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► To cite this version:

Marc Bourreau, Richard Feasey, Ambre Nicolle. Assessing fifteen years of State Aid for broadband in the European Union: A quantitative analysis. *Telecommunications Policy*, 2020, 44, pp.101974 -. 10.1016/j.telpol.2020.101974 . hal-03492280

HAL Id: hal-03492280

<https://hal.science/hal-03492280>

Submitted on 18 Jul 2022

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Assessing Fifteen Years of State Aid for Broadband in the European Union: A Quantitative Analysis*

Marc Bourreau[†] Richard Feasey[‡] Ambre Nicolle[§]

Abstract

In this paper, we document how public funds, or State Aid, have been used to support the deployment of broadband infrastructure in Europe since 2003. Our descriptive analysis relies on a unique data set on all the broadband measures notified by Member States to the European Commission between 2003 and 2018. We identify two waves of State Aid for broadband: one for the deployment of basic broadband and a more recent one for the roll-out of next-generation access networks. The use of State Aid is very heterogeneous across Member States, with a few large countries representing the bulk of the cases. The objective of most plans is to expand broadband coverage. The typical project relies mainly on public funds and involves a direct grant, an open tender, and a 3- to 5-year contract. Access obligations are imposed on networks deployed with State Aid, using a benchmarking approach in most cases. Finally, we show that notifications are associated with a relatively high level of broadband coverage in notifying countries, suggesting that public investment is taking over from private investment.

Key Words: State Aid; Broadband; Public Policy; European Union.

JEL Classification: L13, L50, L96.

*We thank the Editor, Erik Bohlin, and two anonymous referees for their helpful comments. This article is based on Feasey, Bourreau, and Nicolle (2018), a study written for the Centre on Regulation in Europe (CERRE, www.cerre.eu). The study and this article reflect the views of the authors only; it may not reflect the view of CERRE or its members.

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1 Introduction

The economy of the European Union has long been a ‘mixed’ economy in which many publicly financed activities co-exist alongside privately financed activities. The dominant theme of the late 1990s and early 2000s were the efforts of the European Commission and Member States to privatize formerly State-owned telecommunications operators and to use competition and private capital markets to improve the quality of services, lower prices and finance investments in new broadband infrastructure. Since 2010, there has also been a growing tendency by both the European Commission and European Union Member States to use public funds to extend or accelerate the deployment of broadband infrastructure, in particular through State Aid.

Our objective in this paper is to document when, why and how State Aid has been used in the European Union for the deployment of broadband, using data from the notifications of broadband measures to the European Commission between 2003 and 2018.

The European Commission defines State Aid as any *advantage* conferred by a public authority through state resources on a selective basis to an organization that has the potential to distort competition and/or trade in the European Union. State Aid was introduced in the European Union statute law by the Treaty of Rome, where it is described as any state intervention which has the power to distort competition. State Aid can support a wide variety of activities such as research and development, environmental protection, and give support to small to medium-sized businesses and a wide variety of sectors such as agriculture, fisheries, finance, and telecommunications.

As we will document in this paper, the use of State Aid to extend or accelerate broadband deployment started modestly in the mid-2000s, but it has grown consistently since then as Europe’s ambitions for broadband infrastructure have expanded. Despite its growing financial significance, the use of State Aid to support broadband deployment has received relatively little academic attention to date. Some interesting appraisals have been offered by Commission officials responsible for assessing notifications of broadband State Aid measures. But these tend to focus on the legal and qualitative aspects of broadband State Aid, with an emphasis on whether the conditions which accompany State Aid approvals are sufficient to safeguard

competition in the provision of broadband services. A few studies provide an assessment of the impact of State Aid plans on the deployment of broadband in specific Member States (see the literature review in Section 3), but very little quantitative analysis has been undertaken to assess the regime as a whole.

With this paper, we take a different approach from earlier studies. Drawing upon an exhaustive analysis of all 163 broadband measures notified to the European Commission under the State Aid rules between 2003 and 2018, we describe where State Aid has gone, when and how it has been awarded, for which type of projects, etc. Our study has a descriptive nature, and does not aim at identifying a causal impact of State Aid on broadband deployment. The main take-aways from our analysis are as follows:

- The use of State Aid is very heterogeneous across Member States, with a few (large) countries contributing significantly more than the others, both in terms of number of notifications and budget.
- We identify two waves of State Aid for broadband: one for the deployment of basic broadband (ADSL), and a more recent one for the roll out of next-generation access networks, capable of delivering high-speed broadband.
- The objective of most, if not all, plans is to expand broadband coverage (rather than for example, increasing take-up).
- Projects asking for State Aid are financed mainly with public funds, with an average aid intensity of 73%.
- The typical project involves a direct grant, an open tender, and a contract for 3 to 5 years. In half of the cases, the network is operated only at the wholesale level, and for the other half of the cases we observe vertical integration, with operations at both the wholesale and retail levels.
- Wholesale access obligations are imposed on networks deployed with State Aid, and in most cases, access conditions are set using a benchmarking approach.

