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João Capella-Ramos,
Cristina Checherita-Westphal,
Nadine Leiner-Killinger

Fiscal transfers and economic convergence

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Contents

Abstract

Before the outbreak of the coronavirus (COVID-19) pandemic, discussions were already taking place on how to complete Economic and Monetary Union (EMU) and increase its resilience, inter alia, by speeding up economic convergence. The impact of the current unprecedented crisis on the euro area economy has given the debate new impetus. As a contribution to this topic – and without going into details of new mechanisms for crisis resolution – this paper analyses the role of fiscal transfers in real and business cycle convergence at a regional level. The paper distinguishes between net fiscal transfers – a broad measure defined as the ratio between disposable and primary incomes – and EU structural and investment funds. It provides evidence that net fiscal transfers have contributed to income redistribution across regions and to faster convergence in disposable incomes, although not to higher economic growth and real convergence. More positive evidence has been found for the role of the EU structural and investment funds over the medium term, based on the newly available – and richest so far – European Commission database. Going forward, in addition to efficiency considerations, which are important for real convergence, recommendations on the size and allocation of fiscal transfers should account for their impact on the business cycle. At the same time, in the longer run, it should be borne in mind that fiscal transfers are no substitute for genuine structural reforms and sound macroeconomic and fiscal policies when it comes to promoting sustainable economic growth and convergence.

Keywords: Fiscal transfers, EU structural and investment funds, real convergence, business cycle convergence, economic growth, business cycle

JEL codes: H54, H77, O47

Executive summary

Before the outbreak of the coronavirus (COVID-19) pandemic, discussions were already taking place on how to complete Economic and Monetary Union (EMU) and increase its economic resilience, including by speeding up economic convergence. The impact of the current unprecedented crisis on the euro area and the EU economy has given the debate new impetus. As a contribution to this topic – and without going into details of new mechanisms for crisis resolution – this paper reviews the impact of fiscal transfers (in particular the impact of intergovernmental fiscal transfers) on real and business cycle convergence at a regional level. The main findings are summarised below.

The theoretical and empirical literature draws mixed conclusions with regard to the impact of fiscal transfers on economic growth and convergence. At best, fiscal transfers are more likely to have a beneficial impact if they have a specific purpose (in particular, supporting the recipient's productive capacity) as opposed to general schemes whose aim is simply broad income redistribution. The literature also shows that high institutional quality and good technological capacity are important prerequisites for maximising the efficiency and effectiveness of fiscal transfers in terms of achieving economic growth and convergence.

Stylised facts and an empirical analysis conducted for the European Union (EU-28), the euro area (EA-19) and the initial euro area (EA-12) Member States over the period 2000-2016 offer evidence of convergence in GDP per capita – that is to say, "real convergence" – at both the country and, in particular, at the regional level. The results are weaker for the mature euro area economies (EA-12), and were particularly so during the last economic and financial crisis, although there is no statistically significant evidence of divergence either.

This paper distinguishes between two measures of fiscal transfers. First, the paper establishes a broad measure of "net fiscal transfers" – defined as the ratio between disposable and primary incomes at the regional level – which captures the overall impact of transfers, taxation and other redistribution policy measures. Second, the analysis covers EU structural and investment funds based on a rich historical dataset at the regional level. This dataset provides, in a single source, data on intergovernmental fiscal transfers under the EU structural and investment funds at the regional level for all EU programming periods completed thus far, thereby expanding and replacing the datasets previously published by the European Commission. In addition to the actual payments made to the Member States, the dataset also includes, for the first time, model-based estimates of the amounts actually spent under the EU structural and investment funds each year at the regional level.

With regard to the effect of fiscal transfers on real convergence, while these have, overall, contributed to redistribution across regions and generally faster convergence in disposable incomes, their broader impact on economic growth and real convergence is less clear-cut, although it appears less detrimental than in the past (and in previous analyses). The broad measure of net fiscal transfers at the regional

level has been found, at best, not to be associated with lower subsequent economic growth to a statistically significant extent. Some positive economic growth effects at the regional level have been found for the EU structural and investment funds in the medium term, although not in the longer term.

With regard to the role of fiscal transfers in business cycle convergence, this paper shows that although fiscal transfers mostly reflect long-term allocation concerns and do not explicitly address short-term stabilisation needs, their underlying impact on the business cycle is not insignificant. For instance, in the context of the EU Multi-annual Financial Framework 2014-2020, the largest beneficiaries in terms of average annual allocations of funds tend to be countries with particularly large positive output gaps, comparatively low levels of unemployment, and favourable budgetary situations. In the current set-up of EU structural and investment funds, which require a certain degree of co-financing by national budgets, there is the related risk of procyclicality, whereby investment projects may be implemented more decisively only in upswings, once budgetary situations have improved.

The exploratory empirical analysis in the paper confirms that, on average, the absorption pattern of EU structural and investment funds is procyclical, particularly when economic conditions are favourable. Overall, the results provide support for channelling EU fund expenditure to regions experiencing difficult economic conditions, where transfers appear to be most effective.

This paper therefore calls for a reflection on whether allocations and co-financing rates over the Multi-annual Financial Framework could be modulated to attenuate procyclicality during the absorption of EU structural and investment funds. Generally, there would appear to be advantages to making national co-financing rates more dependent on a country's position in the business cycle and/or its budgetary situation.

Overall, sound and resilient institutions and a good administrative capacity to absorb fiscal transfers are instrumental in better aligning such transfers with short-term stabilisation needs and long-term catching-up concerns. Structural reforms thus remain the main tool for achieving economic convergence. Moreover, structural reforms could also help to enhance the efficient management and effective absorption of EU structural and investment funds, thereby increasing economic resilience.

1 Introduction

There is a common understanding that economic convergence within the euro area is beneficial in several respects. First, it is often argued that a sufficient degree of economic convergence across the euro area countries (in particular nominal and business cycle convergence[1]) supports the proper functioning of Economic and Monetary Union (EMU). Accordingly, the closer countries are to the euro area average, the more likely it is that the single monetary policy will be appropriate for them all. Second, a sufficient degree of real convergence (catching-up income or GDP convergence) is often viewed as a prerequisite for the social cohesion that will keep the euro area and the EU together in the long term. Third, convergence towards more resilient economic structures enhances countries' ability to withstand adverse economic shocks. It was on this basis that the Five Presidents' Report (2015) called for "significant and sustained convergence towards similarly resilient economies across countries".

This paper analyses the role of fiscal transfers in supporting real and business cycle convergence. Fiscal transfers may have very different objectives, including, among others, income redistribution across individuals and regions, economic development and social cohesion. Fiscal transfers can be set up in different ways to achieve these objectives. They can flow vertically from governments to citizens, which is generally the most common form. Alternatively, fiscal transfers can also flow vertically and horizontally across various levels of government. These intergovernmental fiscal transfers, at the EU level, notably include, among others, EU structural and investment funds, which cover transfers from countries and regions with high income per capita to countries and regions with lower income per capita. At the country level, these transfers relate to income redistribution schemes within individual Member States, which usually aim to bring about a catching-up of income per capita in the poorer regions to the level of those with higher income per capita (e.g. the German fiscal equalisation system – *Länderfinanzausgleich*). These fiscal transfers achieve their primary objectives with varying degrees of effectiveness.

Fiscal transfers may have a general economic impact that goes beyond the remit of their primary objective. For example, fiscal transfers primarily aimed at income redistribution can also have an impact on economic growth, which is why this paper takes a broader approach. The paper focuses on the impact of intergovernmental fiscal transfers on economic growth and convergence – in particular the impact of EU structural and investment funds. However, it also looks at a broader measure of a fiscal transfer which, although it primarily addresses income redistribution can, nevertheless, affect economic growth and convergence.

Equally, even though it may not be their primary objective, fiscal transfers can also have an impact on the business cycle in the short term. Such an impact may often be a side effect, as most fiscal transfers aimed at real convergence are of a lasting nature. Even so, this type of cyclical impact has occasionally been exploited as

[1] See Box 1 of this paper for a survey of different concepts of economic convergence.

a policy tool used to stabilise the economy. This was notably the case during the economic and financial crisis, when national co-financing rates for the EU structural and investment funds were modulated in order to provide the necessary support to the most severely affected Member States.

Discussions are ongoing with regard to how to complete EMU and increase its economic resilience, including through speeding up economic convergence in the euro area. For example, just before the outbreak of the COVID-19 pandemic, a "budgetary instrument for competitiveness and convergence" was developed within the EU budget. This has now been replaced by a dedicated broader fiscal response to the socio-economic consequences of the COVID-19 pandemic in the form of the "Next Generation EU", which notably entails the instrument of a "Recovery and Resilience Facility". Both instruments are geared towards supporting structural reforms and government investment as a way to relaunch economic growth and convergence in the EU and the euro area. As a contribution to the area of fiscal integration, this paper reviews the impact of fiscal transfers, in particular the impact of intergovernmental fiscal transfers, on economic growth and convergence. To this end, it also addresses the possible impact of existing EU intergovernmental fiscal transfers in the context of cyclical stabilisation.

The paper is structured as follows. Section 2 first reviews some conceptual issues surrounding fiscal transfers, before presenting the theoretical and empirical literature on their impact on economic growth and convergence. Section 3 presents the empirical findings for the process of real convergence in the EU and the ensuing impact of (intergovernmental) fiscal transfers. Section 4 analyses the impact that EU structural and investment funds may have on the business cycle. Section 5 concludes and puts forward areas for further research, also in the light of the ongoing debate on EMU deepening.

Box 1
Concepts of economic convergence

This box summarises the various concepts of economic convergence.[2]

Real convergence

Sustainable real convergence is usually regarded as the process during which real income levels per capita in countries with lower levels catch up with those in countries with higher levels. This, therefore, captures the concept of moving towards similar income levels and living standards, which, in turn, is seen as promoting economic and social cohesion. In economic growth theory, real convergence is usually measured as β- and/or σ-convergence. Unconditional β-convergence simply implies that countries with lower income per capita record higher growth rates than those with higher income per capita, over a prolonged period. By contrast, conditional β-convergence captures the concept that countries will tend to grow on the basis of their starting positions – for example, in terms of their choice of policies, institutions and demographics – which implies that they tend to reach different steady-state income levels, even in the long term. Finally, σ-convergence reflects a simple decline in the dispersion of real income levels across countries over time. This can be misleading as an

[2] For a detailed overview of the concepts of economic convergence, see Diaz del Hoyo et al. (2017).

indicator of convergence towards higher living standards, given that this can also be achieved when the growth rates of countries with higher incomes decline faster during troughs than those of countries with lower incomes.

Nominal convergence

This concept captures the process of convergence towards common nominal economic indicators. For EU Member States, compliance with the so-called Maastricht criteria is a prerequisite for accession to the euro area. These nominal indicators, as outlined in the Maastricht Treaty, comprise the interest, inflation and exchange rates, as well as the general government budget balance and debt ratios.

Business cycle or cyclical convergence

These concepts, which we use interchangeably, refer to situations in which business cycles follow similar paths across countries or regions. A high degree of business cycle alikeness is of particular importance for the smooth functioning of EMU, insofar as it facilitates the conduct of a common monetary policy. Indeed, the closer Member States' business cycles are within EMU, the more likely it is that the same monetary policy will be optimal for them all. According to Mundell (1961), an adequate degree of business cycle convergence is one criterion for a region to qualify as an optimal currency area. Business cycle convergence can be measured, for example, as business cycle dispersion (e.g. whether output gaps are of a similar size) and as business cycle synchronisation (e.g. whether output gaps swing simultaneously). Structural reforms play a particularly important role in achieving business cycle convergence. They are significant given the impact that idiosyncratic economic fluctuations – i.e. those triggered by factors that are endemic to a specific country or region – have on business cycles across Member States and their respective regions. Idiosyncratic economic fluctuations arise from the fact that countries are not equally resilient to otherwise similar economic shocks. These degrees of economic resilience are a reflection of countries' economic structures and, in particular, of their varying capacity to absorb (and reduce the persistence of) economic shocks by prompting a swift recovery.

Institutional convergence

This term is relatively new and gained particular traction when the notion was explicitly mentioned in the Five Presidents' Report (2015), where it is denoted as a "process towards more resilient economic structures" that makes countries more resilient to adverse economic shocks. To this end, convergence is understood here as the process of aligning national economic structures – for example, labour and product markets, but also conditions for doing business, and political institutions – with best practices. As Diaz del Hoyo et al. (2017) stress, however, country specificities need to be taken into account, given that the objective is not to achieve "a single institutional model" across countries, but to focus, instead, on the model's outcomes in respect of, for instance, labour and product market adaptability.

2 Literature review

The theoretical and the empirical literature offer mixed conclusions with regard to the impact of intergovernmental fiscal transfers on economic growth and convergence. This section first reviews several conceptual issues surrounding fiscal transfers, before presenting the main findings of the literature, in particular the findings of empirical studies, on the impact of fiscal transfers on economic convergence. More details of the studies covered are presented in the Annex.

2.1 Intergovernmental fiscal transfers – some conceptual issues

2.1.1 Categories and economic rationale

Fiscal transfers can take multiple forms, the most common being transfers from the government to citizens. These fiscal transfers are multifaceted and can usually be captured indirectly by looking at income indicators such as households' primary and disposable incomes.

Alternatively, fiscal transfers can take place across various government levels. These intergovernmental fiscal transfers can flow vertically, from a higher to a lower level of government (e.g. from supranational unions to sovereign states or from central governments to regions), or horizontally, within the same level of government (e.g. between federal states or regions). They may be used for allocation or stabilisation purposes. For the purpose of this paper, the table below shows an example of the classification of intergovernmental fiscal transfers from an economic policy angle – the core focus of this paper.

Table 1

A possible categorisation of intergovernmental fiscal transfers from an economic policy angle

PURPOSE	
Redistribution and economic cohesion	**Economic stabilisation and risk-sharing**
- General-purpose transfers	- Insurance against idiosyncratic economic shocks
- Specific-purpose transfers (conditional), for example, EU structural and investment funds	- Insurance against common economic shocks

Notes: Own representation – the categorisation is for the purpose of this paper. It does not further disaggregate fiscal transfers to assess their effectiveness with regard to objectives that are not intrinsically related to economic policy and, therefore, risk going beyond those mentioned in the table. As an illustration, EU agricultural and fisheries funds, which form part of the EU structural and investment funds, are also devoted to environmental protection and the management of fish stocks.

