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Getting Closer or Falling Apart? Euro Area Countries After the Sovereign Debt Crisis

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Abstract

We study convergence and divergence dynamics in a sample of euro area countries by assembling an extensive dataset that contains information on public spending and policy outcomes in a variety of areas of government intervention including education, health, and civil justice from the early 1990s. We also focus on other important determinants of a country's economic performance such as the level of regulation of product and labor markets, as well as the trust in political institutions, quality of governance, and inequality. Results show that despite divergent economic growth in the euro periphery countries after the 2010–2012 sovereign debt crisis, the quality of services and level of regulation did not deteriorate or indeed improved, increasing convergence with the core euro countries. However, the euro area sovereign debt crisis dramatically worsened citizens' perceptions of quality of governance, as well as the level of social trust. This calls in question the future political viability of the EMU project and asks for reform.

Keywords Euro · Debt · Crisis · Convergence · Reforms · Governance · Trust

JEL Classification H5 · G01 · P48 · P51

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Introduction

The formation of the European Union (EU) and of the European Economic and Monetary Union (EMU) was predicated on increasing convergence among member countries. Economic convergence first, but also political convergence in terms of quality of institutions, respect of rule of law, transparency in governance, reduction in corruption and tax evasion, and so on. As for the EMU, while it was obvious that the introduction of the common currency did not initially satisfy the criteria of an Optimal Currency Area, the expectation was that this problem would have been gradually solved over time. Increased economic convergence would have also made it easier to introduce institutional reforms further strengthening the euro area (Junker et al. 2015); for some European federalists such as Jean Monnet, increased economic convergence would have also made it possible to converge eventually to a fully fledged political union (Gros and Thygesen 1998). The euro was to become the common currency of the EU and, indeed, all EU countries—except Denmark and the UK—had legally committed to adopt it (Spolaore 2013).

Observing the situation 22 years after the launch of the euro in 1999 and 17 years after the EU enlargement in 2004, it is tempting to conclude that European policy makers could not have been more wrong. The second largest European economy, the United Kingdom, decided to leave the EU. Economic convergence between countries in the west and the east of the EU has been strong, but political models have diverged so much that membership in the EU of countries such as Poland and Hungary cannot be taken for granted in the long run. In the euro area, the initial convergence in per capita GDP turned into divergence after the sovereign debt crisis (European Central Bank 2015).[1]

However, this pessimistic assessment is too one-sided. Following the sovereign debt crisis, the functioning of many euro area institutions was revamped and the European Stability Mechanism (ESM) was established. For instance, fiscal policies are now better coordinated through the so-called European Semester procedure and fiscal rules in the Growth and Stability Pact (GSP) were tightened.[2] In view of these institutional reforms, one could reasonably expect that the economic divergence in the aftermath of the sovereign debt crisis would be reversed and the convergence would resume in the medium term.

[1] This divergence trend induced by the outbreak of the euro area sovereign debt crisis was due to both structural rigidities and the institutional fragility of the EMU (Manasse 2013). Indeed, differently from what one may suspect, this divergence was not driven by the severe recession in single specific cases (e.g., Greece), but involved several euro area periphery countries (see Fig. 1). In light of this evidence, we study whether divergence involved also the quality of fundamental public services associated to the growth of a country, with the aim of shedding light on the survival of the EMU project. It is finally worth underlining that divergence trends in per capita GDP can be detected immediately after the outbreak of the crisis (i.e., 2010-2012) and subsequently weaken thanks to the interventions of European authorities (e.g., European Stability Mechanism).

[2] The reaction of European authorities to an exogenous larger shock such as the Covid crisis in 2020 has been much more forceful, with a more active role of the ECB in supporting member countries and the banking system and with the introduction of new tools, such as the Ng-Eu, financed by common European debt, to sustain economic convergence. It is however too early to comment on the effects of these new instruments on the evolution and sustainability of the monetary union.

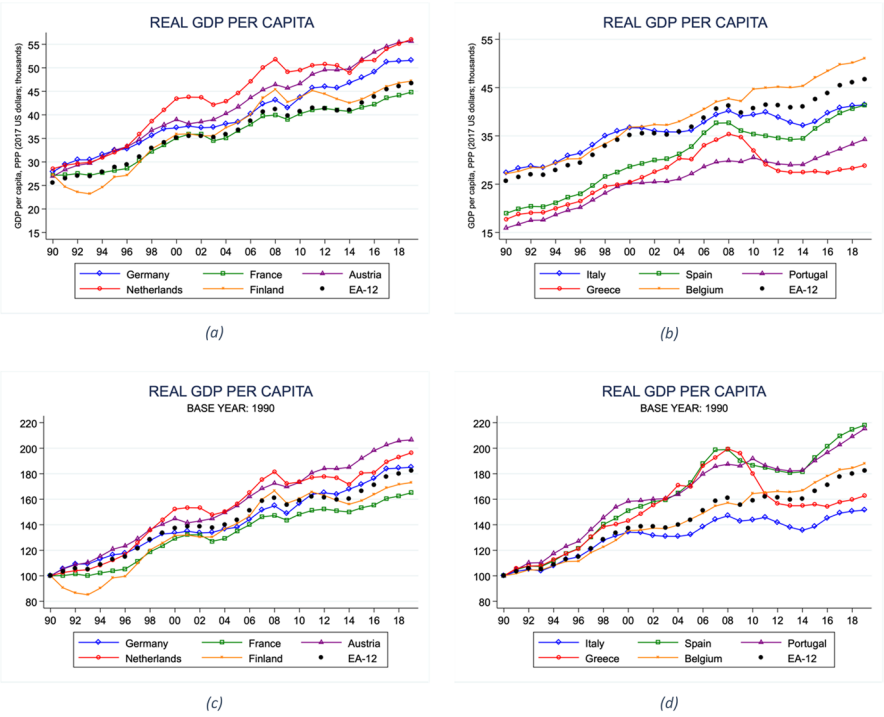

Fig. 1 GDP per capita (1990–2019). Panels (**a**) and (**b**) of Fig. 1 display the evolution over time of GDP per capita for selected euro area countries, as well as the population-weighted average value of the real GDP per capita for the EA-12 countries (i.e., Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). The value of the real GDP per capita reported in this Figure is obtained by taking the ratio of the expenditure-side real GDP at chained PPPs (in 2017 US Dollars) and a country's total population (Source: Penn World Tables). In Panels (**c**) and (**d**), the value of GDP per capita is set equal to 100 in 1990

To address these issues properly, however, one needs to go beyond the simple evolution of GDP or GDP per capita and look instead at factors that might affect the potential future growth of a country, such as the accumulation of human capital (e.g., health and education), the competitiveness of markets (e.g., civil justice, labor and product market regulations, tax system), and the quality of political and social institutions. If, despite the sovereign debt crisis, convergence has continued across euro area countries with respect to these fundamental factors, economic convergence might also be expected to resume after the crisis. To be crystal clear; we do not claim, and we do not know of any theory claiming, that the adoption of the common currency *per se* should have led to increasing convergence either in policies concerning the accumulation of human capital or in the quality of institutions. Rather, the question addressed here is whether the euro area countries that were relatively more affected by the sovereign debt crisis—and therefore had to implement stronger fiscal adjustments—have nevertheless managed to maintain convergence in these public sector variables essential for economic growth.

To perform this systematic analysis of convergence/divergence patterns among euro area countries along all these dimensions, we collect a vast array of comparable data from several sources concerning public services, product and labor markets regulation, and quality of institutions for the period 1990–2019. In the case of public services, we collect indicators regarding not only expenditure, but also internal organization and output. We complement the descriptive analysis based on convergence trends with difference-in-differences and event-study estimates. First, we test whether *participation at the monetary union* had any impact on the performance of the EA-12 countries which first adopted the euro compared to other OECD economies with similar market and political institutions.[3] Second, we test whether euro area countries hit by the sovereign debt crisis experienced different patterns of economic and institutional performance with respect to those which were not affected.

We report both good and bad news. Using standard measures of convergence (i.e., *sigma-* and *beta-convergence*), it does not seem that in the period 1990–2019 EA-12 countries were on a diverging path with respect to the economic indicators more strictly connected to efficiency and economic growth. Although the countries more stricken by the great financial crisis in 2008 and by the subsequent euro area sovereign debt crisis had to reduce public expenditure in many fundamental services, the process of convergence in the main output indicators related to the accumulation of human capital was not affected by this. For example, there was still convergence in the share of graduates in the population. Concerning civil justice (e.g., number of procedures), competitiveness, regulation of labor and product markets, and female participation to the labor market, there was actually a strong evidence of convergence, as many euro area countries implemented massive reforms to improve the functioning of the public sector and make their markets more flexible and competitive.

Our evidence from difference-in-differences estimates broadly confirms these results. While many of the estimated effects of participation at the EMU turn out to be not significant, for the sovereign debt crisis, there is instead evidence of a reduction in public expenditure. However, reforms were introduced which somewhat compensated for this. For example, expenditure in civil justice declined, but regulatory reforms led to a reduction in the number of procedures needed for a trial, thus generally improving the efficiency of the sector. We also observe a greater liberalization of the labor markets in euro area countries hit by the crisis.