- The vast majority of measures were approved by the European Commission, but for many of them, the Commission asked for additional information during the approval process.
- Finally, we show that notifications are associated with a relatively high level of broadband coverage in notifying countries, suggesting that public investment is taking over from private investment.

The rest of the paper is organized as follows. In Section 2, we define and describe the State Aid system and its rules. In Section 3, we present the data. In Section 4, we provide the results from our quantitative analysis. Section 5 concludes.

2 State Aid for Broadband

The European Union Law defines State Aid as follows: (1) this is an intervention in the form of grants or guarantees¹ by the state or through state resources; (2) the state intervention gives the selected company, industry sector or region, an advantage; (3) competition may be distorted; and (4) the state intervention may have an impact on trade between Member States. On a general basis, State Aid is prohibited by Article 107 of the Treaty of the Functioning of the European Union (TFEU). However, in some circumstances, state interventions are necessary for the functioning of the economy and State Aid pursuing specific policy objectives may be considered compatible with the Treaty. We describe below the State Aid rules that determine the compatibility of a state intervention with the Treaty.

The State Aid rules perform a critical role in ensuring that when Member States use public funds to support certain economic activities, they do not give particular private companies an unfair competitive advantage over others, whether other companies within the same Member State or companies from other Member States with whom the recipients of State Aid might compete. Some distortion of competition is always likely to occur when a particular company receives the benefit of State Aid and others do not, so the State Aid rules require the application of a ‘balancing test’ under which any harmful effects are kept to an absolute minimum in order to

¹The intervention often takes the form of grants, but it can also be a guarantee conceded to a specific recipient, or an interest or tax relief.

achieve the intended outcomes. Proposed State Aid measures which fail to meet these conditions – either because the harmful effects have not been minimized or because the benefits of the measure are unclear – will be unlawful. Moreover, any unlawful State Aid which has already been disbursed will be required to be recovered.

There are two main sources of State Aid: First, State Aid funds may come from the European Structural and Investment Funds (ESIF). These funds are constituted by the Regional Development Fund (ERDF) and Agricultural Fund for Rural Development (EAFRD). The former represents a budget of €290 billion, and the latter a budget of €100 billion over the period 2014-2020. Second, State Aid funds may originate from national governments or local authorities within individual Member States. These funds are allocated in national budgets (either for provision by national Government or for allocation to municipal authorities) or in regional or municipal budgets when those bodies have independent revenue-raising powers.

To date, a large share of broadband deployment in Europe appears to have been undertaken by private companies without the benefit of State Aid, as some countries were able to reach a significant coverage without the use of public funds, as suggested by Figure 1. Most of the efforts of European policymakers have been devoted to removing former monopoly rights and promoting competition between private firms in broadband markets. The introduction of public funds carries the risk of undermining these efforts and distorting competition between existing market participants and crowding out investments which they might otherwise make, as suggested by the empirical evidence provided by Wilson (2019).

The results of the efforts made by the private sector differ significantly between Member States, with Member States such as the Netherlands achieving very extensive deployment² of very high capacity broadband infrastructure³ without public funds, Member States such as the UK achieving very extensive deployment of next-generation broadband but only very limited deployment of very high capacity infrastructure, and Member States such as Italy or the Czech Republic today having a broadband infrastructure which is neither very extensive nor very high capacity. A small number of Member States – Malta, Belgium and Luxembourg – have achieved

²By very extensive, we mean here a level of deployment above the average in the EU.

³Very high capacity (VHC) networks are defined by the European Commission as networks which allow a download speed superior or equal to 100 Mbps.

extensive and high capacity broadband deployment without relying on any form of State Aid whatsoever. However, most Member States have used State Aid to supplement broadband deployment by the private sector, albeit to differing degrees and in various different ways, as suggested by Figure 1.

