

ADOPTING THE EURO DOES NOT WORK WITHOUT POLITICAL INTEGRATION

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ABSTRACT:

A new empirical exercise for dealing the effects of monetary unions on welfare is developed. The estimates of the effects of adopting the euro using a sample of 216 countries for the 1960-2021 period apply a novel multiple-period differences-in-differences approach. They show a significant and robust negative effect on economic growth of adopting the euro, mainly for the countries with the highest income inequality.

Key Words: Monetary Unions, International Coordination, Monetary Policy, Public Policy, Financial services

JEL Codes: H61, H62, G21, H25

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Data Availability statement: the dataset and codes will be uploaded to the Harvard Dataverse once the paper is accepted. Then, a link will be provided.

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1. Introduction

According to authors as Bordo and Jonung (1999) or Balassa (1961), economic integrations through monetary unions “do not work without political integration” (Granville, 2016: 25). So, a specific case of them, the adoption of the Euro, may not be the exception. Recently, new advances in econometrics as Callaway and Sant’Anna (2021) have allowed researchers to discover the impact of exogenous shocks as pandemics, natural disasters (Liao and Kousky, 2022; Peña and Sanso-Navarro, 2025), or laws on different economic and population variables. Specifically, there is a recent study on the effects of the integration to the European Union on several economic variables. Nonetheless, there is no study of the effects of the integration in the Eurozone by applying this novel methodology. The novelty and importance of this methodology is the use of multiple periods of treatment in the Differences-in Differences approach, which allows us to compare at the same time different shocks in only one average treatment effect, by considering the same period for all the countries the year when the phenomenon occurs.

The study of the benefits or pros and prejudices or cons of monetary unions is also still on debate. Among the benefits of this coordination could be considered the common currency. It permits a simpler administration for international trading flows. Nonetheless, cons of these unions include the presence of a single monetary policy for countries applying several fiscal policies. These differentiated tax systems and public expenditures also lead to different levels of inflation. Therefore, differentiated interest rates could be necessary for those countries if there is not, at the same time, a joint and coordinated fiscal policy. It is needed to consider possible rate shifts for improving income (Peña, 2023). Some authors as Conti’s (2014) have analyzed the effects of monetary unions on economic growth, finding a positive effect for the euro area, but they do not have used the multiple-period differences-in-differences (DiD) methodology proposed by Callaway and Sant’Anna (2021) as empirical approach. The closest example using this methodology is the paper of Zhao et al. (2022), where they apply the same methodology but for the impact of the European Union (EU) membership on economic growth. The main empirical novelty of this paper is applying the later methodology to the empirical topic of the second paper of this paragraph.

The objective of this paper is double. First, it is worth providing a brief literature review on the advantages and disadvantages of a monetary union and observing what is more recommendable. In particular, it is interesting to clarify whether coordinating monetary

policies generate higher or lower welfare. Second, the economic effects of monetary coordination are empirically checked for its suitability for the Eurozone. The empirical exercise uses the full sample of countries of the World Bank for the 1960-2021 period, through the abovementioned methodology. After this introduction, Section 2 shows a brief literature review of the economic effects of monetary unions, Section 3 provides data and methods, while Section 4 presents the empirical results and briefly discusses them. Section 5 applies additional robustness checks, discusses all the results and provides policy implications. Finally, Section 6 provides the concluding remarks.

2. Literature Review

To the author's knowledge, the main literature on the effects of monetary integration is divided into the following principal topics. Some authors deal with the European Union (EU), apart from the Eurozone, other others study the economic effects of the euro area on trade, Foreign Direct Investment (FDI), risk, regulatory, financial, fiscal and monetary topics, those related with inflation, the presence of crises as well as possible reforms, productivity, economic growth. Finally, there are papers similar to the present one.

2.1 Economic and Monetary Unions

In general terms and before concreting on the specific effects, Stavárek, Řepkova and Gajdošová (2012) study the pros of the EU integration. They highlight a greater presence of risk sharing and diversification opportunities, an improved allocation of capital in investing decisions, and a possible higher economic growth. In contrast, the main drawbacks of this integration are the vulnerability to macroeconomic shocks and financial crises through a higher volatility of output and consumption. Finally, they observe that the highest degree of financial integration achieved on the euro area is in the monetary and public bond markets, while the rest of financial markets are still more fragmented.

Starting with the effects of monetary unions on trade, Rose (2000) finds that currency union members trade each other over three times on average more than non-members. Frieden (2002) is aware that traditional arguments based on the Optimal Currency Areas (OCAs) emphasize the improvements of OCAs on economic efficiency or inflation aversion. Nonetheless, there are distributional factors, such as the opposition of "losers" like the import competitors since there is a usual inability of national governments to engage in depreciations for improving international competitiveness.

The author finds that manufactured exports and trade balance are statistically associated with devaluation and volatility of the exchange rates. Chintrakarn (2008) obtains that two countries with membership on the euro currency trade more than other country-pairs. More recently, De Sousa (2012) observes that the currency union effect on average on commercial trade decreases over time. Gunnella et al. (2021) reviews the three decades of euro and studies the impact of the membership on trade. They find a higher level of exports for the members of the euro, with a greater effect for the older members.

Another topic involves regulatory issues. Kalemli-Ozcan et al. (2010) observe that the impact of the Eurozone membership on financial integration is essentially driven by the elimination of currency risk. However, there is also a contribution of the legislative–regulatory convergence for the development of cross-border financial transactions. Affinito and Farabullini (2018) find that bank interest rates differ among countries with markets still segmented since no banking services are neither differentiated yet.

Ferrero (2009) provides possible fiscal and monetary rules for a currency union. According to the author, monetary policy has to stabilize prices with flexible inflation targets. On the other hand, fiscal policy should stabilize idiosyncratic shocks without generating inflationary expectations. Foresti (2018) highlights the relevance of avoiding uncertainty and the importance for the union of preferences and targets of policy makers. Finally, he suggests a more flexible fiscal policy for the European Monetary Union (EMU). In this region contemporaneous fiscal reforms went towards more rigid rules. More recently, Reichlin et al. (2023) find that the aggregate long-run accumulated surplus in the EMU is mainly driven by the fiscal policy of Germany's one adopted when unconventional monetary policy was applied.

With respect to the effects on inflation, Meller and Nautz (2012) observe a convergence in the degree of long term inflation persistence. Furthermore, and in line with theoretical expectations, there is a statistically significant decrease of inflation persistence in the EMU. Regarding the business cycles, Campos et al. (2017) empirically observes that synchronization is higher in Eurozone countries than in others. In relation with the Euro crises, Hellwig (2011) discusses about the 2010 crisis of the Eurozone and its possible reform. He states that the different nature of the crises in these countries and the failure to disentangle them prevent from a satisfactory well-working of sovereign borrowing and banking.

