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Abstract

We examine the impact of the European Central Bank's monetary policy on the euro area labor markets over the period 2010-2018. Using Jordà's (2005) local projection method, we find that unemployment rates decline in response to expansionary monetary policy surprises that can be related to unconventional policy measures. At the same time, hours worked rise. In the periphery countries, the reduction in unemployment rates is relatively pronounced, while in the core countries it is only minor. Thus, labor markets in the euro area were impacted differently by unconventional monetary policy measures.

JEL-Codes: E240, E520, E580, C230.

Keywords: Euro area, unconventional monetary policy, labor markets, local projections.

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1 Introduction

In the euro area, the recession resulting from the global financial crisis of 2007–2009 led to a sharp rise in unemployment rates.[1] The European Central Bank (ECB) responded to the economic slump by implementing expansionary monetary policy measures; from 2010 these included unconventional measures in the form of open market purchases of government bonds (Dell'Ariccia et al., 2018). Nevertheless, the situation in labor markets of several euro area member countries continued to deteriorate. Unemployment rates gradually began to fall only from 2012, after reaching comparatively high levels.[2]

In this article, we examine whether the ECB's monetary policy contributed to improving the situation in the labor markets of the euro area over the period 2010-2018, that is, after the onset of the global financial crisis. Following Jordà (2005), we estimate local projections to analyze the reaction of unemployment rates to expansionary monetary policy shocks that can be related to unconventional measures. We refer to Altavilla et al. (2019), Jarocinski and Karadi (2020), and Leombroni et al. (2021), who use high-frequency data to identify monetary policy surprises. Since our sample is small, we adopt panel techniques.

We find that unemployment rates in the euro area fall after expansionary monetary policy shocks. Simultaneously, hours worked gradually increase. Although, the periphery countries slipped into deep recession following the global financial crisis, which was accompanied by a crisis in the banking sector, we observe that the decrease in the peripheral unemployment rates in response to the shocks is relatively strong. By contrast, in the core countries, the reduction is only minor. While we cannot draw a compelling inference about the driving forces behind our results – possible explanations could be the implementation of structural labor market reforms in the periphery countries (Eichhorst et al., 2017), or the effect of unconventional monetary policy to lower risk premiums on peripheral bonds (Altavilla et al., 2021; Fanelli and Marsi, 2022) – they show that the euro area labor markets were affected in different ways by unconventional monetary policy measures.

Our analysis contributes to the findings of related studies. Evgenidis and Papadamou (2021) find that the unemployment rate in the euro area as a whole falls after an expansionary monetary policy innovation. Hachula et al. (2020) confirm a decline in the euro area unemployment rate in response to an unconventional monetary policy shock. However, the decrease is significant only for the period 2007-2014, but not afterwards. Lenza and Slacalek (2021) show that the situation in the labor markets of the four largest euro area member countries, that is Germany, France,

[1] Germany was an exception. The German unemployment rate hardly rose despite the turmoil caused by the global financial crisis.

[2] In Ireland, the unemployment rate began to fall in the first half of 2012, whereas in other countries, the rates only started to decline in the years thereafter.

Italy and Spain, improves after an expansionary monetary policy innovation. Our analysis differs from these studies in three ways. First, we use a panel of euro area countries, which allows us to distinguish between country groups. Second, we use different exogenous shock series to identify monetary policy surprises. Third, our approach allows us to consider non-linearities.

This article proceeds as follows. Section 2 presents our model, introduces the data, and discusses the shock series taken from the literature to identify exogenous monetary policy innovations. Section 3 discusses the empirical results. Finally, Section 4 presents the conclusion.

