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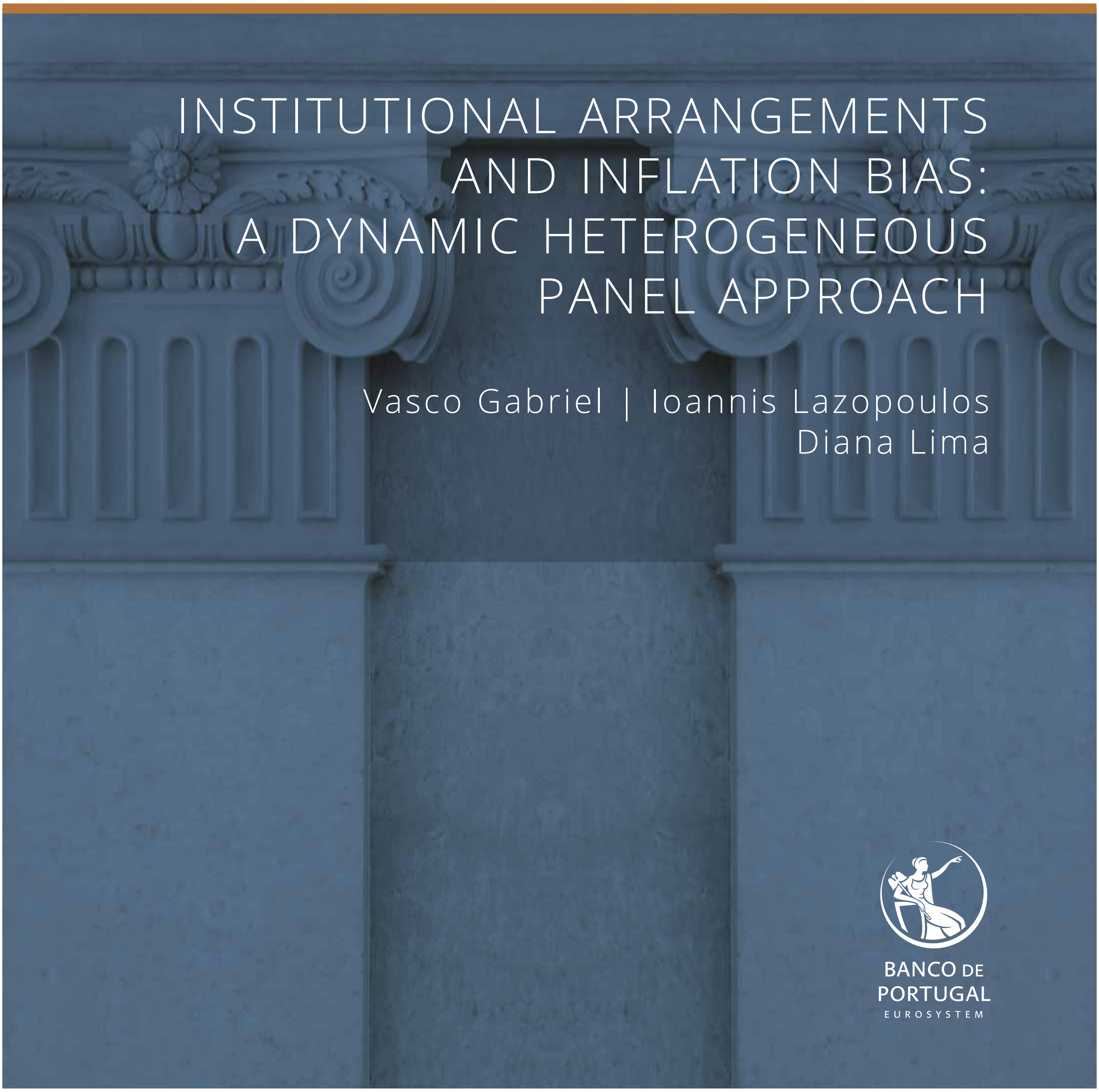

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The analyses, opinions and findings of these papers represent the views of the authors, they are not necessarily those of the Banco de Portugal or the Eurosystem

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Lisboa, 2021 • www.bportugal.pt

Working Papers | Lisboa 2021 • Banco de Portugal Av. Almirante Reis, 71 | 1150-012 Lisboa • www.bportugal.pt •
Edition Financial Stability Department • ISBN (online) 978-989-678-770-7 • ISSN (online) 2182-0422

Institutional Arrangements and Inflation Bias: A Dynamic Heterogeneous Panel Approach

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December 2021

First published April 2021

Abstract
The paper investigates whether the institutional arrangements that determine the conduct of monetary policy and prudential regulation and supervision of the banking system influence policymakers' actions in pursuing their designated mandates. Employing recently developed dynamic heterogeneous panel methods and using data for 25 industrialised countries from 1960 to 2018, we empirically assess whether central banks' main objective of inflation stability is compromised when assigned with both policy mandates manifested as inflation bias. Our results show that, once we appropriately control for relevant policy and institutional factors, the separation of prudential policy and monetary policy does not have a significant effect on inflation outcomes.

JEL: E21, E60, F40

Keywords: Monetary policy, microprudential and macroprudential policy, institutional mandates, panel data.

Acknowledgements: This research project was supported by FCT - Fundação para a Ciência e a Tecnologia, through PhD Research Scholarship SFRH/BD/69139/010.

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1. Introduction

The financial disruptions that preceded the 2007-08 events triggered a worldwide comprehensive evaluation of the regulatory and supervisory frameworks. All over the world, reforms were implemented to introduce a macroprudential policy oversight of the financial system. Although the tendency in the late 1990s was to separate the monetary policy from the regulation and supervision of the banking system (hereafter prudential policy, including both micro and macroprudential policies), the financial crisis questioned this apparent consensus as several countries (most notably the United Kingdom, Ireland, Iceland and the Euro-area countries) implemented changes in their institutional setups reinforcing the role of central banks in prudential policy.[1]

Much of the recent developments in the institutional design of policymaking have been focused on monetary and macroprudential policy interactions. Assigning the financial stability mandate to an independent authority with additional instruments improves policy outcomes and therefore welfare according to the Tinbergen rule, provided that policies are effective and have complementary effects on the two objectives. In contrast, when the effects from policy interplay are conflicting and coordination between policymakers is limited, internalising negative externalities by assigning both mandates to a central bank confines the possible welfare losses. However, the analysis of the type of impact on policy objectives is a complex task, as macroprudential policy works through the same transmission channels as monetary policy. Whether central banks should lean against financial imbalances has been a subject of debate in the literature following the institutional reforms that have taken place after the 2007 crisis.

The aim of this paper is to examine whether the institutional structure of policymaking affects macroeconomic outcomes by influencing the monetary and prudential policies interaction. Indeed, we empirically assess whether the allocation of policy mandates affects central banks' primary objective of inflation stabilisation. Using data for 25 industrialised countries over six decades, our results show that, once we appropriately control for relevant policy and institutional factors, the separation of prudencial policy and monetary policy does not have a significant effect on inflation outcomes.

The evaluation of policy interactions has attracted the attention of the macroeconomic literature. This typically involves calibrated models that examine the welfare effects in settings where the central bank responds to financial variables in order to prevent the development of financial imbalances, and configurations that consider various levels of coordination between the central bank and an independent macroprudential regulator. However, the results are far from conclusive, suggesting

1. Over the period from 1986 to 2006, Masciandaro (2009) shows that 94% in a sample of 91 countries chose to consolidate financial supervision into a unified financial authority outside the central bank. See also Dalla Pellegrina *et al.* (2013). For a comprehensive review of the developments in monetary policy see Masciandaro (2020).

that the relationship between the allocation of policy mandates and macroeconomic outcomes is unclear, as the effect of stabilisation policies on policy goals depends on the type and propagation of demand and supply imparities across the financial system and the real economy.

While there are many arguments in favour of the separation of the two policy mandates, the main criticism has been that it can lead to sub-optimal results when stabilisation policies have negative spillovers and coordination between policymakers is limited.[2] In this case, by taking into account the impact that the micro and the macroprudential regulators' actions have on inflation, the central bank enhances monetary stability but potentially at the detriment of financial stability. This negative externality could be reduced if the central bank is instead assigned both monetary and prudential mandates such that the effects of monetary policy on financial stability are considered. Indeed, interest rate changes could adversely affect banks' profitability and soundness by influencing risk perceptions and altering the value of banks' net worth. However, a looser monetary policy would consequently lead to inflation bias.

In order to assess the above, we construct a variable (*Separate*) that classifies the allocation of policy mandates. Monetary policy mandates are typically assigned to central banks, while the institutional arrangements for prudential policy are usually much more diverse, particularly after recent widespread reforms concerning macroprudential mandates. Thus, countries where the central bank is also in charge of micro and macroprudential policies are classified as having a combined regime, while countries in which prudential mandates are assigned to independent entities are classified as having separate regimes. Although the variable (*Separate*) is built to capture both the micro and the macroprudential policy mandates, it mainly represents the evolution of the microprudential policy perspective, since macroprudential policy frameworks were more recently introduced (as a consequence of the global financial crisis of 2008). Moreover, whilst it may be argued that our baseline indicator of 'separateness' is oversimplified, we consider different variants of the *Separate* variable and further complement it with additional measures of central banks' involvement in banking supervision.

Then, to empirically examine whether central banks with monetary and prudential mandates experience worse inflation outcomes, we exploit both cross section and time variation in institutional arrangements by employing a flexible dynamic macro-panel data approach that is well suited to our set-up (25 countries, nearly 60 years for the period 1960-2018). In particular, we resort to the newly developed Dynamic Common Correlated Effects (DCCE) estimator of Chudik and Pesaran (2015), which is particularly useful when both the cross-section and the

2. In addition to the organisational differences involved in pursuing the two objectives, separation of mandates reduces the political and reputational risk faced by governments and central banks in the event of a banking crisis (Goodhart and Schoenmaker 1995). A summary of arguments for and against the separation of the two mandates can be found in Ioannidou (2005) and Doumpos *et al.* (2015).

time series dimensions are sufficiently large. Moreover, the DCCE allows for both observed and unobserved heterogeneity across countries, as well as unobserved common factors. We thus take into account the dynamic nature of inflation rates and the presence of global factors (brought about by increased financial integration or common business cycles), which, if not appropriately recognised, induce significant biases in standard estimators. In addition, we consider proxies that aim at capturing other aspects of the policymaking structure, such as the monetary policy regime (i.e. inflation targeting) and the presence of deposit insurance schemes, together with variables that account for the degree to which open economies are exposed to 'imported' inflationary shocks.

In contrast with earlier, and somewhat crude, empirical literature (DiNoia and DiGiorgio 1999, Ioannidou 2005 or Copelovitch and Singer 2008, for example), our estimation results show that the institutional separation does not have a significant impact on inflation, suggesting that inflation rates are not systematically higher in countries in which central banks are also in charge of prudential policy. We show that the same applies to inflation volatility. Moreover, we evaluate how different supervisory arrangements impact policy 'inputs' in the shape of central banks' preferences, measured by a central banks' conservatism (CBC) index as in Levieuge and Lucotte (2014) and Levieuge, Lucotte and Pradine-Jobet (2019). These results shore up our main conclusion that central banks with both monetary policy and prudential policy functions do not display lower inflation aversion that those with a single mandate of price stability.

These findings are robust along several dimensions and, in fact, we show that previous results in the literature are explained by the imposition of inappropriate constraints on the panel specification. Our results also suggest that there are other characteristics of the monetary and macroprudential architecture that could be driving forces of low inflation rates, such as inflation targeting and deposit insurance systems, the latter by steering confidence in the well functioning of the banking system. In addition, economic factors such as the output gap and several 'openness' variables (such as exchange rates, capital and trade openness) are also important determinants of inflation levels and volatility.

Our contribution is related to a well established literature on the empirical determinants of inflation that emphasize the role of 'institutional' factors, using a multi-country approach. These include central bank independence (see Cukierman *et al.* 1992 or, more recently, Arnone and Romelli 2013), the varying degrees of trade openness (see Bowdler and Nunziata 2006) or political instability (see Aisen and Veiga 2006). There is also a growing literature related to institutional aspects of macroprudential and monetary policies, such as, *inter alia*, Masciandaro and Volpicella (2016), who study the distinct drivers explaining the role of central banks in macroprudential governance, while Levieuge *et al.* (2019) look at the link between central banks' preferences and the vulnerability of the banking sector. Moreover, Doumpos *et al.* (2015) consider the role of central bank independence and supervisory unification in mitigating the adverse effects of crises, whereas Masciandaro and Romelli (2018) show that systemic banking crises appear to trigger reforms in supervisory structure. Thus, we build upon and extend these studies in order to assess the effect of financial regulation mandates on inflation.

The rest of the paper proceeds as follows. Section 2 describes the transmission mechanisms of monetary policy and how prudential policy may affect these channels.

Section 3 presents the data used in the empirical part of the paper and describes the methodology used in the empirical analysis, while section 4 discusses the estimation results. Section 5 concludes.

2. Macroeconomic outcomes and the interaction between monetary and micro and macroprudential policies

Monetary and prudential policies seemingly pursue different key objectives, with the former focusing on price stability, the latter looking after the solvency of the individual banks and the resilience of the banking system as a whole. Although they are distinct policy objectives *per se*, they are likely to positively contribute to the ultimate goal of macroeconomic stability (sometimes termed the "Schwartz's conventional wisdom"). In this sense, policy objectives of monetary authorities and banking supervisors are complementary at least in the long-run, since both promote the economic and financial conditions needed to achieve stability at the macroeconomic level. Nonetheless, under specific economic circumstances, these policy goals may conflict with one another, with policy actions potentially offsetting each other. First, although largely pro-cyclical, financial cycles tend to be longer than business cycles, which may lead to a decoupling between financial circumstances and economic fundamentals. Second, and perhaps more importantly, several propagation channels of monetary policy transmission are likely to interact with bank stability and ultimately with the stability of the financial system, in an asymmetric fashion. Policy rate adjustments influence asset and collateral prices which, through the financial accelerator mechanism (see Bernanke and Gertler 1995), may encourage excessive risk-taking behaviour, undermining the goal of financial stability. Asset and collateral prices respond positively to a policy rate cut, especially when perceived to be prolonged, leading to an ease of credit standards which stimulates credit provision and encourages banks and borrowers to take on greater risks. As such, monetary policy transmission via the asset pricing and risk-taking channels may sow the seeds for financial instability (see Borio and Zhu 2012).

Moreover, the standard operations of monetary policy via banks' balance-sheet could affect borrowers' solvency by influencing the external finance premium they face, and consequently the soundness of the financial system. Typically, any rise in banks' funding costs is passed on to their customers in an attempt to maintain stable profit margins, leading to a fall in the supply of loans. Although most bank-dependent borrowers may not be completely excluded from credit, higher cost of borrowing is likely to increase their external finance premium and reduce real activity, while inducing higher default rates. Thus, monetary policy transmission via the traditional credit channel may also lead to financial instability.

In addition, aiming to maintain stable intermediation margins, changes in banks' funding costs also have a direct impact on their risk-taking behaviour. A change in the policy rate does not only affect the inherent risks banks face in performing the asset transformation function, mainly funded by short-term demand deposits while providing long-term typically fixed-rate loans, but also provides them with an incentive to seek riskier ventures to maintain profitability levels at the expense of financial stability. Finally, small open economies may face an added peril through the exchange rate channel, as changes in the policy rate largely determine the direction (and volume) of capital inflows, which can be quite volatile in emerging economies. In turn, fresh capital may be the catalyst for excessive credit growth and increases in leverage, thus counteracting the aim of the initial policy decision (see also Brzoza-Brzezina *et al.* 2017).

Policy interactions via the shared propagation channels could also restrain the effectiveness of monetary policy transmission. For example, in an economic downturn, monetary policymakers' efforts to avert deflationary pressures and stimulate growth by reducing the policy rate could be offset by banking supervisors' decision to raise capital requirements in order to guarantee the resilience of the banking system to economic shocks (see Goodhart and Schoenmaker 1995). The rise in capital requirements in a deflationary economic environment may lead to a reduction of credit supply, exacerbating the adverse economic conditions and counteracting the monetary stimulus promoted by the decrease in interest rates.[3]

Recent theoretical literature studies the interaction between monetary and macroprudential policies, as well as the effect of different institutional arrangements. While some studies find negligible effects of interaction issues on policy outcomes (Beau *et al.* 2014; Aiyar *et al.* 2016), a tentative consensus seems to be emerging regarding the need for better communication and coordination of policies. Indeed, Ueda and Valencia (2014) identify a time-inconsistency problem arising when the central bank has a "dual-mandate" [sic] of both price and financial stability, since the central bank has an incentive to leave inflation unchecked once a financial shock realises, which suggests that it is optimal to separate price and financial stability goals. Moreover, De Paoli and Paustian (2017), Bodenstein *et al.* (2019), Lazopoulos and Gabriel (2019) and Silvo (2019) provide a formal analysis of an array of coordination problems, under commitment and discretion and for a variety of institutional designs and policy instruments, showing that welfare losses can be substantial in cases of non-cooperative strategic interactions. Nonetheless, the full benefits of coordination seem to depend on the fragility of the financial sector and risk-taking (Angeloni and Faia 2013; Collard *et al.* 2017), as well as on the importance policymakers attach on output gap stabilisation (Gelain and Ilbas

3. However, some recent theoretical results suggest that macroprudential policy has a limited impact on inflation outcomes (Suh 2014 and Lazopoulos and Gabriel 2019), as it tends to operate on the decisions of borrowers only, unlike monetary policy, which affects both borrowers and savers.