However, this comforting picture changes when we look at institutional, political and social indicators. Our econometric analysis suggests that euro area countries affected by the sovereign debt crisis experienced a collapse in terms of citizens' perceptions about quality of governance, trust in national and European institutions, as well as turnout at national elections, with an increasing share of votes for populist parties. Perhaps surprisingly, a divergent trend among EA-12 countries with respect to some of these variables (e.g., corruption and perceptions about the quality of governance) appears even before the great financial crisis of 2008, as perceptions were already deteriorating in countries such as Greece, Italy, Portugal and Spain in the

[3] To secure a higher level of economic and institutional homogeneity, we exclude from the sample of the OECD countries that we use as control group both those that joined the OECD after 1989 and Turkey.

first part of the 2000's. Moreover, as our difference-in-differences estimates confirm, also social trust collapsed in the countries hit by the euro area sovereign debt crisis.

Summing up, our results suggest that, despite an increased process of convergence in terms of economic indicators concerning the quality of fundamental public services, after the outbreak of the sovereign debt crisis EA-12 were characterized by a strong trend of divergence in both institutional variables (e.g., governance quality) and political variables (e.g., share of votes for populist parties). Paradoxically, when considering political variables, a pattern of convergence emerges for citizens' trust in institutions. However, this trend is driven by the collapsing trust in core countries less affected by the crisis, which became closer to periphery countries that were already exhibiting lower levels of trust. Considering these results, the viability of the EMU project (and probably, consequently, of the entire EU project) after the euro area sovereign debt crisis was more in trouble on political rather than economic grounds. Even if the fiscal consolidation and the economic reforms implemented in the euro countries more hit by the economic crisis were necessary and useful to the future growth of these countries, in democracies citizens' perceptions matter. The fall of trust in national institutions and politicians, as well as the deterioration of the perceived quality of governance in several euro area countries affected by the crisis, led to a political backlash against the political parties that introduced the reforms. This happened for example in Italy in 2018, when populist parties gained power on an anti-Europe and anti-fiscal austerity agenda. And at the European elections of 2019, if populist parties did not manage to win a majority, they however substantially increased their voting shares and were the most voted in several countries both belonging (France, Italy, Austria) and not belonging (Poland) to the euro area.[4]

Our work is related to several strands of literature. An extensive macro-econometric literature has already discussed convergence or divergence trends among EMU countries, particularly questioning the benefits of the monetary union (e.g., Campos et al. 2016) and whether symmetric or asymmetric shocks have become more likely after its establishment (e.g., Eichengreen et al. 2007; Alesina et al. 2017; Campos et al. 2019a). Bargain et al. (2013) study asymmetric shocks, fiscal systems, and debt crises in the euro area. Campos et al. (2021), moreover, explore the relationship between core and periphery countries in the single currency area, while Gros (2018) compares the convergence between Eastern and Western European countries with the divergence between Northern and Southern ones, focusing on macroeconomic variables such as wages, investment, and consumption. Mihaljek (2018) analyzes income convergence in Central and Eastern Europe, shedding light on the methodological issues related to the choice of meaningful benchmarks to evaluate catching-up processes in convergence studies. Finally, in another contribution, Campos et al. (2019b) provide a meta-analysis that summarizes this literature. Our analysis, however, differs from these studies not only in terms of methodology, but also because

[4] As a relevant counterexample, it is worth mentioning how the establishment in February 2021 of a new government in Italy led by the Prime Minister Mario Draghi changed citizens' perceptions on the quality of governance up to the point that the well-known magazine *The Economist* chose Italy as country of the year for 2021.

our focus is on the evolution of fundamental factors, including political institutions, which lie behind economic developments.

A more micro-founded economic literature, instead, has examined the effects of the introduction of the euro on some specific sectors and markets. An example is the work of Alesina et al. (2010) that documents how the EMU triggered a deregulation process in the product markets, while labor markets reforms lagged behind. More generally, several authors have used the indicators of reforms, productivity and growth in the OECD area developed by Nicoletti et al. (2003), which we also rely on in this paper, to discuss comparable issues. A novelty of our approach, nevertheless, is that we consider also institutional and political variables, because of their relevance for the sustainability of economic convergence. Our work is also related to the literature that investigates the effects of economic and financial crises on the adoption of economic reforms (Alesina et al. 2006; Mian et al. 2014; Gokmen et al. 2021). This literature typically analyzes the characteristics of the crisis or of the political system that favor or impede reforms. Abstaining from these issues, we limit our research to study the effect of crises on reforms in EMU countries.

We are certainly not the first to document the fall in the level of trust in political institutions in euro area countries hit by the sovereign debt crisis, although other authors do not offer a similar detailed convergence analysis. For example, Dustmann et al. (2017) document empirically the effects of the economic crisis and increased immigration in Europe. Algan et al. (2017) study the political consequences of the great financial crisis in Europe, documenting that in post-2008 elections, EU regions with higher unemployment experienced the sharpest decline in trust in institutions and traditional politics. Rodrik (2018) traces back the rise of populism to globalization, also distinguishing between a "left" and a "right" populism in Europe based on the characteristics of the immigrated population. Guiso et al. (2017) discuss the emergence of populist parties in Europe, distinguishing more carefully between supply and demand factors. They suggest that the rise of populism is linked not only to truly declining economic conditions, such as for example an increase in unemployment, but more generally to the feeling of insecurity that economic phenomena such as globalization, reforms, and digitalization might have created in vast segments of the population. In an extension and in line with our findings, Guiso et al. (2019) argue that populist movements gained more consensus in euro countries because the institutional constraints imposed by participation at the EMU (common monetary policy and the European fiscal rules) limited the possible actions that mainstream parties could take in the face of shocks. Noury and Roland (2020) also offer a comprehensive review of the literature on populism in Europe and argue that the "economic anxiety" produced by the 2008 great financial crisis helped the "cultural backlash" championed by populist parties to gain electoral support among voters.

Inequality can also affect citizens' perceptions about the quality of governance, their level of trust in institutions, and the support for populist parties. Several authors have examined empirically the relationship between inequality and the establishment of the European Monetary Union or the occurrence of the great financial crisis. Bertola (2010) suggests the existence of a U-shaped relationship between the establishment of the euro area and income inequality. Inequality in EMU countries diminished until 1999, remained constant in 2000–2001 and grew during the

subsequent years. Atkinson et al. (2011) explore the relationship between inequality and the economic crisis: they do not find any empirical evidence that rising inequality leads to crises, but they document that inequality increases after a large crisis. Initially, a financial crisis mainly affects the richest individuals, while the subsequent recession hits more the poorest groups of the population.

Finally, Alesina et al. (2017), in another contribution closely related to ours, ask whether the EMU is an optimal "political" area by studying the cultural, political, and social divergence across EA-12 countries over time using social surveys. Their answer is broadly positive, as the cultural variance *inside* EA-12 countries is much larger than that *across* EA-12 countries, and the US, despite being a consolidated political union, do not exhibit a lower level of cultural variance with respect to the euro area. However, they also note that several indicators, including perceptions of quality of governance and corruption, were on a diverging path in the euro area even before the advent of the sovereign debt crisis.

The rest of the paper is organized as follows. Section "Data set" details the characteristics of our data set, specifying the collected variables and their sources. Section "An overview of convergence/divergence trends" presents a convergence analysis, looking at indicators of convergence for all our variables in the EMU context. Section "Empirical analysis" describes how we code membership to the euro area and the occurrence of the sovereign debt crisis, discussing the econometric evidence. Section "Concluding remarks" concludes. Some appendices are available online. Appendix 1 describes in detail our data sources. Appendix 2 and Appendix 3 present the graphical analysis relative to *sigma-convergence*. Appendix 4 shows the graphs of the event studies for all the variables included in our data set. Appendix 5 reports additional tables which display the results of further robustness checks for our econometric analysis.

Data set

To implement our empirical analysis, we collect a variety of data for a sample of relatively homogeneous countries. The largest sample of countries used in our econometric analysis includes all countries that joined the Organization for Economic Cooperation and Development (OECD) before 1989, except for Turkey, which has been excluded because of its remarkably different institutional features. This sample has been chosen to guarantee enough institutional homogeneity, a fundamental feature to reduce distortions in the assessment of the effects induced by decision of some of these countries to adopt the euro as their currency. The countries included in our larger sample are then: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece,

Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.[5]

Most observations cover the years from 1990 to 2019. This allows us to identify three different periods for the countries that adopted the euro: a first period before the establishment of the single currency area in 1999; a second period between 1999 and the outbreak of the euro area sovereign debt crisis, conventionally set in 2010 (see Sect. "Empirical analysis" for further discussion on the identification of the economic crisis); a third final phase marked by the consequences of the sovereign debt crisis. However, observations for some variables are available only for a shorter time horizon (see Online Appendix 1): in this case, we develop our analysis only for the available period. For each country, we collect detailed information regarding the main services provided by the public sector, taking also into account regulation, institutional variables (e.g., governance quality), and political indicators concerning citizens' attitudes (e.g., trust in political institutions and consensus for populist parties). In the selection of the indexes concerning expenditure, organization of services and outcomes, we consider both data availability and the relevance of the index for our analysis. Table 1 reports the summary statistics for these outcome variables of interest.[6]

Human Capital Indicators: Tertiary Education

Within the sphere of education, we focus specifically on the *tertiary level*, given its importance for the economic development of a country. According to the definition provided by the World Bank,[7] tertiary education includes public and private universities, colleges, technical training institutes, and vocational schools. Data about the *expenditure for students* attending tertiary education, measured as a fraction of per capita GDP, have been collected from the World Bank database, where information is available for the period from 1999 to 2015. Using the same database, we also consider the *ratio between students and teachers* as an indicator that summarizes the production technology of the service. This index might be taken as a measure of the efficiency of the educational system: a low value, in fact, suggests higher quality as the size of classes is smaller. Finally, we searched the OECD database to obtain *the share of individuals aged 25–34 who hold a tertiary level degree* as a measure of output of the service over the period 1998–2019.

