

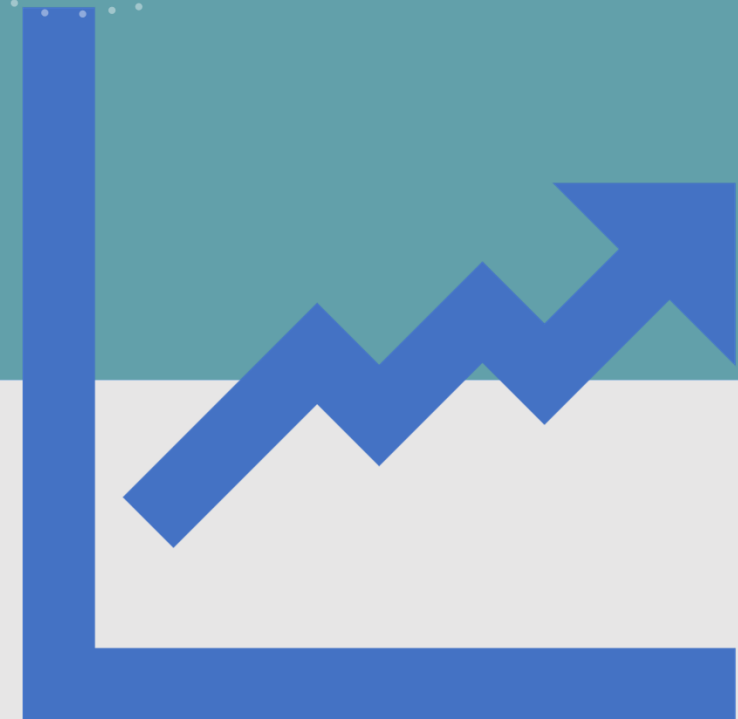
The impact of endogenous product and labour market reforms on unemployment: New evidence based on local projections

By

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Preamble

- *“Flexible labour and product markets are essential to help euro area countries respond optimally and rapidly to shocks and to avoid the higher costs of lost output and higher unemployment associated with the slower and more protracted adjustment of rigid economies.*
- *The gains from reforms will clearly be larger when reforms are more ambitious and when they are implemented jointly with reforms in other areas.*
- *In this light, more efforts are warranted to deregulate product markets, where reform effort has been muted in recent years. Further labour market reform is also necessary and will help to reduce structural unemployment.” (ECB, 2014, p. 62).*

Introduction

- International organisations and central banks often call for structural reforms (SR) (involves deregulating retail trade, professional services and certain segments of network industries-reducing barriers to entry; easing hiring and dismissal regulations for workers, etc.).
- These reforms relate not only to the labour market, but also to product markets as competition in the product market is an important determinant of employment: in imperfectly competitive markets firms restrict output and, thus, employment (Griffith et al., 2007).
- Quite a few studies have investigated the impact of SR on unemployment (see Boeri et al., 2015, Parlevliet et al., 2018, and Campos et al., 2018 for reviews).

This paper...

1. Empirically examines the impact of SR (product and labor market) on unemployment, using the local projections (LP) approach (Jordà, 2005) in 25 OECD countries for the 1970-2020 period.
 2. Updates of the reform indicators put together by Duval et al. (2018) until 2020.
- LP has been widely used to analyze the dynamic effects of policy shocks (Jordà and Taylor, 2016; Hülsewig and Rottmann, 2023).
 - Most previous research does not take into account that SR are not exogenous: it is well-known that SR are more likely to be implemented during periods of crises (Pitlik and Wirth, 2003) and that government ideology may matter (Potrafke, 2010). We control for the likely endogeneity of SR using Jordà and Taylor (2016) [Augmented Inverse Probability Weighted \(AIPW\) estimator](#).

Contributions

1. Previous studies employed OECD continuous indicators of SR. Instead, we use the reform indicators of Duval et al. (2018), which we update until 2020.
2. Unlike previous studies, we use the LP approach and check for the endogeneity of reforms (by the AIPW estimator). This allows us to estimate the quasi-experimental dynamic (treatment) effect of SR on unemployment.
3. In contrast to most previous research, we also examine the impact of SR for different types of unemployment (long-term versus short-term, across different age groups, and gender).
4. Our paper also differs from these previous studies by not only providing evidence for 25 OECD countries but also zooming in on the subset of [euro area countries](#).

Summary of Key Findings

1. Our findings suggest that labour market reforms reduce unemployment.
 - a) For youth unemployment it takes longer for the effect of labour reforms to set in; while their effect on female unemployment remains statistically significant throughout, the effect on male unemployment becomes insignificant after three years.
 - b) Labour market reforms hardly have a significant effect on unemployment in the EA.
2. The AIPW results suggest that product market reforms, for some time, increase unemployment, in contrast to the findings based on the simple LP.
3. Labour market reforms do not affect unemployment when the economy is below trend.
4. The effects of SR on unemployment are stronger for high collective bargaining coverage.

Previous Literature (1/3)

- A substantial research on the effects of SR uses simulations of DSGE models (see Parlevliet et al., 2018 for a review).
- Campos et al. (2018) argue against DSGE models posing that *“A problem with this approach is that the simulations just confirm a priori beliefs: in most DSGE models, unemployment is voluntary. Structural reforms are interpreted as an intervention that changes the relative price of leisure versus labour (e.g., by reducing unemployment benefits). In addition, most DSGE models are based on calibrations, as acknowledged by all authors. They are not empirical evidence.”*

Previous Literature (2/3)

- Other studies present estimates of the impact of structural reforms on (un)employment using panel or cross-section data. Some examples:
 - Berger and Danniger (2007) report in an OECD sample between 1990 and 2004 that lower levels of product and labour market regulation foster employment growth.
 - Griffith et al. (2007) suggest that the increase in competition due to product market reform leads to higher employment.
 - Bouis et al. (2012a) find that unemployment benefits reforms boost employment.

Previous Literature (2/3)

- The papers most closely related to our work are Bordon et al. (2018) and Duval et al. (2020).
 - Bordon et al. (2018) investigate the impact of structural reforms on employment using OECD labour market reform indicators and the local projection approach, while controlling for endogeneity.
 - Duval et al. (2020) also use the Duval et al. (2018) database and local projections, but these authors do not control for endogeneity of reforms. Furthermore, they focus on a subset of labour market reforms, whereas the present paper considers broader measures of both labour market and product market reforms.