2017; Levieuge and Garcia-Revelo 2020). Lambertini *et al.* (2013) and Rubio and Carrasco-Gallego (2014), on the other hand, show that even if there is coordination, the different effects these policies have on saving and borrowing decisions lead to heterogeneous welfare implications, thus highlighting the existence of a welfare trade-off between borrowers and savers.

However, no optimal institutional configuration, mandate allocation or policy instrument comes to the fore from these studies, with the overall (and joint) effects of macroprudential and monetary policies largely depending on the type of shock hitting the economy (Angelini *et al.* 2014; Quint and Rabanal 2014; Tayler and Zilberman 2016; Lazopoulos and Gabriel 2019).[4] Naturally, this poses a challenge for institutional arrangements of monetary policy and prudential policy. In the case central banks are in charge of prudential policy, they have to deal with these potentially conflicting goals: controlling inflation at the target levels, while maintaining financial stability. These decisions may depend on the emphasis that is given to financial stability, but the conflict of interest argument implies that central banks may opt for being more flexible in their inflation mandates, when financial stability is at stake. Goodhart and Schoenmaker (1995), among others, argue that central banks responsible for prudential policy have incentives to be particularly attentive to the effects of their interest rate decisions on the profitability and stability of the banking sector.

Against this background, it is therefore argued that an inflation bias may arise in institutional mandates characterised by central banks with supervisory functions, in opposition to an institutional set-up in which banking regulation is assigned to a separate authority. The potential inflation bias stems from a less strict monetary policy stance towards inflation than in the case in which the monetary policymaker is not concerned about financial stability. In this sense, the argument can be stated as follows: countries in which central banks are prudential policymakers will experience higher inflation rates, on average, than countries in which prudential policy is assigned to an agency other than the central bank.

This is largely an empirical question, which we tackle next. Previous studies suggest that there is a degree of inflation bias, with Hasan and Mester (2008), DiNoia and DiGiorgio (1999) and Goodhart and Schoenmaker (1995) finding that countries whose central banks do not have supervisory duties exhibit lower inflation rates. In the same vein, Ioannidou (2005) finds that the Fed relaxes bank supervision when monetary policy is tightened. More recently, Ampudia *et al.* (2019) find that an integrated structure does not seem to be correlated with more price and/or financial instability, but their results are not robust across specifications. However, once we allow for heterogeneous effects, the possibility of common shocks, the use of appropriate controls and a much larger sample, there is no evidence of an inflation bias.

4. Svensson's (2012) comment on Woodford (2012) is symptomatic of how unsettled the debate is.

3. Empirical Strategy

The diversity of the results obtained in the literature suggests that the intricate mix of shocks and policy interactions leads to a variety of macroeconomic outcomes, which perhaps explains the variety of institutional setups of policymaking observed worldwide. In this section, we try to empirically ascertain whether countries with separate institutional mandates experience lower and more stable inflation rates, taking into account some important features that characterise countries' institutional architecture.

3.1. Data

We consider annual time series data for 25 OECD countries over the period 1960-2018. The choice of countries is mostly driven by data availability for the period considered (see Table A.1). Naturally, one could increase the cross-section dimension, but the time span would be shortened considerably. The dependent variable is the annual inflation rate and, in addition to the explanatory variables considered in related empirical literature, a number of other regressors is included in the analysis (see Copelovitch and Singer 2008 and Aisen and Veiga 2006, for example). The group of regressors is divided in four categories: institutional, external, economic and banking structure. Table B.1 in the Appendix provides the definition and data sources for each variable considered in the econometric analysis.

< Table A.1 here >

3.1.1. Institutional Factors. The main variable of interest is *Separate*, representing central banks' mandate in terms of prudential policy and is captured by a dummy that takes the value of 1 if the responsibility of prudential policy (in both micro and macroprudential perspectives) is assigned to an authority independent from the central bank, and the value of 0 if it remains the central bank's responsibility.[5] The classification of institutional mandates by country is also presented in Table A.1, based on information disclosed in the Bank Regulation and Supervision Surveys (2001, 2003, 2007, 2011 and 2019) provided by the World Bank (see Table B.1 for details).[6]

5. The variable *Separate* does not account for whether the separate authority also oversees securities markets and/or insurance companies. Prudential policy is considered to be a responsibility of the European Central Bank for the Euro-area Member States since the introduction of the common currency in 1999 (except for Greece which joined the European Monetary Union in 2001) as national central banks are part of the Euro-system. Even if Euro-area Member States are considered instead to have a separate institutional mandate, the estimation results obtained do not change substantially, as shown in the Supplementary Appendix.

6. The dataset is complemented with other sources, namely the central banks' and supervisory agencies' webpages. The Supplementary Appendix contains more details on the construction of *Separate*.

The evolution of inflation rates and the institutional arrangements in the 25 countries included in our sample is presented in Table A.2. Over the sample period 1960-2018, inflation rates decreased substantially: in 1975, the global sample inflation was 13.5% on average, continuously falling during the 1980s and the 1990s, and stabilising around 2% in the 2000s.

$<$ Table A.2 here $>$

According to our classification, central banks had a dual mandate (for price stability and prudential policy) for two-thirds of the OECD countries in our sample in 1960 while the remaining countries allocated the prudential responsibility of the banking system to an independent authority. This distribution remained stable until the late 1990s, a period in which we observe an increase in the number of countries that have opted to separate prudential responsibilities from the central bank. In the early 2000s, there was a balance in this sample between countries with the two different institutional settings. Over the next decade, separation of mandates became an equally prevailing institutional setting, reaching a peak of 14 countries out of 25 in 2005. Following the 2007 financial crisis, some countries reformed their institutional arrangements by allocating the microprudential responsibility back to the central bank. This tendency is already to some extent reflected in 2015 figures, which illustrate a decrease in the number of countries with separate prudential policy mandates over the last years in the sample. The dataset covers a sufficiently wide time span to allow for some of the countries considered in the sample to change their institutional mandates of prudential policy more than once.[7] For the remaining countries, there is a predominance of jurisdictions that never changed their supervisory arrangements (16 out of 25) and 7 countries introduced reforms during this period. Finally, the reforms entailing a macroprudential oversight of the financial system were also taken into account in the classification of the variable *Separate*, as reported in the Supplementary Appendix.

The insurance of bank deposits in the event of a bank failure is another common pillar of the financial system policy design - currently, most OECD countries and an increasing number of developing countries feature some sort of explicit depositor protection (Demirguc-Kunt *et al.* 2013). A country with an explicit deposit insurance scheme is expected to experience lower average inflation rates - in principle, a central bank can pursue its inflation mandate more aggressively as it is less concerned about the effect of interest rates on banking stability. In our dataset, the deposit insurance variable takes the value of 1 for countries with explicit deposit insurance and 0 otherwise.

In addition, following Cukierman *et al.* (1992), there is a large literature suggesting that the degree of independence of the central bank (thereafter CBI)

7. This is the case for Ireland, which reviewed its banking supervisory institutional arrangement in 2003 and again in 2010, after the subprime crisis; for Luxembourg, which reviewed its supervisory mandate in 1983 and 1999, as well as the United Kingdom, with changes in its financial supervisory structure in 1997 and again in 2013.

has a significant deflationary effect. Moreover, to account for the effects of inflation targeting on inflation behaviour, a dummy variable is introduced taking the value of 1 at the year that a country adopted inflation targeting and onwards, and the value of 0 in the remaining cases. Since this approach pursues an explicit public commitment to control inflation as the primary policy goal, we expect that a country that has adopted inflation targeting will experience lower inflation rates.

We also condition our inflation estimations on an exchange rate regime variable that takes the value of 1 for all varieties of 'hard' fixed exchange rates and 0 for floating or managed floating regimes. Finally, Euro membership is included to control for the Euro-area countries' specific monetary policy mandate and it takes the value of 1 from 1999 onwards for the Euro-area member countries (2001 for Greece) until the inception of the Single Supervisory Mechanism in 2015, and 0 afterwards.

3.1.2. External and Economic Factors. In order to capture the impact of external factors on inflation outcomes, we consider trade openness, trilemma indexes (namely capital account openness, a monetary independence index and an exchange rate stability index), the real effective exchange rate (REER) and oil price changes. Trade openness is measured as the sum of imports and exports as a percentage of GDP - according to Romer (1993), an inverse relation between trade openness and inflation is expected as more open economies benefit from lower inflation, on average. While there is a broad empirical support for this view, Terra (1998) shows that this is mostly driven by the presence of highly indebted countries in the samples used in most studies.

The trilemma indexes are constructed by Aizenman *et al.* (2010), varying between 0 and 1, the latter indicating maximum stability/openness. Similarly to trade openness, empirical evidence shows that higher exchange rate stability and higher financial openness can lower inflation levels, while greater monetary independence leads to higher inflation (Gruben and McLeod 2002, Aizenman *et al.* 2010). In turn, the REER reflects changes in the relative competitiveness of a country. Furthermore, we also control for the fact that energy price hikes may have inflationary effects by using the Brent crude oil price index.[8]

To control for the effect of business cycle conditions on inflation, we include as regressors the output gap, as well as currency and banking crises. The output gap measures the difference between the actual level of national output and the estimated potential level - here, we use the Hamilton filter (Hamilton 2018) to construct this variable.[9] A positive output gap implies upward pressures on inflation. On the other hand, currency and banking crises are dummy variables that take value of 1 whenever the country is experiencing a currency or a banking crisis. The impact

8. To control further for 'imported' inflation, we also considered oil imports as a percentage of GDP, as well as net energy imports as a percentage of energy use, but these variables were seldom significant in our regressions, so we do not report these results.

9. Similar results are obtained if HP-filtered GDP or GDP growth rates are used instead.

of banking crises on inflation depends to a certain extent on the monetary stance that can be maintained during a crisis and whether inflation is kept as the primary policy objective (Garcia-Herrero 1997). Currency crises, on the other hand, may have inflationary consequences.

3.1.3. Banking Sector Factors. In our sample of industrialised countries, there is significant variation in the size of the banking systems. While the weight of the banking system in the total economy has an average around 85%, the variation across countries ranges from 15% to 311%. In order to capture the possible influence of the characteristics of the banking system in each country on inflation outcomes, we control for credit cyclicality. A standardized Credit Gap indicator is published by the BIS, often referred to as the 'Basel Gap', in relation to the activation of Countercyclical Capital Buffer macroprudential measures, introduced by the Basel III accords. We follow Galán (2019), who shows that a modified 'Basel Gap' measure (based on a HP-filter with a smoothing coefficient of 25,000) describes well the cyclical properties of credit-to-GDP for a range of countries and matching semi-structural measures that better capture systemic credit events, when in charge of prudential policy.

It can be argued that central banks with regulatory powers may be more concerned with banking stability in the presence of a large banking system relative to the overall size of the economy, due to the reputation costs stemming from bank distress. In institutional frameworks in which central banks are also in charge of macroprudential policy, a large banking system may aggravate the inflation bias - therefore, we may expect the size of the banking system to have a positive impact on inflation outcomes, since when the banking system contributes to a larger share of the domestic economy, central banks may fear to a greater extent the monetary policy effects on bank stability.

3.2. Model Specifications

Given the nature of our dataset and the well-documented persistence in inflation rates, we resort to the Dynamic Common Correlated Effects (DCCE) estimator of Chudik and Pesaran (2015). While the analysis of macro panel data is still dominated by estimators developed for micro datasets (such as the Arellano-Bond or Blundell-Bond estimators, devised for panels where T is small relative to N), the DCCE estimator is particularly suitable when both the cross-section and the time series dimensions are sufficiently large. Indeed, our sampling period spans over nearly 60 years, which allows us to exploit temporal variation in institutional mandates of prudential policy, in addition to cross-country heterogeneity. This long time span captures several changes in the countries' institutional mandates, with some countries changing their institutional arrangements more than once during this spell.

Unlike standard estimators, a further advantage of the DCCE estimator is that it is robust to unknown types of error cross-section dependence, which is likely to feature due to the presence of common shocks and unobserved components. This is highly relevant in our case, as the last few decades have witnessed increased economic and financial integration that generates strong interdependencies amongst the cross-sectional units in our sample. Indeed, this period captures several macroeconomic and financial cycles, such as the oil shocks in the 1970s, the 'Great Moderation' period and the secular decline in the levels of inflation rates across all countries in our sample, as well as common shocks such as the more recent Great Recession. Left unaccounted for, cross-sectional dependence can lead to severe biases and this problem becomes more acute in dynamic panel settings, as discussed in Phillips and Sul (2007).

Moreover, the DCCE estimator addresses another potential source of inconsistencies that may arise if the slope parameters are falsely assumed to be identical across countries (see Pesaran and Smith 1995). Thus, we control for heterogeneity by first estimating country-specific effects, which are subsequently combined through a mean-group (MG) estimator to obtain estimates of the average effects.

Our choice of a dynamic framework is motivated by the literature on inflation dynamics, which suggests that there is considerable persistence in inflation. In this vein, in order to estimate the relationship between inflation rates and institutional arrangements of prudential regulation, while controlling for variables that are known to affect inflation, we adopt as our baseline specification the following heterogeneous dynamic panel model with a multifactor error structure:

$$\pi_{i,t} = \beta_i Separate_{i,t} + \varphi_i \pi_{i,t-1} + \delta'_{0i}\mathbf{x}_{i,t} + \delta'_{1i}\mathbf{x}_{i,t-1} + u_{i,t} \quad (1)$$

$$u_{i,t} = \alpha_i + \lambda'_i \mathbf{f}_t + e_{i,t} \quad (2)$$

where $\pi_{i,t}$ is the inflation rate for country i in year t, $Separate_{i,t}$ is a binary variable that takes value of 1 if the country is classified as having a separate authority with macroprudential responsibilities at time t and value of 0 otherwise, $\mathbf{x}_{i,t}$ is a k-dimension vector of control variables as described in the previous subsection and assumed to be weakly exogenous, α_i accounts for time-invariant unobserved country specific effects, $\mathbf{f}_t$ is an $m \times 1$ vector of unobserved common factors (capturing common business cycles or exposure to global economic, political or financial shocks, for example) with corresponding country-specific factor loadings λ'_i and $e_{i,t}$ represents the idiosyncratic errors, possibly correlated across countries.[10] Further below, we will also consider a richer 'hybrid' version of the New Keynesian Phillips Curve, in which inflation depends on forcing variables that capture

10. The model above can be easily extended to incorporate $p > 1$ lags of the dependent variable and the regressors, although this has to be balanced against the cost of estimating additional parameters, particularly if k is large. Also, while the vector $\mathbf{x}_{i,t}$ can include variables that are not lagged, the regressors themselves are allowed to feedback on lags of the dependent variable and may depend on $\mathbf{f}_t$ or other specific unobserved factors, which we omit to keep notation simple, see Chudik and Pesaran (2015) for details.

inflationary pressures, as well as on a combination of expected future inflation and lagged inflation, while in section 4.3.2 we study the dynamics of inflation volatility.

This is an extremely flexible specification that, with suitable restrictions on the parameters, encompasses several approaches used in empirical practice, e.g. static and/or (partially) pooled panels, some of which will be considered below. However, these frameworks can lead to biased estimates, particularly in the presence of common unobserved factors, which is likely to be the case in our application.[11]

Consistent estimation of (1)–(2) is carried out with the Dynamic Common Correlated Effects estimator of Chudik and Pesaran (2015), which approximates the unobserved common factors by augmenting the estimation equation with additional terms $\sum_{l=0}^{p_T} \gamma'_{i,l} \overline{\mathbf{z}}_{\mathbf{t}}$ containing cross-section averages $\overline{\mathbf{z}}_{\mathbf{t}} = (\overline{\mathbf{x}}_t, \overline{\pi}_t)$, with $p_T = T^{1/3}$. Mean Group (MG) estimates can then be obtained by averaging estimated coefficients across countries, e.g. $\widehat{\beta}_{MG} = \frac{1}{N} \sum_{i=1}^{N} \widehat{\beta}_i$, with the corresponding standard errors computed non-parametrically following Pesaran and Smith (1995). Although MG-type estimators are likely to produce somewhat larger standard errors than pooled estimators, as a much larger number of parameters is estimated, they are consistent both if slope parameters are homogeneous or if there is slope heterogeneity across countries. Also, given our panel dimension, small sample biases are not a cause for concern, as the Monte Carlo simulations in Everaert and Pozzi (2014), Chudik and Pesaran (2015) and Neal (2015) show.