The manifold (at least in theory) economic rationale for intergovernmental fiscal transfers is as follows.

Intergovernmental fiscal transfers may provide insurance against adverse economic shocks.

- **These transfers allow for the pooling of recipients' risks emanating from adverse economic shocks.** This insurance role may be twofold: (i) against idiosyncratic economic shocks impacting individual recipients, i.e. risk-sharing; and (ii) against common economic shocks impacting all recipients simultaneously, i.e. economic stabilisation. It could be claimed that, in the absence of exchange-rate adjustments and fully operational labour, product and credit markets, the short-term policy toolkit may offer limited options for cushioning economic shocks. Under certain circumstances, intergovernmental fiscal transfers may allow recipients to smooth their consumption path (Friedman, 1957) across government levels, with jurisdictions that are doing better than usual at a certain point in time contributing to insure those that are doing worse than usual. From an intertemporal angle, such an arrangement could be expected to benefit different jurisdictions to a similar degree, on condition that no jurisdiction is expected to consistently perform better or worse than the average.

Intergovernmental fiscal transfers may be used for the purposes of redistribution and economic cohesion.

- **General-purpose transfers usually aim to address differences in the ability of (lower-level) governments to raise revenues for the purpose of providing public goods and services.** In fiscal federalism systems, tax collection is, to a large extent, decentralised, meaning that it takes place at lower levels of government than central government.[3] Through the subsequent redistribution of (parts of) these tax revenues, differences in the collection of taxes are partially addressed. To this end, general-purpose transfers increase recipients' resources – meaning that they carry an income effect – and, in general, do not affect relative prices – usually meaning that they carry no substitution effect.[4] Examples of general-purpose transfers are the federal fiscal equalisation system in Germany (*Länderfinanzausgleich*) and the regional transfer system in Italy.

- **Specific-purpose intergovernmental fiscal transfers typically include some kind of conditionality and, therefore, play an active role in recipients' economic policies.** These transfers allow higher-level governments to exercise some sort of influence or oversight by specifying the type of expenditure that can be financed – known as the input-based conditionality – or the service delivery results that should be achieved – known as the output-based conditionality. They also often incorporate provisions requiring recipients to co-finance a specified percentage of expenditures using their own resources (known as matching transfers). Specific-purpose transfers have both an income effect and a substitution effect. Examples of specific-purpose transfers are the EU structural and investment funds (see Box 2), whose main aim is to foster the convergence

3 See also Burriel et al. (2020).

4 If tax revenue accrued solely to central government and spending decisions were centralised, then redistribution would be achieved through (direct) government-to-citizen transfers – i.e. through vertical rather than horizontal transfers.

of poorer regions towards the EU average. Germany's structural funding across its *Länder* – i.e. the *Gemeinschaftsaufgabe "Verbesserung der regionalen Wirtschaftsstruktur"* – is similar since it consists of supplementary federal grants for subsidising investment in structurally disadvantaged states.

2.1.2 Design issues and potential adverse effects

Intergovernmental fiscal transfers do not necessarily have the desired economic effect – instead, they can end up introducing distortions and inefficiencies. The reasons for this are as follows.

- **Intergovernmental fiscal transfers pose significant design challenges.** These transfers are often associated with "beggar-thy-neighbour" problems. It is difficult to design a system of intergovernmental fiscal transfers that exclusively maximises the recipient's economic growth potential or minimises the dispersion/variability of its income per capita without causing, inadvertently, the systematic redistribution of income from richer to poorer regions. In particular, general-purpose transfers appear to carry sizeable "flypaper effects" – i.e. transfers "stick to where they first land" – hampering their impact on economic growth and real convergence. In practice, they are not always geared towards increasing the recipient's productive capacity and, thereby, towards strengthening its potential growth in a sustainable manner. Their allocation is therefore often suboptimal.

- **Intergovernmental fiscal transfers carry moral hazard issues.** Barro (1999) argues that transfer payments, and the associated tax finance, generally distort economic decisions. On that basis, he argues that a greater level of income redistribution induces more distortions, reducing investment and, therefore, slowing down economic growth. Several factors may contribute to that outcome. First, intergovernmental fiscal transfers, if not properly designed, may reduce the incentives for policymakers in recipient jurisdictions to pursue sound economic policies that increase resilience to asymmetric economic shocks. Second, through flypaper effects, fiscal transfers may end up contributing to economic dependency and the build-up of economic imbalances that make recipients even more vulnerable to asymmetric economic shocks. Third, intergovernmental fiscal transfers may lead to distortions that hinder the effectiveness of market mechanisms in adjusting to asymmetric economic shocks. Fourth, considerations of political economy play a role in hampering the intended positive impact of transfers. Persson and Tabellini (1996) argue that efficient intergovernmental insurance can only be attained by a majority vote if all regions have the same risk properties. With different degrees of riskiness, majority-voting leads to inefficiencies as voters try to achieve permanent redistribution in their favour.

2.2 Main findings of the literature

The empirical evidence offers mixed conclusions with regard to the sign and magnitude of the impact of intergovernmental fiscal transfers on economic growth and convergence. While fiscal transfers seem to contribute to redistribution across countries and regions, generally leading to (stronger) convergence in disposable incomes, their broader impact on economic growth and convergence is less clear-cut. Some of the literature that finds a positive role for fiscal transfers suggests that specific-purpose transfers – as opposed to general-purpose transfers – are more likely to carry benefits. The Annex provides a systematic review of the most recent studies investigating the role of intergovernmental fiscal transfers in economic growth and real convergence.

General-purpose intergovernmental fiscal transfers appear to have very limited (if any) beneficial impact on economic growth and convergence. In Germany, it has been argued that general-purpose transfers (notably in the context of the *Länderfinanzausgleichls*) have been irrelevant or, possibly, even harmful.[5] This disappointing track-record may have been the result of *Länder* also using transfers to subsidise declining industries.[6] In Italy[7], general-purpose transfers are usually found to have had only a limited impact on reducing the gap in income per capita between the (richer) Centre-North and the (poorer) *Mezzogiorno*. This appears to have occurred because intergovernmental fiscal transfers have not been associated with a stronger commitment to supply-side regional development policies and a rise in capital expenditure in the *Mezzogiorno*. Instead, they have mainly served the purpose of consumption rebalancing, with little room for investment financing.[8] At the same time, these studies acknowledge that such sizeable transfers were – at least partly – justified by the considerable ex ante gap in government revenue and expenditure per capita resulting from the difference in income per capita, as well as socio-economic infrastructure endowment, between the North and the South. In the EU, Checherita et al. (2009) captured fiscal transfers not as flowing between different levels of government but as the ratio between disposable and primary incomes at the regional level in the period 1995-2005, finding that transfers might have succeeded in achieving redistribution across jurisdictions. At the same time, however, after controlling for various factors including labour mobility, transfers are not found to have promoted real convergence and economic growth. Finally, outside the EU, evidence

5 See Berthold et al. (2001), Berthold and Fricke (2005), Berthold and Fricke (2007) and, more recently, Baskaran et al. (2016) and Weddige-Haaf and Kool (2017).

6 See Baskaran et al. (2016).

7 The fact that Italy is not a federation complicates the assessment of regional policy due to data constraints. This is because government finance statistics are structured according to government levels and not geographical units. Most studies are based on reconstructed data series assembling elements from different sources.

8 See Giannola et al. (2014) and Petraglia et al. (2016).

for the impact of general-purpose transfers on real convergence and economic growth also appears to be mixed.[9]

Specific-purpose intergovernmental fiscal transfers appear to have some beneficial impact in terms of real convergence and economic growth. In the EU, earlier studies[10] offered a pessimistic view, diagnosing a failure of the EU structural and investment funds and showing that the regional growth and convergence pattern in the EU was no different from that in other federations that lack a similarly extensive cohesion policy. More recent studies[11], however, identify a positive relationship – even if only of limited magnitude – between the EU structural and investment funds and real convergence and economic growth. For instance, Becker et al. (2010) conducted a back-of-the-envelope assessment and estimated that, in a best-case scenario, the EU structural and investment funds were associated with a multiplier of approximately 1.2 – i.e. every additional euro of transfers generated 20 additional cents of GDP (PPS) per year in the average programming period. This is broadly in line with the general fiscal multiplier found in the literature for government investment and contemporaneous government consumption. Merler (2016) exploited features in the EU structural and investment funds' eligibility rules in order to construct a quasi-experimental framework, finding that those NUTS 3[12] regions that were formally eligible for EU structural and investment funds had grown faster and had converged towards the EU average – at a pace of 2% per year over the period 2000-2014. In Germany, Weddige-Haaf and Kool (2017) found some evidence that structural funding across the *Länder* had a significantly positive marginal effect on the growth rates of the recipient states.[13]

However, the benefits of specific-purpose intergovernmental fiscal transfers do not increase monotonically with their magnitude. It has sometimes been argued that some recipients use transfers in an increasingly inefficient manner, making the case for diminishing returns in the spirit of Hirshleifer (1958). In the EU, Becker et al. (2012)[14] identified a non-linear relationship between the amount of EU regional transfers received and the growth of GDP per capita. They estimated a maximum desirable level of transfers (i.e. the threshold above which no additional, or even lower,

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9 In Canada, Coulombe and Lee (1995) and Kaufman et al. (2003) reported a positive effect, while Rodríguez (2006) found no significant effect. In Australia, Rangarajan and Srivastava (2004) found that transfers were associated with regional economic convergence in the 1990s, while Ramakrishnan and Cerisola (2004) concluded that there was no significant impact. In Russia, Martínez-Vazquez and Timofeev (2010) found that federal transfers had a negative effect on regional economic convergence. In India, Bagchi (2003) found that regional disparities persisted over 50 years, despite the consistent flow of federal transfers to regions. In Brazil, Maciel et al. (2008) and de Oliveira (2008) suggested that transfers to states and municipalities had a positive effect on the process of regional convergence. In China, Shuanyou and Hongxia (2003), Heng (2008) and Candelaria et al. (2009) found that intergovernmental fiscal transfers had helped to ease regional inequalities in recent decades.

10 See, for instance, Sala-i-Martin (1996) and Boldrin and Canova (2001). Recent studies have argued that these earlier evaluations suffered from potential problems relating to the limited availability of data.

11 See Midelfart-Knarvik and Overman (2002), Ederveen et al. (2002) and Cappelen et al. (2003), Beugelsdijk and Eijffinger (2005), Ederveen et al. (2006), Becker et al. (2010) and Merler (2016).

12 NUTS is Eurostat's acronym of "Nomenclature des Unités Territoriales Statistiques". Eurostat distinguishes between three sub-national regional aggregates: NUTS 1 (large regions with a population of 3-7 million inhabitants), NUTS 2 (groups of regions and unitary authorities with a population of 0.8-3 million inhabitants) and NUTS 3 regions (with a population of 150-800 thousand inhabitants).

13 See Weddige-Haaf and Kool (2017).

14 They estimate that 18% of NUTS 3 recipient regions received transfers above the threshold maximising the growth of GDP per capita. They also find that the transfer multiplier fell short of unity in about 36% of the NUTS 3 recipient regions across the 1994-1999 and 2000-2006 programming periods.

per capita income growth effects would be generated) at about 1.3% of a region's GDP and an optimal desirable level of transfers (i.e. the threshold that maximises their aggregate positive growth-impact) at about 0.4% of a region's GDP. This suggests that there may be significant scope for greater efficiency through the reallocation of EU structural and investment fund transfers across Member States. Reducing the transfers to regions to below the maximum desirable level may harm their growth prospects but would also enhance aggregate efficiency if the transfer size were above the optimal desirable level.

Institutional quality and technological capacity are important prerequisites for maximising the effectiveness and efficiency of intergovernmental fiscal transfers in promoting economic convergence and growth. Institutional quality (e.g. the rule of law, the absence of corruption, bureaucratic efficiency and the strength of electoral institutions) as well as technological capacity (e.g. human and physical capital endowments) have been found in many studies to be important facilitators of the beneficial impact of fiscal transfers. First, above a certain threshold of EU structural and investment funds, quality of government is the key factor determining the return on public investment.[15] On that basis, in many recipient regions receiving the bulk of EU structural and investment funds, a greater level of expenditure would, at best, lead only to a marginal improvement in economic growth, unless the quality of government were significantly improved. High-quality institutions may play a key role in overcoming distortions typically associated with EU funding schemes: (i) the moral hazard problem – i.e. the risk of a Member State not investing in certain regions, with the aim of keeping welfare low and, thereby, being eligible for EU funding; (ii) the substitution problem – i.e. the risk that no additional investments are made but, instead, planned investments are financed by the funds received, and (iii) the agency problem – i.e. the fact that funds are collected at a higher level and then managed locally with, typically, little transparency, thereby increasing the incentives for local administrators to extract rents from the funds received.[16] Second, technological capacity, for instance, that associated with the project management skills of those deciding on transfer allocation and project implementation in the field, plays a decisive role in achieving the transfers' desired objective.[17]

Box 2
Main features of the EU structural and investment funds

The EU structural and investment funds (ESIF) consist of five different funds. These funds comprise the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund (CF), the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF) (see Table A for details). The first three funds make up about three-quarters of the entire fund financial envelope and are referred to as cohesion policy funds (often also labelled as "regional policy").

15 See Rodriguez-Pose and Garcilazo (2013).

16 See the study by De Angelis et al. (2018), which estimates that in the absence of EU funding disbursements between 2007 and 2014, the annual number of white collar crimes in southern Italy would have been 4% lower in that period.

17 See Aiello et al. (2012) for Italy, or Dumeiuviene and Adomyniene (2014) for Lithuania.

The ESIF are aimed at increasing economic, social and territorial convergence within the EU. In the 2014-2020 programming period, the ESIF – in particular the ERDF, the ESF and the CF – were expected to support 11 investment priorities, also known as "thematic objectives": *1. Strengthening research, technological development and innovation; 2. Enhancing access to, and use and quality of information and communication technologies; 3. Enhancing the competitiveness of small and medium-sized enterprises; 4. Supporting the shift towards a low-carbon economy in all sectors; 5. Promoting climate change adaptation, risk prevention and management; 6. Preserving and protecting the environment and promoting resource efficiency; 7. Promoting sustainable transport and removing bottlenecks in key network infrastructures; 8. Promoting sustainable and quality employment and supporting labour mobility; 9. Promoting social inclusion, combating poverty and any discrimination; 10. Investing in education, training and vocational training for skills and lifelong learning; 11. Enhancing the institutional capacity of public authorities and stakeholders and efficient public administration.*

Table A

Overview of the ESIF's structure – 2014-2020

Objective		The EU Structural and Investment Funds (ESI Funds)		EU funds planned allocations (2014-2020)
Economic, social and territorial cohesion	Cohesion policy ("regional policy")	"Structural Funds"	The European Regional Development Fund (ERDF)	42.9%
			The European Social Fund (ESF)	19.0%
			The Cohesion Fund (CF)	14.3%
			The European Maritime and Fisheries Fund (EMFF)	1.3%
			The European Agricultural Fund for Rural Development (EAFRD)	22.6%

Sources: European Commission (Eurostat and DG REGIO, as updated on 13 August 2019); authors' calculations.
Notes: The dataset provides information on planned total and EU financing under the different ESIF (2014-2020) in current prices. It is updated daily to reflect any modifications – i.e. thematic reallocations – agreed between the Member States and the European Commission.