2 Methodology, data and monetary policy shocks

2.1 Model specification

Following Jordà (2005), the model is given by:

$$X_{i,t+h} = \theta_h \text{MP}_{i,t} + \phi_h'(L) Z_{i,t-1} + \gamma_h I \times \text{MP}_{i,t} + \alpha_{i,h} + u_{i,t+h} \tag{1}$$

where $X_{i,t+h}$ is the variable of interest; subindex i denotes the country; $\text{MP}_{i,t}$ is the exogenous monetary policy shock; θ_h is the coefficient corresponding to the shock; $Z_{i,t-1}$ is a vector of control variables; $\phi_h(L)$ is a polynomial in the lag operator; γ_h is the coefficient corresponding to the interaction between dummy variable I and the shock; $\alpha_{i,h}$ captures country fixed effects; and $u_{i,t+h}$ is an error term. In our baseline model, the interaction is neglected. Our variables of interest are the unemployment rate and the log of hours worked. The vector Z_t comprises lags of the variables of interest, the first difference of the log of real output, the inflation rate, which is the annual rate of change of the Harmonized Consumer Price Index (HCPI), the government bond rate, a financial stress indicator and the first difference of the log of hourly compensation. The lag length is set to two.

The response of the variable of interest at time $t+h$ to a monetary policy shock at time t is given by the estimated coefficient θ_h. Thus, the impulse responses are derived by estimating a series of single regressions for each horizon $h = 0, 1, 2, 3...H$ to generate a sequence of the θ_h's. We use the method of Driscoll and Kraay (1998) to obtain heteroskedasticity-consistent standard errors that are robust to very general forms of spatial and temporal correlations. We set the maximum autocorrelation lag to $H + 1$.

2.2 Data and exogenous monetary policy surprises

Our data come from the ECB and comprise quarterly time series. Since the monetary authorities introduced the government bond purchase programs after the global financial crisis, we consider the period from 2010Q1 to 2018Q4.[3] The set of countries includes the core countries, that is Austria, Belgium, Germany, Finland, France, and the Netherlands, as well as the periphery countries Spain, Ireland, Italy and Portugal.[4] Additionally, we consider exogenous monetary policy surprises. Altavilla et al. (2019) derive QE shocks. Since the shocks primarily relate to the period 2014-2018, we combine them with their *timing shocks*, which reflect the revisions of policy expectations for the short run (Altavilla et al., 2019, p. 163). Leombroni et al. (2021) identify risk premium shocks to monetary policy that summarize the new information about unconventional policies, such as asset purchases, liquidity supports and refinancing operations. Finally, Jarocinski and Karadi (2020) derive pure monetary policy shocks.[5] We standardize the shock series to have a mean of zero and standard deviation of one. Moreover, we normalize the shocks to reflect a monetary loosening.

3 Results

Figure 1 shows the average reaction of the euro area labor markets to exogenous monetary policy surprises. The dashed lines denote the estimated impulse responses. The shaded areas represent the 90% error bands.

We observe that unemployment rates in the euro area decline significantly in response to all shocks. The maximum drop is 0.18 percentage points on average and occurs around 10 quarters after the innovations. Moreover, we find that hours worked gradually increase. Thus, monetary policy contributes to improving the situation in the euro area labor markets by implementing unconventional policy measures.

Next, we distinguish between country groups. For the core countries, we set the interaction dummy I in (1) to 1, and 0 for the periphery countries. Figure 2 summarizes the results.