[5] Euro area countries included in our sample are, therefore, the eleven countries which joined the Economic and Monetary Union in 1999 (i.e., Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain) and Greece, which joined in 2001. We use the acronym EA-12 to refer to them. It is worth underlining here that our analysis does not include Eastern European countries which joined the EMU more recently (e.g., ex-communist countries) because of their remarkably different economic, institutional, and political initial conditions compared to the EA-12 countries. Moreover, issues of data availability of many indicators we use in our analysis make it hard or prevent at all to include Eastern European countries in our analysis. Many variables of interest are, indeed, available only for short and recent time periods, while other indicators are not at all provided.

[6] Our analysis considers a broad set of economic, institutional, and political indicators. We deliberately decided not to restrict *a priori* our analysis to a specific set of indicators and to empirically test which ones are affected by our ''events'' of interest. For the sake of clarity, when presenting our econometric analysis in Sect. "Empirical analysis", we focus only on the most relevant results, while reporting the estimates for all the other variables in the Online Appendix.

[7] http://www.worldbank.org/en/topic/tertiaryeducation.

Table 1 Summary Statistics

	Mean	Std. dev.	Median	Min	Max
Tertiary education					
Expenditure (% GDP per capita)	33.25	10.61	33.44	11.20	73.58
Students-teacher ratio	14.07	5.64	13.21	3.76	44.51
Graduates (% population aged 25–34)	36.15	11.34	37.60	6.57	62.96
Health care					
Expenditure (% GDP)	6.58	1.48	6.45	3.21	14.39
Hospital beds (per 1000 inhabitants)	5.30	2.65	4.51	2.14	15.58
HAQ index (on a scale 0–100)	88.14	5.11	88.74	67.10	97.10
Life expectancy at birth (in years)	79.45	2.23	79.44	73.96	84.36
Life expectancy at age 65, men (in years)	17.05	1.59	17.10	13.30	20.30
Life expectancy at age 65, women (in years)	20.53	1.46	20.60	17.30	24.00
Civil justice					
Average cost of a trial (% claim)	21.12	7.61	22.10	7.70	45.70
Average number of procedures (per dispute)	31.45	4.92	31.00	21.00	42.00
Average length of trials (in days)	536.22	261.88	477.50	216.00	1711.00
Labor market					
LMP expenditure (% GDP)	1.97	1.20	1.79	0.24	7.07
Permanent employment protection[a]	2.04	0.92	2.08	0.09	4.83
Temporary employment protection[a]	1.68	1.20	1.34	0.25	4.87
Female participation (% active women 25+)	53.14	8.18	54.71	33.55	73.74
Male unemployment (% male labor force)	6.92	3.78	6.10	1.13	25.60
Female unemployment (% female labor force)	7.94	5.04	6.45	1.80	31.61
Regulation					
Doing business—DTF average[b]	77.13	6.93	79.41	57.09	89.30
Product market regulation[a]	1.54	0.32	1.50	0.78	2.75
Fiscal pressure (% GDP represented by taxes)	35.67	6.50	35.10	22.66	50.81
Governance, corruption, and shadow economy					
World governance indicators[c]	3.58	0.90	3.87	0.40	4.85
Corruption perception index[d]	77.73	13.96	80.00	34.00	100.00
Shadow economy (% GDP)	14.77	5.28	13.83	6.60	29.00
Trust					
Trust in the national Parliament[e]	4.90	0.91	4.83	2.09	6.69
Trust in politicians[e]	3.93	0.98	3.92	1.39	5.53
Trust in the European Parliament[e]	4.56	0.53	4.67	2.59	5.75
Social trust[e]	5.42	0.86	5.29	3.65	6.93
Voting turnouts and populist parties, income, and inequality					
Electoral turnout (% eligible voters)	73.95	12.57	75.93	42.22	95.77
Votes for populist parties (% votes)	9.82	9.80	7.80	0.00	51.12
Income share held by top 1%	0.11	0.02	0.11	0.04	0.19
Income share held by top 10%	0.34	0.04	0.33	0.23	0.46
Income share held by bottom 50%	0.21	0.03	0.21	0.13	0.28

Table 1 (continued)

[a]This index ranges between 0 and 6, with higher values corresponding to a stricter regulation (see Sects. "Labor market" and "Product market regulation" for more details)

[b]This index ranges between 0 and 100, with higher values implying a better performance (see Sect. "Product market regulation" for more details)

[c]This indicator is constructed by aggregating through Principal Component Analysis the World Governance Indicators developed by the World Bank, with higher values corresponding to better governance (see Sect. "Governance, corruption, and shadow economy" for more details)

[d]This index ranges between 0 and 100, with higher values associated to lower levels of corruption (see Sect. "Governance, corruption, and shadow economy" for more details)

[e]This score ranges between 0 and 10, with higher values associated to higher trust (see Sect. "Trust" for more details)

Human Capital Indicators: Health Care

We take government expenditure (as a fraction of GDP) *devoted to health care*[8] for the years between 1990 and 2019 from the OECD statistics, which also provide the number of (maintained, staffed, and immediately available) *beds in* (public and private) *hospitals per 1000 inhabitants*. We use this last variable as a proxy, albeit imperfect, of supply of health care services. Quality can be assessed through the *Health care Access and Quality index* (HAQ), a score ranging between 0 and 100 assigned every five years since 1990 to each country by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington,[9] and *life expectancy at birth*, one of the World Development Indicators included in the World Bank database for the whole period 1990–2019. Specifically, this variable indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of her birth were to stay the same throughout her life. As a further indicator of quality of the health care services, we consider *life expectancy at age 65*, which is provided by the OECD for men and women separately. This variable indicates the average number of years that a person at age 65 can be expected to live in each country, assuming that age-specific mortality levels remain constant.

Civil Justice

To explore the field of civil justice, we use some of the "Doing Business" indicators available at the World Bank database since 2004. In particular, the section concerning contract enforcement includes a country-level variable that measures the *average cost of a trial* as a percentage of the value of the underlying (average) claim. The

[8] We consider this variable as an input to supply health care services and not as an indicator of efficiency/quality in the provision of these services.

[9] The index is available for 195 countries. Countries in the top 5% are as follows: Andorra, Switzerland, Iceland, Norway, Sweden, Australia, Finland, Spain, and the Netherlands. Countries in the bottom 5% are as follows: Papua New Guinea, Guinea, Haiti, Eritrea, Chad, Guinea-Bissau, Lesotho, Somalia, Central African Republic, and Afghanistan. According to GBD 2015 Health care Access and Quality Collaborators (2017, p. 231), the HAQ index shows "strong convergence validity as compared with other health-system indicators, including health expenditure per capita (r=0.88), an index of 11 universal health coverage interventions (r=0.83), and human resources for health per 1000 (r=0.77)."

same database also provides data about the *number of procedures underlying the solution of a dispute*, which can be interpreted as a measure of the efficiency of the organization of the system: a disproportioned number of procedures might lead, in fact, to inefficiencies and delays. Finally, a traditional outcome indicator available in the same data set is the *length of trials*, expressed as the number of days that are necessary to enforce a contract.[10]

Labor Market

We first consider the *share of GDP invested in Labor Market Policies*, which reflects subsidies and incentives targeted at people who are unemployed, employed but at risk of job loss, inactive but willing to work. This variable is available at the OECD dataset for the period from 1990 to 2018. Regulation, then, is measured in terms of *employment protection* in the case of both *permanent* and *temporary* contracts: a score ranging between 0 and 6 has been computed by the OECD for the period from 1990 to 2018 to measure the strictness of the regulation concerning individual and collective dismissals in each country. Higher scores are associated to stricter regulation, which in turn implies lower labor market flexibility. Two other useful indicators for the performance of the labor market are the *share of active women* (older than 25) and the *unemployment rate*, which is computed separately for both males and females as a fraction of the labor force. These outcome variables have been extracted from the International Labor Organization (ILO) database for the whole period 1990-2019.