In addition, we will also consider an IV extension of the DCCE estimator that accommodates the possibility of endogenous regressors (following Everaert and Pozzi 2014 and Neal 2015), as well as the "half-panel jacknife" bias correction method of Dhaene and Jochmans (2015), in which the bias-corrected estimates are obtained as, e.g.

$$\tilde{\beta}_{MG} = 2\widehat{\beta}_{MG} - \frac{1}{2}(\widehat{\beta}^a_{MG} + \widehat{\beta}^b_{MG}) \tag{3}$$

where $\widehat{\beta}^a_{MG}$ is the MG estimate using the first half of the panel $(t = 1, ..., T/2)$, while $\widehat{\beta}^b_{MG}$ uses the second half $(t = T/2 + 1, ..., T)$.

Our main focus is the identification of β. In addition to the assumption of weak exogeneity (which we test below) required by the DCCE estimator, our identification strategy exploits the fact that *Separate* is unlikely to be contemporaneously correlated with ε_t, as changes to institutional arrangements are very infrequent and it is unlikely that they occur in response to short term movements in inflation rates. Moreover, we try to ensure that all other potential sources of variation in inflation are accounted for in $\mathbf{x}_t$ and $\mathbf{f}_t$, thus allowing us to pin down the effect of $Separate$, as explored next.

11. A typical strategy to account for common unobserved factors is to include a common linear trend, but this may be insufficient in most cases, as the factors $\mathbf{f}_t$ need not be linear.

4. Results

4.1. Preliminary Analysis

Given the trends in Table A.2 discussed above, assessing whether or not institutional arrangements affect inflation rates is an empirically relevant question, as the correlation between inflation and our variable $Separate$ is negative (-0.165) and significant. Moreover, a simple regression of inflation rates on $Separate$ (i.e. without extra covariates) delivers a coefficient of -2.306 (p-value of 0.000). Even when fixed effects are taken into account, the estimated coefficient is sizeable (-3.214) and significant (p-value of 0.020). Thus, a crude and cursory analysis suggests the presence of a non-negligible inflation bias, consistent with the idea of a conflict between monetary policy outcomes and the financial stability mandate. However, as explored next, it is crucial to consider other determinants of inflation, while using the appropriate estimation techniques.

We first conduct panel root tests on the non-dummy variables as in Maddala and Wu (1999) and Pesaran (2007), the latter valid in the presence of cross sectional dependence. The results are summarised in Table A.3, showing that, bar a few inconclusive results, all variables appear to be stationary in levels. We then gauge the cross-section correlation properties of the raw data by means of the (pre-estimation) Pesaran (2004) cross-section dependence (CD) test, reported in Table A.4. The results suggest that there is substantial cross-section dependence in the data, therefore using a standard panel estimator that does not control for possible common factors is likely to produce misleading inferences.

$<$ Table A.3 here $>$

$<$ Table A.4 here $>$

We also report estimates using standard static panel estimators (pooled OLS and fixed effects) in Table A.5, using different sets of control variables: the first column of each estimator refers to results using variables for which we have (balanced panel) data for the full sample period, the second column includes all regressors, while the third column displays results for a restricted specification that includes only significant parameters estimates. We consider the latter not only because it is sensible practice, but also because there is substantial variation in the significance of regressors across different specifications, which should be highlighted. Moreover, this attenuates potential efficiency issues due to the high number of estimated parameters. Our main focus is the sign and statistical significance of the coefficient $\widehat{\beta}_{MG}$ associated with the variable *Separate*.

$<$ Table A.5 here $>$

It is noteworthy that the first three columns in Table A.5 essentially replicate the result found in DiNoia and DiGiorgio (1999) and Copelovitch and Singer (2008), i.e. with a simple pooled OLS estimation we find that when the mandate of financial stability is assigned to a separate agency, central banks in our sample are more likely to conduct tighter monetary policies. The effect is large, with a separate institutional arrangement lowering annual inflation by around 1 percentage point, and very significant.[12]

However, when we control for time-invariant unobserved cross-country heterogeneity (such as cultural factors, geographic location, language, etc.) with fixed effects and use heteroskedasticity-robust standard errors, the previous result is much less striking. The point estimates are of the same sign and similar magnitude, and only (weakly) statistically significant in column 6. As for other determinants of inflation, their importance varies considerably across estimators and specifications. The exception is the output gap measure, which, as expected, is one of the main drivers of inflation dynamics in all estimations.

In Table A.5, the influence of central bank independence is substantial (2 to 3 percentage points decrease) and in accordance with previous results in the literature, while it is interesting to register the non-negligible deflationary effect of the existence of a deposit insurance scheme. The same is true for the openness variables (capital and trade), initially correctly signed and significant, while exchange rate movements also have negative effects, as expected. In turn, cyclical fluctuations in credit appear to have only mild positive, but insignificant, effects.

Moving to a fixed effects specification allows us to further scrutinise some of our model identification assumptions. Indeed, following Wooldridge (2010), we can test for the null of strict exogeneity by augmenting the baseline specification with leads (say $t+1$ values) of the desired set of variables and then performing a test of the joint significance of these lead terms. Focusing on the non-dummy variables, such a test returns a p-value of 0.307, so it seems safe to assume that the relevant explanatory variables are exogenous.[13]

Nevertheless, the previous estimations refer to static specifications, which are not adequate for our problem. Thus, we resort to standard dynamic panel estimation in Table A.6, in which lagged Inflation is included as a regressor.[14] We report results from the standard Arellano and Bond (1991) GMM estimator for dynamic panels, as well as the simple two-way fixed effects. As can be seen, the introduction of a lag in the dependent variable changes the results substantially: indeed, the coefficient on *Separate* is now smaller in magnitude and, most importantly, statistically

12. Unlike Copelovitch and Singer (2008), we do not use inflation rates in logs, as our sample contains negative values for this variable.

13. Recall that for the DCCE estimator we require $\mathbf{x}_{i,t}$ in (1) to be weakly exogenous, which naturally is implied by the stronger assumption of strict exogeneity.

14. As an additional robustness check and for all model variants discussed here, we conducted estimations with regressors lagged by one period in order to minimise potential endogeneity issues. Results are qualitatively similar, as reported in the Supplementary Appendix.

insignificant. In turn, the coefficient on *Inflation*$_{t-1}$ is large and quite significant.[15] It is also interesting to note that the results are remarkably similar across both estimators, which suggests that the time series dimension in our sample is likely to attenuate the small T bias usually associated with dynamic panel specifications. However, one should be cautious interpreting these estimates, as there is strong evidence of cross-correlation in the errors (with clear rejections of the null of cross-section independence), which might invalidate the analysis. Thus, we consider next estimators that account for both parameter heterogeneity and common correlated effects.

$<$ Table A.6 here $>$

4.2. Dynamic Heterogenous Panel Estimations

We have seen that lagged inflation is likely to have an important role, as described in (1)–(2), so we now turn to DCCE estimation as in Chudik and Pesaran (2015), which also allows for slope heterogeneity. As alluded to above, it is necessary to add sufficiently long lags of cross-section averages to ensure consistency of the estimator, but specifying longer lags than necessary can lead to estimates with poor small sample properties. Our strategy is to allow up to $p^T = T^{1/3}$ lags whenever possible, but given the dimension of the set of regressors, this will not always be feasible, in which case we use either 1 or 2 lags to help reduce the possible adverse effects of data mining.

$<$ Table A.7 here $>$

Table A.7 reports results for the DCCE estimator. The first three columns refer to results where no lags of regressors are included, whereas columns 5 to 7 allow for one lag of some explanatory variables. Columns 4 and 8 report results using the Dhaene and Jochmans (2015) jacknife estimator described in Section 3.2.[16]

First, we note that allowing for coefficient heterogeneity affects the previous results, particularly when compared to those of Table A.5. Indeed, the coefficient associated with *Separate* is estimated to be much smaller and always insignificant, with the sign depending on the particular specification. Second, when the full set of regressors is used (columns 2 and 6), estimation tends to be occasionally more imprecise, which is consistent with the degrees of freedom problem mentioned before. However, when a general-to-specific approach is employed, a much clearer picture emerges, with the output gap, exchange rates and the presence of a deposit insurance scheme appearing to be the main drivers of inflation. Third,

15. Using the lag selection methods of Han *et al.* (2016), we find that the optimal lag is 2, but these methods are devised for pure autoregressive panels. Using an additional lag in our estimations does not change the results qualitatively.

16. For simplicity and to save space, we only report jacknife estimates for the restricted specifications, the results being similar for the unrestricted cases.

the DCCE procedure controls for cross-correlation in the error term using cross-section averages and it does so quite effectively, as implied by the results of the CD test, with the null of cross-sectionally independent residuals not being rejected, thus suggesting that our model is doing a reasonable job at capturing the main features of inflation dynamics. Finally, it is also noteworthy that the jacknife bias correction appears to be minimal, indicating that the DCCE results appear to be reliable. Thus, all in all, the estimation results support the view that there is no evidence of a significant impact of the institutional arrangements for monetary and microprudential and macroprudential policies on inflation outcomes.

We conduct one further important check. The literature on inflation dynamics, and in particular the so-called New Keynesian Phillips Curve, has emphasised the role that expectations about *future* inflation has on current inflation. The empirical evidence suggests that a 'hybrid' version of the Phillips Curve, combining expected future inflation and lagged inflation, provides a good characterization of inflation dynamics (see Gali and Gertler 1999 and Mavroeidis *et al.* 2014, for example). This is encapsulated in the following modification of (1) as

$$\pi_{i,t} = \beta_i Separate_{i,t} + \varphi_i^F E_t \pi_{i,t+1} + \varphi_i^B \pi_{i,t-1} + \delta'_{0i}\mathbf{x}_{i,t} + \delta'_{1i}\mathbf{x}_{i,t-1} + u_{i,t} \quad (4)$$

where E_t denotes (conditional) expectations formed at time t. In the absence of well-measured expectations on inflation for all countries in our sample, the usual practice is to replace the term $E_t \pi_{i,t+1}$ with actual observed values, which introduces potential endogeneity issues through an additional expectational error. Thus, in order to estimate (4), we should resort to instrumental variable estimation. Extending the DCCE estimator of Chudik and Pesaran (2015) to IV/GMM estimation is relatively straightforward, as discussed in Neal (2015) (see also Everaert and Pozzi 2014).

$<$ Table A.8 here $>$

Table A.8 contains the results for the IV extension of the DCCE estimator, for both the baseline specification (1)–(2) and the 'hybrid' version in (4), with Newey-West standard errors and up to 2 lags of the variables as instruments. Results for the Kleibergen-Paap underidentification test suggest that all instruments used are relevant.[17] Overall, the main conclusion regarding the insignificance of the *Separate* variable is not altered. As in Table A.7, the real exchange rate, as well as the exchange rate stability index, are found to be significant and positive in both the baseline and 'hybrid' specifications. On the other hand, the presence of explicit deposit insurance schemes lowers inflation rates by 0.7 to 1.5 percentage points. Interestingly, both 'forward-looking' and 'backward-looking' effects (captured by φ_i^F and φ_i^B, respectively) seem to be present, though of a slightly lower magnitude

17. Weak-instrument-robust inference is not yet developed for the DCCE estimator, but typically weak-IV robust standard errors are larger than standard ones, so it is unlikely that our conclusions regarding the statistical significance of the *Separate* variable would be overturned.

than reported in the literature (focusing mainly on US quarterly data, it should be noted). Although the backward-looking term is larger, no effect seems to clearly dominate, which is consistent with recent results in the literature (see Mavroeidis *et al.* 2014).

4.3. Additional Checks

We considered a number of robustness checks to ensure our results hold in several different settings. Namely, we use alternative classifications of the *Separate* variable for countries for which there is some ambiguity about the institutional arrangements. Moreover, we carry out sub-sample analysis in order to test whether the 2008 crisis has had an effect on the empirical findings obtained, given that it motivated the reformulation of the institutional setups of prudential policy in several countries. Furthermore, we also obtained pooled estimates for the *Separate* variable while allowing for parameter heterogeneity in the other regressors.[18]

Next, we consider additional checks that complement our main findings along several distinct dimensions. First, we explore interactions of *Separate* with other variables that may amplify the effect of institutional arrangements. Second, we consider the potential effects of separate mandates on inflation volatility as an additional measure of monetary policy performance. We then turn our attention to policy preferences instead of outcomes, exploring an index for central bank relative aversion to inflation. Finally, we use alternative and slightly more refined measures of supervisory arrangements.

4.3.1. Estimation with interactions. It may be argued that the influence of *Separate* is conditional on other institutional arrangements, such as the degree of central bank independence, the exchange rate regime and the size of the banking sector. In addition, a central bank, even if not officially in charge of financial stability, might be undertaking macroprudential policy indirectly via output stabilization - more specifically, the monetary authority would be reacting to both output and credit gaps.[19]

Thus, interacting *Separate* with output or credit gaps allows us to pick up some of these possible additional effects, in particular whether or not institutional policy arrangements affect the inflation-gap(s) trade-offs. We test this possibility by considering the most favourable scenario for this hypothesis, i.e. ignoring any dynamics in inflation and omitting the output gap as the forcing variable. As can be seen in Table A.9, none of the interaction terms is significant and, moreover,

18. These results are available in the Supplementary Appendix and they support our main finding that the separation of monetary and prudential policy does not have a significant effect on inflation outcomes.

19. Note that if we assume a policy trade-off between price stability and output stabilization (as discussed in Silvo 2019, for example), a higher weight on output stabilization potentially leads to inflation bias, an effect that is indeed consistent with that of a combined regime.

do not affect the significance of *Separate* on its own (results are similar for the dynamic and hybrid cases and if we include the additional controls).

< Table A.9 here >

4.3.2. Inflation volatility and Policy Mandates. Price stability is associated with both low and *stable* levels of inflation. While our previous results suggest that different institutional arrangements have little bearing on inflation levels, it is important to assess whether or not central banks focusing only on price stability are more successful in achieving lower inflation volatility. To empirically appraise this, we adapt (1) by using inflation volatility, denoted by σ_π^2, as the dependent variable:

$$\sigma_{\pi,t}^2 \quad = \quad \beta_i^* Separate_{i,t} + \varphi_i \sigma_{\pi,t-1}^2 + {\delta^*}'_{0i}\mathbf{x}_{i,t} + {\delta^*}'_{1i}\mathbf{x}_{i,t-1} + u_{i,t} \qquad (5)$$

In practice, we approximate σ_π^2 by computing inflation's standard deviation over a 5-year rolling-window.[20] If this implicit upshot from the inflation bias argument holds, then we would expect β^* to be negative and statistically significant. Yet, as results in Table A.10 reveal, the effect of mandates separation is not statistically significant. To save space, the first panel of Table A.10 reports estimates without additional controls, while the second panel includes all the controls. In all cases (bar Pooled in the first panel), estimations indicate that the effect of *Separate* is mostly correctly signed, but never significant. Notably, we observe that volatility is quite persistent and that several variables contribute to its dynamics - again, we see the stabilising effects of the existence of a Deposit Insurance scheme and the relevance of open economy channels.

< Table A.10 here >

4.3.3. Central Bank Preferences and Policy Mandates. Thus far we have concentrated on studying the potential impact on inflation *outcomes* of different institutional arrangements regarding prudential and monetary policies. An alternative and, to a large extent, complementary view is to take into account the regulator's preferences, as outcomes may not always be under complete control of the policymaker (see Krause and Méndez 2008 and Levieuge *et al.* 2019, for example). Although the focus shifts from outcomes to policy *intentions*, this is a useful angle to pursue, given the discussion in section 2 regarding potential incentives for central banks to be more accommodative with respect to inflation.