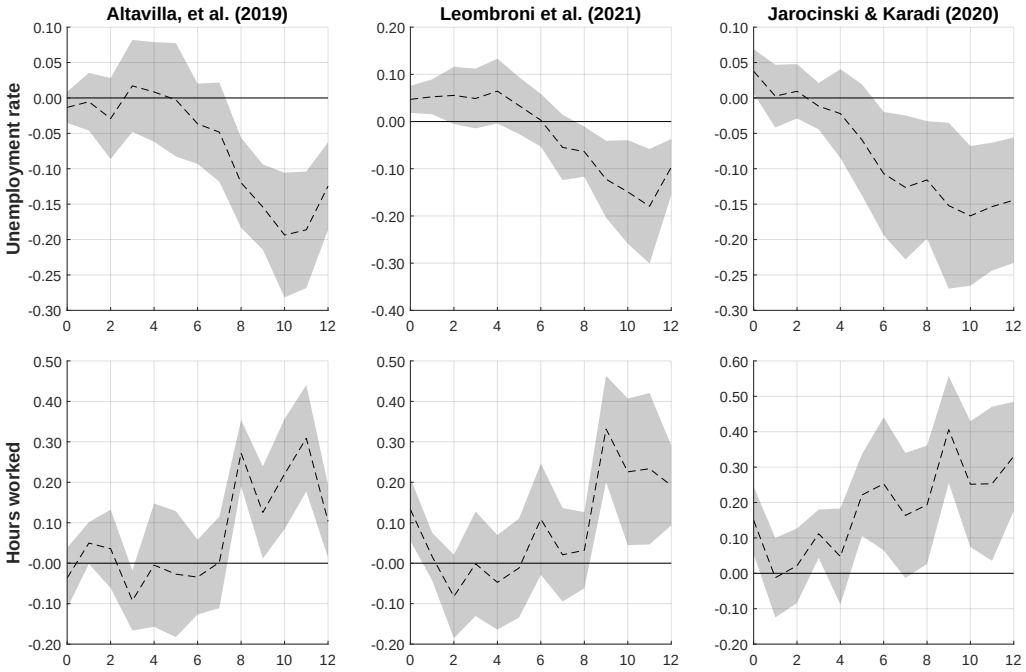
We see a notable difference between the country groups in the labor market responses to expansionary monetary policy shocks. In the periphery, the decline in the unemployment rates is relatively pronounced. At the same time, the increase in hours worked is striking. By contrast, in the core countries, the unemployment rate

[3] The effective sample period starts in 2009Q3 to take account of the two lags.

[4] We exclude Greece because it obtained external finance through financial aid programs from May 2010 onwards.

[5] The shock series of Jarocinski and Karadi (2020) is available only till 2016Q4.

Figure 1: Reaction of euro area labor markets to monetary policy shocks



Notes: Impulse responses to expansionary monetary policy shocks. The dashed lines indicate the estimated impulse responses to one standard-deviation shock. The shaded areas represent the 90% error bands. The variation in unemployment rates is expressed in percentage points. The variation in the log of hours worked is measured in percent.

falls only in response to the shock of Altavilla et al. (2019), while the responses to the other shocks are hardly significant.

Finally, we examine the significance of the differences in reactions between the country groups using a t-test. Since the responses of the labor market variables to the shocks are delayed, the null hypothesis H_0 is: γ_h *equals null* for every horizon $h = 5, 6, 7, ..., H$. Table 1 reports the number of horizons in which H_0 is rejected. The results suggest that the differences between the country groups in terms of the