The ESIF are a sizeable part of the EU budget. The budget is proposed annually by the European Commission and adopted by the European Council. The annual budget must remain within the ceilings of the Multi-annual Financial Framework (MFF), which is usually agreed for seven years. The latest MFF spans the years 2014-2020 and amounts, on average, to about 1% of the EU's GNI per year. Of this, the ESIF (amounting to more than €400 billion) constitute about one-third. Around half of these funds are dedicated to euro area countries and cumulate to more than 2% of GDP over the entire MFF – i.e. about 0.25% of euro area GDP per year. The net budgetary impact is, however, smaller as the EU budget also relies on Member States' contributions which could otherwise be used by national governments to pursue their own policies.[18]

The ESIF are subject to eligibility criteria, which correlate with countries' GDP per capita. In particular, ESIF recipients are grouped into "less developed regions", "transition regions" and "more developed regions". The co-financing rate that countries have to pay for absorption of funds is negatively correlated with a region's GDP per capita (see Table B for details). Other conditions that must be fulfilled to meet eligibility criteria for obtaining funds include, among others, administrative

[18] In particular, the EU budget has the following main sources of revenue: (i) traditional own resources, which consist mainly of custom duties on imports from outside the EU and sugar levies; (ii) VAT-based own resources, which result from levying a uniform rate of 0.3% on the harmonised VAT base of each Member State; and (iii) GNI-based own resources, which are assessed on the basis of a percentage of Member States' GNI. This latter item has become the largest revenue source of the EU budget and acts as its "residual", thereby ensuring that it remains balanced overall.

capacity to manage the funds.[19] The more the region is developed, the more its use of ESIF has to be targeted towards pre-identified key priority areas.

Table B

Eligibility criteria for receiving funds under the EU's cohesion policy

Fund	Eligibility	EU co-financing rate (via the EU budget)
ERDF, ESF	Less developed regions (NUTS 2 regions with GDP per capita of less than 75% of EU-27 average)	Decreasing with GDP per capita, around 80%
	Transition regions (NUTS 2 regions with GDP per capita between 75 and 90% of the EU-27 average)	
	More developed regions (NUTS 2 regions with GDP per capita of more than 90% of the EU-27 average)	
CF	Member States with a GNI per capita of less than 90% of the EU-27 average	

Notes: The reference period is 2007-2009 for the ERDF and the ESF, and 2008-2010 for the CF. The table does not reflect possible recent changes introduced by the Coronavirus Response Initiative (CRII), the Coronavirus Response Investment Initiative Plus (CRII+) and the Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU).

Allocations made under the EU's cohesion policy can cumulate to a sizeable share of countries' GDP. As shown in Table C, for the 2014-2020 MFF, the funds are allocated in roughly equal shares to the EA-19 and to the non-euro area Member States. The largest beneficiary of cohesion policy funds is Poland, which receives about 19.3% of the total funds available. This is followed by Italy (9.7%) and Spain (8.4%). As a percentage of national GDP, cumulated allocations under the cohesion policy funds in the period 2014-2020 are largest in Croatia (21.4% of GDP), Latvia (20.2% of GDP), Hungary (19.9% of GDP), Lithuania (19.7% of GDP) and Bulgaria (18.8% of GDP). Among the EA-19, the largest beneficiaries are the Baltic countries (around 18-20% of GDP), as well as Slovakia (17.3% of GDP).

[19] See the European Parliamentary Research Service (2015) for an overview of the ESIF and conditions attached to receiving them.

Table C

Allocation of EU structural and investment funds for the period 1989-2020

Reference area	Reference area	Executed amounts in the programming periods 1989-2013				Allocated amounts for the programming period 2014-2020			
		€ million	€/cap	% GDP	% EU-28	€ million	€/cap	% GDP	% EU-28
Belgium	BE	5,499.4	528.8	2.0	0.7	2,615.9	231.6	0.6	0.6
Germany	DE	78,054.1	965.2	3.5	9.9	27,935.0	339.2	0.9	6.3
Estonia	EE	4,723.2	3,348.1	48.5	0.6	4,423.5	3,361.6	18.5	1.0
Ireland	IE	14,267.2	3,585.8	12.4	1.8	3,225.3	688.7	1.1	0.7
Greece	EL	67,328.2	6,252.1	43.2	8.5	20,881.1	1,936.4	11.4	4.7
Spain	ES	135,750.0	3,216.7	18.4	17.2	37,227.6	801.5	3.2	8.4
France	FR	44,589.1	722.6	2.9	5.7	26,569.1	397.4	1.2	6.0
Italy	IT	83,643.5	1,445.7	6.5	10.6	42,835.0	706.5	2.5	9.7
Cyprus	CY	819.0	1,151.8	6.8	0.1	881.0	1,034.6	4.5	0.2
Latvia	LV	6,620.2	2,824.2	54.9	0.8	5,575.6	2,845.7	20.2	1.3
Lithuania	LT	9,782.5	2,861.5	55.7	1.2	8,372.4	2,919.0	19.7	1.9
Luxembourg	LU	261.3	583.9	1.0	0.0	140.1	239.9	0.2	0.0
Malta	MT	896.9	2,287.9	20.3	0.1	827.9	1,892.1	7.3	0.2
Netherlands	NL	5,738.9	360.2	1.2	0.7	1,947.4	114.4	0.3	0.4
Austria	AT	7,442.9	920.7	3.3	0.9	4,922.9	563.3	1.3	1.1
Portugal	PT	67,271.1	6,537.6	52.3	8.5	25,409.4	2,460.8	13.1	5.7
Slovenia	SI	5,280.5	2,630.7	21.0	0.7	3,912.2	1,894.8	9.0	0.9
Slovakia	SK	14,283.5	2,658.3	37.0	1.8	15,053.6	2,771.9	17.3	3.4
Finland	FI	6,399.6	1,231.5	4.5	0.8	3,765.0	685.1	1.7	0.9
EA-19	**EA-19**	**558,651.4**	**1,727.5**	**7.5**	**70.9**	**236,520.3**	**695.2**	**2.1**	**53.4**
Bulgaria	BG	8,996.0	1,121.4	41.6	1.1	9,765.7	1,370.1	18.8	2.2
Czech Republic	CZ	29,740.1	2,877.1	33.0	3.8	23,837.8	2,256.2	12.4	5.4
Denmark	DK	1,766.7	329.8	1.0	0.2	1,546.8	270.0	0.5	0.3
Croatia	HR	737.2	169.3	2.4	0.1	10,524.9	2,523.2	21.4	2.4
Hungary	HU	30,291.4	2,974.6	47.9	3.8	24,914.3	2,538.6	19.9	5.6
Poland	PL	89,283.8	2,334.1	43.8	11.3	85,574.0	2,226.9	18.1	19.3
Romania	RO	25,173.4	1,155.3	38.1	3.2	30,580.4	1,552.0	16.2	6.9
Sweden	SE	5,942.1	661.9	2.1	0.8	3,538.4	356.6	0.8	0.8
United Kingdom	UK	37,374.9	625.4	2.4	4.7	16,051.1	244.5	0.7	3.6
European Union	**EU-28**	**787,957.1**	**1,606.7**	**7.9**	**100.0**	**442,853.7**	**866.1**	**2.9**	**100.0**

Sources: European Commission (Eurostat and DG REGIO, as updated on 13 August 2019); authors' calculations.

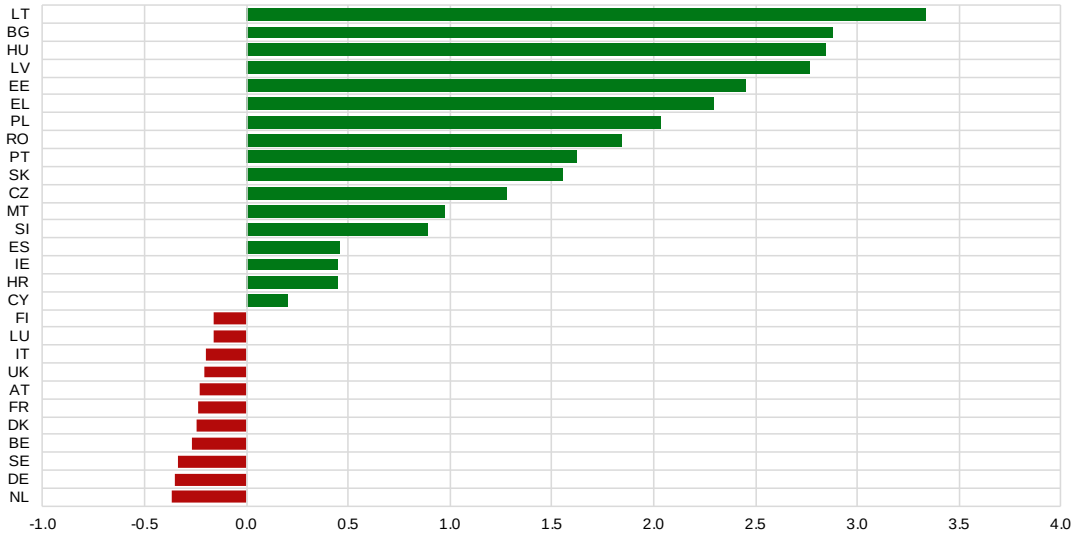
In addition, as shown in Chart A below, in some receiving countries the EU net flows amount to a sizeable share of GDP per year. The chart shows the average operating budgetary balance by Member State in the period 2000-2019. The operating budgetary balance is defined as the difference between what a Member State receives from and what it pays into the EU budget. It is, therefore, a fair indication of the EU budget's net first-round static effect on a Member State's economy.

Finally, as shown in Chart B below, the ESIF allocation is sizeable in a number of euro area countries. However, it may well be the case that the actual absorption follows a different pattern. While the average annual ESIF allocation for the euro area in the period 2000-2015 appears to be limited to 0.3% of GDP, the cumulated impact in the programming periods 2000-2006 and 2007-2013 is non-negligible.

Chart A

Average EU operating budgetary balance in the period 2000-2019, by country

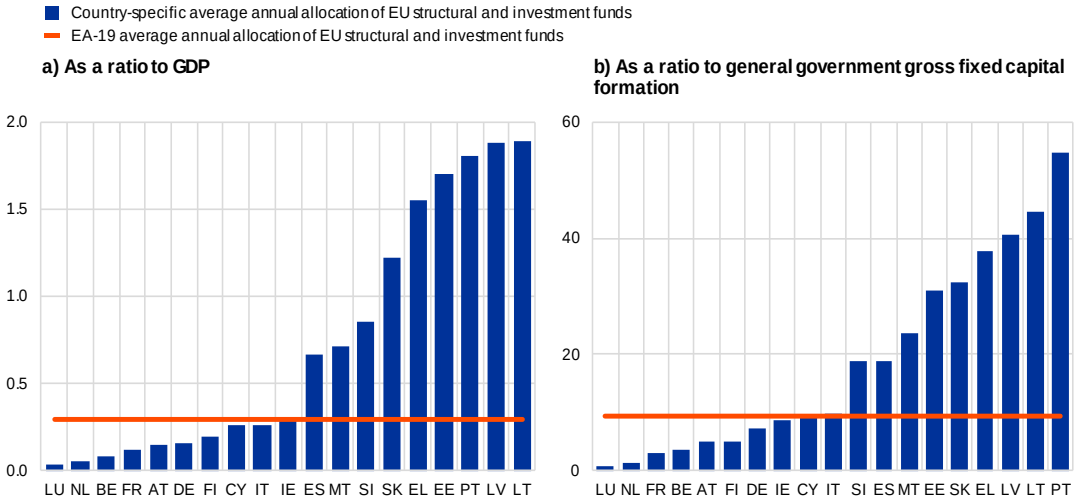
(percentage of Member State's GDP)



Sources: European Commission (DG Budget and Eurostat); authors' calculations.
Notes: EU-15 and HR: 2000-2019; CY, CZ, EE, HU, LT, LV, MT, PL, SI and SK: 2004-2019; BG and RO: 2007-2019. Includes the retroactive impact of the 2014 Own Resources Decision.

Chart B

Average level of EU structural and investment funds in the period 2000-2016 for euro area countries



Sources: European Commission (Eurostat and DG REGIO); authors' calculations.

3 Fiscal transfers and real convergence: empirical findings for the euro area and the EU

In this section, the paper provides empirical evidence of whether certain intergovernmental fiscal transfers have contributed to economic growth and real convergence in the euro area – and the EU more broadly – over the past two decades. Specifically, it aims to capture whether such transfers can be shown to have raised the level of GDP per capita (or income) of poorer regions to a level closer to that of richer regions. For this purpose, the paper follows a two-step approach. First, the empirical analysis seeks to identify to what extent the EU and the euro area have achieved real convergence over the last two decades and whether the last financial and sovereign debt crisis slowed down the process of real convergence. Second, the role of fiscal transfers in economic growth and real convergence is estimated. For this purpose, a distinction is made between the impact of a broad measure of net fiscal transfers and that of the EU structural and investment funds.

3.1 Evidence for real convergence

Finding 1: Since the introduction of the euro (here the period 2000-2016), there has been real catching-up (GDP per capita) convergence across the EU and the euro area countries and regions.