To do so, we employ the measure of central bank conservatism (*CBC*) proposed by Levieuge and Lucotte (2014) and refined by Levieuge *et al.* (2019), based on the relative importance of price and output volatilities, σ_π^2 and σ_y^2, respectively. The index is bounded between 0 and 1, the latter indicating maximum conservatism

20. Alternatively, one can also fit a GARCH model to inflation and retrieve $\hat{\sigma}_\pi^2$ - the results are qualitatively similar.

with respect to inflation, and is trigonometrically defined as

$$CBC_t = \frac{1}{90}\left[atan\left(\frac{\hat{\sigma}^2_{y,t}}{\hat{\sigma}^2_{\pi,t}}\right) \times \frac{180}{pi}\right] \tag{6}$$

capturing the angle at each point of the Taylor curve, where, as above, $\hat{\sigma}^2_{y,t}$ and $\hat{\sigma}^2_{\pi,t}$ are computed using a 5-year rolling window (see Levieuge *et al.* 2019 for details). Then, similarly to the inflation outcomes specifications, we estimate

$$CBC_{i,t} = \beta_i^{**}Separate_{i,t} + \gamma_i^{**}CBC_{i,t-1} + \delta'^{**}{}_{0i}\mathbf{x}_{i,t} + \delta'^{**}{}_{1i}\mathbf{x}_{i,t-1} + u^{**}_{i,t} \tag{7}$$

$$u^{**}_{i,t} = \alpha_i^{**} + \lambda'^{**}{}_i\mathbf{f}_t + e^{**}_{i,t} \tag{8}$$

in which we control for persistence in central banks preferences by including a lag of CBC_t (estimations with additional lags of CBC_t lead to similar results). If the inflation bias hypothesis is correct, we would expect β^{**} to be positive and statistically significant, i.e. central banks focusing only on monetary policy (i.e. *Separate* $= 1$) would display a larger degree of inflation-aversion, while central banks who are also in charge of financial supervision (i.e. *Separate* $= 0$) would be more accommodative.

$<$ Table A.11 here $>$

However, results in Table A.11 suggest that, as with the inflation outcomes results, there is no evidence of a relationship between central bank conservatism and mandate separation. With the exception of Arellano-Bond GMM results in the first panel (which provide the most favourable scenario for the significance of *Separate*), indicating a mild positive effect of *Separate* at the 10% significance level, all other estimates are consistent with our previous findings. Nevertheless, it is interesting to notice that there is indeed a substantial and highly significant degree of persistence in central banks' preferences, with the Credit Gap and several 'openness' variables appearing to shape the degree of inflation aversion.

4.3.4. Alternative Institutional Architecture Measures. While we examined alternative classifications to account for some less clear-cut arrangements, we acknowledge that the *Separate* binary grading is admittedly too coarse to allow us for a more nuanced analysis. Thus, we consider two additional measures that provide ancillary information regarding institutional arrangements concerning monetary and macroprudential mandates.

First, we make use of the *Banking Supervision* measure used by Abiad *et al.* (2008) in their index of financial reform. One of the dimensions of this index is prudential regulation and supervision of the banking sector, the authors looking at: i) to what extent the banking supervisory agency is independent from the executive's influence, ii) if a country adopt risk-based capital adequacy ratios, iii) whether certain financial institutions are exempt from supervisory oversight, and iv) how effective on-site and off-site examinations of banks are. The *Banking Supervision* measure is then constructed, with scores ranging from zero (the highest degree of ‘repression’) to three (full liberalization). The dataset covers reforms from 1973 to 2005, thus only a fraction of the period we consider above. Note also that this measure is focused more on microprudential aspects of banking supervision implementation and less so on mandates’ allocation, therefore complementing rather than replacing our institutional classification through *Separate*.

Second, we employ the Central Bank Involvement in Supervision (CBIS) index of Masciandaro and Romelli (2018), a broad measure attempting to capture the different degrees of involvement in financial sector supervision, in particular to what extent countries adopt a unified financial supervision framework inside the central bank, including financial and insurance markets.[21] The CBIS index distinguishes six levels of supervisory involvement:

- All financial sector supervision within the central bank (6 points)
- Banking and securities markets supervision within the central bank (5 points)
- Banking and insurance sectors supervision within the central bank (4 points)
- Only banking supervision within the central bank (3 points)
- Banking supervision shared between the central bank and another authority (2 points)
- Central bank not involved in supervision (1 point)

Although this index provides a higher level of detail compared to the dichotomic nature of our *Separate* variable, its coverage is limited to the period 1996 to 2013.[22] Nevertheless, it is useful to explore the relationship between the CBIS index and inflation outcomes.

$<$ Table A.12 here $>$

Table A.12 shows estimations when *Banking Supervision* and the CBIS index replace *Separate* in our estimations. Given that the sample size is smaller, we also report estimates using standard estimators such as pooled regressions, fixed effects and Arellano-Bond-type GMM in addition to DCCE estimates. The first two panels in Table A.12 report estimates for inflation as the dependent variable, whereas the bottom panels have results for inflation volatility (to save space and for convenience, we omit estimates of additional regressors). As can be observed, *Banking Supervision* is significant in explaining inflation levels and volatility when standard estimators are employed, but, crucially, not when we take into account cross-section dependence and slope heterogeneity. This, in essence, is analogous to the conclusions of the preceding section. Furthermore, estimations using the CBIS index indicate that this variable is never significant in explaining inflation outcomes, thus reinforcing our main interpretation.

21. Masciandaro and Romelli (2018) focus on explaining the evolution of the role of central banks as supervisors, finding that systemic banking crises and peer effects drive supervisory reforms.

22. Reassuringly, its correlation with *Separate* is reasonably large, at 0.64.

5. Conclusions

The paper investigates the implications that the delegation of microprudential and macroprudential policy has on macroeconomic outcomes, with a focus on price stability, using a data set comprising 25 OECD countries from 1960 to 2018. We improve upon existing literature by adopting a more appropriate dynamic macro-panel data approach that allows for cross-country heterogeneities as well as global unobserved drivers of inflation. Contrary to previous empirical evidence, our estimation results for all relevant specifications show that separation of prudential regulation from the central bank does not have a statistically significant impact on inflation. As such, no evidence was found to suggest that the additional mandate of financial stability restrains central banks in the conduct of monetary policy or that it gives rise to an inflation bias. In addition to possible complementarities in the pursuit of stabilisation policies, it is reasonable to argue that central banks are always concerned with the stability of the banking system, independently of the assigned mandates, since distress in the banking sector may disrupt the transmission channels of monetary policy impairing its effectiveness.

Controlling for cross-section dependence with CCE-type estimators generally decreases the measured contribution of the control variables in explaining the dynamics of inflation. This is likely to be the case because the error term is characterised by cross-sectional dependence that may, to a large extent, be driven by common international cyclical components and common shocks. Thus, when using DCCE estimators, we are gauging the (smaller) impact of the driving variables on inflation dynamics purged of common global factors. This perhaps explains why an institutional feature such as central bank independence, usually associated with the decline in inflation levels, is seldom significant in our estimations. Equally, our results suggest that variables controlling for the occurrence of currency and banking crises appeared to have had a less significant impact on inflation in industrialised countries.[23] On the other hand, economic factors such as the output gap and openness variables (measures related to exchange rate regimes, as well as trade and capital openness) stand out in terms of the magnitude of their impact on inflation.

It could be argued that a possible explanation for our main result is the low variability of the *Separate* variable relative to inflation rates. Nevertheless, our findings indicate that there are other features of the monetary and financial supervisory architecture that display similar variability and yet may play a role in maintaining inflation rates in low levels, thereby contributing for the stability of the economy. Indeed, some of our results underline the importance of the establishment of deposit insurance schemes in determining lower levels of inflation rates. This implies that a central bank can be more aggressive in their inflation mandate

23. Note also that the occurrence of banking and currency crises is not very frequent during the period considered here, as the countries in our sample generally have more mature banking systems.

when deposits are protected by these insurance systems, suggesting that deposit insurance schemes can be seen not only as an important institutional pillar in enhancing public confidence and fostering financial stability, but also in contributing to attaining the goal of price stability.

Although no evidence was found to associate inflation bias with the institutional structure for the countries in our sample, other concerns (such as 'reputation risks' and 'organisational costs') may pose higher challenges for central banking. Recent reforms to assign an explicit financial stability mandate to monetary authorities (via macroprudential responsibilities) may imply new sources of conflicts with monetary policy. In this new environment for policymaking, the most important challenge for central banks is to avoid severe disruptions in the banking system or regulatory capture by the banking industry as they damage its reputation as a monetary policymaker. In order to accomplish such an outcome, as Svensson (2012) and Smets (2014) amongst others argue, price stability should remain the ultimate goal for central banks, while financial stability should be a secondary objective.

Note also that we focused solely on the effects of policymaking institutional structure on inflation outcomes, i.e. on the effectiveness of monetary policy. It would also be interesting to understand the impact of different institutional configurations on macroprudential outcomes. However, financial stability does not have an established definition nor a widely accepted outcome measure, as several variables have been suggested in the literature as indicators of financial distress policymakers should respond to such, as credit spreads, credit growth, leverage ratios, or systemic risk indicators. As more data becomes available, this is certainly a topic worth exploring.

References

Abiad, A., E. Detragiache, and T. Tressel (2008). "A New Database of Financial Reforms." IMF Working Paper 08/266, International Monetary Fund.

Aisen, A. and F. J. Veiga (2006). "Does Political Instability Lead to Higher Inflation? A Panel Data Analysis." *Journal of Money, Credit and Banking*, 38, 1379–1389.

Aiyar, Shekhar, Charles W. Calomiris, and Tomasz Wieladek (2016). "How does credit supply respond to monetary policy and bank minimum capital requirements?" *European Economic Review*, 82, 142–165.

Aizenman, J., M. D. Chinn, and H. Ito (2010). "Assessing the Emerging Global Financial Architecture: Tracing and Evaluating the New Patterns of the Trilemma's Configurations." *Journal of International Money and Finance*, 29, 615–641.

Ampudia, Miguel, Thorsten Beck, Andreas Beyer, Jean-Edouard Colliard, Agnese Leonello, Angela Maddaloni, and David Marques-Ibanez (2019). "The architecture of supervision." Working Paper Series 2287, European Central Bank.

Angelini, Paolo, Stefano Neri, and Fabio Panetta (2014). "The Interaction between Capital Requirements and Monetary Policy." *Journal of Money, Credit and Banking*, 46, 1073–1112.

Angeloni, I. and E. Faia (2013). "Capital regulation and monetary policy with fragile banks." *Journal of Monetary Economics*, 60, 311–324.

Arellano, M. and S. Bond (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies*, 58, 277–97.

Arnone, M. and D. Romelli (2013). "Dynamic central bank independence indices and inflation rate: A new empirical exploration." *Journal of Financial Stability*, 9, 385–398.

Beau, Denis, Christophe Cahn, Laurent Clerc, and Benoît Mojon (2014). "Macro-Prudential Policy and the Conduct of Monetary Policy." In *Macroeconomic and Financial Stability: challenges for Monetary Policy*, *Central Banking, Analysis, and Economic Policies Book Series*, vol. 19, edited by Sofía Bauducco, Lawrence Christiano, and Claudio Raddatz, chap. 9, pp. 273–314. Central Bank of Chile.

Bernanke, Ben S. and Mark Gertler (1995). "Inside the Black Box: The Credit Channel of Monetary Policy Transmission." *Journal of Economic Perspectives*, 9, 27–48.

Bodea, Cristina and Raymond Hicks (2015). "Price Stability and Central Bank Independence: Discipline, Credibility, and Democratic Institutions." *International Organization*, 69, 35–61.

Bodenstein, M., L. Guerrieri, and J. LaBriola (2019). "Macroeconomic Policy Games." *Journal of Monetary Economics*, 101, 64–81.

Borio, Claudio and Haibin Zhu (2012). "Capital regulation, risk-taking and monetary policy: A missing link in the transmission mechanism?" *Journal of Financial Stability*, 8(4), 236–251.

Bowdler, C. and L. Nunziata (2006). " Trade Openness and Inflation Episodes in the OECD." *Journal of Money, Credit and Banking*, 38, 553–563.

Brzoza-Brzezina, Michał, Marcin Kolasa, and Krzysztof Makarski (2017). "Monetary and macroprudential policy with foreign currency loans." *Journal of Macroeconomics*, 54(B), 352–372.

Chinn, M. D. and H. Ito (2008). "A new measure of financial openness." *Journal of Comparative Policy Analysis*, 10, 309–322.

Chudik, A. and M. H. Pesaran (2015). "Common correlated effects estimation of heterogeneous dynamic panel data models with weakly exogenous regressors." *Journal of Econometrics*, 188, 393–420.

Collard, Fabrice, Harris Dellas, Behzad Diba, and Olivier Loisel (2017). "Optimal Monetary and Prudential Policies." *American Economic Journal: Macroeconomics*, 9, 40–87.

Copelovitch, Mark S. and David A. Singer (2008). "Financial Regulation, Monetary Policy, and Inflation in the Industrialized World." *The Journal of Politics*, 70, 663–680.

Courtis, Neil (2011). *How Countries Supervise their Banks, Insurers and Security Markets 2011*. Central Banking Publications.

Cukierman, A., S.B. Webb, and B. Neyapti (1992). "Measuring the independence of Central Banks and its effect on policy outcomes." *World Bank Economic Review*, 6, 353–398.

Dalla Pellegrina, L., D Masciandaro, and R. V. Pansini (2013). "The central banker as prudential supervisor: Does independence matter?" *Journal of Financial Stability*, 9, 415–427.

Darvas, Z. (2012). "Real effective exchange rates for 178 countries: a new database." Working paper 2012/06, Bruegel.

De Paoli, Bianca and M. Paustian (2017). "Coordinating Monetary and Macroprudential Policies." *Journal of Money, Credit and Banking*, 49, 319–349.

Demirguc-Kunt, A., E. Kane, and L. Laeven (2013). "Deposit Insurance dataset." Policy Research Working Paper 6934, World Bank.

Dhaene, G. and K. Jochmans (2015). "Split-panel jackknife estimation of fixed-effect models." *Review of Economic Studies*, 82, 991–1030.

DiNoia, Carmine and Giorgio DiGiorgio (1999). "Should Banking Supervision and Monetary Policy Tasks be Given to different Agencies?" *International Finance*, 2, 361–378.

Doumpos, Michael, Chrysovalantis Gaganis, and Fotios Pasiouras (2015). "Central Bank Independence, Financial Supervision Structure and Bank Soundness: An Empirical Analysis Around the Crisis." *Journal of Banking and Finance*, 61, s69–s83.

Everaert, G. and L. Pozzi (2014). "The predictability of aggregate consumption growth in OECD countries: a panel data analysis." *Journal of Applied Econometrics*, 29, 431–453.

Galán, Jorge E. (2019). "Measuring Credit-to-GDP Gaps: The Hodrick-Prescott Filter Revisited." Documentos Ocasionales 1906, Banco de España.

Galán, Jorge E. and J. Mencía (2018). "Empirical Assessment of Alternative Structural Methods for Identifying Cyclical Systemic Risk in Europe." Documento de Trabajo 1825, Banco de España.

Gali, Jordi and Mark Gertler (1999). "Inflation dynamics: A structural econometric analysis." *Journal of Monetary Economics*, 44, 195–222.

Garcia-Herrero, A. (1997). "Monetary impact of a banking crisis and the conduct of monetary policy." International Monetary Fund, Working Paper No 97/124.

Garriga, A. C. (2016). "Central Bank Independence in the World: A New Dataset." *International Interactions*, 42, 849–868.

Gelain, Paolo and Pelin Ilbas (2017). "Monetary and macroprudential policies in an estimated model with financial intermediation." *Journal of Economic Dynamics and Control*, 78(Supplement C), 164–189.

Goodhart, Charles and Dirk Schoenmaker (1995). "Should functions of Monetary Policy and Banking Supervision be Separated?" *Oxford Economic Papers*, 47, 539–560.

Gruben, W. C. and D. McLeod (2002). "Capital account liberalization and inflation." *Economic Letters*, 77, 221–225.

Hamilton, James D. (2018). "Why You Should Never Use the Hodrick-Prescott Filter." *Review of Economics and Statistics*, 100, 831–843.

Han, C., P. C. B. Phillips, and D. Sul (2016). "Lag length selection in panel autoregression." *Econometric Reviews*, 36, 225–240.

Hasan, I. and L. Mester (2008). "Central bank institutional structure and effective central banking: cross-country empirical evidence." *Comparative Economic Studies*, 50, 620–645.

Ilzetzki, E., C. M. Reinhart, and K. S. Rogoff (2019). "Exchange Rate Arrangements Entering the 21^{st} Century: Which Anchor Will Hold?" *Quarterly Journal of Economics*, 134, 599–646.

Ioannidou, Vasso (2005). "Does monetary policy affect the central bank's role in bank supervision?" *Journal of Financial Intermediation*, 14, 58–85.

