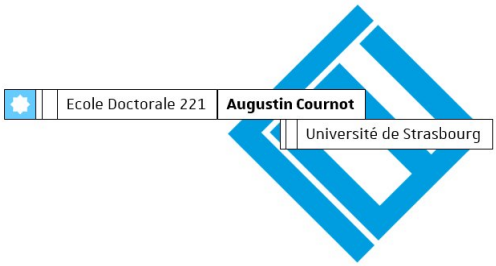

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LES FONDS STRUCTURELS EUROPEENS: ALLOCATION ET EFFICACITE ECONOMIQUE

Préparée sous la direction de Meixing DAI, de Phu NGUYEN-VAN et de Thi Kim Cuong PHAM

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Je dédie cette thèse à Amatxi

Table of contents

Reading note / Note de lecture

This thesis was written entirely in English to ease the discussion and the diffusion of its results. For French readers, translated versions of the general introduction and conclusion are available. The thesis is made of four independent chapters. In order to make each chapter readable independently from the others, some elements are to be found in several chapters, especially those relating to the economic literature and the institutional context. Each chapter also contains its own contextual elements and a literature review specific to the issue addressed in the chapter. For this reason, the general introduction remains brief on the literature, in order to avoid excessive redundancies.

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Cette thèse a été rédigée intégralement en anglais afin de faciliter la discussion et la diffusion de ses résultats. Pour les lecteurs francophones, une version traduite de l'introduction générale et de la conclusion générale est proposée. La thèse est composée de quatre chapitres autonomes. Pour permettre la lecture de chaque chapitre indépendamment des autres, certains éléments sont mentionnés dans plusieurs chapitres, notamment parmi ceux ayant trait à la littérature ou la présentation du contexte institutionnel. Chaque chapitre contient également ses propres éléments de contexte et une revue de littérature spécifique à la problématique étudiée. Pour cette raison, l'introduction générale demeure brève sur les éléments de littérature, dans l'objectif de limiter les redondances.

General introduction

"Expression of the solidarity between Member States and regions which do not have the same level of development, an opportunity to give everyone a chance and strengthen the competitiveness of the whole, the cohesion policy has become, in budgetary terms, the second policy of the Union."

This sentence pronounced by Jacques Delors during the speech marking the end of his mandate at the head of the European Commission, on January 16, 1995 in Strasbourg, is still true today. The cohesion policy represents some 291 billion euros, or 27.1% of the European budget for the multiannual financial framework (MFF) 2021-2027. Established in the 1980s, it responds to a founding objective of the Treaty of Rome (1957) where the Member States declare that they are "concerned about strengthening the unity of their economies and ensuring their harmonious development, by reducing the the gap between the different regions and the backwardness of the less favored".[1]

This policy is based on five structural funds, the three main ones being the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF).[2] All EU regions are eligible for the European funds but the level of financial assistance granted to each region depends mainly on their relative GDP per capita to the EU average. Thus, regions located below the 75% threshold, known as *convergence regions*, are the main beneficiaries of the cohesion policy.

As such, the EU funds co-finance public and private investment projects aimed at stimulating the accumulation of physical and human capital to increase the GDP per capita in the beneficiary regions *in fine*. The ERDF especially supports technological progress by devoting more than 50% of its resources to the following 3 thematic objectives: "Strengthening Innovation and Research and Development (R&D)", "Information and Communication Technology" and "Support for Innovative SMEs ". The role of the ESF is rather to increase the quality of the labor factor by devoting nearly 75% of its resources to the objectives "Employment and Labor Mobility" and "Education, training and lifelong learning". As for the CF, it is only intended for the poorest countries in the area, those with a level of GDP per capita below 90% of the European average. It concentrates half of its resources to

[1] Source: Preamble of Communautés Européennes. Bureau de représentation (France) (1957).

[2] There is also the European Agricultural Fund for Rural Development (EAFRD), which supports rural development and constitutes the second pillar of the common agricultural policy (CAP). Then, there is the European Maritime and Fisheries Fund (EMFF) which is part of the common fisheries policy.

contribute to the construction of the trans-European transport network (TEN-T) by financing infrastructures such as railways, highways, airports or port facilities. The other part of the FC finances environmental infrastructure such as drinking water networks or recycling centers.

The challenge of the economic convergence within the EU has changed with a shift from the East to the South. Central and Eastern European countries, such as the Czech Republic, Hungary, Poland and the Baltic States, which have grown significantly over the past decade, will experience a significant reduction in their allocations. At the same time, weakened by the economic crisis of sovereign debt in the euro zone and by the Covid-19 pandemic economic downturn, Italy, Spain, Greece and Portugal will see their support being reinforced. With the effective departure of the United Kingdom from the European Union (EU) at 1^{er} January 2021, the resource constraint on the European budget has increased. As well, the emergence of new challenges, such as ecological transition and internal security, make the EU diversify its spending. In this context, the economic effectiveness of the structural funds rhymes with necessity.

This thesis answers to four research questions built around the notions of economic effectiveness and allocation of the European structural funds:

— Do the European structural funds have an impact on the synchronization of economic business cycles so that the EMU could be closer to an optimal monetary area?

— Is there a dilemma between rapid absorption of the European funds and a high economic effectiveness in the convergence regions?

— In the case of the Cohesion Fund, is it optimally alocated? How would this fund be allocated to maximise the recipient countries' economic growth to achieve economic convergence in the EU?

— Is the intranational allocation of the European funds subject to political factors? Especially, have the reforms towards more regional autonomy been detrimental to national lagging regions?

The first general contribution of this thesis is related to the analysis of economic effectiveness of the EU funds. Traditionally, in the context of the European structural funds, the latter is defined as the capacity of funds to increase the level of economic growth of a recipient region. The goal of economic convergence must therefore be achieved by a more sustained increase in the GDP per capita

of lagging regions, and more particularly of *convergence regions*, which are those situated below 75% of the European average. However, the literature shows the European funds does not have any direct positive effect on the economic activity of the beneficiary regions. In particular, Ederveen et al. (2002) and Cappelen et al. (2003) open the field of the conditional study of the economic impact of structural funds by showing that they perform poorly in the lagging regions, the core recipient regions, characterized by a lack of activities focused on research and development (R&D) activities and a low level of economic openness. The following literature highlights a variety of factors which condition the effectiveness of the EU funds without overturning the postulate that they exhibit the highest economic efficiency in the most advanced regions. Indeed, the most developed regions have more administrative and bureaucratic resources (Barro (1990); Rodríguez-Pose & Fratesi (2004); Huliaras & Petropoulos (2016)), of better institutional quality (Becker (2012); Becker et al. (2013); Becker et al. (2013); Rodríguez-Pose & Garcilazo (2015)), and economic activities involving a higher level of human capital (Becker (2012); Becker et al. (2013)). Therefore, the leading regions have a higher absorption capacity, while the economic effectiveness of the European transfers is reduced above a certain threshold of aid intensity in the lagging regions (Becker et al. (2010)).

Still about the notion of economic effectiveness, this thesis exploits the growing interweaving of the EU's economic objectives with those of the Economic and Monetary Union (EMU) since the departure of the United-Kingdom. Indeed, the Meseberg declaration of June 19, 2018 resulted in the proposition of an EU budget instrument for convergence and competitiveness, specifically to the EMU's Member States financed by the 2021-27 EU budget. But given the scale of the economic shock of the global Covid-19 pandemic, this instrument has been substituted by the *NextGeneration EU* recovery plan. Endowed with 750 billion euros, it is mostly designed as a traditional European structural fund, and it will be spent in the economies the most impacted by the economic shock of the pandemic. It constitutes a system of transfers between countries which are in a favorable economic situation *via* contributions to a common fund reversed to economies in difficulty in the form of subsidies. Therefore, the *NextGeneration EU* recovery plan has a contractual dimension, theorized by Johnson (1970), and seeks to push the EMU towards an optimal monetary zone by helping to synchronize its business cyles. This optimality condition is essential to make the monetary policy of the European Central Bank (ECB) be suited for all the EMU as these 19 economies must achieve totally synchronized business cycles

(Mundell (1961); Darvas & Szapáry (2008)). A substantial literature identifies the main beneficiary countries of the structured funds, namely Mediterranean, Central and Eastern Europe, as *periphery* of the EMU characterized by poor economic synchronization with the major European economies of the West (Fidrmuc & Korhonen (2006); Darvas & Szapáry (2008); Stiblarova & Sinicakova (2020)).

The second general contribution is related to the allocation process of the European funds. The latter is made up of three sequences: the first involves the Member States and the European Commission, which results in the distribution of the overall envelope of the cohesion budget between EU Member States. Secondly, Member States establish *partnership agreements*. It is a document bringing together all investment projects where the European funds will play their role of co-funding investment tool. This stage is characterized by interactions between the regions and their respective central government and results in a regional allocation of funds within each of the Member States. Finally, each Member State sends its partnership agreement to the European Commission, which decides whether or not to accept this document as it is. If the partnership agreement is not validated, it must be redefined, with the European Commission having the last word.

The negotiations between the central government and its constituent regions, which therefore lead to the regional allocation of funds, has been particularly studied (Kemmerling & Bodenstein (2006); Bodenstein & Kemmerling (2011); Charron (2016); Dellmuth et al. (2017)). In particular, a dilemma between the original objective of supporting the economic growth of the poorest regions on the one hand, and a complete and rapid absorption of funds on the other, was put forward. Thus, this literature underlines the primacy of the objective of a fast absorption of the European funds over the principle of cohesion. Considered as a signal of an efficient management of funds, the speed of absorption of the latter constitutes a political objective, the Member States seeking to send a signal for complete and efficient absorption of funds to the European Commission. The dilemma between absorption and cohesion lies in the fact that the poorest regions are those with the lowest absorption capacity levels. The emergence of this dilemma is particularly visible with a growing share of the European funds directed to the regions characterized by the presence of large metropolitan areas (Faludi et al. (2015)). This trend has been accelerated over the last decade since the *Barca* report (Barca (2009)). The aim of the latter was to reform the EU's cohesion policy by territorializing the design of the economic and social agenda, in order to give greater responsibility to local actors (Solly (2016)). However, only urban

regions have been able to adapt to the reform of the cohesion policy, peripheral regions that did not have the means (Gruber et al. (2019); Medeiros & Rauhut (2020)).

This thesis is organized into 4 chapters which provide both empirical and theoretical contributions. **Chapter 1** extends the notion of economic effectiveness of the European structural funds by evaluating their impact on the synchronization of economic cycles. **Chapter 2** illustrates the trade-off between fast absorption of funds and high economic effectiveness in the lagging regions of the EU. **Chapter 3** presents an optimal allocation of the Cohesion Fund by emphasizing the biases of the observed allocation. Finally, **Chapter 4** focuses on the allocation of the structural funds by formalizing the existing strategic interactions between the regions and the central government leading to a diversion of the European funds towards the wealthier regions in the majority of the Member States. The role of regional autonomy is particularly highlighted.

Chapter 1 assesses the impact of the cohesion policy on the synchronization of economic cycles. This is discussed not only in the context of the EMU, but also in the perspective of future enlargements to other Central and Eastern European countries, which are the main beneficiaries of cohesion policy. The latter can be seen as a common fiscal policy instrument to reduce idiosyncratic shocks by increasing the degree of synchronization of recipient economies. In particular, the structural funds aim to accelerate the economic integration of recipient countries *via* strengthening trade and financial linkages within the EU. By considering more than 3000 bilateral observations over the period 2000-2016, this chapter shows that the European structural funds generate a positive externality in terms of increased synchronicity between EU countries. The empirical results are qualitatively similar and robust to the use of different estimators (OLS, panel IV) and different techniques of filtering the business cycle (Hodrick-Prescott, Christiano-Fitzgerald). The effects are larger if one takes into account membership to the EMU, which suggests that the common currency accentuates the positive effects of structural funds. The driving forces systematically identified are the ERDF and the CF, through which most projects financing transport infrastructure and technological development are supported.

The main contribution of this chapter is to broaden the notion of *economic efficiency* which can be associated to the structural funds by including them in the

list of potential driving forces of the synchronization of economic cycles. Beyond the fiscal discipline resulting from the Maastricht criteria (nominal convergence) systematically associated with more synchronized economic cycles (Darvas et al. (2005)), it is shown here that the structural funds can make the EMU tend towards an optimal monetary zone. In addition, the political implications of these results may be relevant for a future enlargement of the EMU, as a support from the cohesion policy would ensure greater monetary integration. Finally, this chapter validates the growing interweaving of the objectives of the EU and the EMU by showing that stronger economic support for the poorest economies in the EU goes in the direction of greater homogeneity in the economic cycles, which is necessary for the stability of the EMU.

Chapter 2 comes back to the *economic effectiveness* apprehended as the impact of the European structural funds on economic growth. This chapter is part of the literature dealing with the effects of the EU funds on per capita GDP growth by revealing the causal impact of the speed of regional absorption. This chapter is particularly interested in regions characterized by a GDP per capita below than 75% of the average European GDP per capita, which makes them eligible for the Objective 1 status by allowing them to benefit from significantly increased European transfers. The rapid absorption of the EU funds is a political objective for the European Commission. To speed up absorption, a part of each budgetary envelope is even automatically suspended by the Commission if it has not been used, or if no payment request has been received two years after the end of the Multiannual Financial Framework (MFF) (*rule of n +2*). By focusing on 256 NUTS-2 regions over the period 2000-2016 and using a regression on discontinuity (RDD) with heterogeneous treatment effect, this chapter shows that a higher absorption speed of the European funds is associated with a lower impact of the Objective 1 treatment on regional GDP per capita growth. This result is especially in the lagging regions with low economic growth patterns, particularly the Mediterranean regions. This absorption speed has been approximated as the share of actual payments allocated for a given MFF implemented after the last year of the corresponding MFF. These results are robust to a change in estimator (fixed-effect OLS), a change in the dependent variable (growth of per capita investment), and to different sample windows around the treatment eligibility threshold. The estimation results indicate that the incentives provided by the European Commission to accelerate the absorption of the EU funds have a counterproductive impact on the economic effectiveness of the cohesion policy.

The main contribution of the chapter lies in showing the existence of a dilemma

between the political objective of rapid absorption and achieving a high economic effectiveness for Objective 1 regions. Given that lagging regions are characterized by low absorption capacity patterns (Ederveen et al. (2006); Becker et al. (2013); Rodríguez-Pose & Garcilazo (2015)), it seems therefore likely that faster absorption of the EU funds may be associated with lower economic effectiveness, referring to the *easy-spend solutions* mentioned by Huliaras & Petropoulos (2016). The second contribution of this chapter is to give a theoretical basis to the trade-off based on a complete and rapid absorption of the European funds on the one hand, and the objective of achieving economic convergence within the EU by helping the less advanced regions on the other hand (Bouvet & Dall'Erba (2010); Bodenstein & Kemmerling (2011); Dellmuth & Stoffel (2012); Charron (2016)). In terms of economic policy recommendation, this chapter reveals that the decommitment rule suffers from a major design issue: it is characterised by a *one-size fits all* logic. Therefore, a differentiated decommitment rule between Objective 1 and wealthier regions, or even a suspension of the rule for the Objective 1 regions, could help to mitigate the use of strategies detrimental to the effectiveness of the Cohesion Policy.

In a context where the European budget resource constraint is increasing, **Chapter 3** determines whether one of the five European structural funds, the Cohesion Fund (CF), which is distributed only to Member States with a GDP per capita below than 90% of the EU average, could have been better allocated to foster economic convergence in the EU during the 2014-2020 MFF. This approach is normative, it highlights the biases of the observed CF allocation by comparing the latter with the calculated optimal allocation. This work is based in particular on the development aid literature which has highlighted the concept of optimal allocation with the objective of reducing the level of absolute poverty (Burnside & Dollar (2000); Collier & Dollar (2001); Llavador & Roemer (2001); Collier & Dollar (2002)); Cogneau & Naudet (2007)). The optimal CF allocation calculated in this chapter is the solution to an optimization problem of a global altruistic donor, represented by the European Commission, which maximizes the GDP per capita of the recipient countries. This solution has been empirically simulated with the estimation results of a growth equation covering the 17 recipient countries for the period 1995-2015 with the generalized moments method of Blundell & Bond (1998). Estimates show that the impact of the CF on per capita GDP depends positively on the level of economic freedom of the recipient country, but is also conditional on inflation and public debt. Recipient countries with moderate national debt and low inflation levels are those where the CF is the most effective.

The calculated optimal allocation gives more funds to Poland and Romania thanks to their high economic efficiency, low relative GDP per capita and high relative demographic weight. These two countries stand for over 80% of total funds, compared to around 48% in the observed allocation. This allocation satisfies both the principle of *equity* because these countries have a low relative GDP per capita and a significant demographic weight. The principle of *effectiveness* is not omitted because the optimal allocation allows the CF to stimulate further the economic growth of the beneficiary countries: the economic gain is at least 13% according to the specifications retained, by putting forward the need for sound macroeconomic management which is explicitly mentioned in EU legislative texts. The resulting optimal allocation therefore complies with the European legislative texts and gives a theoretical legitimacy to the European fiscal rules. In terms of public policies, this chapter contributes to the debate on the criteria for allocating structural funds: new extensions could be added on the basis of more political criteria such as the respect of the European democratic principles in the countries benefiting from the CF, or environmental issues such as the compliance with commitments to reduce greenhouse gas emissions.

This chapter completes the substantial literature which criticises the way in which the structural funds are distributed among the beneficiary countries because this sub-optimal allocation undermines the overall effectiveness of the cohesion policy (Cappelen et al. (2003); Rodríguez-Pose & Fratesi (2004); Becker (2012); Rodríguez-Pose & Garcilazo (2015); Crescenzi & Giua (2016)). One of the limitations of this literature is the absence of any suggestion of an allocation capable of maximizing the impact of structural funds on economic growth. The main contribution of this chapter is therefore to propose an allocation of the CF that is optimal in the sense of meeting the founding economic objective of the cohesion policy, namely the achievement of economic convergence within the EU.

Chapter 4 focuses on the strategic interactions taking place during the allocation process of the EU funds. It proposes a signalling game model between a central government and its constituent poor region. This model is complemented by a problem of welfare maximisation of the altruistic central government which results in the regional allocation of European funds. In particular, this chapter illustrates how the level of regional decentralization reinforces these strategic interactions. Theoretically, it is shown that a central government is less willing to direct structural funds towards its less advanced regions when their level of regional autonomy is high. Also, this model shows that a central government that perceives a higher risk of moral-hazard in a poor region will reduce its allocation

in European funds. These theoretical forecasts are partially confirmed on the basis of a set of data of 119 NUTS-2 nationally lagging regions of 18 Member States over the period 1989-2020, using the generalized method of Blundell & Bond (1998). It is thus empirically shown that increased regional decentralization is indeed detrimental to these regions. Regional decentralization reduces the central government's control, so it tends to disadvantage regions with low absorption capacity, *i.e*, the poorest regions. These results are supported by various indicators of regional decentralization. In contrast, empirical estimates indicate that better regional absorption performance does not have any significant impact on the final regional allocation of funds. This result can be explained by the fact that, according to the conclusions of the previous chapter, a high absorption rate is not associated to a high economic effectiveness in the lagging regions. Since central governments can themselves put in place strategies to artificially inflate the speed of absorption of funds, such as the use of retroactive projects, it makes sense that central governments do not reward poor regions with faster absorption patterns.

The contributions of this chapter are twofold: first, it is the first theoretical study to formalize the strategic interactions linked to European funds between regions and central governments. The only existing study on this subject, Védrine (2020), considers only strategic interactions at the regional level. Second, this chapter is the first empirical study considering a large sample of regions over an extended period: 119 regions belonging to 18 Member States along the period 1989-2020. It enriches the existing literature which has only been focused on the absolute regional amounts over a single MFF, mainly 2000-2006 and 2007-2013 (see, for example, Bouvet & Dall'Erba (2010); Bodenstein & Kemmerling (2011); Dellmuth & Stoffel (2012); Chalmers (2013); Charron (2016); Rodríguez-Pose & Courty (2018)). From a policy perspective, our results emphasize that reforms towards more regional decentralization could have contributed to reduce the redistributive degree of the cohesion policy at the national level. In a context of persistent intra-national regional disparities, these results call for a reform of the structural fund allocation methods to ensure greater redistribution to national lagging regions.

Introduction générale

"Expression de la solidarité entre États et régions qui n'ont pas le même niveau de développement, moyen de donner à chacun sa chance et de renforcer la compétitivité de l'ensemble, la politique de cohésion est devenue, en termes budgétaires, la deuxième politique de l'Union."

Cette phrase prononcée par Jacques Delors lors du discours marquant la fin de son mandat à la tête de la Commission européenne, le 16 janvier 1995 à Strasbourg, est toujours vraie aujourd'hui. La politique de cohésion représente quelques 291 milliards d'euros, soit 27,1 % du budget européen pour le cadre financier pluriannuel (CFP) 2021-2027. Mise en place dans les années 1980, elle répond à un objectif fondateur du traité de Rome (1957) où les États membres déclarent être « soucieux de renforcer l'unité de leurs économies et d'en assurer le développement harmonieux, en réduisant l'écart entre les différentes régions et le retard des moins favorisées » .[3]

Cette politique est basée sur cinq fonds structurels, les trois principaux étant le Fonds européen de développement régional (FEDER), le Fonds social européen (FSE) et le Fonds de cohésion (FC).[4] L'ensemble des régions de l'UE est éligible aux fonds européens mais le niveau d'assistance financière accordé à chaque région dépend principalement de leur PIB par habitant relativement à la moyenne de l'UE. Ainsi, les régions se situant en dessous du seuil de 75 % de la moyenne européenne, dites *régions de convergence*, sont les principales bénéficiaires de la politique de cohésion.

À ce titre, les fonds européens co-financent des projets d'investissement publics et privés ayant pour but de stimuler l'accumulation de capital, physique et humain, pour augmenter le PIB par habitant dans les régions bénéficiaires *in fine*. Le FEDER soutient principalement le progrès technique en consacrant plus de 50 % de ses ressources aux 3 objectifs thématiques suivants : « Renforcement de l'innovation et R&D », « technologie de l'information et de la communication » et « soutien aux PME innovantes ». Le FSE a plutôt pour rôle d'augmenter la qualité du facteur travail en consacrant près de 75 % de ses ressources aux objectifs « Emploi et mobilité de la main d'œuvre » et « Éducation, formation et apprentissage tout au long de la vie ». Quant au FC, il est uniquement destiné aux pays les plus

[3]Source: Communautés Européennes. Bureau de représentation (France) (1957). Préambule.

[4]Il existe aussi le Fonds européen agricole pour le développement rural (FEADER), qui soutient le développement rural qui constitue le second pilier de la politique agricole commune (PAC). On retrouve ensuite le Fonds européen pour les affaires maritimes et la pêche (FEAMP) qui s'inscrit dans la politique commune de la pêche.

pauvres de la zone, ceux ayant un niveau de PIB par habitant inférieur à 90% de la moyenne européenne. Il concentre la moitié de ses ressources pour contribuer à la construction du réseau trans-européen de transports (RTE-T) en finançant des infrastructures telles que les chemins de fer, les autoroutes, les aéroports ou les équipements portuaires. L'autre part du FC finance des infrastructures environnementales telles que les réseaux d'eau potable ou les centres de recyclage.

Le défi de la convergence économique au sein de l'UE s'est transformé avec un basculement de l'Est vers le Sud. Les pays d'Europe centrale et orientale, tels que la République tchèque, la Hongrie, la Pologne et les États baltes, qui se sont développés de manière significative au cours de la dernière décennie, vont connaître une réduction considérable de leurs allocations. Dans le même temps, doublement affaiblis par la crise économique des dettes souveraines de la zone euro et par celle de la pandémie du Covid-19, l'Italie, l'Espagne, la Grèce et le Portugal verront leur soutien renforcé. Avec le départ effectif du Royaume-Uni de l'Union Européenne (UE) au 1^{er} janvier 2021, la contrainte de ressources pesant sur le budget européen s'est accrue. On notera aussi l'émergence de nouveaux défis, comme la transition écologique et la sécurité intérieure, qui contraint l'UE à diversifier ses dépenses. Dans ce contexte, l'efficacité économique des fonds structurels rime avec nécessité.

Cette thèse répond à quatre questions de recherche bâties autour des notions d'efficacité économique et d'allocation des fonds structurels européens:

— Les fonds structurels européens ont-ils un impact sur la synchronisation des cycles économiques pour permettre à l'UEM de se rapprocher d'une zone monétaire optimale ?

— Existe-t-il un dilemme entre une absorption rapide des fonds européens et une efficacité économique élevée dans les régions de convergence ?

— Dans le cas du Fonds de cohésion, est-il alloué de manière optimale ? Sinon, comment ce fonds pourrait-il être alloué pour maximiser la croissance économique des pays bénéficiaires afin d'accélérer la convergence économique au sein de l'UE ?

— L'allocation intranationale des fonds européens est-elle soumise à des facteurs politiques ? En particulier, les réformes vers plus d'autonomie régionale ont-elles été préjudiciables aux régions nationales les moins développées ?

La première contribution générale de cette thèse est liée à la notion d'efficacité économique. Traditionnellement, dans le contexte des fonds structurels, cette

dernière est définie comme la capacité des fonds à augmenter le niveau de croissance économique d'une région bénéficiaire. L'objectif de convergence économique doit donc être réalisé par une augmentation plus soutenue du PIB par habitant des régions pauvres, et plus particulièrement des *régions de convergence* qui sont celles se situant en-dessous de 75 % de la moyenne de l'UE. Or, la littérature montre que les fonds structurels européens n'ont pas d'effet direct positif sur l'activité économique des régions bénéficiaires. Notamment, Ederveen et al. (2002) et Cappelen et al. (2003) ouvrent le champ de l'étude conditionnelle de l'impact économique des fonds structurels en montrant qu'ils ne sont que peu performants dans les régions les plus pauvres, caractérisées par un manque d'activités portées sur les activités de recherche et développement (R&D) et une faible ouverture économique, mais qui constituent pourtant le coeur des bénéficiaires de la politique de cohésion. La littérature qui s'en suit met en avant une diversité de facteurs qui conditionnent l'efficacité des fonds sans renverser le postulat que ces derniers stimulent le plus la croissance économique des régions les plus avancées. En effet, les régions les plus développées disposent de plus de ressources administratives et bureaucratiques (Rodríguez-Pose & Fratesi (2004); Huliaras & Petropoulos (2016)), d'une meilleure qualité institutionnelle (Becker (2012); Becker et al. (2013); Rodríguez-Pose & Garcilazo (2015)), ou d'activités économiques impliquant un niveau de capital humain plus élevé (Becker (2012); Becker et al. (2013)). Les régions les plus avancées disposent donc d'une capacité d'absorption plus élevée, ce qui est d'autant plus important car les fonds structurels perdent en efficacité au delà d'une certaine intensité (Becker et al. (2010)).

Toujours sur la notion d'efficacité économique, cette thèse exploite l'imbrication croissante des objectifs économiques de l'UE avec ceux de l'Union économique et monétaire (UEM) depuis le départ du Royaume-Uni. Ainsi, la déclaration de Meseberg du 19 juin 2018 a abouti sur la proposition d'un instrument budgétaire de convergence et de compétitivité (IBCC), un outil budgétaire propre à la zone euro financé par le budget pluriannuel pour la période 2021-27. Mais face à l'ampleur du choc économique de la pandémie mondiale de Covid-19, l'IBCC a laissé place au plan de relance *NextGeneration EU*. Doté de 750 milliards d'euros, il sera dépensé à plus de 90 % à la manière d'un fonds structurel européen traditionnel dans les économies les plus touchées par le choc économique lié à la pandémie. Il constitue donc un système de transferts entre pays qui connaissent une situation économique favorable *via* des contributions à un fonds commun reversé aux économies en difficulté sous forme de subventions afin de compenser les écarts de conjoncture et d'aboutir à une synchronisation des cycles économiques. Le plan

NextGeneration EU revêt donc une dimension contracylique, théorisée par Johnson (1970), cherchant à faire tendre l'UEM vers une zone monétaire optimale. Or, la politique monétaire de la Banque centrale européenne (BCE) n'est optimale que si les 19 économies de l'UEM ont des cycles économiques synchronisés (Mundell (1961); Darvas & Szapáry (2008)). Une littérature conséquente identifie les principaux pays bénéficiaires des fonds structurels, à savoir l'Europe méditerranéenne, centrale et orientale, comme une *périphérie* de l'UEM caractérisée par une faible synchronisation économique avec les économies majeures d'Europe de l'Ouest (Fidrmuc & Korhonen (2006); Darvas & Szapáry (2008); Stiblarova & Sinicakova (2020)).

La seconde contribution générale concerne le processus d'allocation des fonds européens. Ce dernier est composé de trois séquences. La première fait intervenir les États membres et la Commission européenne, ce qui aboutit sur la répartition de l'enveloppe globale du budget de la cohésion entre États membres de l'UE. Deuxièmement, les États membres établissent des *accords de partenariat.* Il s'agit d'un document rassemblant tous les projets d'investissement où les fonds européens joueront leur rôle de co-financeur. Cette étape est caractérisée par des interactions entre les régions et leur gouvernement central respectif et aboutit à une allocation régionale des fonds au sein de chacun des États membres. Enfin, chaque État membre envoie son accord de partenariat à la Commission européenne qui décide d'accepter ou non ce document en l'état. Dans le cas où l'accord de partenariat n'est pas validé, celui-ci doit être redéfini, la Commission européenne ayant le dernier mot.

Les négociations entre gouvernement central et ses régions constituantes, qui aboutissent donc à la répartition régionale des fonds, ont particulièrement été étudiées (Kemmerling & Bodenstein (2006); Bodenstein & Kemmerling (2011); Charron (2016); Dellmuth et al. (2017)). Notamment, un dilemme entre l'objectif originel d'un soutien à la croissance économique des régions les plus pauvres d'une part, et une absorption complète et rapide des fonds d'autre part, a été mis en avant. Ainsi, cette littérature souligne la primauté de l'objectif d'une absorption élevée des fonds européens sur le principe de cohésion. Considérée comme un signal d'une gestion efficace des fonds, la vitesse d'absorption de ces derniers constitue un objectif politique, les États membres cherchant à ne pas envoyer de signal montrant une absorption incomplète des fonds à la Commission Européenne. Le dilemme entre absorption et cohésion réside dans le fait que les régions les plus pauvres sont celles ayant les capacités d'absorption les moins élevées. L'émergence de ce dilemme est particulièrement visible avec une part croissante des fonds européens dirigés vers

les régions caractérisées par la présence de grands ensembles métropolitains (Faludi et al. (2015)). Cette tendance s'est accélérée au cours de la dernière décennie depuis le rapport *Barca* (Barca (2009)). Ce dernier a eu pour but de réformer la politique de cohésion de l'UE en la territorialisant, notamment dans la conception de l'agenda économique et social, pour donner une responsabilité accrue aux acteurs locaux (Solly (2016)). Cependant, seules les régions urbaines ont été en mesure de s'adapter à la réforme de la politique de Cohésion, les régions périphériques n'en n'ayant pas eu les moyens (Gruber et al. (2019); Medeiros & Rauhut (2020)).

La thèse est organisée en 4 chapitres qui fournissent des contributions à la fois empiriques et théoriques. Le **chapitre 1** étend la notion d'efficacité économique des fonds structurels européens en évaluant leur impact sur la synchronisation des cycles économiques. Le **chapitre 2** illustre l'incompatibilité entre absorption rapide des fonds et efficacité économique élevée dans les régions les plus pauvres de l'UE. Le **chapitre 3** présente une allocation optimale du FC faisant apparaître les biais de l'allocation actuelle. Enfin, le **chapitre 4** formalise les intéractions stratégiques existant entre les régions et le gouvernement central à l'origine d'un détournement des fonds européens des régions les plus pauvres dans la majorité des États membres. Le rôle de l'autonomie régionale y est notamment mis en avant.

Le **chapitre 1** évalue l'impact de la politique de cohésion sur la synchronisation des cycles économiques. Ceci est examiné non seulement dans le contexte de l'UEM, mais également dans la perspective des futurs élargissements à d'autres pays d'Europe centrale et orientale, qui sont les principaux bénéficiaires de la politique de cohésion. Cette dernière peut être considérée comme un instrument de politique budgétaire commune permettant de réduire les chocs idiosyncratiques en augmentant le degré de synchronisation des économies bénéficiaires. Notamment, les fonds structurels ont pour but d'accélérer l'intégration économique des pays receveurs *via* un renforcement des liens commerciaux et financiers au sein de l'UE. En considérant plus de 3000 observations bilatérales sur la période 2000-2016, ce chapitre montre que les fonds structurels génèrent une externalité positive en termes de synchronicité accrue entre les pays de l'UE. Les résultats empiriques sont qualitativement similaires et robustes à l'utilisation de différents estimateurs (MCO, panel IV) et de différentes techniques de filtrage du cycle économique (Hodrick-Prescott, Christiano-Fitzgerald). Les effets sont plus importants si l'on

tient compte de l'adhésion à l'UEM, ce qui suggère que la monnaie commune accentue les effets positifs des fonds structurels. Les forces motrices systématiquement identifiées sont le FEDER et le FC, à travers desquels la plupart des projets de financement des infrastructures de transport et du développement technologique sont soutenus.

La principale contribution de ce chapitre est d'élargir la notion d'*efficacité économique* qui peut être associée aux fonds structurels en les intégrant dans la liste des potentielles forces motrices de la synchronisation des cycles économiques. Au delà de la discipline budgétaire issue des critères de Maastricht (convergence nominale) systématiquement associée à des cycles économiques plus synchronisés (Darvas et al. (2005)), il est montré ici que les fonds structurels peuvent rapprocher l'UEM d'une zone monétaire optimale. De plus, les implications politiques de ces résultats pourraient s'avérer tout aussi pertinentes pour un futur élargissement de l'UEM dans la mesure où un soutien de la politique de cohésion garantirait une intégration monétaire accrue. Enfin, ce chapitre valide l'imbrication croissante des objectifs de l'UE et de l'UEM en montrant qu'un soutien économique renforcé des économies les plus pauvres de l'UE va dans le sens d'une plus grande homogénéité dans les cycles économiques de l'UEM, ce qui est l'objet du plan *NextGeneration EU*.

Le **chapitre 2** revient à l'*efficacité économique* appréhendée par l'impact des fonds structurels sur la croissance économique. Ce chapitre s'inscrit dans la littérature traitant des effets des fonds structurels européens sur la croissance du PIB en révélant l'impact causal de la vitesse d'absorption régionale. Ce chapitre s'intéresse particulièrement aux régions caractérisées par un PIB par habitant inférieur à 75 % de la moyenne du PIB européen par habitant, ce qui les rend éligibles au statut Objectif 1 en leur permettant de bénéficier de transferts européens nettement accrus. L'absorption rapide des fonds de l'UE constitue un objectif politique pour la Commission européenne. Pour accélérer l'absorption, une partie de l'enveloppe budgétaire d'un CFP est même automatiquement suspendue par la Commission si elle n'a pas été utilisée ou si aucune demande de paiement n'a été reçue deux ans après la fin du cadre financier pluriannuel (CFP) (*règle du n +2*). En s'intéressant à 256 régions NUTS-2 sur la période 2000-2016 à l'aide d'une régression sur discontinuité (RDD) à traitement hétérogène, ce chapitre montre qu'une vitesse d'absorption plus élevée des fonds européens, en particulier dans les régions méditerranéennes où la croissance économique est faible, est associée à un impact moindre du traitement Objectif 1 sur la croissance du PIB par habitant régional. Cette vitesse d'absorption a été approchée comme la part des

paiements réels allouée pour un CFP donné mis en œuvre après la dernière année du CFP correspondant. Ces résultats sont robustes à un changement d'estimateur (MCO à effets fixes), un changement de la variable dépendante (croissance de l'investissement par tête), et à différentes fenêtres d'échantillon autour du seuil d'éligibilité du traitement. Les résultats d'estimation indiquent que les incitations fournies par la Commission européenne pour accélérer l'absorption des fonds ont un impact contre-productif sur l'efficacité économique de la politique de cohésion.

La contribution principale de chapitre réside dans le fait de montrer l'existence d'un dilemme entre l'objectif politique d'une absorption rapide et celui d'une efficacité économique élevée pour les régions Objectif 1. Étant donné que les régions en retard sont souvent caractérisées par une faible capacité d'absorption (Ederveen et al. (2006); Becker et al. (2013); Rodríguez-Pose & Garcilazo (2015)), il semble donc probable qu'une absorption plus rapide des fonds puissent être associée à une efficacité moindre, reflétant les *projets à dépenses faciles* mentionnés par Huliaras & Petropoulos (2016). La seconde contribution de ce chapitre est de donner un fondement théorique au dilemme qui repose sur deux objectifs qui sont une absorption complète et rapide des fonds européens d'une part, et l'objectif d'une convergence économique au sein de l'UE en aidant les régions les moins avancées d'autre part (Bouvet & Dall'Erba (2010); Bodenstein & Kemmerling (2011); Dellmuth & Stoffel (2012); Charron (2016)). En termes de politiques économiques, ces résultats suggèrent de limiter les incitations visant à accélérer l'absorption des fonds européens dans les régions de l'Objectif 1. Le retour à la règle $n + 2$ pour la période de programmation 2021-2027 serait donc préjudiciable à la performance économique globale de la politique de cohésion.

Dans un contexte où les contraintes budgétaires qui pèsent sur le budget européen sont croissantes, le **chapitre 3** détermine si l'un des cinq fonds structurels européens, le FC, qui est distribué uniquement aux États membres avec un PIB par habitant inférieur à 90% de la moyenne de l'UE, aurait pu être mieux alloué pour favoriser la convergence économique dans l'UE lors du CFP 2014-2020. Cette approche est normative, elle met en lumière les biais de l'allocation actuelle du FC en comparant cette dernière avec l'allocation optimale calculée. Ce travail s'appuie notamment sur la littérature de l'aide au développement (APD) qui a mis en lumière le concept d'allocation optimale dans un objectif de réduction du niveau de pauvreté absolue (Burnside & Dollar (2000); Collier & Dollar (2001); Llavador & Roemer (2001); Collier & Dollar (2002)); Cogneau & Naudet (2007)). L'allocation optimale du FC calculée dans ce chapitre est la solution d'un problème d'optimisation d'un donneur global, représenté par la Commission européenne, qui

maximise le PIB par habitant des pays bénéficiaires. Cette solution a été simulée empiriquement avec les résultats d'estimation d'une équation de croissance couvrant 17 pays pour la période 1995-2015 avec la méthode des moments généralisés de Blundell & Bond (1998). Les estimations montrent que l'impact du FC sur le PIB par habitant dépend positivement du niveau de liberté économique du pays receveur, mais est aussi conditionnel à l'inflation et à la dette publique. Les pays bénéficiaires ayant une dette nationale modérée et des niveaux d'inflation faibles sont ceux où le FC est le plus efficace. L'allocation optimale calculée donne plus de fonds à la Pologne et à la Roumanie grâce à leur efficacité économique élevée, à leur faible PIB par habitant relatif et à leur poids démographique relatif élevé. Ces deux pays représentent plus de 80% du total des fonds, alors que ce chiffre est d'environ 48% avec l'allocation observée. Cette allocation satisfait à la fois le principe d'*équité* car ces pays ont un faible PIB par habitant relatif et un poids démographique important. Le principe d'*efficacité* n'est pas omis car l'allocation optimale permet au FC de stimuler plus fortement la croissance économique des pays bénéficiaires, le gain est d'au moins 13% selon les spécifications retenues, en mettant en avant la nécessité d'une gestion macroéconomique saine qui est explicitement mentionnée dans les textes législatifs de l'UE. L'allocation optimale qui en résulte que nous calculons est donc conforme aux textes législatifs européens et donne une légitimité théorique aux règles budgétaires européennes. En termes de politiques publiques, ce chapitre contribue au débat sur les critères d'allocation des fonds structurels : de nouvelles extensions pourraient être ajoutées sur la base de critères plus politiques comme le respect des principes démocratiques européens dans les pays bénéficiaires de la FC, ou environnementaux comme le respect des engagements de réduction d'émissions de gaz à effet de serre.

Ce chapitre complète la littérature conséquente qui critique la manière dont les fonds structurels sont répartis entre les pays bénéficiaires car cette allocation sous-optimale réduit l'efficacité globale de la politique de cohésion (Cappelen et al. (2003); Rodríguez-Pose & Fratesi (2004); Becker (2012); Rodríguez-Pose & Garcilazo (2015);Crescenzi & Giua (2016)). Une des limites de cette littérature est l'absence de suggestion d'une allocation capable de maximiser l'impact des fonds structurels sur la croissance économique. La principale contribution de ce chapitre est donc de proposer une allocation du FC qui soit optimale au sens d'une satisfaction de l'objectif économique fondateur de la politique de cohésion, à savoir la réalisation de la convergence économique au sein de l'UE.