The case for using State Aid to support broadband deployment rests upon two key assumptions. The first is that access to high capacity broadband infrastructure is an important enabler of economic activity and social inclusion and that it generates significant positive externalities (i.e., benefits beyond those released directly by those using the infrastructure) for the country and for Europe as a whole. This assumption underpins both the use of State Aid and the adoption, by both the European Commission and a very large number of Member States, of ambitious ‘national broadband plan’ which specify targets for achieving the extensive deployment and improvement of broadband infrastructure across the country.⁴ The assumption is not unique to Europe and other countries in the world seek to promote the deployment broadband infrastructure in the belief that it will contribute to economic growth and social development.⁵ The assumption that broadband infrastructure will yield positive externalities also suggests a role for public funds. This is because private companies, operating under market conditions, find it difficult to capture the economic value of externalities, which are benefits which their own customers do not recognize and so are unwilling to pay for. The consequence is that investments in broadband infrastructure will fall short of those that would be made if the value of the externalities were properly accounted for. Public funds are often used to fill the gap arising from this form of market failure.

Despite its growing financial significance, the use of State Aid to support broadband deployment has received relatively little academic attention to date. In particular, the quantitative analysis of State Aid broadband projects before and after their implementation is still very limited and incomplete. This paper takes a first step towards a more systematic quantitative analysis of State Aid broadband projects in the European Union, for the period 2003 to 2018.

⁴An overview of these plans is provided by the European Commission in its “Study on National Broadband Plans in the EU-28: connectivity, targets and measures” (2017).

⁵See, for example, the OECD report “National Broadband Plans” (2011) and the report by Cullen International for Ericsson “Benchmarking 15 National Broadband Plans” (2014).

3 Related literature

Our paper is the first one to undertake a comprehensive quantitative analysis of the broadband State Aid measures notified to the European Commission since 2003. A general description of State Aid measures for broadband, guidelines and best practices, is provided by Papadias et al. (2009) and Chirico and Gaàl (2011). Chirico and Gaàl also provide an overview of the countries that notified measures to the European Commission, but a more detailed description –in particular regarding budgets– is absent from their paper. While our work complements this stream of literature, it also contributes more generally to the literature on State Aid for broadband, a topic which recently attracted the interest of regulators and scholars.

In its 2013 guidelines, the European Commission insisted on the need to improve State Aid control, in particular through ex-post evaluation of State Aid measures. Several reports followed, aiming at providing such an evaluation. The report by Oxera (2015) is one of the first evaluations. It discusses the compliance and effectiveness of the UK National Broadband Scheme, without assessing the more global impact on consumers and competition. Another report by Lear, DIW Berlin and Analysys Mason for the EC (2017) analyses the impact of State Aid in Germany and finds that after 5 years, DSL coverage was 12-20% higher in areas that had received State Aid compared to areas which had not. A more recent study by Ipsos Mori (2018) for the UK Government evaluates the State Aid scheme in the UK and finds that due to State Aid, 2.5 million additional households obtained an access to fast or very fast broadband, and 1 million obtained access up to 2 years earlier than they would have without State Aid.

The findings from these reports are extended or challenged in papers which analyse the impact of State Aid measures and other public policies on the development of broadband networks. Wallsten (2005) questions that public subsidies can have an impact on broadband penetration in the US and finds that most state-level policies are actually ineffective. Belloc et al. (2012) assess the impact of public policies on broadband penetration in 30 OECD countries. They find that most policies are effective, but that their effect depends on the stage of technology diffusion. For example, demand-side policies seem to be effective at an advanced stage of broadband diffusion. Boik (2017) also stresses the importance of demand-side policies. He shows that in

the US, universal access to high-speed broadband is unlikely to be attained because the local demand is not willing to pay to upgrade to the new technology.

Duso et al. (2017) and Briglauer et al. (2019) find that State Aid has extended broadband coverage in rural areas in Germany. Duso et al. (2017) also analyse the impact of State Aid on competition between broadband providers. They find that the number of broadband providers increased significantly in areas that received State Aid. They conclude that State Aid was successful in expanding coverage, without impeding competition. By contrast, Wilson (2019) finds that in the US, public policies for broadband have crowded out private investment. Briglauer et al. (2019) assess the impact of State Aid on employment and wages, using a difference in differences approach to compare coverage, employment and wages in treated and untreated municipalities between 2010 and 2011. They find that the employment rate is higher in aided municipalities, even though this is not reflected by an increase in local jobs or wages. They conclude that State Aid has not contributed to closing the economic divide regarding employment in rural areas.

4 Data

We have derived data from three sources: the European Commission’s website, the Official Journal of the European Union and an exhaustive analysis of the data contained in individual decision letters which the Commission issues for each notification. We detail below the information we collected from each source.