Krause, S. and F. Méndez (2008). "Institutions, arrangements and preferences for inflation stability: Evidence and lessons from a panel data analysis." *Journal of Macroeconomics*, 30, 282–307.

Laeven, Luc and Fabian Valencia (2018). "Systemic Banking Crises Revisited." IMF Working Paper 18/206, International Monetary Fund.

Lambertini, Luisa, Caterina Mendicino, and Maria Punzi (2013). "Leaning against boom-bust cycles in credit and housing prices." *Journal of Economic Dynamics and Control*, 37(8), 1500–1522.

Lang, J. H. and P. Welz (2018). "Semi-Structural Credit Gap Estimation." Working Paper Series 2194, European Central Bank.

Lazopoulos, I. and V. J. Gabriel (2019). "Policy Mandates and Institutional Architecture." *Journal of Banking and Finance*, 100, 122–134.

Levieuge, G. and Y. Lucotte (2014). "A Simple Empirical Measure of Central Banks' Conservatism." *Southern Economic Journal*, 81, 409–434.

Levieuge, G., Y. Lucotte, and Pradines-Jobet. F. (2019). "Central banks' preferences and banking sector vulnerability." *Journal of Financial Stability*, 40, 110–131.

Levieuge, Grégory and Jose David Garcia-Revelo (2020). "When could macroprudential and monetary policies be in conflict?" LEO Working Papers 20-05, University of Orléans.

Lim, Cheng Hoon, Ivo Krznar, Fabian Lipinsky, Akira Otani, and Xiaoyong Wu (2013). "The Macroprudential Framework; Policy Responsiveness and Institutional Arrangements." IMF Working Papers 13/166, International Monetary Fund.

Maddala, G. S and S. Wu (1999). "A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test." *Oxford Bulletin of Economics and Statistics*, 61(S1), 631–652.

Masciandaro, D. and D. Romelli (2018). "Central bankers as supervisors: Do crises matter?" *European Journal of Political Economy*, 52, 120–140.

Masciandaro, D. and A. Volpicella (2016). "Macro prudential governance and central banks: Facts and drivers." *Journal of International Money and Finance*, 61, 101–119.

Masciandaro, Donato (2009). "Politicians and financial supervision unification outside the central bank: Why do they have it?" *Journal of Financial Stability*, 5, 124–146.

Masciandaro, Donato (2020). "What Bird is That? Central Banking and Monetary Policy in the Last Forty Years." *SSRN Electronic Journal*.

Mavroeidis, S., M. Plagborg-Moller, and J. H. Stock (2014). "Empirical Evidence on Inflation Expectations in the New Keynesian Phillips Curve." *Journal of Economic Literature*, 52, 124–188.

Neal, T. (2015). "Estimating Heterogeneous Coefficients in Panel Data Models with Endogenous Regressors and Common Factors." Manuscript.

Òscar Jordà, Moritz Schularick, and Alan M. Taylor (2017). "Macrofinancial History and the New Business Cycle Facts." In *NBER Macroeconomics Annual 2016*, vol. 31, edited by Martin Eichenbaum and Jonathan A. Parker. University of Chicago Press.

Pesaran, M. H. (2004). "General Diagnostic Tests for Cross Section Dependence in Panels." Manuscript.

Pesaran, M. H. (2007). "A simple panel unit root test in the presence of cross-section dependence." *Journal of Applied Econometrics*, 22, 265–312.

Pesaran, M. H. and R. P. Smith (1995). "Estimating long-run relationships from dynamic heterogeneous panels." *Journal of Econometrics*, 68, 79–113.

Phillips, P. C. B. and D. Sul (2007). "Bias in dynamic panel estimation with fixed effects, incidental trends and cross section dependence." *Journal of Econometrics*, 137, 162–188.

Popper, H., A. Mandilaras, and G. Bird (2013). "Trilemma stability and international macroeconomic archetypes." *European Economic Review*, 64, 181–193.

Quint, D. and P. Rabanal (2014). "Monetary and macroprudential policy in an estimated DSGE model of the euro area." *International Journal of Central Banking*, 10, 169–236.

Romelli, Davide and Marco Arnone (2013). "Dynamic Central Bank Independence Indices and Inflation Rate: A New Empirical Exploration." *Journal of Financial Stability*, 9, 385–398.

Romer, D. (1993). "Openness and Inflation: Theory and Evidence." *Quarterly Journal of Economics*, 108, 869–903.

Rubio, Margarita and José A. Carrasco-Gallego (2014). "Macroprudential and monetary policies: Implications for financial stability and welfare." *Journal of Banking and Finance*, 49(Supplement C), 326–336.

Silvo, Aino (2019). "The Interaction of Monetary and Macroprudential Policies." *Journal of Money, Credit and Banking*, 51, 859–894.

Smets, Frank (2014). "Financial Stability and Monetary Policy: How Closely Interlinked?" *International Journal of Central Banking*, 10, 263–300.

Suh, Hyunduk (2014). "Dichotomy between macroprudential policy and monetary policy on credit and inflation." *Economics Letters*, 122, 144–149.

Svensson, Lars (2012). "Comment on Michael Woodford, "Inflation targeting and financial stabiilty"." *Sveriges Riksbank Economic Review*, 1, 33–39.

Tayler, William J. and Roy Zilberman (2016). "Macroprudential regulation, credit spreads and the role of monetary policy." *Journal of Financial Stability*, 26(Supplement C), 144–158.

Terra, C. (1998). "Openness and Inflation: A New Assessment." *Quarterly Journal of Economics*, 113, 641–648.

Ueda, K. and Fabián Valencia (2014). "Central bank independence and macroprudential regulation." *Economics Letters*, 125, 327–330.

Woodford, Michael (2012). "Inflation Targeting and Financial Stability." NBER Working Papers 17967, National Bureau of Economic Research, Inc.

Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT Press.

Appendix A: Tables

Countries	**Combined Mandate** ($Separate = 0$)	**Separate Mandate** ($Separate = 1$)
Australia	1960-1997	1998-2018
Austria	1960-2018	-
Belgium	2011-2018	1960-2010
Canada	-	1960-2018
China	1960-2002	2003-2018
Denmark	-	1960-2018
Finland	-	1960-2018
France	1960-2018	-
Germany	1960-2018	-
Greece	1960-2018	-
Iceland	1960-1998 / 2011-2018	1999-2010
Ireland	1960-2002 / 2010-2018	2003-2009
Italy	1960-2018	-
Japan	1960-1997	1998-2018
Luxembourg	1983-1997	1960-1982 / 1998-2018
Netherlands	1960-2018	-
New Zealand	1960-2018	-
Norway	-	1960-2018
Portugal	1960-2018	-
Singapore	1960-2018	-
Spain	1960-2018	-
Sweden	-	1960-2018
Switzerland	-	1960-2018
United Kingdom	1960-1997 / 2013-2018	1998-2012
United States	1960-2018	-

Table A.1. Countries classification - separate and combined mandates

Year	Separate Bank. Superv.	Combined Mandates	Inflation Rate (average)
1960	8	17	1.9%
1965	8	17	4.2%
1970	8	17	5.1%
1975	8	17	13.5%
1980	8	17	13.4%
1985	7	16	8.0%
1990	7	17	6.1%
1995	7	17	3.3%
2000	12	13	2.5%
2005	14	11	2.1%
2010	13	12	1.9%
2015	10	15	2.2%

Table A.2. Mandates of prudential policy and average inflation for 25 countries

Maddala-Wu statistic						
Lags	Inflation	Openness	Oil Imports	Output Gap	Credit Gap	REER
0	104.534	74.669	99.965	762.733	86.827	65.357
	(0.000)	(0.013)	(0.000)	(0.000)	(0.001)	(0.071)
1	136.452	82.160	104.762	1028.207	293.065	134.952
	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)
2	77.196	51.420	100.747	715.167	194.807	108.079
	(0.008)	(0.418)	(0.000)	(0.000)	(0.000)	(0.000)
3	78.399	45.276	94.835	728.221	223.079	102.632
	(0.006)	(0.663)	(0.000)	(0.000)	(0.000)	(0.000)
4	57.931	34.206	98.8411	661.846	187.606	85.196
	(0.206)	(0.957)	(0.000)	(0.000)	(0.000)	(0.001)

Pesaran Zt-bar statistic						
Lags						
0	−13.127	−1.401	−0.189	−22.333	−0.465	−2.289
	(0.000)	(0.081)	(0.425)	(0.000)	(0.321)	(0.011)
1	−13.119	−2.807	−0.399	−22.239	−7.843	−5.534
	(0.000)	(0.003)	(0.345)	(0.000)	(0.000)	(0.000)
2	−11.165	−1.728	−1.117	−20.596	−4.078	−3.942
	(0.000)	(0.042)	(0.132)	(0.000)	(1.000)	(0.000)
3	−9.852	−2.196	−0.559	−20.371	−4.080	−2.917
	(0.000)	(0.014)	(0.288)	(0.000)	(0.000)	(0.002)
4	−8.448	−0.903	−0.870	−17.338	−4.867	−2.466
	(0.000)	(0.183)	(0.192)	(0.000)	(0.000)	(0.007)

Table A.3. Panel Unit Root Tests

Notes: We used the Stata routine ‘multipurt’ written by Markus Eberhardt. The null hypothesis is that all series are nonstationary. We report results when a trend is included for Openness and Oil Imports, with a constant only otherwise; *p-values* in brackets.

Variable	CD-test	*p-value*	corr	abs(corr)
Inflation	87.74	0.000	0.660	0.682
Openness	94.33	0.000	0.709	0.745
Oil Imports	65.83	0.000	0.496	0.618
Output Gap	44.83	0.000	0.343	0.360
Credit Gap	16.04	0.000	0.140	0.308
REER	7.68	0.003	0.058	0.361

Table A.4. Cross section correlation in the data

Notes: The Pesaran (2004) statistic is distributed as $N(0,1)$ under the null hypothesis of cross-section independence of each variable. Average - ‘corr’ - and absolute average correlation - ‘abs(corr)’ - coefficients amongst the time series for each country are also computed.

Inflation as dependent variable	Pooled			Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
Separate	-1.133***	-0.251	-0.647**	-1.119	-0.688	-1.738
	(0.291)	(0.228)	(0.315)	(0.867)	(0.513)	(1.061)
Output Gap	0.0579	0.177***	0.252***	0.115***	0.159*	0.217*
	(0.0501)	(0.0398)	(0.0584)	(0.0346)	(0.0812)	(0.110)
Dep. Insurance	-2.015***	-0.896***		-2.665**	-1.612*	-3.055
	(0.342)	(0.256)		(1.137)	(0.823)	(1.792)
CBI	-2.352***	-0.605		-4.914**	-0.465	
	(0.872)	(0.658)		(2.095)	(1.739)	
Openness	-0.00780***	-0.00202	0.00855***	0.0282**	0.00779	0.0313*
	(0.00206)	(0.00212)	(0.00248)	(0.0113)	(0.00845)	(0.0173)
REER	-0.0325***	-0.0643***	-0.0434***	-0.0274***	-0.0446***	
	(0.00353)	(0.00801)	(0.0104)	(0.00272)	(0.0150)	
Credit Gap		0.0177			0.0181	
		(0.0122)			(0.0131)	
Oil Imports		1.715			-2.234	
		(1.272)			(4.369)	
Capital Open		-6.751***	-11.20***		-5.388***	-6.121***
		(0.503)	(0.600)		(1.369)	(1.611)
Ex. Rate Stab.		-2.098***			-2.018**	
		(0.504)			(0.869)	
Mon. Indep.		0.669			1.189	
		(0.663)			(0.919)	
Inf. Targeting	Yes	Yes	No	Yes	Yes	No
Euro Area	Yes	Yes	Yes	Yes	Yes	No
Fixed	Yes	Yes	Yes	Yes	Yes	No
'Great' dummies	Yes	Yes	No	Yes	Yes	No
Crises dummies	No	Yes	Yes	No	Yes	Yes
Observations	1425	997	1130	1425	997	1130
Adjusted R^2	0.431	0.732	0.590	0.529	0.727	0.581
CD test (p-value)	0.000	0.000	0.000	0.031	0.000	0.142

- Standard errors in parentheses.
- * *p-value* < 0.10, ** *p-value* < 0.05, *** *p-value* < 0.01.
- CD: Pesaran (2004) residuals pairwise-correlation test for the null hypothesis of cross-section independence.
- For each estimator, column (1) contains balanced panel results for the full sample period; column (2) includes all regressors; column (3) displays results for significant parameters estimates only.
- CBI is the Central Bank Independence index; REER is the the Real Effective Exchange Rate; Ex. Rate Stab. is the Exchange Rate Stability index; Mon. Indep. is the Monetary Independence index (see section 3.1 for details).

Table A.5. Static homogeneous panel: Pooled and Fixed Effects estimations

Inflation as dependent variable		FE			GMM	
	(1)	(2)	(3)	(4)	(5)	(6)
Separate	-0.309	-0.0964	-0.485	-0.544***	-0.462	-0.322
	(0.357)	(0.209)	(0.315)	(0.194)	(0.297)	(0.331)
Inflation$_{t-1}$	0.718***	0.640***	0.718***	0.812***	0.673***	0.725***
	(0.0148)	(0.0269)	(0.0277)	(0.0150)	(0.0301)	(0.0194)
Output Gap	0.234***	0.238***	0.349**	0.292***	0.294***	0.355***
	(0.0465)	(0.0617)	(0.124)	(0.0248)	(0.0427)	(0.0727)
Dep. Insurance	-0.648*	-0.514	-0.889	-1.215**	-0.340	-0.948
	(0.363)	(0.318)	(0.533)	(0.499)	(0.408)	(0.612)
CBI	-1.904**	-0.443		-1.832**	-1.293	
	(0.902)	(0.957)		(0.802)	(0.901)	
Openness	0.0126**	0.00400	0.0151	0.000566	0.000928	
	(0.00605)	(0.00493)	(0.00997)	(0.00149)	(0.00258)	
REER	-0.0155***	-0.0247***		-0.0107***	-0.0163*	-0.0176***
	(0.00236)	(0.00871)		(0.00320)	(0.00856)	(0.00668)
CreditGap		0.0117			0.0168	
		(0.00744)			(0.0118)	
Oil Imports		-0.612			1.264	2.458*
		(1.862)			(1.352)	(1.289)
Capital Open		-1.909***	-1.484**		-3.900***	-4.202***
		(0.618)	(0.699)		(0.866)	(0.597)
Ex. Rate Stab.		-1.202**	-1.234**		-3.641***	-4.368***
		(0.472)	(0.489)		(0.761)	(1.083)
Mon. Indep.		-0.109			-1.710**	-3.570**
		(0.528)			(0.840)	(1.615)
Inf. Targeting	Yes	Yes	No	Yes	Yes	Yes
Euro Area	Yes	Yes	No	Yes	Yes	Yes
Fixed	Yes	Yes	No	Yes	Yes	No
‘Great’ dummies	Yes	Yes	No	Yes	Yes	Yes
Crises dummies	No	Yes	Yes	No	Yes	Yes
Observations	1425	997	1068	1425	997	1047
Adjusted R^2	0.785	0.841	0.799	-	-	-
CD test (p-value)	0.393	0.002	0.605	0.000	0.000	0.000
A-B AR(1)				0.102	0.001	0.129
A-B AR(2)				0.843	0.041	0.998

- See notes to Table A.5.
- Robust standard errors in parentheses.
- GMM refers to the standard Arellano and Bond (1991) estimator, using up to 4 lags of the variables as instruments.
- A-B AR(1) and A-B AR(2) refer to the Arellano-Bond test for the null of no autocorrelation of order 1 and 2, respectively.