Le **chapitre 4** formalise les intéractions stratégiques dont le fondement a été révélé dans le **chapitre 2** en proposant un modèle de jeu de signal entre un

gouvernement central et sa région pauvre constituante. Ce modèle est complété par un problème de maximisation du bien-être du gouvernement central altruiste qui aboutit à l'allocation de fonds européens destinés à la région pauvre. Particulièrement, ce chapitre illustre comment le niveau de décentralisation régionale renforce ces intéractions stratégiques. Théoriquement, il est montré qu'un gouvernement central est moins disposé à orienter les fonds structurels vers ses régions les moins avancées lorsque leur niveau d'autonomie régionale est élevé. Aussi, ce modèle montre qu'un gouvernement central qui perçoit un risque d'aléa moral plus élevé dans une région pauvre diminuera sa dotation en fonds européens. Ces prévisions théoriques ne sont que partiellement confirmées empiriquement sur la base d'un ensemble de données de 119 régions NUTS-2 ayant un PIB par habitant inférieur à la moyenne nationale de chacun des 18 États membres auxquels elles appartiennent sur la période 1989-2018, en utilisant la méthode des moments généralisés de Blundell & Bond (1998). Il est ainsi montré empiriquement qu'une décentralisation régionale accrue est effectivement préjudiciable aux régions en retard. La décentralisation régionale réduit le contrôle du gouvernement central, elle tend donc à défavoriser les régions à faible capacité d'absorption qui sont les régions pauvres. Ces résultats sont étayés par différents indicateurs de décentralisation régionale. En revanche, les estimations empiriques indiquent qu'une meilleure performance d'absorption régionale n'a pas d'impact significatif sur l'allocation finale des fonds. Ce résultat peut s'expliquer par le fait que, conformément aux conclusions du **chapitre 2**, une vitesse d'absorption élevée n'est pas synonyme d'efficacité économique élevée. Les gouvernements centraux pouvant eux-même mettre en place des stratégies pour gonfler artificiellement la vitesse d'absorption des fonds, comme l'usage des projets rétroactifs, il fait donc sens que les gouvernements centraux ne récompensent pas les régions pauvres ayant une vitesse d'absorption plus élevée.

D'un point de vue théorique, ce chapitre est théorique car il s'agit de la première étude formalisant les intéractions stratégiques liées aux fonds européens entre régions et gouvernement central. La seule étude existante sur ce sujet, Védrine (2020), considère uniquement les intéractions stratégiques au niveau régional. Ce chapitre formalise donc les interactions stratégiques entre les différent acteurs de la politique de cohésion de l'UE.

Sur le plan empirique, ce chapitre est la première étude à considérer la dynamique régionale de l'allocation des fonds structurels avec un échantillon large de régions sur une période étendue : 119 régions appartenant à 18 États membres sur la période 1989-2018. Elle enrichit la littérature existante qui ne s'est concentrée que sur les montants régionaux absolus pour un CFP donné,

principalement 2000-2006 et 2007-2013 (Bouvet & Dall'Erba (2010) ; Bodenstein & Kemmerling (2011); Dellmuth & Stoffel (2012); Chalmers (2013); Charron (2016); Rodríguez-Pose & Courty (2018)). L'interprétation relative aux implications politiques est que les réformes allant vers plus de décentralisation régionale ont diminué le degré redistributif de la politique de cohésion à l'échelle nationale. Dans l'optique d'une réduction des disparités régionales persistantes dans chaque État membre, ces résultats appellent à une réforme des modalités d'allocation des fonds structurels pour assurer une plus grande redistribution entre les régions en limitant les intéractions stratégiques existantes.

Chapter 1

Positive externalities of the EU Cohesion Policy: toward more synchronised economies?

This chapter is co-authored with
Lubica Stiblarova

Summary

This chapter explores a dimension of economic effectiveness that has not be treated in the literature dealing with the EU funds by exploring the impact of the EU funds on business cycle synchronisation. Using over 3,000 bilateral country-pairs during three programming periods, this chapter assess the impact of the European Cohesion policy on business cycle synchronisation in the Economic and Monetary Union (EMU). Panel instrumental variables estimation results suggest that the ECP provides a positive externality in terms of increased synchronicity. The effects are even stronger when taking into account the EMU membership, which would suggest the less synchronised non-euro Central and Eastern European member states to become a part of the EMU. Further analysis reveals that the systematically identified driving forces are the European Regional Development Fund (ERDF) and the Cohesion Fund (CF). Following the European Council from July 17-21 2020, the European recovery plan *Next Generation EU* could have a promoting effect on the EMU's monetary policy if it is designed as an additional structural investment fund promoting financial and trade integration, as are both the CF and the ERDF.

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1.1 Introduction

Are countries in the Economic and Monetary Union (EMU) really advancing toward greater business cycle synchronisation? Existing empirical research shows mixed results regarding this matter. Whereas some authors find evidence of increasing synchronisation in time (Fatas (1997); Artis & Zhang (1999); Darvas & Szapáry (2008)), others claim that converging and diverging periods of synchronisation tend to alternate (Massmann & Mitchell (2005); De Haan et al. (2008)) or raise doubts as to whether a common monetary policy would be suitable to implement in more recently joined members, as the differences in the business cycles may not be alleviated (Inklaar & De Haan (2001)).

The synchronisation aspect in the monetary unions has been mostly highlighted in the Optimum Currency Areas (OCA) theory pioneered by Mundell (1961), according to which the optimality of the common monetary policy depends not on the fulfilment of the formally determined, Maastricht criteria, which might not prevent imbalances among the member states after the adoption of a common currency (Angelini & Farina (2012); Lukmanova & Tondl (2017)), but instead on the extent to which economies willing to adopt the common currency share specific common characteristics, the so-called *OCA properties* (Frankel & Rose (1998); Campos & Macchiarelli (2016)). Synchronisation of business cycles (that is, the extent to which output gaps among the member states are correlated), is often assumed to be the crucial criterion within the OCA framework (Darvas & Szapáry (2008)).

The issue of business cycle synchronisation has been predominantly discussed in the context of the EMU. Given the heterogeneity of the EMU, researchers often identify *the core* (initial member states, mostly) and *the periphery* (later members). While most Western European countries (EU-15) are identified as the core countries (Bayoumi & Eichengreen (1992); Artis & Zhang (1999); Darvas & Szapáry (2008); Soares et al. (2011); Belke et al. (2017)), the research on the Central and Eastern European (CEE) countries remains still scarce and limited, and treats them as a part of the periphery (Fidrmuc & Korhonen (2006); Darvas & Szapáry (2008);

Soares et al. (2011); Stiblarova & Sinicakova (2020)).[1] [2]

The reason for this may lie in the fact that these economies have experienced two remarkable transitions in the last two decades. Transformation in the true sense of the word happened, first, during the switch from planned to market economies, and second, during the period of entry and integration within the EU, accompanied by the latter's outstanding trade openness, financial integration, and capital account liberalisation (Mody et al. (2009)). In this chapter, we focus on the latter type of transition, because, aside from the last step of adopting the common currency, the euro, the transition is still ongoing for the majority of the CEE countries. Although several reforms have been implemented to improve the institutional establishment of the EMU and strengthen cooperation between the member states, the future shape of the EMU remains uncertain, as do the potential for enlargements (Blesse et al. (2020)). One may note that those countries classified as belonging to the periphery regarding business cycle synchronisation are still the poorest ones in the EU (see Figure 1.1), variously lagging behind the EU average due to the heterogeneous speed of real income convergence.

To support economic development and convergence between the EU member states in terms of GDP per capita, five main EU funds (officially, the European Structural and Investment Funds), have been established: 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). These EU funds constitute the second-largest budget line after the EU's agricultural expenses for the current programming period 2014-20.[3] The EU funds provide financing for a wide range of projects and programmes in different areas (such as regional or agricultural development, transport infrastructure, and research) to promote economic growth, mostly in the EU's lagging countries. As Figure 1.2 indicates, the CEE countries

[1] Germany, Austria, France, Belgium, and the Netherlands are unanimously identified as the core countries, whereas Greece, Portugal, Ireland, and Finland are often considered the periphery. These findings are illustrated in the annex, Table A1.1 ; Austria can be considered the EMU economy with the highest average level of business cycle synchronisation with Germany (one of the EMU's core main economies, considered as a reference EMU business cycle) during 2000-2014. Conversely, Greece exhibits the lowest average value.

[2] We follow the OECD term *CEE countries*, comprising the Visegrad countries (Hungary, Poland, Slovakia, and the Czech Republic), the Baltic countries (Estonia, Latvia, and Lithuania), and the Southeastern countries (Bulgaria, Croatia, Romania, and Slovenia).

[3] For more information concerning the legislation of the EU funds, see regulation (EU) No. 1303/2013 of the European Parliament and of the Council and repealing Council Regulation (EC) No. 1083/2006 or particular Fund-specific regulations – the ERDF Regulation No. 1301/2013; the ESF Regulation No. 1304/2013; the CF Regulation No. 1300/2013; the EAFRD Regulation No 1305/2013; the EMFF Regulation No. 508/2014.

are in the spotlight of the European Cohesion Policy, as they are the recipients of the bulk of the EU funds.

Through the promotion of the economic integration of the recipient countries, we expect that the EU funds could provide a positive externality, bringing the EMU closer to the OCA. Our study tries to fill the gap in the empirical literature, which to the best of our knowledge has not focused on the role of supranational fiscal transfers such as the EU funds as a possible driving force of business cycle synchronisation. However, it should be mentioned that this chapter builds on substantial work by Darvas et al. (2005), who provide empirical evidence of the helping role of both fiscal convergence and fiscal discipline on the closeness of business cycle fluctuations. A common fiscal policy instrument in the form of the EU funds could possibly reduce idiosyncratic shocks among economies as well, by increasing trade and financial linkages between the recipients.

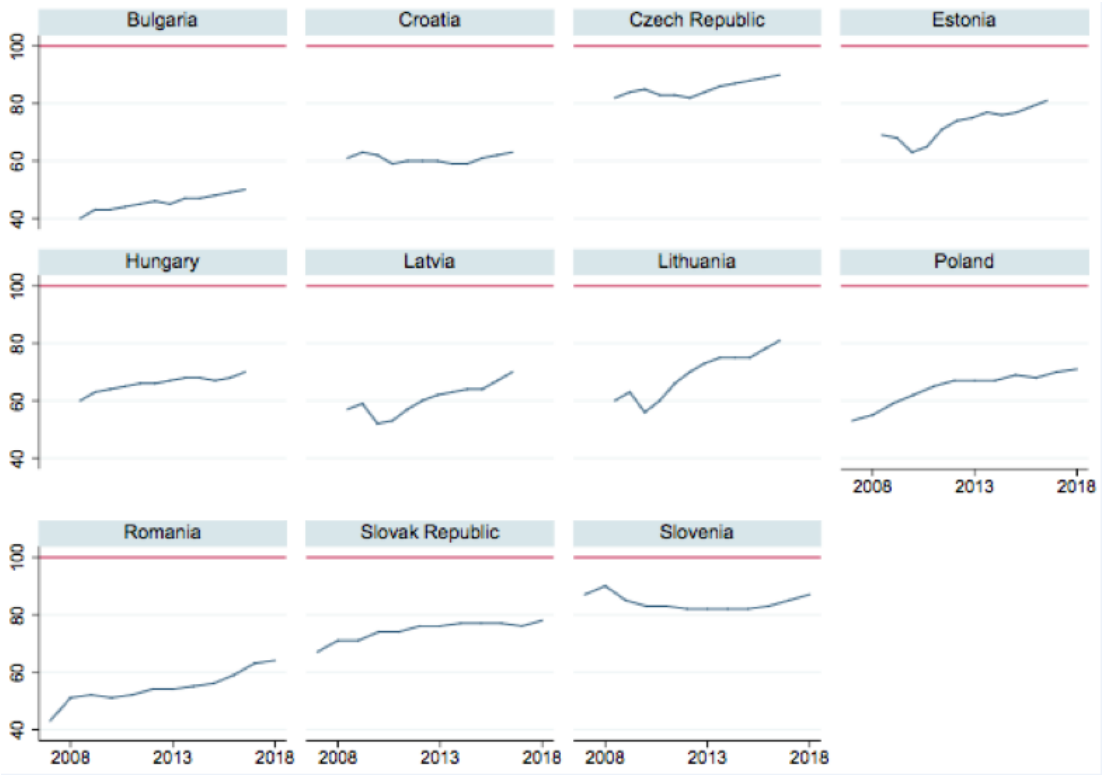

Figure 1.1 – GDP per capita of the CEE countries, 2007-18 (EU28=100)

Notes: Graph from authors. GDP per capita is expressed in Purchase Power Standard (PPS).

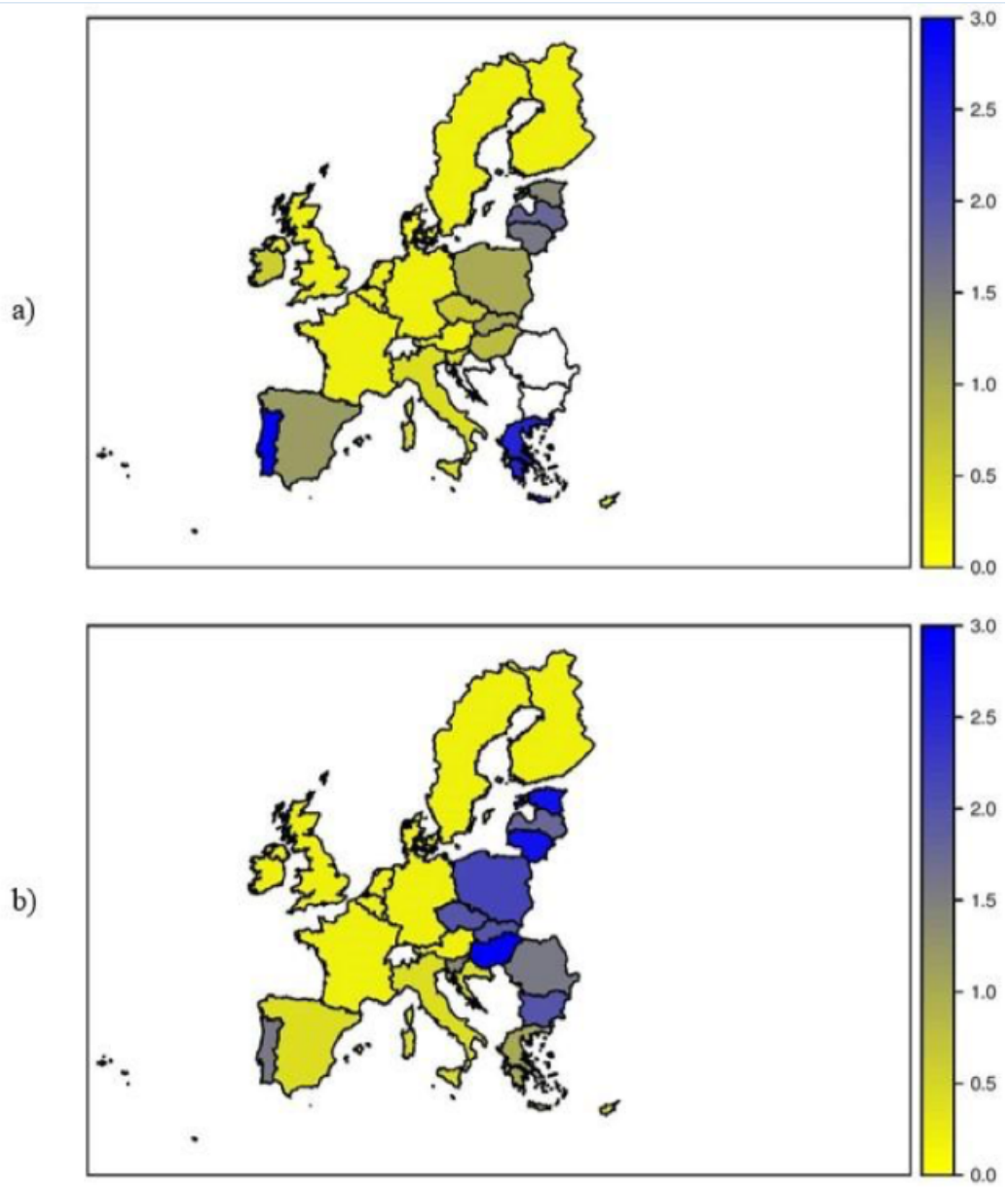

Figure 1.2 – Commitments of the EU funds

Notes: Graph from authors. We depict total committed amount of resources (ERDF, ESF, CF) as a share of country's GDP: a) in the programming period 2000-06; b) in the programming period 2007–13.

The aim of this chapter is therefore to study the potential role of the EU funds on business cycle synchronisation. We examine this issue not only in the context of the EMU, but also from the perspective of future enlargements to other CEE countries, which are the biggest recipients of the EU funds. Our results suggest that the EU funds have improved business cycle synchronicity in the EU. The effects are even stronger when taking into account the EMU membership, which would suggest that the less synchronised non-euro CEE member states should become a part of the EMU. The policy implications of our results might therefore be very valuable

not only for the implementation and regulation of the recent European Cohesion Policy, but also when considering potential future enlargement of the EMU. The systematically identified driving forces are the ERDF and the CF, through which most projects financing transport infrastructure and technological development are supported. These estimates are robust to different estimators and different business cycle filtering techniques.

The remainder of this chapter is organised as follows: the second section provides a related literature review. The third section deals with the methodology and data used to conduct our analysis: we apply a panel instrumental variables approach to account for the possible endogeneity problem of the business cycle synchronisation driving forces. The fourth section provides the estimation results for the full sample, as well as for the sub-samples with particular country-pairs and EU funds. We conclude our findings in the last section, with regard to EU cooperation in the areas of supranational fiscal transfers and common economic governance. We also give perspectives for future research.

1.2 Related literature

Previous research about the EU funds has mostly attempted to determine whether these expenditures can be considered as an important policy instrument promoting economic growth (Becker et al. (2010); Mohl & Hagen (2010); Pellegrini et al. (2013)), the level of convergence (Cappelen et al. (2003); Becker et al. (2013)), or employment rates of the member states (Bondonio & Greenbaum (2006); Mohl & Hagen (2010)). However, it is important to note that the literature acknowledges that the impact of the EU funds on GDP is conditional on certain factors. Some commonly identified determinants of this conditional impact are quality of institutions and government (Ederveen et al. (2006); Becker (2012); Rodríguez-Pose & Garcilazo (2015)), absorption capacity (Tătulescu & Pătruţi (2014); Huliaras & Petropoulos (2016)), socio-economic conditions (Crescenzi & Giua (2016)), and quality of macroeconomic management (Tomova et al. (2013)). However, to our knowledge no systematic empirical research directly addresses the question of potential linkage between the EU funds and business cycle synchronicity.

Can these payments promote business cycle synchronisation in the EMU to make it closer to an OCA? The very few existing studies mostly focus on the examination of a cyclical component of the EU funds in the years following the Great Recession of 2008-09 to underline a counter-cyclical component of the European Cohesion Policy.

Smail (2010) highlights the reactivity of the European authorities to this economic downturn in form of series of amending regulations aimed at increasing the level of advances to member states in order to use the EU funds as a tool for macroeconomic stabilisation. These advances accounted for more than eight percent of all funds in the programming period 2007-13. Such a strategy has also been pursued in the programming period 2014-20, as, for instance, when an additional €1.375 billion was allocated for Greece, or €1 billion for Portugal.[4]

Another key measure has been to simplify the EU funds regulations to make the implementation of projects easier and speed up recipient countries' absorption. According to Kondor-Tabun & Staehr (2015), this measure led to a faster execution of programmes in the Baltic countries after the global financial crisis. Besides that, this study points out that in Poland (the biggest EU funds recipient country), a similar pattern can be observed. On the other hand, some studies such as that by Tătulescu & Pătruţi (2014) describe the EU funds as procyclical, owing to the reduced ability to draw allocated funds during economic downturns. Indeed, during recessions, the available resources for national co-financing are reduced as a result of increased national expenditure and of a reduction on the revenue side of public budgets. Covering the period 2004-15 for the Czech Republic, Chmelová et al. (2018) examines and concludes that EU funds are procyclical, as a 1 percent increase of the Czech economy's output gap is associated with an increase in European transfers by CZK 8.4 billion. However, Chmelová et al. (2018) concludes that this procyclicality must be considered a purely random effect resulting from the restricted time frame of the programming periods. The ability to prepare projects and implement them in the context of the national and EU legal framework are identified as the main determinants of this procyclicality. Indeed, the first years of a programming period are characterised by few payments, as a large amount of investment projects are just being constituted and await the approval of the European Commission. Given that all of EU's economies are recipients of the EU funds, their pro-cyclicity or counter-cyclicity might promote business synchronisation, as payments are implemented simultaneously.

To the best of our knowledge, empirical literature lacks a study exploring the potential role of the Cohesion Policy on business cycle synchronisation among its recipient countries, a gap that we will try to fill. In the context of the EU, three drivers of business synchronisation have already been widely identified in the literature. First, trade intensity has so far been the most examined potential driver (Frankel & Rose (1998); Baxter & Kouparitsas (2005); Silvestre & Mendonça (2007)), leading

[4]See Annex VII of the EU Regulation No. 1303/2013 for more details.

to more synchronised business cycles by boosting demand shocks among countries. Frankel and Rose (1998) find a positive relationship between trade and synchronisation based on the dataset of industrialised countries, and many other empirical studies of industrialised countries confirm their findings (see, for instance, Fatas (1997), and Clark & Van Wincoop (2001)). A second driving force is the similarity of economic structures, as when, in the presence of sector-specific shocks, two economies producing the same types of goods are likely to face similar economic conditions (Imbs (2004); Calderon et al. (2007); Beck (2014)). This evidence has also been supported when studying the economic integration of eight CEE countries which joined the EU in 2004; the similarity of economic structures in these countries had a direct positive and significant effect on business cycle synchronisation with the euro area members over the period 1990-2003 (Siedschlag & Tondl (2011)). This study also draws attention to the endogeneity of business cycle correlations, the similarity of economic structures, and the trade intensity resulting from membership in the EMU. Indeed, this study concludes that the new EU countries will better qualify for the monetary union after the adoption of the euro, and that therefore they should not postpone joining the euro area. The promoting role of the euro on CEE countries' economic integration has also been supported by researchers such as Jiménez-Rodriguez et al. (2010) and Nguyen & Rondeau (2019). The pioneering work of Darvas et al. (2005) invokes the fiscal rules inherited from the Maastricht (nominal convergence) criteria as a factor fostering fiscal convergence and making member states' business cycles fluctuate more closely with one another. By promoting economic integration of their recipient economies, the EU funds may act as an additional driver of business cycle synchronisation in the Common Market, especially for the countries that share the euro.

Our analysis contributes to the existing empirical literature in two ways. Firstly, we investigate whether the EU funds have a positive externality on the common monetary policy, that is, whether such payments have contributed to the overall level of synchronisation in the EU, and especially in the EMU. Secondly, we tackle the issue of economic integration of the CEE countries within the EU, by studying the role of the EU funds in promoting business synchronisation between the CEE and the EU-15 countries.

1.3 Methodology and data

1.3.1 Panel instrumental variables estimation

Our instrumental variable strategy builds on studies of Frankel & Rose (1998), Imbs (2004) and Darvas et al. (2005), taking into account the possible endogeneity problem of the business cycle synchronisation driving forces. We estimate the following regression model:

$$\begin{aligned}\text{SyncFisher}_{i,j,\tau} = \beta_1 \text{Actual EU}_{i,j,\tau} + \beta_2 \text{Trade}_{i,j,\tau} + \beta_3 \text{Specialisation}_{i,j,\tau} \\ + \sum_{c=1}^{C} \delta_c \text{Xc}_{i,j,\tau} + \mu_{i,j} + \gamma_\tau + \epsilon_{i,j,\tau}\end{aligned} \tag{1.1}$$

where $\text{SyncFisher}_{i,j,\tau}$ represents a level of the business cycle synchronisation between country i and country j within time span τ. The variable of our interest, Actual $\text{EU}_{i,j,\tau}$ denotes a total amount of actual expenditure from the EU funds in countries i and j within time span τ.[5] The model specification also covers the key determinants of the business cycle co-movement, mostly highlighted in the previous empirical literature: $\text{Trade}_{i,j,\tau}$, which denotes trade intensity between countries i and j within time span τ, and Specialisation $\text{EU}_{i,j,\tau}$, which stands for the similarity in industry specialisation between countries i and j within time span τ. We also include a set of control variables ($\text{Xc}_{i,j,\tau}$), country-pair fixed effects ($\mu_{i,j}$) and time fixed effects (γ_τ) to account for country-pair/time heterogeneity.

We consider the following set of control variables. First, we take into account a variable related to human capital, which presents an education proxy measuring the labour enrolments in high school and tertiary education. Dellas & Sakellaris (2003) and Ductor & Leiva-Leon (2016) find that countries with different levels of schooling are more likely to be in different business cycle phases, as during periods of expansion, individuals tend to substitute human capital investment with other economic activities because of the higher opportunity costs of schooling. Second, we consider the urbanisation rate as an exogenous control for level of economic development (Bloom et al. (2008)); urban areas induce economies of scale and consequently,

[5] As the EC declares: " *Data collected on annual real expenditure from the EU funds follows the cycle of the EC member states' reimbursement and not exactly the date, on which payments took place. This may negatively bias evaluation of the policy implications while performing analyses. In order to prevent from that, the EC develops more realistic estimate of the annual expenditure, which presents the mean of 100 000 simulations on the historic annual EU payments*". Hence, we consider this modelled annual expenditure as our actual EU funds expenditure variable. Information regarding the robustness and sensitivity of assumptions are available in Lo Piano et al. (2017).

a higher level of income. Examination of country-pairs shows that deep income differences should lead to synchronised business cycles (Antonakakis & Tondl (2014)). Third, we consider a proxy for institutional setting (namely, control of corruption), as previous studies find significant linkages to business cycle synchronisation (Altug & Canova (2014); Antonakakis & Tondl (2014)). For instance, Altug & Canova (2014) conclude that for a full sample of the European and Mediterranean countries, differences in the quality of governance and in civil liberties reduce business cycle synchronisation. However, one should be careful when using simple OLS estimation of the relationship between business cycle synchronisation and its determinants. Trade intensity and industry specialisation are proven to be the endogenous determinants of business cycle synchronisation (Frankel & Rose (1998); Imbs (2004); Antonakakis & Tondl (2014)).[6]

Similarly, the final allocation of the EU funds, which can be considered a fiscal instrument, is plausibly driven by contemporaneous economic conditions. For instance, countries in deteriorated economic condition may be likely to receive a greater share of the EU payments than others, confirming counter-cyclical character and a greater business cycle synchronisation, which would likely bias our estimates. On the other hand, there might exist an upward bias, which would occur if the expansionary periods are positively correlated with an increase in aggregate demand, a growing number of co-financed projects, and the final allocation of the EU funds payments. This would imply a cyclical character of the EU payments, reducing the level of the business cycle synchronisation, which can be also associated with the paradox of decreased ability to draw the EU's resources in the recessionary periods. Taking these facts into account, we also cannot consider actual expenditure from the EU funds as an exogenous variable with respect to business cycle fluctuations, due to expenditure's demand-driven nature (counter-cyclical or cyclical).

Without correcting for possible endogeneity, our estimates would be biased, invalidating basic assumption of uncorrelated error term with the independent variable. To address this issue, we employ a panel instrumental variable strategy using two stage least squares (2SLS) estimation, where the first stage estimation has the

[6]Since the impact of trade intensity and industry specialisation on business cycle co-movement has already been investigated by numerous authors, it is not central to this chapter. We rather recommend to the reader the vast empirical literature on this matter.

following form:

$$\begin{aligned}\text{Actual EU}_{i,j,\tau} = &\sum_{n=1}^{N} \theta_{1,n} \text{Z}_{n,i,j,\tau} + \alpha_1 \text{Trade}_{i,j,\tau} + \alpha_2 \text{Specialisation}_{i,j,\tau} \\ &+ \sum_{c=1}^{C} \pi_{1c,i} \text{X}_{c,i,j,\tau} + \lambda_{1i,j} + \text{v}_{1\tau} + \zeta_{1i,j,\tau}\end{aligned} \tag{1.2}$$

$$\begin{aligned}\text{Trade}_{i,j,\tau} = &\sum_{n=2}^{N} \theta_{2,n} \text{Z}_{n,i,j,\tau} + \alpha_3 \text{Actual EU}_{i,j,\tau} + \alpha_4 \text{Specialisation}_{i,j,\tau} \\ &+ \sum_{c=1}^{C} \pi_{2c,i} \text{X}_{c,i,j,\tau} + \lambda_{2i,j} + \text{v}_{2\tau} + \zeta_{2i,j,\tau}\end{aligned} \tag{1.3}$$

$$\begin{aligned}\text{Specialisation}_{i,j,\tau} = &\sum_{n=3}^{N} \theta_{3,n} \text{Z}_{n,i,j,\tau} + \alpha_5 \text{Actual EU}_{i,j,\tau} + \alpha_6 \text{Trade}_{i,j,\tau} \\ &+ \sum_{c=1}^{C} \pi_{3c,i} \text{X}_{c,i,j,\tau} + \lambda_{3i,j} + \text{v}_{3\tau} + \zeta_{3i,j,\tau}\end{aligned} \tag{1.4}$$

where $Z_{n,i,j,\tau}$ denotes n-th instrumental variable (instrument) used to estimate endogenous determinants of the synchronisation: actual payments from the EU funds/trade intensity/specialisation, varying over both time span τ and country-pairs i,j. Estimated dependent variables from (Eq. 1.2), (Eq. 1.3) and (Eq. 1.4) are consequently used in (Eq. 1.1), which presents the second stage estimation.

Empirical research of trade intensity and industry specialisation offers many options regarding possible instruments. Trade instruments include commonly known gravity variables, such as geographical distance, and dummy variables denoting common borders or common language (Frankel & Rose (1998)). However, because of their time-invariant nature, we have to follow Imbs (2004), Bravo-Ortega & Di Giovanni (2006) and use time-variant measures: the non-tariff barriers and the remoteness index, which defines the propensity to trade between countries i and j.[7] For specialisation, we apply GDP gap and GDP product of both economies, showing two stages of specialisation: initial diversification, followed by re-specialisation at a relatively high level of income (Imbs & Wacziarg (2003)), alongside the capital account restrictions or liberalisation, which serve as the instruments for specialisation arising from access to financial markets (Imbs (2004)).

[7] Imbs (2004) also suggests other instruments, such as local trade agreements and import duties. Unfortunately, these do not seem relevant for the current EU institutional framework and the European single market.

To account for the endogeneity in the actual payments from the EU funds, the literature is not so extensive. We need to find an instrument $Z_{n,i,j,\tau}$ which is uncorrelated with contemporaneous economic conditions (and the error term), but strongly linked to the actual EU funds expenditure. In this chapter, we decide to use planned EU payments (commitments) as an instrument to the actual payments from the EU funds; this constitutes our innovation in business cycle synchronisation research.[8] The argument behind using the commitments as a source of exogenous variation in the actual EU payments is that their allocation rule, provided in the annex (Table A1.2), is based on past values of variables such as one NUTS-2 region's relative GDP per capita, unemployment rate, and demographic and geographic characteristics.[9] Consequently, the commitments allocation is determined at the regional NUTS-2 level at the beginning of each programming period, independently of contemporaneous business cycle conditions. It is driven by supranational political factors—negotiations and the final approval by the European Council and the European Parliament based on the proposal by the European Commission, which occurs several years prior to considered programming periods—rather than by endogenous business cycle conditions. At the same time, it goes without saying that commitments allocation is closely connected to the actual allocation (see in the annex, Figure A1.1), although many member states do not draw all committed resources from the EU funds, due to their low absorptive capacity (Becker et al. (2013)). The instrument relevance (strength) is tested using F-test of the first stage regression for weak instruments and the consistency of the 2SLS estimation by Wu-Hausman test for endogeneity. We report heteroscedasticity and serial correlation consistent standard errors for within-groups estimators throughout the chapter (Arellano et al. (1987)).

1.3.2 Variables definition and data

In line with previous studies (see, for instance, Imbs (2004); Darvas et al. (2005); Siedschlag & Tondl (2011); Antonakakis & Tondl (2014)), we choose the Pearson correlation coefficient of real GDP time series as the indicator measuring the level of the business cycle synchronisation. We calculate bilateral correlation coefficients between each country i and country j within time span τ using input data v (real

[8] However, we follow recent empirical contributions regarding estimation of the impact of government spending on the (local) economy, in which authors use planned funds resources as instruments (see, for instance, Coelho (2019) and Dupor & Guerrero (2017)).

[9] See the EU Council Regulations 502/1999, 595/2006, and 189/2007 for further details. For the CF, allocation criteria are first established at the member state's level with the 90 percent threshold rule.

GDP) by de-trending technique (s):

$$\text{Sync}_{i,j,\tau} = \text{Cor}(v, s)_{i,j,\tau} \tag{1.5}$$

To retrieve cyclical component from real GDP time series, we apply the high-pass Hodrick-Prescott (HP) filter (Hodrick & Prescott (1997)). In spite of the fact that the HP filter has been subject to some criticism— it is said to suffer from the so called 'end-point bias problem'—we rely on this filter because it has become a standard tool for filtering business cycles (Ravn & Uhlig (2002)), predominating in recent empirical studies.[10] In addition, we check the robustness of our results with the use of another filtering technique, the band-pass Christiano-Fitzgerald filter (Christiano & Fitzgerald (2003)), which avoids the aforementioned problem.
As the Pearson correlation coefficient is bounded at [-1, 1], the error term in our model specification would likely not be normally distributed, which could lead to unreliable inference (Inklaar et al. (2008)). To avoid this problem, we decide to apply Fisher's z-transformation of the Pearson correlation coefficient:

$$SyncFisher_{i,j,\tau} = \frac{1}{2}\log\frac{(1 + Sync_{i,j,\tau})}{(1 - Sync_{i,j,\tau})} \tag{1.6}$$

Such transformation should ensure normality in the distribution of the correlation coefficients (David (1949)).

For the EU funds variable, we select only CF, ERDF, and ESF, due to the fact that together, these funds provide most of the financial resources to the member states. Another reason for considering only these particular funds is that each programming period implies specific objectives and instruments, which slightly differ among periods (and among the member countries to which these payments are allocated).[11] The payments from these funds remain consistent, allowing us to cover more programming periods. We also provide more alternatives of this variable regarding particular funds and country-pairs, in order to capture differing intensity of the EU funds impact' in the sub-groups. Another way to deal with this measure could be by classifying the payments according to thematic objectives. However, the European Commission does not provide data on annual (actual) EU funds expendi-

[10] Canova (1998) claims that the choice of de-trending method might affect estimated cyclical properties. On the other hand, De Haan et al. (2008) conclude that the authors of empirical studies often reach qualitatively similar results in spite of different filtering techniques used to estimate the business cycles.

[11] For instance, European Agricultural Guidance and Guarantee Fund (EAGGF) was replaced by the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD) in 2007.

ture per country and per objective.[12] We create a dataset of annual committed and actual EU funds expenditure covering three programming periods (2000-06, 2007-13, and 2014-16) from multiple documents and databases published by the European Commission. In the programming period 2000-06, data on annual committed payments from the CF are not available; here, we follow an amended proposal from 2003 for a Council Regulation establishing a Cohesion Fund, and calculate missing data.[13]

Trade intensity is calculated in the standard way as bilateral trade over country i's and country j's nominal GDP (Imbs (2004)). Trade instrument, the remoteness index presents the standard remoteness index of Bravo-Ortega & Di Giovanni (2006) at the EU level:

$$\text{Remoteness}_{i,j,\tau} = \sum j, \tau \frac{D_{i,j,\tau}}{T_{j,\tau}/T_{\tau}} \tag{1.7}$$

where $D_{i,j,\tau}$ denotes the population-weighted distance from country i to country j and $T_{j,\tau}$ stands for the bilateral trade flows (imports and exports) between i and j in period τ, whereas T_{τ} represents the total intra-European trade. This variable captures an expected increase in trade for bilateral trading partners that are remote from the rest of the EU. For example, it would be expected that Ireland and the UK would trade more with each other not only because of their geographic closeness, but also because of their remote geographic positions in the EU.

For the specialisation, we compute the Krugman (1991) specialisation index (KSI) based on 18 industrial categories, which ranges between 0 and 2; whereas a value 2 indicates total specialisation (with regard to the EU-average, in our case), a value 0 represents perfect similarity.[14] As we work with the country-pairs, we compute the ratio of KSI between countries i and j to obtain a similarity in industry specialisation that takes values between 0 and 1. The higher the value, the more similar the relative industrial structure in the country-pair.

[12] This is due to the fact that there was no harmonised system or information available regarding classification of the payments per objective across different funds and programming periods. Only annual commitments per country and objective are available.

[13] In the programming period 2000-06, the financial resources from the CF should be allocated to 14 EU member states (from 1 January 1, 2000: Greece, Spain, Portugal, and Ireland; from date of accession to the EU: the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia, and Slovakia). Commitment appropriations for the latter should be: €2.6168 billion in 2004, €2.1517 billion in 2005, and €2.8220 billion in 2006. We calculate annual commitments for each country by multiplying total annual commitment appropriations by mean indicative allocation coefficient per country. Total resources available for commitments for Greece, Spain, Portugal, and Ireland are only available for the whole period 2000-06; here, we calculate annual committed payments per country based on annual committed payments from remaining funds under Objective 1 (Convergence).

[14] NACE Rev. 2 1-digit industry classification.

All variables used in the model estimation undergo several transformations. Firstly, the variables are expressed as an annual percentage change or percentage of population/GDP to account for the country's size and population. Consequently, we calculate bilateral values of each variable (such as correlation coefficients, a sum of actual/committed payments) between each country-pair. The last step of transformation presents a log-transformation of the smoothed data; we apply five year rolling window transformation (time span τ), by which we lose a few observations, but eliminate redundant fluctuations/noise in time series and take into account possible persistent effect by using a lag term of the EU funds expenditure on business cycle synchronisation. [15]

Our sample covers a panel dataset of the EU–28 countries in time period 2000-16. We construct bilateral measures, which means that in total the model can be estimated as using a maximum of 4,914 observations. We provide all the variables definitions and sources in the annex, (Table A1.3) .

1.4 Results and discussion

In this section, we present the main results from performed analysis regarding the potential linkage between the supranational fiscal transfers from the EU funds and business cycle synchronisation, which are available in Table 1.1, Table 1.2 and Table 1.3. In general, our results support the view that the EU funds enhance business cycle synchronisation. Both weak instruments test and Wu-Hausman test for the endogeneity of the instrument are satisfied while using control variables in our model's specifications. Firstly, estimation results for the impact of total EU funds in the EU-28 are provided in Table 1.1.[16]

[15] Deciding on the length of rolling window might be problematic especially when using correlation coefficients (due to the trade-off between statistical confidence and ability to isolate significant changes in time). Here, we follow the studies of Antonakakis & Tondl (2014) and Lukmanova & Tondl (2017), who use five year rolling windows while investigating potential business cycle synchronisation driving forces.

[16] For the sake of brevity, the OLS estimation results suggesting limited bias are not reported (available upon request).

Table 1.1 – Panel IV estimation results – total EU funds

	(I)	(II)	(III)	(IV)	(V)	(VI)
Actual EU payments	0.0895**			0.2027***		0.0815*
	(0.0361)			(0.0431)		(0.0436)
Trade intensity		0.3717***			0.3166***	0.3129***
		(0.0871)			(0.0762)	(0.1030)
Specialization			1.0605***	2.0841***	1.8418***	1.4563***
			(0.2304)	(0.2988)	(0.2784)	(0.2723)
Education	0.5140*	1.2405***	0.9173**	1.0597***	1.3624***	1.3280***
	(0.2730)	(0.3188)	(0.3587)	(0.4047)	(0.3672)	(0.3497)
Urbanization	-0.0854***	-0.0654**	-0.0471**	-0.0387*	-0.0251	-0.0300
	(0.0194)	(0.0255)	(0.0195)	(0.0213)	(0.0241)	(0.0241)
Corruption	0.4726	0.3596	1.2391**	2.4542***	1.6300**	1.8375***
	(0.5174)	(0.6709)	(0.6143)	(0.7062)	(0.7565)	(0.6871)
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
R-squared	0.7979	0.7759	0.8164	0.8120	0.7758	0.7979
N	2 702	2 534	2 311	2 244	2 302	2 235
Weak instruments	4019.2490			1123.3820		789.995
	<0.0001***			<0.0001***		<0.0001***
		73.4400			41.8300	387260
		<0.0001***			<0.0001***	<0.0001***
			72.8180	75.3780	57.9300	65.5250
			<0.0001***	<0.0001***	<0.0001***	<0.0001***
Wu-Hausman	0.1350	41.9060	4.8630	6.3220	15.9500	7.5590
	0.7140	<0.0001***	0.0276**	<0.0001***	<0.0001***	<0.0001***

Note: This table reports results from the two stage least square (panel IV) estimation, where dependent variable presents Fisher's z-transformation of the Pearson correlation coefficient. We control for country-pair and year fixed effects. Robust standard errors (Arellano, 1987) are reported in parentheses. *p < 0.1, **p< 0.05, ***p< 0.01.
Source: Authors' calculations based on data from European Commission, Eurostat, and World Bank.