Product Market Regulation

To study the regulation of markets, we rely on the "Doing Business" indicators, which concern several features: *Starting a Business, Dealing with Construction Permits, Getting Electricity, Registering Property, Getting Credit, Protecting Minority Investors, Paying Taxes, Trading across Borders, Enforcing Contracts* and *Resolving Insolvency.* Every feature is evaluated over the period 2004–2016 using a score (from 0 to 100) that is defined as "Distance to Frontier" because it measures how far each country is from the best performer observed across all economies and all years. To obtain a synthetic index, we computed an *annual average of all these scores* for each country. A further indicator of the quality of regulation is derived from the OECD measure of the *strictness of product market regulation*, an index that evaluates the control of the government as well as the presence of barriers to entrepreneurship, investment, and trade. This index, available from 1998 to 2018, takes

[10] Note that the publication of "Doing Business" indicators has been discontinued in September 2021 because of some irregularities which have interested product market regulation data (see Sect. "Product market regulation") after 2016, when a change in methodology occurred. Since there was no methodological change for civil justice data (and the product market regulation data that we use refer to the period 2004-2016), our analysis is not affected by these irregularities. See also: https://www.worldbank.org/en/news/statement/2021/09/16/world-bank-group-to-discontinue-doing-business-report.

values from 0 to 6 and increases in presence of stricter regulation. Finally, as a proxy for fiscal pressure, we collect information about *total tax revenues as a percentage of GDP* for the years between 1990 and 2018.

Governance, Corruption, and Shadow Economy

As far as governance and corruption are concerned, the most relevant source of information is represented by the World Governance Indicators computed by the World Bank since 1996. These indicators are the result of surveys addressed to entrepreneurs, citizens, and expert respondents. The World Bank computes six separate indicators regarding *Voice and Accountability*, *Political Stability and Absence of Violence*, *Government Effectiveness*, *Regulatory Quality*, *Rule of Law* and *Control of Corruption*. Each index is computed by aggregating individual data and is expressed in units of a standardized normal distribution: hence, values range between −2.5 and 2.5, with higher numbers corresponding to better governance. To capture the overall quality of governance with a *unique measure*, we use Principal Component Analysis to extract for each year the main component of the six variables listed above. Another indicator, which focuses more specifically on corruption, is the *Corruption Perception Index*, developed by Transparency International and available for the period 1996–2019. This index measures citizens' perceptions about corruption on a scale from 0 to 100, with higher scores attributed to countries where corruption is perceived as *less* pervasive. Finally, we use the estimates provided by the Institute for Economic Research (IFO), which cover the period between 1990 and 2015, to measure the *share of shadow economy on GDP*.

Trust

Economic crises might also affect citizens' *trust in institutions* and *toward other members* of the society. We searched the European Social Survey (ESS) database to obtain measures concerning trust in the *national Parliament*, trust in *national politicians*, trust in the *European Parliament* and *social trust* in European countries. The ESS database, which contains information for the period between 2002 and 2018, is based on interviews conducted in each country every two years: questions are asked to resident people aged 15 and over, regardless of their nationality, language, or legal status. Everyone's level of trust is expressed on a scale between 0 and 10, with higher scores associated to higher trust. For each country, we computed an annual weighted average of individual scores by means of survey weights.

Voting Turnouts and Populist Parties

Crises might affect democratic participation and political support for extreme parties. To measure the *turnout at national elections* since 1992, we use the database of the International Institute for Democracy and Electoral Assistance (IDEA). Using the European Election database and Van Kessel's classification (2013), instead, we compute the *share of votes obtained by populist parties*.

Economic inequality and poverty

Crises can have an impact on the level of inequality and poverty. Therefore, we collect data on the share of income held by the top 10%, the top 1% and the bottom 50% of the population. These variables are taken from the World Inequality database and are available for the period 1990–2019.

GDP and Population

To describe trends over time of real GDP per capita in the countries in our sample, we rely on the database "Penn World Tables" (version 10.0) developed by researchers at the University of California Davis and at the Groningen Growth and Development Centre (Feenstra et al. 2015). For each country in our sample, we take data on the expenditure-side real GDP at chained PPPs (in millions 2017 US Dollars) and population (in millions) over the period 1990–2019. We, then, take the ratio of these two variables to compute each country's annual value of real GDP per capita.

Crisis Indicators: Credit Ratings and Other Control Variables

To identify the emergence of a crisis (see section "Empirical analysis" for a discussion), we also exploit the *credit ratings* attributed to each country by Standard & Poor's since 1990, which are available at the "Trading Economics" database.

An Overview of Convergence/Divergence Trends

Figure 1 presents the evolution of GDP per capita in selected euro area countries from 1990 to 2019. As it is clear from the figure, the group of EA-12 countries in our sample grew at approximately the same rate before joining the Economic and Monetary Union in 1999. With the monetary union, we first observe a period of sharp convergence, when relatively poorer countries like Spain and Greece grew much faster than richer countries such as Germany, Belgium, Austria, or the Netherlands. After the euro area sovereign debt crisis, since 2010, we observe a process of divergence with richer countries growing faster than poorer ones, particularly with respect to Greece, whose economy collapsed.

Keeping these figures in mind, we now look at what happened to the variables in our sample. Borrowing from the economic growth literature (e.g., Barro and Sala-i-Martin 1992), we use both *sigma-convergence* and *beta-convergence* to check for convergence/divergence trends across countries.[11] *Sigma-convergence* is a standard measure of dispersion among countries (e.g., the standard deviation) in each specific year: a rising value along years suggests increasing divergence and vice versa. The

[11] Strictly speaking, as we have reduced ex ante the sample to a subset of homogeneous countries characterized by similar institutions, ours is an exercise of "conditional convergence".

analysis of beta-convergence, instead, focuses on the average annual growth rate of a variable over a given period and compares it with the initial value of the series: if lower initial levels are associated to subsequent higher growth rates, there is evidence of convergence. These two indicators capture the same phenomenon (indeed, *beta-convergence* is a necessary, although not sufficient, condition for *sigma-convergence*), but the former allows to appreciate trends over a long period, whereas the latter to look at convergence/divergence in specific time intervals.

We compute *sigma-* and *beta-convergence* for each variable in the sample of EA-12 countries. Online Appendix 2 reports the graphs (Figs. A2.1–A2.10) regarding *sigma-convergence* for our indicators, while Table 2 provides a qualitative summary of the results, displaying "plus" and "double plus" ("minus" and "double minus") to indicate, respectively, weak or strong convergence (divergence).[12] Results are reported for the three periods under consideration: before the introduction of the euro; after 1999 but before the outbreak of the sovereign debt crisis in 2010; after 2010. As a robustness check, following Mihaljek (2018), we also replicate our analysis of *sigma-convergence* after excluding Ireland and Luxembourg, two potential outliers (an offshore financial center and a tax haven for global corporations, respectively) which may bias our dynamics. The corresponding graphs are reported in Online Appendix 3 and largely confirm all our previous results.

Starting with ***Tertiary Education*** (Fig. A2.1), the analysis of *sigma-convergence* shows that EA-12 countries in the sample *converged in terms of expenditure* between 2004 and 2011, when the sovereign debt crisis induced a short temporary divergence. This is confirmed by *beta-convergence* (not displayed in the Online Appendix), with initially lower spending countries increasing their expenditure more than higher spending ones, a trend that on balance has not been affected by the crisis. The crisis has also not affected *outcome*, measured by the *share of graduates*, which shows an overall convergence along the whole period under consideration. Concerning our proxy for the *organization* of the service, however, some dispersion emerges; indeed, *sigma-divergence* in the *students-teacher ratio* across countries grew uninterruptedly after 2008 because of the recession.

A similar story emerges for the ***Health Care Sector*** (Fig. A2.2). Government expenditure started diverging after the beginning of the great financial crisis, and so did the number of staffed beds in hospitals. However, the HAQ index, which was sharply converging before the crisis, did not diverge after it. Also, in the case of life expectancy at birth and at age 65 (for both men and women), there is no evidence of divergence after the outbreak of the euro area sovereign debt crisis.

A more complex pattern characterizes ***Civil Justice*** (Fig. A2.3), for which information is available only after 2004. Concerning expenditure, convergence tends to prevail after the outbreak of the euro area sovereign debt crisis. Moreover, a *marked convergence* emerges in terms of the *number of procedures* after this crisis, as in many countries reforms were implemented to enhance efficiency in the judicial system by reducing procedures, especially in euro periphery countries such as Greece,

[12] To save space, we do not report the graphs for beta convergence for our indicators. They are available from the authors upon request.

Table 2 *Sigma-convergence* (EA-12 countries)

	Before euro (1990–1998)	Before crisis (1999–2009)	After crisis (2010–2019)
Tertiary education			
Expenditure	NA	−/+	+/−
Students-teacher ratio	NA	s	--
Graduates	NA	s	+
Health care			
Expenditure	-	++	--
Hospital beds	s	++	--
HAQ	+	+	s
Life expectancy at birth	s	+	s
Life expectancy at age 65—Men	s	+	s
Life expectancy at age 65—Women	s	+	s
Civil justice			
Expenditure	NA	-	+
Number of procedures	NA	--	++
Length of trials	NA	+	--
Labor market			
LMP expenditure	++	−/+	−/+
Permanent employment protection	+	s	++
Temporary employment protection	s	++	s
Female participation	+	+	+
Male unemployment	−/+	++	--/+
Female unemployment	−/+	++	--/+
Regulation			
Doing business—DTF average	NA	+	++
Product Market Regulation	NA	s	+
Fiscal pressure	s	+	-
Governance, corruption, and shadow economy			
World governance indicators	s	-	--
Corruption perception index	+	s	--/++
Shadow economy	--	++	−/++
Trust			
Trust in the national Parliament	NA	-	--/+
Trust in politicians	NA	-	--/+
Trust in the European Parliament	NA	s	−/+
Social trust	NA	s	-
Voting turnouts and populist parties, income, and inequality			
Electoral turnout	--	s	-
Votes for populist parties	-	+	--
Income share held by top 1%	+	s	+
Income share held by top 10%	+	s	+
Income share held by bottom 50%	+	s	+

Table 2 (continued)

For each outcome variable, the table reports whether in the different periods under consideration there is convergence (+), strong convergence (++), stability (s), divergence (-) or strong divergence (--). In a given period, we can also observe convergence followed by divergence (denoted by "+/−") or divergence followed by convergence (denoted by "−/+"). NA denotes that data are unavailable in a given period. For example, if we look at expenditure on tertiary education, data are not available in the period 1990-98. In the years 1999-2009 we observe first a process of "divergence" followed by "convergence" ("−/+"), while the last period under consideration (2010–2019) is characterized by "convergence" followed by "divergence" ("+/−")

Spain, Italy, and Portugal. However, several countries also show a remarkable *growth of the length of trials*, which slightly decreased only in Italy and Portugal. This increased divergence.