Table A.6. Dynamic homogeneous panel: Fixed Effects and GMM estimations

Inflation as dependent variable	DCCE			Jacknife	DCCE			Jacknife
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Separate	-0.0444	-0.123	-0.0470	0.278	0.174	0.00141	-0.112	0.196
	(0.202)	(0.242)	(0.163)	(0.249)	(0.279)	(0.132)	(0.127)	(0.285)
Inflation_{t-1}	0.288***	0.246***	0.403***	0.385***	0.250***	0.163***	0.440***	0.433***
	(0.0424)	(0.0597)	(0.0381)	(0.0464)	(0.0422)	(0.0563)	(0.0341)	(0.0415)
Output Gap	0.137***	0.143***	0.203***	0.228***	0.151***	-0.00807		
	(0.0326)	(0.0450)	(0.0422)	(0.0508)	(0.0468)	(0.0708)		
Dep. Insurance	-0.699	-0.969*	-1.000**	-1.172**	-0.671	-1.507**	-1.008**	-1.072***
	(0.441)	(0.536)	(0.470)	(0.501)	(0.512)	(0.687)	(0.475)	(0.333)
CBI	-1.736	-2.550			-2.144	-3.421		
	(1.874)	(2.106)			(2.507)	(3.552)		
Openness	0.0446**	0.0372			0.0823*	0.0344		
	(0.0222)	(0.0267)			(0.0454)	(0.0459)		
REER	-0.0119	-0.0126	-0.0351**	-0.0410***	0.0599*	0.0301		
	(0.0189)	(0.0256)	(0.0138)	(0.0154)	(0.0344)	(0.0307)		
Credit Gap		-0.00297				-0.00478		
		(0.0219)				(0.0435)		
Oil Imports		26.94*				-4.480		
		(14.37)				(13.67)		
Capital Open		3.032				3.618*		
		(1.968)				(1.847)		
Ex. Rate Stab.		-1.944**				-1.648		
		(0.972)				(1.052)		
Mon. Indep.		1.018				-0.571		
		(1.093)				(0.844)		
REER_{t-1}					-0.102***	-0.114***		
					(0.0338)	(0.0341)		
Openness_{t-1}					-0.0919*	-0.0279		
					(0.0497)	(0.0434)		
Output Gap_{t-1}						0.0823	0.152***	0.157***
						(0.0502)	(0.0203)	(0.0230)
Credit Gap_{t-1}						0.0583		
						(0.0482)		
Inf. Targeting	Yes	Yes	No	No	Yes	Yes	No	No
Euro Area	Yes	Yes	No	No	Yes	Yes	No	No
Fixed	Yes	Yes	No	No	Yes	Yes	No	No
'Great' dummies	Yes	Yes	No	No	Yes	Yes	No	No
Crises dummies	No	Yes	No	No	No	Yes	No	No
Observations	1375	955	1375	1375	1325	952	1350	1350
Adjusted R^2	0.548	0.861	0.377	0.377	0.649	0.926	0.306	0.306
CD test (p-value)	0.946	0.394	0.903	0.903	0.926	0.193	0.487	0.487

Table A.7. Dynamic Common Correlated Effects panel estimations

Note: See notes to Tables A.5; To save space, we omit cross-section averages, country-specific intercepts and trend terms.

Inflation as dependent variable						
	Baseline Case			'Hybrid' Phillips Curve		
	(1)	(2)	(3)	(1)	(2)	(3)
Separate	-0.268	-0.250	-0.324	-0.539	-0.333	0.278
	(0.441)	(0.271)	(0.243)	(0.527)	(0.302)	(0.263)
Inflation$_{t-1}$	0.308***	0.187**	0.402***	0.297***	0.147*	0.296***
	(0.0451)	(0.0849)	(0.0444)	(0.0476)	(0.0875)	(0.0457)
Inflation$_{t+1}$				0.194***	0.0550	0.202***
				(0.0385)	(0.0620)	(0.0303)
Output Gap	0.180***	0.106	0.266**	0.127*	0.0365	0.155**
	(0.0609)	(0.0670)	(0.105)	(0.0703)	(0.0594)	(0.0713)
REER	-0.0255	-0.0362	-0.0736**	-0.0189	0.0128	-0.0521***
	(0.0218)	(0.0505)	(0.0302)	(0.0210)	(0.0407)	(0.0197)
Openness	0.0562	0.0395		0.0849*	0.0483	
	(0.0441)	(0.0373)		(0.0435)	(0.0333)	
Dep. Insurance	-1.042*	-1.213*	-0.668*	-1.025*	-1.250*	-1.523*
	(0.555)	(0.709)	(0.387)	(0.565)	(0.685)	(0.855)
CBI	-1.305	-0.0933		0.167	-1.818	
	(2.259)	(3.486)		(2.001)	(2.422)	
Credit Gap		0.0515			0.0264	
		(0.0448)			(0.0332)	
Oil Imports		4.838			9.243	
		(16.12)			(21.28)	
Capital Open		0.853			1.610	
		(2.716)			(2.059)	
Ex. Rate Stab.		-3.353**			-3.006**	
		(1.575)			(1.344)	
Mon. Indep.		0.676			0.733	
		(1.959)			(1.396)	
Inf. Targeting	Yes	Yes	No	Yes	Yes	No
Euro Area	Yes	Yes	No	Yes	Yes	No
Fixed	Yes	Yes	No	Yes	Yes	No
'Great' dummies	Yes	Yes	No	Yes	Yes	No
Crises dummies	No	Yes	No	No	Yes	No
Observations	1375	953	1375	1350	953	1350
Adjusted R^2	0.221	0.436	0.837	0.324	0.570	0.518
CD test (p-value)	0.947	0.334	0.341	0.030	0.563	0.172
Underid. test (p-value)	0.013	0.054	0.025	0.012	0.064	0.021

- See notes to Tables A.5; up to two lags of each variable are used as instruments.
- 'Underid. test' refers to the Kleibergen-Paap LM statistic for the null of underidentification.

Table A.8. Dynamic CCE-IV estimations

Inflation as dependent variable				
Separate	0.417 (0.944)	0.178 (0.260)	-0.277 (0.352)	0.0153 (0.187)
Separate×CBI	-1.112 (1.787)			
Separate×Fixed		0.476 (0.470)		
Separate×Credit Gap			0.0416 (0.0469)	
Separate×Output Gap				9.487 (6.064)
Observations	1473	1473	1321	1425
Adjusted R^2	0.033	0.068	0.098	0.048

Table A.9. Dynamic CCE with interactions

Note: See notes to Table A.5. Additional regressors omitted for convenience.

Inflation Volatility ($\hat{\sigma}^2_{\pi,t}$) as dependent variable						
	Pooled	FE	FE	GMM	DCCE	Jacknife
Separate	-1.292***	-0.996	-0.170	-1.012	0.0496	-0.699
	(0.248)	(1.124)	(0.157)	(0.801)	(0.234)	(0.793)
$\hat{\sigma}^2_{\pi,t-1}$	-	-	0.825***	0.879***	0.524***	0.530***
			(0.0180)	(0.0102)	(0.0333)	(0.0497)
Observations	1475	1475	1450	1450	1375	1375
Adjusted R^2	0.288	0.359	0.794	-	0.204	0.204
Separate	-0.309	-0.954	-0.288	-0.176	-0.670	-1.237
	(0.203)	(0.622)	(0.178)	(0.207)	(0.612)	(0.902)
$\hat{\sigma}^2_{\pi,t-1}$			0.673***	0.654***	0.134**	0.276**
			(0.0263)	(0.0260)	(0.0621)	(0.122)
Output Gap	-0.0860**	-0.172***	-0.0684	-0.0800**	-0.100**	-0.217*
	(0.0356)	(0.0545)	(0.0443)	(0.0384)	(0.0502)	(0.121)
Dep. Insurance	-0.639***	-1.720**	-0.688**	-0.289	-0.477	-4.320*
	(0.228)	(0.788)	(0.291)	(0.182)	(0.296)	(2.260)
CBI	-0.408	-0.266	-0.443	0.274	0.839	13.37**
	(0.588)	(1.312)	(0.568)	(0.656)	(2.898)	(6.520)
Openness	-0.00448**	0.00631	0.00641	0.00142	0.0397	0.126*
	(0.00189)	(0.00913)	(0.00394)	(0.00159)	(0.0337)	(0.0668)
REER	-0.0503***	-0.0309*	-0.00548	-0.0192*	0.0262	0.0730
	(0.00715)	(0.0154)	(0.00604)	(0.0107)	(0.0188)	(0.0554)
Ex. Rate Stab.	-1.724***	-0.669	-0.264	-1.769***	1.000	1.650
	(0.450)	(0.782)	(0.362)	(0.561)	(0.901)	(1.846)
Capital Open	-5.461***	-5.286***	-1.650***	-3.079***	5.814	28.69
	(0.449)	(1.254)	(0.510)	(0.665)	(5.272)	(21.56)
Oil Imports	3.201***	-0.948	-1.763	0.799	-27.93**	-35.55*
	(1.136)	(3.656)	(1.990)	(0.697)	(12.11)	(19.94)
Credit Gap	-0.0234**	-0.0175	-0.00707	-0.00343	-0.0588**	0.0572
	(0.0109)	(0.0127)	(0.00911)	(0.0118)	(0.0252)	(0.0980)
Mon. Ind.	0.982*	1.591*	0.898*	0.941	1.605*	3.581
	(0.592)	(0.842)	(0.508)	(0.726)	(0.877)	(2.638)
Inf. Targeting	Yes	Yes	Yes	Yes	Yes	Yes
Euro Area	Yes	Yes	Yes	Yes	Yes	Yes
Fixed	Yes	Yes	Yes	Yes	Yes	Yes
'Great' dummies	Yes	Yes	Yes	Yes	Yes	Yes
Crises dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	997	997	997	997	955	955
Adjusted R^2	0.670	0.681	0.832	-	0.885	0.885

Table A.10. Inflation Volatility as dependent variable

Note: See notes to Table A.5. Additional regressors omitted for convenience.

CBC as dependent variable	Pooled	FE	FE	GMM	DCCE	Jacknife
Separate	-0.00136	-0.0491	-0.0155	0.0424*	-0.00204	0.000992
	(0.00971)	(0.0424)	(0.0103)	(0.0224)	(0.0125)	(0.0163)
CBC$_{t-1}$			0.687***	0.883***	0.586***	0.613***
			(0.0328)	(0.0227)	(0.0351)	(0.0347)
Observations	1400	1400	1375	1375	1325	1325
Adjusted R^2	0.255	0.289	0.627	-	0.397	0.397
Separate	-0.00615	-0.0161	-0.00575	0.00455	0.00387	0.0114
	(0.0126)	(0.0423)	(0.0133)	(0.0141)	(0.0100)	(0.0844)
CBC$_{t-1}$			0.648***	0.686***	0.317***	0.385*
			(0.0186)	(0.0311)	(0.0557)	(0.222)
Output Gap	0.00354	0.000888	0.000117	-0.00278	0.00379	0.0168
	(0.00221)	(0.00252)	(0.00201)	(0.00169)	(0.00602)	(0.0105)
Dep. Insurance	0.0213	0.0146	0.00634	-0.00510	-0.0247	0.125
	(0.0142)	(0.0440)	(0.0193)	(0.0186)	(0.0367)	(0.197)
CBI	0.0975***	-0.0193	-0.0549**	-0.00439	-0.140	-0.663
	(0.0365)	(0.0640)	(0.0247)	(0.0317)	(0.226)	(0.784)
Openness	0.000337***	0.000758**	0.000265	0.0000602	0.00376*	-0.00354
	(0.000118)	(0.000335)	(0.000181)	(0.0000669)	(0.00193)	(0.00587)
REER	0.000187	0.000939	0.000474	0.000733*	0.00528**	0.00411
	(0.000445)	(0.00101)	(0.000445)	(0.000421)	(0.00223)	(0.00545)
Ex. Rate Stab.	-0.0298	-0.0289	-0.0356	0.0514*	-0.0912	-0.113
	(0.0280)	(0.0478)	(0.0230)	(0.0263)	(0.0688)	(0.127)
Capital Open	0.149***	0.0879	0.0390	0.107***	0.127	0.211
	(0.0279)	(0.0862)	(0.0328)	(0.0260)	(0.125)	(0.359)
Oil Imports	-0.147**	-0.342**	-0.102	-0.0601	0.678	1.501
	(0.0706)	(0.157)	(0.118)	(0.0856)	(1.521)	(2.220)
Credit Gap	-0.00224***	-0.00188*	-0.00108**	-0.00102**	-0.00318*	-0.00946*
	(0.000679)	(0.000931)	(0.000519)	(0.000454)	(0.00171)	(0.00558)
Mon. Ind.	0.00821	-0.00237	-0.0420	-0.00489	-0.0760	-0.247
	(0.0368)	(0.0470)	(0.0277)	(0.0392)	(0.0957)	(0.271)
Inf. Targeting	Yes	Yes	Yes	Yes	Yes	Yes
Euro Area	Yes	Yes	Yes	Yes	Yes	Yes
Fixed	Yes	Yes	Yes	Yes	Yes	Yes
‘Great’ dummies	Yes	Yes	Yes	Yes	Yes	Yes
Crises dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	997	997	997	997	955	955
Adjusted R^2	0.413	0.406	0.657	-	0.909	0.909

Table A.11. Estimations with the Central Bank Conservatism (CBC) Index

Note: See notes to Table A.5. Additional regressors omitted for convenience.

Inflation as dependent variable							
	Pooled	FE	FE	GMM	DCCE	Jacknife	DCCE-IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bank Supervision	-1.374***	-1.479**	-0.648**	-1.410***	-0.606	1.071	0.371
	(0.224)	(0.533)	(0.255)	(0.246)	(0.484)	(1.307)	(0.604)
Inflation_{t-1}			0.670***	0.674***	0.449***	0.394***	0.423***
			(0.0279)	(0.0376)	(0.0552)	(0.0821)	(0.0414)
Inflation_{t+1}							0.626***
							(0.0374)
Observations	751	751	751	751	709	709	709
Adjusted R^2	0.471	0.610	0.791	-	0.648	0.648	0.611
CBIS	0.0370	-0.178	-0.151	-0.287	-0.229	-0.343	-0.0655
	(0.0429)	(0.180)	(0.117)	(0.287)	(0.141)	(0.211)	(0.185)
Inflation_{t-1}			0.478***	0.318***	0.239**	0.358**	0.211*
			(0.0449)	(0.110)	(0.108)	(0.162)	(0.118)
Inflation_{t+1}							-0.187***
							(0.0690)
Observations	444	444	444	444	394	394	394
Adjusted R^2	0.171	0.287	0.455	-	0.204	0.204	-0.522
Inflation volatility as dependent variable							
Bank Supervision	-1.319***	-1.055**	-0.332*	-0.895***	0.718*	-0.625	-
	(0.198)	(0.401)	(0.168)	(0.138)	(0.388)	(0.541)	-
Inf Vol_{t-1}			0.750***	0.746***	0.579***	0.586***	-
			(0.0248)	(0.0206)	(0.0536)	(0.0692)	-
Observations	751	751	751	751	709	709	-
Adjusted R^2	0.408	0.516	0.791	-	0.607	0.607	-
CBIS	0.00411	0.0336	0.00479	0.0915	0.0706	0.106	-
	(0.0254)	(0.0426)	(0.0225)	(0.0726)	(0.113)	(0.170)	-
Inf Vol_{t-1}			0.474***	0.486***	-0.0870	-0.130	-
			(0.0819)	(0.102)	(0.0977)	(0.147)	-
Observations	444	444	444	444	394	394	-
Adjusted R^2	0.061	0.111	0.376	-	0.230	0.230	-

Table A.12. Estimations with Prudential Policy and CBIS indexes

Note: See notes to Table A.5. Additional regressors omitted for convenience.

Appendix B: Sources and Definitions

Variables	Sources and Definitions
Inflation	Inflation rate (CPI, annual percent change), 1960-2018. GDP deflator inflation was also considered, but the results are similar. Sources: World Development Indicators (WDI) and IMF International Financial Statistics (IFS).
Separate	Dummy=1 if a country has separated mandates for monetary policy and prudential policy, 1960-2018. Source: World Bank - Banking Regulation Survey of 2000, 2008, 2012 and 2019, as well as Central Banks and Banking Supervisors web pages. This classification is based on Courtis (2011) and the answers given by the countries in this sample to questions 12.1 of the World Bank survey for 2008, 2012 and 2019 utilized by the authors to compile the dataset (see Supplementary Appendix for further details).
Inflation targeting	Dummy=1 if the country implements Inflation Targeting, 0 otherwise. We assume that the Member States of Euro-zone pursue inflation targeting.
CBI	Central Bank Independence Index based on Cukierman *et al.* (1992)'s methodology for calculating legal independence. Source: updated by the authors based on Cukierman *et al.* (1992) and Garriga (2016) (see also Bodea and Hicks 2015).
Deposit Insurance	Deposit Insurance Fund Dummy=1 if a country has a deposit insurance scheme, 0 if not. Source: Demirguc-Kunt *et al.* (2013), the World Bank's *Deposit Insurance Around The World* and from the International Association of Deposit Insurers (IADI) datasets.
Euro Area	Dummy that takes a value of 1 if a country belongs to the Euro-area and 0 otherwise.
Output Gap	Output gap is obtained by applying the Hamilton filter (see Hamilton 2018) to GDP at constant prices, 1960-2018. Source: Penn World Tables, World Bank and IMF.
Credit Gap	Domestic credit provided by banking sector as a % of GDP, HP-filtered with a smoothing coefficient of 25,000, as recommended by Galán (2019). Source: World Bank, Bank of International Settlements and the Jordà-Schularick-Taylor Macrohistory Database (see Òscar Jordà *et al.* 2017). Growth rates of the this variable were also considered with similar results.
Fixed	Dummy variable for the exchange rate regime, it takes the value of 0 for floating or managed floating regime and 1 for all varieties of hard fixed exchange rates, 1960-2018. Source: Ilzetzki *et al.* (2019), updated by the authors.
REER	Real Effective Exchange Rate, 1960-2018. Source: narrow measure from the Bruegel Dataset, based on the work of Darvas (2012).
Openness	Openness of the economy in current prices, measured as total trade (sum of import and export) as a percentage of GDP. 1960-2018. Source: Main sources: WDI, IFS and Penn World Tables.
Trilemma Indexes	Exchange Rate Stability (1961-2018), Monetary Stability (1960-2018) and Capital Account Openness (KAOPEN) Chinn-Ito Indexes (1970-2018), between 0 and 1, the latter indicating maximum stability/openness. Source: Aizenman *et al.* (2010), 2019 update.
Banking/Currency Crisis	Dummy=1 when the country has a banking/currency crisis, 0 otherwise, 1970-2018. Source: Laeven and Valencia (2018).
Oil Imports	Value of oil imports in US dollars over GDP. 1962-2018: IMF
Brent	Brent Crude Oil price index, 1960-2018. Source: IMF.