The impact of the EU funds on business synchronisation remains positive and significant in all specifications (columns (I), (IV), and (VI)). As expected, an increased bilateral trade intensity leads to more economic synchronisation (columns (II), (II) and (VI)) resulting from more economic interdependencies (Frankel & Rose (1998); Baxter & Kouparitsas (2005); Silvestre & Mendonça (2007)). Moreover, similarity in economic specialisation has a promoting role on business synchronisation (columns (III), (IV) and (VI)), as both countries are more likely to face analogous economic shocks (Imbs (2004)). Regarding control variables, a significant positive relationship between the actual EU payments and business cycle synchronisation can be observed while controlling for education, urbanisation rate, and corruption. Our results, like those of Ductor & Leiva-Leon (2016), indicate that education promotes business cycle synchronisation, while urbanisation has an adverse effect. Finally, an increase in the quality of institutions represented by the corruption index is found to foster business cycle synchronisation in line with Altug

& Canova (2014).

As a next step in our analysis, we divide the dataset into several parts, taking into account particular funds and country-pairs to provide additional findings. We also incorporate a robustness check for performed analysis (while also taking into account particular funds and country-pairs), using different filtering techniques to retrieve the business cycles: the Christiano-Fitzgerald (CF) filter and the Hodrick-Prescott (HP) filter. The related estimations are displayed in Table 1.2 and Table 1.3.

Table 1.2 – Panel IV estimation results – country-pairs analysis and robustness check

	CF	**CF**	**HP**	**HP**
	(1)	(2)	(3)	(4)
Total funds:				
EMU pairs	0.1929***	0.1936***	0.2510***	0.1846**
	(0.0526)	(0.0623)	(0.0460)	(0.0795)
EU-15-CEE pairs	0.1216	0.1937	0.9007***	1.2266***
	(0.0899)	(0.1192)	(0.1310)	(0.2694)
EU-15 pairs	0.1909***	0.2401***	0.1732*	0.1955**
	(0.0717)	(0.0827)	(0.0929)	(0.0933)
CEE pairs	0.5737*	-0.7096	1.2297***	1.3615
	(0.3246)	(0.8363)	(0.4361)	(1.6213)
Control variables	NO	YES	NO	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Note: This table reports the second stage from the two stage least square (panel IV) estimation, where dependent variable presents Fisher's z-transformation of the Pearson correlation coefficient from: Christiano-Fitzgerald (CF) real GDP filtered data, Hodrick-Prescott (HP) real GDP filtered data. Other endogenous variables (trade intensity, similarity in industrial specialisation index) are also included in the model. We control for country-pair and year fixed effects. Robust standard errors (Arellano et al. (1987)) are reported in parentheses. *p < 0.1, **p< 0.05, ***p< 0.01.

Source: Authors' calculations based on data from European Commission, Eurostat, and World Bank.

Table 1.3 – Panel IV estimation results – funds analysis and robustness check

	CF (1)	**CF** (2)	**HP** (3)	**HP** (4)
Total pairs (EU-28):				
All funds	0.1368***	0.1341***	0.2510***	0.0815*
	(0.0283)	(0.0317)	(0.0460)	(0.0436)
CF	0.2414	0.9301***	0.8662***	0.8367***
	(0.1568)	(0.2023)	(0.1948)	(0.2271)
ERDF	0.3002***	0.2711***	0.4425***	0.1193***
	(0.0300)	(0.0278)	(0.0515)	(0.0431)
ESF	-0.3132*	-0.0421	-0.1353***	-0.0660
	(0.1712)	(0.0361)	(0.0487)	(0.0489)
Control variables	NO	YES	NO	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Note: This table reports the second stage from the two stage least square (panel IV) estimation, where dependent variable presents Fisher's z-transformation of the Pearson correlation coefficient from: Christiano-Fitzgerald (CF) real GDP filtered data, Hodrick-Prescott (HP) real GDP filtered data. Other endogenous variables (trade intensity, similarity in industrial specialisation index) are also included in the model. We control for country-pair and year fixed effects. Robust standard errors (Arellano et al. (1987)) are reported in parentheses. *p < 0.1, **p< 0.05, ***p< 0.01.
Source: Authors' calculations based on data from European Commission, Eurostat, and World Bank.

First, we examine the relationship between the EU funds and business cycle synchronisation in the EMU (row (1)). The advantage of considering only EMU country-pairs is that it allows us to take into account the effects of fiscal discipline associated with membership in this area. We find that the EU funds can promote business cycle synchronisation in the EMU. This finding has important policy implications, as it reveals that the European Cohesion Policy has a positive externality on the EMU's common monetary policy. Indeed, even if their initial aim is the promotion of economic convergence, the EU funds are beneficial for business cycle synchronisation as well.

To tackle the issue of the economic integration of CEE countries, we examine the EU-15–CEE pairs, the EU-15 pairs, and the CEE pairs, due to the prevailing claims about two-speed or multi-speed Europe, which can also be reflected by differences in the level of business cycle synchronisation among these groups of countries. We should recall that a majority of the CEE countries are major recipients of the European Cohesion Policy, such as the Czech Republic, Hungary, Poland, Romania, Bulgaria, and Croatia. The enhancing role of the EU funds on business cycle syn-

chronisation holds for the EU-15 pairs, but is not robust to the CF filter between the EU-15 and the CEE countries. Moreover, we do not find any positive relationship at all between the EU funds and business cycle synchronisation among the CEE pairs, which is in line with Stanišić et al. (2013), who rejects the hypothesis of a common business cycle between the CEE countries. Regarding the economic integration of CEE countries, these results may suggest that the European Cohesion Policy has a fostering role in economic integration, provided that the country adopt the euro, as did the Baltics, Slovenia and the Slovak Republic. Such a result suggests that the degree of economic integration underwent more significant increases for the CEE countries that have adopted the euro than it did the other CEE countries. (Jiménez-Rodriguez et al. (2010); Siedschlag & Tondl (2011); Nguyen & Rondeau (2019)).

Besides our main results, we examine the effects of particular funds (CF, ERDF and ESF) on business cycle synchronisation to understand which EU fund drives business cycle synchronisation the most. The estimation results are available in Table 1.3. We find that both the CF (row (1)) and the ERDF (row (2)) have promoted business cycle synchronisation, although the same could not be said for the ESF (row (3)). To interpret our estimation results and understand why the ERDF and the CF are the only funds promoting business cycle synchronisation in the EU, we rely on the extensive empirical literature which has acknowledged these funds' role in promoting trade integration and, consequently, business cycle synchronicity (Basile et al. (2008); Breuss et al. (2010); Grigoraş & Stanciu (2016)).

To illustrate this point, we could mention that about €59.1 billion from the ERDF and the CF was spent on transport infrastructure for the current programming period. Moreover, about €86.9 billion was spent from the ERDF on technological development. Also, during the period 2015-17, the ERDF and the CF accounted for more than 50 percent of gross fixed capital formation by the general government in Portugal, Lithuania, Latvia, and the Slovak Republic.[17] The ERDF and the CF are the only EU funds financing transport infrastructure and projects supporting technological development, and it should be mentioned that both these EU funds represent a large portion of public investment expenditures in the EMU countries belonging to the periphery. However, the ESF is usually targeted at disadvantaged groups of people that are not included in the labour market. For instance, for the period 2014-17, projects with the theme 'Employment, social inclusion and education,' to which the ESF devotes a majority of its resources, covered 15.3 million people, of which 7.9 million were unemployed and 4.9 million inactive.[18] Hence, our

[17]Source: European Commission. Permalink: https://cohesiondata.ec.europa.eu/Other/-of-cohesion-policy-funding-in-public-investment-p/7bw6-2dw3

[18]See EC (2019) 816 final/2 of 01.04.2019.

results suggest that the ESF payments of a non-investment nature do not seem to boost synchronisation as the CF or the ERDF do their with technological, more long-term-growth generating programmes.

1.5 Conclusion

The aim of this study was to investigate the potential role of the EU payments in business cycle synchronisation, a topic rarely addressed in the previous empirical literature. Our sample covered a panel dataset of the EU-28 countries for the period 2000-16. We considered several variants of the country-pairs and of particular EU funds to confirm robustness of our results.

Overall, our estimation results suggest the enhancing role of the EU funds on business cycle synchronisation. Our findings are qualitatively similar and robust to the use of different estimators (OLS, panel IV) and different business cycle filtering techniques (the Hodrick-Prescott filter, the Christiano-Fitzgerald filter). More detailed findings suggest that the EU funds promoted business synchronisation especially in the EMU, which constitutes a positive externality of the European Cohesion Policy. Even if its main aim is to increase member states' competitiveness and convergence, the goal of alleviating asymmetries of the members' business cycles by means of the EU funds might present an additional motive to support lagging EU economies. Although each EU member state is obliged to join the EMU after meeting Maastricht criteria, some CEE candidate countries are not currently considering adoption of the euro; our results, however, suggest that the degree of economic integration was greater for the CEE countries that have adopted the euro than for the other CEE countries.

Moreover, we find that both the ERDF and the CF have fostered business cycle synchronisation, which can be explained by the fact that both of these EU funds represent a large part of public investment expenditures in the EMU countries belonging to the periphery. This result confirms previous empirical evidence that the EU funds have increased financial and trade integration in the recipient countries. Following the European Council of July 17-21, 2020, the European recovery plan 'Next Generation EU' could therefore have a promoting effect on the EMU's monetary policy if it is designed as an additional structural investment fund promoting financial and trade integration, as are both the CF and the ERDF.

With this chapter, we enlarged the list of potential driving forces of business cycle synchronisation. Besides previously examined fiscal variables—fiscal convergence and fiscal discipline, which are encouraged by the Maastricht (nominal convergence)

criteria and systematically associated with more synchronised business cycles (Darvas et al. (2005))—we find that another instrument, namely, fiscal transfers within the EMU seems to be effective in boosting synchronisation of the member states' business cycles, and these transfers could possibly help the EMU to become an OCA. These findings thus call for strengthening cooperation of the EMU countries in the area of supranational fiscal transfers and common economic governance, and might support the idea of the creation of a fiscal union within the EMU.

The next chapter comes back to economic effectiveness apprehended through the stimulation of GDP per capita.

1.6 Appendices

1.6.1 Additional tables

Table A1.1 – Business cycle synchronisation with Germany

	2000-04	**2005-09**	**2010-14**	**Average**
AT	0.7440	0.9897	0.8254	0.8530
BE	0.4274	0.9840	0.5091	0.6402
CY	0.4275	0.5983	0.2115	0.4124
EE	-0.9104	0.8978	0.4130	0.1335
ES	-0.7495	0.9324	0.0391	0.0740
FI	-0.0314	0.9947	0.6527	0.5387
FR	0.2636	0.9697	0.9651	0.7328
GR	-0.8917	0.6190	-0.3614	-0.2114
IR	-0.7061	0.7468	0.2603	0.1003
IT	-0.2325	0.9789	0.4366	0.3943
LT	-0.9352	0.9862	0.2738	0.1083
LU	0.7431	0.9350	0.0602	0.5794
LV	-0.8269	0.9622	0.2962	0.1438
MT	0.1560	0.8968	-0.3232	0.2432
NL	0.9827	0.8875	0.3818	0.7507
PT	0.4185	0.8787	-0.0388	0.4194
SI	-0.1217	0.9161	0.2048	0.3331
SK	0.6738	0.8681	0.1497	0.5638

Note: Business cycle synchronisation is measured as the Pearson correlation coefficient from the HP filtered GDP data of each EMU country with Germany (reference EMU business cycle).
Source: Authors' calculations based on data from Eurostat.

Table A1.2 – Allocation method of the EU funds for the programming period 2014-2020

	LDR	**TR**	**MDR**	**Cohesion Fund**
Population	Yes	Yes	Yes (25%)	
Member State population				Yes
Member State surface area				Yes
Member State's relative GDP/cap to the EU's average	Yes	Yes		Yes
Relative GDP/cap to the wealthiest NUTS 2 region			Yes (7.5%)	
Relative unemployment rate to the LDR's average	Yes	Yes		
Relative unemployment rate to the MDR's average			Yes (20%)	
Minimal threshold of €19.8 per capita		Yes	Yes	
Maximal threshold: 40% of the amount obtained by a LDR		Yes		
Population density NUTS 3 level			Yes (2.5%)	
Europe 2020 targets			Yes (45%)	

Note: Less developed regions (LDR) have a GDP per capita in Purchase Power Standard (PPS) lower than 75% of the EU-28's average. Transition regions (TR): between 75% and 90%. Most developed regions (MDR): more than 90%. LDR, TR and MDR refer to the allocation criteria of the ERDF and the ESF only.
Source: ANNEX VII, EU Regulation 1303/2013.

Table A1.3 – Variables definition and data sources

Variable	Variable definition	Index used as an input	Source
$SyncFisher_{i,j,\tau}$	Fisher's z-transformation of Pearson correlation coefficient of HP (CF) filtered log real GDP series between country i and j within time span τ	Gross domestic product at market prices, Price index (implicit deflator), 2010=100, €	Authors' calculations based on Eurostat
$ActualEU_{i,j,\tau}$	Sum of actual EU payments of country pair i and j within time span τ (as share of GDP), 4 alternatives (total, ERDF, CF, ESF, respectively)	Actual EU payments assigned to EU countries, % of GDP	Authors' calculations based on European Commission
$EUcommitments_{i,j,\tau}$	Sum of committed EU payments of country pair i and j within time span τ (as share of GDP), 4 alternatives (total, ERDF, CF, ESF, respectively)	Committed EU payments assigned to EU countries, % of GDP	Authors' calculations based on European Commission
$Trade_{i,j,\tau}$	Log-transformed bilateral trade over country i and country j's nominal GDP (Imbs (2004)) within time span τ	Bilateral flows between EU countries, % of GDP	Authors' calculations based on the CEPII Gravity Dataset
$Non-tariffbarriers_{i,j,\tau}$	Sum of the non-tariff trade barriers index of country-pair i and j within time span τ, (in log)	Economic freedom index (sub-component)	Authors' calculations based on Fraser Institute Economic Freedom dataset
$Remoteness_{i,j,\tau}$	Sum of the remoteness index of country-pair i and j within time span τ, (in log)	Remoteness index from Bravo-Ortega & Di Giovanni (2006)	Authors' calculations based on Eurostat and Head et al. (2010) dataset
$Specialisation_{i,j,\tau}$	Ratio of Krugman specialisation index between country-pair i and j calculated relatively to the EU-28 within time span τ, (in log)	Krugman specialisation index from Krugman (1991) based on sectorial gross value-added	Authors' calculations based on Stehrer et al. (2019)
$GDPgap_{i,j,\tau}$	Absolute difference of GDP of country-pair i and j within time span τ, over their sum (in log)	Gross domestic product at market prices, 2010=100€	Authors' calculations based on Eurostat
$GDPproduct_{i,j,\tau}$	Product of GDP of country-pair i and j within time span τ, (in log)	Gross domestic product at market prices, 2010=100€	Authors' calculations based on Eurostat
$Capitalliberalisation_{i,j,\tau}$	Sum of the capital account openness of country-pair i and j within time span τ, (in log)	The Chinn-Ito capital account openness index	Authors' calculations based on Chinn & Ito (2008)
$Education_{i,j,\tau}$	Sum of share of population with upper secondary and post-secondary non-tertiary education of country pair i and j within time span τ	A share of population with upper secondary and post-secondary non-tertiary education	Authors' calculations based on Eurostat
$Urbanization_{i,j,\tau}$	Sum of urban population growth of country pair i and j within time span τ	Urban population growth (annual %)	Authors' calculations based on World Bank
$Corruption_{i,j,\tau}$	Sum of control of corruption index of country pair i and j within time span τ	Control of Corruption - Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests	Authors' calculations based on WGI database from World Bank

1.6.2 Additional figures

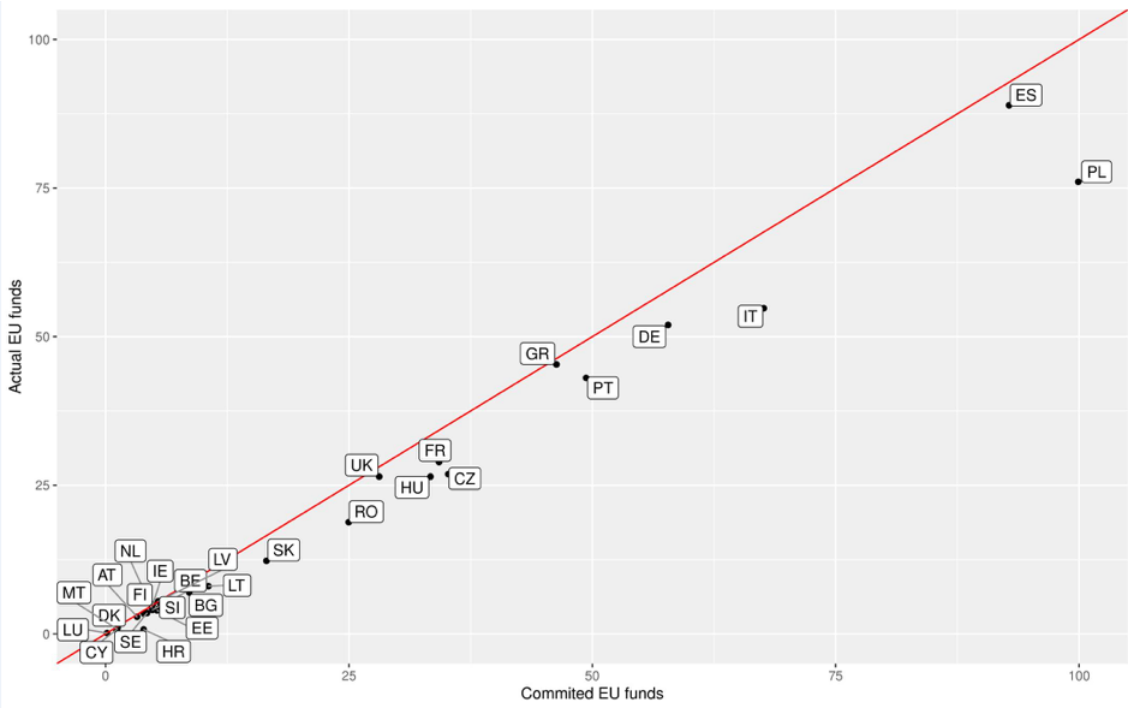

Figure A1.1 – Commitments and actual EU funds

Notes: We depict total committed and actual amount of resources (CF, ERDF, and ESF) to each EU country in 2000-16 (in billion €).

Source: Authors' calculations based on data from European Commission.

Chapter 2

Impact of European Cohesion Policy on regional growth: *When time isn't money*

Summary

Considering economic effectiveness *via* the stimulation of per capita GDP, this chapter gives a theoretical basis to the trade-off based on a complete and rapid absorption of the European funds on the one hand, and the objective of achieving economic convergence within the EU by helping the less advanced regions on the other hand. It contributes to the literature discussing the effects of the EU Funds on GDP growth by revealing the causal impact of regional absorption's speed. The analysis is conducted using a regression discontinuity design approach with heterogeneous treatment on NUTS-2 regions during the period 2000-2016. We show that a faster absorption, especially in the Mediterranean regions, is associated with worse economic outcomes of the Objective 1 treatment. The opposite holds for non-treated regions. Regarding policy implications, this study suggests that the decommitment rule should be softened, or even removed for Objective 1 regions.

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Publication process

This Chapter is in a Revise and Resubmit process in the journal *Regional Studies*.

2.1 Introduction

Cohesion Policy is designed to foster economic homogeneity across countries and regions of the EU to make their market integration be successful. In 1989, Jacques Delors, president of the European Commission between 1985 and 1995, argued that the Cohesion Policy is meant " to give every region an opportunity to benefit from the enormous advantages the single market will bring".[1] For the current programming period 2014-20, they constitute the second-largest budget line after the EU's Common Agricultural Policy as they stand for almost a third of the European budget. A special scheme has been designed for NUTS-2 regions characterised by GDP per capita lower than 75% of the per capita European GDP average making them eligible for the Objective 1 treatment. Since the programming period 1989-94, this status allows some regions to benefit from markedly increased EU transfers to fasten their convergence process.

To make an efficient use of this European rent, recipient regions must use these transfers in investment projects generating additional economic growth. A high regional absorption capacity is therefore necessary to reach these policy goals. The European Commission defines absorption capacity as "the ability to use the financial resources made available [...] on the agreed actions and according to the agreed timetable.[2] Therefore, the absorption speed of the EU funds constitutes a policy target for the European Commission as it is considered as a signal for the absorption capacity of a recipient region. [3]

To accelerate absorption, a portion of the budgetary commitment is even automatically decommitted by the Commission if it has not been used or if no payment application has been received by the end of the second year following that of the budgetary commitment (*n+2 rule*). This rule has been introduced in 1999 due to a growing concern at the EU level about the poor financial performance of some EU regional development programmes. The programming period 2014-20 has been characterised by a softer rule since the decommitment procedure has been postponed 3 years after the end of the programming period (*n+3 rule*). Observing a slowdown in the absorption speed, the Commission has proposed to return to the *n+2 rule* for the programming period 2021-27 (Bachtler et al. (2019)).

[1] From the *Programme of the Commission for 1989.* Address by Jacques Delors, President of the European Commission, to the European Parliament and his reply to the debate. Strasbourg, 16 February 1989.

[2] Final report - ERDF and CF expenditure. Contract No 2007.CE.16.0.AT.036.

[3] The financial implementation of the EU Funds is even updated on a daily basis by the European Commission.
See https://cohesiondata.ec.europa.eu/overview#

Figure 2.1 below indicates the share of EU payments implemented after the end of their corresponding programming period, *i.e.* the late payments, for each NUTS-2 region for the programming periods 1994-99, 2000-06 and 2007-13. It can be noticed that the European map becomes more reddish across time, indicating that late payments are an increasing phenomenon. During the 2007-13 period, a vast majority of regions have more than 50% of late payments, a share outrunning 75% in most of the English, Belgian and Portuguese regions. It is worth mentioning that only 25% of the observations of this study have a share of late payments lower than 20%, while 30% of observations outreach the 80% threshold. According to Figure 2.1 , it appears that regions having the fastest absorption are mostly located in Sweden, Finland and Greece.

Fast absorption is helpful in the sense that it avoids decommitments of EU payments. For instance, regarding the programming period 2000-06, substantial amounts were decommitted in the Netherlands (11.1%), Luxembourg (10.8%) and Denmark (6.1%) resulting from a slow absorption (Bachtler & Ferry (2015)). However, one drawback of spending faster might be spending worse. "Some Member States are critical of n+2 and argue that it will lead to a recurrence of problems with preparing and managing large, high-value projects, encourage a less strategic approach to project selection" (Bachtler et al. (2019), p.39).

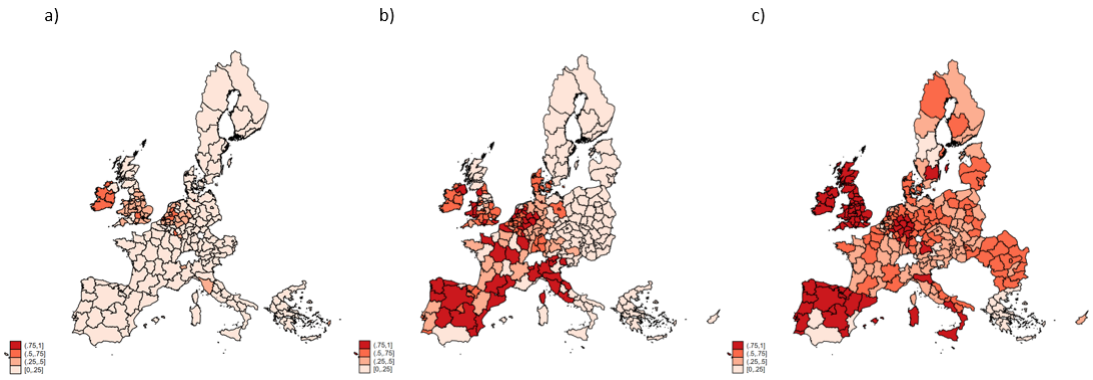

Figure 2.1 – Share of late EU payments of MFFs 1994-99 (a), 2000-06 (b) and 2007-13 (c).

Notes: MFF denotes for Multi-annual Financial Framework. [0.25; 0.5] denotes a NUTS-2 region where between 25% and 50% of total EU payments of a given MFF (1994-99, 2000-06 or 2007-13) have been executed after the end of this MFF. The same logic applies for [0; 0.25], [0.5; 0.75] and [0.75;1].

Source: Own elaboration based on data from Lo Piano et al. (2017).

The novelty of this chapter is to assess whether fast absorption of the EU funds constitutes a desirable policy outcome of the Cohesion Policy. In other words, should

we trust absorption speed in evaluating the absorption capacity of a recipient region? Is it a suitable proxy for absorption capacity?

To study this question, this chapter contributes to existing research by exploiting a new source of the conditional impact of the Cohesion Policy on regional economic growth: the absorption speed of the EU funds in recipient NUTS-2 regions. Our analysis aims to determine whether the delays in EU payments may generate a heterogeneity in the Objective 1 treatment's effect on economic growth of recipient regions. In other words, we intend to determine whether the magnitude of the impact of the EU funds in lagging regions is fully determined by their pace of spending. The estimation methodology of this chapter is based on Becker et al. (2013) which exploits the discrete jump in the probability of EU transfer receipt at the 75% threshold to conduct a fuzzy regression discontinuity design (RDD) with heterogeneous local average treatment effect (HLATE). While Becker et al. (2013) estimates the impact of the Objective 1 treatment based on regional governance quality and human capital level, we are focused on the regional absorption rate of the EU funds. To increase the reliability of our estimates, we consider real EU payments from the database of Lo Piano et al. (2017) that follows the dates in which expenditures took place on the ground. This is not the case of commitments, usually employed in the literature studying the economic effectiveness of the Cohesion Policy (see *e.g.*,Becker et al. (2010, 2013), Pellegrini et al. (2013), Rodríguez-Pose & Garcilazo (2015), Gagliardi & Percoco (2017), Percoco (2017), Becker et al. (2018)).

This chapter shows that a faster absorption of the EU funds reduces the effectiveness of the Cohesion Policy in Objective 1 regions, or the ability of the EU funds to stimulate economic growth. In other words, faster the EU funds are absorbed in Objective 1 regions, lower is the impact on economic growth. This result reveals the tension between *spending good* and *spending fast* in the European lagging regions as they are generally characterised by a lower absorption capacity.

This illustrates the fact that fast absorption might be the outcome of a strategic behaviour of recipient regions or governments to send a signal of good management to the European authorities (Huliaras & Petropoulos (2016), Aivazidou et al. (2020)). A quantile regression analysis suggests that this result is especially valid in regions with the lowest economic growth performances, the latter being mostly located in the Mediterranean Europe. A second result is that slow absorption has a negative impact on economic growth in non-treated regions. As they are wealthier, they receive significantly less EU transfers and are generally characterised by a higher absorption capacity (Becker (2012)), which gives little room to conduct the strategic behaviours aimed at increasing absorption rates. Therefore, in non-treated

regions, slow absorption would rather be the outcome of a lower management quality (Dudek (2005), Milio (2007), Tosun (2014), Surubaru (2017), Incaltarau et al. (2020)). These results are robust to different specifications, sample compositions and outcome variables.

The interpretation pertaining to policy implications is easily implementable by policymakers as we propose to remove the *one-size fits all* logic of the decommitment rule. We suggest to introduce a place-based approach dimension considering the lower absorption capacity of Objective 1 regions. Therefore, a differentiated decommitment rule between Objective 1 and wealthier regions, or even a suspension of the rule for the Objective 1 regions, could help to mitigate the use of strategies detrimental to the effectiveness of the Cohesion Policy.

The remainder of this chapter is organised as follows: Section 2 provides a related literature review. Section 3 deals with the methodology and data used to conduct our analysis. Section 4 provides the estimation results, the robustness tests alongside with the discussion. We conclude in Section 5.

2.2 Related literature

Among the large literature dealing with the Cohesion Policy, the local quality of governments has unanimously been investigated as a promoting factor of the conditional impact of the EU funds on regional economic growth resulting from a higher absorption capacity (see *e.g.*, Ederveen et al. (2006), Becker et al. (2013), Mendez et al. (2013*a*), Rodríguez-Pose & Garcilazo (2015), Dall'Erba & Fang (2017)). For instance, Dall'Erba & Fang (2017) offers a meta-regression analysis of the impact of EU funds on regional growth of recipient regions based on 323 estimates in 17 econometric studies. Human capital and quality of institutions are identified as "characteristics of the recipient regions that condition the effectiveness of the funds (Dall'Erba & Fang (2017), p.10).

Some recent studies highlight that fast absorption is a signal for high absorption capacity resulting from a sound institutional environment (Dudek (2005), Milio (2007), Tosun (2014), Surubaru (2017), Incaltarau et al. (2020)).Tosun (2014) explores the determinants of the absorption pace with regard to the European Regional Development Fund's (ERDF) 2000–06 programming period and finds that Member States' government effectiveness is positively associated with the speed of absorption of the ERDF. As well, Surubaru (2017) associates faster absorption to better institutions and stronger administrative capacity. This comparative study mentions that in the case of Bulgaria, the result of the favourable political and institutional

environments has been a higher progression of the absorption speed than the Romanian one for the period 2007-13. A similar study conducted by Incaltarau et al. (2020) concludes on the promoting role of government effectiveness on national absorption rate.

However, the view that fast absorption results from high absorption capacity is not unanimously acknowledged (ECA (2004), Polverari et al. (2007), CSIL (2010), Huliaras & Petropoulos (2016), Aivazidou et al. (2020)). Notably, Huliaras & Petropoulos (2016) provides a case study on Greece for the programming period 2007-13. The authors highlight the weaknesses of the administrative capacity and the bad institutional environment of authorities in charge of the implementation of the Cohesion Policy. As a result, the observed fast absorption has been more the result of *easy-to-spend solutions* than a good use of the EU funds resulting from a high absorption capacity. Indeed, "In 2010, one of the top priorities of the newly elected government was not to lose 'a single euro' of the National Strategic Reference Framework 2007–2013 money" (p.8, Huliaras & Petropoulos (2016)). Similarly, Aivazidou et al. (2020) concludes that low-performance of the EU funds in the Italian regions for the programming period 2007-13 can be held accountable for the strategies aiming at increasing absorption percentages instead of fostering administrative capacity.

Regarding the decommitment rule specifically, it has been effective to fasten absorption (Bachtler & Ferry (2015), but it led the authorities in charge of the implementation of the Cohesion Policy to focus on the pace of spending rather than the quality of interventions (Polverari et al. (2007); CSIL (2010)). Moreover, this rule had a detrimental impact on the ability of the Cohesion Policy to adapt to specific regional and national contexts (EC (2011)). It could be mentioned as well that the decommitment rule put a strong pressure on local administrative resources as 50% of payments are submitted between September and December (ECA (2004)). To sum up, the faster absorption induced by the *n+2 rule* might have been detrimental to the conduct of the Cohesion Policy and its ability to foster regional economic growth. Therefore, our study provides insights whether fast absorption has a fostering or detrimental impact on the ability of Objective 1 treatment to stimulate growth at the regional level.

Regarding the estimation approach, Becker et al. (2010) is the first study to adopt a RDD design to exploit the existence of a threshold in the attribution of the treatment status (set as 75% of the EU per capita GDP in purchasing power parity). An extended use of the RDD is then proposed in Becker et al. (2013) where heterogeneous local effects are estimated. The analysis based on heterogeneous local

average treatment effect (HLATE) showed that the degree of absorptive capacity is important in explaining differences in outcomes. This approach has then been followed by numerous studies to reveal different sources of heterogeneity on the impact of the EU funds on regional growth: Gagliardi & Percoco (2017) provides evidence that the initial distribution of land matters since rural areas closed to city centres are those where the impact of EU funds is the strongest. For example, Percoco (2017) finds that that the size of the regional service sector is detrimental to the impact of the EU funds on regional growth. Becker et al. (2018) explores heterogeneity across recipient regions in terms of their exposure to the last European financial and economic crisis and reveals that in spite of a positive impact, the effects of the European transfers are weaker in countries that have been hit harder by the crisis.

The next section presents the methodology and data employed in our analysis.

2.3 Methodology and data

2.3.1 Regression discontinuity design estimation

In this study, we focus on the potential heterogeneity of treatment effect according to the share of late payments $a_{i,\rho}$ which is defined as:

$$a_{i,\rho} = \frac{{eu_{i,\rho-1}}^{late}}{eu_{i,\rho-1}} \tag{2.1}$$

where ${eu_{i,\rho-1}}^{late}$ denotes the payments of the last programming period $\rho - 1$ made for a region i after the end of this corresponding programming period. We consider the programming periods 1994-99, 2000-06 and 2007-13. [4] $eu_{i,\rho-1}$ denotes the total allocation provided to region i for the associated programming period $\rho - 1$. To sum up, late payments can be defined as the payments of programming period ρ -1 made in programming period ρ. Finally, $a_{i,\rho}$ is bounded to [0;1].

We recall that the main contribution of this study is to analyse whether $a_{i,\rho}$, can be considered as a suitable proxy for regional absorption capacity by evaluating its impact on the effectiveness of the Objective 1 treatment. To answer this question, we make the hypothesis that $a_{i,\rho-1}$ is associated with the programming period ρ. More precisely, the share of late payments of period 1994-99 is associated with 2000-06, the one of 2000-06 is associated with 2007-13, and the one of 2007-13 is associated

[4] It should be mentioned that the *n+2 rule* states that a sum committed to a programme should be claimed by the end of the second year following a given programming period. Therefore, because of the European authorities' processing time, last payments are executed 3 years after the end of a given programming period (2002 for 1994-1999, 2009 for 2000-2006 and 2016 for 2007-2013).

with 2014-20. The motivations behind this assumption are threefold: (i) Operational programmes, or the detailed plans in which the Member States set out how money from the EU funds will be spent during the programming period ρ, are built in the final years of the programming period $\rho - 1$; (ii) The way how the EU funds are managed in the first years of ρ might be crucially determined by the absorption capacity inherited from the period $\rho - 1$; (iii) Regarding the empirical strategy, it has the advantage to avoid potential endogeneity of the interaction variable.

To conduct the analysis, we adopt a Heterogeneous Local Average Treatment (HLATE) estimation where the absorption rate may amplify or reduce the treatment effect. We rely on a Regression Discontinuity Design (RDD) in line with recent studies (see *e.g.*, Becker et al. (2013); Gagliardi & Percoco (2017); Percoco (2017); Becker et al. (2018); Cerqua & Pellegrini (2018)). RDD is based on the principle that there is an exogenous eligibility rule built on an observable variable, called the forcing variable. In this study, this is the relative GDP per capita of one NUTS-2 region expressed in purchase power parity (PPS) regarding the European average. For the programming period 2000-06, the eligibility status is determined on the basis of years 1994-96 (1997-99 for countries that have joined the EU in 2004), years 2000-02 for the programming period 2007-13 and years 2007-09 for the programming period 2014-20.[5]

The treatment is a binary Objective 1 indicator for a NUTS-2 region i. We recall that Objective 1 status leads to increased transfers aiming at reducing the gap in per capita GDP between non-treated and treated regions. One key feature is that the treatment rule is not perfectly respected. Indeed, in reality, there are some exceptions from the treatment rule due to several reasons. We could mention that the sparsely populated regions in Austria, Finland and Sweden are eligible for funds despite being above the relevant threshold of 75%. Another group comprises the outermost regions of France, Portugal and Spain, where the Canary Islands are above the 75% threshold. Finally, the last exception is the phasing-out status, *i.e.* NUTS-2 regions that were granted Objective 1 transfers in 1994-99 with a GDP higher than the 75% threshold for the period 2000-06. In a nutshell, due to the imperfect compliance of the eligibility rule, we must implement a *fuzzy* RDD design. As indicated by Imbens & Lemieux (2008), applying ordinary least squares (OLS) would lead to biased estimates because of the fuzziness of the treatment. Therefore, a two-stage least squares (2SLS) where the actual treatment is instrumented by the eligibility rule should be implemented to provide reliable estimates. We highly rely on follow Becker et al. (2013) for the entire econometric strategy.

[5]See the EU Council Regulations 595/2006 and 189/2007 for instance.

The second stage of the 2SLS under *fuzzy* with a HLATE identification where the interaction variable is the share of late EU payments is given by:

$$y_{i,\rho} = \alpha_2 + \tau \hat{t_{i,\rho}} + \zeta_{0n}(1-\hat{t}_{i,\rho})\tilde{x}_{i,\rho} + \eta_{0q}(1-\hat{t}_{i,\rho})a_{i,\rho} + \zeta_{1n}\hat{t}_{i,\rho}\tilde{x}_{i,\rho} + \eta_{1q}\hat{t}_{i,\rho}a_{i,\rho} + \theta_k \sum_{k}^{K} k_{i,\rho} + \mu_{i,\rho} \tag{2.2}$$

where $y_{i,\rho}$ represents the GDP per capita growth of region i averaged for the programming period ρ, α_2 is a constant and $\mu_{i,\rho}$ is the error term. $\tilde{x}_{i,\rho}$ is the deviation from the 75% threshold while $a_{i,\rho}$ and $\sum_k^K k_{i,\rho}$, a set of K control variables, are expressed as the deviation from their sample mean. τ denotes the coefficient directly associated with the fitted value of the treatment $\hat{t_{i,\rho}}$. $a_{i,\rho}$ is associated to coefficients $\zeta_{1,n}$ and $\eta_{1,q}$ when the treatment is switched-on ($\hat{t_{i,\rho}} = 1$). $\zeta_{0,n}$ and $\mu_{0,q}$ are the same coefficients when the treatment is switched-off.

Regarding the first stage regression, we use the eligibility rule that is represented through a binary variable taking the value of 1 if the NUTS-2 region has a GDP per capita below 75% of the EU average, and 0 otherwise. A linear probability model is implemented, the first stage regression is given by:

$$t_{i,\rho} = \alpha_1 + \sigma r_{i,\rho} + \beta_{0n}(1 - r_{i,\rho})\tilde{x}_{i,\rho} + \gamma_{0q}(1 - r_{i,\rho})a_{i,\rho} + \delta r_i + \beta_{1n} r_{i,\rho}\tilde{x}_{i,\rho} + \gamma_{1q} r_{i,\rho} a_{i,\rho} + \epsilon_{i,\rho} \tag{2.3}$$

where $t_{i,\rho}$ represents the instrumented variable that is the treatment status of region i for the programming period ρ, α_1 is a constant and $\epsilon_{i,\rho}$ is the error term of the first-stage estimation. Eligibility rule for treatment in programming period ρ, $r_{i,\rho}$, is determined according to the 75% threshold for region i that is eligible for treatment: $r_{i,\rho} = 1$ when the forcing variable is lower or equal to 75%, $r_{i,\rho} = 0$ in the opposite case. $\tilde{x}_{i,\rho,T}$ is the forcing variable normalised around the 75% threshold. $a_{i,\rho,T}$, the interaction variable, normalised around its mean value, is associated to coefficients $\zeta_{1,n}$ and $\eta_{1,q}$ when there is eligibility for the treatment ($r_{i,\rho} = 1$). $\zeta_{0,n}$ and $\mu_{0,q}$ are the same coefficients when $r_{i,\rho} = 0$, or when a region is not eligible for Objective 1 treatment.

The following subsection describes the data used in the analysis and their descriptive statistics.

2.3.2 Data and descriptive statistics

We collected most of the data from Eurostat Regional Statistics. They have been completed with data from Cambridge Econometrics. The information about Objective 1 status and eligibility and about expenditures come from the European Commission. We provide all data sources in Table A3.1 . Our sample covers a panel data set of the the EU's NUTS-2 regions for the period 2000-16. We do not include Bulgaria, Romania, and Croatia for reasons of data availability. The resulting number of NUTS-2 regions is 244. We used the NUTS2-2013 classification employed by EC (2019) which provides the input data used to build the following index. Regarding the time dimension of the dataset, data employed in the analysis are averaged for each programming period: 2000-06 and 2007-13. Regarding the programming period 2014-20, the latest available year is 2016, so the data correspond to averages of period 2014-16.[6] Such a transformation is implemented because the treatment variable is determined for each programming period ρ.