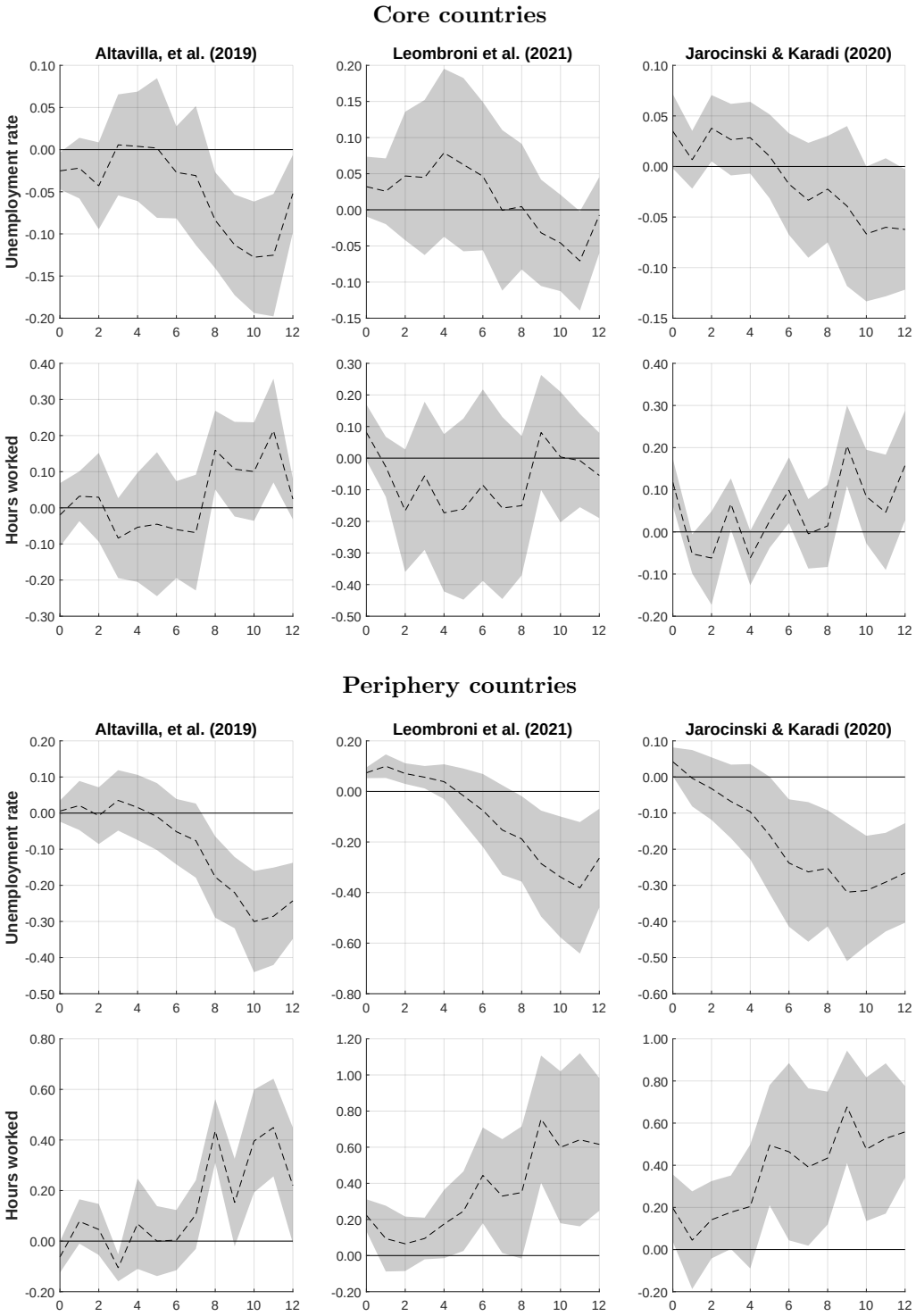
Table 1: Results of t-tests

	Unemployment rate	Hours worked
Altavilla et al. (2019)	4	3
Leombroni et al. (2021)	4	5
Jarocinski and Karadi (2020)	8	7

Notes: The table counts the number of horizons in which the null hypothesis H_0: γ_h *equals null* is rejected. The tests refer to the 10% significance level.

responses of the labor market variables are not negligible.

Figure 2: Country groups' impulse responses to monetary policy shocks



Notes: See Figure 1 for explanations.

4 Conclusion

We examine the impact of the ECB's monetary policy on the euro area labor markets over the period 2010-2018. We find that unemployment rates fall after expansionary monetary policy shocks, which can be related to unconventional monetary policy measures. Simultaneously, the number of hours worked increases. The distinction between country groups indicates differences in the responses of the labor market variables. In the periphery countries, the decline in unemployment rates is relatively strong, while in the core countries, it is small. The same applies to hours worked. The findings suggest that the euro area labor markets reacted differently to unconventional monetary policy measures.

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Data appendix - Not intended for publication

ECB Statistical Data Warehouse:

- Gross domestic product at market prices, chain linked volume
  MNA.Q.Y.XX.W2.S1.S1.B.B1GQ._Z._Z._Z.EUR.LR.N
- Harmonized index of consumer prices
  CP.M.XX.N.000000.4.INX
  This is converted to quarterly data using monthly averages. The HICP inflation rate is calculated as the annual rate of change
- Unemployment rate
  LFSI.M.XX.S.UNEHRT.TOTAL0.15_74.T
  This is converted to quarterly data using monthly averages
- Hours worked
  ENA.Q.Y.XX.W2.S1.S1._Z.EMP._Z._T._Z.HW._Z.N
- Government bond rate
  IRS.M.XX.L.L40.CI.0000.EUR.N.Z
  This is converted to quarterly data using monthly averages
- Country-level index of financial stress
  CLIFS.M.XX._Z.4F.EC.CLIFS_CI.IDX
  This is converted to quarterly data using monthly averages
- Hourly compensation
  MNA.Q.N.XX.W2.S1.S1._Z.COM_HW._Z._T._Z.IX.V.N