The ***Labor Market*** series show clearer dynamics (Figs. A2.4 and A2.5). Expenditure as a percentage of GDP increased rapidly after the great financial crisis in the countries hit by the recession and this increased the divergence between 2008 and 2010. After then, convergence resumed. Concerning *labor market regulation*, a *sharp convergence* for *permanent contracts* emerges after the euro area sovereign debt crisis, parallel to what had happened for temporary contracts before it. Indeed, Portugal, Spain, Greece, Ireland and, to a lesser extent, Italy and France reduced protection for regular permanent contracts. Furthermore, the process of *sigma-convergence* for *female labor market participation* continued in EA-12 countries despite the crisis, while, as expected, a sharp *sigma-divergence* characterized (male and female) *unemployment rates* after the outbreak of the crisis until 2013. Unemployment, in fact, increased everywhere immediately after 2009, with the only exception of Germany, where it declined.

As far as the ***Doing Business*** (average) indicator is concerned (only available since 2004), there was a slight convergence before 2008 (Fig. A2.6). However, because of the great financial crisis, the process of *convergence strengthened*, particularly after 2011. Again, the countries that achieved the strongest improvements were those that suffered the worst consequences of the sovereign debt crisis, namely Greece, Italy, Portugal, and Spain. The same process characterizes ***Product Market Regulation*** (Fig. A2.6): even in this case, the convergence process among EA-12 countries after the crisis towards a reduced protection is strong. In addition, after a period of *sigma-convergence* before the crisis, EA-12 countries started diverging also in terms of ***Fiscal pressure*** immediately after 2007 (Fig. A2.6).

Different results emerge about the ***Quality of Governance*** (Fig. A2.7) indicator. After the foundation of the EMU and up to the great financial crisis, *divergence increased* following a deterioration in the indicator in Southern Europe, particularly in Greece, Italy and, to a lesser extent, Spain, and Portugal. The euro area sovereign debt crisis influenced this scenario by worsening it. Consequently, *divergence increased even further*. Indeed, in the extreme case of Greece, the index fell by 12% yearly between 2008 and 2016. About the ***Corruption Perception*** index (Fig. A2.7),

convergence was interrupted by the introduction of the euro[13]; then, divergence sharply increased between 2008 and 2012, when it reversed again into convergence. Italy and Spain stand out because in these countries the perception of corruption was already growing before the crisis. Divergence in ***Shadow Economy*** (Fig. A2.7) increased in the period preceding the foundation of the EMU but fell consistently after 1999. With the euro crisis, however, *divergence* started rising again until 2013, particularly because of the worsening performance of Greece, Italy, Portugal, and Spain.

Trust* in *the national Parliament and in national politicians (available only for EU countries from 2002 to 2014) continuously diverged between 2002 and 2008 and diverged even more strongly after the great financial crisis, before showing a slight *sigma-convergence* in recent years (Fig. A2.8). This last phenomenon is due to a broad reduction in trust levels across almost all countries. Specifically, while trust did not change in most EU countries up to 2008, it was already declining in Portugal, Italy and, most of all, Greece in the period 1999–2007. With the euro area sovereign debt crisis, apart from Germany and Sweden, a *sharp reduction* in trust in national institutions occurred everywhere, with Greece as an extreme case.

As for ***Trust* in the *European Parliament*** (Fig. A2.8), there was a slight increase in *sigma-convergence before* the euro area sovereign debt crisis, since Sweden became a bit less and Italy a bit more EU sceptic, but subsequently divergence prevailed sharply until 2010, when the trend became stable. However, stability was reached at a lower level of trust, as after the crisis all countries exhibited a reduction in this indicator. ***Social trust*** (Fig. A2.9), instead, was not affected by the crisis, remaining roughly constant in all countries. Hence, there are no patterns of convergence/divergence across countries.

The increasing divergence in trust in national institutions, quality of governance and perception of corruption affected ***Turnout at national elections*** (Fig. A2.9), too. After a period of substantial stability, in fact, *divergence* emerged between 2010 and 2013. Specifically, electoral turnout fell in Portugal, France, Italy, and Greece, while it remained stable in the other European countries. Depressing enough, European countries show a remarkable process of divergence also in the ***Votes for Populist*** parties (Fig. A2.9). Populist parties were born and raised consensus in all European countries, even those less affected by economic losses such as France, Finland, or Sweden. However, while in Greece and Spain the average annual growth rate of votes for populist parties steadily increased after the sovereign debt crisis, the growth rate is lower in countries like Italy or Austria, where the support for populist parties was already very high.

Results concerning trust and electoral turnouts are strictly related to the trends that emerge with respect to inequality and poverty: after an initial period of convergence, in fact, EA-12 countries exhibit a relevant pattern of sigma-divergence in terms of income distribution because of the outbreak of the euro area sovereign debt crisis (Fig. A2.10). In particular, the share of income held by the top 10% of the population fell significantly in Portugal, Spain, Italy, and Greece, where it was

[13] Alesina et al. (2017) note the same and suggest that this might be due to the specialization induced by the EMU, with countries in the North of Europe specializing more in manufactures and countries in the South more on services that are more prone to corruption and bad government. This is however little consistent with the case of Italy, that has a strong manufacture sector.

already low before the crisis, while it remained stable in the other countries, generating a remarkable diverging in the euro area.

Summing up, as already anticipated in the Introduction, a general story seems to emerge from the analysis of all these indicators. If one looks only at the economic indicators more strictly connected to efficiency and economic growth, such as our proxies for the supply of human capital, civil justice, "Doing Business" or labor and product market regulations, it does not seem that EA-12 countries are on a diverging path. Although the countries mostly stricken by the sovereign debt crisis had to reduce public expenditure on fundamental services, increase taxes and economize on the production of services, it turns out that the main output indicators, such as the HAQ index for health care or the share of graduates for tertiary education were not affected by this. Indeed, there is no evidence of divergence in the performance of the health care system and there is still convergence in tertiary education. Concerning civil justice, "Doing Business" and regulation of both labor and product markets, there is actually a very strong evidence of *convergence*, as many EA-12 countries hit by the sovereign debt crisis implemented massive reforms to improve the functioning of the public sector and make their markets more flexible and competitive.

However, results are reversed if one looks at institutional variables and political indicators that depend on citizens' perceptions, such as the level of trust in national and European institutions. Perhaps surprisingly, in this case, a general divergent trend among EA-12 countries appears even before the great financial crisis and the euro area sovereign debt crisis, when the EU and the EMU seemed largely able to keep their promises. However, the degree of institutional divergence in terms of governance quality accelerated strongly after 2008. Such trend is mirrored in the growing political divergence among euro countries in terms of support for populist parties, which highly increased in periphery countries. Paradoxically, a pattern of convergence emerges with respect to the level of trust in institutions after the outbreak of the sovereign debt crisis. Unfortunately, such trend cannot be attributed to higher trust in crisis countries, but it is rather due to a reduction in the level of trust also in non-crisis EA-12 countries.

Empirical Analysis

Econometric Specifications

To cast further light on these processes, in this section we look in more detail on whether the adoption of the euro (what we refer to as "*euro membership*") or the occurrence of the sovereign debt crisis in some euro area countries (what we refer to as "*euro crisis*") played any role in explaining the time patterns of the outcome variables described in Sect. 2. To this end, we rely on difference-in-differences estimates and on event-study analysis.

An issue to address when performing the empirical analysis relates to the coding of the two "events" of interest, i.e., the adoption of the euro and the sovereign debt

crisis. As regards the first event, in our main analysis it refers to those countries which adopted the euro in 1999. In the next section, we assess whether our findings are robust to the inclusion in the treatment group of Greece, which adopted the European single currency in 2001.[14]

Coding the occurrence of the euro area sovereign debt crisis is not so straightforward. This crisis hit only some countries, at different moments and with a different intensity. We could use variables such as GDP growth to determine the size and timing of the crisis, but indicators of this sort are themselves endogenous. For instance, the fiscal correction measures implemented by several countries after the debt crisis had an impact on the GDP performance. Hence, without pretense of fully addressing issues of endogeneity, we prefer to rely on different indicators to identify the occurrence of the crisis. In our main analysis, the event "*euro crisis*" refers to Greece, Ireland, Italy, Spain, and Portugal that starting from 2010 were hit by the sovereign debt crisis (see Busetti and Cova 2013). In the next section, we test the robustness of our results to the adoption of a different definition of "*euro crisis*" based on variations of countries' credit ratings.