It should be mentioned that only actual received payments have been considered in this study, and not commitments as most of studies of the literature (see *e.g.*, Becker et al. (2010), Becker (2012), Becker et al. (2013), Pellegrini et al. (2013), Tosun (2014), Rodríguez-Pose & Garcilazo (2015), Gagliardi & Percoco (2017), Surubaru (2017), Becker et al. (2018), Cerqua & Pellegrini (2018), Incaltarau et al. (2020)). As Lo Piano et al. (2017) declares, this dataset has the advantage to follow the dates in which expenditures took place on the ground. This is not the case of commitments, which" may negatively affect the analytic work subsequently done by the experts to carry out policy assessments or to run counterfactual impact evaluations estimating the effects of the varying intensities of the EU funds on regional growth variables. The misalignment between COM reimbursement cycle and date of the interventions on the ground (beneficiaries' expenditures) may represent a disturbance acting either as a noise or as a bias." (Lo Piano et al. (2017), p.6). Hence, we consider this modelled annual expenditure as our actual EU funds expenditure variable to increase the reliability of our estimates.

As control variables, we include *population density* as the European authorities consider that a low population density is a structural handicap to achieve economic growth. We also use both the *share of the manufacturing sector and the share of financial and business services in regional gross added value (GVA)*. Moreover, we consider the *share of the active population* and the *unemployment rate* to have a proxy for the size of the labour force, and the share of the active population having

[6] This is not problematic for the programming period 2007-13 as the latest payments are made in 2016.

achieved tertiary education as a proxy for *human capital*. Finally, to control for the effects of the asymmetric shocks from the Great Recession and the following Euro Crisis, we consider the difference between the national 10 years government-bond yield spreads (*GBYS*) of a region with the national German one. The rationale behind this choice of variable is that Germany is legitimate to be the benchmark economy thanks to its very favourable market conditions in issuing public debt, especially since the last decade (Debrun et al. (2019)).

Table 3.1 displays summary statistics for key variables of interest averaged and pooled over the programming periods 2000-06, 2007-13 and 2014-16. The outcome variable, *GDP per capita growth* is calculated as the difference between the logged-GDP per capita and its lagged value. The forcing variable, *relative GDP per capita*, is then displayed as a deviation from the 75% threshold of the EU average by the time of decision of the European Commission. The interaction variable is expressed in terms of deviation regarding the pooled sample mean value, and so are the above mentioned control variables. Regarding the interaction variable, it appears that the mean is relatively similar between regions below and above the 75% threshold, although one subsample is more than twice bigger.

Table 2.1 – Descriptive statistics

Variable	**Obs.**	**Mean**	**S.D.**	**Minimum**	**Maximum**
GDP per capita growth	747	0.049	0.037	-0.141	0.221
Investment per capita growth	705	0.046	0.072	-0.267	0.428
Objective 1	747	0.275	0.447	0	1
Eligibility for Objective 1	747	0.313	0.464	0	1
Relative GDP per capita	747	0.934	0.328	0.291	2.603
GBYS	722	0.010	0.015	-0.006	0.105
Activity rate	730	0.692	0.078	0.403	0.828
Unemployment rate	726	0.088	0.056	0.019	0.348
Population density	720	357.5	778.081	3.300	7394.000
Human capital	730	0.240	0.092	0.036	0.519
Share of manufacturing in GVA	747	0.219	0.086	0.035	0.535
Share of financial and business services in GVA	747	0.226	0.060	0.092	0.476
Share of late payments	747	0.432	.362	0	1
Below GDP 75% threshold	203	0.473	0.430	0	1
Above GDP 75% threshold	544	0.417	0.332	0	1
Below sample mean	377	0.126	0.167	0	0.429
Above sample mean	370	0.744	0.208	0.433	1

Notes: Detailed descriptive statistics are provided for the share of late payments.
Source: Own calculations based on data from European Commission, Eurostat and Cambridge Econometrics.

2.3.3 Validity of RDD setup and estimates of HLATE

This subsection will verify and document graphically the most important assumptions related to the RDD setup that are (i) exogeneity of the treatment *via* manipulation of GDP per capita; (ii) probability jump of treatment status at the threshold; (iii) discontinuity at the threshold of the outcome variable; (iv) absence of discontinuity of the interaction variable and the control variables around the threshold. In order to perform the graphical analysis, following Becker et al. (2018), the forcing variable is divided in equally sized bins of 2 percentage points in width to the left and the right of the threshold level. The outcome, interaction variable, control variables and treatment status are then grouped and averaged by bin.

First, Figure 3.2 displays the density distribution of GDP per capita expressed using pooled averaged observations of programming periods 2000-06, 2007-13 and years 2014-16. The RDD setup would not be valid if a spike before the 75% threshold would have been observed as it would invalidate the exogeneity of the Objective 1 treatment. This is not suggested by Figure 3.2 since the density peak can be observed around a level of 90%.

Figure 3.3 illustrates graphically how the probability of Objective 1 treatment relates to region-specific per capita GDP relative to the European average prior to each programming period (forcing variable). While a probability jump is visible at the 75% threshold, the fuzziness of the RDD design is revealed as some regions having a relative GDP per capita higher than 75% of the European at the time of the European Commission's decision are treated, and *vice versa*.

Identification of a causal effect of Objective 1 treatment on growth by means of RDD requires that there is a discontinuity at the threshold, which is obvious in Figure 3.4. To illustrate the effect of the discontinuity in Objective 1 treatment on regional growth, the outcome variable (i.e, the averaged growth rate for a NUTS-2 region of per capita GDP in PPP) is plotted against the forcing variable. The jump of the outcome variable at the threshold amounts to about 0.4 percentage point.[7] This result strengthens the usefulness of the RDD in apprehending the question of the impact of the EU funds on regional GDP growth.

Finally, Figure 3.5 plots the interaction variable (i.e, the averaged share of late EU payments for a NUTS-2 region) against the forcing variable. There is no indication of a jump at the 75% threshold, which ensures the validity of the RDD estimates (Imbens & Lemieux (2008)). A similar pattern is observed for the control

[7] Another potential jump visible at around 60% of the European average per capita GDP could be pointed. Such a jump is observed in other related studies (see, e.g. Becker et al. (2010); Gagliardi & Percoco (2017); Percoco (2017)). However, this is out of the scope of studying the impact of the Objective 1 treatment on regional growth as we are focused on the 75% threshold.

variables used in the analysis (see the Figure A3.1 in the appendix).

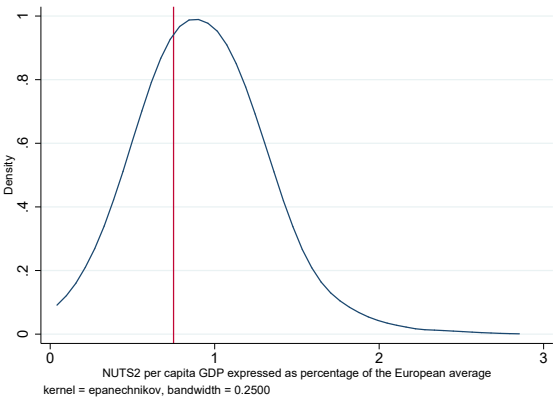

Figure 2.2 – Density check to detect potential manipulation of GDP per capita

Notes: The graph shows a density plot of relative GDP per capita based on the years determining the treatment status of a NUTS-2 region with pooled data of the period 2000-16.

Source: Own elaboration based on data from European Commission.

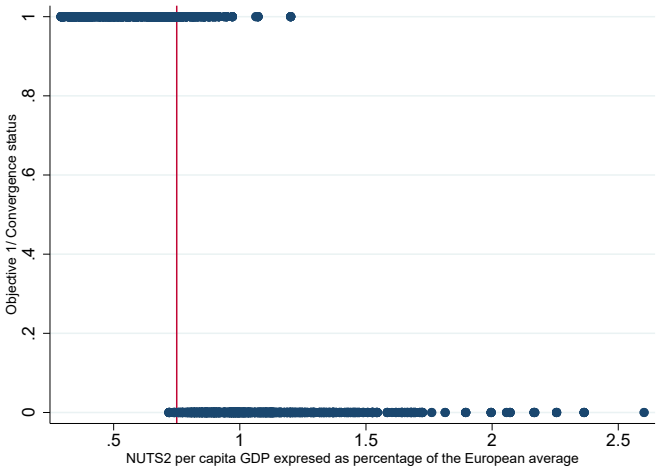

Figure 2.3 – Assignment of Objective 1 treatment status

Notes: The graph shows the assignment of the actual treatment status (1 if a NUTS-2 region is treated, 0 in the other case) with annual pooled data of programming periods 2000-16.

Source: Own elaboration based on data from European Commission.

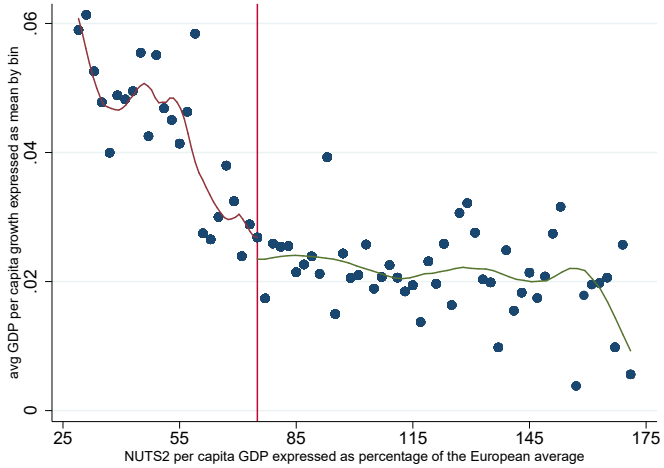

Figure 2.4 – Discontinuity of outcome at the threshold

Notes: The graph shows the GDP per capita growth plotted on the forcing variable with annual pooled data of programming periods 2000-16.

Source: Own elaboration based on data from European Commission.

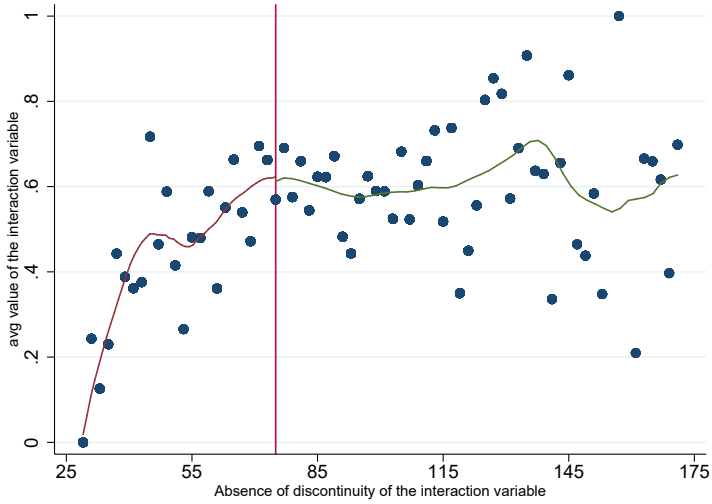

Figure 2.5 – Absence of discontinuity of the interaction variable

Notes: The graph shows the share of late payments plotted on the forcing variable with annual pooled data of programming periods 2000-16.

2.4 Results and discussion

2.4.1 Estimation results

In this subsection, we present main results from performed analysis regarding regional GDP per capita growth and the share of late EU payments. In general,

our results support the view that the later the payments are made *i.e.* slower the absorption of the EU funds is, the higher is the effectiveness of the Cohesion Policy in Objective 1 regions.

Table 3.3 reports estimates of the local average treatment effect (LATE) of Objective 1 status on regional economic growth. These simple RDD regressions stand for the average effect of the Objective 1 treatment on regional growth. The LATE is estimated in two different samples: averaged observations of regions having a share of late payments below (column (1)) and above (column (2)) the sample average. The sample size is restricted to increase the reliability of the RDD estimates: we propose a subsample including regions with a relative GDP per capita 25% higher and lower than the European average at the time of decision by the European Commission, *i.e.* between 50% and 100%. Indeed, the RDD approach is based on observations that are close to this threshold since they are likely to be very similar to each others with respect to observed and unobserved characteristics, except for the outcome variable. Therefore, the mean difference in the outcomes can be attributed to the treatment effect. This average treatment effect (ATE) sacrifices external validity by focusing only on observations close to the cut-off point, that is the 75% level of the average European regional GDP per capita. Finally, we include estimates of panel fixed-effects to capture all the unobserved factors related to each NUTS-2 regions.

As it can be observed, the Objective 1 treatment has a systematic positive and significant effect for regions characterised by a share of late EU payments higher than the sample average. However, the same cannot be said for the fast spending regions as the LATE is positive and significant only for the RDD estimate including the entire sample, which could be considered as the less reliable estimate because of the between regions comparability issue. Otherwise, the Objective 1 treatment does not have any significant effect on regional per capita GDP growth. Consequently, the estimates displayed in Table 3.2 might reveal an heterogeneous impact of the Objective 1 treatment according to the EU transfers' absorption pace. This legitimates to study the heterogeneous local average treatment effect (HLATE) of the Objective 1 treatment based on the share of late EU payments.

Table 2.2 – Heterogeneity of the Objective 1 treatment effect on regional GDP per capita growth: sample decomposition according to the share of late payments.

	(1)	(2)
Estimator	Late payments below the average	Late payments above the average
RDD	0.016***	0.019***
	(0.003)	(0.003)
Panel fixed-effects	-0.008	0.026***
	(0.008)	(0.008)
Observations	313	419
RDD 50-100	0.004	0.017***
	(0.006)	(0.004)
Observations	157	237

Notes: This table reports results from the two stage least square estimation of the LATE with a sample restricted to the observations with a share of late payments below (column (1)) and above (column (2)) the European average. *RDD* refers to the estimation of the Local Average Treatment Effect (LATE) of the Objective 1 treatment for the entire sample, while *RDD 50-100* considered only the observations with a relative GDP per capita between 50% and 100% of the European average. The forcing variable is the relative GDP per capita of 1996-98 (97-99) for years 2000-06, 2000-02 for years 2007-13 and 2007-09 for years 2014-16. *Panel fixed effects* describes the two stage least square (panel IV) estimation using regional fixed effects.
The dependent variable presents regional GDP per capita growth. Robust standard errors are reported in parentheses. * denotes $p < 0.10$; ** $p < 0.05$; ***$p < 0.01$.
Source: Own calculations based on data from European Commission and Eurostat.

The estimation results for the heterogeneous effects (HLATE) are displayed in Table 3.3. To increase the reliability of RDD estimates as much as possible, we restrict our sample to 12.5% around the eligibility threshold, *i.e.* NUTS-2 regions having a GDP per capita from 62.5% to 87.5% of the European average (columns (1)-(2)). One drawback of this procedure is the sharp reduction of sample size since the number of observations falls to 219. Columns (3) and (4) include regions with a relative GDP per capita between 50% and 100% of the European average, which allow us to nearly double the sample size to 394 observations. Columns (5) and (6) include the entire sample as only regional fixed effects are included with the use of panel fixed-effects. It is not worth mentioning to indicate that some non-linearity is introduced with the squared term of the share of late payments in columns (2), (4) and (6). The analysis shows that weak instruments and endogeneity tests are generally verified. For sake of brevity, we report only second-stage estimates.

The first striking result is that a faster absorption of the EU funds reduces the effectiveness of the Cohesion Policy in Objective 1 regions, or the ability of the EU funds to stimulate economic growth. Indeed, in all specifications, the coefficient on the term of interaction between the share of late payments and the treatment exhibits a positive sign. The introduction of a quadratic interaction term even reinforces this result. In all specifications, we obtain $\frac{\partial y_{i,\rho}}{\partial a_{i,\rho}} > 0$ for Objective 1 regions

which indicates that the net effect of an increase in the share of late payments is beneficial to regional growth. This result validates that fast absorption might be the outcome of a strategic behaviour of recipient regions or governments to send a signal of good management to the European authorities (Huliaras & Petropoulos (2016); Aivazidou et al. (2020)). This finding gives ground to the conflict between spending fast and spending good in lagging regions as they are generally characterised by a lower absorption capacity (Becker et al. (2013)). In other words, local managing authorities may encounter more difficulties to spend a European subsidy efficiently for a given time period compared to a wealthy region.

A second result is that slow absorption has a negative impact on economic growth in regions having a relative GDP per capita higher than 75% of the European average. Indeed, as they do not benefit from the Objective 1 treatment, we find that $\frac{\partial y_{i,\rho}}{\partial a_{i,\rho}} < 0$. As these regions are wealthier than the Objective 1 regions, they receive significantly less EU transfers and are generally characterised by a higher absorption capacity (Becker (2012)), which gives little room to conduct the strategic behaviours aimed at increasing absorption rates. Therefore, in non-treated regions, slow absorption would rather be the outcome of a lower management quality (Dudek (2005), Milio (2007), Tosun (2014), Surubaru (2017), Incaltarau et al. (2020)).

A third result is the treatment does not have any robust direct impact on regional economic growth, making its impact purely conditional. Indeed, in all regressions, the magnitude of the impact of the EU funds in lagging regions is fully determined by their pace of spending. Therefore, the Objective 1 treatment does not promote economic growth *per se*. This finding is in line with a large majority of the literature underlining that the effectiveness of the Cohesion Policy mostly relies on regional governance quality and human capital level (see *e.g.*, Cappelen et al. (2003), Becker et al. (2013), Rodríguez-Pose & Garcilazo (2015), Becker et al. (2018)).

Regarding control variables, half of them are characterised by insignificant effects. The remaining ones are associated with the expected significant effects: (i) it could be noticed that the proxy for human capital, *i.e.* tertiary education achievement, is associated to a positive and significant impact on per capita GDP growth in most of specifications; (ii) a similar outcome appears for the share of the manufacturing sector in regional gross added value, indicating that the industrial sector is a powerful growth driver (Baumol (2001)); (iii) it is worth mentioning the robust negative significant impact of the GBYS on per capita GDP growth. This feature reveals that the the inclusion of this control variable is relevant to capture the shocks inherited from the Great Recession and the following Euro Crisis.

Table 2.3 – Objective 1, late payments and regional GDP per capita growth– heterogeneous local average treatment effect (HLATE) (IV second stage estimates) and panel fixed-effects.

	(1) HLATE 25%	(2) HLATE 25%	(3) HLATE 50%	(4) HLATE 50%	(5) Panel FE	(6) Panel FE
GDP per capita	0.061	0.059	-0.055**	-0.057**	-0.115***	-0.116***
	(0.120)	(0.120)	(0.023)	(0.022)	(0.019)	(0.018)
Objective 1	0.027	0.022	0.001	0.001	0.008	-0.007
	(0.024)	(0.019)	(0.001)	(0.001)	(0.008)	(0.009)
Late payments	-0.013	-0.001	-0.016**	-0.016**	-0.019***	-0.016***
	(0.011)	(0.015)	(0.007)	(0.007)	(0.006)	(0.006)
Objective 1* Late payments	0.031**	0.027	0.027***	0.025***	0.022***	0.018***
	(0.014)	(0.016)	(0.009)	(0.010)	(0.006)	(0.007)
Late $payments^2$		-0.019		-0.008		-0.019
		(0.045)		(0.018)		(0.012)
Objective 1* Late $payments^2$		0.037		0.033		0.095***
		(0.065)		(0.030)		(0.018)
Density	0.018	0.018	0.014	0.013	-0.005	-0.016
	(0.030)	(0.030)	(0.020)	(0.021)	(0.010)	(0.015)
Unemployment	-0.050	-0.040	-0.066*	-0.058	0.028	0.010
	(0.060)	(0.058)	(0.038)	(0.037)	(0.044)	(0.044)
Activity	0.037	0.043	0.000	0.001	-0.090**	-0.127***
	(0.039)	(0.039)	(0.026)	(0.025)	(0.045)	(0.045)
Financial sector	0.070	0.076	0.025	0.029	0.135	0.177*
	(0.056)	(0.061)	(0.032)	(0.033)	(0.102)	(0.105)
Manufacturing sector	0.035	0.038	0.042***	0.045***	0.211***	0.271***
	(0.022)	(0.023)	(0.017)	(0.017)	(0.063)	(0.066)
Tertiary education	0.025	0.023	0.058***	0.059***	0.190***	0.197***
	(0.030)	(0.032)	(0.020)	(0.021)	(0.030)	(0.031)
Spread Germany (GBYS)	-0.358***	-0.375***	-0.389***	-0.402***	-0.807***	-0.808***
	(0.109)	(0.110)	(0.077)	(0.080)	(0.113)	(0.117)
Constant	0.019	0.021	0.033***	0.034***	0.048***	0.059***
	(0.015)	(0.013)	(0.005)	(0.004)	(0.008)	(0.10)
R^2	0.047	0.044	0.273	0.273	0.461	0.469
Weak instruments	2.954*	4.242***	19.180***	20.681***	28.327***	18.946***
Durbin Endogeneity	4.672*	5.599	3.293	3.498	4.080	17.504
Wu-Hausman Endogeneity	2.169	1.926	1.600	1.118	1.424	4.307
Regional fixed effects	NO	NO	NO	NO	YES	YES
Observations	219	219	394	394	732	732

Notes: This table reports results from the two stage least square estimation of the HLATE with a sample restricted to 12.5% (columns (1)-(2)) and 25% (columns (3)-(4)) around the 75% threshold of the forcing variable (GDP per capita). The forcing variable is the relative GDP per capita of 1996-98 (97-99) for years 2000-06, 2000-02 for years 2007-13 and 2007-09 for years 2014-16. The two stage least square (panel IV) estimation using regional fixed-effects are reported in columns (5) and (6) using the full sample. The dependent variable presents regional GDP per capita growth.

Robust standard errors are reported in parentheses. *p < 0.1, **p< 0.05, ***p< 0.01.

Source: Own calculations based on data from European Commission, Cambridge Econometrics and Eurostat.

To give strength to these results, we conduct additional regressions using a different outcome variable, the growth of per capita regional investment, as the initial aim of the Cohesion Policy is to stimulate public and private investment to foster regional GDP growth. The structure of Table A3.2 is the same as Table 3.3. The estimation results, available in the appendix, are qualitatively similar.

Following the methodology of Becker et al. (2013), we implement non-parametric regressions based on local linear estimator with bootstrapped estimations (500 times). The optimal bandwidth is selected using the improved AIC of Hurvich et al. (1998). The non-parametric estimates are derived from a specification with both linear GDP per capita and share of late payments. The variability of the HLATE function according to the share of late payments is displayed in Figure 3.6. It can be observed that an increase in the share of late payments has a positive effect on the effect of the treatment on regional per capita GDP growth since the HLATE is an increasing function. It should be noticed that the non-parametric HLATE function is steeper. Moreover, while the HLATE estimated with the RDD estimator is always positive, the non-parametric estimated HLATE is negative for all late payments below the sample mean value. Figure A2.2 in the appendix displays similar estimates where the dependent variable is per capita investment growth. The estimation results are qualitatively similar.

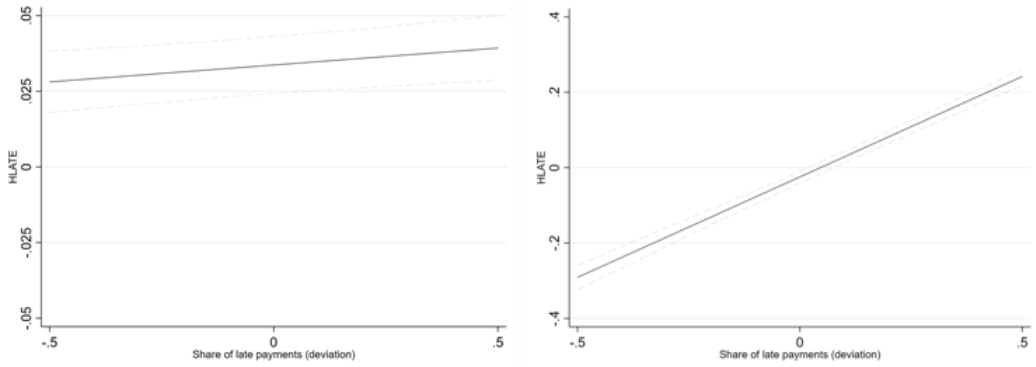

Figure 2.6 – HLATE and regional per capita GDP growth for different levels of the share of late EU payments.
Notes: The solid line illustrates the point estimates, the dashed lines represent the 95 percent confidence intervals. The confidence intervals are derived from bootstrapped standard errors with 100 replications.
Source: Own elaboration.

Given the nature of the projects financed by the Objective 1 financial transfers (*e.g.*, transport infrastructure or research projects), our previous estimation results may be affected by spatial autocorrelation. This is confirmed by Moran's I test over that is always below 0.2 but systematically significant, indicating modest spatial

autocorrelation. [8] To tackle this issue, spatial auto-regressive fixed effects estimates are conducted. A weighting contiguity matrix based on the 244 NUTS-2 regions of our sample is created where first and second order neighbours have the same weight. The estimation results are reported in Table 3.4. Whilst remaining robust, it can be noticed that the significance of late payments is reduced to the 10% level where per capita GDP growth is the dependent variable. It can still be observed that: (i) an increase in the share of late payments in Objective 1 regions is not detrimental to economic growth; (ii) the opposite holds in non-treated regions (iii) the effect of the Objective 1 treatment is mostly conditional.

The next subsection deals with additional regressions to increase the precision of our estimates. First, quantile regressions are implemented to investigate whether the treatment effects are homogeneous across per capita GDP growth levels. Moreover, following the conclusions of Becker (2012), we investigate whether the intensity of the European transfers is relevant in determining their capacity to stimulate economic growth in recipient regions.

2.4.2 Additional results

Let us now turn to Table A3.3 that reports results for the simultaneous-quantile regressions with the regional economic growth (columns (1)-(2)) and investment per capita growth (columns (3)-(4)) as outcome variables. Regions having a GDP per capita 12.5% around the eligibility threshold have been selected. Again, the purely conditional impact of the Objective 1 treatment is validated for both the outcome variables.

An interesting additional result provided by Table A3.4 is that the absorption speed appears to be relevant only in regions exhibiting the lowest economic growth patterns, which are mostly located in Southern Europe. Considering that most of the Objective 1 regions are located in the Mediterranean and the Central Eastern European (CEE) countries, 47% of the regions in the lowest 25% quantile, in terms of economic growth, belongs to the Mediterranean Europe and 5% to the CEE countries.[9] On the contrary, if we consider the upper 25% quantile, where the absorption speed appears to be irrelevant, the CEE countries stand for 31% of the sample and this share falls to 30% for the Mediterranean ones.[10]

[8] For sake of brevity, the test values are not reported. They are available upon request.

[9] In details, 18% are Greek, 13% Spanish, 9% Italian, 6% Portuguese and 1% Cypriot (Mediterranean regions) . 3% Slovenian and 2% Czech (regions from CEE countries).

[10] Mediterranean Europe: 17% Spanish, 8% Greek, 3% Portuguese, 1% Cypriot and 1% and 1% Maltese. CEE: 12% Czech, 9% Polish, 4% Hungarian, 3% Slovenian, 1% Slovak 1% Latvian and 1% Lithuanian.

Table 2.4 – Objective 1, late payments and regional GDP and Investment per capita growth–Spatial autoregressive (SAR) fixed-effects (IV second stage estimates).

	(1)	(2)	(3)	(4)
GDP per capita	-0.085***	-0.085***	-0.059*	-0.056*
	(0.013)	(0.013)	(0.031)	(0.030)
Objective 1	0.011**	0.004	0.035***	0.002
	(0.005)	(0.006)	(0.011)	(0.014)
Late payments	-0.008**	-0.007*	0.005	0.011
	(0.004)	(0.004)	(0.009)	(0.010)
Objective 1* Late payments	0.010*	0.008	0.005	-0.004
	(0.006)	(0.006)	(0.010)	(0.014)
Late $payments^2$		-0.008		-0.064**
		(0.013)		(0.031)
Objective 1* Late $payments^2$		0.041*		0.198***
		(0.022)		(0.052)
Density	-0.008	-0.006	-0.005	-0.007
	(0.013)	(0.012)	(0. 028)	(0.028)
Unemployment	0.003	0.003	0.252*	0.259**
	(0.055)	(0.054)	(0.130)	(0.130)
Activity	-0.053	-0.056	0.031	0.014
	(0.058)	(0.057)	(0.136)	(0.134)
Financial sector	0.214**	0.215**	-0.086	-0.010
	(0.087)	(0.087)	(0.209)	(0.208)
Manufacturing sector	0.027	0.040	0.044	0.099
	(0.061)	(0.062)	(0.144)	(0.144)
Tertiary education	0.149***	0.152***	0.220***	0.217**
	(0.035)	(0.036)	(0.085)	(0.014)
Spread Germany (GBYS)	-0.788***	-0.786***	-1.529***	-1.518***
	(0.116)	(0.115)	(0.282)	(0.277)
R^2	0.105	0.115	0.119	0.146
ρ dep. variable	0.690***	0.696***	0.598***	0.583***
ρ residuals	0.747***	0.728***	0.692***	0.680***
Regional fixed effects	YES	YES	YES	YES
Observations	732	732	732	732

Notes: This table reports results from the Spatial auto-regressive fixed effects model where the dependent variable is GDP per capita growth (columns (1)-(2)) and Investment per capita growth(columns (3)-(4)).
ρ dep. variable denotes the spatial lag coefficient for the dependent variable, the same logic applies for ρ residuals. Their significances legitimate the use of the SAR model.
Robust standard errors are reported in parentheses. *p < 0.1, **p< 0.05, ***p< 0.01.
Source: Own calculations based on data from European Commission, Cambridge Econometrics and Eurostat.

Table 2.5 – Objective 1, late payments and outcome variables– Simultaneous-quantile regressions.

	(1) Fifth-order 25%	(2) Fifth-order 75%	(3) Fifth-order 25%	(4) Fifth-order 75%
Objective 1	-0.019	0.002	-0.019	-0.009
	(0.016)	(0.008)	(0.013)	(0.019)
Objective 1* Late payments	0.072***	0.008	0.085***	0.023
	(0.018)	(0.028)	(0.027)	(0.025)
Late payments	-0.044***	-0.004	-0.037**	0.000
	(0.011)	(0.004)	(0.015)	(0.013)
Objective 1* Late $payments^2$	0.129***	0.028	0.211**	0.068
	(0.041)	(0.028)	(0.093)	(0.072)
Late $payments^2$	-0.038	0.002*	-0.059	-0.009
	(0.027)	(0.013)	(0.045)	(0.019)
Constant	0.027***	0.040***	-0.010	0.039***
	(0.009)	(0.005)	(0.010)	(0.010)
R^2	0.244	0.211	0.237	0.133
Observations	373	373	373	373

Note: The two stage least square (panel IV) estimation using regional fixed-effects uses the fifth-order of the forcing variable. The forcing variable is the relative GDP per capita of 1996-98 (97-99) for years 2000-06, 2000-02 for years 2007-13 and 2007-09 for years 2014-16. Robust standard errors are reported in parentheses. It contains an estimate of the VCE via bootstrapping, and the VCE includes between-quantile blocks. *p < 0.1, **p< 0.05, ***p< 0.01. Source: Own calculations based on data from European Commission, Cambridge Econometrics and Eurostat.

2.4.3 General discussion

First, our results indicate that fast absorption in the Objective 1 regions is not a desirable policy outcome since a faster absorption is significantly associated with a lower effectiveness of the Cohesion Policy in terms of stimulation of economic growth. These results especially corroborate the findings of Huliaras & Petropoulos (2016). In details, the latter focuses on Greece, especially during the 2007-13 period, and reveals that every time a programming period end was approaching, the political authorities targeted *easy to spend* solutions, such as unconditional direct subsidies to small and medium-sized enterprises or the construction of parking facilities to keep authorities satisfied and exhibit the fact that all the European money has been spent on time. Moreover, the conclusions of Huliaras & Petropoulos (2016) particularly corroborate our estimation results as we have shown that fast absorption is the most detrimental in Objective 1 regions with poor growth performances (see Table A2.3), where the Greek regions stand for 18% of our observations. Regarding the *n+2* rule in particular, our results are in line with the literature pointing out that this rule resulted in an increased

focus on the pace of spending rather than the quality of the investment projects (CSIL (2010)), especially in regions with limited administrative resources (ECA (2004)), as the Objective 1 regions. While a strand of the literature concludes on a positive association between regional administrative capacity and the speed of the implementation of the Cohesion in Spain (Dudek (2005)), Italy (Milio (2007)), Romania and Bulgaria (Tosun (2014)), we posit that absorption pace is failing signal for absorption capacity. Indeed, it does not capture local strategies implemented to fasten absorption at the cost of lower economic effectiveness. For instance, the use of *retrospective projects* consists on funding projects which have incurred expenditure, or are completed before the EU co-financing has been formally applied, *i.e.* they are financed retrospectively. As these projects are often selected, initiated or carried out without having been expressly linked to a programme's objectives or to specific legal requirements linked to EU assistance, they exhibit a significant risk of low economic effectiveness (ECA (2018)). Aivazidou et al. (2020) mentions as well the reduction of regional share of contribution as a strategy to increase absorption rates. This study proposes then an alternative measure of absorption, the net absorption rate of total funding based on the initial total commitments (net ITAR) to alleviate the bias of this strategy on absorption rates.

Our results give ground to the tension between *spending fast* and *spending good*. The origins of this trade-off have been somewhat theorised by the literature dealing with the political economy of the EU funds (see *e.g.*, Dellmuth (2011), Charron (2016)). This literature underlines the existence of two objectives: (i) a full and fast absorption of the European funds on one side, (ii) achieving regional cohesion by aiding lagging regions on the other side. During the implementation of the Cohesion Policy, the European Commission and the Member States can be considered as Principals, and recipient regions as Agents. The policy goal of the European Commission is to maximise the absorption rates of recipient regions to send a signal that the EU funds are fully used, so as to provide incentives to the Member States to increase their financial contribution for the next programming period, it tends therefore to favour regions with high absorption rate past tracks when it comes to the allocation decision (Dellmuth (2011)). Charron (2016) shows that even Member States do not have full interest to go against the full absorption policy goal of the European Commission to send a good signal of the use of the EU funds to the European Commission. As a result, Member States push to foster absorption rate of EU funds in recipient regions, even the poorest ones. Resorting to *restrospective projects* or reducing regional share of contribution illustrate the strategic behaviours aiming at fastening absorption.

2.5 Conclusion

This study investigates the effects of EU funds on regional growth in Objective 1 NUTS-2 regions with a panel dataset of 244 regions for the period 2000-16 by using a RDD with heterogeneous treatment based on the methodology of Becker et al. (2013). We focus on the speed of the EU funds' absorption that has been approached as the share of real payments allocated for a given programming period implemented after the end of this corresponding programming period.

The main result of this study is that a faster absorption of the EU funds reduces the effectiveness of the Cohesion Policy in Objective 1 regions, or the ability of the EU funds to stimulate economic growth. This result validates that fast absorption might be the outcome of a strategic behaviour of recipient regions or governments aiming at increasing absorption rates to send a signal of good management to the European authorities (Huliaras & Petropoulos (2016); Aivazidou et al. (2020)). This finding gives ground to the conflict between *spending fast* and *spending good* in lagging regions as they are generally characterised by a lower absorption capacity (Becker et al. (2013)). A more detailed analysis suggests that this result is especially valid in regions with the lowest economic growth performances, the latter being mostly located in the Mediterranean Europe. A second result is that slow absorption has a negative impact on economic growth in non-treated regions. As they are wealthier, they receive significantly less EU transfers and are generally characterised by a higher absorption capacity (Becker (2012)), which gives little room to conduct the strategic behaviours aiming at fastening absorption. Therefore, in non-treated regions, slow absorption would rather be the outcome of a lower management quality (Milio (2007); Tosun (2014); Surubaru (2017); Incaltarau et al. (2020)). A third result is that the treatment does not have any robust direct impact on regional economic growth, making its impact purely conditional. Indeed, the magnitude of the impact of the EU funds in lagging regions is strongly determined by their pace of spending. This finding is in line with a large majority of the literature underlining the conditional effectiveness of the Cohesion Policy (see *e.g.*, Cappelen et al. (2003); Becker et al. (2013) ; Rodríguez-Pose & Garcilazo (2015); Becker et al. (2018)).

Regarding policy implications, we believe that the decommitment rule suffers from a major design issue: it is characterised by a *one-size fits all* logic. The early work of Batterbury (2002) already mentioned the need of a place-based approach ("The Commission needs to adapt better its Structural Fund policies to suit the

characteristics of particular regions having diverse cultures and norms" (Batterbury (2002), p.15), that has been applied in several areas of the Cohesion Policy since the Barca report (Barca (2009)). Therefore, a differentiated decommitment rule between Objective 1 and wealthier regions, or even a suspension of the rule for the Objective 1 regions, could help to mitigate the use of strategies detrimental to the effectiveness of the Cohesion Policy. This would be especially relevant for the period 2021-27 as the budget allocated to the Cohesion Policy would globally be reduced but increasingly focused on the lagging regions, a trend likely to be valid for future programming periods.

The next chapter completes the substantial literature which criticises the way in which the structural funds are distributed among the beneficiary countries. This sub-optimal allocation has an impact on the overall effectiveness of the cohesion policy in terms of per capita GDP growth.

2.6 Appendices

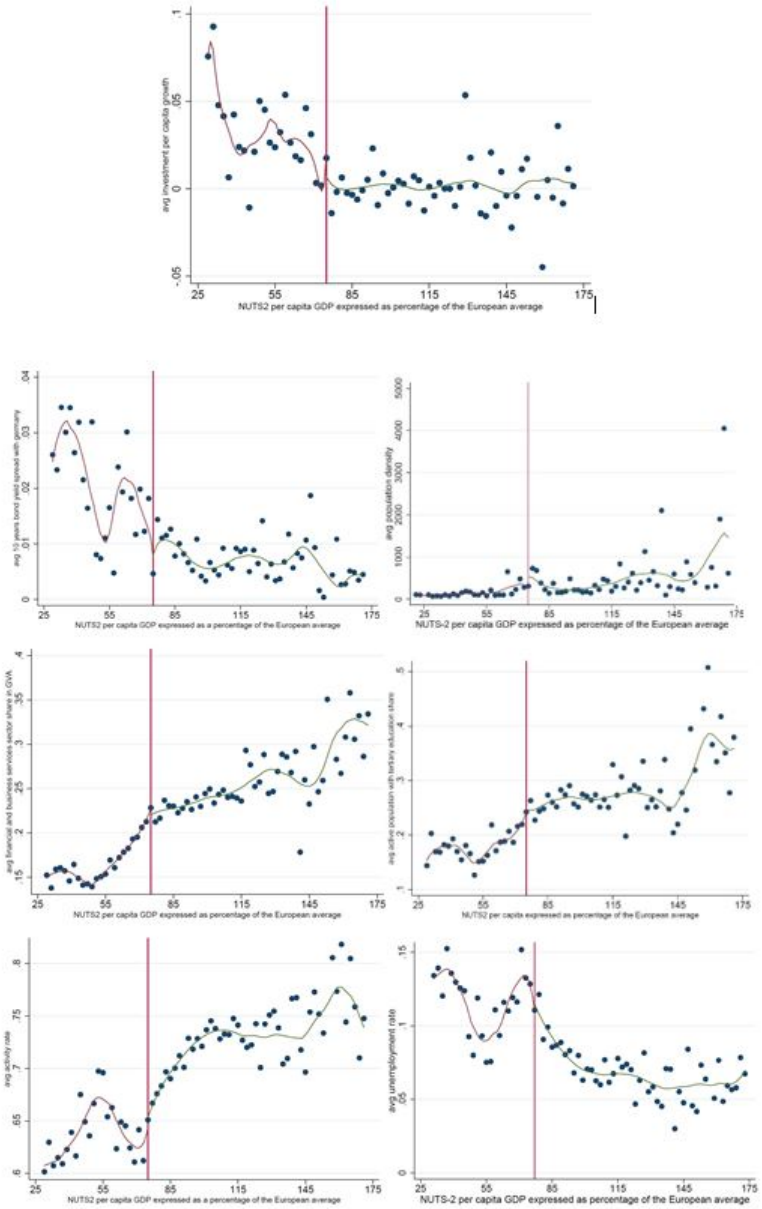

Figure A2.1 – Discontinuity of per capita investment growth and absence of discontinuity of the covariates at the threshold level

Notes: The graph shows the covariates used in the analysis plotted on the forcing variable with averaged pooled data of programming periods 2000-06, 2007-13 and the period 2014-16.

Source: Own elaboration based on data from European Commission.