Data: structural reforms dataset

- SR data focuses on major policy changes in PMR and EPL for regular workers. Major reforms are identified by Duval et al. (2018)—updated in this paper until 2020. The approach considers both reforms and “counter-reforms.
- The dataset is built in two steps:
 1. for each country and each policy area, we record all legislative actions mentioned in all past OECD Economic Surveys published over the period 1970-2020.
 2. among all those actions, we identify major measures as those that meet at least one of 3 alternative criteria:
 - i. a narrative criterion based on OECD staff’s judgement on the significance of the reform at the time of adoption;*
 - ii. whether the reform is mentioned again in subsequent Economic Surveys;*
 - iii. the magnitude of the change in the corresponding OECD indicator.*

Data: structural reforms examples

Announcement Year	Implementation/ Scored Year	Area	Country	Content	Normative language	Mention in reports	Large change in OECD indicator
1982	1984	Product market (telecommunications)	USA	antitrust suit against AT&T	The most important deregulatory move in telecommunications came with the antitrust suit against AT&T by the U.S. ...Competition for long-distance voice services entered a new phase in 1984..	1986, 1989, 2004	no
1993	mid-1994/1995	Employment protection legislation	Spain	a draft law modifying the current law regulating employment. It introduces....dismissals of permanent workers;	... far-reaching labor market reforms aimed at lifting barriers to job creation. A decree was passed at the end of December 1993 and a draft has been presented to Parliament and is expected to become law by the middle of 1994	no	yes for 1995
n.a.	1994	Unemployment benefits	Denmark	Labor market reforms of 1994: activation of the unemployed, limiting the period of unemployment benefits, enforcing job availability criteria, compulsory full-time activation, stricter eligibility criteria.	The measures taken ...are steps in the right direction,...raining and education offers are fully operational, a foundation has been established for reducing the duration of unemployment benefits on a sustainable basis..	2000	yes for 1994 (replacement rate), other aspects (duration, eligibility, active policies) not captured

Data: strengths of the SR narrative dataset

- Compared to indirect methods that would infer major shocks in the PMR and EPL areas only from changes in OECD variables, our approach:
 - identifies the exact timing of major legislative actions;
 - identifies the precise shocks that underpin what otherwise looks like a gradual increase or decrease in the OECD indicator without any obvious break;
 - documents the nature and timing of the legislative actions that underpin observed large changes in the OECD indicator – in cases where the latter are the main, or even the only source of identification of a major shock.
 - captures reforms in areas for which OECD indicators exist but do not cover all relevant policy dimensions;
 - covers a longer time period in some policy areas, such as EPL.

Data: weaknesses of the SR narrative dataset

- As transparent as they are, the criteria we apply to identify major shocks are only one amongst several possible options — there is no single, objective way to distinguish between major and minor reforms.
- We do not distinguish among different major reforms — all of them are treated equally, even though, in practice, some have likely been more important than others.
- By design, the shock database provides no information regarding the stance of product or labor market regulations.
- The dataset does not attempt to measure and compare policy settings across countries, and as such is no substitute for other publicly available continuous indicators.
- Dataset should be regarded as work in progress, for researchers to improve upon; the approach taken here could be extended to other relevant areas not covered here.

Data: SR stylized facts (1/2)

Table 1. Number of reform categories (25 advanced economies, 1970-2020)

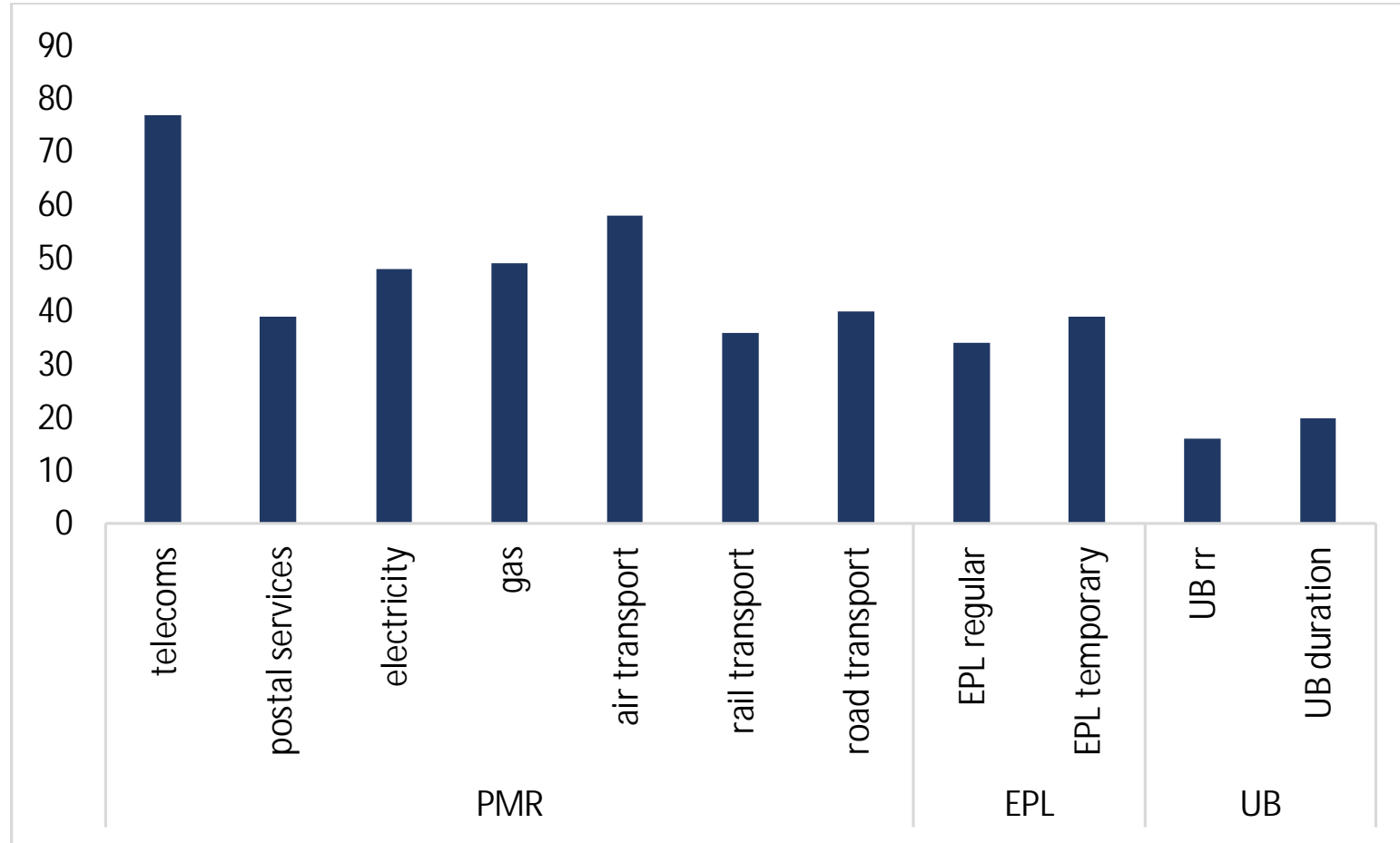
Reform type	Number of reforms	Number of counter reforms	Reforms (% of total)	Counter-reforms (% of total)
Product market reforms	224	2	99.1	0.9
Labour market reforms	84	30	73.4	26.6
Employment protection legislation (EPL) reforms	60	21	74.1	25.9
Unemployment benefit (UB) reforms	24	9	72.7	27.3

Note: The total number of observations is 911 (based on the 1-year forecast estimation sample).