Campos et al. (2015) investigates whether the inclusion of Norway in the EU in 1995 would have increased the labor productivity. They find that its national productivity would have increased a 6% on average for the 1995-2001 period. Lane (2006) reviews the main differences in the EMU members since its foundation in 1999. He observes persistent differences in their inflation rates, since the monetary policy has not suited every time to all members. His findings also highlight that the impact of the union on macroeconomic cycles is a key for the future of the union.

2.2 Adoption of the Euro

Zhao et al. (2022) are the authors of the closest empirical paper to the present one regarding methodology. The reason is that they use the same methodology as the author of the present paper—the multiple-period difference-in-differences (DiD) method, proposal developed by Callaway and Sant’Anna (2021)—. Nonetheless, these authors apply this methodology for estimating the effects of the to the EU membership on economic growth. In contrast, the present paper analyzes the effects on several economic variables associated to the inclusion in the Eurozone, a specific case of monetary coordination. They use data from 27 EU member states for the 2000-2018 and find that adhering to the EU promotes the development of different states around the world.

Apart from the effects on trade, the literature has mainly focused on the effects on FDI. Sanso-Navarro (2011) studies the decision of the United Kingdom of not adopting the Euro and its effects on FDI by applying a synthetic control method. He obtains evidence of a statistically significant cost of FDI received from the United States. More recently, Bruno et al. (2021) study the effect on FDI of the membership on the EU. They analyze data of almost every country worldwide for the 1985-2018 period and find a higher FDI received by the EU members from intra and extra EU countries.

The closest paper to the present one regarding this issue is the Conti’s (2014) paper, where he performs a study of the impact of the euro on economic growth (as the present paper). Nevertheless, he uses a common differences-in-differences (DiD) approach, so there is no multiple-period DiD in this paper, in contrast to the present work. He uses a sample of EU15 countries plus Norway and Iceland for the 1990–2010 period and obtains that adopting the Euro is associated with a higher level of per capita GDP and labor productivity. However, there is also some evidence that this effect is lower in countries with higher public debt.

Regarding the effects of adopting the Euro, Affuso et al. (2023) estimate an extended two-way fixed effects model based on Wooldridge (2021). According to them, this procedure produces identical results to the method proposed by Callaway and Sant'Anna (2021). They find that Eurozone consumers lost a 1.13-2.26% of yearly consumer welfare per capita after adopting the Euro. Notwithstanding, Ferrari and Picco (2023) observe that adopting the euro has decreased risk-sharing and consumption smoothing. The reduction is mostly driven by periphery countries of the Eurozone that have experienced a reduction in risk-sharing through private credit. Finally, Duque Gabriel and Pessoa (2024) use a synthetic control approach for creating a counterfactual scenario where each Eurozone country would have evolved without having adopted the euro. They apply a matching algorithm mechanism. Although they find that most countries' economic growth is not significantly influenced by the Euro adoption, there are some mild losers (France, Germany, Italy, and Portugal) and a winner (Ireland).

This paper tries to join the advantages of the previous two papers and will estimate the economic effects of the adoption of the euro, mainly focusing on economic growth, as in Conti (2004) and leaving the study in depth of the rest of effects as further research. The methodology will be the one used by Zhao et al. (2022), so it is used the multiple-period DiD proposed by Callaway and Sant'Anna (2021).

3. Data and Methods

The database used for the empirical section is shown in the Appendix, for the full sample of the 1960-2021 period and 216 countries. Table 1 shows the main variables used for checking the effects of monetary unions, but also for the check of hypotheses. The *gdpgr* variable is the growth rate of the Gross Domestic Product (GDP), *gini* is the income inequality measured by the Gini index, or measured by the share of people with the highest 1% income by the *top* variable, *inflation* is a variable that collects the growth rate of the Consumer's Price Index (CPI), *surplus* provides the public cash surplus over GDP, *pressure* is the tax collection over GDP, *branches* are the commercial bank branches over 100,000 adults, *imports* are the imports over GDP, *rho* is the marginal productivity of financial services, measured as the lending rates minus deposit rates divided by the sum of both, *varho* is the absolute value of the rho variable, *lendrate* is the lending interest rate, and *gdp* is the GDP.

All variables are directly or indirectly provided by the World Bank database, with the exception of *top*, taken from the World Income Inequality Database (WIID). The empirical methodology consists of the study of the causal effect of the adoption of the euro on several economic variables. Concretely, the Callaway and Sant’Anna (2021) methodology is applied, following Zhao et al. (2022) and using this empirical approach:

$$Y_{it} = \beta \text{membership}_{it} + \gamma X_{it} + u_{it} \quad , \quad (1)$$

where Y is the dependent variable, β the coefficient of the target variable, *membership* the year of adopting the euro for each country, X the control variables and γ their coefficient, u the error term, where i is the country and t the time.

First of all, the unconditional effects of adopting the euro on several variables will be provided. After that, robustness checks for economic growth (the *gdpgr* variable) will be estimated by differentiating between temporal effects through considering the lags of *gdp* and *gdpgr* as control variables. Other control variables are the geographical factors, given by the supra-national division provided by the World Bank Database, and, finally, time and geography will be jointly considered. In the second subsection of the next section a further analysis will be provided for the differences regarding income inequality when estimating the effects on economic growth.

Table 1. Descriptive analysis of the variables

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
<i>gdpgr</i>	9734.000	3.671	6.317	-64.047	149.973
<i>gini</i>	1831.000	38.244	9.059	20.700	65.800
<i>top</i>	7669.000	0.159	0.062	0.021	0.641
<i>inflcpi</i>	8283.000	23.924	332.250	-18.109	23773.130
<i>surplusgdp</i>	3884.000	-1.447	9.489	-203.719	238.577
<i>pressure</i>	4124.000	17.088	7.802	0.000	147.661
<i>branches</i>	2961.000	18.691	23.279	0.140	287.240
<i>imports</i>	8434.000	41.907	27.999	0.016	429.359
<i>rho</i>	3953.000	0.368	0.248	-0.865	1.377
<i>varho</i>	3953.000	0.384	0.223	0.000	1.377
<i>lendrate</i>	4,473	39.40397	1493.189	0.5	99764.53
<i>gdp</i>	10,274	1.85E+11	9.94E+11	8824448	2.30E+13

4. Empirical Results

5.1 Effects

The Average Treatment Effects on Treated (ATT) sample for each estimation is provided in Table 2, where all the ATTs for each period are expressed on average. It is worth highlighting that, for some variables, it has been necessary to reduce the sample due to feasibility of the estimations.

