Final Project 2

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The answers in this work refer to Jorda et al. (2020).

1 Analytical Strategy to find the causal effect

1.1 Explain the analytical strategy used by JST to identify the causal effects of monetary policy on output and inflation.

The analytical strategy used to identify the causal effect is to exploit the trilemma of international finance, which states that a country cannot have **(i)** a fixed exchange rate, **(ii)** free capital mobility, and **(iii)** an independent monetary policy all at once. Therefore, countries that peg their exchange rate to a base country import the monetary policy of that base country. When the base country changes its interest rate unexpectedly, the pegging country experiences exogenous movements in its domestic real interest rate. This mechanism is used to build an external instrumental variable *(IV)*, which equals the unpredictable component of the base-country interest-rate change for countries that peg, adjusted for the degree of capital mobility. This instrument provides quasi-random movements, since the peg countries must follow the base country's shocks in interest rates. This satisfies the conditions necessary to identify the causal effect. These conditions include exogenous variation in the interest rate, that the instrument moves the domestic interest rate, and that the instrument affects output and inflation only through interest rates. To estimate the dynamic effect on output and inflation, local projections are used to estimate the impulse response functions at each horizon for a +100 bps exogenous interest-rate change.

1.2 How can potential attenuation bias with respect to the effectiveness of monetary policy be addressed?

The attenuation bias arises when OLS is used, since it assumes that interest rates are exogenous, but in this context they are endogenous, as central banks follow an interest rate rule. The correlation between policy decisions and underlying economic conditions biases the estimated effect toward zero (making monetary policy appear weaker than it actually is) and can even produce the wrong sign. Therefore, an instrumental variable *(IV)* is used instead of OLS to remove the endogeneity problem and provide more credible estimates of the effects of monetary policy. The paper also accounts for spillovers coming from float economies rather than from monetary transmission. Since the true responses remain close to the *(IV)* estimates and far

from the attenuated *OLS* estimates, this confirms that attenuation bias is the main issue rather than spillover contamination.

2 Empirical effects of Monetary Policy in different states

2.1 Baseline model

The baseline model does not account for state dependence and only considers a +100 bps exogenous increase in the short-term interest rate. For this change in the interest rate, real GDP per capita decreases by 2.5%, real consumption per capita by 1.5%, and real investment per capita by 6% over the course of four years. In the next subsection, the full sample is compared to the post-WW2 period.

2.2 Booms and Slumps

Booms (slumps) are years in which log GDP per capita is above (below) its long-run country-specific trend component. The effect on real GDP per capita of monetary policy in booms appears quite strong (around −2.5%), while in slumps it is less than −0.5%, although tight policy is also unlikely in a slump. The effects for the full sample and the post-WW2 period are quite similar.

2.3 High- vs. low inflation

For high inflation (inflation > 2%), the responses of real GDP and the other variables appear strong and are very similar for the full sample and the post-WW2 period. For low inflation (inflation < 2%), monetary policy is significantly less effective, and differences in the time paths between the full sample and post-WW2 can be observed.

2.4 Mortgage credit

This state shows that in a period of rapid recent growth in mortgage credit, a 1% shock to interest rates can depress output by about 5 percentage points, while in periods with mortgage-credit growth below the country mean the effects are significantly weaker.

2.5 Non-mortgage credit

For non-mortgage credit, the change in real GDP per capita is similar to the baseline in both specifications, while for the price level and the short-term interest rate there are small deviations.

2.6 Why can the distinction matter?

As seen from the differences in results depending on the state of the economy, the effects of monetary policy are not constant. In states of booms, high inflation, and mortgage credit booms, the effects are stronger compared to states of slumps and low-inflation environments. Without making these distinctions, these differences would be hidden in the baseline estimates and would fail to represent how monetary policy works in different macroeconomic environments.

3 How convincing do you find the analysis of the paper? Provide a critical assessment of some of the major strengths or weaknesses of the analysis conducted by JST.

3.1 Strengths

One strength is the use of the trilemma of international finance, which provides a source of exogenous monetary policy shocks, overcoming the endogeneity problem that would occur when using OLS or VAR estimates. Another strength is the use of a long historical panel covering the period from 1870 to 2006. Finally, the combination of IV and local projections allows for flexible and transparent impulse responses.

3.2 Weaknesses

While the trilemma approach is a strength, it is at the same time a weakness, since it can only be used for peg economies, representing a local average treatment effect rather than a general effect for all countries. Another concern is that although spillovers are taken into account, foreign monetary shocks may still affect domestic outcomes through channels other than the domestic interest rate.

4 4a) Divergence of real interest, inflation and growth rates of Eurozone average

Figure 1 shows the strong divergence in real interest rates, inflation, and growth relative to the Eurozone average. Countries that face frequently lower real interest rates also face above average growth rates, making ECB policy too expansionary. Conversely, countries that face higher real interest rates are facing below average growth, making ECB policy too restrictive. These divergences are persistent and prevalent, and thus supporting the argument that monetary policy can amplify divergence.