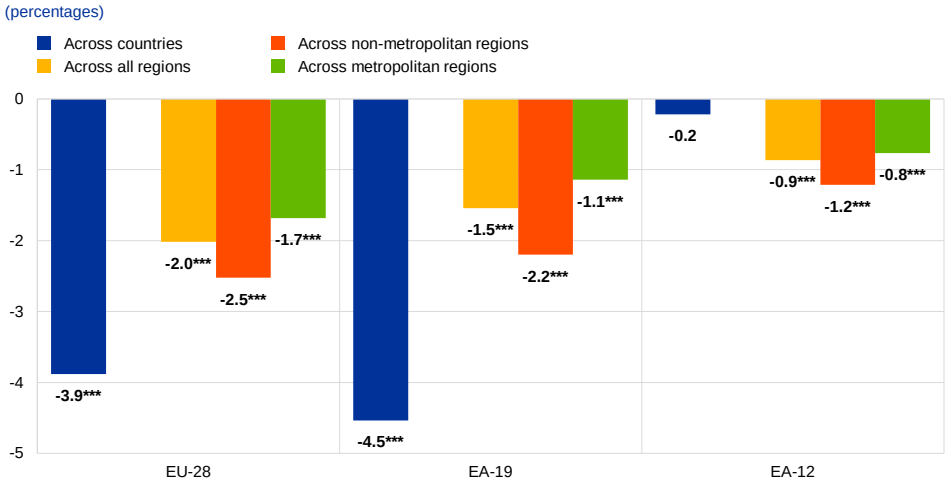
Real convergence is most often captured by the concept of β-convergence (also called "catching-up convergence"). As foreseen by the neoclassical growth model, (unconditional) β-convergence occurs when poorer countries or regions grow faster than richer countries over a relatively long period of time. Real convergence is captured empirically by a negative and statistically significant β-coefficient, whereby a lower initial level of GDP per capita is associated with higher economic growth. Chart 1 below shows the unconditional β-coefficients and their statistical significance level from regressions across the EU (EU-28), the euro area (EA-19) and the initial euro area Member States (EA-12).[20] The β-coefficient is negative for all samples. Although, at the country level, the negative β-coefficient is statistically significant only for the EU-28 and the EA-19, at the regional level, it is statistically significant for the three configurations, including the EA-12. Real convergence appears to have been stronger across non-metropolitan regions compared with metropolitan regions (i.e. cities and their respective commuting zones), thereby confirming what might be intuitively expected in view of the former's generally lower initial levels of GDP per

[20] The EA-12 includes the euro area Members States at the beginning of the reference period: Austria (AT), Belgium (BE), Finland (FI), France (FR), Germany (DE), Ireland (IE), Italy (IT), Luxembourg (LU), Netherlands (NL), Portugal (PT), Spain (ES) and Greece (Member State since 2001). The EU-28 comprises all current Member States of the European Union (including the United Kingdom (UK)).

capita. Overall, the results point to real catching-up convergence, on average, for the EU and the euro area samples since the introduction of the euro.[21]

Chart 1

Estimated β-convergence coefficients of GDP per capita across countries and NUTS 3 regions (2000-2016)



Sources: Eurostat (national and regional accounts, GDP per capita (PPS, purchasing power standards) by country and NUTS 3 classification), authors' calculations.
Notes: β-convergence is a necessary condition for real convergence. It is assessed by estimating a simple bi-variate linear regression of the average annual growth rate of GDP per capita on its initial per capita level (in log terms). Following Weddige-Haaf and Kool (2017), among others, we divided the 2000-2016 sample period into four (approximately equal) intervals (2000-2003, 2004-2007, 2008-2011 and 2012-2016). This balances the desire for more observations with that of limiting the impact of the business cycle. The β-convergence coefficients were obtained using panel regressions (random effects). "Metropolitan regions" are identified by Eurostat and are defined as urban agglomerations where at least 50% of the population lives inside a functional urban area – i.e. a city and its commuting zone – consisting of at least 250,000 inhabitants. Significance levels: *10%, **5%, ***1%.

Finding 2: Evidence of real convergence across the EA-12 regions during the period 2000-2016 is less clear-cut than for the other samples, but there is no systematic evidence of divergence.

Given their higher and more homogenous level of GDP per capita, the EA-12 regions tend to show slower real convergence than the EU-28 or the EA-19, while the results at the country level lack statistical significance (see Chart 1 and the analysis below). In general, these results are in line with other studies, which point to the difficulties experienced by some initial euro area Member States in catching up significantly with the euro area's average level of real GDP per capita.[22] At an empirical level, particularly in country cross-sectional samples, such conclusions may hinge, however, on estimates of β-convergence that are based on a very restricted number of observations. Assessing β-convergence based on larger (regional or panel) samples (see Chart 1 or Table 2 below) yields either real

21 See, also, similar results for the euro area country sample in Imbs, J. and Pauwels, L. (2019), "Twenty Years of Convergence", paper presented at the ECB Forum on Central Banking, 17-19 June 2019.

22 As pointed out in Sondermann et al. (2019), Italy, in particular, exhibited a protracted diverging tendency, with its level of real GDP per capita falling from slightly above the euro area average in 1999 to less than 90% in 2018. Other countries, in particular Portugal and Greece (but also Spain), started with a significant gap from the euro area average, but have not closed this much (Greece only did before the crisis, with a significant decline afterwards). Diaz del Hoyo et al. (2017) argue that the main reason for a lack of real convergence in these countries is a gradual reduction in total factor productivity growth, which began long before they introduced the euro.

convergence or a lack of statistical significance, but no systematic evidence of real divergence, on average, for the EA-12 sample.

Finding 3: The last financial and sovereign debt crisis slowed down the real catching-up process, particularly in the mature euro area economies, but the subsequent economic recovery (before the outbreak of the COVID-19 pandemic) had brought convergence back on track.

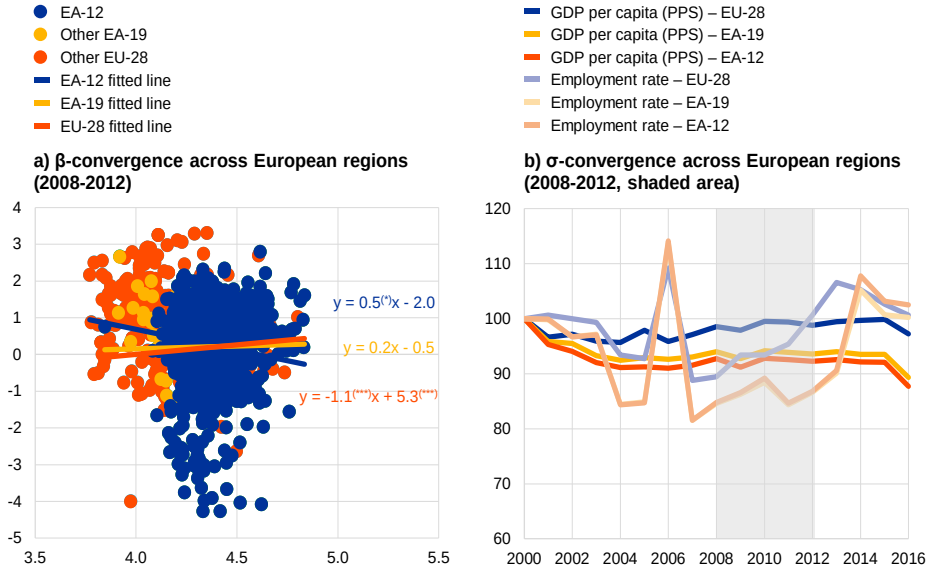
During the last financial and sovereign debt crisis, regional real convergence appears to have been negatively affected – particularly in the EA-12 – although signs of renewed convergence were evident at the outbreak of the COVID-19 pandemic. In regressions for the crisis period (covering 2008-2012), the β-coefficients for the EA-19 and EA-12 samples turn positive (and also statistically significant for the EA-12 sample, but only at the 10% significance level). The β-coefficient remains negative and statistically significant for the broader EU-28 sample (see panel (a) of Chart 2). Nevertheless, the evidence of regional real convergence – even in the EA-12 – is difficult to ignore over longer periods of time (see Finding 1).[23] Moreover, as documented in detail in the Commission's Seventh Report on Economic, Social and Territorial Cohesion (European Commission, 2017), "the first signs of convergence resuming are evident". This trend is illustrated in panel (b) of Chart 2 by the σ-convergence (an update of the above-mentioned report). Although the trend seen up to 2006 of decreasing dispersion in GDP per capita across NUTS 3 regions had stalled during the crisis years, it had clearly resumed in the years before the outbreak of the COVID-19 pandemic, with 2016 GDP per capita dispersion below the levels observed in 2000 for all three samples. Likewise, the dispersion of employment rates of NUTS 3 regions for the EA-12, EA-19 and EU-28 – which seemed to increase much more than the dispersion of GDP per capita during the last crisis – had resumed its downward trajectory as of 2013-2014.

[23] Imbs, J. and Pauwels, L. (2019) find evidence of continued β-convergence in the euro area country sample during the post-crisis period (2008-2018).

Chart 2

Real convergence during the last financial and sovereign debt crisis (2008-2012)

(a) y-axis: average annual growth of GDP per capita (PPS); percentages; x-axis: logarithm of GDP per capita (PPS); 2008; b) coefficient variation (2000 = 100); percentages)



Sources: Eurostat, Regional Statistics (GDP per capita (PPS), employment (15-64 years) and unemployment (15 years or over) rates by NUTS 3 classification), authors' calculations.
Notes: In Panel (a) the fitted lines are derived from β-convergence regressions for cross-section samples (EA-12 for the blue line; EA-19 for the yellow line and EU-28 for the red line) for the period 2008-2012. Significance levels: *10%, ***1%. Panel (b) is an updated chart from the Commission's Seventh Report on Economic, Social and Territorial Cohesion, by NUTS 3 classification. The dispersion of employment rates across NUTS 3 regions is missing in Belgium for the period 2006-2011, France for the periods 2004-2005 and 2007-2016, Portugal for the period 2006-2016, Slovenia for the period 2000-2009 and, finally, Cyprus, Luxembourg and Malta for the entire sample period.

3.2 Evidence for real convergence and fiscal transfers

The analysis now turns to estimating the impact of fiscal transfers on economic growth and real convergence. To that end, a distinction is made between the impact of a broad measure of net fiscal transfers and that of the EU structural and investment funds.

Finding 4: While fiscal transfers have contributed to redistribution across regions, generally leading to (faster) convergence in disposable incomes, their broader impact on economic (GDP) growth and real convergence has been less clear-cut.

a) Analysis based on the concept of net fiscal transfers at the regional level

As a first step, the concept of net fiscal transfers – i.e. the ratio between disposable and primary incomes at the regional level – is used, building on earlier analysis.[24] This measure encapsulates a broad concept, which captures the overall impact of transfers, taxation and other distributional policy measures, including intergovernmental fiscal transfers, particularly within countries. Earlier analysis found that, during the period 1995-2005, disposable incomes across EU regions converged

[24] See Checherita et al. (2009).

at a higher rate than primary incomes, with the lowest rate being estimated for GDP per capita. Since the difference between primary income and disposable income is given by the net impact of taxes and transfers, government intervention appears to have led to lower disparities across regions in terms of income levels ultimately available to households. On the other hand, given that the main difference between GDP per capita and household primary income per capita is explained by commuting flows of workers, labour mobility appears to have been particularly important for the catching-up process of household incomes. Moreover, using a battery of empirical estimators[25], the analysis found that net fiscal transfers had been, on average, detrimental to GDP growth. Finally, when the sample was divided into two sub-sets – "receiving regions and marginal payers" and "heavily taxed regions" – for the former group net transfers had a negative impact on economic growth, while for the latter group net taxes had an even higher negative impact on economic growth.

An update of the earlier analysis for this paper's reference period (2000-2016) broadly confirms the results seen previously: net fiscal transfers in EU regions are associated with positive redistribution effects, although not with favourable GDP growth effects. In the EU regional sample, our proxy for average net fiscal transfers has a mean of 89.8% (and a median of 89.4%), ranging from a minimum of 67.5% to a maximum of 115.6%. According to this measure, on average, the largest "paying" NUTS 2 regions include: Hovedstaden (Denmark), Utrecht (Netherlands) and the Flemish Brabant in (Belgium) – the first percentile of the distribution, with an average ratio of below 73.1% – as well as Inner London (United Kingdom), the Walloon Brabant and East Flanders (Belgium), Midtjylland and Sjælland (Denmark), Flevoland, South-Holland and North-Holland (Netherlands), Île-de-France (France), Helsinki-Uusimaa (Finland), Budapest (Hungary) and Stockholm (Sweden) – the fifth percentile, with an average ratio of below 76.6%. At the other end of the distribution, the largest "receiving" NUTS 2 regions include North-West and North-Centre (Bulgaria) and North-East (Romania) – the 99th percentile, with an average ratio of above 107.6% – as well as Bulgaria's remaining regions (except for the country's capital region), two regions in Portugal, Germany and Romania, the whole of Cyprus[26] and one region in Greece. For the exact data and ranking, see Table 2 below.

[25] Also in the context of a system of simultaneous equations capturing the relationship between net fiscal transfers to households, labour mobility and GDP growth, while accounting for the endogenous nature of fiscal transfers (i.e. relatively higher net transfers are granted to poorer regions).

[26] Cyprus constitutes one single NUTS 2 region.

Table 2

Largest “paying” and “receiving” NUTS 2 regions, based on the concept of net fiscal transfers

	Largest "paying" regions			Largest "receiving" regions		
	NUTS 2 region	Country	Proxy "net fiscal transfers" (%)	NUTS 2 region	Country	Proxy "net fiscal transfers" (%)
1	Hovedstaden	DK	67.5	North-West	BG	115.6
2	Utrecht	NL	71.6	North-Centre	BG	107.7
3	Flemish Brabant	BE	73.0	North-East	RO	107.6
4	Inner London – West	UK	73.4	Centre	BG	107.1
5	Wallon Brabant	BE	73.5	Região Autónoma da Madeira	PT	106.8
6	Midtjylland	DK	73.7	Chemnitz	DE	106.6
7	Flevoland	NL	73.9	South-East	BG	106.1
8	South-Holland	NL	74.6	Centre	PT	105.1
9	Sjælland	DK	74.6	South Muntenia	RO	104.9
10	Île-de-France	FR	75.1	Cyprus	CY	104.5
11	Helsinki-Uusimaa	FI	75.3	South-West Oltenia	RO	104.2
12	North-Holland	NL	75.5	Alentejo	PT	104.0
13	Budapest	HU	76.1	Sachsen-Anhalt	DE	103.4
14	Stockholm	SE	76.4	Eastern Macedonia, Thrace	GR	103.4
15	East Flanders	BE	76.6	North-East	BG	103.3

Sources: Authors’ calculations based on Eurostat, Regional Statistics and NUTS 2 level data.
Notes: The table shows the NUTS 2 regions in the fifth percentile of the distribution of the variable “net fiscal transfers” calculated as the ratio, as a percentage, between the region’s disposable income (PPS per inhabitant) and its primary income (PPS per inhabitant), averaged over the period 2000-2016.