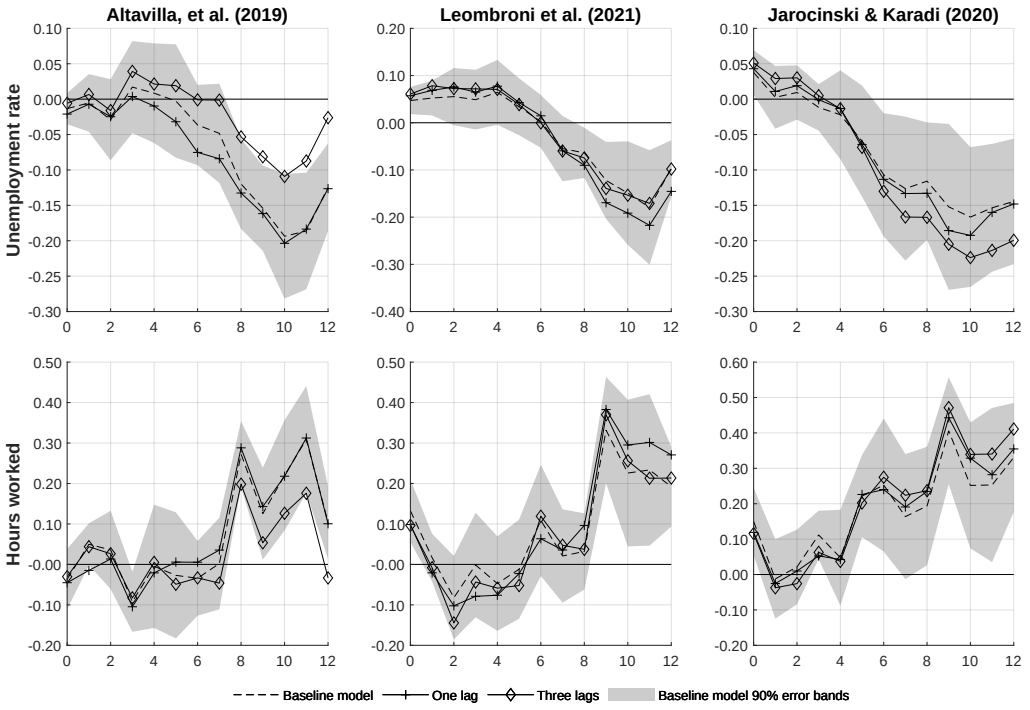
In the series' codes, XX is a placeholder for the countries' acronyms: Austria (AT), Germany (DE), Spain (ES), Finland (FI), France (FR), Ireland (IR), Italy (IT), the Netherlands (NL), and Portugal (PT). Non-seasonally adjusted data are seasonally adjusted using the IRIS Macroeconomic Modeling Toolbox.

Robustness checks - Not intended for publication

Alternative lag orders

We assess the robustness of our results by estimating model (1) with alternative lag orders. In particular, we consider a lag order of one and three, respectively. Figure 3 summarizes the results by showing the impulse responses together with the baseline model 90% error bands.