Counter-reforms are relatively rare events in product markets, while they can account for up to 25% of total shocks in the labour market.

Data: SR stylized facts (2/2)

Figure 1. Number of reforms by area (25 advanced economies, 1970-2020)



The vast majority of product and labour market reforms in our sample were implemented during the 1990s and the 2000s. 15

Data: unemployment

- Unemployment data come from the OECD.

Fig. 2. Examples of reforms and counter reforms and unemployment in individual countries



Zooming-in...

Ireland

Italy

Data: other

- As controls we use: real GDP growth, the output gap (calculated with the HP filter, $\lambda=100$), and the annual percentage change in the consumer price index (from OECD).
- We employ data from the OECD on the adjusted collective bargaining coverage rate (=the number of employees covered by a collective agreement in force as a proportion of the number of eligible employees equipped).
- When we endogenize reforms, we follow de Haan and Wiese (2022) and include several political-economy variables based on our own update of the *Database of Political Institutions* in our model to predict reforms.

Methodology: LP unconditional

- We estimate IRFs by applying Jordà's (2005) LP method.
- LPs advocated by Auerbach and Gorodnichenko (2012, 2013) and Romer and Romer (2019) as a flexible alternative to VARs and ARDLs.
- LPs also flexible to accommodate a panel structure and does not constrain the shape of IRFs, allowing to analyze different types of policy shocks (Jordà and Taylor, 2016; Ramey and Zubairy, 2018; Born et al., 2020).
- The basic LP unconditional regression takes the following form:

$$\ln U_{i,t+h} - \ln U_{i,t} = \alpha_i + \beta_{1jh} \sum_{j=0}^5 d_{i,t-j} + \beta_{2lh} \sum_{l=0}^4 (\ln U_{i,t-l} - \ln U_{i,t-1-l}) + \beta_{3h} \sum_{h=1}^h d_{i,t+h} + \beta'_{4ch} \sum_{c=0}^1 X_{i,t-c} + \delta_t + u_{i,t+h}$$

Methodology: LP conditional

- We estimate a threshold model like Ramey and Zubairy (2018) and de Haan and Wiese (2022).
- We examine whether the effect of structural reforms on unemployment depends on the state of the business cycle and the level of collective bargaining, as some previous research suggests (cf. Bouis et al., 2012a; Duval et al., 2020; Schnabel, 2020).

$$\begin{aligned}
 & \ln U_{i,t+h} - \ln U_{i,t} \\
 &= I_{i,t}^{boom} \left[\alpha_i + \beta_{1jh} \sum_{j=0}^5 d_{i,t-j} + \beta_{2lh} \sum_{l=0}^4 (\ln U_{i,t-l} - \ln U_{i,t-1-l}) + \beta_{3h} \sum_{h=1}^h d_{i,t+h} + \beta'_{4ch} \sum_{c=0}^1 X_{i,t-c} + \delta_t \right] \\
 &+ (1 \\
 &- I_{i,t}^{boom}) \left[\alpha_i + \beta_{1jh} \sum_{j=0}^5 d_{i,t-j} + \beta_{2lh} \sum_{l=0}^4 (\ln U_{i,t-l} - \ln U_{i,t-1-l}) + \beta_{3h} \sum_{h=1}^h d_{i,t+h} + \beta'_{4ch} \sum_{c=0}^1 X_{i,t-c} + \delta_t \right] \\
 &+ e_{i,t+h}
 \end{aligned}$$

Methodology: AIPW unconditional (1/2)

- Major drawback of baseline equation: it ignores that SR may be introduced in countries/years where the expected benefits of reform are higher than in countries/years where no reforms are introduced.
- Quasi-experimental method, namely the Augmented Inverse Probability Weighted (AIPW) estimator - Glynn and Quinn (2010) and Jordà and Taylor (2016).
- Two steps:
 1. Logit models to estimate the probability that a SR occurs. *Predictors: other reform indicator, OG, real GDP growth, employment rate, inflation rate.*
 2. We use LPs specified before but weighing observations inversely according to the predicted probabilities from the logit model >>> more weight on observations that are comparable >>> **reduces treatment selection bias.**

Methodology: AIPW unconditional (2/2)

- Method is doubly robust and only requires one of the following conditions to hold:
 1. the conditional mean model is correctly specified;
 2. OR the probability score model is correctly specified.
- *Interpretation of weighting*: removal of the correlation between the covariates and the SR shock (Imbens and Wooldridge, 2009).
- Separate conditional mean (OLS) models are estimated for the treated and the non-treated observations. We report the “Average Treatment Effect” (ATE).
- In all AIPW outcome regressions, we use the same specification as the baseline unconditional LP equation. However, to correct for the imported uncertainty from the first stage propensity score estimation in the second stage, we calculate block-bootstrapped standard errors.