Table 3 reports stronger convergence in disposable income levels compared with primary income levels, with the lowest rate of real convergence generally being estimated for GDP per capita. The findings also indicate that in most specifications net fiscal transfers have continued to be associated with lower growth in GDP per capita across EU and euro area regions, albeit to a lesser extent than in the analysis of previous periods (see Table 4).

Table 3

β-convergence in GDP, primary income per capita and disposable income per capita across regions (2000-2016)

	EU-28		EA-19		EA-12	
Cross-section: Long-term average (2000-2016)						
Mean regressions						
	β-coefficient	**N**	**β-coefficient**	**N**	**β-coefficient**	**N**
GDP per capita	-2.3***	281	-2.0***	178	-0.2	166
Income per capita	-2.6***	278	-2.3***	177	-0.2	166
Disposable income per capita	-3.0***	278	-2.9***	177	-0.9	166
Quantile regression (median)						
	β-coefficient	**N**	**β-coefficient**	**N**	**β-coefficient**	**N**
GDP per capita	-2.1***	281	-0.9***	178	-0.1	166
Income per capita	-2.4***	278	-0.6*	177	0.2	166
Disposable income per capita	-2.7***	278	-1.9***	177	-0.4	166
Panel: Medium-term averages over 4 periods (2000-2003, 2004-2007, 2008-2011, 2012-2016)						
Panel (random effects)						
	β-coefficient	**NT**	**β-coefficient**	**NT**	**β-coefficient**	**NT**
GDP per capita	-2.6***	1,113	-2.6***	701	-0.8***	653
Income per capita	-2.7***	1,105	-2.9***	697	-1.0***	653
Disposable income per capita	-3.1***	1,105	-3.6***	697	-1.7***	653

Sources: Authors' calculations based on Eurostat, Regional Statistics and NUTS 2 level data.
Notes: GDP per capita denotes gross domestic product (GDP) at current market prices, PPS per inhabitant; income per capita denotes the balance of primary income of households, in PPS, based on final consumption per inhabitant; disposable income per capita denotes disposable income of households, in PPS, based on final consumption per inhabitant (all at NUTS 2 level). Dependent variables are the annual average growth rate of GDP, primary and disposable incomes per capita, calculated as indicated in the table sub-headers. Explanatory variables are values at the beginning of the period (lagged 17-years for the cross-sectional analysis and 4 to 5-years for the panel analysis). Significance levels: *10%, **5%, ***1%. Data on primary and disposable incomes are missing for Malta and the two NUTS 2 regions of Croatia. N stands for numbers of cross-sectional observations; T number of time period observations; NT total number of observations in the panel (sample).

While it is difficult to establish a direct causal link between fiscal transfers and GDP growth per capita, and our conclusions are mainly based on associations, several factors mitigate the potential for endogeneity in our analysis. First, in terms of pure reverse causality effects, the allocation of net fiscal transfers (and, in particular, the EU structural and investment funds to be used in the next section) depends on the initial level, and not the future growth rate, of GDP (income) per capita (the lower the initial income level, the higher the transfer). This variable is explicitly controlled for in our regressions. The regression-coefficient of fiscal transfers, therefore, captures effects beyond those stemming from pure catching-up convergence (i.e. the lower the initial GDP (or income) level, the higher the associated growth rate). Second, to mitigate the risk of endogeneity even further, we use the initial level of fiscal transfers in regressions for subsequent medium- and long-term growth. Although it is true that the statistical significance of the coefficients is weaker when the initial level of fiscal transfers (as opposed to the associated period average) is used, no significant positive effects are revealed. Third, while it is difficult to find good instruments for fiscal transfers, the main results and conclusions do not change when these are instrumented (and the same applies to the EU structural and investment

funds used in the next section).[27] Fourth, we use several estimators to perform robustness checks. These include ordinary least squares (OLS), random effects, fixed effects and quantile (median) regressions, with standard errors corrected, in each case, for autocorrelation and possible correlation within (country) clusters or across individual units. In the same vein, in line with the earlier analysis, we ran a generalised structural equation model (SEM) comprising two equations: (i) one establishing the relationship between the growth rate of GDP per capita and both the initial level of GDP per capita and fiscal transfers (similar to Table 4); and (ii) another explicitly establishing the relationship between the amount of transfers received per capita by a given region and the respective level of GDP per capita. The results obtained were in line with those presented in Table 4 (and Table 5).

Table 4

GDP per capita growth, β-convergence and the potential impact of net fiscal transfers across regions (2000-2016)

Cross section: Long-term growth of real GDP per capita, 10-year average, 2000-2016									
Initial net fiscal transfers (2000)									
	Model 1			Model 2			Model 3		
	OLS, clustered SE by country			Quantile regressions (median), robust VCE			Quantile regressions (median), robust VCE		
	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12
Initial GDP per capita (2000)	-2.490***	-2.404**	-0.526	-2.357***	-1.397***	-0.114	-1.586***	-1.709***	-1.008**
Net fiscal transfers (2000)	-0.023	-0.039*	-0.021	-0.025***	-0.027*	-0.003	-0.007***	-0.007	0.000
Other controls							Yes	Yes	Yes
N	281	178	166	281	178	166	142	96	92
R^2	0.489	0.330	0.028						
Average net fiscal transfers (2000-2016)									
	Model 1			Model 2			Model 3		
	OLS, clustered SE by country			Quantile regressions (median), robust VCE			Quantile regressions (median), robust VCE		
	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12
Initial GDP per capita (2000)	-3.322***	-3.078***	-0.873	-3.059***	-1.903***	-0.916***	-3.166***	-2.073***	-1.294
Net fiscal transfers (avg.)	-0.099***	-0.096**	-0.042	-0.077***	-0.067***	-0.064***	-0.060***	-0.028**	-0.018
Other controls							Yes	Yes	Yes
N	280	177	166	280	177	166	253	159	151
R^2	0.583	0.432	0.085						

[27] For instance, using instruments such as: (i) average net fiscal transfers (or EU structural and investment funds) for all the other regions in the dataset; (ii) the same variables but for all the other countries' regions in the dataset – i.e. excluding all the regions of the country to which the region pertains; (iii) the variable "share of agriculture" in regional GDP in regressions for which this variable is not found to be statistically associated with economic growth.

Panel: Medium-term average growth of real GDP per capita over 4 sub-periods (2000-2003, 2004-2007, 2008-2011, 2012-2016)

Initial net fiscal transfers (beginning of each sub-period)

	Model 1			Model 2			Model 3		
	RE, clustered SE by country			Quantile regressions (median), robust VCE			FE, robust SE, region and period dummies		
	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12
Initial GDP per capita (2000)	-3.414***	-3.688***	-1.021*	-2.358***	-1.437***	-0.585**	-12.57***	-13.24***	-17.52***
Net fiscal transfers (initial)	-0.080*	-0.089*	-0.037	-0.041***	-0.028***	-0.013	0.088*	0.055	-0.043
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies							Yes	Yes	Yes
Other controls							Yes	Yes	Yes
NT	1,106	696	652	1,105	697	653	765	486	468
R^2							0.632	0.702	0.702

Average net fiscal transfers (annual average over each sub-period)

	Model 1			Model 2			Model 3		
	RE, clustered SE by country			Quantile regressions (median), robust VCE			FE, robust SE, region and period dummies		
	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12
Initial GDP per capita (2000)	-3.746***	-4.072***	-1.672**	-2.674***	-2.340***	-0.863***	-15.10***	-17.57***	-20.62***
Net fiscal transfers (avg.)	-0.106***	-0.120**	-0.073	-0.067***	-0.069***	-0.039***	-0.031	-0.088***	-0.124***
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies							Yes	Yes	Yes
Other controls							Yes	Yes	Yes
NT	1,107	697	653	1,107	697	653	847	533	511
R^2							0.683	0.747	0.751

Sources: Authors' calculations based on Eurostat, Regional Statistics and NUTS 2 level data.
Notes: The dependent variable is the annual average growth rate of GDP per capita (PPS) calculated as indicated in the table sub-headers. Outlier data for Ireland (NUTS 2 "Southern" region) related to the exceptional GDP revision in 2015 have been removed from the samples. The variable "GDP level" is the logarithm of GDP at current market prices (PPS per inhabitant). The variable "net fiscal transfers" is the percentage ratio between disposable income (PPS per inhabitant) and primary income (PPS per inhabitant). The "other controls" used in the regressions are: (i) the variable "share agriculture", which denotes the share of agriculture (and related NACE branches) in the total compensation of employees at NUTS 2 level (as a percentage); (ii) the variable "outbound labour mobility ratio", which is a proxy for (short-distance) outward labour mobility or labour commuting calculated as the ratio between a NUTS 2 region's residents working outside the region and those working inside the region (as a percentage) – data on labour mobility are missing for many regions; (iii) the variable "unemployment rate", which denotes the unemployment rate by region at the NUTS 2 level. Data on "net fiscal transfers" are missing for Malta and two regions in Croatia. Explanatory variables are used either at the beginning of the period or as averages (avg.) over the period indicated in the table sub-headers. Estimators used in individual regressions are shown in the table sub-headers. For the panel regressions, RE and FE denote the random-effect and fixed-effect estimators respectively. SE denotes standard errors. Significance levels: *10%, **5%, ***1%.

b) Analysis based on EU structural and investment funds at the regional level

The analysis in this sub-section is based on the richest historical dataset so far available on transfers of EU structural and investment funds at the regional level. The European Commission has recently released a new dataset which provides, in a single source, data on intergovernmental fiscal transfers under the EU structural and investment funds (comprising, in particular, the ERDF, the CF, the

EAFRD[28] and the ESF) at the NUTS 2 level for all EU programming periods completed so far (1989-1993, 1994-99, 2000-2006 and 2007-2013).[29] This dataset has expanded and replaced datasets previously published on the ERDF and the CF, including additional years and EU funds. The dataset also accounts for what has long been argued in the literature, i.e. that the cycle of EU fund transfers should reflect the moment real expenditure matched by EU fund transfers is actually incurred and not the moment payments are made to the Member States. In addition to EU fund payments, the dataset therefore includes, for the first time, model-based estimates of the amounts actually spent under the EU structural and investment funds each year at the regional level.[30] To the best of our knowledge, this is the first study to use this very comprehensive dataset.

A similar empirical analysis based on the new dataset points to EU structural and investment funds having some positive impact on the growth of GDP per capita in the period 2000-2016, although the evidence remains mixed. An earlier related analysis found that EU structural and investment funds spent during the period 1994-1999 had had a positive, albeit slight, impact on subsequent economic growth – only through the human development component. An update for the period 2000-2016 offers some evidence for the positive effect of both total EU fund payments and model-based EU fund expenditure in panel models with fixed effects. Such models mainly capture the medium-term perspective and real convergence within regions – as opposed to between regions. No evidence of positive effects is found for the cross-sectional dataset capturing longer time effects over the entire period 2000-2016. Since the results are very similar for EU fund payments and (model-based) expenditure, for the sake of conciseness only the latter are shown in this paper (see Table 5). With regard to the individual EU structural and investment funds for which data are available (CF, ESF, ERDF and EAFRD), a positive association with growth is found for all, particularly for the full sample of EU-28 regions. As for the EA-12 regions, no strong evidence of statistical significance is found for the CF and the ESF funds (the former having been directed to very few regions of EA-12 countries in the period of analysis).[31]

28 The database also includes EAFRD's predecessor, the European Agricultural Guidance and Guarantee Fund (EAGGF).

29 The dataset was first released on 22 March 2018. See European Commission (2016) and Historic EU payments - regionalised and modelled.

30 Developed by the University of Bergen, which was entrusted with building a framework of the beneficiaries' yearly expenditure on the basis of the regional pattern of EU fund payments. The framework utilises an "index of regional specificity", whereby the time gap between the payments remitted and actual expenditure is lower for NUTS 2 regions with a low index of specificity. For more information, see source in previous footnote.

31 Results not shown in the current paper for the sake of conciseness are, of course, available on request.

Table 5

GDP per capita growth, β-convergence and impact of (model-based) EU fund expenditure across regions, 2000-2016

Cross section: Long-term growth of real GDP per capita, 10-year average, 2000-2016									
Initial EU fund expenditure (2000)									
	Model 1			Model 2			Model 3		
	OLS, clustered SE by country			Quantile regressions (median), robust VCE			Quantile regressions (median), robust VCE		
	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12
Initial GDP level (2000)	-2.225***	-2.332**	-0.810	-1.770***	-1.461***	-1.158**	-2.069***	-1.476***	-1.276*
Initial EU fund expenditure (2000)	-0.239***	-0.369**	-0.207	-0.254***	-0.302***	-0.358***	-0.223***	-0.101*	-0.0540
Other controls							Yes	Yes	Yes
N	262	172	164	262	172	164	238	155	150
R^2	0.523	0.314	0.058						
Average EU fund expenditure (2000-2016)									
	Model 1			Model 2			Model 3		
	RE, clustered SE by country			Quantile regressions (median), robust VCE			FE, robust SE, region and period dummies		
	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12
Initial GDP level (2000)	-2.780***	-3.313***	-0.450	-2.477***	-2.271***	-0.567	-2.478***	-2.045***	-0.975*
EU fund expenditure (avg.)	-0.450**	-0.687***	-0.198	-0.374***	-0.481***	-0.226	0.0506	-0.150	0.118
Other controls							Yes	Yes	Yes
N	277	177	165	277	177	165	250	159	151
R^2	0.518	0.428	0.032						

Panel: Medium-term average growth of real GDP per capita over 4 sub-periods (2000-2003, 2004-2007, 2008-2011, 2012-2016)

Initial EU fund expenditure (beginning of each sub-period)

	Model 1			Model 2			Model 3		
	RE, clustered SE by country			Quantile regressions (median), robust VCE			FE, robust SE, region and period dummies		
	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12
Initial GDP level	-2.944***	-3.594**	-0.433	-1.854***	-0.582**	0.471	-16.69***	-19.49***	-19.98***
EU fund expenditure (initial)	-0.106	-0.543**	-0.127	-0.126***	-0.0112	0.184**	0.274***	0.828***	0.952***
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies							Yes	Yes	Yes
Other controls							Yes	Yes	Yes
NT	1,039	673	633	1,039	673	633	822	524	505
R^2							0.691	0.768	0.755

Average EU fund expenditure (annual average over each sub-period)

	Model 1			Model 2			Model 3		
	RE, clustered SE by country			Quantile regressions (median), robust VCE			FE, robust SE, region and period dummies		
	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12
Initial GDP level	-2.932***	-4.270***	-0.461	-1.859***	-0.529**	0.532	-17.00***	-18.36***	-19.42***
EU fund expenditure (avg.)	-0.186	-0.555**	-0.124	-0.110**	0.0524	0.226***	0.551***	0.917***	0.675**
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies							Yes	Yes	Yes
Other controls							Yes	Yes	Yes
NT	1,068	684	639	1,068	684	639	833	529	508
R^2							0.691	0.757	0.745

Sources: Authors' calculations based on the European Commission's database of regional structural and investment funds.
Notes: Dependent variable is the growth rate of GDP per capita (PPS), annual average over the period indicated in the table sub-headers. The variable "EU fund expenditure" corresponds to the model-based estimate for annual real expenditure matched by EU fund transfers, per inhabitant. Initial levels indicate the values at the beginning of the period. Averages (avg.) are calculated for the reference periods. For "other controls" and explanations of regression estimators, see the notes to Table 4. Significance levels: *10%, **5%, ***1%.