Table B.1. Variables - Sources and Definitions

Supplement to "Institutional Arrangements and Inflation Bias: A Dynamic Heterogeneous Panel Approach"

Appendix A: Data

This section provides further detail to Table A1 in the paper regarding the sources and assumptions used in the construction of the dataset.

Inflation Main source: World Development Indicators (WDI). CPI inflation is preferred over GDP deflator as the latter is only available from 1971 onwards for several countries in our sample. Nonetheless, results are qualitatively the same if we run the regressions using GDP deflator for this shorter period. We use GDP deflator data for China prior to 1987 and, in the case of Iceland, for the period 1968-1976 in which CPI inflation was not reported - however, results are the same if GDP deflator is used throughout.

Separate See next section for detailed notes and assumptions.

Central Bank Independence Main sources: Cukierman *et al.* (1992) for the early part of the sample (1960 to early 1970's), Garriga (2016) and Bodea and Hicks (2015) for subsequent years. We also considered the 'Dynamic' CBI Index of Romelli and Arnone (2013) with similar results, but their sample is much more limited (only 10 countries and from 1972 to 2010).

GDP/Output Gap Main source: Penn World Tables. Different output gap measures were computed: i) based on the standard and one-sided Hodrick-Prescott filter with a smoothing coefficient of 100; ii) a CBO-type measure, whereby the (linear) trend is re-estimated at every period; iii) a measure based on the Hamilton (2018) filter, adjusted for annual data. As discussed below, results remain unaltered across different measures of the output gap.

Credit (and 'Basel') Gap Main sources: based on Credit-to-GDP ratios, Bank of International Settlements (BIS), WDI and the Jordà-Schularick-Taylor Macrohistory Database of Òscar Jordà *et al.* (2017). A standardized Credit Gap indicator is published by the BIS, often referred to as the 'Basel Gap', in relation to the activation of Countercyclical Capital Buffer macroprudential measures, following the Basel III accords (BIS, 2010 and BIS, 2011). This variable is constructed based on a one-sided HP filter with a smoothing coefficient of 400,000. Alternative semi-structural measures have been proposed by Lang and Welz (2018) and Galán and Mencía (2018), *inter alia*, that better capture systemic credit events. These measures require additional data, such as house prices and interest rates, which are not available for our sample period and for several of the countries in our dataset. However, Galán (2019) shows that employing a standard double-sided HP-filter with a smoothing coefficient of 25,000 approximates the semi-structural measures quite well and describes well the cyclical properties of credit-to-GDP across a range of countries. This is, therefore, our preferred measure for the Credit Gap, although we also employ the Basel Gap with similar results, as shown below.

REER (Real Effective Exchange Rate) Main source: narrow measure from the Bruegel Dataset, based on the work of Darvas (2012). The broad measure (i.e. more trading partners) is only available from 1979 for several of the countries in our dataset, hence the preference for the narrow measure, containing data from 1960 onwards. The correlation between both measures is around 0.9, thus suggesting they essentially capture the same dynamics.

Trilemma Indexes Exchange Rate Stability (1961-2018), Monetary Stability (1960-2018) and Capital Account Openness (KAOPEN) Chinn-Ito Indexes (1970-2018), between 0 and 1, the latter indicating maximum stability/openness. Source: based on Chinn and Ito (2008) and Aizenman *et al.* (2010), 2019 update. We also employed the Trillema Indexes of Popper *et al.* (2013), with similar results, but this dataset is more limited in its time span, stopping at 2010.

Banking/Currency Crisis Source: Laeven and Valencia (2018), dummy=1 when the country has a banking/currency crisis. Alternative measures for these two variables are available from the Global Crises Dataset. Although the latter measures tend to detect more crisis events that the Laeven and Valencia (2018) data, the main results of our estimations remain largely the same, as discussed below.

Energy Imports variables Main Sources: WDI, IMF IFS and International Energy Agency. We use Oil Imports as defined in Table A1. We also considered alternative measures, namely overall Fuel Imports as a % of Imports and Net Energy Imports as a % of energy use, but these variables occasionally display a trend and a unit root cannot be rejected using the panel unit root tests of Table 2. Nevertheless, as shown below, using these alternatives instead of Oil Imports does not affect the main results.

Appendix B: Definition of *Separate*

The variable *Separate* measures monetary policy and banking supervision institutional arrangements, namely whether or not *prudential policy* is part of a central bank's mandate. The argument referring to a conflict between the monetary policymaker and the banking regulator and supervisor, as originally presented, focused on banking supervision duties, equivalent to what is currently termed microprudential supervision of banks and other financial institutions - the strand of prudential policy aimed at identifying the idiosyncratic risks of each bank.

The 2008-2009 financial crisis highlighted the need for fostering financial stability and several reforms were undertaken to provide a macroprudential oversight of the financial systems. Macroprudential policy is another strand of prudential policy and complements microprudential supervision by taking a macro approach of the banking system, i.e. by identifying risks that can become systemic and lead to financial instability. The macroprudential perspective of banking supervision is, to a large extent, now established worldwide. Regarding its institutional arrangements, central banks play a major role in conducting macroprudential policy in many countries, but the architecture of of macroprudential policy can be quite distinct from country to country - see Lim *et al.* (2013).

Against this background, we take into account the profound changes in supervision arrangements to classify the institutional regimes for prudential regulation and supervision in each country across the period 1960-2018 into separate or combined institutional regimes. For this purpose, we create a dummy variable (*Separate*) which takes the value of 1 if the function of banking regulation and supervision is assigned to an authority independent from the central bank. In contrast, *Separate* takes the value of 0 if banking regulation and supervision is a central bank's responsibility (the latter case refers to a *combined* institutional arrangement). The classification of countries in terms of *Separate* and *combined* institutional arrangements is presented in Table 1 in the main article.[24]

For the 2001 to 2018 period, the classification of countries into these two groups (i.e. *Separate* or *combined arrangements*) is based on information disclosed in the Bank Regulation and Supervision Survey (BRSS) provided by the World Bank, which surveys the main aspects of banking regulation and supervision from supervisory authorities located in 143 jurisdictions. Results from the first wave were released in 2001 and they were complemented by the waves published in 2003, 2007, 2011 and 2019.[25] The classification into separate or combined institutional arrangements is based on answers to question 12.1 from the supervision section of the survey. It should be noted that question 12.1 changed from wave to wave in order to reflect the Basel III reforms that, in particular, introduced a macroprudential policy framework for the financial system. Thus, the classification of *Separate* took these changes into account (Table B.1).

24. Note that the variable *Separate* does not account for whether a separate banking supervisor also oversees securities markets and/or insurance companies. The classification only captures the allocation (or exclusion) of banking regulation and supervision to central banking responsibilities. For the euro area Member States, we consider a separate banking supervision regime after their entrance in the European Monetary Union, in 1999 (except for Greece which joined the European Monetary Union in 2001) since monetary policy is centralised in the European Central Bank.

25. For details about the survey, see `https://www.worldbank.org/en/research/brief/BRSS`.

Waves	Question	Classification
2001	12.1 Bank Supervision Authority	0 if the central bank; 1 otherwise
2003	12.1 What body/agency supervises banks?	0 if the central bank; 1 otherwise
2007	12.1 What body/agency supervises banks? Central bank; A Single Bank Supervisory Agency/Superintendency; Multiple Bank Supervisory Agencies/Superintendencies?	0 if the central bank; 1 otherwise
2011	12.1 What body/agency supervises commercial banks for prudential purposes? a. The Central Bank; b. A single bank supervisory agency/superintendency; c. Multiple bank supervisory agencies/superintendencies including the Central Bank; d. Multiple bank supervisory agencies/superintendencies excluding the Central Bank; e. Other (please explain)	0 if a. or c.; 1 otherwise
2019	12.1 What body/agency supervises banks for prudential purposes: a. The Central Bank; b. A single bank supervisory agency/superintendency (different from the Central Bank); c. Multiple bank supervisory agencies/superintendencies including the Central Bank; d. Multiple bank supervisory agencies/superintendencies excluding the Central Bank; e. Other (please explain); f. Not applicable; g. Do not know	0 if a. or c.; 1 otherwise

Table B.1. Classification of the variable *Separate* based on the World Bank BRSS

It is also important to note that for the waves of 2011 and 2019 additional questions were introduced to assess whether the mandate of the institutions taking care of banking regulation and supervision would also include, among other aspects, systemic/financial stability for the 2011 wave, or macroprudential supervision for the 2019 wave. We take this new information into account when classifying the institutional arrangements in each country, double-checking our classification based on answers to question 12.1.

We use additional sources to complement the above, namely the Copelovitch and Singer (2008)'s classification, the survey by Courtis (2011) on international supervision arrangements, as well as the central banks' and supervisory agencies' websites (which were useful to fill in the gaps or confirm our previous classifications). Still, there are some countries for which a clear-cut separation of banking supervision responsibilities is difficult to undertake, since those can be shared in a non-explicit way by both an independent supervisory authority and the central bank. As such, we conduct robustness checks to the variable *Separate*, as described in detail in C.1 below.

Appendix C: Robustness checks

The following sections provide a succinct discussion of a series of additional robustness checks, confirming that, all in all, the separation of banking supervisory powers from the central bank is not a significant institutional determinant of low inflation rates in industrialised countries.

C.1. Alternative Separate classification

Our main empirical findings are checked for robustness by using an alternative classification of the variable *Separate*. Indeed, the classification of the institutional mandates can be somewhat ambiguous for Australia, Austria, Denmark, Finland and Switzerland, as well as for countries that joined the Euro-area. In Australia, the institutional setup was classified as separate from 1998 onwards, based on the fact that the Australian Prudential Regulation Authority, responsible for the regulation and supervision of the banking system, was established that year as a single agency. Nonetheless, the Reserve Bank of Australia (RBA) has always had responsibility for the overall financial system and is currently tasked to deal with threats to financial stability which have the potential to spill over to economic activity and consumer and investor confidence.

In Austria, the Austrian Central Bank shares responsibilities in the banking supervisory domain with the Financial Market Authority (FMA), which justifies the classification into a combined institutional arrangement. Nevertheless, we test for the possibility of a separate setup since the inception of the FMA, in 2002.

As for Denmark, the classification of institutional frameworks for banking regulation and supervision is not straightforward. The Danish Financial Supervisory Authority (FSA), an independent agency, was established in 1988 and was formed as part of the restructuring of the Danish Ministry of Industry, suggesting that the Danish central bank was not engaged in supervisory tasks before that period. However, in the 2011 World Bank dataset, it is noted that the central bank and the Danish FSA were jointly responsible for the supervision of the banking system. In addition, there is a memorandum of understanding dating from April 2005 between the central bank and the financial supervisor which introduces more clarity into the division of financial stability functions between the two, indicating the previous engagement of the central bank in supervisory tasks, although they were not reported in previous surveys. Taking this information into account, a combined setup classification was tested from 1960 to 2012.

The case of Finland appears simple to deal with, given that the Finnish Financial Supervisory Authority (FIN-FSA) was established in 1922, being named as the Bank Inspectorate before 1993. In the World Bank surveys it is always answered that the Financial Supervision Authority has the supervisory task while no role is assigned to the central bank. Following also other authors, we have thereby classified it as separate. Nonetheless, looking deeper into its history, the Bank of Finland was always responsible for the stability of the financial system, suggesting an alternative classification as a combined setup from 1960 to 2019, which we actually reflect in the *alternative separate* variable.

Countries that joined the common currency can instead be considered to have a separate institutional arrangement as the conduct of monetary policy in the Euro-area is centralised within the European Central Bank, leaving the national central banks powerless in this regard.[26]

Finally, the case of Switzerland also needs careful consideration. While the answers to the World Bank survey support our classification as *Separate*, there were some changes in how banking and financial regulation is conducted, with some macroprudential powers assigned to the Swiss Central Bank in 2012. Nevertheless, the Federal Council is the ultimate body responsible for macroprudential decisions, after consultation with the central bank and the Swiss Financial Market Supervisory Authority. Thus, given this enhanced role of the central bank (even though formally it is not the macroprudential authority), it is admissible to consider an alternative classification, with *Separate* taking the value 0 after 2012.

Thus, the robustness of our estimation DCCE results is checked against alternative configurations of the institutional mandates and is reported in the Tables D.1 and D.2 with *Separate** denoting the alternative classification.[27] As can be seen, our findings are robust to either classification scheme for the dummy variable capturing banking supervision arrangements, with unimportant differences concerning the significance of specific control variables. Different combinations of these alternatives were also used, and the results remained the same.

$<$ Tables D.1 and D.2 here $>$

C.2. Pre-Great Recession sample period

Moreover, in order to test whether the 2008 crisis has an effect on the empirical findings obtained, given that it motivated the reformulation of the institutional setups of banking regulation and supervision in several countries, the three models are estimated for the period from 1960 to 2007. This time period captures in full the so-called 'Great Moderation' period which is characterised by low levels and volatility of inflation rates, coupled with low unemployment and stable growth. The estimation results are reported in Tables D.3 and D.4.

$<$ Tables D.3 and D.4 here $>$

26. With the creation of the Single Supervisory Mechanism (SSM) in 2013, which conferred banking supervisory powers upon the European Central Bank, additional issues regarding the classification of the Euro-area countries in terms of their banking supervisory mandates will be raised. The SSM Regulation empowers the ECB to supervise the significant banks in each Member State, but the responsibility to supervise the less significant banks is still under the national supervisory authorities domain.

27. Results for pooled/static estimators do not differ qualitatively from those reported in the paper.

Again, estimation results are consistent with those obtained for the larger sample period, mainly in what concerns the lack of a significant statistical effect of the variable *Separate* on inflation rates. The main difference is the significance, for some specifications, of the variables “Currency Crisis" and “REER" instead of “Openness" in Table D.3.

C.3. Pooled estimation of Separate

For completeness, we also estimated the effects of the *Separate* variable assuming homogeneity across countries, while allowing for slope heterogeneity elsewhere, as it could be argued that the failure to detect significance in this variable might be due to potential inefficiencies in MG estimation. Table D.5 reports estimates for the parsimonious versions of Tables 7 and 8 in the paper and, once again, the results are consistent with the main findings in the paper.

< Tables D.5 here >

C.4. Estimation with lagged covariates

As mentioned in the paper, a commonly used strategy to alleviate potential endogeneity issues is to estimate the models with variables lagged by one period. Tables D.6 and D.7 reproduce the counterpart of Tables 7 and 8 in the paper, but with the regressors lagged by one period. As can be observed, the *Separate* remains insignificant in all specifications considered. While the dummy ‘Banking Crisis’ appears significant, but wrongly signed, in column 3 of Table D.6, it becomes insignificant when the jacknife bias-correction procedure of Dhaene and Jochmans (2015) is used. On the other hand, the variable ‘CBI’ is flagged as significant in IV estimations, with the expected negative sign, while all other results are consistent with earlier findings.

< Tables D.6 and D.7 here >

C.5. Different Output Gap measures

In the paper, we present our results based on the Hamilton (2018) filter. Nevertheless, we consider alternative measures, such as a standard HP-filter-based output gap, a CBO-type gap measure, whereby the trend in output is re-estimated as new data arrives, as well as a one-sided-HP-filter measure, which, while still sharing some of the disadvantages of the standard HP-filter, it does not rely on future data to estimate the current trend.