The difference-in-differences specification that we use to test the impact of the adoption of the euro on the variables of interest is as follows:

$$Y_{it} = \alpha + \beta PostEuro_{it} + \rho_i + \gamma_t + \varepsilon_{it} \tag{1}$$

where Y_{it} denotes our outcome variables, $PostEuro_{it}$ is a dummy variable that in the period 1999-2004 is equal to one for all countries that adopted the euro in 1999,[15] ρ_i and γ_t are country and year fixed effects, respectively. The pre-treatment period starts six years before the adoption of the euro (i.e., in 1993). The control group is given by the OECD countries listed in Sect. 2 that did not adopt the euro. Standard errors are clustered at the country level.

To assess the impact of the sovereign-debt crisis that hit some euro countries, we estimate the following difference-in-differences specification:

$$Y_{it} = \alpha + \beta PostCrisis_{it} + \rho_i + \gamma_t + \varepsilon_{it} \tag{2}$$

The variable $PostCrisis_{it}$ takes value one for Greece, Ireland, Italy, Spain, and Portugal starting from 2010 and in the following five years (see Busetti and Cova 2013). The specification includes country and year fixed effects (ρ_i and γ_t, respectively). Also in this case, the pre-treatment period begins six years before the occurrence of the "event" of interest (i.e., in 2004). When estimating Eq. (2), we restrict the control group to the euro countries in our sample[16] that did not experience the sovereign-debt crisis. Standard errors are clustered at the country level.

[14] Former Eastern Socialist European countries that joined the EMU after 2004 as well as Cyprus and Malta that became part of the Euro area in 2008 are excluded from the analysis.

[15] The countries which adopted the euro in 1999 are Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain. We drop Greece from these estimates.

[16] The euro countries in the control group are Austria, Belgium, Finland, France, Germany, Luxembourg, and Netherlands.

To test for parallel trends and assess the dynamic effects of the treatment under consideration, we also estimate the following model for the adoption of the euro in year $t_1 = 1999$:

$$Y_{it} = \alpha + \sum_{k=-6}^{k=+5} \omega_k euro_{i,(t_1+k)} + \rho_i + \mu_t + \varepsilon_{it} \tag{3}$$

Using this equation, we estimate a sequence of time varying coefficients of the variable $euro_{i,(t_1+k)}$ that for each year $t = t_1 + k = 1993, \ldots, 2004$ is equal to one for all countries that adopted the euro in 1999. The omitted year is the one before the "treatment". The coefficients ω_k with $k < 0$ should not be statistically different from zero. The specification includes country and year fixed effects (ρ_i and μ_t, respectively). Standard errors are clustered at the country level. The control group is given by all our sample countries that did not adopt the European single currency.

In the same vein, we estimate the following equation for the occurrence of the sovereign debt crisis in the euro area ("*euro crisis*") in year $t_1 = 2010$:

$$Y_{it} = \alpha + \sum_{k=-6}^{k=+5} \tau_k crisis_{i,(t_1+k)} + \rho_i + \mu_t + \varepsilon_{it} \tag{4}$$

The explanatory variable $crisis_{i,(t_1+k)}$ takes value one for Greece, Ireland, Italy, Spain, and Portugal for each year $t = t_1 + k = 2004, \ldots, 2015$. When estimating equation (4) too, we omit the year before the "treatment". The control group is given by the remaining euro area countries that did not experience the sovereign debt crisis.

Main Results

Table 3 summarizes our findings concerning the adoption of the euro. In particular, the second and third column of the table report estimates of the coefficient β from Eq. (1) with associated standard errors. It is worth noting that the results reported in this table refer to a smaller number of outcome variables than in the sovereign debt crisis analysis as we do not always have enough observations for the years preceding the adoption of the euro.

Some interesting considerations emerge from this table, complementing the convergence analysis of Sect. 3. The adoption of the euro is associated with an improvement of the Health care Access and Quality index, an increase in female labor market participation, and a reduction in female unemployment. There is also evidence that countries that adopted the euro experienced a reduction in temporary employment protection.

Table 4 report our findings concerning the euro area sovereign debt crisis. They show in the second and third column estimates of the coefficient β from Eq. (2) with associated standard errors. The picture that emerges is somewhat different. In the aftermath of the sovereign debt crisis that hit Greece, Ireland, Italy, Spain, and Portugal starting from 2010, we observe a statistically significant reduction in permanent and temporary employment protection, an increase in male and female unemployment as well as in labor market expenditure. As regards civil justice, both

Table 3 Difference-in-differences: adoption of the euro (1993–2004)

Outcome variables	Coefficient	Standard error	Observations	R-squared
Health care				
Expenditure	−0.130	(0.157)	262	0.626
Hospital beds	−0.0496	(0.264)	209	0.607
HAQ	0.714**	(0.284)	264	0.960
Life expectancy at birth	0.089	(0.112)	264	0.936
Life expectancy at age 65—Men	−0.058	(0.092)	264	0.9228
Life expectancy at age 65—Women	0.053	(0.141)	264	0.7794
Labor market				
Expenditure	0.0410	(0.323)	237	0.440
Permanent employment protection	−0.0932	(0.056)	240	0.077
Temporary employment protection	−0.464*	(0.263)	240	0.268
Female participation	1.830**	(0.783)	264	0.603
Male unemployment	−0.772	(1.093)	264	0.385
Female unemployment	−2.032*	(1.110)	264	0.469
Governance, corruption, and shadow economy				
World governance indicators	−0.0511	(0.076)	198	0.113
Corruption perception index	2.018	(2.116)	195	0.061
Shadow economy	0.132	(0.327)	246	0.564
Voting turnouts and populist parties, income, and inequality				
Electoral turnout	0.670	(1.485)	262	0.209
Votes for populist parties	−3.098	(1.786)	178	0.215
Income share held by top 1%	−0.006	(0.005)	264	0.393
Income share held by top 10%	−0.007	(0.006)	264	0.432
Income share held by bottom 50%	−0.001	(0.005)	264	0.115

***p value < 0.01; ** 0.01 ≤ p value < 0.05; * 0.05 ≤ p value < 0.10

The table reports in the second and third column estimates of the coefficient β from equation (1) with associated standard errors for all available outcome variables. All specifications include country and year fixed effects. Robust standard errors clustered at the country level

the number of judicial procedures and expenditure fell after this crisis. At the same time, we observe a worsening of citizens' perceptions about the quality of governance and a decline in trust in the European and national Parliaments as well as in politicians. Social trust decreased, too.

A selection of the main results obtained from the estimates[17] of Eqs. (3) and (4) is presented in Figs. 2, 3, 4, and 5, while the graphs for all the other variables are reported in the Online Appendix 4. The year zero on the x-axis refers to 1999 in the euro membership analysis and to 2010 in the euro crisis estimates.

[17] Also in this case, due to data availability constraints, we report estimates on a smaller number of outcome variables for the "euro membership" analysis.

Table 4 Difference-in-differences: euro area sovereign-debt crisis (2004–2015)

Outcome variables	Coefficient	Standard error	Observations	R-squared
Tertiary education				
Expenditure	0.201	(2.077)	122	0.200
Students-teacher ratio	2.650	(3.019)	131	0.183
Graduates	0.996	(1.870)	144	0.716
Health care				
Expenditure	−0.361	(0.342)	144	0.437
Hospital beds	−0.120	(0.427)	144	0.474
HAQ	0.078	(0.342)	144	0.948
Life expectancy at birth	0.254	(0.191)	144	0.937
Life expectancy at age 65—Men	0.103	0.121	144	0.916
Life expectancy at age 65—Women	0.215	0.124	144	0.901
Civil justice				
Expenditure	−1.586*	(0.844)	141	0.152
Number of procedures	−1.563*	(0.807)	141	0.555
Length of trials	35.56	(80.81)	141	0.139
Labor market				
Expenditure	0.756***	(0.225)	132	0.454
Permanent employment protection	−0.316*	(0.162)	140	0.377
Temporary employment protection	−0.280**	(0.103)	140	0.447
Female participation	−0.554	(1.138)	144	0.468
Male unemployment	8.516***	(1.965)	144	0.668
Female unemployment	7.810***	(1.834)	144	0.630
Regulation				
Doing Business—DTF average	1.381	(1.288)	141	0.521
Product Market Regulation	−0.148	(0.088)	144	0.725
Fiscal Pressure	−0.211	(1.088)	144	0.316
Governance, corruption, and shadow economy				
World governance indicators	−0.338**	(0.136)	144	0.454
Corruption perception index	−1.548	(1.710)	144	0.357
Shadow economy	0.155	(0.250)	144	0.894
Trust				
Trust in the national Parliament	−0.874***	(0.180)	128	0.583
Trust in politicians	−0.654**	(0.220)	128	0.477
Trust in the European Parliament	−0.666***	(0.118)	128	0.615
Social trust	−0.147*	(0.067)	128	0.182
Voting turnouts and populist parties, income, and inequality				
Electoral turnout	−2.714	(1.938)	144	0.506
Votes for populist parties	7.697	(4.956)	117	0.491
Income share held by top 1%	0.008	(0.005)	144	0.275
Income share held by top 10%	−0.001	(0.007)	144	0.274
Income share held by bottom 50%	0.002	(0.003)	144	0.165