4 Intergovernmental fiscal transfers and the business cycle

Since EU cohesion policy funds primarily address allocation concerns, it is usually only by coincidence that they match the stabilisation needs of an economy. Nevertheless, although intergovernmental fiscal transfers seek, first and foremost, to achieve real convergence, they can also have an impact on economic stabilisation. This multipronged impact is illustrated by the example of EU structural and investment funds. In times of crisis, if these funds are absorbed steadily and according to plan, they could contribute to smoothing out the business cycle and, thereby, have a countercyclical effect. However, if these projects are only implemented during an economic upswing once the budgetary situation has improved, this could result in procyclical policies, as additional demand will be created at a time when capacity utilisation is already increasing. This section examines these issues in closer detail.

4.1 EU structural and investment funds, national co-financing and business cycles

The national co-financing requirement may affect when and to what extent EU structural and investment funds are absorbed. Countries that receive transfers under EU structural and investment funds should co-finance the projects they are implementing as a result (see also Box 2). The aim, in particular, is to increase governments' ownership of projects and reduce the risk of resources being spent inefficiently. At the same time, the obligation to co-finance investment projects can have an impact on the timing of countries actually absorbing funds for investment. If a country is in a trough, there are basically two possibilities. On the one hand, if public finances are not constrained, the fiscal space available for co-financing EU investment projects will facilitate the absorption of additional funds for investment, which will have a positive impact on the wider economy. In a situation of this type, countries will also have incentives to step up projects financed from EU funds, while reducing others financed exclusively from national resources. In cases in which there is a high level of additional investment take-up, this could even contribute to an overheating of the economy. On the other hand, if government finances are constrained, EU investment projects might not be implemented, in order to avoid any negative impact on the government budget balance. This could deepen an economic downturn. Consequently, the national co-financing requirement may, in theory, have a procyclical impact on the economy.

The cyclical impact of EU structural and investment funds should broadly correlate with the share they represent of countries' government gross fixed capital formation. If an economic downturn does not impose constraints on government budgets and if a large share of government investment is financed by EU

structural and investment funds, the latter are more likely to generate the positive side effect of stabilising the economy. By contrast, if the budgetary leeway for co-financing government investment becomes severely constrained, the fact that EU structural and investment funds can only be absorbed if they are co-financed by Member States may imply a sizeable negative impact on the economic cycle. As Chart B, panel (b) in Box 2 indicates, the ratio of EU structural and investment fund allocations to government gross fixed capital formation in the period 2000-2016 appears to have been significant in some euro area countries.

During the last economic and financial crisis, the EU structural and investment funds were used as a discretionary instrument in order to support the most severely affected Member States. In 2011, the Council followed a European Commission proposal to top up EU co-financing rates – thereby automatically reducing the national co-financing requirement – for projects in six countries that were subject to financial assistance programmes. The countries were subject to balance of payments assistance (Latvia, Hungary and Romania) or economic adjustment programmes (Greece, Ireland and Portugal).[32] The proposal implied no additional funding within the MFF but, instead, a frontloading of EU co-financing over its horizon to ensure that severely affected countries needed to contribute less to projects co-financed by the EU. This "exceptional measure" was scheduled to end when financial assistance ceased. By contrast, no measures have so far been taken to curb, in a similarly discretionary manner, allocation profiles for countries at risk of overheating.

Before the COVID-19 outbreak, for the MFF 2014-2020, the largest beneficiaries in terms of average annual allocations of EU cohesion policy tended to be countries which were enjoying more favourable macroeconomic conditions.[33] Chart 3 shows the correlations (no causal inference is drawn[34]) between the allocation of EU structural and investment funds and various economic indicators. With regard to the euro area, the chart illustrates that the countries with the largest average annual allocations of EU structural and investment funds tend to be those with (relatively) more favourable nominal GDP growth (and output gaps) and government budget balances. This is especially the case for countries which joined the EU relatively late and qualify for larger EU fund allocations given their lower levels of GDP per capita – the Baltic countries being a case in point. On the other hand, countries such as Italy – a recipient of only limited allocations of EU funds relative to GDP – had weaker growth prospects and more constrained public finances. Apart from potentially contributing to overheating the economies of the former group of countries, this could give rise to cyclical divergence across Member

32 See the press release.

33 For similar results for the 2000-2006 financial perspective see Kamps et al. (2009).

34 Chart 3 does not imply that downturns induce lower absorption of funds and, therefore, lower co-financed investment. Rather, it gives an indication that, on average, over a period of seven years countries with less favourable budgetary and economic situations were allocated fewer EU funds and thus had lower co-financed EU investment.

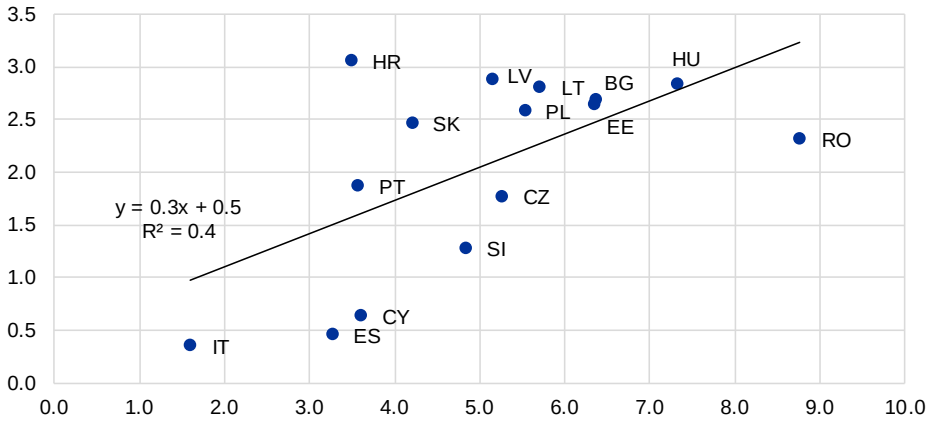
States in the EU and the euro area. It should, however, be noted that the actual absorption of EU structural and investment funds may follow a different pattern.[35]

Chart 3

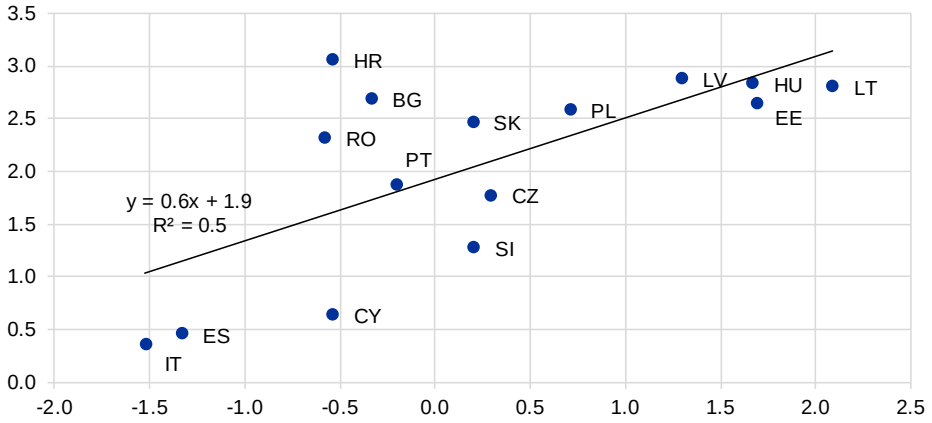
Average annual EU structural and investment fund allocations versus economic indicators – countries with allocations of at least 0.25% of GDP per year (2014-2020)

(y-axis: EU structural and investment funds (average annual allocations); x-axis: economic indicators)

a) Correlation with nominal GDP growth (excluding outliers Malta and Greece)

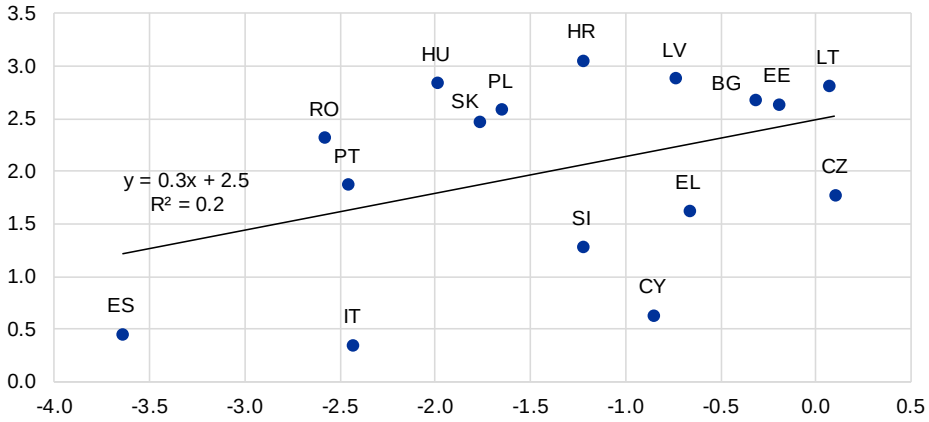


b) Correlation with output gap (excluding outliers Malta and Greece)



[35] Generally, an assessment of the impact of EU structural and investment funds on the economy should account for the fact that countries also need to contribute to the EU budget. It appears, however, that the greatest beneficiaries of EU structural and investment funds are those countries that are also the largest net recipients under the EU budget. This is conceptualised by the so-called operating balance, which aims to capture the difference between what a country pays into the EU budget and what it receives from it. As Box 2 shows, among the EA-19 (apart from the Baltic countries) Greece, Portugal, Slovakia, Malta, Slovenia, Ireland, Spain and Cyprus were net beneficiaries of the EU budget between 2000 and 2019, expressed as a percentage of their respective levels of GDP.

c) Correlation with general government budget balance (excluding outlier Malta)



Sources: European Commission (European Commission 2019 autumn economic forecast, DG Budget and Eurostat); authors' calculations.

Similar conclusions emerge from the exploratory analysis of the impact of EU structural and investment funds on business cycles across NUTS 2 regions in the EU and the euro area in the period 2000-2016 (Table 6). To obtain a measure of the regional business cycles, the GDP levels of NUTS 2 regions are broken down into trend and cyclical components by applying the widely used Hodrick-Prescott filter.[36] The resulting trend components may be treated as proxies for regional potential GDP and the cyclical components as regional output gaps. With a view to balancing the desire for more observations with that of limiting the impact of the business cycle, the full period considered (2000-2016) is split into four sub-periods. The resulting regional output gaps over these periods are averaged and gauged as either "good economic times" or "bad economic times", depending on whether the average regional output gap is positive or negative.

- Panel (a) of Table 6 investigates the appropriateness of the absorption pattern of EU structural and investment funds to the business cycle – i.e. whether funds were absorbed in a countercyclical manner (higher absorption in regions experiencing "bad economic times" and lower absorption in regions experiencing "good economic times"). The results provide a mixed picture. In "good economic times", on average, the regions with more positive output gaps absorbed (relatively) more EU structural and investment funds. By contrast, in "bad economic times", on average, the regions with more negative output gaps absorbed (relatively) more EU funds. At the same time, the regression coefficients for "bad economic times" are often below the absolute value of those for "good economic times".

- Panel (b) of Table 6 investigates the stabilisation impact of EU structural and investment funds according to regions' position in the business cycle – in particular whether they foster the closure of negative output gaps during "bad economic times". To that end, panel (b) uses the change in the output gap as

[36] See Hodrick and Prescott (1997). In line with common practice for annual data, the smoothing parameter (λ) was set at 100. The Hodrick-Prescott filter is applied to GDP data at NUTS 2 level for the period 2000-2017 – as opposed to the period 2000-2016 used in the subsequent analysis – to contain the filter's well-known endpoint bias.

opposed to its level (used in panel (a)). The results indicate that higher absorption of EU funds in “bad economic times” plays a particularly beneficial role in the closure of output gaps.

- As a robustness check and to control for the possible risk of endogeneity, we also ran a generalised structural equation model (SEM) comprising two equations: (i) one establishing the relationship between the level of the regional output gap (and of its change) and the respective absorption of EU structural and investment funds; and (ii) another explicitly establishing the relationship between the amount of EU fund expenditure per capita in a given region and the respective level of GDP per capita. The results obtained were in line with those shown in Table 6, while also confirming that EU fund expenditure per capita is, on average, negatively correlated with GDP per capita (as prescribed by the above-mentioned EU fund allocation principles).

- **The absorption of EU investment and structural funds appears to have been particularly high in regions in which economic conditions were already favourable, thereby giving rise to risks of procyclicality, particularly in “good economic times”.** As a consequence, the results argue in favour of channelling EU investment and structural funds to regions experiencing “bad economic times”, where such transfers appear to be the most effective. The economic efficiency of EU funds would therefore be optimised by enhancing their countercyclical nature through capping transfers in “good economic times”. This would allow fiscal buffers to be created which could be employed in “bad economic times”.