< Table D.8 here >

Irrespectively of the procedure used in the construction of the Output Gap, the results remain qualitatively similar, as can be seen in Table D.8, the variable *Separate* is never significant and this is also the case when full estimations are considered.

C.6. Alternative ‘Crisis’ and Energy Imports measures

As mentioned in section 1 above, we explore the use of alternative measures for the ‘Crisis’ and Energy Imports controls, with no substantial difference in the results.

$<$ Table D.9 here $>$

$<$ Table D.9 here $>$

Appendix D: Tables of the Supplement

Inflation as dependent variable	DCCE			Jacknife	DCCE			Jacknife
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Separate*	0.303	-0.140	0.304	-0.0182	-0.301	4.117	-0.144	0.388
	(0.450)	(1.569)	(0.315)	(0.443)	(0.384)	(5.136)	(0.337)	(0.467)
Inflation$_{t-1}$	0.260***	-0.394	0.204**	0.285***	0.0963*	-0.259	0.226***	0.201***
	(0.0598)	(0.240)	(0.0849)	(0.0960)	(0.0569)	(0.233)	(0.0615)	(0.0696)
Output Gap	0.292***	-0.0605	0.238***	0.221***	0.0691	-0.245	0.134*	0.103
	(0.0595)	(0.358)	(0.0699)	(0.0821)	(0.0632)	(0.213)	(0.0732)	(0.0678)
Inf. Targeting	0.0781	1.504			-0.0554	-0.952		
	(0.173)	(1.569)			(0.212)	(0.934)		
CBI	-1.095	-4.801			-1.525	-10.62		
	(1.527)	(6.059)			(2.343)	(9.846)		
Dep. Insurance	0.0772	2.299			-0.230	-0.774		
	(0.534)	(2.203)			(0.429)	(0.810)		
Euro Area	0.348	-0.472			-0.0254	-0.268		
	(0.415)	(0.792)			(0.257)	(0.276)		
Bank Credit Gap	0.0445	0.0643			-0.110	-3.609		
	(0.0603)	(0.289)			(0.661)	(5.715)		
Fixed	-0.404	-1.731			-0.0916	9.398		
	(0.305)	(1.468)			(0.497)	(7.416)		
REER		-0.0398	-0.0584**	-0.0545*		-0.0335		
		(0.135)	(0.0277)	(0.0309)		(0.100)		
Openness		0.0547				-0.808	0.0767*	0.0878
		(0.282)				(0.666)	(0.0443)	(0.0559)
Capital Open		-3.904				-0.668		
		(5.642)				(5.262)		
Banking Crisis		-0.897				0.785		
		(1.404)				(1.802)		
Currency Crisis		-2.572				-1.896	-0.786**	-1.368**
		(3.770)				(1.342)	(0.397)	(0.611)
OutputGap$_{t-1}$					0.311***	0.164	0.217***	0.185***
					(0.0779)	(0.326)	(0.0539)	(0.0587)
Bank Credit Gap$_{t-1}$					0.203	3.033		
					(0.686)	(5.067)		
REER$_{t-1}$						-0.104		
						(0.150)		
Openness$_{t-1}$						-0.267		
						(0.218)		
Observations	913	725	809	809	913	757	841	841

- See notes to Tables 5 and 6 in the paper.

Table D.1. DCCE panel estimations - alternative *Separate** classification

Inflation as dependent variable	(1)	(2)	(3)
Separate*	-0.470	-2.368	-0.251
	(1.993)	(2.180)	(0.386)
Inflation_{t+1}	0.0281	-0.178	0.201***
	(0.0619)	(0.173)	(0.0398)
Inflation_{t-1}	0.0515	-0.00719	0.319***
	(0.0789)	(0.165)	(0.0444)
Output Gap	0.209**	-0.140	0.192***
	(0.101)	(0.175)	(0.0688)
Inf. Targeting	-0.117	0.185	
	(0.529)	(0.645)	
CBI	-0.609	-0.359	
	(0.591)	(1.059)	
Dep. Insurance	0.836	0.292	
	(0.868)	(0.952)	
Euro Area	-0.860	0.417	
	(2.877)	(0.479)	
Bank Credit Gap	0.226	-0.277	
	(0.165)	(0.481)	
Fixed	-0.853	-1.314	
	(0.815)	(1.036)	
REER		-0.0100	
		(0.0986)	
Openness		0.135	0.0869**
		(0.163)	(0.0416)
Capital Open		-2.547	
		(3.978)	
Banking Crisis		-1.747	
		(1.322)	
Currency Crisis		-1.556	
		(1.483)	
Observations	912	783	874

- See notes to Tables 5 and 6 in the paper.

Table D.2. Dynamic CCE-IV estimations - alternative *Separate** classification

Inflation as dependent variable	DCCE			Jacknife	DCCE			Jacknife
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Separate	-0.325	0.0587	-0.146	-0.653	-0.194	-1.090	-0.0795	0.0184
	(0.267)	(0.195)	(0.233)	(0.567)	(0.172)	(1.430)	(0.223)	(0.277)
Inflation_{t-1}	0.162**	-0.0755	0.260***	0.283***	0.0491	-0.468	0.385***	0.403***
	(0.0635)	(0.0871)	(0.0662)	(0.0801)	(0.0623)	(0.260)	(0.0475)	(0.0572)
Output Gap	0.221**	0.473***	0.268***	0.176**	0.114	0.227		
	(0.0947)	(0.158)	(0.0788)	(0.0745)	(0.0809)	(0.262)		
Inf. Targeting	-0.123	0.939			0.143	0.195		
	(0.239)	(0.644)			(0.191)	(0.606)		
CBI	-1.005	4.038			-1.028	1.917		
	(2.370)	(4.505)			(2.452)	(2.652)		
Dep. Insurance	0.559	0.911			0.907	-0.0382		
	(0.904)	(1.027)			(0.925)	(0.991)		
Euro Area	0.264	0.0830			-0.357	-0.274		
	(0.500)	(0.379)			(0.345)	(0.446)		
Bank Credit Gap	0.279	-0.253			-0.598	1.278		
	(0.193)	(0.196)			(0.651)	(2.165)		
Fixed	-0.942*	-2.561**	-1.155**	-1.420**	-0.820	-0.612		
	(0.532)	(1.186)	(0.532)	(0.674)	(0.513)	(1.275)		
REER		-0.147				0.0483	-0.0964**	-0.117***
		(0.0996)				(0.0508)	(0.0376)	(0.0409)
Openness		0.105	0.105*	0.135**		0.0444		
		(0.128)	(0.0563)	(0.0655)		(0.200)		
Capital Open		2.717				1.280		
		(1.985)				(7.740)		
Banking Crisis		0.541				-0.685		
		(0.318)				(1.553)		
Currency Crisis		-2.106*	-0.479*	-0.0792		-2.557	-0.731**	-1.228**
		(1.216)	(0.248)	(0.590)		(1.835)	(0.344)	(0.494)
OutputGap_{t-1}					0.469***	0.454	0.398***	0.365***
					(0.0921)	(0.268)	(0.0654)	(0.0840)
$\text{Bank Credit Gap}_{t-1}$					0.838	0.155		
					(0.792)	(1.038)		
REER_{t-1}						0.00939		
						(0.163)		
Openness_{t-1}						-0.124		
						(0.173)		
Observations	745	670	745	745	745	665	721	721

- See notes to Tables 5 and 6 in the paper.

Table D.3. DCCE panel estimations - sample period 1960-2007

Inflation as dependent variable	(1)	(2)	(3)
Separate	1.885	0.685	-0.0840
	(1.722)	(0.427)	(0.301)
Inflation_{t+1}	-0.0722	-0.348	0.203***
	(0.122)	(0.232)	(0.0604)
Inflation_{t-1}	0.00390	-0.384**	0.266***
	(0.134)	(0.152)	(0.0621)
Output Gap	0.0692	0.699	0.177*
	(0.184)	(0.519)	(0.0967)
Inf. Targeting	-0.195	-0.0382	
	(0.424)	(1.435)	
CBI	-1.534	-0.357	
	(1.427)	(1.570)	
Dep. Insurance	-0.180	-1.024	
	(1.266)	(0.962)	
Euro Area	-1.141	-0.363	
	(6.076)	(0.450)	
Bank Credit Gap	0.301	0.0790	
	(0.646)	(0.391)	
Fixed	-2.686	-2.198	
	(2.539)	(2.010)	
REER		0.0725	
		(0.0841)	
Openness		0.428	0.119**
		(0.329)	(0.0560)
Capital Open		5.696	
		(5.777)	
Banking Crisis		0.194	
		(0.696)	
Currency Crisis		-3.499	-0.804**
		(2.457)	(0.400)
Observations	768	691	736

- See notes to Tables 5 and 6 in the paper.

Table D.4. Dynamic CCE-IV estimations - sample period 1960-2007

Inflation as dependent variable	DCCE	DCCE with lagged regressors	DCCE-IV
Separate	0.0169	-0.616	-0.229
	(0.421)	(0.650)	(0.637)
Inflation_{t-1}	0.441***	0.209***	0.362***
	(0.0541)	(0.0560)	(0.0649)
Inflation_{t+1}			0.117*
			(0.0604)
Output Gap	0.315***		0.430***
	(0.0464)		(0.0864)
REER	-0.0422***		-0.0601*
	(0.0157)		(0.0343)
Fixed		-0.789*	
		(0.420)	
Openness		0.173***	
		(0.0558)	
Output Gap_{t-1}		0.354***	
		(0.0550)	
Observations	889	913	864

- See notes to Tables 5 and 6 in the paper.

Table D.5. DCCE and DCCE-IV estimations - pooled *Separate*

Inflation as dependent variable	DCCE			Jacknife
	(1)	(2)	(3)	(4)
Separate	-0.612	-0.233	0.0885	0.287
	(0.547)	(0.341)	(0.241)	(0.249)
Inflation$_{t-1}$	0.277***	0.0139	0.342***	0.321***
	(0.0938)	(0.156)	(0.102)	(0.104)
Inf. Targeting$_{t-1}$	0.261	-0.910		
	(0.224)	(0.687)		
CBI$_{t-1}$	1.820	1.539		
	(2.839)	(2.249)		
Dep. Insurance$_{t-1}$	-0.567	-1.290		
	(0.675)	(1.353)		
Euro Area$_{t-1}$	0.762***	0.215		
	(0.291)	(0.842)		
Output Gap$_{t-1}$	0.372***	0.166	0.420***	0.301***
	(0.105)	(0.304)	(0.0883)	(0.0682)
Bank Credit Gap$_{t-1}$	0.0501	0.401		
	(0.0795)	(0.406)		
Fixed$_{t-1}$	-0.565*	-0.981		
	(0.323)	(0.828)		
REER$_{t-1}$		0.00967		
		(0.117)		
Openness$_{t-1}$		0.149		
		(0.160)		
Capital Open$_{t-1}$		2.247		
		(6.135)		
Banking Crisis$_{t-1}$		-2.151	-0.975**	-0.801
		(1.169)	(0.421)	(0.840)
Currency Crisis$_{t-1}$		0.211		
		(0.752)		
Observations	913	741	818	819

- See notes to Tables 5 and 6 in the paper.

Table D.6. DCCE panel estimations - regressors lagged by one period

Inflation as dependent variable	(1)	(2)	(3)
Separate_{t-1}	-0.0633	-0.00737	0.0606
	(0.192)	(0.340)	(0.0865)
Inflation_{t+1}	0.114**	0.139***	0.211***
	(0.0483)	(0.0519)	(0.0388)
Inflation_{t-1}	0.282***	0.214***	0.315***
	(0.0547)	(0.0828)	(0.0498)
Inf. Targeting_{t-1}	-0.0156	-0.576*	
	(0.194)	(0.298)	
CBI_{t-1}	-0.212	1.874	-2.134**
	(1.043)	(2.040)	(0.945)
Dep. Insurance_{t-1}	0.201	-0.306	
	(0.715)	(0.347)	
Euro Area_{t-1}	0.119	-0.321	
	(0.338)	(0.220)	
Output Gap_{t-1}	0.241***	0.240***	0.206***
	(0.0739)	(0.0721)	(0.0518)
Bank Credit Gap_{t-1}	0.0241	-0.0345	
	(0.0352)	(0.0731)	
Fixed_{t-1}	-0.294	-0.453	
	(0.353)	(0.360)	
REER_{t-1}	-0.0786**	-0.0322	-0.0396***
	(0.0374)	(0.0290)	(0.0151)
Openness_{t-1}		-0.00213	
		(0.0302)	
Capital Open_{t-1}		0.440	
		(1.009)	
Banking Crisis_{t-1}		-0.0509	
		(0.331)	
Currency Crisis_{t-1}		0.555	
		(0.509)	
Observations	864	799	847

- See notes to Tables 5 and 6 in the paper.

Table D.7. Dynamic CCE-IV estimations with lagged regressors

Inflation as dependent variable									
Separate	0.830	0.649	-0.249	-0.123	-0.796	-0.596	0.723	1.795	-1.072
	(0.949)	(0.916)	(0.414)	(0.276)	(0.676)	(0.402)	(3.764)	(1.528)	(0.768)
RT Gap	0.173			0.0934**			0.208		
	(0.130)			(0.0456)			(0.210)		
HP Gap		-0.0155			0.0377			0.466	
		(0.0819)			(0.0391)			(0.308)	
OSHP Gap			-0.592***			-0.265*			0.880
			(0.123)			(0.136)			(0.589)
Inflation$_{t-1}$				0.425***	0.487***	0.434***	0.409***	0.386***	0.508***
				(0.0346)	(0.0433)	(0.0499)	(0.0806)	(0.0571)	(0.0848)
Inflation$_{t+1}$							0.909***	0.368	0.802***
							(0.166)	(0.367)	(0.214)
Observations	1375	1375	1375	1375	1375	1375	1350	1350	1350
Adjusted R^2	0.255	0.072	0.038	0.219	0.250	0.266	0.239	0.385	0.173

RT Gap denotes a 'real-time' CBO-type output gap measure, HP Gap is a standard HP-filtered Output Gap, OSHP Gap is a one-sided-HP-filtered Gap.

Table D.8. DCCE estimations - alternative Output Gap measures

Inflation as dependent variable						
Separate	-0.626	-0.654	-0.339	-0.549*	-1.782	7.401
	(0.728)	(0.415)	(0.209)	(0.293)	(1.703)	(6.442)
Banking Crisis	3.300		1.454		0.863	
	(2.415)		(1.153)		(2.747)	
Currency Crisis	-0.331		-0.737		-2.706	
	(0.696)		(0.600)		(2.461)	
Banking Crisis GC		-0.0419		-0.724**		1.312
		(0.756)		(0.365)		(0.978)
Currency Crisis GC		0.0394		0.720*		-2.227
		(1.360)		(0.423)		(3.041)
Inflation$_{t-1}$			0.396***	0.428***	0.367***	0.421***
			(0.0435)	(0.0332)	(0.111)	(0.0398)
Inflation$_{t+1}$					1.267***	0.846***
					(0.451)	(0.167)
Observations	1325	1325	1325	1325	1300	1300
Adjusted R^2	0.100	0.220	0.261	0.212	0.172	0.156

Banking and Currency Crisis are the Laeven and Valencia (2018) measures, 'GC' denotes the corresponding variables from the Global Crises Dataset.

Table D.9. DCCE estimations - alternative 'Crisis' measures

Inflation as dependent variable									
Separate	0.561 (0.506)	1.051 (0.956)	0.347 (0.528)	-0.131 (0.164)	0.725 (0.867)	-0.00585 (0.221)	-0.774 (0.855)	-2.586 (2.037)	7.215 (5.401)
Oil Imports	-0.568 (19.86)			15.12 (12.80)			-7.220 (27.38)		
Fuel Imports		0.0000832 (0.108)			0.102 (0.0708)			0.365* (0.204)	
Energy			0.0231 (0.0822)			0.121 (0.110)			-0.629 (0.397)
Inflation$_{t-1}$				0.302*** (0.0409)	0.310*** (0.0829)	0.324*** (0.0413)	0.418*** (0.0822)	0.325*** (0.102)	0.482*** (0.0972)
Inflation$_{t+1}$							1.095*** (0.205)	0.426*** (0.162)	1.629*** (0.350)
Observations	1307	1262	1232	1307	1262	1232	1284	1237	1232
Adjusted R^2	0.093	0.141	0.192	0.157	0.209	0.160	0.129	0.126	0.343

'Oil Imports' as used in the paper, 'Fuel Imports' are in % of total imports, 'Energy' denotes Net Energy Imports as a % of energy use.

Table D.10. DCCE estimations - alternative Energy Imports measures

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