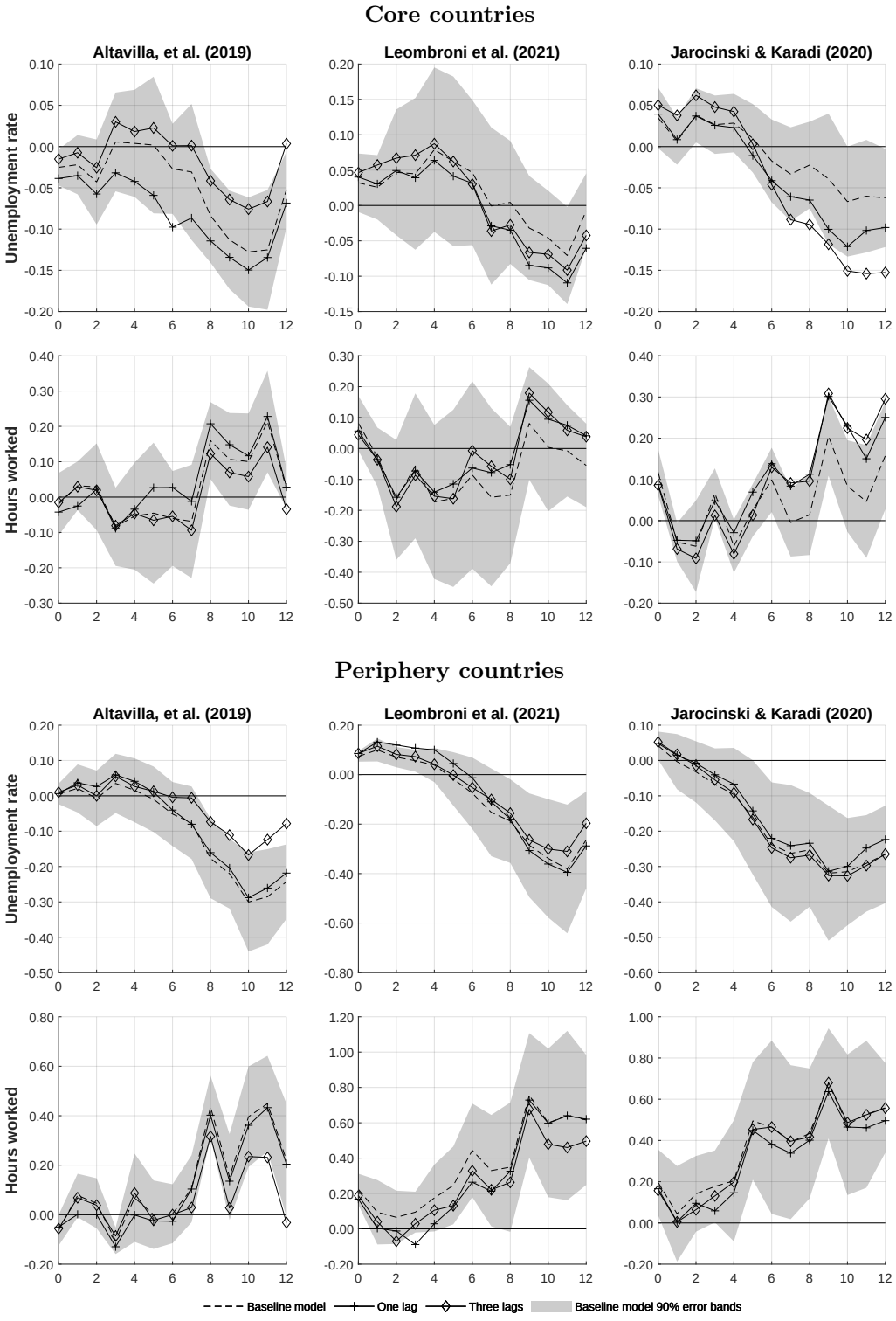
Figure 3: Reaction of euro area labor markets to monetary policy shocks



Notes: See Figure 1 for explanations

Figure 4 shows the results of the robustness check for the two country groups.