The results show a significant negative post-treatment effect on economic growth, fiscal pressure and on bank branches, while a positive post-treatment impact on income inequality measured by *gini* and *top*, on inflation for the OECD and on the share of imports over GDP. The pre-treatment ATTs are not significant.

Table 2. Empirical Average ATTs

Model/Variable	Effect	Coef.	Std. Err.	P-value	95% Conf. Interval	
I: GDPgr	<i>Pre impact</i>	-0.070	0.081	0.385	-0.229	0.088
	<i>Post impact</i>	-1.825***	0.570	0.001	-2.941	-0.708
II: Gini	<i>Pre impact</i>	0.111	0.094	0.237	-0.073	0.294
	<i>Post impact</i>	1.908***	0.575	0.001	0.781	3.035
III: Top	<i>Pre impact</i>	0.001	0.001	0.295	-0.001	0.004
	<i>Post impact</i>	0.015**	0.008	0.043	0.000	0.030
IV: Inflation	<i>Pre impact</i>	-0.263	0.26	0.313	-0.773	0.248
	<i>Post impact</i>	3.512**	1.485	0.018	0.602	6.423
V: Surplus	<i>Pre impact</i>	0.190	0.194	0.327	-0.190	0.571
	<i>Post impact</i>	0.531	1.640	0.746	-2.683	3.745
VI: Pressure	<i>Pre impact</i>	-0.114	0.192	0.551	-0.490	0.261
	<i>Post impact</i>	-9.810*	5.843	0.093	-21.262	1.643
VII: Branches	<i>Pre impact</i>	-0.512	0.369	0.166	-1.236	0.212
	<i>Post impact</i>	-5.534***	1.874	0.003	-9.207	-1.862
VIII: Imports	<i>Pre impact</i>	0.808	0.721	0.262	-0.604	2.221
	<i>Post impact</i>	7.855***	1.759	0	4.407	11.302

Significance at the 10% level, *, 5%, **, 1%, ***

Figures 1 and 2 show the results from Table 3 but collected in some graphs. In red they appear the post-treatment ATTs, with a band for the 5% of confidence interval.

Figure 1. Annual ATTs for GDPgr, Gini, Top and Inflation

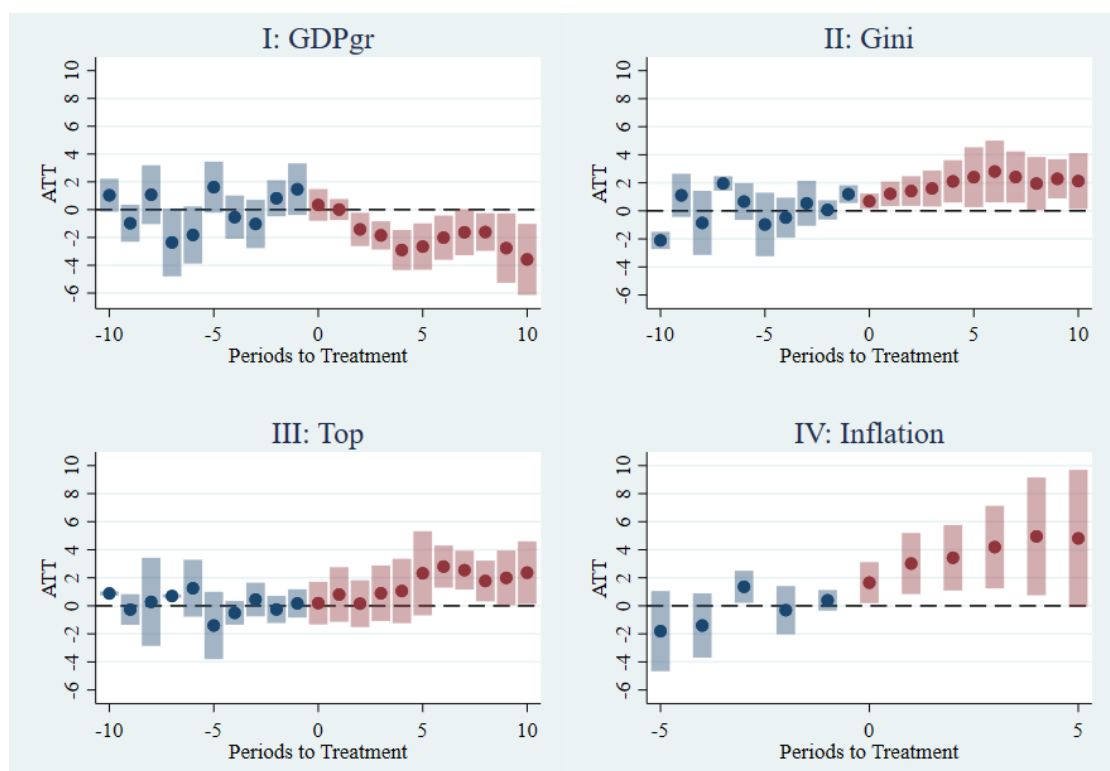


Table 3 shows the ATT effects for economic growth measured by *gdpgr* by considering only 5 periods for the pre and post treatment effects. These results are represented in Figure 3. The results show robustness without regarding the consideration of unconditional (no control), temporal effects (time), geographical factors or time and geography, showing a negative effect of adopting the euro on economic growth respect to the rest of treated countries in all cases. Additionally, it can be observed an initial positive effect on *gdpgr*, but this impact turns into negative and significant some years later.