***p value < 0.01; ** 0.01 ≤ p value < 0.05; * 0.05 ≤ p value < 0.10

The table reports in the second and third column estimates of the coefficient β from equation (2) with

Table 4 (continued)

associated standard errors for all available outcome variables. All specifications include country and year fixed effects. Robust standard errors clustered at the country level

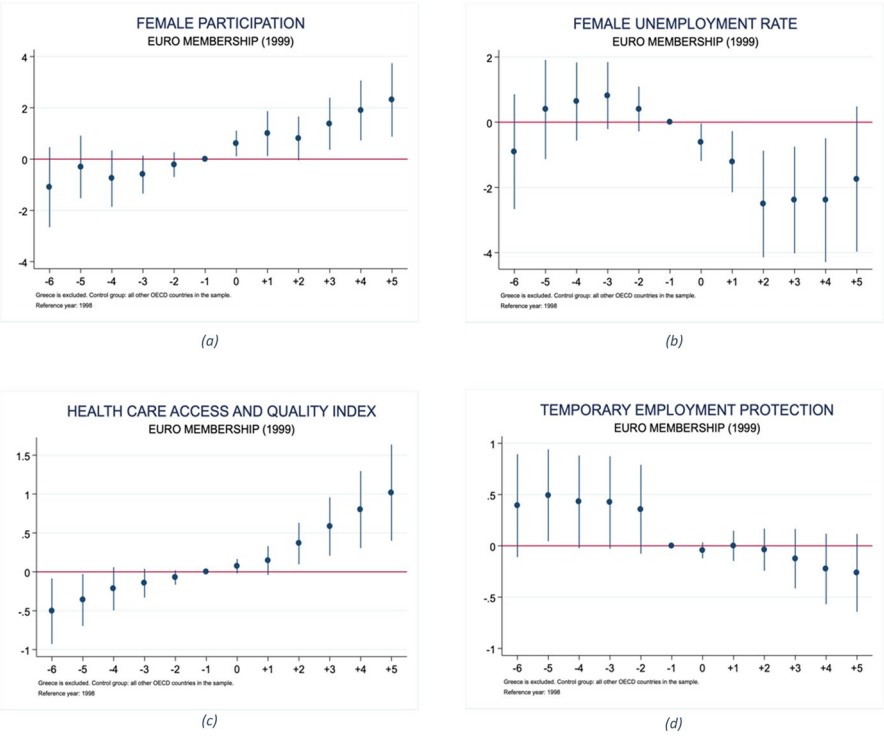

Fig. 2 Euro membership (1999). These graphs report the estimates that refer to the event-study model—Eq. 3. In particular, they show estimates of the coefficients ω_k ($k = -6, -5, \ldots, 0, \ldots, +5$) with the corresponding confidence intervals at the 10% significance level. The year in which the event under consideration (i.e., Euro membership) occurs is denoted by zero on the x-axis and corresponds to year 1999. The omitted year is -1 (namely, 1998). All specifications include country and year fixed effects. Robust standard errors are clustered at the country level. See Table 1 for the measurement units of the dependent variables and Sect. "Data set" and Online Appendix 1 for a detailed description

Results shown in Fig. 2 confirm that the adoption of the euro was associated to higher female labor market participation (panel *a*) and lower female unemployment rate (panel *b*). We detect the presence of pre-trends for estimates of the euro impact on the Health care Access and Quality index (panel *c*) and on temporary employment protection (panel *d*). As regards the latter outcome variable, estimates on the post-treatment period appear to be not very precise.

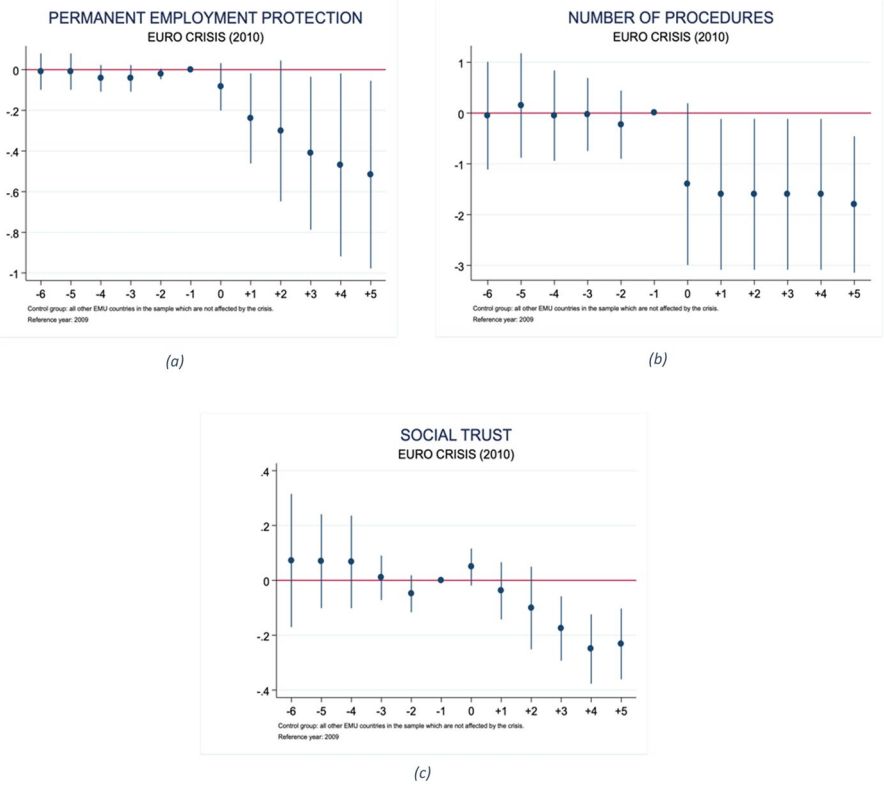

Fig. 3 Euro area sovereign debt crisis (2010). These graphs report the estimates that refer to the event-study model—Eq. 4. In particular, they show estimates of the coefficients τ_k ($k = -6, -5, \ldots, 0, \ldots, +5$) with the corresponding confidence intervals at the 10% significance level. The year in which the event under consideration (i.e., the Euro area sovereign debt crisis) occurs is denoted by zero on the x-axis and corresponds to year 2010. The omitted year is -1 (namely, 2009). All specifications include country and year fixed effects. Robust standard errors are clustered at the country level. See Table 1 for the measurement units of the dependent variables and Sect. "Data set" and Online Appendix 1 for a detailed description

Estimates for the euro area sovereign debt crisis confirm our difference-in-differences results about permanent employment protection (Fig. 3, panel *a*), the number of civil justice procedures (Fig. 3, panel *b*), and social trust (Fig. 3, panel *c*). Figure 4 (panel *a*) provides evidence of a reduction in health care expenditure in the aftermath of the crisis (in particular, from the year +3 to the year +5) without any significant negative impact on Health Care Access and Quality index (panel *b*) and on indicators of life expectancy (panels *c, d, e*). Finally, Fig. 5 suggests that the sovereign debt crisis was followed by decreasing electoral turnout (panel *a*) and increasing electoral support for populist parties (panel *b*).