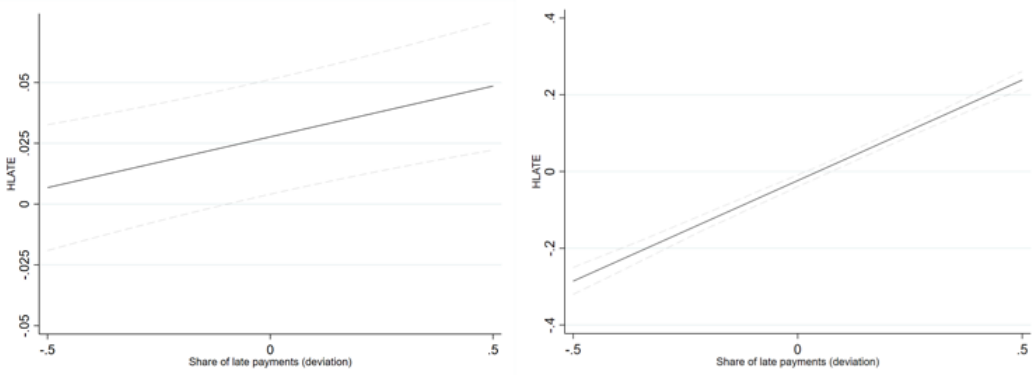

Figure A2.2 – HLATE and regional per capita investment growth for different levels of the share of late EU payments.

Notes: The solid line illustrates the point estimates, the dashed lines represent the 95 percent confidence intervals. The confidence intervals are derived from bootstrapped standard errors with 100 replications.
Source: Own elaboration.

Table A2.1 – Variables definition and data sources

Variable	Variable definition	Source
GDP per capita growth	An annual averaged percentage variation of current GDP per capita in PPS calculated as the difference between the log GDP per capita in PPS and its lagged value for a given MFF (Multi-annual Financial Framework).	Author's calculations based on Eurostat and Cambridge Econometrics if missing data from Eurostat
Investment per capita growth	An annual averaged percentage variation of regional current gross fixed capital formation (GFCF) per capita in PPS calculated as the difference the log GFCF per capita in PPS and its lagged value for a given MFF.	Author's calculations based on Eurostat and Cambridge Econometrics if missing data from Eurostat
Objective 1 status	An averaged dummy variable being equal to 1 if a region receives actually the Objective 1 treatment for a given MFF.	Official Journal of the European Communities L, 194, Volume 53, 27.7.1999 (2000-06) and L, 243, Volume 44, 6.9.2006 (2007-13)
Late EU real payments	An averaged share of the allocated budget of a given MFF that has actually been spent after the last year of this given MFF.	Authors' calculations based on Lo Piano et al. (2017)
Relative GDP per capita	A share of regional GDP per capita in PPS relatively to the European average. (i) Years 1994-96 for the MFF 2000-06 (97-99 for new countries), (ii) years 2000-02 for the MFF 2007-13 and (iii) years 2007-09 for MFF 2014-16.	Authors' calculations based on Eurostat
Spread Germany (GBYS)	An annual averaged difference in percentage between a region's national 10 year bond and the German one for a given MFF.	Authors' calculations based on Eurostat
Activity rate	An annual averaged regional share of the population employed and unemployed for a given MFF.	Cambridge Econometrics
Unemployment rate	An annual averaged regional share of the population unemployed for a given MFF.	Cambridge Econometrics
Population density	An annual averaged number of inhabitants per squared km for a region in a given MFF.	Cambridge Econometrics
Tertiary education	An annual averaged regional share of the active population with tertiary education for a given MFF.	Cambridge Econometrics
Manufacturing sector	An annual averaged regional share of the manufacturing sector in the regional gross added value for a given MFF.	Cambridge Econometrics
Financial and business services sector	An annual averaged regional share of the financial and business services sector in the regional gross added value for a given MFF.	Cambridge Econometrics

Sources: Own elaboration.

Table A2.2 – Objective 1, late payments and regional Investment per capita growth– heterogeneous local average treatment effect (HLATE) (IV second stage estimates) and panel fixed-effects.

	(1) HLATE 25%	(2) HLATE 25%	(3) HLATE 50%	(4) HLATE 50%	(5) Panel FE	(6) Panel FE
GDP per capita	-0.147	-0.153	-0.071	-0.074	-0.078***	-0.078***
	(0.248)	(0.241)	(0.054)	(0.053)	(0.025)	(0.025)
Objective 1	0.001	-0.016	0.022	-0.014	0.034*	-0.005
	(0.052)	(0.040)	(0.021)	(0.013)	(0.020)	(0.021)
Late payments	-0.020	-0.000	-0.014	-0.000	-0.011	0.002
	(0.023)	(0.031)	(0.014)	(0.016)	(0.010)	(0.011)
Objective 1* Late payments	0.063**	0.041	0.056***	0.045**	0.038***	0.024
	(0.031)	(0.037)	(0.020)	(0.022)	(0.015)	(0.016)
Late $payments^2$		-0.010		-0.052		-0.075***
		(0.084)		(0.038)		(0.026)
Objective 1* Late $payments^2$		0.176		0.127*		0.260***
		(0.132)		(0.065)		(0.041)
Density	0.052	0.052	0.034	0.030	0.065	0.153
	(0.063)	(0.061)	(0.049)	(0.050)	(0.020)	(0.287)
Unemployment	-0.158	-0.111	-0.169*	-0.134	0.264**	0.236**
	(0.126)	(0.121)	(0.094)	(0.094)	(0.119)	(0.113)
Activity	-0.029	-0.000	-0.050	-0.029	0.029	-0.057
	(0.082)	(0.084)	(0.064)	(0.064)	(0.116)	(0.118)
Financial sector	-0.055	-0.032	-0.048	-0.040	-0.234	-0.149
	(0.110)	(0.119)	(0.070)	(0.071)	(0.212)	(0.211)
Manufacturing sector	0.033	0.045	0.052	0.059	0.223*	0.372***
	(0.047)	(0.049)	(0.037)	(0.038)	(0.117)	(0.121)
Tertiary education	0.116*	0.103	0.161***	0.158***	0.322***	0.320***
	(0.067)	(0.070)	(0.042)	(0.044)	(0.065)	(0.069)
Spread Germany (GBYS)	-0.781***	-0.855***	-0.710***	-0.751***	-1.456***	-1.459***
	(0.243)	(0.240)	(0.196)	(0.199)	(0.266)	(0.271)
Constant	0.020	0.031	0.014	0.019*	0.029	0.056**
	(0.031)	(0.026)	(0.012)	(0.011)	(0.020)	(0.022)
R^2	0.230	0.229	0.220	0.223	0.357	0.373
Weak instruments	2.954*	4.242	19.180	20.681	28.327	18.946
Durbin Endogeneity	0.537	0.954	1.914	2.265	4.887*	15.571***
Wu-Hausman Endogeneity	0.245	0.293	0.909	0.723	1.765	3.792***
Regional fixed effects	NO	NO	NO	NO	YES	YES
Observations	219	219	394	394	732	732

Notes: This table reports results from the two stage least square estimation of the HLATE with a sample restricted to 12.5% (columns (1)-(2)) and 25% (columns (3)-(4)) around the 75% threshold of the forcing variable (GDP per capita). The forcing variable is the relative GDP per capita of 1996-98 (97-99) for years 2000-06, 2000-02 for years 2007-13 and 2007-09 for years 2014-16. The two stage least square (panel IV) estimation using regional fixed-effects are reported in columns (5) and (6) using the full sample. The dependent variable presents regional Investment per capita growth.

Robust standard errors are reported in parentheses. *p < 0.1, **p< 0.05, ***p< 0.01.

Source: Own calculations based on data from European Commission, Cambridge Econometrics and Eurostat.

Table A2.3 – Objective 1, late payments and outcome variables– Simultaneous-quantile regressions.

	(1) First quartile GDP growth	(2) First quartile GDP growth	(3) First quartile Inv growth	(4) First quartile Inv growth	(5) Fourth quartile GDP growth	(6) Fourth quartile GDP growth	(7) Fourth quartile Inv growth	(8) Fourth quartile Inv growth
GDP per capita	-0.075***	-0.087***	-0.0308	-0.051	-0.045***	-0.037***	-0.094**	-0.080**
	(0.026)	(0.022)	(0.037)	(0.047)	(0.011)	(0.013)	(0.038)	(0.039)
Objective 1	0.004	-0.011	0.207	-0.002	0.012**	0.008	0.020	0.013
	(0.009)	(0.013)	(0.018)	(0.018)	(0.005)	(0.007)	(0.020)	(0.016)
Late payments	-0.037***	-0.032***	-0.025*	-0.018	0.000	-0.004	-0.004	-0.005
	(0.012)	(0.010)	(0.013)	(0.019)	(0.004)	(0.003)	(0.011)	(0.011)
Objective 1* Late payments	0.050***	0.038***	0.057***	0.036	0.002	0.005	0.024	0.016
	(0.016)	(0.0137)	(0.018)	(0.027)	(0.006)	(0.005)	(0.024)	(0.013)
Late $payments^2$		-0.028		-0.048		0.030***		0.073
		(0.035)		(0.040)		(0.010)		(0.016)
Objective 1* Late $payments^2$		0.098*		0.167**		0.009		0.073
		(0.052)		(0.083)		(0.020)		(0.069)
Density	0.004*	0.005*	-0.009	0.007	0.006	0.008	-0.004	0.006
	(0.002)	(0.002)	(0.059)	(0.050)	(0.014)	(0.017)	(0.040)	(0.028)
Unemployment	-0.134**	-0.088	-0.323***	-0.293***	-0.096**	-0.094***	-0.061	-0.063
	(0.061)	(0.086)	(0.120)	(0.102)	(0.041)	(0.025)	(0.101)	(0.130)
Activity	-0.018	-0.008	-0.117	-0.101	-0.005	0.014	0.041	0.081
	(0.031)	(0.040)	(0.096)	(0.064)	(0.028)	(0.017)	(0.067)	(0.059)
Financial sector	-0.013	0.016	-0.027	-0.002	-0.045	-0.041	-0.259***	-0.232***
	(0.052)	(0.062)	(0.066)	(0.091)	(0.031)	(0.027)	(0.058)	(0.062)
Manufacturing sector	0.047	0.056**	0.029	0.081	0.013	0.010	-0.067**	-0.079**
	(0.033)	(0.028)	(0.039)	(0.064)	(0.018)	(0.014)	(0.030)	(0.038)
Tertiary education	0.070**	0.080***	0.094	0.108***	0.080***	0.074***	0.165***	0.171***
	(0.032)	(0.026)	(0.057)	(0.038)	(0.025)	(0.019)	(0.042)	(0.045)
Spread Germany (GBYS)	-0.636***	-0.774***	-1.500***	-1.481***	-0.338**	-0.323***	-0.167	-0.170
	(0.116)	(0.111)	(0.230)	(0.308)	(0.134)	(0.066)	(0.281)	(0.300)
Constant	0.024***	0.027***	-0.017*	-0.009	0.042***	0.038***	0.041***	0.033***
	(0.005)	(0.004)	(0.010)	(0.008)	(0.003)	(0.003)	(0.009)	(0.008)
R^2	0.237	0.249	0.199	0.209	0.205	0.220	0.160	0.179
Observations	394	394	394	394	394	394	394	394

Notes: This table reports results from quantile regressions and contains an estimate of the VCE via bootstrapping, the VCE includes between-quantile blocks. The dependent variable presents regional per capita GDP growth (columns (1)-(2)-(5)-(6)) and investment per capita growth (columns (3)-(4)-(7)-(8)). The estimations are conducted on regions having a GDP per capita between 50% and 100% of the European average. Robust standard errors are reported in parentheses. *p < 0.1, **p< 0.05, ***p< 0.01.
Source: Own calculations based on data from European Commission, Cambridge Econometrics and Eurostat.

Table A2.4 – Objective 1, late payments and outcome variables– Objective 1 treatment intensity.

	(1) Low intensity	(2) Low intensity	(3) High intensity	(4) High intensity
GDP per capita	-0.108***	-0.081	-0.063**	-0.080***
	(0.027)	(0.069)	(0.025)	(0.026)
Objective 1	0.031	-0.375	0.029**	0.013
	(0.021)	(0.735)	(0.013)	(0.013)
Late payments	-0.018***	-0.023***	0.013	0.012
	(0.007)	(0.008)	(0.011)	(0.013)
Objective 1* Late payments	-0.419	9.612	-0.003	-0.005
	(0.579)	(18.040)	(0.012)	(0.014)
Late $payments^2$		-0.003		-0.019
		(0.021)		(0.030)
Objective 1* Late $payments^2$		37.519		0.083**
		(69.360)		(0.034)
Density	-0.015	-0.012	-0.002	-0.005
	(0.015)	(0.016)	(0.020)	(0.020)
Unemployment	-0.615**	-0.504**	0.107	0.074
	(0.308)	(0.246)	(0.065)	(0.067)
Activity	-0.341**	-0.993	0.005	-0.048
	(0.116)	(1.203)	(0.089)	(0.089)
Financial sector	0.375	0.004*	0.209	0.276*
	(0.318)	(0.514)	(0.161)	(0.162)
Manufacturing sector	0.382***	0.815	0.218**	0.289***
	(0.076)	(0.726)	(0.092)	(0.094)
Tertiary education	0.249***	0.383	-0.008	0.039
	(0.067)	(0.258)	(0.051)	(0.054)
Spread Germany (GBYS)	0.130	0.441	-0.801***	-0.846***
	(0.409)	(0.785)	(0.134)	(0.135)
Constant	0.025***	0.042***	0.012	0.034**
	(0.006)	(0.026)	(0.016)	(0.016)
Weak instruments	8180.850***	4042.240***	12.911***	8.521***
Durbin Endogeneity	3.579	2.058	10.941***	13.015***
Wu-Hausman Endogeneity	4.512**	0.543	3.319*	3.090**
R^2	0.421	0.507	0.501	0.527
Observations	366	366	366	366

Notes: This table reports results from the two stage least square (panel IV) estimation using regional fixed-effects. Objective 1 treatment intensity is lower than its median value (0.15 % of GDP per capita) in columns (1)-(2) and higher in (columns (3)-(4)). The dependent variable presents regional GDP per capita growth. Robust standard errors are reported in parentheses. *p < 0.1, **p< 0.05, ***p< 0.01.
Source: Own calculations based on data from European Commission, Cambridge Econometrics and Eurostat.

Chapter 3

"The winner takes it all" or a story of the optimal allocation of the European Cohesion Fund

This chapter is co-authored with
Phu Nguyen-Van and Thi Kim Cuong Pham.

Summary

This third chapter aims to determine an optimal allocation of the European Cohesion Fund (ECF) and compares it with the observed allocation. This optimal allocation is the solution of a donor optimisation problem which maximises recipient countries' GDP per capita to achieve economic convergence in the EU. Compared to the observed allocation, our solution can identify the recipient countries that can benefit from higher ECF transfers than the observed levels, as those having low relative GDP per capita, large population size and where the ECF has a strong capacity to support economic growth. Results are robust to changes in the specification of the donor's utility function.

Acknowledgments

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3.1 Introduction

One serious challenge of the European Union (EU) is the integration of the former socialist and Southern Mediterranean economies.[1] As it is indicated in Figure 2.1, relatively to the EU's average, some countries such as Greece, Portugal and Cyprus have a lower GDP per capita in 2015 than in 2007. As well, some Eastern European countries as Slovenia or Estonia are concerned, their significant trade linkages with the Euro area made them deeply exposed to the last European economic crisis.

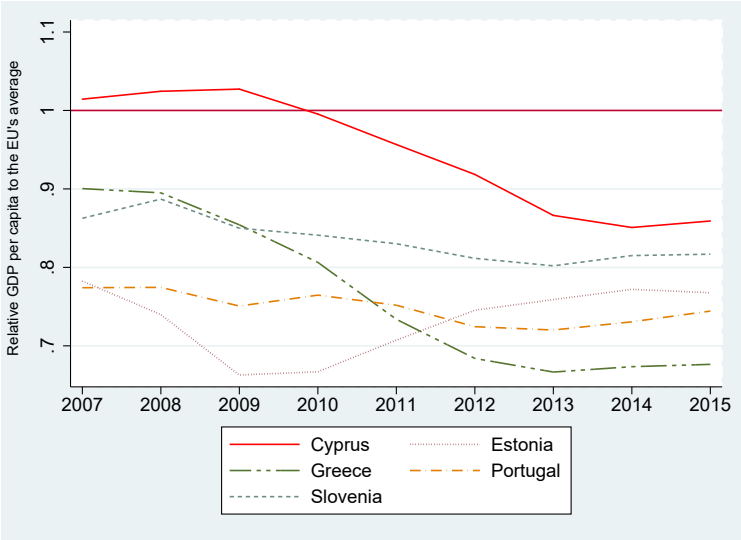

Figure 3.1 – ECF recipient countries having lower relative GDP per capita in 2015 than in 2007

Notes: Graph from authors. Source: Eurostat.

In 1994, the EU launched the European Cohesion Fund (ECF) to make the European economic integration be successful. This fund is targeted to member countries having a GDP per capita lower than 90% of the EU's average, measured in purchase power parity (PPP). Being part of the EU requires sound fiscal policies as public debt was limited to 60% of GDP by the accession criteria for countries applying for the EU membership. As well, since 1997, actual member countries are not allowed to have too high deficit and national debt levels because of the Stability and Growth Pact (SGP) which limits public debt up to 60% of GDP and budget

[1] The integration process started in the 1980s for Greece, Spain and Portugal, the emphasis was put on the Eastern European countries from February 1992 with the adoption of the Maastricht Treaty. The latter increased substantially the financial resources for cohesion policy leading to the future creation of the European Cohesion Fund (ECF). In June 1993, the Copenhagen Council resulted in the announcement of the accession criteria to be a member State of the EU.

deficit to 3% of GDP. Concerning the poor EU's economies, the ECF alleviates the trade-off between fiscal discipline and the financing of economic development: this fund pushes public investment projects funding up to 85% of the total cost (additionality principle).

The expenditures of the ECF could be considered as productive public expenditures *à la Barro (1990)*. As a matter of fact, one half of the fund is allocated towards transport infrastructures to establish the Trans-European Transport Networks (TTN) and the remaining haft are concentrated on environmental infrastructures. The ECF's expenditures are even classified as "investment grants" under the European System of Accounts (ESA 1995 and 2000). The productive nature of the ECF leads to suppose that this European fund stimulates recipient countries' economic growth and helps to fasten economic convergence in the EU. The ECF is about €63 billion (in 2014 prices) for the programming period 2014-2020. Figure Figure 2.1 displays that Poland gets the lion's share with more than 36% of the total available amount. The two poorest countries of the EU, Romania and Bulgaria, get 16% of the total amount. Small and wealthy countries such as the Baltics (Estonia, Latvia and Lithuania), Slovenia and the Slovak Republic get significant shares though: they account for about 15% of the total amount.

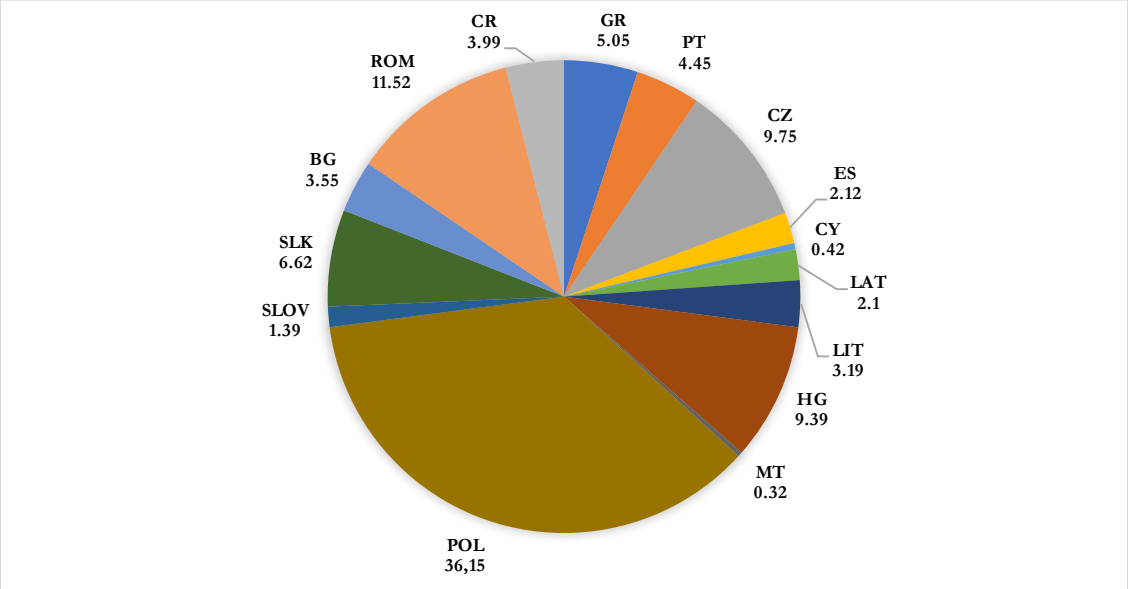

Figure 3.2 – ECF observed allocation (period 2014-2020)

Notes: Graph from authors. Source: European Commission.

Regarding the ongoing strong budget constraints affecting the European budget, we wonder whether the ECF could be allocated in a better way to foster the

economic convergence in the EU. The EU cohesion policy results in transfers between a global donor i.e. the European Commission, and some recipient countries.[2] Moreover, some criticism was addressed to the way European structural funds (SF) are allocated between recipient countries, which affects the global effectiveness of the European cohesion policy (Cappelen et al. (2003), Rodríguez-Pose & Fratesi (2004), Ederveen et al. (2006), Becker (2012), Mendez et al. (2013*b*), Tomova et al. (2013), Rodríguez-Pose & Garcilazo (2015), Huliaras & Petropoulos (2016), Crescenzi & Giua (2016)). However, there was no suggestion about an allocation of SF able to maximise the impact of the European cohesion policy on economic growth in order to promote economic convergence. Through a normative approach, our study fills this gap by providing an optimal allocation of the ECF and compare the latter with the observed one.

In this chapter, we posit a theoretical problem where an altruistic donor chooses an allocation of ECF to maximise the global welfare of recipient countries. Our analysis is implemented in two steps: First, we estimate the ability of the ECF to stimulate GDP per capita thanks to a growth equation using data covering the 15 ECF recipient countries for the period 1995-2015. Based on GMM estimation, we find that the ECF mostly has a conditional effect on growth, depending on recipient countries' national debt and inflation levels. Second, thanks to the estimation results of the growth equation, we run simulations of the ECF's optimal allocation which corresponds to the solution of the donor's optimisation problem. Our results indicate that the ECF should be concentrated on poor countries having a large population, and where the ECF has a strong ability to promote economic growth (i.e. low inflation and low public debt). More precisely, the findings suggest to shift the ECF away from small and wealthy countries (such as the Czech Republic, Malta, Cyprus, Slovenia or the Slovak Republic) and concentrate the fund on bigger, poorer and more efficient countries (Poland and Romania). This result is robust to changes in the specification of the donor's utility function.

The remaining of the chapter is structured as follows. Section 2 discusses the related literature on the conditional effectiveness of financial transfers between donors and recipient countries focusing on foreign aid and European structural funds. Section 3 provides the theoretical framework where the donor's problem and its solution are exposed. Section 4 describes the data of the growth equation, and presents estimation results. Section 5 is related to the simulation of the optimal

[2]The EU cohesion policy is based on five European structural funds (SF) that are the European regional development fund (ERDF), the European social fund (ESF), the European cohesion fund (ECF), the European agricultural fund for rural development (EAFRD), and the European maritime and fisheries fund (EMFF).

allocation of the ECF and policy implications regarding the observed allocation of the fund. We finally conclude our study in Section 6 and provide some research perspectives.

3.2 Related literature

The discussion about the effectiveness of ECF can be based on the previous works on foreign development aid. One major issue highlighted by this literature is the conditional effectiveness of financial transfers between donors and recipient countries. In their seminal chapter, Burnside & Dollar (2000) found that foreign aid has a positive effect on growth only in recipient countries which have good fiscal, monetary and trade policies. Collier & Dollar (2002) used the World Bank's Country Policy and Institutional Assessment (CPIA) as a measure of policy quality and showed that aid may promote economic growth and reduce the poverty in recipient countries if the quality of their policies is sufficiently high. Guillaumont & Chauvet (2001) and Chauvet & Guillaumont (2009) indicated that the marginal effect of aid on growth is conditional on the recipient countries' economic vulnerability, i.e. the marginal effect of aid on growth is an increasing function of economic vulnerability.

Regarding European structural funds (SF), an important literature underlined their conditional impact on economic growth (Cappelen et al. (2003), Rodríguez-Pose & Fratesi (2004), Ederveen et al. (2006), Becker (2012), Mendez et al. (2013*b*), Tomova et al. (2013), Rodríguez-Pose & Garcilazo (2015), Huliaras & Petropoulos (2016), Crescenzi & Giua (2016)). The quality of institutions or government are key variables driving this conditional effectiveness (Ederveen et al. (2006), Becker (2012), Rodríguez-Pose & Garcilazo (2015)). Ederveen et al. (2006) used trade openness as a proxy for institutional quality considering that the more a country is open, the more it is under trade competition, which increases the pressure for an efficient use of SF. They found that the impact of the ERDF on economic growth positively depends on the level of trade openness.

As well, Becker (2012) concluded that regions with poorer governance and lower levels of education fail to make good use of EU transfers. Rodríguez-Pose & Garcilazo (2015) emphasised that SF's impact on GDP in regions receiving more than €150 per capita, which is the case of most of the Eastern European regions, is purely conditioned by the quality of government. Other studies pointed

out low planning capacity, inefficient bureaucratic procedures and lack of experienced staff as factors delaying decisions and thwarting outcomes (Cappelen et al. (2003), Rodríguez-Pose & Fratesi (2004)). These issues refer to the importance of administrative capacity in determining the ability of SF to promote economic growth. Mendez et al. (2013*b*) defined administrative capacity as the capacity of national and regional institutions to design robust strategies, to allocate resources and to administer EU funding efficiently. In a study focused on Greece, Huliaras & Petropoulos (2016) described the consequences of a weak administrative capacity and bad quality of government: As with foreign aid, SF in Greece have ended up supporting a bloated bureaucracy, strengthening patronage patterns and reinforcing clientelistic networks. They also had a negative impact on incentives. They were treated by Greek government officials as an external rent, rather than a support for domestic efforts.

Other variables as sound fiscal and macroeconomic policies (Tomova et al. (2013)) or favourable socio-economic conditions (Crescenzi & Giua (2016)) are as well mentioned by the literature. More precisely, Tomova et al. (2013) showed that sound fiscal policies (proxied by low levels of government debt and deficit) and sound macroeconomic policies (proxied by low levels of net foreign liabilities) are beneficial to ESF's efficiency. Crescenzi & Giua (2016) found that the relationship between Regional Policy funding and regional growth is the strong and positive in areas with favourable socio-economic conditions (proxied by the social filter index).

3.3 A theoretical framework for the ECF optimal allocation

Our theoretical framework is based on the literature of foreign aid allocation where a normative approach is used in order to determine its optimal allocation (Burnside & Dollar (2000), Collier & Dollar (2001), Llavador & Roemer (2001), Collier & Dollar (2002), Cogneau & Naudet (2007), Carter (2014)). In their seminal works, Collier & Dollar (2001, 2002) proposed an optimal aid allocation maximising a social welfare function which is the sum of utilities of aid-recipient countries. A country's utility is measured in terms of number of poor reduced thanks to economic growth. The latter is in turn influenced by aid, institutional quality, and policy quality. Consequently, the aid allocation reducing the poverty is determined by the initial poverty of recipient countries and the aid effectiveness which depend on the recipient

countries' institutional quality, and their policy quality.

Related to this literature, we use a theoretical framework to determine an optimal allocation of the ECF. This fund is a financial assistance designed to take the challenge of the European economic convergence by increasing EU lagging countries' GDP per capita. We assume that an altruistic donor maximises the sum of recipient countries' utilities. In the case of the ECF, the donor is represented by the European Commission which decides how the ECF is allocated among recipient countries, i.e countries having a GDP per capita lower than 90% of the EU's average.[3]

We assume that, for each recipient country i, its utility depends on the extent of its economic gap relatively to the EU, i.e the ratio between its own GDP per capita y_i and 90% of the EU's average, (noted as $0.9\overline{y}$). We assume that y_i depends on the ECF transfers A_i. The term $0.9\bar{y}$, indicating 90% of the EU's average GDP per capita, is assumed constant and taken as given by recipient countries. As well, we exclude the case of $y_i > 0.9\overline{y}$: otherwise, a recipient country would not be eligible anymore for the ECF.[4] We assume that the European Commission, thanks to the ECF, intends to maximise recipient countries' GDP per capita relatively to the EU's average. For a sake of simplicity, we consider a CRRA function as follows:

$$U\left(\frac{y_i}{0.9\bar{y}}\right) = \frac{1}{1-\sigma}\left(\frac{y_i(A_i)}{0.9\bar{y}}\right)^{1-\sigma} \tag{3.1}$$

where $\sigma = \frac{-U''(R)}{RU'(R)}$, with $R \equiv \frac{y_i}{0.9\bar{y}}$, is interpreted as the donor's aversion to the gap R between recipient countries GDP and the EU's average GDP per capita. In other words, σ may be interpreted as the donor's aversion to the recipient countries' poverty compared to the EU's average GDP per capita. As σ increases, the altruistic donor is more concerned with recipient countries having low relative GDP per capita. U is increasing and concave with y_i, i.e. $U_{y_i} > 0$ and $U_{y_i y_i} \leq 0$.

The donor chooses then the optimal ECF allocation maximising the sum of utilities of n recipient countries:

$$\max_{\{A_i\}_{i=1}^n} \sum_{i=1}^n \alpha_i U\left(\frac{y_i(A_i)}{0.9\bar{y}}\right) \qquad (P)$$

s.t.

$$\sum_{i=1}^n A_i N_i \leq \bar{A} \tag{3.2}$$

$$A_i \geq 0, \forall i = 1, 2, ..., n \tag{3.3}$$

[3]It should be mentioned that the ECF is in fact mostly funded by Western European countries. These countries are above the 90% threshold, which makes them be net contributors to the European budget.

[4]For instance, Ireland and Spain have been excluded from the list of beneficiaries respectively in 2003 and 2013 because of their GDP per capita levels higher than 90% of the EU average .

where α_i corresponds to the weight of each recipient country in the utility function of the donor. In our analysis, we consider that α_i is the demographic weight of recipient country i in the total population of all recipient countries. N_i is the total population of recipient country i, A_i is the ECF transfer to country i in terms of percentage of its GDP, and $A_i N_i$ corresponds to the ECF amount received by country i. (Eq. 2.2) represents the constraint of funds availability where $\bar{A}$ is the total available amount. The constraint on the positiveness of the ECF transfers is given by (Eq. 2.3) .

The Lagrangian of the optimisation problem (P) is:

$$L(A_i, \lambda, \mu_i) = \sum_{i=1}^{n} \alpha_i U\left(\frac{y_i(A_i)}{0.9\bar{y}}\right) + \lambda\left(\bar{A} - \sum_{i=1}^{n} A_i N_i\right) + \sum_{i=1}^{n} \mu_i A_i, \tag{3.4}$$

where and λ and μ_i are the Lagrange multipliers of constraints (2) and (3), respectively. A solution of the model $(\hat{A}_1, \hat{A}_2, ..., \hat{A}_n)$, $\hat{\lambda}$ and $\hat{\mu_i}$ must satisfy the following first order conditions (FOCs), $\forall i = 1, ..., n$:

$$\frac{\partial L(\hat{A})}{\partial \hat{A}_i} = -\hat{\lambda} N_i - \hat{\mu_i} + \alpha_i U_y y_A = 0, \tag{3.5}$$

$$\sum_{i=1}^{n} N_i \hat{A}_i = \bar{A}, \tag{3.6}$$

$$\hat{\mu_i} \geq 0, \hat{A}_i \geq 0. \tag{3.7}$$

where U_y denotes the marginal utility of GDP per capita and y_A the marginal effect of the ECF on GDP per capita. (Eq. 2.7) corresponds to the complementarity condition between $\hat{A}_i$ and $\hat{\mu_i}$. For a country i receiving a strictly positive ECF amount $\hat{A}_i > 0$, we have $\hat{\mu_i} = 0$. On the opposite, if $\hat{A}_i = 0$, we must have $\hat{\mu_i} > 0$.

If we consider the case of a country receiving a strictly positive ECF amount, i.e. $\hat{A}_i > 0$ and $\hat{\mu_i} = 0$, (Eq. 2.5) gives us the optimal value of λ:

$$\hat{\lambda} = \alpha_i \frac{U_y(y_i(A_i)) y_A(A_i)}{N_i}, \forall i = 1, ..., n \text{ such that } \hat{A}_i > 0 \tag{3.8}$$

This expression gives the value for $\hat{\lambda}$ which equalises the right hand side term in over all the ECF recipient countries at the optimal solution of the optimisation program (P). As $\hat{\lambda}$ stands for the shadow value of the ECF, it represents the marginal benefit of one extra-unit of ECF expressed in utility units. This equality shows that, when the optimisation problem is solved, the marginal cost of one extra-unit of ECF is the same as its marginal benefit for every recipient countries. If we now consider only the case of a country j receiving no ECF transfer $(A_j = 0)$, we obtain the following

conditions:

$$\hat{\mu_j} = \hat{\lambda} N_i - \alpha_j U_y(y_i(A_i)) y_A(A_i), \forall j = 1, ..., n \text{ such that } \hat{A}_j = 0 \tag{3.9}$$

The results above can be summarised in the following proposition:

Proposition 1. *Considering the donor's optimisation program (P), the ECF optimal allocation* $\{\hat{A}_i\}_{i=1}^n$ *must respect the three following conditions:*

1. $\hat{A}_i > 0$ *if* $\hat{\lambda} = \alpha_i \dfrac{U_y(y_i(A_i)) y_A(A_i)}{N_i}$ *and* $\hat{\mu}_i = 0$,
2. $\hat{A}_j = 0$ *if* $\hat{\mu_j} = \hat{\lambda} N_j - \alpha_j U_y(y_i(A_i)) y_A(A_i)$, *and* $\hat{\mu}_j > 0$,
3. $\sum_{i=1}^n \hat{A}_i N_i = \bar{A}$.

where $\hat{\lambda}$ *is the multiplier associated to the total amount of ECF, and* $\hat{\mu_i}$ *is the multiplier associated to the positiveness of recipient countries' ECF transfers.*

The second derivative of U_i with respect to $\hat{A}_i$ is :

$$\frac{\partial^2 U(\hat{A_i})}{\partial \hat{A_i}^2} = U_{yy} y_A^2 + y_{AA} U_y, \tag{3.10}$$

where U_{yy} is the second derivative of U with respect to y_i and y_{AA} is the second derivative of y_i with respect to A_i. As the budget constraint is linear with respect to A_i, this second derivative of U_i must be non positive to ensure the existence of a solution. Thus, from (Eq. 2.10), the following condition should be satisfied:

$$\frac{y_{AA}}{y_A^2} \leq -\frac{U_{yy}}{U_y}. \tag{3.11}$$

The right-hand side term of equation (11) is always positive because of the increasing and concave utility function with respect to GDP per capita. However, we do not know the sign of the left-hand side term of (Eq. 2.11). An empirical estimation of the growth equation will allow us to conclude whether there exists a solution with real data. This will be the object of the following section. More precisely, we consider the role of the ECF and other factors being likely to affect recipient countries' GDP per capita such as the quality of macroeconomic management and institutions. We will see that estimation results satisfy (Eq. 2.11), leading to the existence of a solution of the optimisation problem. The estimation results of this growth equation will then be employed to make simulations of the ECF's optimal allocation, the latter being the solution of the donor's optimisation program (P).

3.4 Estimation of the growth equation

3.4.1 Determinants of economic growth

This subsection describes the set of variables employed in our growth equation. We first consider some relevant exogenous factors able to explain recipient countries' growth such as geographical localisation and history after World War Two (WW2). Concerning the former, De Menil (2003) underlined the importance of being close to a EU-15 country to explain the satisfying growth performances of Poland, Hungary and the Czech Republic during the 1990s. These authors argued that this favourable localisation lowered the political cost of implementing market oriented structural reforms, citizens being more directly confronted to Western European high living standards. As well, Bevan & Estrin (2004) stressed the role of localisation on foreign direct investment inflows (FDI) for Poland and the Czech Republic. These countries have greatly benefited from the European integration by becoming part of the German supply chain (Hinterland) since being a neighbour of Germany helped reducing their transactions costs.[5] Regarding the history of ECF recipient countries after WW2 , we focus on countries having experienced a socialist era and the length of this period or *market memory*, as it has been called by De Melo et al. (2001) in order to capture the lack of familiarity with market institutions. These authors found that the initial degree of macroeconomic distortions caused by central planning has an adverse impact on current economic performance.

One other determinant of GDP per capita is the level of economic freedom (Goldsmith (1995), Dawson (2003)).[6] It has been observed that the former socialist countries that joined the EU as soon as 2004 are those which implemented a so-called *shock therapy* to increase the level of national economic freedom.[7] Pitek et al. (2013) found that moderate government spending, high monetary and investment freedoms have been significant determinants of economic growth between 1990 and 2008 in Eastern European countries. Besides, Dell'Anno & Villa (2013) analysed the impact of the speed of these reforms on economic growth and found that the contemporaneous speed of transition lowers current economic growth, but the impact becomes positive in the medium-long run.[8] Therefore, we could expect that countries having

[5]Transports and communication costs, costs of dealing with a different language, informational costs and those related to sending personnel abroad.

[6]Economic freedom is based on the security of property rights, the ability to trade with any domestic or foreign entity and the extent of property confiscation through the taxation and inflation levels.

[7]We refer to Poland, the Czech and Slovak republics, the Baltics, Hungary and Slovenia.

[8]See also Aghion & Blanchard (1994) who estimated that the past level of reforms leads to higher economic growth and this effect reaches its greatest value with a lag of 3 years.

implemented significant market reforms would benefit from higher GDP per capita.

We finally estimate the impact of the ECF on GDP per capita, i.e y_A and y_{AA} from condition (11), in order to check the existence of a solution to our optimisation problem (P). Referring to the literature dealing with the European cohesion policy, we study the ECF's conditional impact on GDP per capita. As Ederveen et al. (2006), Becker (2012), Rodríguez-Pose & Garcilazo (2015), Crescenzi & Giua (2016), these conditioned factors correspond to quality of institutions and government.

Moreover, we consider macroeconomic management conditions as in Tomova et al. (2013). We put an emphasis on public debt because of the crowding-out effect that may rise from an excessive public debt level regarding the ECF's ability to promote economic growth. As a matter of fact, high public debt could be harmful to the ECF's economic performance because of the *additionality principle*. This rule related to EU cohesion policy make ECF recipient country's managing authority provide, at least, the remaining 15% of a project's cost. If it does so with additional debt, the initial positive effects on growth could be offset because of a crowding-out effect arising with a high initial national debt level. In other words, countries respecting the SGP should be those where SF are the most efficient. Note that the EU condemns slack budget discipline since European transfers could be suspended following an excessive deficit procedure that can be launched by the European Commission.[9] We therefore expect that high public debt levels will be detrimental to the ECF's marginal effect on GDP per capita.

In a nutshell, the conditional effect of the ECF on GDP per capita will be studied through the inclusion of interaction terms between the ECF and variables dealing with macroeconomic management, quality of institutions and government. The following section deals with the specification of the growth equation.

3.4.2 Econometric specification

Our growth equation is estimated by using a panel data framework (Islam (1995), Caselli et al. (1996)). To avoid business cycles effects, we use 4-years average data for all variables excepted GDP per capita and its lagged value. We use current GDP per capita and its lagged values from observations with a 4 years interval, i.e. 1995, 1999, 2003, 2007, 2011 and 2015. Concerning explanatory variables, we use their

[9]Member States which run excessive budget deficits of more than 3% of GDP, or which fail to reduce their excessive debts (above 60% of GDP) at a sufficient pace, follow a particular set of rules known as the Excessive Deficit Procedure (EDP). A suspension of the Cohesion funds commitments could then be decided if the qualified majority is obtained following a vote of the European Council. See EU regulation 1303/2013, article 23, *Measures linking effectiveness of ESI funds to sound economic governance.*

average values over the following 4 years periods: 1995-1998, 1999-2002, 2003-2006, 2007-2010 and 2011-2014. The resulting data are an unbalanced panel data sample covering 17 countries and period 1995-2015 (5 waves of 4 years intervals).[10]

Our dependent variable is the log real GDP per capita in international prices PPP 2011 ($y_{i,t}$). We assume that the latter depends on its lagged value ($y_{i,t-1}$). GDP per capita of country i in period t also depends on the log of ECF per capita ($A_{i,t}$) expressed in international prices PPP 2011. We then consider one dummy variable related to geographical location (Geo_i) and one variable indicating the number of years under socialism after WW2, ($Socialism_i$). As well, we assume that GDP per capita depends on levels of economic freedom ($Efreedom_{i,t}$), inflation ($Inflation_{i,t}$), national debt ($Debt_{i,t}$) and its squared term ($Debt^2_{i,t}$) to capture a non linear effect *à la Reinhart and Rogoff (2010)*. We also include human capital ($Human_{i,t}$). We finally control for the effects of the other EU funds through a single variable ($EUfunds_{i,t}$) aggregating the ERDF, EAFRD and the ESF. We hence consider the following baseline model:

$$y_{i,t} = \rho y_{i,t-1} + X'_{i,t}\beta + +\lambda_A A_{i,t} + \gamma_2 Period_{99-02} + \gamma_3 Period_{03-06} + \gamma_4 Period_{07-10} + \gamma_5 Period_{11-14} + v_t + \epsilon_{i,t} \tag{3.12}$$

In Model (1), $X_{i,t}$ includes (Geo_i, $Socialism_i$, $Efreedom_{i,t}$, $Debt_{i,t}$, $Debt^2_{i,t}$, $EUfunds_{i,t}$) and ($Human_{i,t}$). (v_t) is the time effect and ($\epsilon_{i,t}$) is the error term of the regression. Individual fixed effects are not included because they are removed by system-GMM.