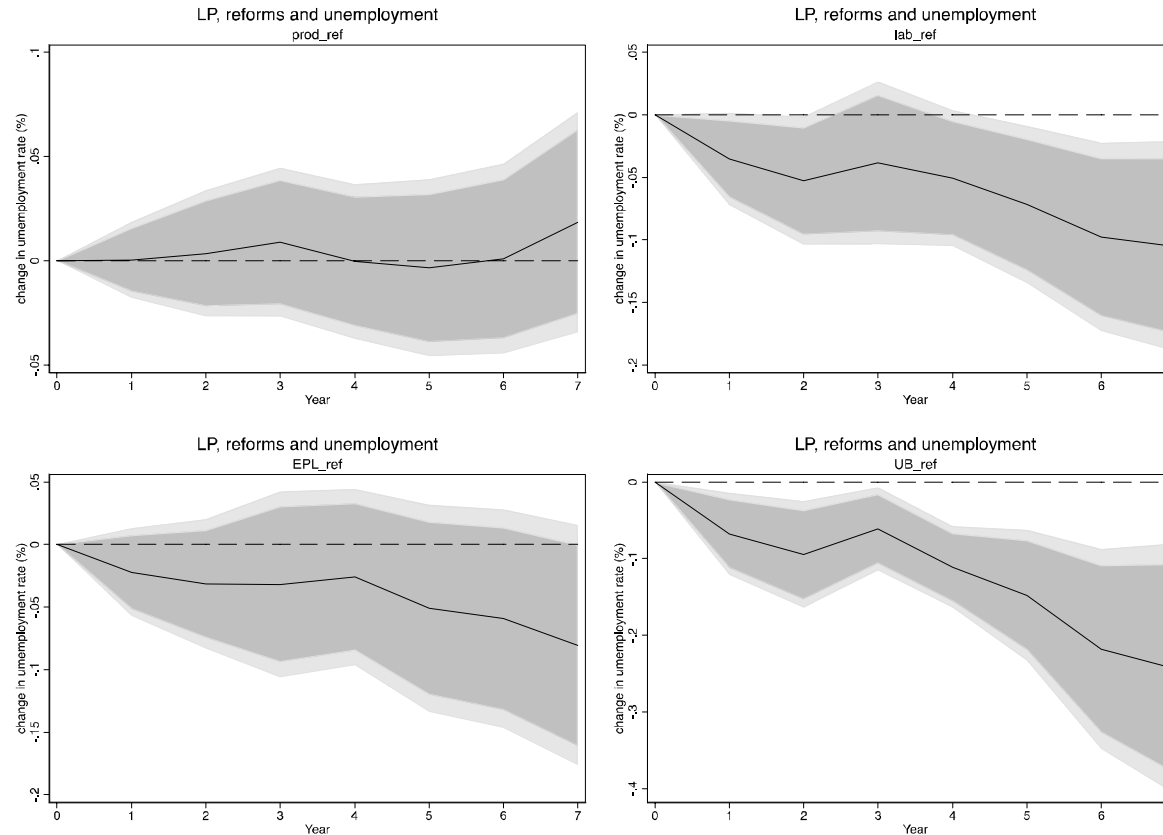
Methodology: AIPW conditional

- The AIPW models were also estimated conditioning on the countries' business cycle position and collective bargaining coverage, but again weighted inversely according to the estimated propensity scores.
- The conditional AIPW estimator requires additional degrees of freedom since effectively we are estimating a model for, e.g., each level of collective bargaining coverage.

Results: baseline unconditional

Fig. 3. Unconditional Local Projections: effect of product and labour market reforms on unemployment: full sample

Product market reforms



Labor market reforms

EPL reforms

Unemployment benefits reforms

Notes: The solid black lines in the figure plots the impulse responses of product market (upper left panel) and labour market (upper right panel) reforms on unemployment. The panels in the lower part show impulse responses for EPL (left panel) and UB (right panel) reforms. Year=1 is the first year after a reform took place at year=0. So, the position of the line at e.g., year=7 shows the change in unemployment 7 years after the reform. The dark grey shaded areas display the 90% SCC error bands; the light grey shaded areas display the 95% SCC error bands. The underlying regressions are shown in Tables A2-A5 in the Appendix.

Results: baseline unconditional

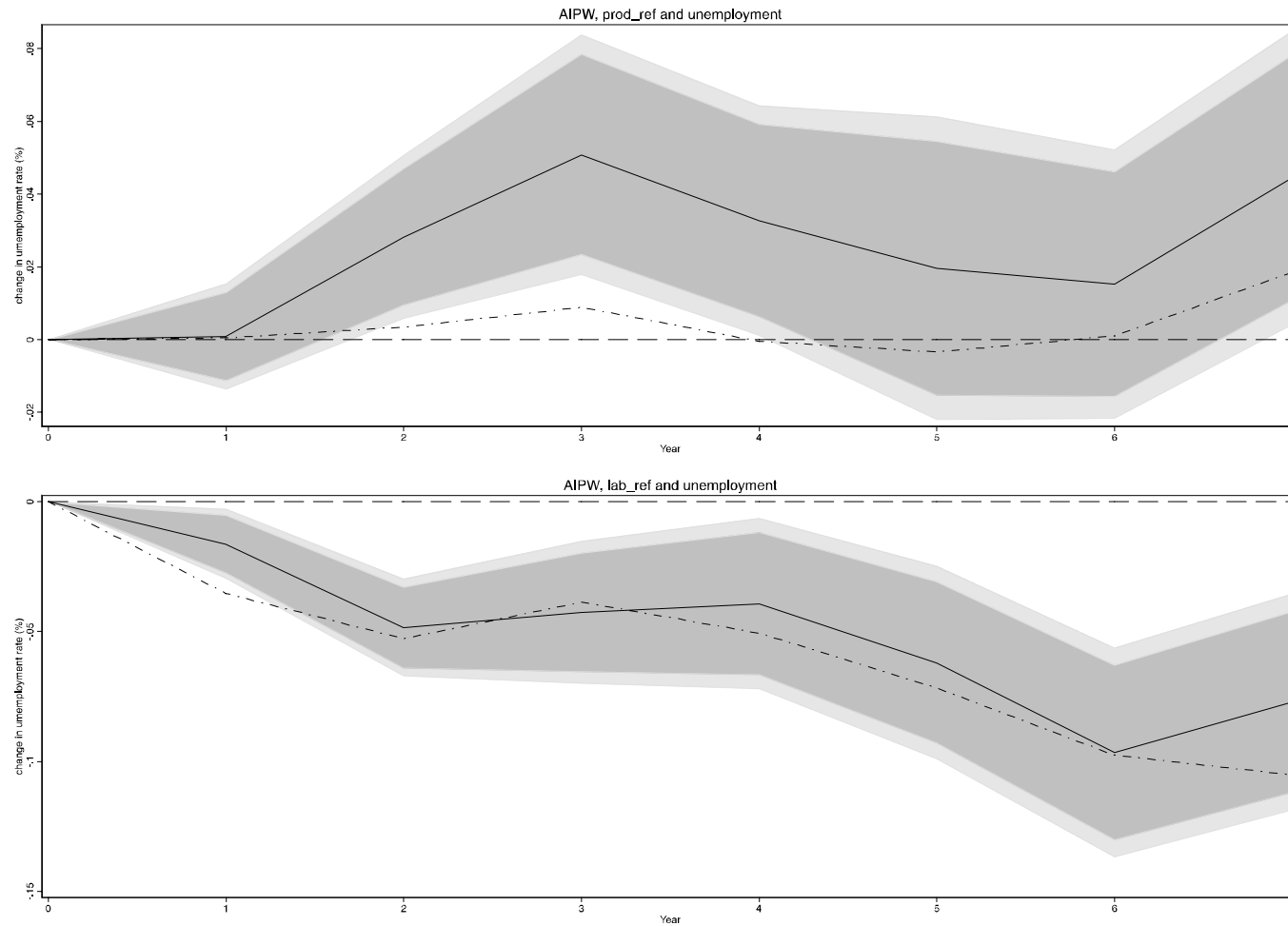
- A PMR reform does not significantly affect unemployment.
- In contrast, labor market reforms are followed by a decrease in unemployment with the point estimates becoming statistically significant after four years.
- The unemployment-reducing effect of labour market reforms is notably due to UB reforms.
- We estimate the LP model for euro-area (EA) countries and non-euro-area countries (not shown):
 - While our findings for non-EA countries are consistent with our full sample results, the findings for EA countries change quite remarkably.
 - For EA countries, product market reforms lead to a higher level of unemployment, whereas labour market reforms do not affect unemployment.