5 4b) Correlations and Local Projections

To asses if national real interest rates are differentials to the Euro Zone average are associated with current and future inflation, simple correlations between the real rate gaps and leads of inflation and growth are computed in **Table 1**. There is moderately negative correlation between the real rate

co_r_hicp0	co_r_hicp1	co_r_hicp2	co_r_gdp0	co_r_gdp1	co_r_gdp2
-0.208	-0.078	-0.010	-0.021	0.084	0.144

Table 1: Correlation between Real Rate Differentials and Inflation and GDP Differentials

and the inflation differentials for horizon 0. This is consistent with what was shown by **Figure 1** and the standard monetary transmission. This relation weakens over time and after two years it is essential zero, thus real rate differentials influence inflation only in the short run. For output the correlation is close to zero but increases over the two years to a weakly positive value. Therefore real rate differentials do not systematically predict growth divergences across countries.

Figure 2 shows the coefficiants for the local projections. The inflation response is strongly negative initially but not persistent beyond the short run, which shows that real rate differentials matter for current inflation but lose predictive power over time. For the output response the effect is initially very weak and increases over the horizon of the 2 periods. This increase appear not to be driven by monetary actions but by country-specific characteristics.
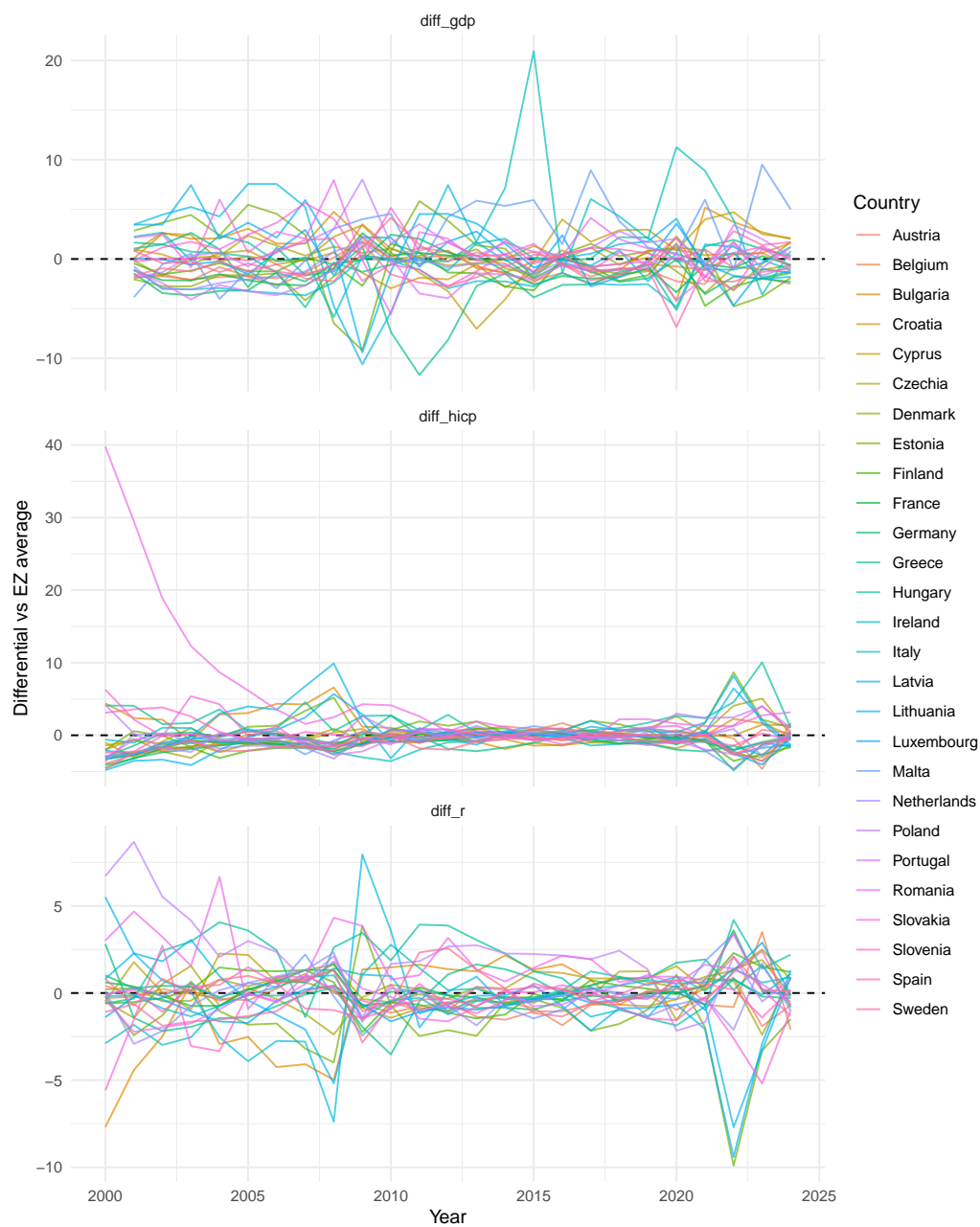
Figure 1: Divergence of real interest, inflation and growth rates of Eurozone average
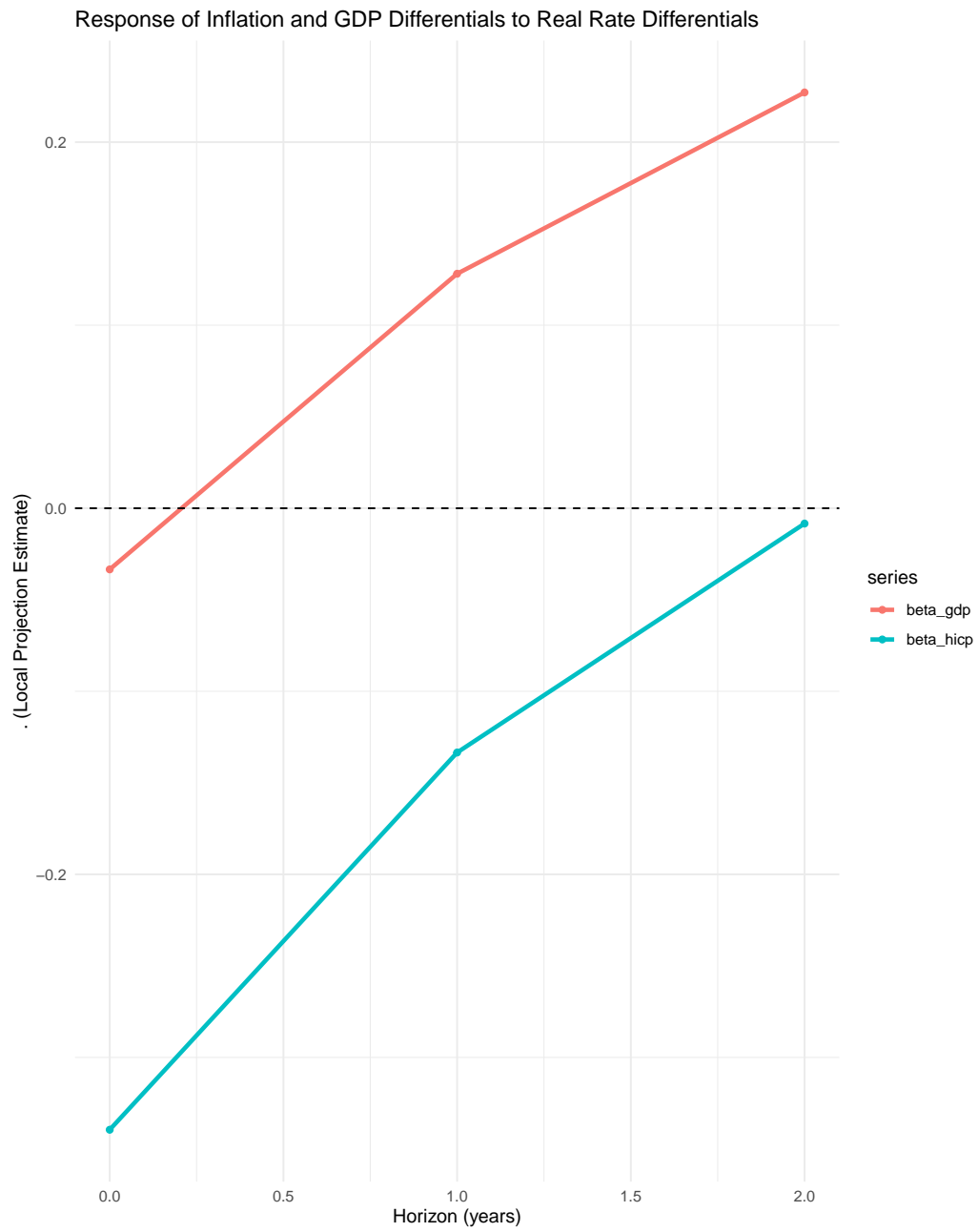
Figure 2: Local Projection

6   4c) Discussion

As seen in the previous section, there is a systematic policy effect where above-average real rates reduce inflation relative to the Eurozone average in the current year, but they do not systematically affect current or future growth differentials. For inflation, the effect is quantifiable as shown earlier. For growth, the effect is too weak to be quantifiable; therefore, for smaller member countries, other factors likely dominate macroeconomic divergence. These factors may include structural differences such as labor markets, productivity growth, national fiscal policy, credit and housing cycles as described in the paper, or external shocks. The results imply that ECB policy creates only temporary inflation divergence and no systematic long-run effects, which is reassuring for the stability of the Eurozone. The differences in inflation and growth across member countries appear to stem mainly from structural factors rather than the ECB's common monetary policy.

References

Jorda, Oscar, Moritz Schularick, and Alan M. Taylor, "The effects of quasi-random monetary experiments," *Journal of Monetary Economics*, 2020, *112*, 22–40.