In order to determine a conditional effect of ECF on growth, we include interaction terms in our baseline model. We then estimate Model (2) where we consider the interaction between the ECF and macroeconomic management variables that are national debt and inflation. Testing those interactions is in line with the fiscal rules related to the SGP and Tomova et al. (2013). We also fit with Ederveen et al. (2006), Becker (2012), Rodríguez-Pose & Garcilazo (2015) and Crescenzi & Giua (2016) by estimating the role of institutional quality and quality of government on the ECF's effect on growth with Model (3): Model (3a) adds interactions between the ECF and the corruption index ($Corruption_{i,t}$) as a proxy of institutional quality, and Model (3b) uses the government effectiveness index ($Government_{i,t}$) as a proxy of quality of government.[11]

The presence of the lagged dependent variable term in the right hand side of

[10] As the data correspond to series of average values with a small $T(T=5)$, the non-stationarity issue is not a major issue here. Moreover, the model also includes time dummies to control for trend effects.

[11] Those two interactions are not estimated simultaneously because of multicollinearity issues.

the growth equation implies that Models (1), (2), (3a) and (3b) can be estimated by using the system-GMM method of Blundell & Bond (1998). Two sets of regressors are considered: (i) strictly exogenous regressors (including time dummies, geographical location (Geo_i) and Socialism ($Socialism_i$)) and (ii) predetermined regressors (including initial GDP per capita $y_{i,t-1}$, human capital ($Human_{i,t}$), national debt ($Debt_{i,t}$), Inflation ($Inflation_{i,t}$), economic freedom ($Efreedom_{i,t}$), corruption ($Corruption_{i,t}$), government Effectiveness ($Government_{i,t}$), ECF transfers ($A_{i,t}$) and the remaining European funds ($EUfunds_{i,t}$).

3.4.3 Data and variables

Table A2.1 summarises the variables we use in the estimation of our growth equation. The data are an unbalanced panel data sample covering 15 countries and period 1995-2015. Regarding the ECF, the EU provides data about how much is spent for each programming period: $1994-1999, 2000-2006, 2007-2013$ and $2014-2020$. To get annual amounts of ECF transfers as for other variables, we take the annual average for each of the programming periods.[12] Descriptive statistics of variables are provided in Table 2.1.

Table 3.1 – Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min.	Max.
GDP per capita (log) ($y_{i,t}$)	85	9.980	0.394	9.022	11.027
Lagged GDP per capita (log) ($y_{i,t-1}$)	85	9.932	0.398	9.022	10.798
Debt ($Debt_{i,t}$)	85	0.479	0.308	0.049	1.720
Debt squared ($Debt^2_{i,t}$)	85	0.324	0.439	0.002	2.960
Inflation ($Inflation_{i,t}$)	85	0.094	0.348	0.007	3.152
Heritage Index of Economic Freedom ($Efreedom_{i,t}$)	85	64.660	7.138	47.030	81.480
Corruption ($Corruption_{i,t}$)	85	0.570	0.542	-0.567	1.740
Government Effectiveness ($Government_{i,t}$)	85	0.754	0.460	-0.428	1.805
Geographical Location (Geo_i)	85	0.529	0.502	0.000	1.000
Socialist Experience $Socialism_i$)	85	0.647	0.481	0.000	1.000
Workforce Tertiary Education ($Human_{i,t}$)	85	0.526	0.194	0.171	1.117
ECF (log) ($A_{i,t}$)	85	3.408	1.400	0.432	5.354
EU funds (log) ($EUfunds_{i,t}$)	85	4.959	1.147	0.888	6.194
Period 1995-1998	85	0.167	0.375	0.000	1.000
Period 1999-2002	85	0.167	0.375	0.000	1.000
Period 2003-2006	85	0.167	0.375	0.000	1.000
Period 2007-2010	85	0.167	0.375	0.000	1.000
Period 2011-2014	85	0.167	0.375	0.000	1.000

[12] The estimations of the chapter are based on the periods 1995-1998, 1999-2002, 2003-2006, 2007-2010, and 2011-2014.

3.4.4 Estimation results

Our analysis shows that Arellano-Bond tests in the regressions residuals, AR(1) and AR(2), the Sargan and Hansen overidentifying restrictions tests and tests for exogeneity are generally verified. Our dynamic panel data is unbalanced with more individual dimensions than time dimension (T=5 and N=15). Following Roodman (2009), it is therefore preferable to use the system GMM method of Blundell & Bond (1998) when N is larger than T. Table 2.2 displays the estimation results of Models (1), (2), (3a) and (3b) with the measure of Economic Freedom from Heritage Foundation.

We also do estimation with Fraser Institute's measure of Economic Freedom and its 5 sub-areas (government size, sound monetary policy, regulation, legal system, and trade). Analyses using Fraser Index on Economic Freedom are reported in the appendix. Table A2.2 provides definition of Fraser Institute's measure of Economic Freedom, Table A2.3 presents its descriptive statistics and Table A2.4 provides growth equation's estimations using this index. Figure A2.1 indicates indeed that the both measures of Economic Freedom are strongly correlated. We also observe that because the five Fraser sub-area indexes encompass some economic and policy variables (e.g. government size vs debt, sound monetary policy vs inflation, legal system and regulation vs corruption), the latter were excluded from the corresponding regressions. Results using those two different measures of Economic Freedom are quite similar. In particular, the effect of Fraser Institute's general Economic Freedom index is positive like the Heritage counterpart (even it is not statistically significant). While the regressions with Fraser sub-area indexes give an additional information that three of the five dimensions of economic freedom (sound monetary policy, regulation, and trade) can have an impact on growth, their interactions with ECF remain similar to the case with Heritage index.

Results obtained with system-GMM estimators indicate that the lagged term of GDP per capita is highly significant and has a positive effect on current GDP per capita. The high significance of the lagged term of GDP per capita gives strength to the use of system GMM. The size of this effect is rather similar across all specifications. Concerning the other regressors, Economic Freedom exhibits a significant positive impact on GDP per capita in all models, which is in line with Dell'Anno & Villa (2013). Those estimates highlight the returns on the market-oriented reforms implemented in the 1990s in most of recipient countries. In addition, we also observe that other European funds (variable EU funds per capita) do not directly exert a significant effect on GDP per capita of recipient countries (except a negative weakly significant effect in model 3a). Similar results have been founded by previous studies

such as Rodríguez-Pose & Fratesi (2004), Dall'Erba & Le Gallo (2008), Le Gallo et al. (2011), Fratesi & Perucca (2014). Moreover, this variable includes the European Agricultural Fund for Rural Development whose specific impact on economic growth has been found insignificant by Crescenzi & Giua (2016). We could mention as well that the European Social Fund included in this variable aims to finance essentially social expenditures that are not productive in the sense of Barro (1990).

Let us now turn to the analysis of the ECF's estimation results. They indicate that the ECF's impact is purely conditional as the direct term is insignificant. We observe that the impact of the ECF on GDP per capita is not conditioned to recipient countries' institutional quality. Indeed, both the interaction terms related to corruption and government effectiveness do not exhibit any significance, which goes against studies like Ederveen et al. (2006). Instead of institutional quality, the impact of the ECF on GDP per capita appears to be conditioned to public debt and inflation as it is indicated by models (2), (3a) and (3b). For instance, from Model (2), the marginal effect of the ECF on GDP per capita can be expressed as:

$$\frac{\partial y_{i,t}}{\partial A_{i,t}} = -0.473 I_{i,t} + 0.367 D_{i,t} - 0.316 D_{i,t}^2. \tag{3.13}$$

We find that inflation reduces the marginal effect of ECF on GDP per capita, which gives rationales to the aim pursued by the EU's monetary authorities to keep inflation to a low level. Regarding public debt, we notice that the ECF is efficient in countries having moderate national debt levels with a pattern *à la Reinhart & Rogoff (2010)*. (Eq. 2.13) indicates that national debt is complementary to the ECF up to a estimated ratio of 61.36% of GDP.[13] Beyond this level, national debt is detrimental to the ECF's effect. This result, in line with Tomova et al. (2013), legitimates the rules imposed by the SGP where national debt of one country cannot go beyond 60% of its GDP. This result is even more relevant in the context of the ECF and its additionality principle, i.e national governments must fund at least 15% of an investment project's cost. Indeed, national debt could harm the ECF's economic impact in significantly indebted countries because of a strong crowding-out effect rising from a high initial national debt level.[14]

[13] Estimation results of Model (3a) indicate a rather similar number, 60.93% of GDP.

[14] Table 2.4 indicates that the marginal impact of the ECF is even negative in countries where public debt is very high such as Greece and Portugal.

3.5 Simulation of the optimal allocation of ECF

3.5.1 Observed allocation and optimal allocation

In this section, estimation results of Model (2) are employed to simulate the optimal solution of the donor's optimization problem (P). We can then compare this optimal allocation to the observed one in 2015. As it has been shown in the first order conditions of our optimization problem, an optimal allocation of the ECF leads to the same $\hat{\lambda}$ for every recipient countries. The optimal allocation sets $\hat{A}_i$ is defined in Proposition 1. For all $\hat{A}_i > 0$, the optimal value of λ (equation (8)) is rewritten as:

$$\hat{\lambda} = \alpha_i \frac{1}{0.9\bar{y}} \left(\frac{y_i}{0.9\bar{y}} \right)^{-\sigma} \frac{y_A(\hat{A}_i)}{N_i}. \tag{3.14}$$

The ECF's optimal allocation is estimated for the programming period 2014-2020 with data from the year 2015. A total of 15 countries have been receiving the ECF during this period. The estimation results from Model (2) allow us to give the empirical values of $y_A(A_i)$. We then set the value of the parameter σ which indicates to what extent the donor is adverse to low relative GDP per capita. We consider three cases: (i) $\sigma = 0.2$, (i) $\sigma = 0.5$, and (iii) $\sigma = 0.8$. A higher value of σ means that the donor is more sensitive to the ratio ratio $y_i/0.9\bar{y}$ between recipients countries' GDP per capita and the average level of GDP per capita in the EU countries. Empirical simulations of three ECF optimal allocations are provided in Table 2.3.

Table 3.2 – Growth equation estimation results.

Variables	Model 1	Model 2	Model 3a	Model 3b
Lagged GDP per capita(log)	0.556***	0.660***	0.690***	0.626***
	(0.147)	(0.123)	(0.122)	(0.129)
Human capital	0.077	-0.028	0.039	-0.081
	(0.182)	(0.147)	(0.135)	(0.137)
Debt	0.347*	1.492**	1.634***	1.599*
	(0.175)	(0.564)	(0.534)	(0.794)
Debt squared	-0.141	-1.348***	-1.399***	-1.431***
	(0.089)	(0.346)	(0.333)	(0.482)
Economic Freedom	0.021***	0.013***	0.013***	0.015***
	(0.005)	(0.004)	(0.004)	(0.005)
Geo. location	0.073*	0.032	0.040	0.028
	(0.037)	(0.035)	(0.041)	(0.043)
Socialist experience	-0.009	0.016	0.002	0.040
	(0.080)	(0.054)	(0.073)	(0.075)
ECF per capita (log)	0.011	-0.058	-0.061	-0.081
	(0.024)	(0.042)	(0.042)	(0.075)
EU funds per capita (log)	-0.044	-0.023	-0.043*	-0.019
	(0.033)	(0.017)	(0.024)	(0.022)
Period 1999-2002	0.090	0.139**	0.147*	0.132
	(0.077)	(0.062)	(0.080)	(0.081)
Period 2003-2006	0.034	0.095*	0.093	0.097
	(0.067)	(0.049)	(0.063)	(0.065)
Period 2007-2010	0.057	0.121***	0.113**	0.128**
	(0.055)	(0.040)	(0.050)	(0.055)
Period 2011-2014	-0.077**	-0.028	-0.036	-0.017
	(0.029)	(0.031)	(0.036)	(0.039)
ECF*Inflation		-0.473***	-0.432**	-0.430**
		(0.106)	(0.166)	(0.178)
ECF*Debt		0.367**	0.416***	0.407*
		(0.131)	(0.134)	(0.199)
ECF*Debt squared		-0.316***	-0.339***	-0.334**
		(0.079)	(0.080)	(0.116)
ECF*Corruption			-0.007	
			(0.007)	
ECF*Gov. Effect.				0.003
				(0.010)
Intercept	3.147**	3.023***	2.749**	3.241**
	(1.253)	(1.035)	(1.072)	(1.130)
Observations	85	85	85	85
Arellano-Bond AR(1), p-value	0.070*	0.045**	0.053*	0.038**
Arellano-Bond AR(2), p-value	0.350	0.308	0.171	0.258
Sargan overid. restr. test, p-value	0.034**	0.012**	0.011**	0.042**
Hansen overid. restr. test, p-value	1	1	1	1
Hansen GMM instr. test, p-value	1	1	1	1

Note: This table displays the estimation results of the growth equation following Models (1), (2), (3a) and (3b). Dependent variable: GDP per capita. Results are obtained with system GMM method of Blundell & Bond (1998). *, ** and *** denote 10%, 5% and 1% significance levels. Strictly exogenous regressors include time dummies, geography and Socialism. Predetermined regressors are human capital, national debt, corruption, government effectiveness, inflation, EU funds, ECF transfers and lagged GDP per capita.

Table 3.3 – Observed and optimal ECF allocations with $\sigma = 0.2$, $\sigma = 0.5$ and $\sigma = 0.8$.

	Observed		Optimal $\sigma = 0.2$		Optimal $\sigma = 0.5$		Optimal $\sigma = 0.8$	
Country	ECF/cap	% Total	ECF/cap	% Total	ECF/cap	% Total	ECF/cap	% Total
Bulgaria	53.32	3.55	36.41	2.42	49.48	3.29	50.83	3.38
Croatia	102.38	3.99	35.54	1.39	45.65	1.79	55.71	2.18
Czech Republic	99.70	9.75	3.03	0.30	5.74	0.56	1.15	0.11
Estonia	173.95	2.12	4.89	1.21	0.66	0.01	2.36	0.02
Greece	50.33	5.05	0.48	0.00	5.72	0.58	51.99	5.21
Hungary	102.90	9.39	27.04	2.47	48.07	4.38	92.28	8.41
Latvia	114.68	2.10	1.43	0.03	0.25	0.01	3.42	0.06
Lithuania	118.56	3.19	0.01	0.00	0.42	0.01	0.37	0.01
Malta	79.88	0.32	0.04	0.00	0.04	0.00	1.24	0.00
Poland	102.67	36.15	224.31	79.00	192.64	67.82	150.02	52.82
Portugal	46.34	4.45	0.01	0.00	0.06	0.01	0.01	0.00
Romania	62.72	11.52	75.29	13.83	114.36	21.01	146.60	26.94
Slovenia	72.71	1.39	28.49	0.55	33.41	0.64	36.41	0.70
Slovak Republic	131.71	0.83	0.79	0.04	0.07	0.00	1.90	0.10
Cyprus	38.99	0.42	0.06	0.00	1.64	0.02	4.91	0.05
Average marginal eff.	0.058		0.091		0.087		0.066	

Note: The observed and optimal ECF transfers per capita are expressed in PPP $ 2011 prices. The share allocated to each ECF recipient country is expressed in % of its GDP. The average marginal efficiency is expressed as the elasticity of GDP per capita to the ECF.

Poland beneficiates from the largest increase of its ECF transfers and becomes the main recipient country in three optimal allocations with 79% of total funds when $\sigma = 0.2$, 67.82% of total funds when $\sigma = 0.5$, and 52.82% when $\sigma = 0.8$. As well, Romania is better off: this country stands for 13.83% of the total allocation when $\sigma = 0.2$, 21.01% when $\sigma = 0.5$ and 26.94% when $\sigma = 0.8$. Both Poland and Romania concentrate the great majority of ECF transfers with a cumulated share above 80%. Greece beneficates from our optimality principle with an optimal ECF transfers higher than the observed one when $\sigma = 0.8$.[15]. The 12 remaining recipient countries see their transfers being reduced and, in total, concentrate less than 20% of total transfers in both optimal allocations.[16] Some countries such as Cyprus, Malta, Estonia, Latvia, Lithuania, the Slovak and Portugal are even close to receive any ECF transfer. How could be these results be interpreted?

There are at least three arguments which may explain why Poland and Romania are taking it all: the ECF marginal efficiency level in both countries, their relative GDP per capita and population size. These values are reported in Table 2.4.

[15]Greece beneficiates from 5.21% of the optimal allocation with $\sigma = 0.8$, while its share in the observed allocation is 5.05%

[16]This cumulated share is 7.17% with $\sigma = 0.2$, 10.59 % with $\sigma = 0.5$, and 15.03% with $\sigma = 0.8$.

Table 3.4 – Estimated ECF recipient countries' economic performance and relative GDP per capita in 2015.

	Marginal efficiency (%)	Relative GDP per capita (%)	Population share (%)
Bulgaria	0.067	47.8	5.75
Croatia	0.077	58.3	3.38
Czech Republic	0.088	85.9	8.45
Estonia	0.020	77.4	1.05
Greece	-0.336	67.8	8.70
Hungary	0.083	70.3	7.88
Latvia	0.084	64.7	1.58
Lithuania	0.089	75.7	2.33
Malta	0.098	96.2	0.35
Poland	0.094	71.0	30.42
Portugal	-0.059	74.6	8.28
Romania	0.082	57.7	15.88
Slovenia	0.080	81.5	1.65
Slovak Republic	0.095	79.5	4.34
Cyprus	0.023	85.8	0.93
Average		72.9	

Note: Marginal efficiency corresponds to the elasticities of recipient countries' GDP per capita with the ECF. Relative GDP per capita is expressed the ratio between recipient GDP and the EU's average in PPP. Population share indicates the demographic weight of one country in the total sample, corresponding to α_i in equation (14).

First, both Poland and Romania are countries where the ECF has a strong marginal impact on GDP per capita, compared to other recipient countries. Heterogeneities in the ECF's economic performances between recipient countries are mainly driven by differences in public debt levels (as inflation is homogeneous across European countries). In Poland and Romania, an increase by 1% of the ECF transfers generates a rise of GDP per capita by 0.094% and 0.082%, respectively. Among recipient countries, Poland is one of countries where the ECF has the strongest marginal effect because its public debt, 53.4% of GDP in 2015, is one of the closest to the optimal level, estimated to 61.36% of GDP. Regarding the SGP, Poland is slightly under the 60% threshold fixed by the SGP, its debt level is very far from the one observed in Greece which exhibits the worst ECF's economic performance. Indeed, an increase by 1% of the ECF transfers generates a fall of GDP per capita by 0.336% because of a skyrocking national debt representing nearly 177% of GDP. A similar pattern could be observed in the case of Portugal as well. Overall, countries having a bad macroeconomic management regarding public debt do not achieve a high ECF economic performance.

Let us now move towards our second criteria, relative GDP per capita. Romania and Poland are relatively poor countries with respectively 71% and 57.7% of the EU's average GDP per capita. Both Poland and Romania are under the sample's average (72.9%), Romania is even the second poorest country of the sample. On the contrary, Malta is above the 90% boundary fixed by the EU which would make this

country not eligible anymore for the ECF.

Finally, both these countries benefit more of the optimal allocations thanks to a large demographic weight: Poland stands for 30.42% of the total sample population, Romania is the second most populated country. Because the demographic weight of each recipient country is considered in the donor's utility function with the parameter α_i, countries having the largest population sizes receive more ECF transfers. Most of remaining countries are characterised by either low ECF economic efficiency, high relative GDP per capita or small population size. For instance, despite one of the most important ECF economic efficiency and population size, the Czech Republic loses nearly all of its ECF funds because this country has the second highest GDP per capita of our sample.

It should be noticed as well that as σ is risen from 0.2 to 0.5 and to 0.8, ECF transfers directed towards Hungary, Greece, Croatia, Romania, and Bulgaria are sharply increased (Table 3). Those countries respectively have the tenth, eleventh, thirteenth, fourteenth and fifteenth GDP per capita of our sample which means that they are among the poorest ECF recipient countries (Table 2.4). The cases of Hungary, Greece and Romania are striking: these countries see their ECF transfers increasing considerably with σ. For instance, the optimal ECF transfers to Greece moves from 0% when when $\sigma = 0.2$ to 5.21% when $\sigma = 0.8$ while ECF funds seem do not contribute to economic performance of this country. This result strengthens the fact that while economic efficiency is rewarded, economic fairness is not forgotten.

We recall that the aim of our optimal allocation is to increase the ECF's economic efficiency in order to help the EU achieving economic convergence. Table 2.3 indicates that both the optimal allocations perform better than the observed one: on average, a 1% increase of the ECF transfers generates a 0.091% increase of GDP per capita when $\sigma = 0.2$, a 0.087 increase of GDP per capita when $\sigma = 0.5$ and 0.066% when $\sigma = 0.8$ which is more than the 0.058% of the observed allocation. These results are driven by the good performances of Poland and Romania. The lower performance of the optimal allocations with $\sigma = 0.5$ and $\sigma = 0.8$ is mainly due to a larger share directed towards Greece which drags down the overall economic performance of the ECF.

As it has been underlined, the ECF's observed allocation is very different from the optimal allocation we have computed. This may be as well related to some issues dealing with the political economy of the European Cohesion policy highlighted in the works of Rodden (2002), Wonka (2007), Gehring & Schneider (2018). Rodden (2002) stated that "empirical analysis demonstrates a close connection between the distribution of votes and fiscal transfers in the legislative institutions of the European

Union." Given that small countries' electoral weight in the European Parliament is higher than their actual demographic weight, this helps explaining why we notice a *small country bias* in the observed allocation while the optimal allocations remove this bias by taking into account the real demographic weight of each recipient countries. One another political economy issue is related to an assumption made about the donor's behaviour. Indeed, in our theoretical model, we have assumed that the donor is purely altruistic, which may not be the case in reality. Wonka (2007) suggested a principal-agent structure, where governments select reliable actors who are expected to take national interests into account at the EU-level. Gehring & Schneider (2018) strengthened this idea as they demonstrated that the nationalities of EU Commissioners influence budget allocation decisions in favour of their country of origin. They focused on the Commissioners for Agriculture and, on average, providing the Commissioner causes a 1 percentage point increase in a country's share of the overall EU budget, which corresponds to 850 million euros per year. This issue would constitute an interesting topic for our further investigation.

3.6 Conclusion

The European Cohesion Fund is an additional tool used by the EU to promote economic convergence between its member states. The ECF is targeted to those having a relative GDP per capita lower than 90% of the EU's average.

This study has dealt with the issue of the allocation of the ECF between recipient countries. We have adopted a normative approach where an optimal allocation of the ECF is computed and compared to the observed allocation for the period 2014-2020. To obtain this optimal allocation, we have solved an optimization problem where a purely altruistic donor has maximised the global welfare of ECF recipient countries. The optimal solution of this theoretical problem has been then empirically simulated thanks to the estimation results of a growth equation based on system GMM estimators using a database covering 17 countries for the period 1995-2015.

We find that GDP per capita is significantly and positively affected by its own lagged value and the level of economic freedom. As well, our estimates show that the ECF's impact on GDP per capita is conditional to inflation and public debt. Recipient countries with moderate national debt and low inflation levels are those where the ECF is the most efficient. The optimal ECF allocation gives more funds to Poland and Romania thanks to their high ECF economic efficiency, low relative GDP per capita and large population size. Both these countries stand for more than 80% of total funds while this figure is about 48% with the observed ECF allocation in

2015. Regarding economic efficiency, optimal allocation exhibits a higher marginal impact than the observed allocation.

The ECF optimal allocation we propose is based on economic criteria that are the initial relative GDP per capita and the ECF's economic performance conditioned on the quality of macroeconomic management. The necessity of a sound macroeconomic management is explicitly mentioned in EU regulations. The resulting optimal allocation we compute is therefore in line with the European legislative texts and gives additional theoretical background to the European fiscal rules. As well, we have considered a demographic criterion where recipient countries are weighted according to their population size, which avoids any demographic bias towards small recipient countries. This chapter is a contribution to the debate relating to European structural funds' allocation criteria: further extensions could be added to this study based on more political criteria such as the respect of European democratic principles in the ECF recipient countries.

The last chapter focuses on the politic forces related to the allocation process of the EU funds between a central government and its constituent regions to understand the determinants of the final regional allocation.

3.7 Appendices

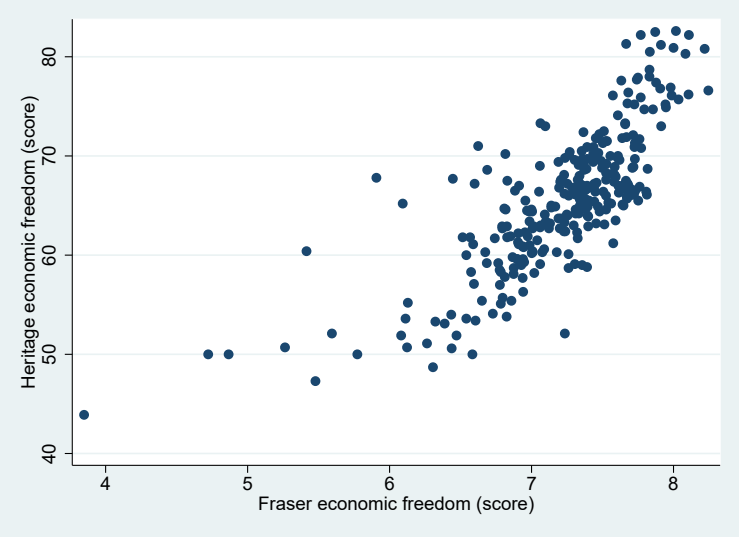

Figure A3.1 – Heritage and Fraser economic freedom indexes (Correlation: 0.779)

Table A3.1 – Data and variables definition.

Variable name	Definition	Unit	Source
GDP per capita ($y_{i,t}$)		PPP 2011$	World Bank
Lagged GDP per capita ($y_{i,t-1}$)	GDP per capita of the last period (4 years ago)	PPP 2011$	World Bank
Human Capital ($Human_{i,t}$)	Working labour force having achieved tertiary education	Percentage of working labour force	World Bank
Geographical localization ($Geo_{i,}$)	Be a neighbour of a EU-15 country	Dummy variable	
Socialist Experience ($Socialism_i$)	Length under a socialist government after WW2	Number of years	
Government Effectiveness ($Government_{i,t}$)	Perceptions of the quality of public services, policy formulation and implementation, and the credibility of the government's commitment	Score between -2.5 to 2.5 (best score)	Worldwide governance indicators
Corruption ($Corruption_{i,t}$)	Perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests	Score between -2.5 to 2.5 (best score)	Worldwide governance indicators
Economic Freedom ($Efreedom_{i,t}$)	Rule of Law, government size, regulatory efficiency, and performance on Market's openness (financial, investment and trade freedoms)	Score between 0 and 100 (best score)	Heritage Foundation
Inflation ($Inflation_{i,t}$)	Variation of consumer price index	Percentage of price index	World Bank
National Debt ($Debt_{i,t}$)	General government consolidated gross debt	Percentage of GDP	Eurostat
ECF per capita ($A_{i,t}$)	Level of European Cohesion Fund (ECF) transfers	PPP 2011$	European Commission
EU funds per capita ($EUfunds_{i,t}$)	Sum of European Regional Development Fund (ERDF), European Social Fund (ESF) and European Agricultural Fund for Rural Development (EAFRD) transfers	PPP 2011$	European Commission

Table A3.2 – Measure of Economic Freedom and different components of Economic Freedom from the Fraser Institute

Variable name	Definition	Unit	Source
Economic Freedom (*Fraser*)	Government size, sound monetary policy, level of regulation, quality of legal system, freedom to trade	Score between 0 and 10 (best score)	Fraser Foundation
Size of government (*Size gov. Fraser*)	Government consumption, transfers and subsidies, government enterprises and investment, top marginal income tax rate, top marginal income and payroll tax rate	Score between 0 and 10 (best score)	Fraser Foundation
Sound monetary policy (*Sound monetary Fraser*)	Money growth, standard deviation of inflation, inflation of the most recent year, freedom to own foreign currency bank account	Score between 0 and 10 (best score)	Fraser Foundation
Legal system and property rights FRASER (*Legal system Fraser*)	Judicial independence, impartial courts, protection of property rights, military interference in Rule of Law and politics, integrity of the legal system, legal enforcement of contracts, regulatory restrictions on the sale of real property, reliability of police, business costs of crime	Score between 0 and 10 (best score)	Fraser Foundation
Level of regulation (*Regulation Fraser*)	Credit market regulations, labor market regulation, business regulations	Score between 0 and 10 (best score)	Fraser Foundation
Freedom to trade (*Trade Fraser*)	Tariffs, regulatory trade barriers, Black market exchange rates, controls of the movement of capital and people	Score between 0 and 10 (best score)	Fraser Foundation

Table A3.3 – Descriptive statistics on Fraser Indicators.

Variable	Obs	Mean	Std. Dev.	Min.	Max.
Fraser Index of Economic Freedom	85	7.560	1.566	0.734	9.781
Size of government Fraser	85	5.549	1.118	1.463	7.298
Sound monetary Fraser	85	6.278	0.744	4.798	7.965
Legal system Fraser	85	8.225	2.084	0.735	9.781
Regulation Fraser	85	6.790	0.942	3.741	8.125
Trade Fraser	85	7.974	0.558	6.036	9.727

Table A3.4 – Growth estimation results using the Fraser foundation's index of economic freedom.

Variables	Model I	Model II	Model III	Model IV	Model V	Model VI
Lagged GDP per capita (log)	0.921***	0.893***	0.786***	0.877***	0.796***	0.782***
	(0.085)	(0.076)	(0.084)	(0.107)	(0.081)	(0.099)
Human capital	-0.080	-0.011	-0.005	-0.106	0.068	0.025
	(0.111)	(0.115)	(0.080)	(0.100)	(0.089)	(0.092)
Debt			1.977***	1.857***	-0.955	1.364*
			(0.490)	(0.554)	(0.737)	(0.664)
Debt squared			-1.459***	-1.557***	0.947*	-1.181***
			(0.291)	(0.360)	(0.465)	(0.400)
Geo. location	-0.018	0.011	0.031	0.003	0.000	0.027
	(0.026)	(0.028)	(0.043)	(0.040)	(0.030)	(0.040)
Socialist experience	0.087*	0.110*	0.010	0.031	-0.008	0.011
	(0.050)	(0.053)	(0.052)	(0.057)	(0.048)	(0.050)
ECF per capita	0.127	0.003	0.080	0.020	0.194	0.360
	(0.108)	(0.075)	(0.097)	(0.170)	(0.216)	(0.239)
EU funds per capita	0.018	0.021	-0.059*	-0.011	-0.021	-0.053*
	(0.026)	(0.031)	(0.028)	(0.023)	(0.018)	(0.029)
Period 1999-2002	0.138*	0.181**	0.041	0.139*	0.259***	0.097
	(0.076)	(0.072)	(0.072)	(0.078)	(0.053)	(0.070)
Period 2003-2006	0.100	0.108	0.042	0.096	0.172***	0.045
	(0.058)	(0.066)	(0.064)	(0.057)	(0.046)	(0.061)
Period 2007-2010	0.110**	0.101	0.034	0.118**	0.175***	0.084**
	(0.046)	(0.059)	(0.048)	(0.041)	(0.042)	(0.038)
Period 2011-2014	-0.102**	-0.092*	-0.113***	-0.064**	-0.022	-0.055*
	(0.036)	(0.049)	(0.030)	(0.029)	(0.032)	(0.028)
ECF*Inflation		-0.148			-0.481***	-0.474***
		(0.261)			(0.125)	(0.147)
ECF*Debt			0.437***	0.383***	0.224	0.306*
			(0.116)	(0.128)	(0.151)	(0.148)
ECF*Debt squared			-0.331***	-0.340***	-0.223**	-0.275***
			(0.067)	(0.084)	(0.097)	(0.088)
ECF*Corruption		0.014	-0.000			-0.001
		(0.010)	(0.008)			(0.009)
Fraser	0.079					
	(0.058)					
ECF*Fraser	-0.019					
	(0.015)					
Size gov. Fraser		0.076				
		(0.080)				
ECF* Size gov. Fraser		-0.007				
		(0.017)				
Sound monetary Fraser			0.171***			
			(0.039)			
ECF* Sound monetary Fraser			-0.025**			
			(0.010)			
Fraser legal system				0.046		
				(0.075)		
ECF* Fraser legal system				-0.010		
				(0.017)		
Regulation Fraser					0.195*	
					(0.098)	
ECF* Regulation Fraser					-0.028	
					(0.023)	
Trade Fraser						0.284**
						(0.102)
ECF*Trade Fraser						-0.047*
						(0.024)
Constant	0.264	0.676	1.862**	1.421	0.860	0.385
	(1.125)	(0.965)	(0.851)	(1.341)	(1.179)	(1.143)
Observations	85	85	85	85	85	85
Arellano-Bond AR(1), p-value	0.044**	0.081*	0.036**	0.009***	0.013**	0.032**
Arellano-Bond AR(2), p-value	0.087*	0.070*	0.136	0.403	0.457	0.163
Sargan overid. restr. test, p-value	0.018**	0.016**	0.021**	0.004***	0.069*	0.001***
Hansen overid. restr. test, p-value	1	1	1	1	1	1
Hansen GMM instr. test, p-value	1	1	1	1	1	1

Note:: *, ** and *** denote 10%, 5% and 1% significance levels. In model II using the component "Size of government", Public Debt is dropped. In model III using the component "Sound monetary policy Fraser", Inflation is dropped.

Chapter 4

Regional decentralisation and the European Cohesion Policy: *the leader takes it all*

Summary

How does regional decentralisation affect the allocation of the EU funds at the national level? This chapter formalises and shows that regional autonomy intensifies the political economy of the European Cohesion Policy (ECP) based on a signalling game between a central government and its constituent lagging region. The central government is less willing to provide European transfers to more autonomous lagging regions. This theoretical prediction is empirically confirmed by a study based on a 119 NUTS-2 regions belonging to 18 Member states dataset over the period 1989-2018. However, this study does not find any evidence of significant relation between absorption performance and the intranational regional allocation.

Acknowledgements

I would like to thank Gisèle Umbhauer and the participants of the CPnet workshop "Territorialisation of Cohesion Policy" for their useful comments.

4.1 Introduction

The European Cohesion Policy (ECP) has been set to foster economic and social cohesion in the EU. To this purpose, this supranational policy targets the lagging regions trough the co-financing of investment projects. One issue faced by the ECP is that its core recipient regions, the lagging regions, are those where the absorption capacity is the lowest (Becker et al. (2010)). In other words, this is where the ECP's investment returns are the lowest in terms of economic growth stimulation. One determinant of absorption capacity is the quality of local government, which is acknowledged to be at a low level in most of the European lagging regions (Becker et al. (2013); Teorell et al. (2013)).

One feature of the ECP is that its institutional set could be defined as signalling framework between the European Commission, the Member states and the constituent regions (Dellmuth & Stoffel (2012)). The European Commission seeks to structure intergovernmental transfers in ways that promote EU funding goals. Because the Commission has only imperfect information and control over the fiscal activities of decentralised governments and sanctions are costly, its monitoring and enforcement capacities are largely ineffective (Blom-Hansen (2005)). Therefore, Member states bear most of the responsibility of monitoring since the set of control mechanisms remains quite limited (Bachtler & Ferry (2015).[1]

The efficient management and implementation of the ECP is ensured by a *managing authority* which must provide to the European Commission an annual implementation report. A managing authority may be a national ministry, a regional authority, a local council, or another public or private body that has been nominated and approved by a Member state. As indicated in Table 4.1 , the European funds are mostly managed by regional authorities. Indeed, excepted in Spain and Romania, the implementation of the European funds is shared with regions (Germany, Italy, Poland, Portugal and the Czech Republic) or exclusively managed by them (France, United-Kingdom, Netherlands, Belgium and Sweden).

During the last decades, a majority of Member states have conducted regional decentralisation reforms to increase the autonomy of regional authorities. This can be measured by the regional level of *self-rule*, *i.e.* the constitutional strength and political and fiscal autonomy. As indicated in Figure 4.1 , the self-rule index of Hooghe

[1]Member states are required to appoint *monitoring committees* to assess the effectiveness and the quality of the investment projects, make periodical reviews and propose revisions where necessary. These committees are chaired by the relevant managing authority and comprise regional, economic and social partners. However, their influence is very limited. For more information, see Cartwright & Batory (2012).

et al. (2010) has notably been increasing in Mediterranean (Greece and Italy) and Eastern countries (Czech Republic, Poland, Romania and the Slovak Republic), and remained relatively stable at a high level in Austria, Germany, Spain and Sweden.

Table 4.1 – Sample managing authorities: 2007-13, 2014-20, 2021-27

Country	2007-13	2014-20	2021-27
Austria	NUTS-2	National	NUTS-2
Belgium	NUTS-1	NUTS-1	NUTS-1
Bulgaria	National	National	National
Czech Republic	Mostly national and NUTS-2	National	Mostly national and NUTS-2
Germany	Mostly NUTS-1 and national	NUTS-1	Mostly NUTS-1 and national
Greece	National	Mostly national and NUTS-2	National
Spain	National	National	National
Finland	National	National	National
France	Mostly national and NUTS-2	NUTS-2	NUTS-2
Hungary	National	National	National
Italy	Mostly national and NUTS-2	Mostly national and NUTS-2	Mostly national and NUTS-2
Netherlands	NUTS-1	NUTS-1	NUTS-1
Poland	Mostly national and NUTS-2	Mostly national and NUTS-2	Mostly national and NUTS-2
Portugal	Mostly NUTS-2 and national	Mostly NUTS-2 and national	Mostly NUTS-2 and national
Romania	National	National	National
Sweden	NUTS-2	NUTS-2	NUTS-2
Slovak Republic	National	National	National
United Kingdom	NUTS-1	NUTS-1	NUTS-1

Notes: MFF denotes *Multi-annual Financial Framework*.
Source: own elaboration based on data from European Commission.

Considering this signalling strategies between the central government and its constituent regions, one issue is that the core recipient regions of the ECP, the lagging regions, exhibit the lowest absorption capacity performances (see, *e.g.*, Becker et al. (2010)). As Member States have incentives to send good signals on the use of the European Funds, especially to have more funding in the next MFF, this regional moral-hazard risk is acknowledged as having an influence on the final allocation in a given Member State. There is a trade-off between *cohesion* and *absorption* purposes (Bouvet & Dall'Erba (2010); Dellmuth (2011); Charron (2016)). To explain this result, Charron (2016) mentions the tension between two primary objectives of the Structural Funds regime. On one hand, there is the goal of Funds absorption resulting from strategic interactions between the European Commission and Member States. The latter intend to send a good signal about the use of the European money to obtain larger amounts of transfers in the next MFF. On the other hand, there is the overall goal of achieving regional cohesion by aiding lagging regions.