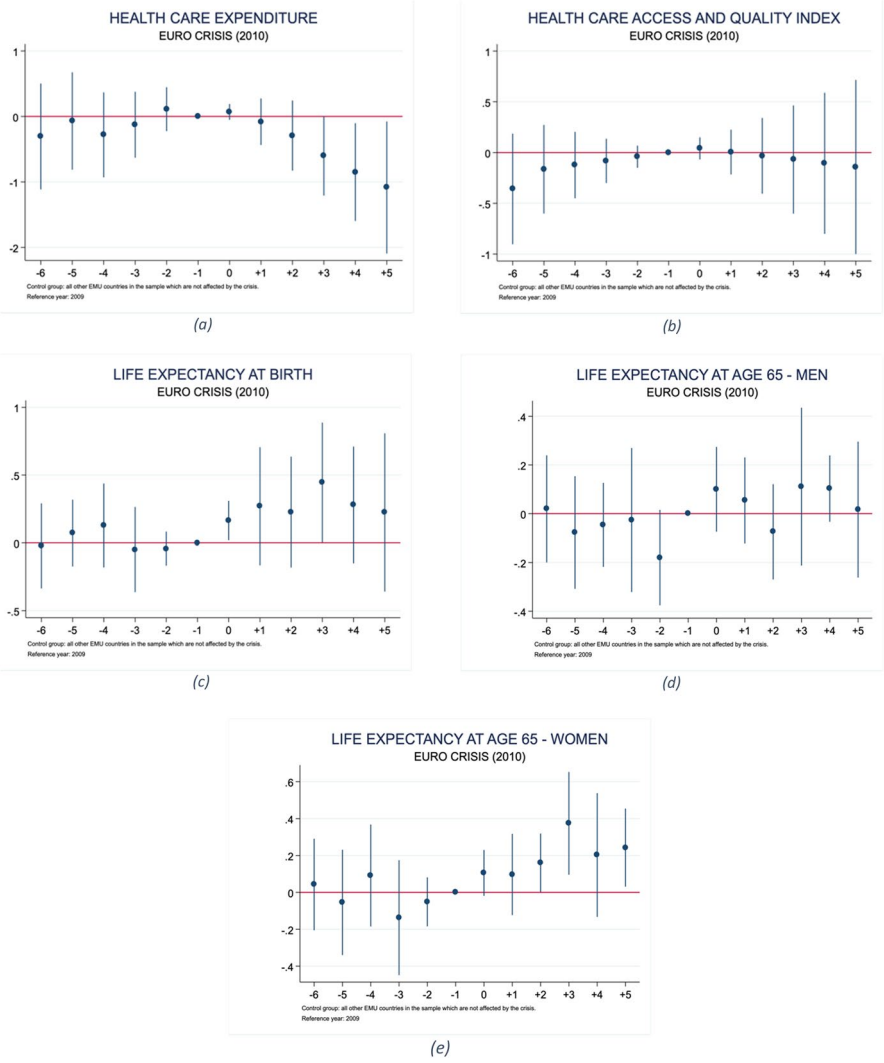

Fig. 4 Euro area sovereign debt crisis (2010). These graphs report the estimates that refer to the event-study model—Eq. 4. In particular, they show estimates of the coefficients τ_k ($k = -6, -5, \ldots, 0, \ldots, +5$) with the corresponding confidence intervals at the 10% significance level. The year in which the event under consideration (i.e., the Euro area sovereign debt crisis) occurs is denoted by zero on the x-axis and corresponds to year 2010. The omitted year is -1 (namely, 2009). All specifications include country and year fixed effects. Robust standard errors are clustered at the country level. See Table 1 for the measurement units of the dependent variables and Sect. "Data set" and Online Appendix 1 for a detailed description

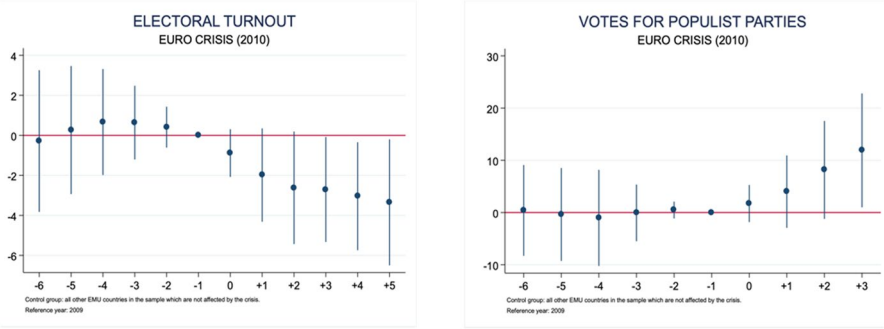

Fig. 5 Euro area sovereign debt crisis (2010). These graphs report the estimates that refer to the event-study model—Eq. 4. In particular, they show estimates of the coefficients τ_k ($k = -6, -5, \ldots, 0, \ldots, +5$) with the corresponding confidence intervals at the 10% significance level. The year in which the event under consideration (i.e., the Euro area sovereign debt crisis) occurs is denoted by zero on the x-axis and corresponds to year 2010. The omitted year is -1 (namely, 2009). All specifications include country and year fixed effects. Robust standard errors are clustered at the country level. See Table 1 for the measurement units of the dependent variables and Sect. "Data set" and Online Appendix 1 for a detailed description

Robustness

In this section, we test whether our main results are robust to a different definition of our treatments of interest. For the adoption of the euro, we estimate an equation identical to (1) but the $PostEuro_{it}$ dummy variable is now equal to one not only for all our sample countries that adopted the euro in 1999 (over the period 1999–2004, as in Sect. "Econometric specifications") but also for Greece from the year 2001 until 2004. The control group is given by countries in our sample that did not adopt the euro. Estimates shown in Table A5.1 in the Online Appendix are in line with our main findings reported in Table 3.[18]

To test the robustness of our findings on the occurrence of the sovereign debt crisis, we estimate equation (2) on the same time-window as before but changing the coding of the explanatory variable $PostCrisis_{it}$. Specifically, we build upon Reinhart (2002), who suggests that variations in the rating attributed by agencies to the sovereign debt of a country can be exploited to identify whether, when, and to which extent an economic crisis has affected it. Downgrades, in fact, reflect a fall in a country's capability to satisfy creditors and this signaling role can make them

[18] As a further robustness check, we also estimate equation (1) using all the available data until the end of the sample period (2019). Estimates reported in Table 3 are largely confirmed, with only a few exceptions. Indeed, the negative impact of euro membership on the level of protection of permanent contracts and on the share of income held by the top 1% of the population becomes statistically significant, whereas the negative effect on female unemployment is no longer statistically significant. Furthermore, the impact of the adoption of the euro on the perceived quality of governance becomes significantly negative. Results are available from the authors upon request.

a good proxy for the occurrence of a crisis. We, therefore, collect the credit ratings attributed to each country by Standard & Poor's since 1990.

It is possible to construct different measures of intensity of the crisis based on these ratings, from "weaker" (such as the introduction of a "minus" to the credit rating) and "medium intensity" (such as the loss of letter—e.g., from AA to A) to the most "severe" crises (such as a change in letter score—e.g., from A to BBB). In our sample, several euro countries (Austria, France, Finland, Netherlands, Portugal, Italy, Spain, and Greece) were subjected to a downgrade of medium intensity in the period we study. However, only few euro countries underwent a "severe" downgrade moving from category A to category B: Greece (2009), Ireland (2011), Italy (2012), Portugal (2011), and Spain (2012). Therefore, the dummy variable $PostCrisis_{it}$ takes the value of one for these countries starting from the year in which the "severe" downgrade occurs.[19] The control group is given by the other euro countries that did not experience a "severe" downgrade or with no downgrade at all. Estimates are shown in Tables A5.2 and A5.3 in the Online Appendix. All our findings discussed in Sect. "Main results" hold except for the results on civil justice (expenditure and number of procedures).[20]

Concluding Remarks

In this paper, we enquire about the convergence/divergence dynamics of a set of current euro countries in the period 1990–2019 by applying different techniques to several selected indicators. As well known, strong patterns of economic convergence and divergence across euro countries characterized the period under consideration. After having obtained access to the EMU, GDP per capita grew more strongly in the poorer Southern countries than in richer Northern ones, while the process reversed with the great financial crisis of 2008-2009 and the euro area sovereign debt crisis of 2010−2012. The results of our analysis tell a different story.

Despite the different crises, a process of convergence continued and even intensified on several economic indicators usually considered as strictly connected to efficiency and economic growth, such as market regulation, Doing Business, and the provision of fundamental public services in the fields of education and civil justice. However, citizens' perceptions about the quality of governance,

[19] We compared the credit ratings attributed by Standard and Poor's to the countries in our sample with those attributed by two other agencies, Moody's and Fitch. We noticed a broad agreement in the evaluations of the three agencies, with only slight temporal differences. Indeed, there is a high degree of similarity between the three series of ratings: their correlation exceeds 70% when we focus on minor downgrades (i.e., the introduction of a "minus" or the loss of a letter) and reaches 97% when the change in the letter score is considered.

[20] As a further robustness check, we also estimate Eq. (2) using all the available data until the end of the sample period (2019). The results reported in Table 4 are largely confirmed. The main difference is that the negative impact of the crisis on health care expenditure, product market regulation and electoral turnout becomes statistically significant, as does the positive effect on the share of income share held by the top 1% of the population.

the level of trust in national and European institutions, as well as the turnout at national elections strongly diverged with the crisis, with the euro area countries more stricken by the crisis that witnessed a larger fall in all these variables. On political grounds, these phenomena reflected themselves in a stronger support for populist and national political parties that being largely anti-European threatened the survival of the EMU project.

This paper is mostly descriptive, but we believe it provides some useful messages. First, euro countries more hit by the economic crisis did a lot to "put their house in order", although often under the pressure of the strong conditionality attached to the supporting ESM programs. The convergence that we detect on the outcomes of several public services as well as on the regulation of product and labor markets is the result of the strong effort that these countries did to tackle the crisis. This is a positive result because it implies that a process of economic convergence might still resume in the future.

Second, the reaction to the euro area sovereign debt crisis was mostly asymmetric. Lacking coordination of national fiscal policies and any form of a euro central stabilization mechanism, crisis-hit countries were largely left alone to confront the consequences of the crisis. Fiscal policy in the euro area was strongly pro-cyclical in the period 2010–2012, as all euro countries simultaneously consolidate their public finances, thus worsening the recession and increasing the costs of the reforms (see Baglioni and Bordignon 2018). Even the limited financial support granted by the ESM to program countries was accompanied by intrusive policy interventions, which were often resented by the population. This might have exacerbated the anti-establishment and anti-EU perceptions that form the basis for the populistic support.

As also suggested by Guiso et al. (2019), a more complete EMU on fiscal and political grounds might have avoided some of the worst consequences of the euro area sovereign debt crisis, including the increasing citizens' frustration that led to increased support for the populists. The very different approach followed by European authorities following the Covid crisis, with also the introduction of new (temporary) common instruments to support the EU countries more hit by the pandemics, might have changed the picture. However, this is an issue which will have to be addressed in future work.

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