Figure 2. Annual ATTs for Surplus, Pressure, Branches and Imports

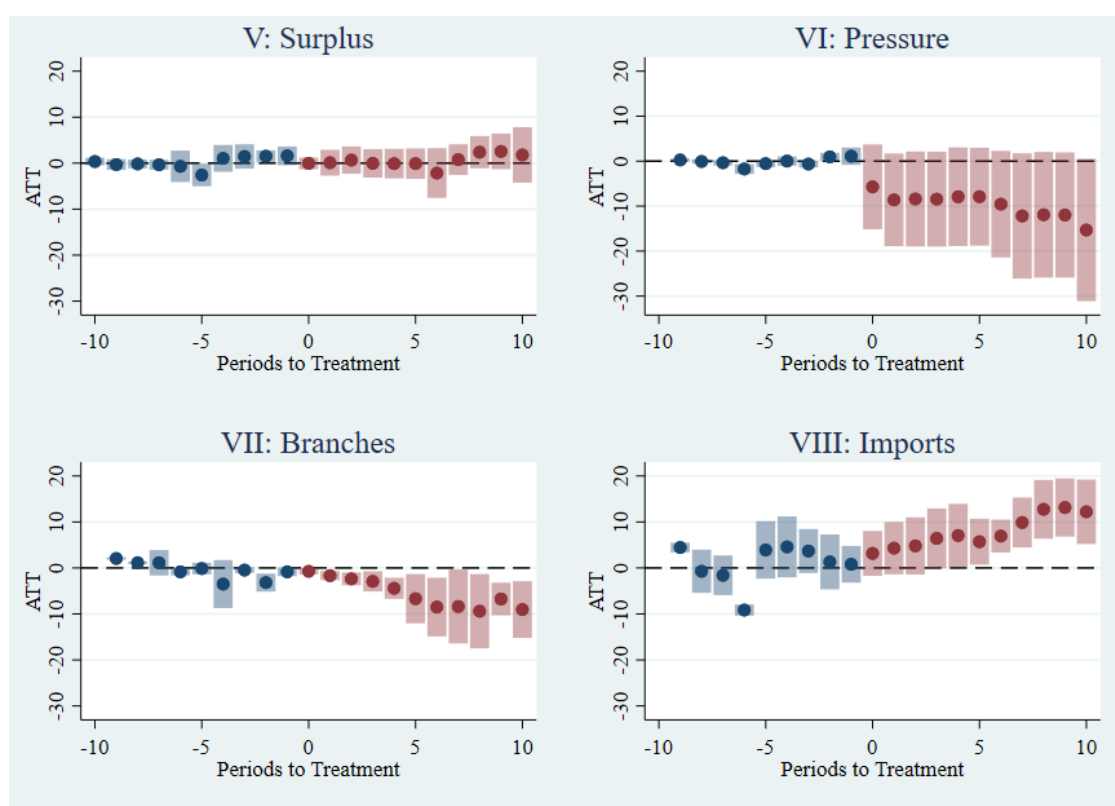
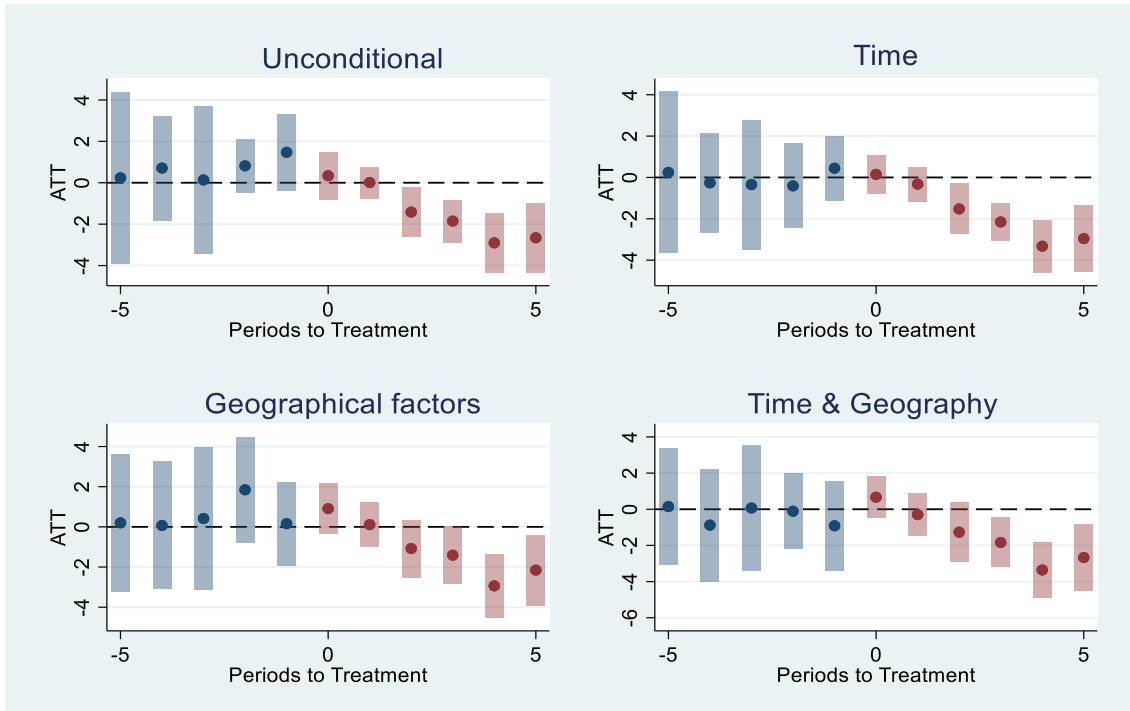


Table 3. Robustness check of the effects of *membership* on *gdpgr*

Model	ATTs	Coef.	Std. Err.	p-value	95% Conf. Interval	
i: Unconditional	<i>Pre impact</i>	0.676	0.538	0.209	-0.378	1.730
	<i>Post impact</i>	-1.41***	0.474	0.003	-2.342	-0.483
ii: Temporal effects	<i>Pre impact</i>	-0.064	0.525	0.904	-1.092	0.965
	<i>Post impact</i>	-1.688***	0.422	0	-2.515	-0.860
iii: Geographical factors	<i>Pre impact</i>	0.539	0.593	0.364	-0.624	1.702
	<i>Post impact</i>	-1.092*	0.559	0.051	-2.188	0.004
iv: Time and Geography	<i>Pre impact</i>	-0.336	0.561	0.55	-1.435	0.764
	<i>Post impact</i>	-1.459***	0.551	0.008	-2.540	-0.379