Table 6

Cyclical impacts of EU structural and investment funds, 2000-2016

a) All regions, medium-term average output gap over 4 periods (2000-2003, 2004-2007, 2008-2011, 2012-2016)

	Model 1			Model 2			Model 3		
	RE, clustered SE by country			Quantile regressions (median), robust VCE			FE, robust SE, region and period dummies		
	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12
EU fund expenditure (avg.)									
- During "good economic times"	0.408***	0.389***	0.298***	0.275***	0.229***	0.202***	0.425***	0.045	-0.050
- During "bad economic times"	-0.253***	-0.270***	-0.305***	-0.246***	-0.301***	-0.322***	-0.133*	-0.513***	-0.612***
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies							Yes	Yes	Yes
Other controls							Yes	Yes	Yes
NT	1,080	694	650	1,080	694	650	839	540	519
R^2	0.693	0.721	0.752				0.737	0.742	0.746

b) All regions, medium-term average change in output gap over 4 periods (2000-2003, 2004-2007, 2008-2011, 2012-2016)

	Model 1			Model 2			Model 3		
	RE, clustered SE by country			Quantile regressions (median), robust VCE			FE, robust SE, region and period dummies		
	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12	EU-28	EA-19	EA-12
EU fund expenditure (avg.)									
- During "good economic times"	-0.061	-0.143	-0.182	-0.130	-0.167	-0.080	-0.926***	0.087	-0.016
- During "bad economic times"	0.828***	0.932***	0.993***	0.685***	0.821***	0.915***	-0.206	1.087**	1.015*
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies							Yes	Yes	Yes
Other controls							Yes	Yes	Yes
NT	1,080	694	650	1,080	694	650	839	540	519
R^2	0.529	0.595	0.672				0.582	0.702	0.695

Sources: Authors' calculations based on the European Commission's database of regional structural and investment funds.
Notes: In panel (a), the dependent variable is the estimated regional output gap, i.e. the difference between actual and estimated potential regional GDP, expressed as a percentage of potential regional GDP, averaged over the periods indicated in the table sub-headers. In panel (b), the dependent variable is the change in the estimated regional output gap, computed over the periods indicated in the table sub-headers. Potential regional GDP has been estimated by applying the standard Hodrick-Prescott filter to the level of annual GDP (PPS) of NUTS 2 regions. The smoothing parameter (λ) has been set to 100, in line with common practice for annual data. "Good economic times" are those periods in which the output gap was positive, on average, over the reference periods. "Bad economic times" are those periods in which the output gap was negative, on average, over the reference periods. Averages (avg.) are calculated for the reference periods. For "other controls" and explanations of regression estimators, see the notes to Table 4.
Significance levels: *10%, ** 5%, ***1%.

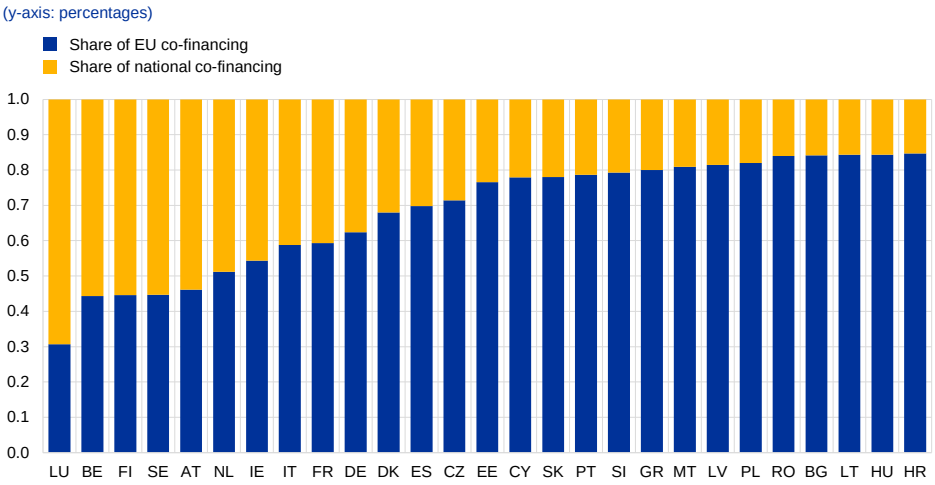
4.2 Policy implications

In principle, EU structural and investment funds are a vehicle that could be used to support demand in the exceptional circumstances of severe economic downturns. Generally, a convergence instrument should be distinguished from a stabilisation instrument – a convergence instrument (e.g. the EU's cohesion policy)

needs, first and foremost, to achieve real convergence in an effective and efficient manner. This is why national co-financing rates decline with levels of GDP per capita (see Box 2 and Chart 4 for an overview of co-financing rates). At the same time, however, as the exploratory analysis above shows, there are risks of EU structural and investment funds being absorbed in a procyclical manner, thereby counteracting crucial stabilisation objectives. There is, therefore, merit in better modulating the absorption of the EU structural and investment funds over the business cycle, in order to attenuate the risk of unwarranted procyclicality.[37] This recommendation is also supported by the evidence reported in panel (b) of Table 6. This shows that the stabilisation impact of a take-up of EU structural and investment funds – measured as a faster improvement of the output gap – is positive and significant when economic conditions are weak.

Chart 4

National co-financing rates of EU structural and investment funds (2014-2020)



Sources: European Commission (DG Budget and Eurostat), authors' calculations.

Allocations and national co-financing rates could be amended over the MFF period to limit potential procyclicality. There would appear to be advantages to making national co-financing rates more dependent on countries' positions in the business cycle and/or their budgetary situations. As Charts 3 and 4 show, national co-financing rates are low in a number of countries that have experienced large positive output gaps and vice-versa. To this end, in order to support the take-up of EU structural and investment funds in fiscally constrained countries during an economic trough, national co-financing rates could be lowered temporarily. To compensate for this, they would need to be raised once the economy has recovered and also, in general, in countries at risk of overheating. This type of mechanism could contribute to lowering the amplitude of the business cycle in countries that are significant beneficiaries of such transfers (and may experience considerable economic swings over the business cycle). During bad economic times in particular, however, reasonable annual floors for nationally financed investment could be considered to

[37] Funke et al. (2018) suggest setting up a euro area budgetary instrument that could temporarily pay for national co-financing obligations in the event of an economic downturn, in order to achieve business cycle convergence.

contain possible substitution problems between nationally and EU-funded investment – i.e. the risk of no additional investment taking place and planned investment being financed instead by the received funds – with a view to safeguarding the overall level of investment in Member States. Moreover, to avoid the difficulties which are an intrinsic part of identifying a country's position in the business cycle, the mechanism should, to the extent possible, be automatic (e.g. based on pre-defined thresholds for GDP growth, the unemployment rate, or annual fund absorption ceilings in good economic times and annual absorption floors in bad economic times). In general, sound and resilient institutions and a high-quality administrative capacity to absorb fiscal transfers are instrumental in their alignment with stabilisation needs.

Some recent initiatives at the euro area and the EU level relate to issues addressed in this paper. For example, before the outbreak of the COVID-19 pandemic, a Budgetary Instrument for Convergence and Competitiveness (BICC) had been established, although this has now been replaced by a dedicated fiscal response to the crisis which ensued. Starting initially with the objective of setting up a separate budgetary capacity for stabilising the euro area during crises, the focus of the BICC instrument had shifted to supporting (within the EU budget) structural reforms and investment needs. It was envisaged that the BICC would be accessible to all euro area countries and to ERM II Member States on a voluntary basis, with support under the instrument being delivered in the form of grants – i.e. direct financial contributions. Importantly, "with a view to ensuring ownership at the national level", it was envisaged that a national co-financing rate would be set as a percentage of the total cost of the investment and reforms.[38] On 9 October 2019, the Eurogroup had agreed on a national co-financing rate of 25% and on a modulation of the national co-financing rate "based on a trigger related to severe economic circumstances, to be applied in a transparent and predictable manner". It had been agreed that "when warranted, based on the trigger, the national co-financing rate should be reduced to half". Such a modulation of the national co-financing requirements would, in principle, represent a tool that could be used to address the impact that the budgetary instrument would have on the business cycle. Given the very limited size of the BICC it was, however, not expected to have a material impact on euro area countries' cyclical conditions. On 21 July 2020 the European Council agreed on an exceptional temporary recovery instrument known as "Next Generation EU" (NGEU) totalling up to €750 billion. The core element in the EU's recovery package is the "Recovery and Resilience Facility" which replaces the BICC. This facility will temporarily – i.e. only over the period 2021-2026 – boost the EU budget in order to support investment and structural reforms. The instrument would entail €312.5 billion in grants and €360 billion in loans to the EU Member States. For the grant component of the instrument, given the severity of the economic downturn, the proposed Recovery and Resilience Facility does not foresee a national co-financing requirement. The instruments' allocation key is intended to support cohesion by allowing countries that had been impacted particularly hard by the pandemic to recover faster and become more resilient. Specifically, in 2021-2022 funds will be distributed on the basis of income per capita and past unemployment developments; for 2023 the past unemployment

[38] For details of the term sheet on the BICC see the Term sheet on the Budgetary Instrument for Convergence and Competitiveness.

developments will be replaced by the observed declines in real GDP in 2020-2021. This allocation key implies sizeable net financial support for those countries that face the largest economic and fiscal challenges after the pandemic. [39] To this end, it combines both allocation and stabilisation objectives.

In addition, some elements of the European Commission's recent proposal for a Coronavirus Response Investment Initiative Plus (CRII+) are worth noting in the context of this paper.[40] The package was proposed by the European Commission on 2 April 2020 and subsequently adopted by the European Parliament on 17 April 2020. It envisages that all non-utilised support from the EU cohesion policy funds can be mobilised to address the effects of the COVID-19 pandemic. CRII+ includes additional flexibility with regard to transferring resources between the cohesion policy funds and/or between categories of regions. Importantly, CRII+ also includes the possibility of applying 100% EU co-financing rates to the relevant operational programmes in the accounting year 2020-2021, allowing Member States to benefit from full EU financing for crisis-related measures. In the absence of annual floors for nationally financed investment, however, it cannot be excluded that EU co-financing rates of 100% may, nevertheless, coincide with a lower overall level of investment in Member States, thereby falling short of the degree of stabilisation required to counteract the economic and social consequences of the COVID-19 pandemic.

In conclusion, addressing the side-effects of a purely allocation-driven convergence instrument such as the EU structural and investment funds on stabilisation is very different from setting up a dedicated instrument aimed at stabilisation. Table 7 compares EU cohesion policy funds with the functioning of a budgetary instrument for stabilisation (often referred to as "fiscal capacity"). While an earlier Commission reflection paper[41] on deepening EMU refers to the possibility of modulating co-financing rates systematically according to the economic conditions in Member States, it stresses, however, the small budgetary capacity within the EU budget. It points to the limited stabilisation properties of such a proposal, particularly if stabilisation were required in the larger euro area economies. In the absence of a political agreement on a stabilisation capacity for the euro area, it seems important to acknowledge and address, to the extent possible, any unwarranted side-effects of EU structural and investment funds on stabilisation.

39 See for details the box entitled "The fiscal implications of the EU's recovery package", ECB Economic Bulletin, September 2020.

40 See Cohesion policy action against coronavirus.

41 See European Commission (2017a).

Table 7

Features of the EU cohesion policy and a fiscal stabilisation instrument

	EU structural and investment funds (Multi-annual Financial Framework)	Proposal for a fiscal capacity within the EU budget
Objective	Economic, social and territorial cohesion	Stabilisation
Country coverage	EU	Euro area (tbd.)
Trigger	Per-capita income thresholds	Cyclical indicators (including unemployment rates)
"Side" economic impact	• Limited impact on stabilisation, which can, however, be greater in countries with large absorption of funds. • Risk of procyclicality mostly in good economic times, thereby accentuating cyclical fluctuations over the business cycle.	Potential impact on economic convergence (direction not obvious ex ante)
Shocks aimed to be addressed	• Some catering for asymmetric shocks: (a) during the last economic and financial crisis, national co-financing rates were reduced in individual countries most severely hit; (b) in the case of a major natural disaster, Member States can also apply for help through the European Union Solidarity Fund (EUSF), which can be mobilised up to a maximum annual total of €500 million. • Some catering for symmetric shocks: (a) 100% EU co-financing rates for crisis-related measures in the accounting year 2020-2021 against the background of the COVID-19 pandemic.	Asymmetric shocks and/or symmetric shocks with an asymmetric impact on individual countries
Contributions	EU budget (including own resources and national contributions)	(Poss.) Increased EU budget (including own resources and national contributions)
Conditionality	For 2014-2020 MFF: 11 themes; compliance with sound economic governance (e.g. suspension of funds linked with the excessive deficit procedure)	• Compliance with EU economic governance framework (including EU fiscal rules). • Funds targeted towards key priorities (including the green and digital transitions).

Note: The table does not refer to a specific proposal for a fiscal capacity. For an example of a proposal for a euro area fiscal capacity see European Commission (2017a), as well as Carnot et al. (2017).

Further empirical analysis is warranted on the side-effects of EU structural and investment funds. In particular, this includes studying the impact different absorption patterns have had, over programming periods, on minimising idiosyncratic cyclical fluctuations. The preliminary analysis in this paper (with additional results available upon request) tends to show support for EU structural and investment funds having a procyclical impact, in particular in good economic times, although further robustness checks would be justified.

5 Conclusions

This paper reviews the impact of fiscal transfers and, in particular, that of intergovernmental fiscal transfers, on real and business cycle convergence. A review of the theoretical and empirical literature shows that intergovernmental fiscal transfers are more likely to have a beneficial impact on real convergence if they target a specific purpose – most notably supporting the recipient's productive capacity – compared with general schemes simply aimed at broad income redistribution.

With regard to the role of fiscal transfers in real convergence, empirical analysis conducted for the EU-28, the EA-19 and the EA-12 for the period 2000-2016 leads to the following conclusions: (1) since the introduction of the euro (in this paper the period 2000-2016), there has been real catching-up (GDP per capita) convergence across the EU and the euro area countries and regions; (2) evidence of real convergence across the EA-12 during the period 2000-2016 is less clear-cut than it is for the other samples, although there is no systematic evidence of divergence; (3) the last financial and sovereign debt crisis slowed down the real catching-up process, particularly in mature euro area economies, although the subsequent economic recovery (before the outbreak of the COVID-19 pandemic) brought convergence back on track; (4) while fiscal transfers have contributed to redistribution across countries and regions, generally leading to (faster) convergence in disposable incomes, their broader impact on economic (i.e. GDP) growth and real convergence has been less clear-cut. Some positive economic growth effects have been found at the regional level for the EU structural and investment funds in the medium term, although not in the longer term.