While referring to Table 4.2 , we observe less internal redistribution since the related Gini coefficients decrease steadily. In other words, the European funds are distributed more equally between regions, including the wealthiest ones. This trend is especially pronounced in countries where regional decentralisation is advanced

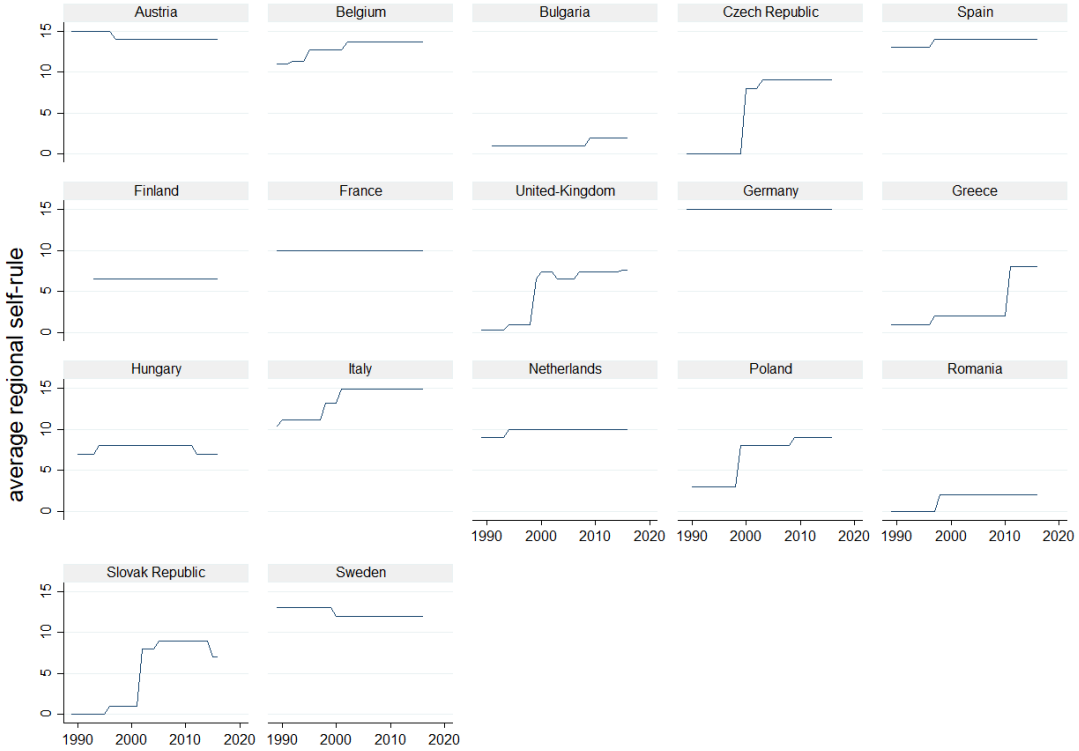

Figure 4.1 – Average regional sample self-rule (1989-2016)

Notes: List of regional authorities: (Austria: *Länder*; Belgium: *Régions*; Bulgaria: *Öblastis*; Czech Republic: *Kraje*; Germany: *Länder*; Greece: *Peripherie*; Spain: *Comunidad autónoma*; Finland: *Maakuntien*; France: *Région*; Hungary: *Megyék*; Italy: *Regioni*; Netherlands: *Province*; Poland: *Województwa*; Romania: *Regiuni de dezvoltare*; Sweden: *Län/ Landstinge*; Slovak Republic: *Kraje*; United-Kingdom: *Region*.
Source: own elaboration based on data from Hooghe et al. (2010).

such in Germany, the Netherlands, Belgium, Austria and to a lesser extent in France.

The main goal of this chapter is to provide evidence whether regional decentralisation has a causal link with the redistributive dimension of national allocations. In other words, does regional self-rule affect the redistribution level of the ECP in a given Member State? To address this question, we build a theoretical model involving a signalling game between a central government and its lagging region. This is followed by a welfare maximisation problem of the altruistic government where the theoretical solution provides the allocation of the lagging region. Theoretically, to the best of our knowledge, we are the first study formalising the national allocation process. The only existing study formalising the strategic interactions related to the allocation of the EU funds, Védrine (2020), considers the regional interactions only. Following the optimisation problem, we empirically verify the theoretical predictions.

Table 4.2 – Gini coefficients of sample national allocations: 1989-93, 1994-99, 2000-06, 2007-13, 2014-2020.

	1989-93	**1994-99**	**2000-06**	**2007-13**	**2014-20**
Austria		0.370	0.213	0.201	0.238
Belgium	0.578	0.737	0.405	0.424	0.246
Bulgaria			0.287	0.268	0.241
Czech Republic			0.172	0.102	0.122
Germany	0.589	0.670	0.549	0.538	0.374
Greece	0.394	0.342	0.439	0.333	0.388
Spain	0.446	0.365	0.381	0.547	0.400
France	0.472	0.370	0.165	0.203	0.260
Hungary			0.320	0.140	0.118
Italy	0.604	0.579	0.475	0.560	0.403
Netherlands	0.495	0.331	0.172	0.206	0.283
Poland			0.339	0.259	0.200
Portugal	0.224	0.169	0.254	0.394	0.438
Romania			0.133	0.117	0.105
Sweden		0.169	0.404	0.127	0.083
Slovak Republic			0.123	0.086	0.217
United Kingdom	0.609	0.571	0.470	0.496	0.569
Average	0.490	0.425	0.312	0.294	0.276

Source: Own calculations based on data from European Commission.

Empirically, we investigate the infranational regional allocation of the EU funds for for 119 NUTS-2 lagging regions belonging to 18 Member States covering the time period 1989-2018. While the existing literature has been focused on the absolute regional amounts of EU funds across all European regions for a given European multi-annual framework (MFF), mostly 2000-06 or 2007-13 (see, *e.g.*, Bouvet & Dall'Erba (2010); Bodenstein & Kemmerling (2011); Dellmuth (2011); Dellmuth & Stoffel (2012); Chalmers (2013); Charron (2016); Dellmuth et al. (2017); Rodríguez-Pose & Courty (2018)). A lagging region is defined as a region exhibiting a relative GDP per capita lower than the national average. The main results can be described as follows:

First, our theoretical findings suggest that an increase in the level of regional decentralisation, or regional self-rule, is associated with a reduction in the proportion of European transfers targeted to the lagging regions. The subsequent empirical analysis employs the system-GMM of Blundell & Bond (1998) and suggests that this testable prediction is confirmed. Additional estimation results suggest that this result is verified for the majority of the self-rule's index sub-components.

Second, our simple theoretical model suggests that the moral-hazard risk perception by the central government is relevant to determine the national allocation. Empirically, consistently with the existing literature, we consider the speed of regional absorption as a signal for moral-hazard risk perception, which could have a positive impact of a region's endowment in EU funds (see *e.g.*,Chalmers (2013), Charron (2016)). However, our estimation results do not conclude on a significant

association between the absorption speed of a lagging region and its EU funds allocation.

Overall, our results highlight an harvesting of the ECP in national leading regions marked by political decentralisation reforms that led to more regional autonomy. Regarding policy implications, an institutional reform of the ECP could be implemented to ensure more redistribution between the constituent regions of every Member States. For instance, an allocation rule guaranteeing a minimal share dedicated to the national lagging regions could help to maintain a minimum level of intra-national redistribution.

The remainder of this chapter is organised as follows: Section 2 provides a related literature review. Section 3 deals with the theoretical model. Section 4 presents the analysis implemented to test the validity of the theoretical predictions. We conclude and provide some policy recommendations in Section 5.

4.2 Related literature

The ECP's allocation criteria are characterised by transparency for regions under 75% of the average EU GDP per capita qualifies for a certain amount of transfers (*"Objective 1 or Convergence regions"*). In this case, there is very little room for negotiation by any actor—be it at national, regional, or EU level—to adjust the appropriation of funding levels. However, criteria for the transfer of funds to regions that are relatively more economically developed (e.g. over 75% of the EU average; formerly known as *"Objective 2/Regional Competitiveness and Employment regions"*) are less predetermined. Following this fact, a recent literature has analysed the political determinants of EU budgetary allocations across European regions (see e.g., Kemmerling & Bodenstein (2006); Bouvet & Dall'Erba (2010); Bodenstein & Kemmerling (2011); Dellmuth (2011); Dellmuth & Stoffel (2012); Chalmers (2013); Schraff (2014); Charron (2016); Dotti (2016); Dellmuth et al. (2017); Rodríguez-Pose & Courty (2018); Koala & Védrine (2020); Védrine (2020)).

First, a branch of the literature has pointed out the importance of partisan political factors, but results are contrasted across studies. The political party position of the leading regional government, *i.e.* left-wing or right-wing, has found support in earlier studies (Kemmerling & Bodenstein (2006); Bouvet & Dall'Erba (2010); Dellmuth (2011)), but its effect has been found as insignificant in more recent studies (Chalmers (2013); Dellmuth et al. (2017)). Another investigated factor has been the number of parties in the regional political panorama as a reduced number of parties weakens regional collective action issues and make

easier the targeting of national political actors to gain favour with the winner and their constituents (Bodenstein & Kemmerling (2011)). A third political factor that scholars have examined has been the extent to which a region is collectively Eurosceptic as a central government may intend to compensate this hostility with more European transfers. However, the *"the side-payment thesis"* has not found empirical support (Dellmuth (2011); Chalmers (2013)) .

A second type of investigated criteria are those related to the vote-buying behaviours of a central government. The goal of such strategies is to obtain regional electoral support, and several articles show that a central government rewards regions that are politically aligned as a positive association between the regional support for the party of the Prime Minister and the amount of EU transfers is found (Bouvet & Dall'Erba (2010); Dellmuth & Stoffel (2012); Chalmers (2013)), Dellmuth et al. (2017)).[2] Two types of vote-buying behaviours are mentioned. First, national executives may distribute EU funds across regions with the aim to enhance their re-election chances in regions where their electoral margin is high. The *core-voters hypothesis* formulated by Cox & McCubbins (1986) has found important empirical support in the case of the EU funds (Dellmuth & Stoffel (2012); Schraff (2014); Dellmuth et al. (2017)). Earlier studies mostly did not support this hypothesis (Bouvet & Dall'Erba (2010); Chalmers (2013)), but the most recent ones have put on emphasis a conditional impact of a high regional electoral margin on the amount of received European transfers. In a study conducted for the German *Länders*, Schraff (2014) shows that *Länder*'s government has incentives to follow a strategy that rewards loyalists only where electoral mobilisation is important. Indeed, risk-averse incumbents anticipate the structural character of regional mobilisation and concentrate their vote-maximising strategies on high turnout counties since investments in voters who are less likely to turn out might be wasted. The study exploits the stability of turnout patterns in German NUTS-3 counties and concludes that the effect of the 1998 *Landtag* elections' turnout levels on later turnout is large, highly significant, and explains over 80% of the variance in the 2003 turnout. Still related to the conditional impact of a high regional electoral margin, Dellmuth et al. (2017), by focusing on 202 NUTS-3 counties in France and Italy, concludes that counties with many core voters receive more EU funds in France, characterised by a majority voting regime, than in Italy which has proportional representation voting. On the opposite, the second mentioned vote-buying behaviour is the *swing-voters hypothesis* formulated by Lindbeck & Weibull (1993) that states closer the two main parties in the run-up

[2] Chalmers (2013) finds a significant effect only for *"Convergence fundings"*.

towards the election, the higher the stakes become for central governments to win this constituency. However, in the case of the European funds, this hypothesis has found little support as only Bodenstein & Kemmerling (2011) find that electoral competition in a region increases its EU transfers, an insignificant (Koala & Védrine (2020); Védrine (2020)) or even detrimental effect is even found by Bouvet & Dall'Erba (2010).

A third category of political determinants of the regional allocation of the European transfers is the institutional strength of regions. The literature has investigated four channels through which this institutional strength can influence the regional final allocation of the EU funds. There are: (a) the capacity to have some lobbying activities in Brussels, (b) the regional co-funding capacity, (c) the ability to influence central government's decisions and (d) the regional autonomy.

Regarding lobbying capacity, the results of studies as Chalmers (2013) Rodríguez-Pose & Courty (2018) indicate that regional offices have a negligible effect on the distribution of EU funds. Bigger offices in Brussels did not necessarily lead to greater shares of funding going to the regions that made the biggest effort to lobby Brussels. In some cases, the efforts have even proven to be detrimental (Rodríguez-Pose & Courty (2018)).

Regarding the *additionality principle* that states that regional or national authorities should provide at least 25% of a project cost funded by the EU, regions the most able to secure larger have a higher bargaining power as they depend less on the willingness of national governments to co-finance projects (Bouvet & Dall'Erba (2010)), but this did not find any empirical support in Chalmers (2013).

Another investigated factor related to institutional strength is the level of regional *shared-rule*, or the ability of a region to participate in co-decision-making processes, have routine and institutionalised interactions with the central government and being invested in countrywide or aggregate outcomes. Considering the bargaining that occurs between a central government and its regions, regional shared-rule may be especially relevant in the case of the EU funds. Using the Regional Autority Index (RAI) of Hooghe et al. (2010), and particularly the shared-rule component, Chalmers (2013) finds that the more a region has the extent to co-determine the distribution of national tax revenues and constitutional change, the more funds it gets.[3] Similarly to regional shared-rule, the regional

[3]In the RAI, shared-rule is the sum of: law-making (the extent to which regional representatives co-determine national legislation); executive control (the extent to which a regional government co-determines national policy in intergovernmental meetings); fiscal control (the extent to which regional representatives co-determine the distribution of national tax revenues); and constitutional reform (the extent to which regional representatives co-determine constitutional change).

representation in the national parliament also affects positively the allocation of European structural funds (Koala & Védrine (2020); Védrine (2020)).

With the ability of a region to co-determine national decisions, regional autonomy has been vastly investigated. Using the rough index of federalism provided by Lijphart (2012), Dellmuth (2011) did not find any significant direct impact of regional authority on the amount of EU funding.[4] Another index that has been used for proxying regional authority is the regional self-rule, taken from the RAI of Hooghe et al. (2010). However, studies find a weak (Chalmers (2013)) or insignificant (Dellmuth et al. (2017)) empirical support in determining regional allocation of the EU funds by the level of regional autonomy. However, most of the existing studies point out a conditional impact of the level of regional autonomy on the amount of EU transfers. Dellmuth (2011) finds that more transfers are provided to constitutionally weak regions if these regions have a good track of absorption in previous rounds. The rationale behind this result is that less autonomous regions are characterised by less financial resources, and therefore a lower administrative capacity. Therefore, more transfers are provided to constitutionally weak regions only if these regions have a reputation of actually spending the funds they claimed and received. On the contrary, Charron (2016) supports constitutionally weak regions with low quality of governance tend to get awarded more funding per capita on average using the self-rule from the RAI and the European Quality of Government Index (EQI) of Charron et al. (2014) to measure regional quality of governance.[5] Similarly, regions with high quality of governance and a high level of autonomy are found to receive more EU funding. In cases of low regional autonomy, principals prefer to allocate greater levels of Funds to regions with lower quality of government in order to increase cohesion. In cases of high regional autonomy, risks associated with absorption failure in lower capacity regions lead principals to strategically allocate greater levels of transfers to regions with higher quality of government as they exhibit a higher absorption capacity.

Overall, a very few studies have considered how the actual decentralisation of the management of the ECP may affect the regional allocation of the EU funds. One of the only existing studies is Védrine (2020), which addresses this issue with

[4]The federalism index of Lijphart (2012) ranges from 1 in centralised states to 5 in federalist ones.

[5]Available for 206 NUTS-1 and NUTS-2 regions, the EQI of Charron et al. (2014) is based on a survey of 85000 citizens. The measure incorporates both perceptions and experiences of citizens and captures the quality of governance, level of corruption, and extent to which public services are delivered impartially. The index focuses on areas such as health care, education, and law enforcement, which are appropriate because it is these that are most often administered by regional actors).

a both theoretical and empirical contribution in the case of the EU-15 for the MFF 2000-06 revealing a regional *yardstick competition* mechanism. This study concludes that in member states where the Cohesion Policy has been decentralised such as Germany, Austria, Belgium, Denmark, Finland, the Netherlands and Sweden, constituent regions attracts more EU funds. Indeed, Védrine (2020) explains that when Cohesion Policy is not decentralised, the weight of the decision of the local government in the utility of voters is low so that a regional government has no incentives to make efforts. However in a decentralised system, the voter in each region has a stronger incentive to acquire information, which allows the voter to discipline better their own government. The effort of this local government will be higher, leading this region to obtain larger amounts of funding. With this reasoning breeding within each region, one obtains a positive effect on the amount of funds received by a region on those received by its neighbours. This result therefore suggests a complex interaction between geographical factors and the institutional scheme of this policy.[6] However, this study does not take into account the existing interactions between the central government and its constituent regions even if they are acknowledged as having an important impact on the national allocation (see e.g., Bodenstein & Kemmerling (2011); Dellmuth (2011); Chalmers (2013); Charron (2016)).

Therefore, our study considers the role of the decentralisation of the ECP on final regional allocation by focusing on a signalling game between a central government and its lagging region. Next section presents the theoretical model employed in the analysis.

4.3 Theoretical model

The theoretical model is built on two pillars: (i) a signalling game between the central government and its lagging region resulting in a Perfect Bayesian Equilibrium providing the theoretical grounds of the central government's welfare function; (ii) a maximisation of the altruistic central government's welfare function providing the EU funds allocation targeted to the lagging region.

[6] About the role of geography, see Koala & Védrine (2020) who conclude that it seems more profitable to a regional government to react to an increase in the lobbying effort of its neighbours by decreasing its own lobbying effort to distort the allocation of EU funds in his favour thanks to the existence of a geographical spillover between the two neighbours regions.

4.3.1 Signalling game

We consider the European Commission which intends to fund the production of public goods in a lagging region to achieve the goal of economic convergence in the EU. However, we assume that the European Commission delegates the management of the Cohesion Policy to the central government. The Cohesion policy budget, G_t is targeted to the lagging region, which is in charge of the production of public goods funded by the European transfers provided by the central government.
The lagging region can either be good type (honest) or bad type (dishonest). These types are independent random draws from an identical distribution, where good types are drawn with probability, π and bad types are drawn with probability $1-\pi$, where $0 < \pi < 1$. A region's type is his private information.

We assume that θ is the production cost of public goods and a binary random variable which can be high or low in each period.[7] That is, $\theta \in \{\theta_l, \theta_h\}$ and $\theta_h > \theta_l > 0$. The probability that the unit cost is high is $Pr(\theta_h) = q$, so $Pr(\theta_l) = 1 - q$, where $0 < q < 1$. We assume that the realisation of θ is private information to the lagging region. The lagging region knows its ability and has to chose a production level of public goods, g_t, in $t = 1$ and $t = 2$.

To deal with the lagging region's moral hazard behaviour, the central government invests an exogenous share $m \in]0; 1[$ of G_1 in monitoring activities. This monitoring effort increases the probability of an inspection conducted at the end of period $t = 1$ to be successful. The probability of success of the inspection, $\delta(m, \eta)$ is an increasing function of m. However, it is a decreasing function of the autonomy level of the lagging region, η as the central government could exert less control on the region's activities. We then consider:

$$\delta(m, \eta) = m^{\eta}. \tag{4.1}$$

If $\eta = 0$, *i.e.* full centralisation, the central government will always find out the type of the lagging region. However, if $\eta = 1$, *i.e.* full decentralisation, $\delta(m, \eta)$ will be at its lowest value since $m < 1$. There is no monitoring activities in period $t = 2$ as the game ends in the second period.

The lagging region can produce $g_1 \equiv \frac{(1-m)G_1}{\theta}$ units of the public good in period $t = 1$, and $g_2 \equiv \frac{G_2}{\theta}$in $t = 2$, where $\theta > 0$ is the cost of a unit of the public good. Following this, the provision of the public good cannot exceed $\frac{(1-m)G_t}{\theta_l}$. If the lagging region is bad type, its goal will be to extract a rent $G_t - g_t$. If it is good type, we

[7] An alternative approach would have been to consider the productivity of public spending such as $\frac{1}{\theta_h}$ would have been the low productivity level, and $\frac{1}{\theta_l}$ the high one.

assume that the region does not have any strategic behaviour so that any rent is extracted.

Regarding the timing of the game, it can be summed up as the following:

— Beginning of period 1. Nature distributes the region's type (Good or Bad).

— Period 1. The central government has its own beliefs on the lagging region's type and make a take-it or leave-it offer to the region. The lagging region produces a quantity of public goods.

— End of period 1. The central government observes the production of public goods, determines its beliefs on the lagging region's type and transfers the funds. An inspection is carried by the central government and may reveal the type of the lagging region.

— Beginning of period 2. The central government makes a take-it or leave-it offer to the lagging region.

— End of period 2. End of the game.

We look to the perfect Bayesian equilibrium of this game.

Let $\rho_t \equiv \rho_t(g_{t-1})$ be the central government's posterior belief in period t that the lagging region is good given that it observed a level of public good production in the previous period, g_{t-1}. We necessarily have $\rho_1 = \pi$. Since the game ends in period 2, the production of public goods in period 2 has no effect on the central government's behaviour.
Consider the following *candidate* Perfect Bayesian Equilibrium:

— In period $t = 1$, a good lagging region produces ${g_t}^l \equiv \frac{(1-m)G_t}{\theta_l}$ of the public good if $\theta = \theta_l$ and ${g_t}^h \equiv \frac{(1-m)G_t}{\theta_h}$ of the public good if $\theta = \theta_h$. However, if $\theta = \theta_l$, a bad type lagging region chooses ${g_1}^h \equiv \frac{(1-m)G_1}{\theta_h}$. If $\theta = \theta_h$, a bad type lagging region sets $g_1 = 0$ (embezzles all transfers) in period 1. Therefore, in our candidate equilibrium, a bad type lagging region with $\theta = \theta_l$ has the same production of public goods level as a good type lagging region with $\theta = \theta_h$. However, a bad type lagging region separates when $\theta = \theta_h$ since there is any public good production. A bad type lagging region embezzles all transfers in period 2, regardless of θ.

— The central government's belief in period 1 is given by $\rho_1 = \pi$. The allocation provided to the central government in period $t = 1$, $G_t(\rho_1)$ can therefore be

considered as exogenous and fixed. However, in period $t = 2$, the central government's beliefs can be defined in three different ways: (i) $\rho_2(g_1 = 0) = 0$ meaning that when the central government observes a production level of 0 by the end of period $t = 1$, it does not believe that the lagging region is good type and does not provide any allocation to the lagging region in period $t = 2$; (ii) $\rho_2({g_1}^h) = \frac{q\pi}{q\pi+(1-\pi)(1-q)}$ where $q\pi$ is the probability of a good type region producing g_1^h, and $(1-\pi)(1-q)$ is the probability of a bad type region producing g_1^h; (iii) $\rho_2({g_1}^l) = 1$, meaning that the central government infers that the lagging region is good type as g_1^l is observed.[8]

We now show that our candidate equilibrium is a Perfect Bayesian Equilibrium. If the Agent is a good type, it will be not be strategic: the maximum production level g_t is guaranteed in $t = 1$ and $t = 2$, so that any rent is extracted.

However, if the lagging region is a bad type, it will have a strategic behaviour in period $t = 1$. Therefore, we must define 3 incentive constraints that have to be respected to make the candidate pooling equilibrium, *i.e* a bad type region with low production cost has the same production level as a good type region with high production cost, be a Perfect Bayesian Equilibrium.[9]

— If the bad type lagging region faces $\theta = \theta_l$.

Produce $\frac{(1-m)G_1}{\theta_h}(> 0)$ instead of 0. This so-called *discipline effect* restraints the bad type lagging region to embezzle all the European transfers because the funds are suspended in $t = 2$ if the central government finds out that the lagging region is bad type. It exercises restraint in period $t = 1$ by providing a quantity of public goods that would have been produced with costs θ_h. Assuming extraction costs θ_l when the bad lagging region pools with the good one, the extracted rent is:

$$\frac{(1-m)G_1}{\theta_l} - \frac{(1-m)G_1}{\theta_h} > 0 \tag{4.2}$$

[8]Note that if the central government observes any level of public good production in period $t = 1$ such that $\frac{(1-m)G_1}{\theta_h} < g_1 < \frac{(1-m)G_1}{\theta_l}$, then it knows that the lagging region got a cost draw of θ_l since $g_1 > \frac{(1-m)G_1}{\theta_h}$ is not possible if $\theta = \theta_h$. But since $g_1 < \frac{(1-m)G_1}{\theta_l}$, it can infer that the lagging region has embezzled some European transfers. Also, if $g_1 < \frac{(1-m)G_1}{\theta_h}$, the central government can correctly infer that the lagging region is bad type. Therefore, a reasonable out-of-equilibrium belief for the central government is $\rho_2(g_1) = 0$ if $g_1 \notin \{{g_1}^h, {g_1}^l\}$. In this case, the central government does not provide any allocation to the lagging region in period $t = 2$.

[9]As the game finishes at the end of period 2, it is optimal for the bad Agent to embezzle all European transfers in period $t = 2$ so that no public good production is expected in $t = 2$.

where $\theta_h > \theta_l$. The above restraint can be written as:

$$(1-m)\frac{(\theta_h - \theta_l)G_1(\rho_1)}{\theta_h\theta_l} \tag{4.3}$$

where $\theta_h - \theta_l$ is the cost differential between high production cost θ_h and the low production cost θ_l. Considering that $\rho_2(g_1) = 0$ if $g_1 \neq \{{g_1}^h, {g_1}^l\}$, a bad type lagging region will not deviate from pooling with a good Agent facing $\theta = \theta_h$. For this to be an equilibrium strategy, we require that:

$$(1-m)\frac{(\theta_h - \theta_l)G_1(\rho_1)}{\theta_h\theta_l} + \beta(1-\delta(m,\eta))G_2(\rho 2) \geq (1-m)G_1(\rho_1) \tag{4.4}$$

where β denotes the discount factor between $t = 1$ and $t = 2$. $1 - \delta(m, \eta)$ is the probability that a bad type region is not detected after the inspection carried at the end of period $t = 1$. To sum up, $\beta(1 - \delta(m, \eta))G_2(\rho 2)$ is the expected gain of a bad type lagging region in period $t = 2$. Finally, the right-hand side $(1 - m)G_1(\rho_1)$ is the rent extracted in period $t = 1$ when the bad type lagging region does not produce any public good.

Produce $\frac{(1-m)G_1}{\theta_h}$ instead of $\frac{(1-m)G_1}{\theta_l}$. We must ensure that a bad type lagging region does not benefit from being good, *i.e.* producing $\frac{(1-m)G_1}{\theta_l}$ when it faces θ_l. The resulting incentive constraint is:

$$(1-m)\frac{(\theta_h - \theta_l)G_1(\rho_1)}{\theta_h\theta_l} + \beta(1-\delta(m,\eta))G_2(\rho_2) \geq \beta(1-\delta(m,\eta))G_2(1), \tag{4.5}$$

where the right-hand side term denotes the gain of the bad type lagging region when it produces $\frac{(1-m)G_1}{\theta_l}$in period $t = 1$.

— If a bad type lagging region faces $\theta = \theta_h$.

Produce 0 instead of $\frac{(1-m)G_1}{\theta_h}$ We must ensure that when a bad type lagging region faces $\theta = \theta_h$, it will embezzle all European transfers in period 1 as it is our candidate Perfect Bayesian Equilibrium. Similarly to the previous incentive constraints, this last one can be written as:

$$(1-m)G_1(\rho_1) \geq \beta(1-\delta(m,\eta))G_2(\rho_2). \tag{4.6}$$

It follows that a bad type lagging region will not deviate from our candidate equilibrium in periods $t = 1$ and $t = 2$. Therefore, our candidate equilibrium is indeed a Perfect Bayesian Equilibrium. The game tree representing this equilibrium

can be found in Figure A.1 in the appendix.

4.3.2 Central government's welfare maximisation

In the previous sub-section, the production levels of both types of lagging regions have been determined. We can move to the amount of European transfers provided by the altruistic central government to the lagging region. The central government is considered as altruistic since its welfare depends on the public goods production achieved in its constituent lagging region. Given the strategies of bad and good types previously discussed, the central government's utility associated with $G_1(\rho_1)$ is given by the function $W_P(\rho_1)$:

$$W_{P1}(G_1(\rho_1)) = \rho_1\Big((1-q){g_1^l}^{1/2}+q{g_1}^{h^{1/2}}\Big)+(1-\rho_1)(1-q){g_1}^{h^{1/2}}+\delta(m,\eta)mG_1(\rho_1)-G_1(\rho_1)$$

which is rewritten as:

$$W_{P1} = \rho_1\Big((1-q){g_1^l}^{1/2}+q{g_1}^{h^{1/2}}\Big)+(1-\rho_1)(1-q){g_1}^{h^{1/2}}+(m^{\eta+1}-1)G_1(\rho_1). \quad (4.7)$$

where g_1^l and g_1^h are the public good productions generated by the input $G_1(\rho_1)$. m refers to the share of $G_1(\rho_1)$ that has been allocated in the monitoring effort. We assume that the success of monitoring $\delta(m,\eta)$ leads to the monitoring expenditure mG_1 have a positive welfare as monitoring efforts help detecting bad type regions at the end of $t=1$, avoiding the loss of European transfers in $t=2$. This effort is weighted by the probability of bad type detection, $\delta(m,\eta)$ that depends negatively on η. In other words, if $\eta=0$, *i.e.* full centralisation, the monitoring effort is less costly since the central government will find out the pooling of a bad type with a good one more easily than if $\eta=1$, *i.e.* full decentralisation. The cost of the Cohesion budget financed by the central government's resources is represented by the term $-G_1$.

Noting that the lagging region embezzles all transfers in period $t=2$ and without any monitoring expenditure, it follows that the central government's welfare function is:

$$W_{P2}(G_2(\rho_2)) = \rho_2\Big((1-q)g_2^{h^{1/2}}+qg_2^{h^{1/2}}\Big)-G_2(\rho_2). \quad (4.8)$$

In an independent way, the central government maximises its utility in both

$t = 1$ and $t = 2$. Regarding $t = 1$, $\frac{\partial W_P(\partial\rho_1)}{\partial G_1(\rho_1)} = 0$ leads to:

$$G_1(\rho_1)^* = (1-m)\left[\frac{\rho_1\left(\frac{1-q}{{\theta_l}^{1/2}} + \frac{q}{{\theta_h}^{1/2}}\right) + (1-\rho_1)\frac{(1-q)}{{\theta_h}^{1/2}}}{2(1-m^{\eta+1})}\right]^2. \tag{4.9}$$

Similarly for the period $t = 2$, we have:

$$G_2(\rho_2)^* = \left[\frac{\rho_2\left(\frac{1-q}{{\theta_l}^{1/2}} + \frac{q}{{\theta_h}^{1/2}}\right)}{2}\right]^2. \tag{4.10}$$

4.3.3 Theoretical predictions

Let us now turn to the impact of a higher decentralisation on the lagging region's allocation. To answer this question we must study $\frac{\partial G_1(\rho_1)^*}{\partial\eta}$. We then have:

$$\frac{\partial G_1(\rho_1)^*}{\partial\eta} = (1-m)\frac{2m^{\eta+1}ln(m)}{(1-m^{\eta+1})^3}\left[\frac{\rho_1\left(\frac{1-q}{{\theta_l}^{1/2}} + \frac{q}{{\theta_h}^{1/2}}\right) + (1-\rho_1)\frac{(1-q)}{{\theta_h}^{1/2}}}{2}\right] \tag{4.11}$$

where $\frac{\partial G_1(\rho_1)}{\partial\eta} < 0$ as $ln(m) < 0$ since $m < 1$. We can notice that η does not have any impact on $G_2(\rho_2)^*$ because of the absence of inspection at the end of period $t = 2$. This leads us to our first theoretical proposition:

Proposition 1. *As a monitoring mechanism exists, an increase in the level of regional decentralisation reduces the transfers provided to the lagging region.*

This proposition stems from the fact as decentralisation is increased, the central government's monitoring investment becomes less efficient in detecting bad regional governments. As a result, it increases the expected deadweight loss associated with moral-hazard behaviour, which makes the lagging region's transfers less valuable for the central government.

Referring to equations (4.9) and (4.10), it is easily verifiable that when the central government is more confident about the lagging region's being a good type, the lagging region's allocation increases as the cost savings due to a draw of $\theta \in \{\theta_l, \theta_h\}$ are more likely to be realised. The partial derivative of $G_1(\rho_1)$ with ρ_1 is given by:

$$\frac{\partial G_1(\rho_1)^*}{\partial\rho_1} = \frac{(1-m)}{2(1-m^{\eta+1})^2}\left(\frac{1-q}{{\theta_l}^{1/2}} + \frac{2q-1}{{\theta_h}^{1/2}}\right)\left(\rho_1\left(\frac{1-q}{{\theta_l}^{1/2}} + \frac{q}{{\theta_h}^{1/2}}\right) + (1-\rho_1)\frac{1-q}{{\theta_h}^{1/2}}\right) > 0. \tag{4.12}$$

This condition is fulfilled when $q \geq 1/2$. It is reasonable to assume that $q = 1/2$: the probability to face high production cost is the same as for low production cost. A similar pattern can be observed through the partial derivative of G_2 with ρ_2:

$$\frac{\partial G_2(\rho_2)^*}{\partial \rho_2} = 2\rho_2 \left[\frac{\left(\frac{1-q}{{\theta_l}^{1/2}} + \frac{q}{{\theta_h}^{1/2}} \right)}{2} \right]^2 > 0. \tag{4.13}$$

The following proposition can be made:

Proposition 2. *A reduction of the moral-hazard risk perception by the central government increases the allocation of the lagging region.*

The next section deals with the empirical validation of these two testable theoretical predictions.

4.4 Empirical study

Our empirical analysis relies on both a country and regional level dataset where each time period is defined by a MFF for 119 NUTS-2 lagging regions belonging to 18 countries over the MFFs 1994-99, 2000-06, 2007-13 and years 2014-18 belonging to the 2014-20 MFF.[10] In this study, we focus on a region's i share in the total EU payments of its country c for a given MFF t, $\text{eu}_{i,c,t}$, divided by its demographic weight $\text{dem}_{i,c,t}$. Hence, when $\text{eu}_{i,c,t} > 1$, region i is relatively supported by the Cohesion Policy compared to the remaining constituent regions, and *vice versa*.

We consider a set of explanatory variables related to official criteria affecting the allocation process, and the political forces that could influence the latter.

4.4.1 Official allocation criteria

To fulfil its main purpose, the promotion of real convergence for the least-developed EU regions, the first allocation criterion of the EU funds is the GDP per capita of a region. More precisely, relative GDP per capita of a given NUTS-2 region expressed in purchase power parity (PPS) regarding the European average is considered. For the MFF 1994-99, years 1988-90 are considered. After the accession of Central and Eastern countries (CEE) in the 2000-06 MFF, the eligibility status is differentiated as it is determined on the basis of years 1994-96 for EU-15 countries and 1997-99 for

[10] Croatia, Cyprus, Estonia, Ireland, Latvia, Lithuania, Ireland, Luxembourg and Malta have been excluded since they are constituted by not more than two NUTS-2 region, which would bias our estimates. Data availability issues led us to do not consider Denmark in the analysis. These restrictions conduct to a loss of 19 NUTS-2 regions.

accession countries. Finally, years 2000-02 and 2007-09 are respectively considered for the 2007-13 and 2014-20 MFF.[11] As we are focusing on the national allocation between lagging and advanced regions of a given Member State, regional relative GDP per capita regarding the European average, $\text{gdp}_{i,c,t}$, is normalised with the national one expressed relatively to the European average as well, $\text{gdp}_{c,t}$. Therefore, $\text{gdp}_{i,c,t} > 1$ indicates that region i is wealthier than the national average, while $\text{gdp}_{i,c,t} < 1$ suggests that region i is lagging at the country-level. Therefore, the sample of this study considers regions characterised by $\text{gdp}_{i,c,t} < 1$.

The second main policy goal of the ECP is *Regional Competitiveness and Employment*: this objective targets industrial regions with a rate of unemployment above the EU average and had the aim of strengthening regional competitiveness, attractiveness, and employment. Therefore, we take into account the normalised regional unemployment level, $\text{unp}_{i,c,t}$ as the ratio between the regional unemployment rate and its national average.

Finally, we consider the normalised regional population density, $\text{den}_{i,c,t}$. The density of a region also affects the territorial distribution of funds. In more densely populated and in highly urbanised regions the cost per head or per unit of GDP of providing most public goods is significantly lower than in more scarcely populated areas. Consequently, regions more densely populated are acknowledged to receive less funding than the sparsely populated ones (ESPON (2005)).

4.4.2 Political forces shaping the allocation process

We consider factors related to *pork-barrel politics*, *side-payments theories* and both the testable predictions presented in Section 3. Especially, we are interested in how these political forces shape the allocation process during the bargaining phase. For a given MFF, the reference bargaining year is the last year before the beginning of this given MFF. Therefore, for instance, we assume that the bargaining determining the allocation of the EU funds of the MFF 1989-93 has been conducted in 1988. Following this rule, we consider year 1993 for the MFF 1994-99, year 1999 for the MFF 2000-06, year 20006 for year 2007-13 and year 2013 for the MFF 2014-2020.

The first variable dealing with *pork-barrel politics* is the political alignment of a region with the central government. National executives' vote-buying behaviour may be constrained by partisan alignment with regional chief executives. In line

[11] See the EU Council Regulations 595/2006 and 189/2007. The same time periods are considered for the remaining official allocation criteria: regional unemployment and regional population density.

with this reasoning, there is evidence that regional executives politically aligned with national executives receive larger amounts of EU funding (Bouvet & Dall'Erba (2010); Bodenstein & Kemmerling (2011); Chalmers (2013)). Therefore, we consider the variable $\text{ali}_{i,c,t}$ that takes the value -1 if a region i is not politically aligned with the central government during the bargaining process. When NUTS-2 regions of our sample are only administrative units, mostly in the UK and CEE countries, we consider that $\text{ali}_{i,c,t}$ is attributed the value of 0.

The political party position of the leading regional authority, *i.e.* left-wing or right-wing, has found support in earlier studies (Kemmerling & Bodenstein (2006); Bouvet & Dall'Erba (2010); Dellmuth (2011)), but its effect has been found as insignificant in more recent studies (Chalmers (2013); Dellmuth et al. (2017)). To take into account this potential effect, we include the variable $\text{pos}_{i,c,t}$ that stands for the political position on a left-right scale of a region i normalised by the political position of the central government during the bargaining process. That stands for the political position on a left-right scale of a region i normalised by the political position of the central government during the bargaining process.[12]

We finally investigate the *core-voters hypothesis* that has found important empirical support in the case of the EU funds with a positive conditional impact of a high regional electoral margin on the amount of received European transfers (Dellmuth & Stoffel (2012); Schraff (2014); Dellmuth et al. (2017)). To this effect, we introduce the variable $\text{mar}_{i,c,t}$ that stands for the electoral margin of a region i normalised by the electoral margin of the central government in the last national election preceding the bargaining process of a given MFF. $\text{mar}_{i,c,t} > 1$ indicates that the electoral margin of region i is higher than the one obtained by the central government, while the opposite holds when $\text{mar}_{i,c,t} < 1$.

Switching to *side-payments theories*, we first consider the role of the Eurosceptic vote, that has not found empirical support (Dellmuth (2011); Chalmers (2013)). The variable $\text{eur}_{i,c,t}$ represents the eurosceptic vote of a region i normalised by the national eurosceptic vote share in the last national election preceding the bargaining process of a given MFF. $\text{eur}_{i,c,t} > 1$ indicates that the eurosceptic vote of region i is higher than the national one, while the opposite holds when $\text{eur}_{i,c,t} < 1$.

Finally, let us consider the variables dealing with the testable predictions emphasised in the model of Section 3.

Our first testable prediction is the impact of regional autonomy on the allocation received by a given region. To investigate this hypothesis, we consider the regional

[12]It is worth mentioning that in the absence of a formal leading regional authority, we consider a missing value

self-rule level of Hooghe et al. (2010) during the bargaining process of a given MFF, $sfr_{i,t}$, as a proxy for regional autonomy. A positive and significant coefficient associated to the regional self-rule would validate the first theoretical prediction. We choose the regional self-rule index of Hooghe et al. (2010) consistently with several studies on this topic to proxy for regional autonomy (see, *e.g.*, Chalmers (2013), Charron (2016), Dellmuth et al. (2017)). It should be mentioned that $sfr_{i,t}$ has not be centred relatively to national average values. Indeed, a substantial number of member states are characterised by homogeneous level of $sfr_{i,t}$ across their constituent regions, such a procedure would bias the estimation of the impact of regional self-rule as many regions with different level of regional autonomy would have a centred self-rule of 0.

Secondly, to study the impact of the moral-hazard risk perception by the central government, we must define the regional absorption rate $abs_{i,c,t}$ as:

$$abs_{i,c,t} = \frac{budget_{i,t-1}{}^{spent}}{budget_{i,t-1}} \tag{4.14}$$

where $budget_{i,t-1}{}^{spent}$ denotes the payments of the last MFF $t-1$ made for a region i during this given MFF. For instance, if $a_{i,c,t}$ is 0.1, it means that only 10% of payments have been made on time. It goes without saying that the lagged term of absorption performance ($t-1$ associated to t) is chosen because a central government observes the last absorption performance of a given constituent region. We then normalise $a_{i,c,t}$ with the national average absorption rate to obtain $abs_{i,c,t}$. When $abs_{i,c,t}$ is higher than 1, region i is characterised by a higher absorption than the national average, while the opposite holds when $abs_{i,c,t}$ is lower than one. It is worth mentioning that $abs_{i,c,1994-99}$ is related to expenditure of the MFF 1989-1993, $abs_{i,c,2000-06}$ to the MFF 1994-99 and so on. We choose this proxy as the absorption speed of the EU funds constitutes a policy target for the European Commission. Indeed, it is considered as a pillar of absorption capacity as the latter is defined as "the ability to use the financial resources made available [...] on the agreed actions and according to the agreed timetable" by the European Commission.[13] While the second chapter of this thesis has shown the adverse impact of absorption speed on the economic effectiveness of the EU funds, we still consider this variable in this analysis since the absorption speed is a determinant of the regional allocation of the EU funds (see, *e.g.*, Chalmers (2013)).