Significance at the 10% level, *, 5%, **, 1%, ***

Figure 3. *Robustness check: Annual ATTs for the effects of membership on gdpgr*



5.2 Further analysis

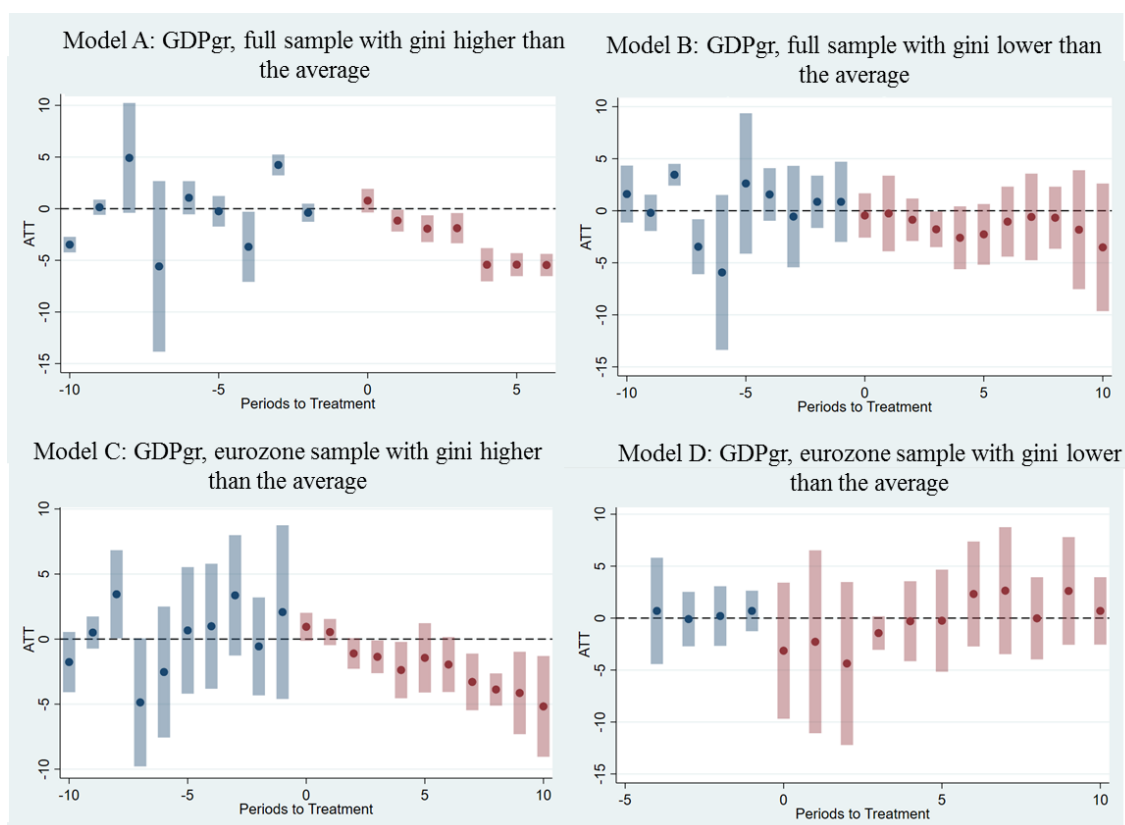
Two additional cases have been considered for the empirical results. Particularly, the differences between *gini* and the presence of treatment only for the euro area. The average/annual ATTs are collected in, respectively, Table 4 and Figure 4.

Table 4. Average ATT effects by differentiating for *gini* and euro area

Model/Variable	Effect	Coef.	Std. Err.	P-value	95% Conf. Interval	
A: GDPgr, full sample with gini higher than the average	Pre impact	-0.338	0.317	0.288	-0.960	0.285
	Post impact	-2.927***	0.458	0	-3.825	-2.029
B: GDPgr, full sample with gini lower than the average	Pre impact	0.0841	0.380	0.825	-0.660	0.828
	Post impact	-1.442	1.463	0.324	-4.309	1.426
C: GDPgr, eurozone sample with gini higher than the average	Pre impact	0.131	0.232	0.573	-0.324	0.585
	Post impact	-2.113***	0.691	0.002	-3.467	-0.760
D: GDPgr, eurozone sample with gini lower than the average	Pre impact	0.373	1.181	0.752	-1.942	2.689
	Post impact	-0.319	1.950	0.87	-4.141	3.504

The results show that the negative effect of adopting the euro is only significant when the income inequality measured by the Gini Index is higher than the average. The results are significant at the 1% level, and they are robust to considering the full sample as treatment or only the years previous to the adoption as treatment.

Figure 4. *Robustness check: Annual ATTs for $gdpgr$ regarding gini and euro area*



5. Additional robustness checks and Discussion of the results

5.1 Additional robustness checks

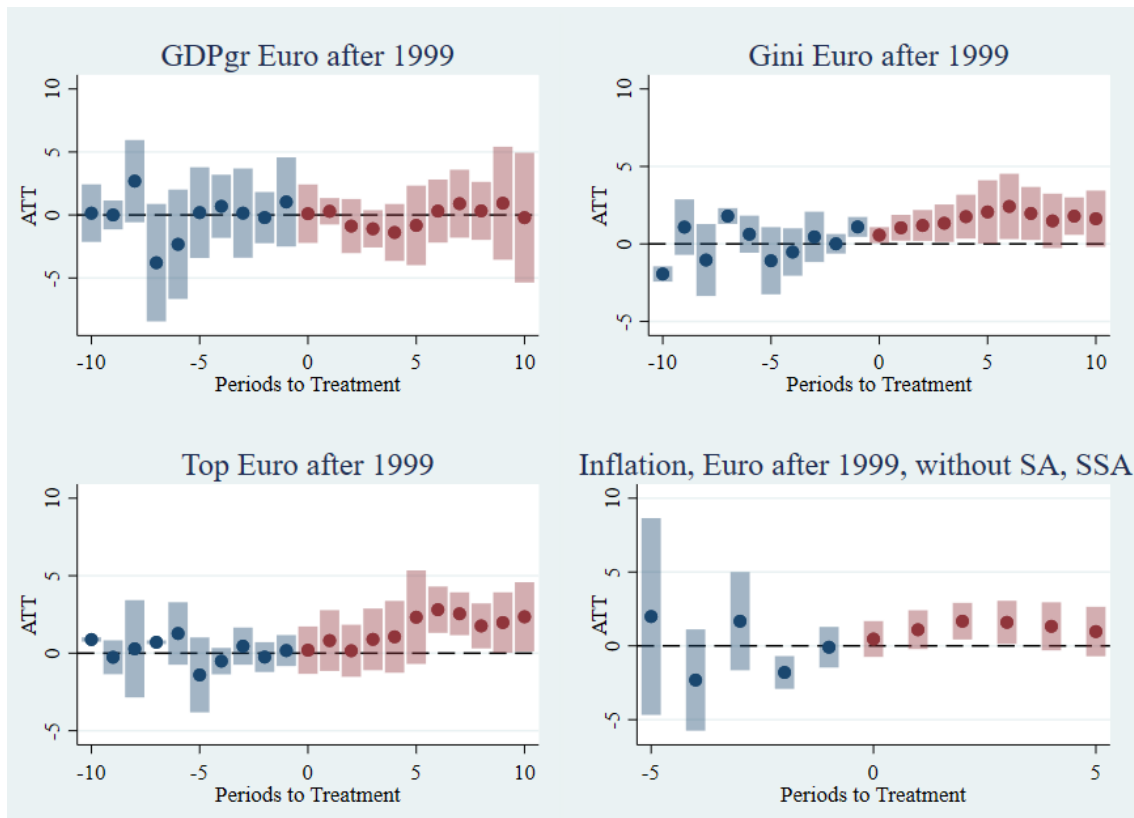
The additional robustness checks consist on estimating results distinguishing between temporal and geographical or institutional sub-samples. First, the effects on the $gdpgr$, $gini$, top and $inflation$ variables are provided for the sub-sample of countries adopting the euro after 1999. There, inflation includes the full sample with the exceptions of the South Asia (SA) and Sub-Saharan Africa (SSA) countries according to the World Bank classification by geographical regions. Their average ATTs and annual ATTs effects are shown, respectively, in Table 5 and Figure 5.