Figure 4: Country groups' impulse responses to monetary policy shocks



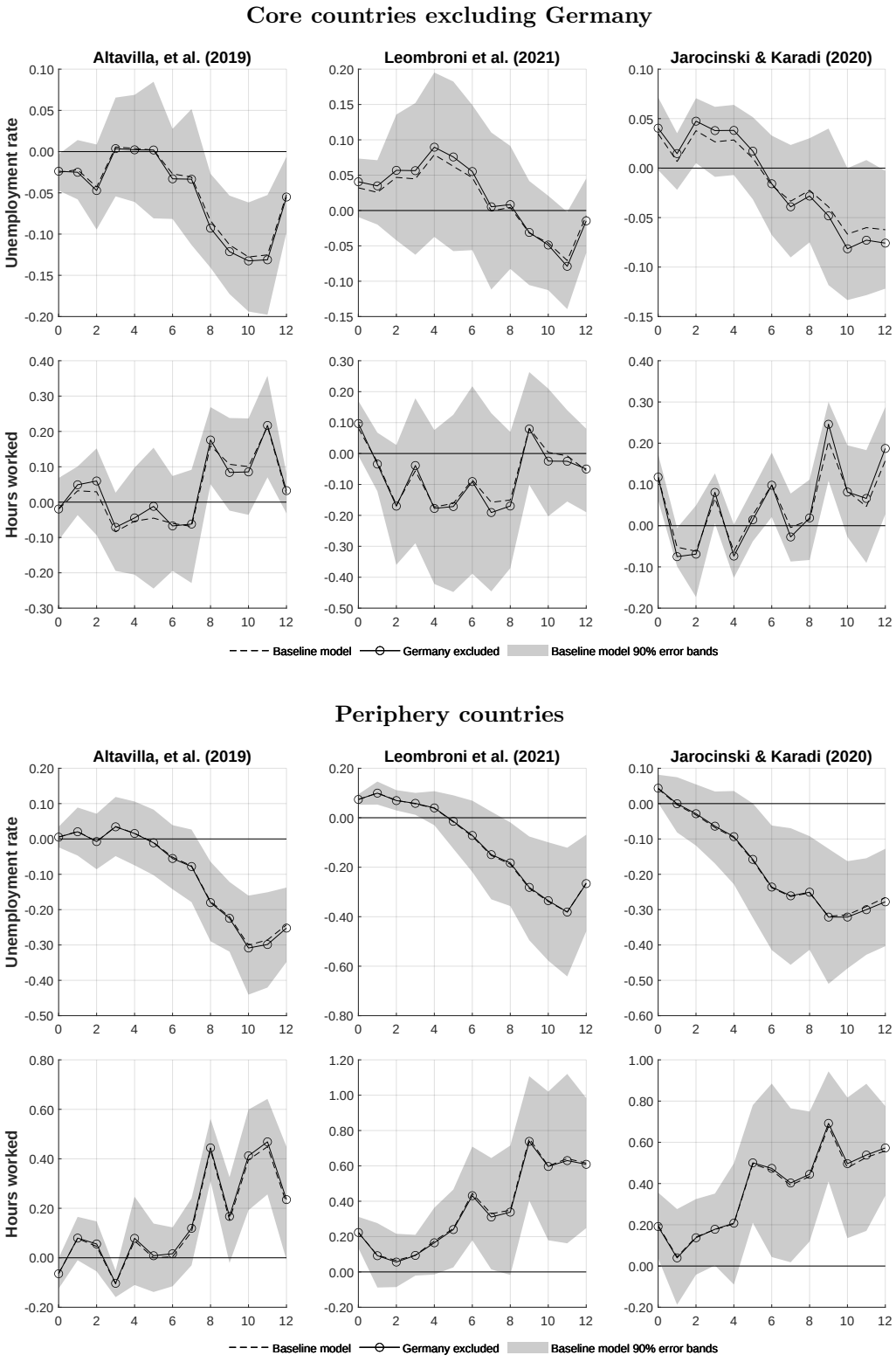
Notes: See Figure 1 for explanations.

Germany excluded

Next, we reduce the number of countries by excluding Germany. The German unemployment rate rose by a small amount during the recession caused by the global financial crisis, and fell continuously in the aftermath. Thus, the development of the unemployment rate in Germany may qualify the country as an outlier. Accordingly, we exclude it from our sample.

For the modified sample of countries, Figure 5 displays the impulse responses. The results show that the reactions of the labor market variables to the exogenous monetary policy shocks remain almost identical.