Results: baseline AIPW preamble

- To check whether the reforms can be treated as exogenous, we perform the balancing tests.
- In an ideal Randomized Controlled Trial (RTC) setting where treatments are assigned randomly, we would expect the probability density function for each control variable to be the same for each sub-population of treated and control units.
- Simple way to check: do a test of equality of means between the subsamples.
- The balance tests suggest that labour and product market reforms cannot be viewed as exogenous events, while there is no treatment selection in covariates for counter-reforms.
- Results of the logit regression output predicting treatment at $t+1$ used to estimate the propensity scores all have high predictive ability.

Results: baseline AIPW

Fig. 6. AIPW results: Full sample



Product market reforms

Labor market reforms

Notes: The solid black lines in the figure plots the impulse responses of product market (upper panel) and labour market (lower panel) reforms on unemployment. The dark grey shaded areas display the 90% error bands, the light grey shaded areas display the 95% error bands. The dotted-dashed line displays impulse responses from the simple LP regressions.

Results: baseline AIPW

- Results for labour market reforms confirm the outcomes of the simple LP model: this type of reform reduces unemployment.
- The AIPW results for product market reform suggest that these reforms for some time increase unemployment (in contrast from findings based on the simple LP).
- As with the LP results, our findings for the sample of non-EA countries are consistent with our full sample AIPW results. For EA countries, however, our results are very different: our evidence suggests that SR have no impact on unemployment.
- So, our results suggest that it is crucial to take endogeneity of SR into account when analysing the effects of SR on unemployment.

Results: AIPW - effect of reforms on different types of unemployment

Youth Unemployment

Long-term unemployment

Male unemployment

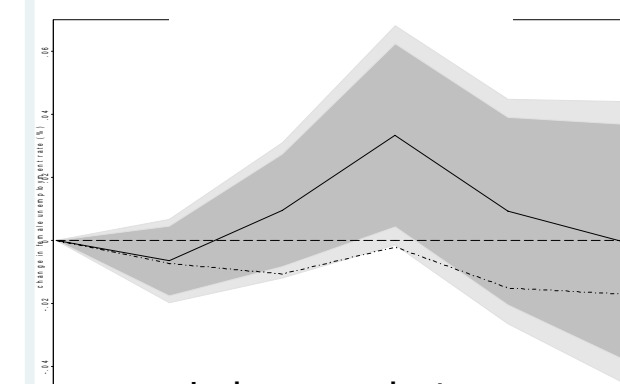
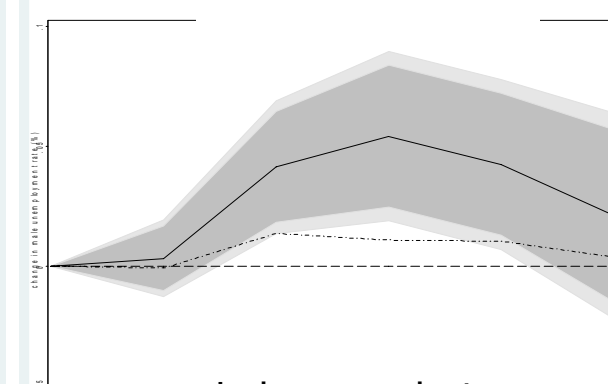
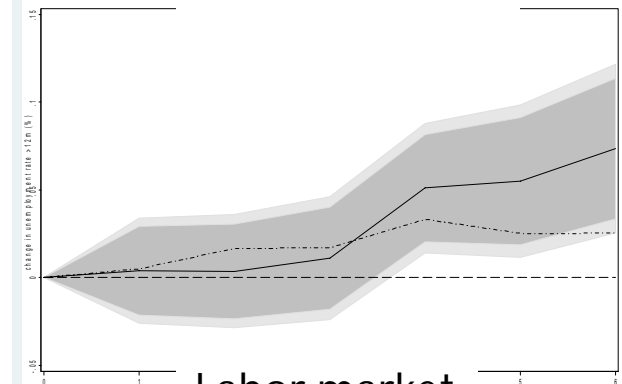
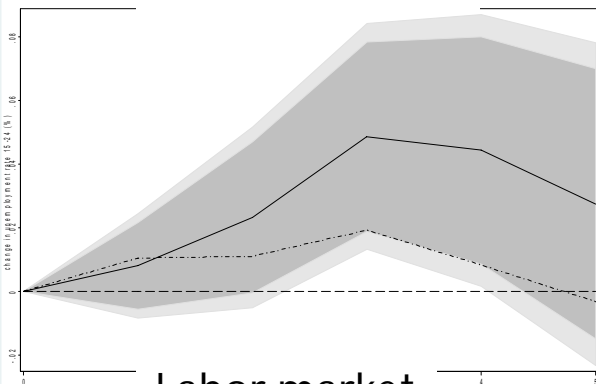
Female unemployment