The results show a consistent and robust effect of the ATTs of Table 1 and Figure 1, where the results apply to all countries adopting the euro. This is in contrast to showing the results of only including those countries that adopted it after 1999, which constitute the last results. The only exception is the $gdpgr$ variable, with no significant effects before and after the shock when only countries with Euro after 1999 are considered.

Table 5. Average ATTs for GDPgr, Gini, Top and Inflation, adoption of euro after 1999

Variable	Sample	Effect	Coef.	Std. Err.	P-value	95% Conf. Interval	
GDPgr	All	Pre impact	-0.143	0.136	0.293	-0.408	0.123
		Post impact	-0.14	0.917	0.879	-1.938	1.658
Gini	All	Pre impact	0.049	0.077	0.524	-0.102	0.2
		Post impact	1.569***	0.529	0.003	0.532	2.605
Top	All	Pre impact	0.135	0.125	0.281	-0.111	0.38
		Post impact	1.535**	0.762	0.044	0.042	3.028
Inflation	Without SA nor SSA	Pre impact	-0.111	0.744	0.881	-1.569	1.347
		Post impact	1.185**	0.579	0.041	0.051	2.32

Figure 5. Annual ATTs for GDPgr, Gini, Top and Inflation, adoption of euro after 1999



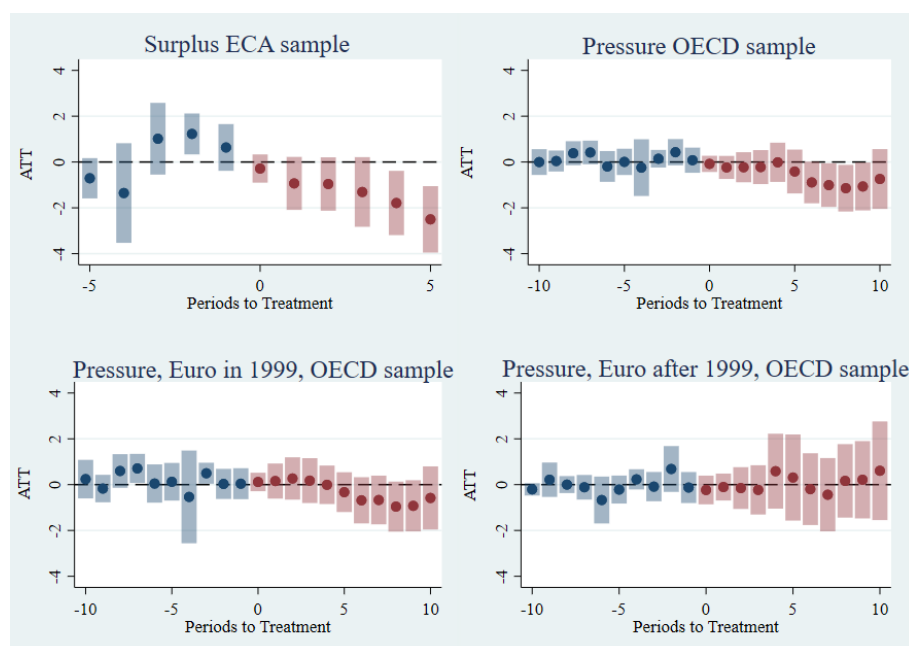
Second, the effects on *surplus* and *pressure* are presented for, respectively, the classification by the European Bank called Europe and Central Asia (ECA) region and the OECD. Then, the last estimations are also temporally differentiated by distinguishing between the countries adopting the euro in 1999 and later, as treatment. Table 6 shows the average ATTs of the previously explained exercise, while Figure 6 graphically represent their annual ATT effects.

The results show a statistically significant effect of adopting the euro on *surplus*, with negative sign, and for *pressure*, with the same sign. This result is achieved after reducing the sample to geographical or institutional sub-samples. If for the *pressure* variable temporal sub-samples are also analyzed, then it is seen that the average ATTs leave to be statistically significant in both—adopting the Euro in 1999 or later—cases. However, there is still a negative significant effect below the 10% significant level in the 8th year after the shock, but only for the countries adopting the Euro in 1999. The reason for this result may be the reduction of the sample that impedes to benefit from the law of large numbers. This leads to the avoidance of distinguishing for every case between zero effects and negative (or positive) effects with not so large number of observations. In all cases, the average ATTs before the shock are not statistically significant below 10%.

Table 6. Average ATTs for subsamples of surplus and pressure

Variable	Sample, year of adopting the Euro	Effect	Coef.	Std. Err.	P-value	95% Conf. Interval	
<i>Surplus</i>	ECA, all	Pre impact	0.163	0.285	0.568	-0.396	0.721
		Post impact	-1.296**	0.534	0.015	-2.343	-0.249
<i>Pressure</i>	OECD, all	Pre impact	0.106	0.097	0.273	-0.084	0.296
		Post impact	-0.55*	0.333	0.099	-1.202	0.103
	OECD, 1999	Pre impact	0.158	0.128	0.217	-0.093	0.409
		Post impact	-0.312	0.395	0.429	-1.086	0.462
	OECD, after 1999	Pre impact	-0.029	0.108	0.788	-0.24	0.182
		Post impact	0.048	0.589	0.935	-1.106	1.202

Figure 6. Annual ATTs for subsamples of surplus and pressure



It is worth highlighting that the year 1999 has been chosen as threshold since it divides the sample roughly to the half for each case. Finally, additional empirical exercises have been performed with *GDPpc*, collected in Table 7 and in Figures 7 and 8. Table 7 shows the average ATTs effects of adopting the euro by considering the OECD subsample alone (first two couples of rows) or jointly OECD and EU subsamples (the two next ones). These effects are further detailed by annual ATTs in Figure 7. The last four couples of rows of Table 6 consider both OECD and EU subsamples. They distinguish, respectively, countries adopting the Euro in 1999 (two first couples of rows) or after that year (two second couples of rows). For each one, there are two further subdivisions, concretely, whether the Gini index of income inequality represented by the *gini* variable is above (first) or below (second) its average. These last results, detailed for annual ATTs, are shown in Figure 8.

