and real GDP to inflation surprises in *open pegs* (red dashed line) and float countries (blue solid line) due to demand (left column) or supply factors (right column). Inflation surprise is scaled to induce an increase inflation by 5 percentage points. Bands are at the 68% and 90% confidence level, based on Driscoll and Kraay (1998) standard errors. Yearly frequency, 1870-2023, using Model and OECD inflation and GDP growth surprises and open capital accounts measure by Quinn, Schindler, and Toyoda (2011).

Figure G.7: Price and cash flow responses to inflation in *open pegs*: demand vs. supply



Notes: Impulse responses of real equity prices, real house prices, real dividends and real rents to inflation surprises in *open pegs* (red dashed line) and float countries (blue solid line) due to demand (left column) or supply factors (right column). Inflation surprise is scaled to induce an increase inflation by 5 percentage points. Bands are at the 68% and 90% confidence level, based on Driscoll and Kraay (1998) standard errors. Yearly frequency, 1870-2023, using Model and OECD inflation and GDP growth surprises and open capital accounts measure by Quinn, Schindler, and Toyoda (2011).