Product market

Product market

Product market

Product market

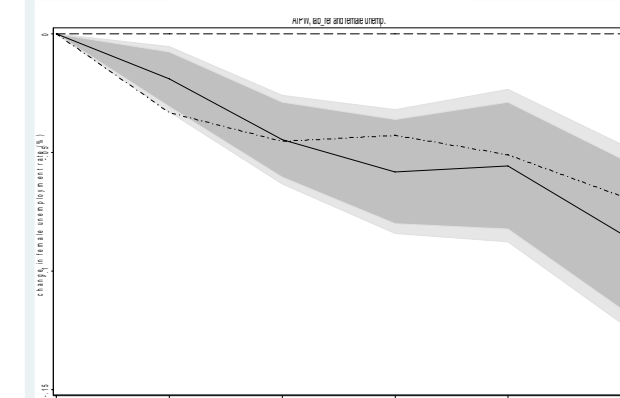
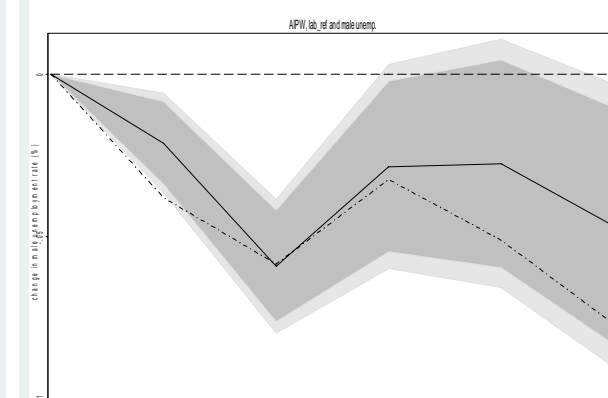
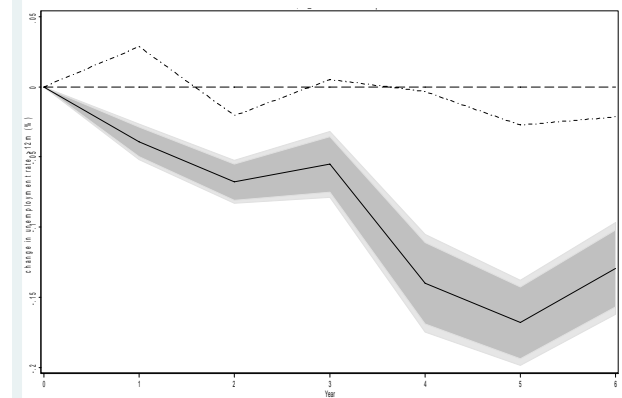
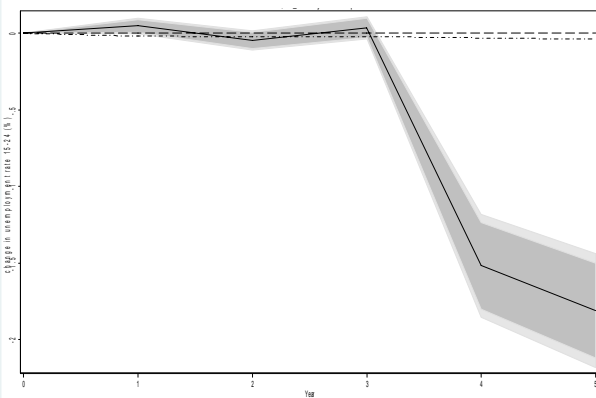


Labor market

Labor market

Labor market

Labor market



Results: AIPW - effect of reforms on different types of unemployment

- Product market reforms increase each type of unemployment, consistent with our findings for overall unemployment.
- Labour market reforms reduce unemployment but for youth unemployment it takes longer for the effect to set in.
- Another notable difference is that the effect of labour market reform on female unemployment remains statistically significant throughout the forecasting horizon, while the effect on male unemployment becomes insignificant after three years.

Robustness and Sensitivity (1/3)

1. Canova (2022) shows that when the dynamic evolution of cross-sections is not homogeneous, the implied estimates are biased in terms of both magnitude and effects' propagation. We obtain similar results when **accounting for dynamic heterogeneity** (Pesaran, 2006; Canova, 2022): results for the (simple and weighted) averaged country estimates compare well with the panel estimates, indicating that any bias due to dynamic heterogeneity is small (at the 5% significance level).
2. IRFs of structural reforms on unemployment for **different levels of education**. Results show that responses are very similar (and statistically not different from one another), although the strongest and fastest effect is found for the unemployed with intermediate levels of education.

Robustness and Sensitivity (2/3)

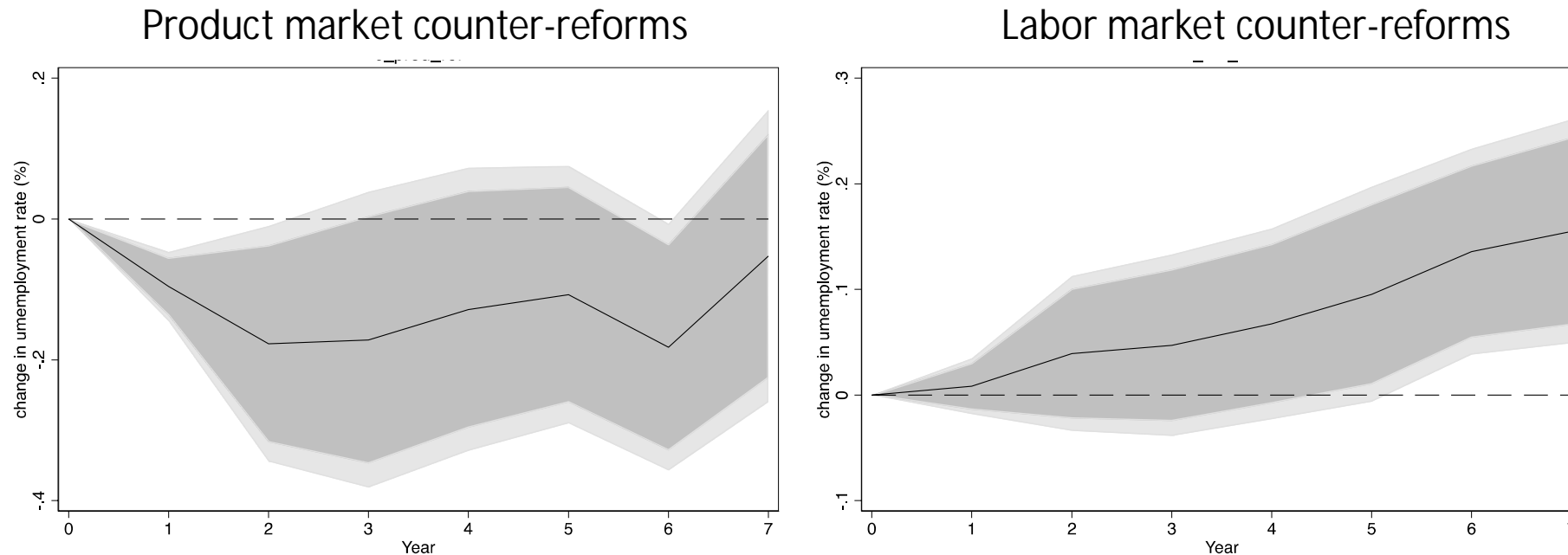
3. We also analyse the **joint effect of labour and product market reforms**. Results suggest that their joint effect is negative for unemployment in the short term, but in the medium term the effect becomes positive.

4. A cause of concern about our results may be the **Nickell (1981) bias** (biased and inconsistent estimates). In our case, $\beta_2 \approx 0.25$ so the bias will be about -0.025, i.e., less than 1/10 of the estimated coefficient. Because of this negative correlation, the Nickell bias also leads to an underestimation of the IRFs. This, in combination with the relative low size of the biased AR(1) term and the large T (50) relative to N (25) leads us to conclude that the Nickell bias in our case is negligible.