Table 7. Average ATTs for different subsamples of *gdppc*

Sample, year of adopting the Euro	Additional condition	Effect	Coef.	Std. Err.	P-value	95% Conf. Interval	
OECD, 1999	None	Pre impact	-0.166	0.145	0.25	-0.449	0.117
		Post impact	-1.954**	0.648	0.003	-3.224	-0.684
OECD, after 1999	None	Pre impact	-0.187	0.151	0.214	-0.483	0.108
		Post impact	-1.136	0.89	0.202	-2.88	0.609
OECD and EU, 1999	None	Pre impact	-0.096	0.137	0.481	-0.364	0.171
		Post impact	-2.104**	0.622	0.001	-3.324	-0.884
OECD and EU, after 1999	None	Pre impact	-0.13	0.12	0.279	-0.365	0.105
		Post impact	-0.551	0.776	0.478	-2.072	0.971
OECD and EU, 1999	Gini higher than average	Pre impact	-0.102	0.142	0.475	-0.381	0.177
		Post impact	-2.16***	0.626	0.001	-3.387	-0.932
OECD and EU, 1999	Gini lower than average	Pre impact	-0.169	0.247	0.495	-0.654	0.316
		Post impact	-1.976***	0.668	0.003	-3.285	-0.667
OECD and EU, after 1999	Gini higher than average	Pre impact	-0.117	0.122	0.337	-0.355	0.122
		Post impact	-0.626	0.766	0.414	-2.127	0.875
OECD and EU, after 1999	Gini lower than average	Pre impact	-0.149	0.123	0.227	-0.39	0.093
		Post impact	-0.55	0.767	0.473	-2.053	0.953

Table 7 and Figure 7 reflect again a negative impact on GDP per capita of adopting the euro, robust to only OECD and OECD plus EU subsamples, for countries adopting the euro in 1999. The results of Table 7 and Figure 8 show that the higher negative effect in absolute value on GDP per capita of adopting the euro when Gini is higher than average persists. As Table 7 shows, when the Gini index is higher than average, the coefficient is also higher in absolute value and with a lower p-value for both treatments, countries adopting the Euro in 1999 and those adopting in later than that date.

Figure 7. Annual ATTs for subsamples of gdppc

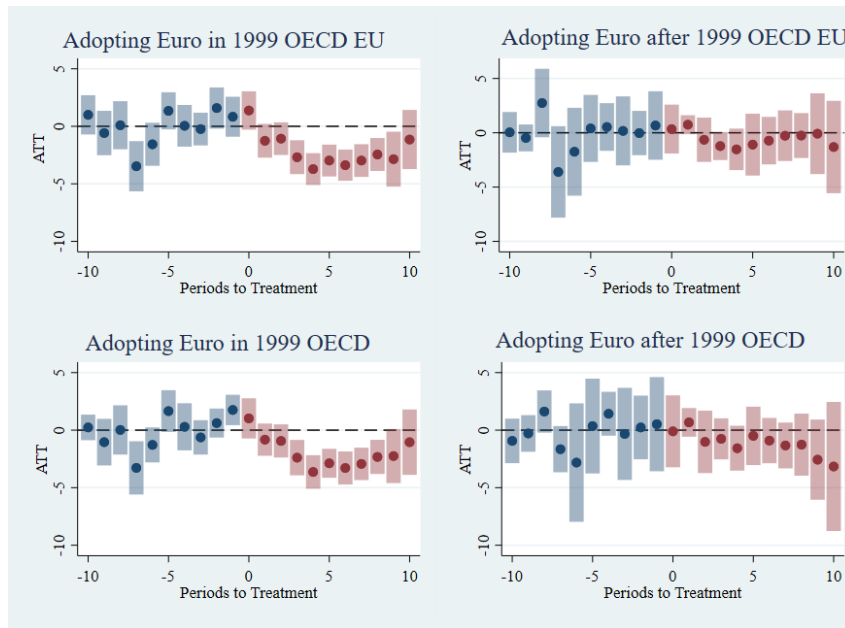
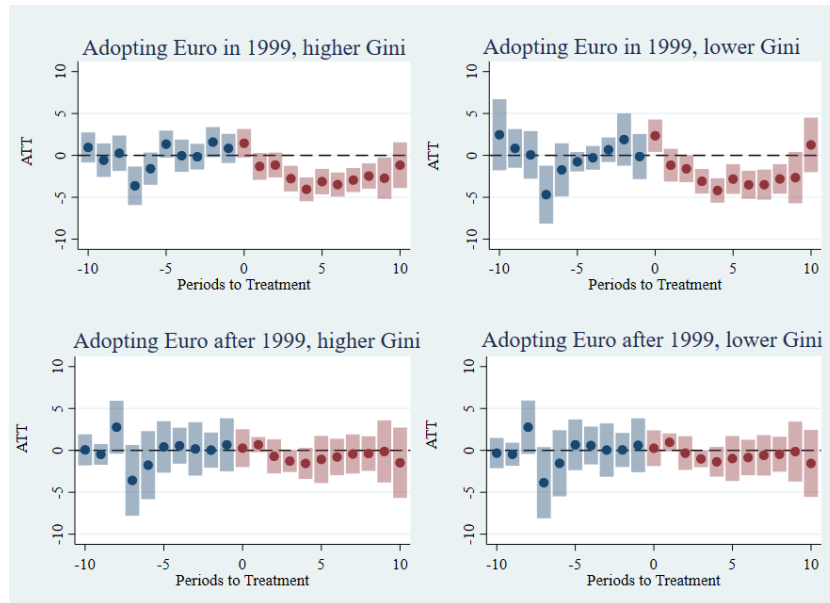


Figure 8. Annual ATTs for subsamples of gdppc when gini is above/below its average

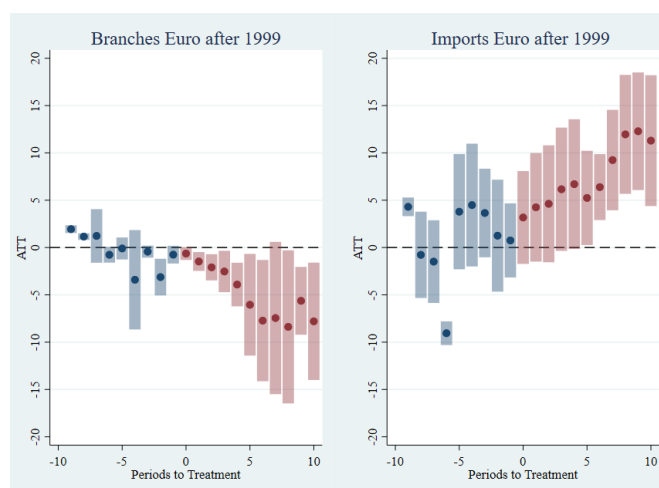


Finally, the robustness checks for the *branches* and *imports* variables only considering the countries adopting the euro after 1999 is considered in Table 8 and Figure 9.