Table 4.3 presents summary statistics of the variables used in the analysis. A few interesting observations can be made: (i) on average, national lagging regions

[13]Final report - ERDF and CF expenditure. Contract No 2007.CE.16.0.AT.036.

are characterised by a per capita GDP 17% lower than the national average; (ii) an unemployment rate 12% higher; (iii) a similar absorption speed than the national average (only 1% lower). Consistently with the second chapter of this thesis, this figure supports the fact that absorption speed might not be a trustworthy signal for regional absorption capacity as we would expect lower values for lagging regions, since they are indeed acknowledged as having lower absorption capacity levels (see, *e.g.*, Becker et al. (2013)).

Table 4.3 – Normalised variables with national averages, descriptive statistics NUTS-2 level.

Variable	**Mean**	**S.D.**	**Minimum**	**Maximum**
EU funds share	1.76	2.91	0.03	23.32
L.EU funds share	1.93	3.33	0.03	26.95
Relative GDP per capita	0.83	0.10	0.41	1.00
Unemployment	1.12	0.45	0.38	3.59
Population density (log)	0.99	0.20	0.15	1.94
Regional political alignment	0.07	0.81	-1	1
Political position	1.06	0.47	0.18	2.45
Electoral margin	0.83	17.01	-15.75	20.00
Eurosceptic vote	0.90	0.44	0	3.36
EU funds absorption	0.99	0.052	0.71	1.20
Regional self-rule	0.59	0.27	0.06	0.88
Institutional depth	0.75	0.22	0.33	1
Policy scope	0.49	0.25	0	0.75
Fiscal autonomy	0.33	0.28	0	0.75
Borrowing autonomy	0.49	0.33	0	1
Representation	0.74	0.33	0	1

Observations: 552. *Source*: See Table A4.1 in the appendix.

4.4.3 Empirical model

Following the two predictions of our theoretical model, we implement the following specification:

$$\text{eu}_{i,c,t} = \beta_1 \text{eu}_{i,c,t-1} + \beta_2 \text{sfr}_{i,t} + \beta_3 \text{abs}_{i,c,t} + \text{X}_{i,c,t} + \mu_i + \lambda_\rho + \epsilon_{i,c,\rho} \tag{4.15}$$

where $eu_{i,c,t}$ is the relative share of a region in the national EU funds allocation. $X_{i,c,t}$ is a vector of controls including regional relative per capita GDP, unemployment, population density and the variables related to the *pork-barrel politics* and *side-payments* theories. μ_i denotes regional fixed effects, and λ_ρ represents MFF time dummies.

Regarding the first theoretical prediction, *i.e.* an increase in the level of regional decentralisation has an adverse impact on the allocation of the lagging region, it will be empirically verified if β_2 is positive and significant. In other words, an increase of the level of self-rule is more beneficial to a wealthy region rather than a lagging one, which turns to less redistribution of the Cohesion Policy.
The second theoretical prediction is that a reduction of the moral-hazard risk perception by the central government has a positive impact on the allocation of the lagging region. To achieve the empirical validation of this hypothesis, β_3 must be significant and negative.

We provide several model specifications in columns (I to V). Column (I), our baseline model, reports estimations for the impact of the official allocation criteria of the ECP: GDP per capita, unemployment and population density. Columns (II-III) adds respectively controls for *pork-barrel politics* (political position of the regional leading party, regional electoral margin and alignment with the central government) and *side-payments* (regional eurosceptic vote). Column (IV) adds the regional absorption speed term. Finally, Column (V) includes the regional self-rule level.

4.4.4 Baseline results

We present the estimation results obtained by system-GMM of Blundell & Bond (1998) in Table 4.4 . Overall, the Arellano-Bond tests for AR (1) and AR (2), the Hansen tests of overidentifying restrictions and exogeneity of instruments are generally verified. Considering the rule of thumb associated with GMM estimations, the number of instruments does not exceed the number of groups so that the Hansen test is not weakened by many instruments and provides robust conclusions. The robust significance of the dependent variable's lagged term legitimates the use of system-GMM to conduct our estimations.

The estimation results in Table 4.4 suggests that the first testable prediction is empirically valid: more decentralisation leads to less internal redistribution towards the national lagging regions. Indeed, the positive and significant coefficient associated to the self-rule term suggests that a higher level of regional autonomy is associated with a lower share in the national allocation. This result is consistent with the validation of our first theoretical prediction as regional decentralisation reduces the control exerted by the central government on its constituent regions. As a result, the potential risk related to moral-hazard is increased in the lagging regions as they are those with the lowest absorption capacity (Becker et al. (2013).

Regarding the second theoretical prediction, the obtained results are not in

accordance with the few previous studies (Dellmuth (2011), Chalmers (2013)). Indeed, our estimates indicate that absorption speed does not appear as having any significant impact on the regional allocation. A potential explanation would be that these studies do not restrict their sample to the lagging regions. A second reason behind this result would be that central governments do not trust absorption speed as a signal for regional absorption capacity.

About the official allocation criteria, we find that regions having a higher unemployment than the national average receive more EU funds. However, while relative GDP per capita regarding the national average has the expected detrimental impact on a region's share in the national EU funds allocation, this impact is not robust. Population density is found to be insignificant as well. These estimation results highlight the fact that official allocation criteria are not sufficient predictors of the actual EU funds allocation (see, *e.g.*, Bouvet & Dall'Erba (2010); Bodenstein & Kemmerling (2011); Dellmuth (2011); Charron (2016); Dellmuth et al. (2017); Cerqua & Pellegrini (2018)).

Regarding other variables related to *pork-barrel politics*, we do not find any robust and significant relation. Otherwise, our results indicate that the most eurosceptic national lagging regions tend to receive relatively less EU funds. Therefore, it appears that central governments do not compensate the aversion towards the EU with more European transfers.

4.4.5 Additional results

In this section, we conduct additional regressions to explore which dimension of regional self-rule drives its detrimental impact on the national lagging regions' allocation. For this purpose, we conduct five regressions using the five sub-indicators of the regional self-rule of Hooghe et al. (2010): (i) institutional depth is the extent to which a regional government is autonomous (column (I)) ; (ii) policy scope is the range of policies for which a regional government is responsible (column (II)); (iii) fiscal autonomy is the extent to which a regional government can independently tax its population (column (III)); (iv) borrowing autonomy is the extent to which a regional government can independently issue debt (column (IV)) ; and (v) representation is the extent to which a region is endowed with an independent legislature and executive power(column (V)).

The estimation results in Table 4.5 reveal that four out of five sub-components drive the validity of our first testable prediction:

The significant negative impact of institutional depth, policy scope, fiscal auton-

Table 4.4 – System-GMM estimation results

	(I)	(II)	(III)	(IV)	(V)
L. EU funds	0.548***	0.459***	0.389***	0.406***	0.412***
	(0.090)	(0.138)	(0.132)	(0.112)	(0.111)
GDP per capita	-0.053	-0.566	-3.044	-3.878	-2.375
	(1.960)	(2.981)	(2.776)	(3.548)	(2.853)
Unemployment	1.199***	1.876	2.101***	1.945***	2.351***
	(0.417)	(1.160)	(0.553)	(0.500)	(0.552)
Density	0.798	1.138	2.125	1.877	1.869
	(1.254)	(3.051)	(2.124)	(1.764)	(1.697)
Position		-0.202	0.055	0.097	0.053
		(0.263)	(0.272)	(0.288)	(0.269)
Margin		0.002	0.006	0.005	0.006
		(0.007)	(0.009)	(0.009)	(0.009)
Alignment		0.070	0.077	0.075	0.072
		(0.118)	(0.083)	(0.081)	(0.108)
Eurosceptic			-0.780**	-0.836**	-0.963**
			(0.341)	(0.319)	(0.395)
L.Absorption				0.660	-0.286
				(1.725)	(2.305)
Self-rule					-1.678**
					(0.711)
Constant	-1.524	0.084	0.083	0.036	0.969
	(2.556)	(2.571)	(2.571)	(3.762)	(3.521)
Observations	552	353	353	353	353
Number of regions	184	119	119	119	119
Number of instruments	42	45	55	65	64
Arellano-Bond Tests					
Arellano-Bond AR(1)	0.070*	0.099*	0.070*	0.066*	0.100*
Arellano-Bond AR(2)	0.196	0.327	0.322	0.319	0.303
Hansen overid. restrictions, p.value	0.204	0.070*	0.242	0.551	0.078*
Hansen exogeneity instruments, p.value	0.208	0.194	0.317	0.782	0.169

Notes: This table reports the estimation results using the system GMM estimator developed by Blundell & Bond (1998), where dependent variable presents the share of a NUTS-2 region in the total national allocation. EU funds variable is treated as endogenous, whereas other regressors (excluding time dummies and population density) are considered to be predetermined. All variables excepted regional alignment and self-rule are normalised around the national average value.
Strictly exogenous regressors: Margin, Alignment, Position, Self-rule and time dummies.
Pre-determined regressors: L. EU funds, GDP per capita, Unemployment, Density, Unemployment, Eurosceptic, L. Absorption.
Time fixed effects included. Robust standard errors in parentheses. * denotes $p < 0.10$; ** $p < 0.05$; ***$p < 0.01$.

omy and representation illustrate that the more a lagging region's government has a broader range of policies that can be conducted independently from the influence of the central government, the less important is the allocation of the national lagging region. This emphasises the importance of the control that could be exerted by the central government on lagging regions, in a context of moral-hazard risk, to determine the final regional allocation of the EU funds.

However, regarding absorption speed performance, we do not observe any significant impact on the regional relative share of EU funds. This confirmation indicates that central governments do not trust absorption speed as a signal for regional absorption capacity. This result is complementary to the second chapter of this thesis where it has been shown that a faster absorption leads to less economic effectiveness in the lagging region. Especially, high absorption speed can be the outcome of manipulations from central governments to send good signals to the European Commission (Huliaras & Petropoulos (2016)) with the use of strategies such as retrospective projects (Aivazidou et al. (2020)).

About the remaining variables, the estimation results are qualitatively similar: (i) official allocation criteria are insufficient predictors as only unemployment has a robust and positive impact on the allocation of a lagging region; (ii) Euroscepticism appears to be a penalising factor, (iii) *pork-barrel politics* variables do not show any significant impact.

Table 4.5 – System-GMM estimation results with different components of regional self-rule

	(I)	(II)	(III)	(IV)	(V)
L. EU funds	0.418***	0.389***	0.401***	0.390***	0.402***
	(0.135)	(0.125)	(0.107)	(0.130)	(0.113)
GDP per capita	-2.428	0.098	-3.119	-5.932	-2.016
	(3.635)	(2.594)	(2.865)	(3.975)	(2.807)
Unemployment	2.164***	3.125***	2.350***	2.095***	2.533***
	(0.560)	(0.675)	(0.477)	(0.572)	(0.630)
Density	4.134**	2.893*	2.210	2.441	2.165
	(2.035)	(1.696)	(1.718)	(2.182)	(1.777)
Position	-0.009	0.092	0.138	0.107	0.0566
	(0.266)	(0.318)	(0.246)	(0.309)	(0.286)
Margin	0.005	0.004	0.006	0.007	0.005
	(0.007)	(0.009)	(0.008)	(0.009)	(0.008)
Alignment	0.043	0.089	0.078	0.058	0.083
	(0.108)	(0.106)	(0.091)	(0.089)	(0.105)
Eurosceptic	-0.925**	-1.373***	-0.968***	-0.795**	-0.993**
	(0.373)	(0.516)	(0.343)	(0.378)	(0.437)
L.Absorption	0.856	0.619	-0.206	1.070	0.045
	(2.267)	(2.437)	(2.111)	(1.405)	(2.375)
Inst. depth	-1.258**				
	(0.552)				
Policy scope		-1.967**			
		(0.967)			
Fiscal autonomy			-1.073*		
			(0.565)		
Borrowing autonomy				-0.018	
				(0.488)	
Representation					-0.513**
					(0.213)
Constant	-2.624	-3.800	-0.056	1.003	0.619
	(3.359)	(3.725)	(3.172)	(2.729)	(3.543)
Observations	353	353	353	353	353
Number of regions	184	119	119	119	119
Number of instruments	71	74	64	64	64
Arellano-Bond Tests					
Arellano-Bond AR(1)	0.078*	0.136	0.083*	0.062*	0.113
Arellano-Bond AR(2)	0.295	0.289	0.313	0.312	0.302
Hansen overid. restrictions, p.value	0.065*	0.100*	0.133	0.305	0.084*
Hansen exogeneity instruments, p.value	0.295	0.159	0.112	0.297	0.100*

Source: This table reports the estimation results using the system GMM estimator developed by Blundell & Bond (1998), where dependent variable presents the share of a NUTS-2 region in the total national allocation. EU funds variable is treated as endogenous, whereas other regressors (excluding time dummies and population density) are considered to be predetermined. All variables excepted regional alignment and different components of self-rule are normalised around the national average value. Strictly exogenous regressors: Margin, Alignment, Position, Self-rule and time dummies

Pre-determined regressors: L. EU funds, GDP per capita, Unemployment, Density, Unemployment, Eurosceptic, L. Absorption.

Time fixed effects included. Robust standard errors in parentheses. * denotes $p < 0.10$; ** $p < 0.05$; ***$p < 0.01$.

4.5 Conclusion

This chapter formalises the framework of the burgeoning literature dealing with the allocation of the EU funds and illustrating the political economy of the Cohesion Policy. Based on a 119 NUTS-2 national lagging regions dataset covering 18 Member states over the period 1989-2018, we confirm that increased regional autonomy is detrimental to the amounts of European transfers received by national lagging regions, those having a GDP per capita lower than the national average. A second prediction of our theoretical setting is that a lower moral-hazard risk perception by the central government has the opposite effect. The key theoretical feature behind both these results is a signalling game between the central government and its lagging region.

These theoretical findings are partially confirmed by our empirical exercise. Regarding regional decentralisation, the latter is proxied by the regional self-rule index of Hooghe et al. (2010). Our results indicate that more decentralisation is detrimental to lagging regions' allocation. Secondly, to proxy for the moral-hazard risk of a national lagging region, we have considered the absorption speed of the last MFF, consistently with studies as Dellmuth (2011) and Chalmers (2013). However, our estimation results do not find any significant relation between absorption speed and final regional allocation. This result underlines the findings of the second chapter of this thesis. Indeed, it has been shown that fast absorption is harmful for the economic effectiveness of the Cohesion Policy in lagging regions. As central governments can be involved in strategies aiming at artificially increasing absorption speed (retrospective projects), it seems consistent that they do not consider absorption speed as a reliable proxy for regional absorption capacity.

Overall, our study reveals that recent regional decentralisation trend favours are detrimental for national lagging regions. In order to deal with the persistent regional disparities at the national level, one has therefore to prevent the weakening of the redistributive feature of the Cohesion Policy. Our findings suggest that an institutional reform as an allocation rule guaranteeing a minimal share of national allocations for lagging regions could help to maintain a minimum level of national redistribution.

4.6 Appendices

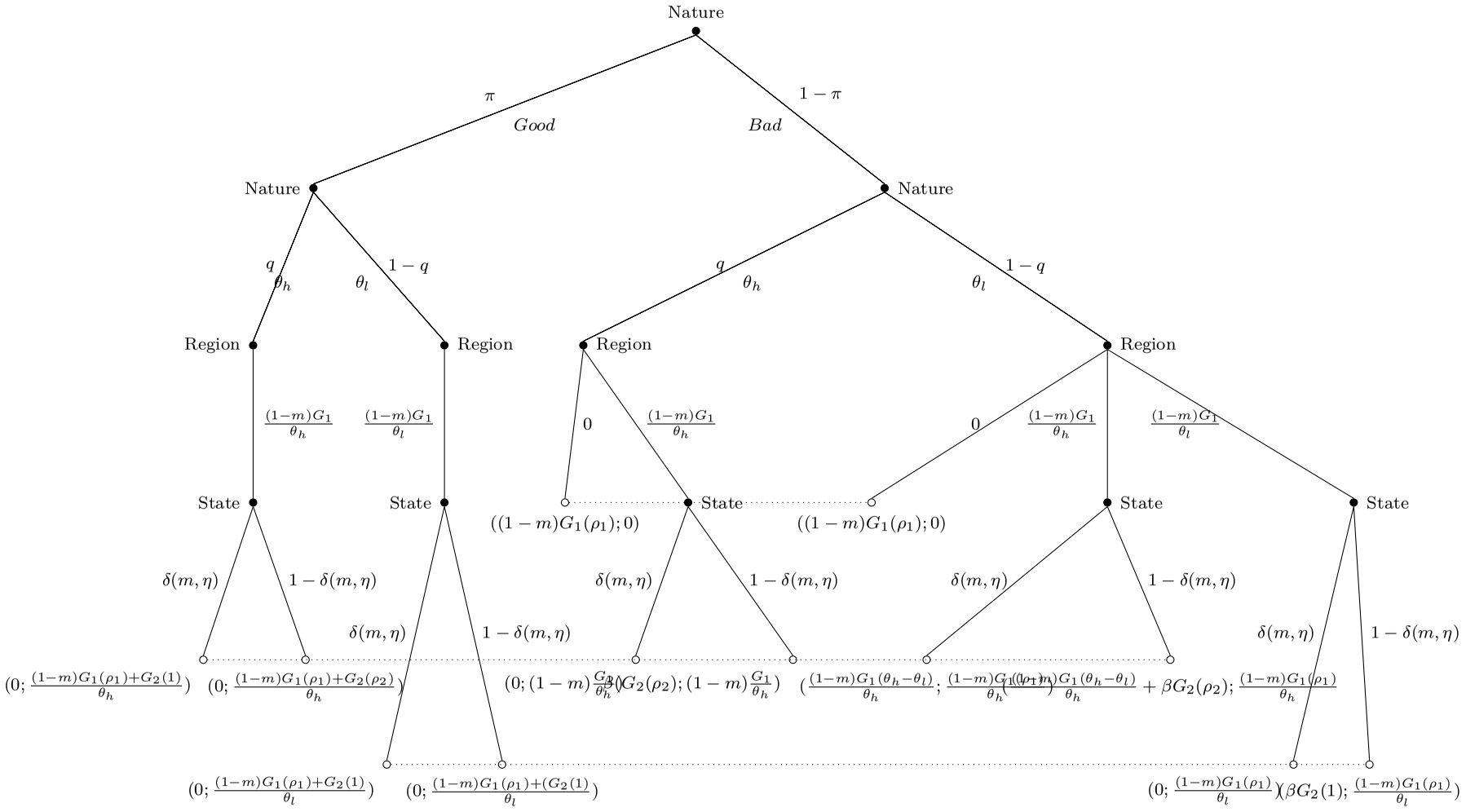

Figure A4.1 – Game tree

Note: $\rho_1 = \pi$; $\rho_2 = \frac{q\pi}{q\pi+(1-\pi)(1-q)}$. When an inspection is launched, there is a probability $\delta(m, \eta)$ that the type of a region is revealed.

Table A4.1 – Variables definition and data sources

Variable	Variable definition	Source
EU funds share	Regional share in the total national allocation of the EFRD, ESF and CF in a given MFF (%)	Regionalisation of ESIF payments 1989-2018 database from Lo Piano et al. (2017).
Regional relative GDP per capita	A share of regional GDP per capita in PPS relatively to the European average. (i) Years 1983-85 for programming period 1989-93(ii) Years 1988-90 for programming period 1994-99 (iii) Years 1994-96 for programming period 2000-06 (97-99 for new countries), (iv) years 2000-02 for programming period 2007-13 and (v) years 2007-09 for programming period 2014-16	Eurostat and Cambridge Econometrics.
Regional unemployment	Regional unemployment (%) and same reference years than Relative GDP per capita	Cambridge Econometrics.
Regional population density	Regional population density (number of inhabitants per squared km) and same reference years than Relative GDP per capita	Cambridge Econometrics.
Regional political alignment	Discrete variable with the value 1 if a region is aligned with the national government, -1 if not and 0 in the case of absence of any regional government.	Various data sources.
Regional relative political position	Regional government's leading party is placed on a 10-point scale with 0 being the extreme left, 5 being centre and 10 being the extreme right.	Index of Benoit & Laver (2006) from ParlGov database.
Regional electoral margin	Regional difference between the national leading party and its challenger in the last national election	European Election Database from the Norwegian Centre for Research Data (NSD).
Eurosceptic vote	Regional share of the eurosceptic political parties in the last national election. Euroscepticism is measured on a 1 to 7 scale, with 1 being "strongly opposed" and 7 being "strongly in favour". Lower scores correspond to greater anti-EU sentiments. A score lower than 3.5 has been taken on.	Index of Hooghe et al. (2008) from the Chapel Hill electoral survey to describe a political party as an eurosceptic party. European Election Database from the NSD to measure its vote share.
Regional self-rule	Constitutional strength, political and fiscal autonomy measured on a 0 to 17-point scale. 0 being the lowest regional autonomy level and 17 being the highest.	Regional Authority Index (RAI) from Hooghe et al. (2010).
Regional EU funds absorption	Regional share of the allocated budget of a given MFF spent during this MFF	Regionalisation of ESIF payments 1989-2018 database from Lo Piano et al. (2017).

Notes: we present only regional variables for sake of brevity. National variables have the exact same definitions and data sources.

General conclusion

The European structural funds have aimed to reduce the economic disparities between the regions of the EU since the creation of the European Economic Community in 1957. Over the last decade, the challenge of economic convergence seems to have shifted from the East towards the South with an economic catching-up process which is coming to an end for certain central European economies, but with a dynamic of emerging divergence in the Mediterranean economies. The latter were notably characterized by a lack of growth in GDP per capita as the economies of Western and Northern Europe experienced a phase of expansion in the years following the euro zone sovereign debt crisis. It follows that the interests of the EU and the EMU converge, as evidenced by the adoption of the *NextGeneration EU* recovery plan at the European Council of 21 July 2020. The latter aims to accelerate the recovery phase following the recession of the Covid-19 pandemic, which could generate *de facto* an alignment of the economic cycles of the South and of the other Member States of the Euro zone. The concept of *economic effectiveness* attributed to the structural funds must therefore be broadened to consider the impact on economic growth on the one hand, but also on the economic cycles of recipient countries on the other hand. In a context where the Union's priorities are diversifying, in particular with the environmental challenge, and where its budget constraint has been accentuated since the departure of the United Kingdom, the *economic effectiveness* of the Cohesion policy is central. However, the latter is reduced by the way in which the Cohesion policy is implemented. The allocation of funds between regions and beneficiary countries is not optimal in the sense that it does not allow maximum economic growth gain to be achieved. But also, the strategic interactions linked to the process of allocating structural funds at the regional level, in particular the risk of moral hazard which threatens a complete absorption of European funds, diverts structural funds from support to the poorest regions and reduces the quality of some EU-funded investment projects. Overall, this thesis is composed of four studies having their own research questions to bring both empirical and theoretical contributions around the analysis of *economic effectiveness* of the structural funds, and their *allocation*. The three main European structural funds are considered, namely the European Regional Economic Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF).

Regarding the aspect of the *economic effectiveness*, this thesis offers to broaden the field of economic effectiveness associated to the European funds by considering

their impact on the business cycles. In this context, the **chapter 1** is the first empirical work that considers the impact of the EU funds on the synchronization of economic cycles in the EMU. It attempts to analyze this for the 28 EU countries over the period 2000-2016. This chapter shows that structural funds generate a positive externality in terms of increased synchronicity between EU countries. The empirical results are qualitatively similar and robust to the use of different estimators (OLS, panel IV) and different business cycle filtering techniques (Hodrick-Prescott, Christiano-Fitzgerald). The effects are larger if one takes into account the EMU membership, which suggests that the adoption of the common currency accentuates these positive effects.

The **chapter 2** adds a new dimension in the study of this conditional economic effectiveness by highlighting the dilemma between a fast absorption and a high impact on economic growth in the Objective 1 regions. Indeed, this chapter shows that the desire to accelerate the absorption of European funds, in particular for the poorest regions, is a harmful political objective which reduces the economic effectiveness of the cohesion policy. It studies the impact of the Objective 1 treatment in 256 regions of the EU over the period 2000-2016 using regressions on discontinuity with heterogeneous effects. In particular, this chapter highlights that Objective 1 regions, which are the core recipient regions of the Cohesion policy, sell off the quality of their investment project with easy-to-spend solutions in order to meet the deadlines for the implementation of investment projects financed by the EU. Central governments can also artificially increase the rate of absorption of structural funds with strategies such as the use of retroactive projects. This chapter therefore highlights that fast absorption is not a reliable signal of high absorption capacity. The incentives put in place to accelerate the absorption of funds, such as the (*n +2 rule*), are therefore detrimental to the economic effectiveness of the Cohesion policy.

Regarding the *allocation* of the European funds, the **chapter 3** considers the final allocation of the European funds between beneficiary countries and exposes that the observed allocation of the European funds is different from an optimal allocation maximising the economic effectiveness. It highlights that political biases in the allocation of structural funds lead to a sub-optimality in their allocation in the sense that economic growth is not maximized in the beneficiary Member States. Through a normative approach, this is demonstrated in the case of the Cohesion Fund. An optimization problem is posed there, the theoretical solution simulated using empirical simulations of a growth equation constitutes the optimal allocation

of the Cohesion Fund for the multiannual financial framework 2014-2020. This solution was empirically simulated with the estimation results of a growth equation covering 17 countries for the period 1995-2015 with the generalized moments method of Blundell & Bond (1998). The optimality of this allocation is based on the principles of *effectiveness* and *equity* which allow, respectively, a greater economic impact on a global scale, and a reorientation of financial support towards poorer economies with a greater relative demographic weight. The significant differences between the optimal allocation and the observed allocation highlight the existing political biases that undermine the achievement of the objective of economic convergence as the over-representation of *small countries*.

Finally, the **chapter 4** shows that the intranational allocation of the structural funds is subject to political forces. The interactions between the constituent regions and the central government are modelled and tested empirically. One of the characteristics of the Cohesion policy is that a negotiation between a central government and its constituent regions determines the final allocation of structural funds. With a view to ensuring a relatively rapid complete absorption of funds, central governments may be tempted to favour the most advanced regions, or their own lagging regions if they can exercise control therein to minimize any risk of moral-hazard. The **chapter 4** therefore proposes a theoretical model of the signalling game between a central government and its lagging regions which makes it possible to formalize the strategic incentives which the latter is subject to. This game is followed by a problem of maximizing the welfare of the altruistic central government, which relies entirely on the production of public goods of its constituent regions. It shows that a central government is less willing to direct structural funds towards its less advanced regions when their level of regional autonomy is high. Considering a sample of 119 regions with a GDP per capita lower than their national average over the period 1989-2018, the estimations carried out with the method of generalized moments of Blundell & Bond (1998) illustrate that an increasing level of regional autonomy apprehended with the *self-rule* level of Hooghe et al. (2010) reduces the control of the central government over its constituent regions. Reforms in favour of regional decentralization therefore tend to favor regions with a strong absorption capacity, which are the most advanced regions. This trend has accelerated over the last decade since the *Barca* report (Barca (2009) which aimed to reform the Cohesion policy by territorializing it. However, only urban regions have been in able to adapt to this reform, the peripheral regions did not have the means to do so, in particular due to limited administrative resources. A second theoretical result of the **chapter 4** is that

a reduced perception of moral hazard risk is beneficial for the poorest regions. However, by considering the speed of absorption of funds as a signal for moral hazard risk, the empirical estimations carried out do not validate this second theoretical prediction. This echoes discussions in **chapter 3** that concluded that absorption rate is not a reliable signal of absorptive capacity.

Limits and future research pespectives

In general, the study of the *economic effectiveness* of the structural funds must be extended to other fields than economic growth, the economic policy targets of the EMU must also be taken into account. Thus, although this thesis has been considering the impact of structural funds on the synchronization of economic cycles, only the direct impact of these funds has been measured in the first chapter of this thesis. A more detailed analysis seeking to determine which variables increase or decrease this impact could be carried out. In addition, a dis-aggregation of data based on the type of projects financed, *i.e* transport infrastructure or R&D projects, would provide more information on the nature of the impact of structural funds on economic cycles. Within the framework of the European Semester, such knowledge would allow a better quality of economic governance within the EU, and particularly within the EMU.

This thesis also calls for broadening the field of *economic effectiveness* studies by considering the institutional architecture of the Cohesion policy. Thus, it has been shown here that the incentives aimed at accelerating the absorption of structural funds have a negative impact on the capacity of the European funds to stimulate the economic growth in the Objective 1 regions. Moreover, the second chapter has shown that the speed of absorption of structural funds is not a reliable signal for the absorption capacity. This raises the question of finding an indicator capable of measuring the good use of the structural funds. This indicator should be measurable in near real time in order to be used by policymakers.

Regarding the *allocation* of the EU funds, the third chapter, which resulted in an optimal allocation of the Cohesion Fund, paves the way for other definitions of optimality that can be applied to other structural funds. Thus, other criteria, policies such as respect for the rule of Law, or environmental criteria such as the reduction of greenhouse gases, could be considered. In addition, the donor was assumed to be totally benevolent, or altruistic. Other extensions with an interested donor with specific objectives can be carried out in other analytical frameworks.

Finally, the broader future research implications are undoubtedly given by the

last chapter, exploratory in the formalization of the forces which are exerted during the process of allocation of the structural funds. This *allocation* process involves strategic interactions between the European Commission, the Member States and their constituent regions. A Principal-Agent framework involving these actors could be a more advanced theoretical framework to explore this research question. Finally, in a context where the reduction of economic disparities within the EU has mainly been driven by the catching up of the economies of Central and Eastern Europe, *i.e.* a reduction in inter-regional inequalities, this chapter calls for further work on regional inequalities at the intranational level.

Conclusion générale

Les fonds structurels européens ont pour objectif de réduire les disparités économiques entre les régions de l'UE depuis la création de la Communauté Économique Européenne en 1957. Depuis la dernière décennie, le défi de la convergence économique semble s'être déplacé de l'Est vers le Sud avec un processus de rattrapage économique qui arrive à son terme pour certaines économies d'Europe centrale, mais avec une dynamique de divergence émergente des économies méditerranéennes. Ces dernières ont notamment été caractérisées par une absence de croissance du PIB par habitant alors que les économies d'Europe de l'Ouest et du Nord ont expérimenté une phase d'expansion dans les années suivant la crise des dettes souveraines de la zone Euro. Il en découle que les intérêts de l'UE et de l'UEM convergent, en témoigne l'adoption du plan de relance *NextGeneration EU* lors du conseil européen du 21 juillet 2020. Ce dernier a pour but d'accélérer la phase de reprise suivant la récession de la pandémie du Covid-19, ce qui pourrait générer *de facto* un alignement des cycles économiques du Sud et des autres États Membres de la zone Euro. La notion d'*efficacité économique* attribuée aux fonds structurels doit donc s'élargir pour considérer l'impact sur la croissance économique d'une part, mais aussi sur les cycles économiques des pays receveurs d'autre part. Dans un contexte où les priorités de l'Union se diversifient, notamment avec le défi environnemental, et où sa contrainte budgétaire s'est accentuée depuis le départ du Royaume-Uni, l'*efficacité économique* de la politique de Cohésion est un central. Or, cette dernière est réduite par la manière dont la politique de Cohésion est menée. L'allocation des fonds entre régions et pays bénéficiaires n'y est pas optimale au sens où elle ne permet pas d'atteindre un gain de croissance économique maximal. Mais aussi, les intéractions stratégiques liées au processus d'allocation des fonds structurels à l'échelle régionale, notamment le risque d'aléa-moral qui menace une absorption complète des fonds européens, détournent les fonds structurels du soutien vers les régions les plus pauvres et réduisent la qualité de certains projets d'investissement financés par l'UE. Globalement, cette thèse est composée de quatre études ayant leurs propres questions de recherche pour apporter des contributions à la fois empiriques et théoriques autour de l'analyse de la *efficacité économique* des fonds structurels, et de leur *allocation*. Les trois principaux fonds structurels européens sont considérés, à savoir le Fonds européen de développement économique régional (FEDER), le Fonds social européen (FSE) et le Fonds de cohésion (FC).

Concernant la notion d'*efficacité économique*, cette thèse propose d'en élargir le champ en considérant l'impact des fonds européens sur les cycles économiques. Dans ce contexte, le **chapitre 1** est le premier travail empirique qui considère l'impact des fonds de l'UE sur la synchronisation des cycles économiques dans l'UEM. Il analyse cela pour les 28 pays de l'UE sur la période 2000-2016. Ce chapitre montre que les fonds structurels génèrent une externalité positive en termes de synchronicité accrue entre les pays de l'UE. Les résultats empiriques sont qualitativement similaires et robustes à l'utilisation de différents estimateurs (OLS, panel IV) et de différentes techniques de filtrage du cycle économique (Hodrick-Prescott, Christiano-Fitzgerald). Les effets sont plus importants si l'on prend en compte l'adhésion à l'UEM, ce qui suggère que l'adoption de la monnaie commune accentue ces effets positifs.

Le **chapitre 2** ajoute une nouvelle dimension à l'étude de cette efficacité économique conditionnelle en mettant en évidence le dilemme entre une absorption rapide et un impact élevé sur la croissance économique dans les régions de convergence. En effet, ce chapitre montre que la volonté d'accélérer l'absorption des fonds européens, en particulier pour les régions les plus pauvres, est un objectif politique néfaste qui réduit l'efficacité économique de la politique de cohésion. Il étudie l'impact du traitement Objectif 1 dans 256 régions de l'UE sur la période 2000-2016 en utilisant des régressions sur la discontinuité à effets hétérogènes. En particulier, ce chapitre souligne que les régions de l'Objectif 1, qui sont les principales régions bénéficiaires de la politique de cohésion, bradent la qualité de leur projet d'investissement avec des solutions de dépenses faciles afin de respecter les délais de mise en œuvre des projets d'investissement financés par l'UE. Les gouvernements centraux peuvent également augmenter artificiellement la vitesse d'absorption des fonds structurels avec des stratégies telles que l'utilisation de projets rétroactifs. Ce chapitre souligne donc qu'une absorption rapide n'est pas un signal fiable de capacité d'absorption élevée. Les incitations mises en place pour accélérer l'absorption des fonds, comme le (*règle n+2*), sont donc préjudiciables pour l'efficacité économique de la politique de cohésion.

Concernant le processus d'*allocation* des fonds européens, le **chapitre 3** considère l'allocation finale des fonds européens entre pays bénéficiaires et expose que l'allocation observée des fonds européens est différente d'une allocation optimale maximisant l'efficacité économique. Il souligne que les biais politiques dans l'allocation des fonds structurels conduisent à une sous-optimalité dans le sens où la croissance économique n'est pas maximisée dans les États membres bénéficiaires.

À travers une approche normative, cela est démontré dans le cas du Fonds de cohésion. Un problème d'optimisation y est posé, la solution théorique simulée empiriquement constitue l'allocation optimale du Fonds de Cohésion pour le cadre financier pluriannuel 2014-2020. Cette solution a été simulée empiriquement avec les résultats d'estimation d'une équation de croissance couvrant 17 pays pour la période 1995-2015 avec la méthode des moments généralisés de Blundell & Bond (1998). L'optimalité de cette allocation repose sur les principes de *efficacité* et de *équité* qui permettent, respectivement, un plus grand impact économique à l'échelle mondiale, et une réorientation du soutien financier vers les économies les plus pauvres avec une plus grande démographie relative. poids. Les différences significatives entre l'allocation optimale et l'allocation observée mettent en évidence les biais politiques existants qui compromettent l'atteinte de l'objectif de convergence économique comme la sur-représentation des *petits pays*.

Enfin, le **chapitre 4** montre que l'allocation intranationale des fonds structurels est soumise à des forces politiques. Les interactions entre régions et gouvernement central sont modélisées et testées empiriquement. L'une des caractéristiques de la politique de cohésion est qu'une négociation entre un gouvernement central et ses régions constituantes détermine l'allocation finale des fonds structurels. En vue d'assurer une absorption complète et relativement rapide des fonds, les gouvernements centraux peuvent être tentés de privilégier les régions les plus avancées, ou leurs propres régions en retard s'ils peuvent y exercer un contrôle pour minimiser tout risque d'aléa moral. Le **chapitre 4** propose donc un modèle théorique avec un jeu de signal entre un gouvernement central et ses régions pauvres, ce qui permet de formaliser les incitations stratégiques du processus d'allocation des fonds. Ce jeu est suivi d'un problème de maximisation du bien-être du gouvernement central altruiste, qui repose entièrement sur la production de biens publics de ses régions constituantes. Il montre qu'un gouvernement central est moins disposé à orienter les fonds structurels vers ses régions les moins avancées lorsque leur niveau d'autonomie régionale est élevé. Considérant un échantillon de 119 régions ayant un PIB par habitant inférieur à leur moyenne nationale sur la période 1989-2018, les estimations réalisées avec la méthode des moments généralisés de Blundell & Bond (1998) illustrent qu'un niveau croissant d'autonomie régionale appréhendé avec la *self-rule* niveau de Hooghe et al. (2010) réduit le contrôle du gouvernement central sur ses régions constituantes. Les réformes en faveur de la décentralisation régionale tendent donc à privilégier les régions à forte capacité d'absorption, qui sont les régions les plus avancées. Cette tendance s'est accélérée au cours de la dernière décennie depuis le rapport *Barca* (Barca (2009) qui visait à réformer la politique

de cohésion en la territorialisant. Cependant, seules les régions urbaines ont su s'adapter à cette réforme, les les régions n'en avaient pas les moyens, notamment en raison de ressources administratives limitées. Un deuxième résultat théorique du **chapitre 4** est qu'une perception réduite du risque d'aléa moral est bénéfique pour les régions les plus pauvres. Cependant, empiriquement, en considérant la vitesse d'absorption des fonds comme signal de risque d'aléa moral, les estimations réalisées ne valident pas cette seconde prédiction théorique, ce qui fait écho aux discussions du **chapitre 3** qui concluaient que le taux d'absorption n'est pas un signal fiable de la capacité d'absorption .

Limites et pespectives de recherches futures

De manière générale, l'étude de la notion d'*efficacité économique* des fonds structurels doit s'élargir vers d'autres champs que celui de la croissance économique, les intérêts économiques de l'UEM doivent également être pris en compte. Ainsi, bien que cette thèse ait considéré l'impact des fonds structurels sur la synchronisation des cycles économiques, seul l'impact direct de ces fonds a été mesuré dans le premier chapitre de cette thèse. Une analyse plus fine cherchant à déterminer quelles variables augmentent ou diminuent cet impact pourrait être réalisée. De plus, une désagrégation des données selon le type de projets financés, *i.e* infrastructures de transport ou projets de R&D, fournirait plus d'informations sur la nature de l'impact des fonds structurels sur les cycles économiques. Dans le cadre du Semestre européen, une telle connaissance permettrait une meilleure qualité de la gouvernance économique au sein de l'UE, et en particulier au sein de l'UEM.

Cette thèse appelle aussi à élargir le champ d'étude de l'*efficacité économique* des fonds structurels en considérant l'architecture institutionnelle de la politique de Cohésion. Ainsi, il a été montré ici que les incitations visant à accélérer l'absorption des fonds structurels a eu impact négatif sur la capacité des fonds européens à stimuler la croissance économique des régions Objectif 1. Le deuxième chapitre a aussi montré que la vitesse d'absorption des fonds structurels n'est pas un signal fiable pour la capacité d'absorption. Cela pose la question de trouver un indicateur capable de mesurer le bon usage des fonds structurels. Cet indicateur devrait être facilement mesurable en temps quasi réel afin d'être utilisé par les décideurs politiques.

Concernant l'étude du *processus d'allocation* des fonds européens, le troisième chapitre, qui a abouti à une allocation optimale du Fonds de cohésion, ouvre la voie à d'autres définitions de l'optimalité qui peuvent être appliquées à d'autres fonds

structurels. Ainsi, d'autres critères, politiques comme le respect de l'Etat de droit, ou encore des critères environnementaux comme la réduction des émissions de gaz à effet de serre, pourraient être envisagés. De plus, le donneur était supposé être totalement bienveillant, ou altruiste. D'autres extensions avec un donneur intéressé avec des objectifs spécifiques peuvent être réalisées dans d'autres cadres d'analyse.

Enfin, les implications les plus larges de recherche future sont sans doute données par le dernier chapitre, exploratoire dans la formalisation des forces qui s'exercent au cours du processus d'allocation des fonds structurels. Ce *processus d'allocation* implique des interactions stratégiques entre la Commission européenne, les États membres et leurs régions constitutives. Un cadre principal-agent impliquant ces acteurs pourrait constituer un cadre théorique plus avancé pour explorer cette question de recherche. Enfin, dans un contexte où la réduction des disparités économiques au sein de l'UE a été principalement tirée par le rattrapage des économies d'Europe centrale et orientale, soit une réduction des inégalités interrégionales, ce chapitre appelle à des travaux supplémentaires sur les inégalités régionales au niveau intranational.

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