Robustness and Sensitivity (3/3)

- Our findings for counter-reforms are broadly consistent with our results for endogenized reforms: product market counter reforms hardly affect unemployment, while labour market counter reforms increase unemployment after some time

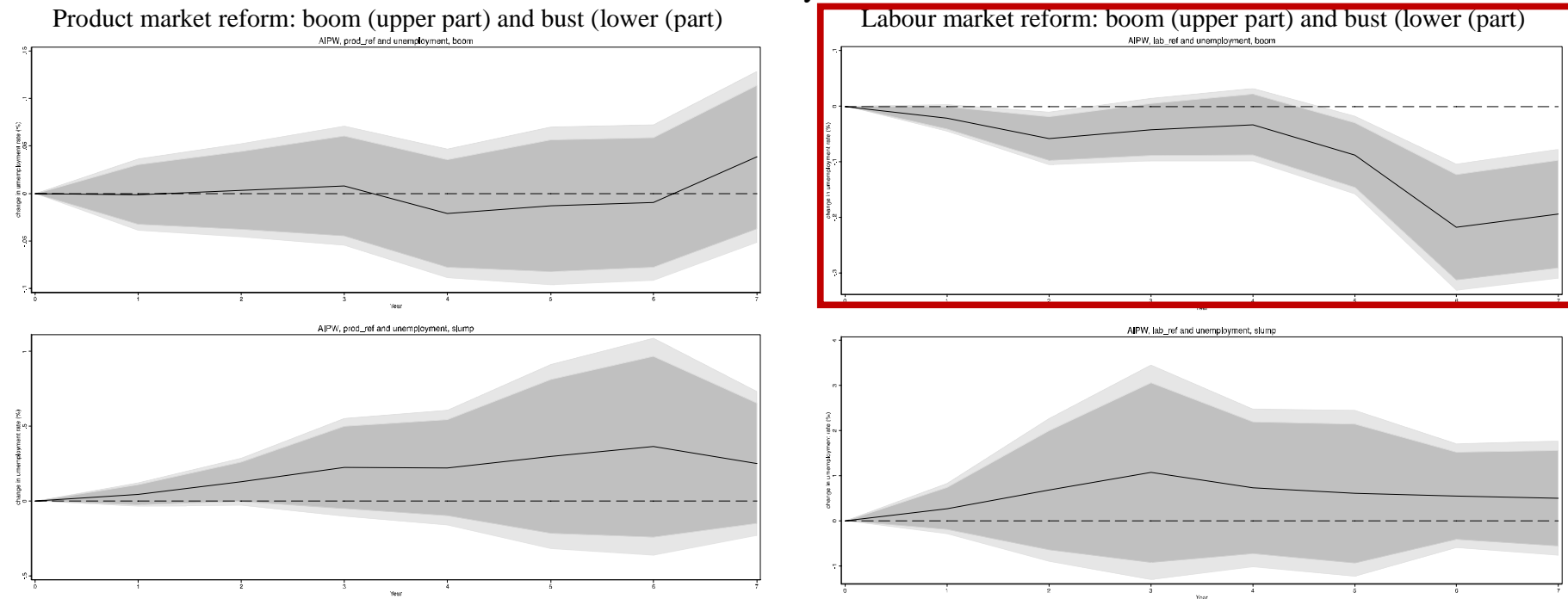
Fig. 9. Unconditional Local Projections: Effect of product and labour market counter reforms on unemployment (full sample)



Conditional AIPW (1/2): business cycle

- Results suggest that when the economy is booming, labour market reforms reduce the unemployment rate; in contrast, when the economy is below trend, labour market reforms do not significantly affect unemployment.

Fig. 10. AIPW Projections: effect of product and labour market reforms on unemployment conditional on business cycle



Conditional AIPW (2/2): collective bargaining

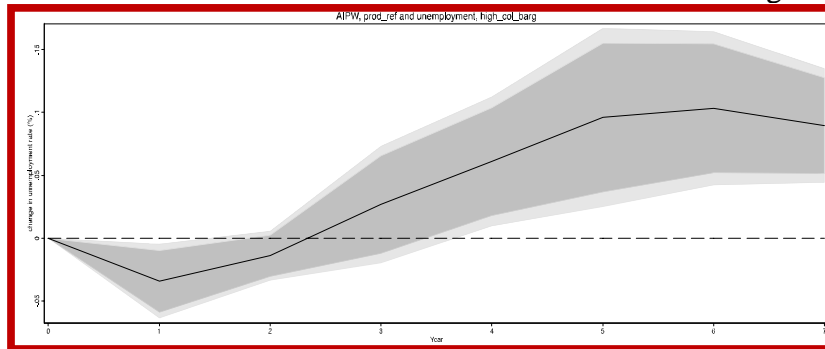
- Collective bargaining may increase labour market efficiency by correcting market failures and by reducing the transaction costs of all parties involved.
- However, collective bargaining may also introduce labour market distortions, for instance, if unions and insiders have excessive power (Schnabel, 2020).
- While the literature on the effects of collective bargaining on economic performance is extensive (OECD, 2019; Schnabel, 2020), little is known about how collective bargaining may affect the impact of structural reform on unemployment.
- Here we examine the conditioning effect of an important dimension of collective bargaining. We use the so-called coverage rate - the percentage of workers in an economy or industry whose terms and conditions of employment are determined by collective rather than individual bargaining.

Conditional AIPW (2/2): collective bargaining

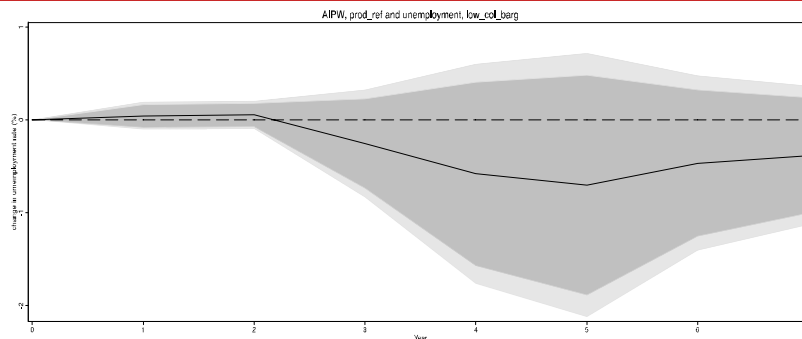
Results suggest that the effects of structural reforms on unemployment are stronger for high collective bargaining coverage observations.