Table 8. Average ATTs for branches and import, adoption of Euro after 1999

Variable	Effect	Coef.	Std. Err.	P-value	95% Conf. Interval	
<i>Branches</i>	Pre impact	-0.473	0.359	0.187	-1.177	0.23
	Post impact	-4.88**	1.883	0.01	-8.571	-1.188
<i>Imports</i>	Pre impact	0.768	0.709	0.279	-0.621	2.156
	Post impact	7.391***	1.733	0	3.995	10.787

Figure 9. Annual ATTs for branches and import, adoption of Euro after 1999



The results show a negative/positive and statistically significant effect of *branches/imports* robust to the new subsample of countries adopting the Euro after 1999, being consistent with previous Table 1 and Figure 2.

5.2 Discussion of the results and policy implications

The results reinforce the statement at the beginning of Section 1 and of the title, that adopting the euro does not work without political integration. The reason is the loss on welfare found in the literature and confirmed with the present findings. Concretely, GDP per capita is lower after adopting the Euro, mainly in the countries that adopted the Euro in 1999, being robust to different specifications. This effect is more pronounced for countries with income inequality measured by the Gini index higher than the average.

There is higher inflation after adopting the Euro. It is consistent to different specifications, mainly for the group of countries adopting the Euro after 1999. As Figures 1 and 5 show, these effects are durable until at five years later. Other effects have been also found. Concretely, there is an effect on average of adopting the euro statistically significant at 10% on tax *pressure*, reducing it. This effect is robust to different specifications, but more pronounced for the countries adopting the euro in 1999. This can put into trouble the public budget sustainability, suggesting higher tax rates for these countries.

Other impacts leading to lower bank branches, higher imports or higher income inequality have been found, more pronounced for countries adopting the euro after 1999. This open a debate on the real effects of common currencies when there is no political integration. With political integration, fiscal and monetary policies may be more accurate. A greater focus on fiscal issues by the Eurozone is irremediably needed.

6. Concluding Remarks

The empirical effects of adopting the euro are estimated using a novel multiple-period difference-in-differences method, the one recently developed by Callaway and Sant'Anna (2021). A sample of 216 countries for the 1960-2021 period is employed. It is obtained a lower and significant economic growth for adopting the euro. This result is more pronounced for the countries with the highest income inequality and for the economies that adopted the euro in 1999. Additionally, a higher level of income inequality—measured through different indicators—, greater inflation, lower commercial branches and more imports are the empirically observed effect of adopting the euro. This effect is specially more pronounced for countries adopting the euro after 1999. Finally, there is a lower tax pressure in the studied countries after adopting the euro, mainly for the economies that adopted the euro in the year 1999. These results are robust to temporal and geographical factors, but also to different geographical and temporal sub-samples applied.

As policy implications, it is worth highlighting the need of better monetary policies rising interest rates for fighting against the positive shock on inflation due to the euro adoption. Nonetheless, rising interest rates could also reduce the loss in economic welfare produced by adopting the euro, since in some cases a raise in official interest rates can improve income, as recently found (Peña, 2023). Additionally, this would probably help to mitigate the reduction on the number of bank branches provoked by the euro. Finally, increasing the tax rates in direct and/or indirect taxation in the Eurozone memberships would smooth the decrease in the tax pressure produced by the membership. This would also alleviate the public surplus and, so, decrease the currently excessive public debt in most of these countries. As conclusion, there is a potential of coordinating both fiscal and monetary policies, since the euro currently does not work in terms of economic welfare as seen in the present paper, and a political, therefore fiscal, integration may represent a reasonable solution.

APPENDIX

Table A1. *Data sample*

Aruba	Barbados	Algeria	Hong Kong SAR, China	Liberia	Mauritius	Qatar	Thailand
Afghanistan	Brunei Darussalam	Ecuador	Honduras	Libya	Malawi	Romania	Tajikistan
Angola	Bhutan	Egypt, Arab Rep.	Croatia	St. Lucia	Malaysia	Russian Federation	Turkmenistan
Albania	Botswana	Eritrea	Haiti	Liechtenstein	Namibia	Rwanda	Timor-Leste
Andorra	Canada	Spain	Hungary	Sri Lanka	New Caledonia	Saudi Arabia	Tonga
United Arab Emirates	Switzerland	Estonia	Indonesia	Lesotho	Niger	Sudan	Trinidad and Tobago
Argentina	Channel Islands	Ethiopia	Isle of Man	Lithuania	Nigeria	Senegal	Tunisia
Armenia	Chile	Finland	India	Luxembourg	Nicaragua	Singapore	Turkiye
American Samoa	China	Fiji	Ireland	Latvia	Netherlands	Solomon Islands	Tuvalu
Antigua and Barbuda	Cote d'Ivoire	France	Iran, Islamic Rep.	Macao SAR, China	Norway	Sierra Leone	Tanzania
Australia	Cameroon	Faroe Islands	Iraq	St. Martin (French part)	Nepal	El Salvador	Uganda
Austria	Congo, Dem. Rep.	Micronesia, Fed. Sts.	Iceland	Morocco	Nauru	San Marino	Ukraine
Azerbaijan	Congo, Rep.	Gabon	Israel	Monaco	New Zealand	Somalia	Uruguay
Burundi	Colombia	United Kingdom	Italy	Moldova	Oman	Serbia	United States
Belgium	Comoros	Georgia	Jamaica	Madagascar	Pakistan	South Sudan	Uzbekistan
Benin	Cabo Verde	Ghana	Jordan	Maldives	Panama	Sao Tome and Principe	St. Vincent and the Grenadines
Burkina Faso	Costa Rica	Gibraltar	Japan	Mexico	Peru	Suriname	Venezuela, RB
Bangladesh	Cuba	Guinea	Kazakhstan	Marshall Islands	Philippines	Slovak Republic	British Virgin Islands
Bulgaria	Curacao	Gambia, The	Kenya	North Macedonia	Palau	Slovenia	Virgin Islands (U.S.)
Bahrain	Cayman Islands	Guinea-Bissau	Kyrgyz Republic	Mali	Papua New Guinea	Sweden	Vietnam
Bahamas, The	Cyprus	Equatorial Guinea	Cambodia	Malta	Poland	Eswatini	Vanuatu
Bosnia and Herzegovina	Czech Republic	Greece	Kiribati	Myanmar	Puerto Rico	Sint Maarten (Dutch part)	Samoa
Belarus	Germany	Grenada	St. Kitts and Nevis	Montenegro	Korea, Dem. People's Rep.	Seychelles	Kosovo
Belize	Djibouti	Greenland	Korea, Rep.	Mongolia	Portugal	Syrian Arab Republic	Yemen, Rep.
Bermuda	Dominica	Guatemala	Kuwait	Northern Mariana Islands	Paraguay	Turks and Caicos Islands	South Africa
Bolivia	Denmark	Guam	Lao PDR	Mozambique	West Bank and Gaza	Chad	Zambia
Brazil	Dominican Republic	Guyana	Lebanon	Mauritania	French Polynesia	Togo	Zimbabwe

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