With regard to the role of fiscal transfers in business cycle convergence, the paper shows that although fiscal transfers mostly reflect long-term allocation concerns and do not explicitly address short-term stabilisation needs, their underlying impact on the business cycle is not insignificant. For instance, in the current set-up of the EU structural and investment funds, which requires a certain degree of co-financing by national budgets, there is an ensuing risk of procyclicality, whereby investment projects may be implemented more decisively only in upswings, once budgetary situations have improved. This is confirmed by our exploratory empirical analysis, which shows that the EU structural and investment funds appear to have been used in a procyclical manner mostly in good economic times, thereby accentuating cyclical fluctuations over the business cycle.

There is still unexplored scope to use the EU structural and investment funds as a vehicle to support Member State's economies during exceptionally severe economic downturns. Generally, a convergence instrument should be distinguished from an economic stabilisation instrument, i.e. a convergence instrument such as the EU's cohesion policy needs, first and foremost to effectively and efficiently achieve real convergence. At the same time, however, there appears to be scope for limiting the impact of any negative side effects on economic stabilisation.

To speed up the real convergence that is needed for the EMU to function smoothly, it is crucial for the implementation of structural (including institutional) reforms to gather renewed momentum. The twin impact that fiscal transfers have on allocation and stabilisation argues in favour of these being best targeted at supporting the implementation of structural reforms that address the sources of idiosyncratic cyclical fluctuations in Member States and respective regions. Such structural reforms should contribute significantly to enhancing the efficient management and effective absorption of the EU structural and investment funds. Indeed, the literature shows that high institutional quality and technological capacity – which have an important role to play in achieving regional convergence – are also invaluable prerequisites for maximising the efficiency and effectiveness of fiscal transfers in achieving economic growth and resilience.

There are various areas for further research. More empirical analysis clearly appears to be warranted on the identification of absorption patterns of EU structural and investment funds over programming periods and the impact these have had on minimising idiosyncratic cyclical fluctuations. Where regularities have been identified, notably for the euro area countries, these could potentially lead to recommendations with regard to reforming the design and operation of the EU budget.

Annex

Table A.1

Overview of empirical studies on the impact of intergovernmental fiscal transfers on economic growth and convergence

Authors	Title	Year	Country	Period	Transfer definition	Empirical framework	Impact > 0?	Comments
Coulombe, S. and Lee, F.C.	"Convergence across Canadian provinces, 1961 to 1991"	1995	Canadian provinces	1961-1991	Government transfers per capita	Neoclassical β-convergence model applied to different concepts of per capita income and output	Yes	Transfers have increased the speed of the convergence process and reduced the level of regional disparities ex post.
Boldrin, M. and Canova, F.	"Europe's regions – income disparities and regional policies"	2001	EU regions according to the NUTS 2 classification.	1980-1996	EU structural funds as a share of GDP	Neoclassical β-convergence model	No	Both private and public capital to labour ratios grew in the poorer regions, over the sample period, to match the level of the same ratios in the richer regions. Total factor and labour productivity indices did not grow. Regressions between various indices of productivity and the flow of EU structural funds received (either contemporaneously or at various lags) indicate either non-significant or negative correlation coefficients.
Ederveen, S., Gorter, J., de Mooij, R. and Nahuis, R.	"Funds and games: the economics of European cohesion policy"	2002	EU regions according to the NUTS 2 classification.	1981-1996	EU structural funds as a share of GDP	Neoclassical β-convergence model extended to include EU structural funds using three specifications: (i) without dummies; (ii) with country-specific dummies; and (iii) with region-specific dummies	Ambiguous	Econometric analysis points to ambiguity on estimated growth elasticity of EU structural funds (measured in % GDP), which varies between -0.35 and +0.7, depending on the specification.
Midelfart-Knarvik, K. H. and Overman, H. G.	"Delocation and European integration – is structural spending justified?"	2002	EU Member States	1990-1993, 1994-1997	EU state aid as a share of GDP	The change in share for a country in an industry is regressed as a function of changes in: (i) the size of the country; (ii) the country's characteristics; (iii) the industry's characteristics, (iv) the flow of EU aid and (v) the flow of state aid.	Yes	National state aid appears to have little effect on industry location. By contrast, EU structural funds have an effect on industry location, notably by attracting industries that are intensive in terms of R&D. However, this effect has mostly operated counter to the countries' comparative advantage.
Cappelen, A., Castellacci, F., Fagerberg, J. and Verspagen, B.	"The impact of EU regional support on growth and convergence in the European Union"	2003	EU regions according to either the NUTS 1 or NUTS 2 classifications	1989-1997	EU structural funds as a share of GDP	Technological-gap model, focusing on the impact of differences across countries in terms of innovation efforts, the potential for imitation and the capacity to exploit advances in technology for differences in growth, extended to include EU structural funds	Yes	EU structural funds have a significant and positive impact on the growth performance of EU regions. The results indicate that these economic effects are much greater in more "developed" regions, emphasising the importance of implementing accompanying policies to improve the competence of receiving regions.

Authors	Title	Year	Country	Period	Transfer definition	Empirical framework	Impact > 0?	Comments
Kaufman, M., Dunaway, S. and Swagel, P.	"Regional convergence and the role of federal transfers in Canada"	2003	Canadian provinces	1961-2000	Federal transfers, including employment insurance and equalisation transfers	System of simultaneous equations including a standard convergence equation, endogenous determination of equalisation and employment insurance transfers, and a migration equation	Partial (conditional)	Employment insurance seems to have a significant negative effect on output convergence, by discouraging migration within Canada. Equalisation transfers appear to have helped to spur convergence.
Beugelsdijk, M. and Eijffinger, S. C. W.	"The effectiveness of structural policy in the European Union: an empirical analysis for the EU-15 in 1995–2001"	2005	EU Member States	1995-2001	EU structural funds as a share of GDP	GMM estimation using panel data	Yes	The hypothesis that EU structural funds contributed to fewer interregional disparities within Member States cannot be rejected. There is no evidence that in more "corrupt" Member States, EU structural funds have a lower positive impact on GDP growth.
Ederveen, S., de Groot, H. L. F. and Nahuis, R.	"Fertile soil for structural funds? A panel data analysis of the conditional effectiveness of European cohesion policy"	2006	EU Member States	1960-1995 (seven subsets of five-year periods)	EU structural funds as a share of GDP	Neoclassical β-convergence model with an additional set of explanatory variables, using pooled cross-sections.	Partial (conditional)	EU structural funds allocated to economies with "good" institutions are effective. Several quantitative measures, including corruption, inflation and openness, serve as a proxy for the quality of institutions. EU structural funds are therefore conditionally effective.
Dall'erba, S. and Gallo, J. L.	"Regional convergence and the impact of structural funds over 1989–1999: a spatial econometric analysis"	2008	EU regions according to the NUTS 1 classification.	1989-1999	EU structural funds as a share of GDP	Neoclassical β-convergence model with spatial effects (i.e. spatial autocorrelation and spatial heterogeneity) using the Getis-Ord statistics. 2SLS using panel data	No	Peripheral regions converge faster although there is no evidence of a significant positive role played by EU structural funds.
Checherita, C., Nickel, C. and Rother, P.	"The role of fiscal transfer for regional economic convergence in Europe"	2009	EU regions according to the NUTS 2 classification.	1995-2005	Net fiscal transfers, defined as the ratio between household disposable income and primary income	System of simultaneous equations capturing the relationship between net fiscal transfers to households, labour mobility and economic growth, later extended to account for EU structural funds	No	While net fiscal transfers contribute to reducing disparities in the disposable income of households at the regional level and, thereby, achieve their intended distributional goal, they also impede output growth, leading to a process of "immiserising convergence". EU structural funds spent in the period 1994-1999 are found to have had a slightly positive impact on economic growth, mainly through the human development component.
Becker, S. O., Egger, P. H. and von Ehrlich, M.	"Going NUTS: the effect of EU structural funds on regional performance"	2010	EU regions according to the NUTS 2 and NUTS 3 classifications	EU programming periods 1989-1993, 1994-1999 and 2000-2006	EU transfers under Objective 1	Fuzzy regression-discontinuity design using panel data	Yes	A differential impact of Objective 1 programme participation on the growth of GDP per capita (PPS) is estimated at about 1.6 percentage points within the same programming period. No such effects can be found for employment growth. A back-of-the-envelope calculation, based on the benchmark specification, suggests that, on average, the funds spent on Objective 1 have a return which is about 1.20 times their costs in GDP terms.
Aiello, F. and Pupo, V.	"Structural funds and the economic divide in Italy"	2012	Italian regions	1996-2007	EU structural funds as a share of GDP	Neoclassical model in which EU structural funds are an augmenting variable of the growth equation. General error correction model using panel data.	Partial and limited	On the one hand, EU structural funds have a positive, but limited, impact on convergence of GDP per capita. On the other hand, EU structural funds have no impact on convergence of labour productivity.

Authors	Title	Year	Country	Period	Transfer definition	Empirical framework	Impact > 0?	Comments
Becker, S. O., Egger, P. H. and von Ehrlich, M.	"Too much of a good thing? On the growth effects of the EU's regional policy"	2012	EU regions according to the NUTS 3 classification.	EU programming periods 1994-1999 and 2000-2006	EU transfers under Objective 1	Generalised propensity score estimation (a non-parametric method for estimating treatment effects conditional on observable determinants of treatment intensity) using panel data	Non-linear, limited effect	An optimal transfer intensity of 0.4% of target region GDP and a maximum desirable intensity of 1.3% are estimated.
Rodriguez-Pose, Andrés and Garcilazo, Enrique	"Quality of government and the returns of investment: Examining the impact of cohesion expenditure in European regions"	2013	EU regions according to the NUTS 2 classification.	1996-2007	EU structural funds as a share of GDP	Neoclassical β-convergence model extended to include: (i) per-capita investment undertaken by the EU in each region under EU structural funds, (ii) a composite indicator of the quality of government in each region and (iii) an additional set of control variables.	Yes (conditional)	The quality of local government is a vital factor in determining the extent to which regional investment transfers into economic growth. This is clearly evident for regions in which EU structural and cohesion funds represent more than €80 per capita per year. The quality of local government (as a factor of economic growth and a mediator for the efficient use of structural cohesion funds), increases as the expenditure threshold rises. Above €120 per capita per year, quality of government is the key factor determining the returns from EU structural funds.
Giannola, A., Scalera, D. and Carmelo, P.	"Net fiscal flows and interregional redistribution in Italy: a long run perspective (1951-2010)"	2014	Italian regions	1951-2010	Net fiscal flows, defined as the difference between what the residents of a region contribute to general government and what they gain from it in terms of public spending targeted at that region.	Model following Bayoumi and Masson (1995), whereby normalised regional disposable income, after public revenue and expenditure, is regressed on the normalised GDP level	No	A prominent upsurge in net fiscal flows in the 1980s and the 1990s had no significant impact on the North-South gap, mainly because it was not connected to a stronger commitment to supply-side regional and development policies, and the increased capital expenditure needed in the *Mezzogiorno*.
Baskaran, T., Feld, L.P. and Necker, S	"Depressing Dependence? Transfers and Economic Growth in the German States, 1975-2005"	2016	West German States (excluding Berlin)	1975-2005	Transfer ratio in t-1, defined as the share of horizontal (equalisation among States) and vertical (from federal government) transfer revenue in total state revenues	GDP is regressed as a function of the transfer ratio and a set of additional control variables. 2SLS estimation uses panel data.	No	Transfers are irrelevant – or possibly even harmful – for economic growth.
Merler, S.	"Income convergence: did EU funds provide a buffer?"	2016	EU regions according to the NUTS 2 and NUTS 3 classifications.		EU transfers under Objective 1	Quasi-experimental framework exploiting the funds' eligibility rules, based on comparable treatment and a control group of regions. Neoclassical β-convergence model, estimated with and without a set of additional control variables and formal eligibility dummy.	Yes	EU structural funds played an important role in limiting the effects of the crisis at the regional level. In particular, the NUTS 3 regions that were formally eligible for Objective 1 funds grew faster than others during the crisis. Evidence is found of income convergence within this group, at a rate of 2% per year.

Authors	Title	Year	Country	Period	Transfer definition	Empirical framework	Impact > 0?	Comments
Petraglia, C., Pierucci, E. and Scalera, D.	"Redistribution and risk sharing in Italy: learning from the past"	2016	Italian regions	1951-1965, 1983-1992	Net fiscal flows as defined in Giannola et al. (2014).	Model following Bayoumi and Masson (1995), whereby regional disposable income is regressed as a function of regional GDP, although including time fixed effects.	No	In the 1980s interregional redistribution occurred almost exclusively through current expenditure. Its main purpose was consumption rebalancing, and there was little room for investment financing.
Weddige-Haaf, K. and Clemens, K.	"Determinants of regional growth and convergence in Germany"	2017	German states	1995-2014	Fiscal equalisation transfers and EU structural funds	Neoclassical β-convergence model augmented by: (i) a trend term, (ii) a crisis dummy, (iii) additional explanatory variables and (iv) non-linear interaction effects	Partial	There is evidence of slow, but significant, convergence once the crisis and trend have been appropriately accounted for. Horizontal equalisation transfers are ineffective in promoting growth and convergence, although there is evidence that federal supplementary grants contribute to convergence. Structural funding is found to have opposing growth effects on Eastern and Western states and has significantly promoted convergence.
De Angelis, I., de Blasio, G. and Rizzica, L.	"On the unintended effects of public transfers: evidence from EU funding to Southern Italy"	2018	Municipalities in southern Italy2007-2014		EU fund disbursements in the programming period 2007-2013	Poisson regression model in which the parameter of interest is the elasticity of white-collar crimes to EU funds	N.A.	Transfers have a statistically significant effect on white collar crimes: in the absence of EU funding disbursements, the annual number of white-collar crimes in Southern Italy would have been 4% lower.

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João Capella-Ramos
European Commission, Brussels, Belgium; email: joao.capella-ramos@ec.europa.eu

Cristina Checherita-Westphal
European Central Bank, Frankfurt am Main, Germany; email: cristina.checherita-westphal@ecb.europa.eu

Nadine Leiner-Killinger
European Central Bank, Frankfurt am Main, Germany; email: nadine.leiner-killinger@ecb.europa.eu

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu

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