Fig. 12. AIPW Projections: effect of product and labour market reforms on unemployment conditional on collective bargaining coverage

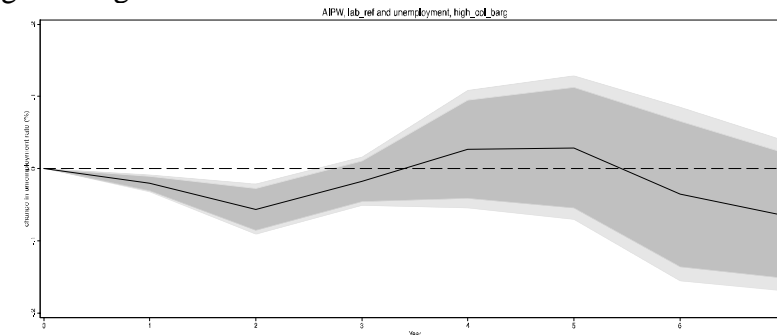
Product market reforms in high collective bargaining



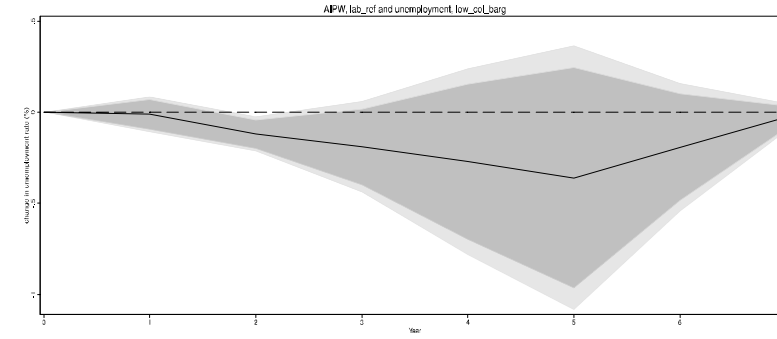
Product market reforms in low collective bargaining



Labor market reforms in high collective bargaining



Labor market reforms in low collective bargaining



Conclusions (1/2)

- We examined the impact of labour market and product market reforms on unemployment in 25 OECD countries between 1970 and 2020, using the LP approach.
- Our findings suggest that labour market reforms reduce unemployment.
- We take endogeneity into account by applying the Augmented Inverse Probability Weighted (AIPW) estimator.
- The AIPW results suggest that product market reforms, for some time, increase unemployment, in contrast to the findings based on the simple LP model.
- So, it is crucial to take endogeneity of structural reforms into account when analysing their effects on unemployment.

Conclusions (2/2)

Other results:

- Product market reforms increase each type of unemployment, whether categorized by age, gender or duration.
- Labour market reforms reduce all types of unemployment but for youth unemployment it takes longer for the effect to set in.
- Labour market reforms do not affect unemployment when the economy is below trend.
- The effects of structural reforms on unemployment are stronger for high collective bargaining coverage observations.

Thank you very much
for your attention!

Ready for (more)
questions.



AIPW - intro

- The AIPW combines both the properties of the regression-based estimator and the inverse probability weighted (IPW) estimator and is therefore a “doubly robust” method in that it requires only either the propensity or outcome model to be correctly specified but not both.
1. First, propensity scores are derived from a latent model which explains the probability of implementing a SR based on a number of reform predictors.
 2. These propensity scores are used to correct for selection bias by reweighting the sample in the LP outcome regressions such that we achieve a quasi-random distribution of countries with and without reform.
 3. The LP model is used to estimate conditional means in both groups separately based on a set of determinants.
 4. Finally, the differences in weighted conditional means at each horizon between both groups are computed to estimate the so-called “average treatment effects” (ATEs) of reforms on unemployment.

Euro-Area Rationale

- It is often argued that price and wage flexibility is particularly important in a currency union (as countries can no longer adjust to asymmetric shocks through exchange rate changes and the common monetary policy cannot take country-specific developments into account).
- This implies that a high degree of national economic flexibility is indispensable, notably so if the frequency of asymmetric shocks is high and countries' business cycles are not synchronized (and labour mobility and international risk sharing are low).
- We examine whether structural reforms in the euro area have a different impact on unemployment than reforms in countries outside the euro area.
- A few previous studies addressed structural reform in the euro area as well (e.g. Rünstler, 2021). Our paper employs LP and a different reform database, while we also consider product market reforms.

Balancing Tests

- The balance for several variables between treated and control observations is a cause of concern. This is an indication that we cannot assume that treatments are assigned randomly as is done in the simple LP analysis above. This suggests that labour and product market reforms cannot be viewed as exogenous events.

Table 2. Balancing tests of covariates: Reforms

Full sample									
VARIABLES	(1) Output gap	(2) Output gap (-1)	(3) Inflation	(4) Inflation (-1)	(5) GDP growth	(6) GDP gr. (-1)	(7) Unemployment	(8) Unemploym. (-1)	(9) Unemploym. (-2)
Product market reforms	-0.010 (0.016)	-0.018 (0.016)	-1.043*** (0.296)	-1.152*** (0.315)	0.005** (0.002)	0.005** (0.002)	-0.011 (0.012)	-0.006 (0.012)	-0.010 (0.013)
Labour market reforms	-0.060** (0.023)	-0.031 (0.024)	-0.191 (0.443)	-0.298 (0.472)	-0.007** (0.003)	-0.007** (0.003)	0.034* (0.018)	0.050*** (0.018)	0.069*** (0.019)
EPL reforms	-0.046* (0.027)	-0.006 (0.028)	0.214 (0.517)	0.239 (0.550)	-0.009** (0.003)	-0.009** (0.003)	0.049** (0.021)	0.057*** (0.022)	0.058*** (0.022)
UB reforms	-0.085** (0.042)	-0.088** (0.043)	-1.135 (0.800)	-1.546* (0.851)	-0.002 (0.005)	-0.003 (0.005)	-0.006 (0.033)	0.027 (0.033)	0.087*** (0.034)
Joint reforms	0.001 (0.007)	-0.001 (0.007)	3.517*** (0.130)	3.745*** (0.138)	-0.018*** (0.001)	-0.018*** (0.001)	0.004 (0.005)	0.007 (0.005)	0.009* (0.005)
Obs.	911	911	911	911	911	911	911	911	911

Propensity Scores

- Smooth kernel density estimates of the distribution of the propensity scores for treatment and control units to check for overlap. Ideally, the overlap between the distribution of propensity scores for treated and control units would be near identical.
- The graphs show that we have considerable overlap between the distributions for treated and control units >>> we have a satisfactory logit model that can be used to identify the ATEs properly using our quasi-experimental estimation strategy.

Fig. 5. Overlap of propensity scores for different types of reforms