Figure 5: Country groups' impulse responses to monetary policy shocks



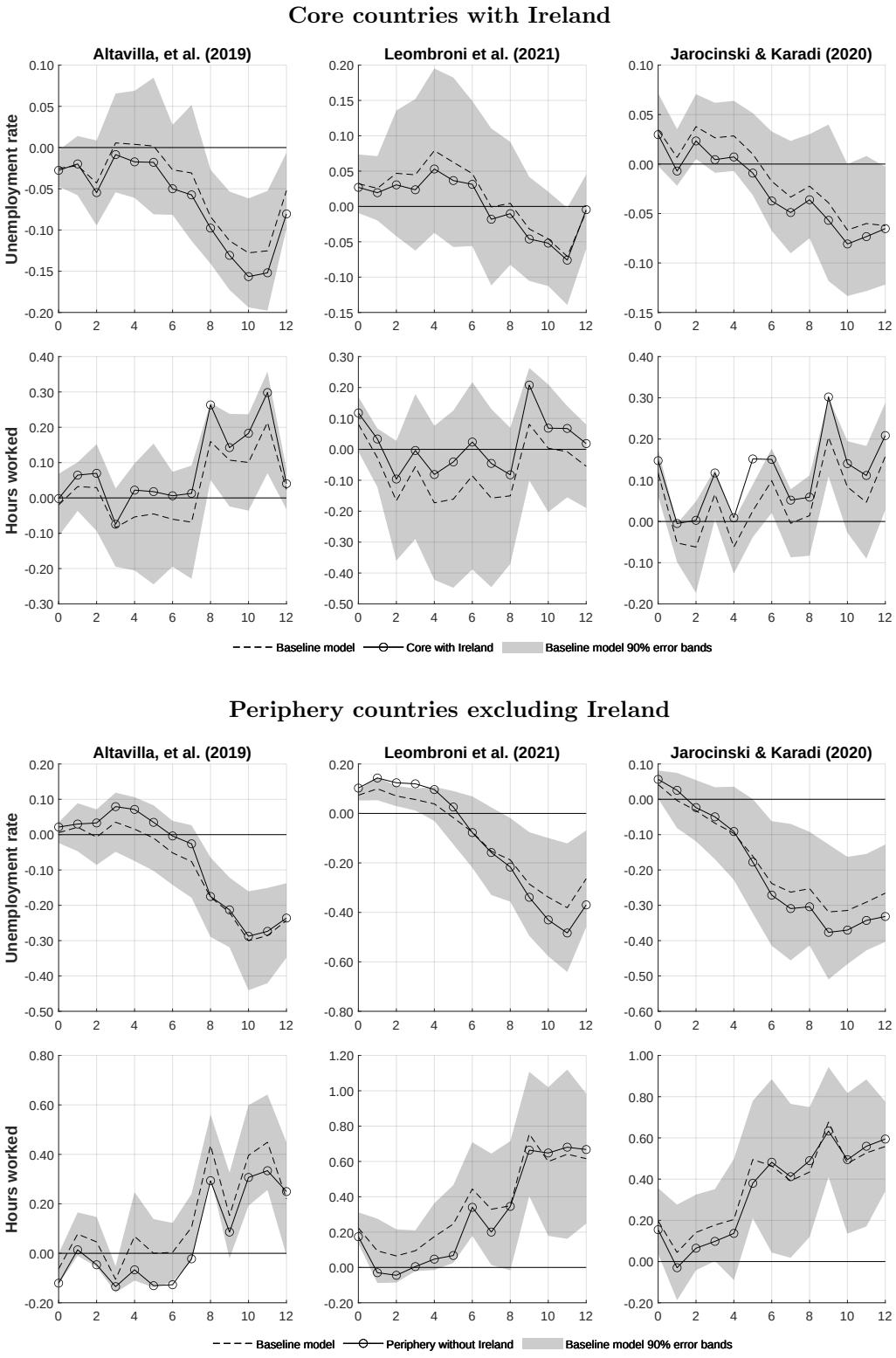
Notes: See Figure 1 for explanations.

Periphery countries without Ireland

Finally, we reduce the group of periphery countries by excluding Ireland, although the country belonged to the group of distressed economies. The Irish economy was hit by the global financial crisis at the beginning of 2008, that is, before other euro area countries, and at a time when financial aid programs were not put in place. The government responded to the crisis by imposing severe austerity measures. In what followed, Ireland prevented to slip again into a deep recession in 2011, from which the other distressed euro area countries did not recover until 2014. Therefore, we include Ireland into the group of core countries to check if our results are affected by this modification.

For the modified country groups, Figure 6 displays the impulse responses. The results show that the reactions of the labor market variables to the exogenous monetary policy shocks remain almost identical.

Figure 6: Country groups' impulse responses to monetary policy shocks



Notes: See Figure 1 for explanations.