The European Commission’s Website

The European Commission’s website gives the following information on each State Aid broadband plan: the Member State involved, the region (when relevant), the main objective of the plan, the financial instrument, the case type, the duration, the notification date, the decision type and date, as well as the identifier of the Official Journal publication of the decision. We collected all these data from the European Commission’s website for all notified cases. The resulting data set is homogeneous and comprehensive, with only a few missing values for the

duration of the plan and the financial instrument.

The Official Journal of the European Union

We complemented the data collected from the European Commission’s website with information from the decisions published in the Official Journal. Each decision contains some additional information, in particular the budget of the plan and its intensity, that is, the share of budget covered by public funds. This information is not always available though; the overall budget is missing for 12% of the cases and intensity for 36% of them⁶. We have also information on the annual budget of the plan, but for only 13 cases.

The decision letters issued by the European Commission

Finally, we have collected the 163 decision letters available on the Commission’s website as of September 2019. These letters are issued by the European Commission as a follow-up to each Member State notification. Each letter contains information on the type of the case (original case, modification, evaluation plan, etc.) as well as detailed information on the procedure, the context, a summary of the notified measure based on elements from the notification, as well as the assessment of the measure by the Commission in terms of involvement of State Aid and compatibility of the measure, and finally the decision of Commission. All this information is provided in a textual and non-standardized way, and we thus had to go through all decision letters to construct our data set.

The part of the decision devoted to the procedure gives the notification date, indicates if the notification benefited from a simplified procedure, if the commission requested additional information, and if the notification followed a complaint by one or several organizations. The section on context provides information on the geography of the targeted area (e.g., high-cost or low-density areas), socio-demographic information on the targeted population (low income) as well as information on the competitive context (number of operators). The summary describes the objectives pursued by the plan, the target area of the measure, the total budget, the source of funds, the beneficiaries, the duration, the procurement procedure planned, information on

⁶Percent of original measures (129 cases out of 163 decisions)

the network –layers, degree of vertical integration, technology– as well as regulatory aspects of the project.

The assessment of the measure comments on the elements which qualify –or not– the measure as State Aid. First, the decision discusses the involvement of state resources. Then, it explores if the measure is providing an economic advantage to an organization, and comments on how the intervention may alter existing market conditions. Finally, it discusses its potential effect on trade.

The measure is considered compatible with the Treaty, in accordance with Article 107 (3)(c) TFEU⁷ and in the light of the Broadband Guidelines, under several conditions. First, it must contribute to the achievement of well-defined objectives of common interest. Second, one must observe the absence of market delivery due to market failures or important inequalities. Third, it must be the most appropriate policy instrument compared to alternative ones, such as demand-side measures, in the case of supply-side measures, for example. Fourth, it must have an incentive effect, i.e., it should affect the behavior of firms. Fifth, it should be limited to the minimum necessary, meaning that the same effect cannot be obtained with less aid. Finally, negative effects, such as distortions of competition and effects on trade, must be limited.

If these conditions are fulfilled, the Commission balances the positive effects of the aid measure in reaching the objectives of common interest against the potential negative effects. Three types of decisions are possible. First, the decision may state that the notified measure is not State Aid, and consequently the measure can be implemented. Second, the decision may conclude that the State Aid is compatible with EU rules and can be implemented. Third, and finally, if there are concerns about the compatibility of the measure, the decision may conclude that a formal investigation is opened. At the end of this investigation, a final decision is adopted, which can be either: (i) a positive decision, allowing the measure to be implemented; (ii) a conditional decision allowing the measure to be implemented under some conditions; or (iii) a negative decision if the measure is incompatible. The Member State may also withdraw its notification, leading to the closing of the case.

⁷The following may be considered to be compatible with the internal market: “aid to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest;”

5 Analysis

Among the 163 cases available when we conducted our data collection, we kept 156 cases which correspond to the original measures (129 cases) and their modifications (27 cases). We excluded from the data set 2 cases which were repetitions of already notified cases, 3 individual notifications within schemes and 2 evaluation plans. In this section, we present the results of our detailed analysis of the 156 State Aid cases for broadband that have been notified to the European Commission between 2003 and 2018. We first describe the 129 original cases (sub-sections 5.1 to 5.8), and then briefly comment on the 27 modification cases (sub-section 5.9). Our analysis will not cover the 3 individual notifications within schemes and the 2 evaluation plans submitted to the European Commission. We also exclude the 2 decisions which concern already notified measures.

5.1 Notifications by Member States

Table 1 shows the share of broadband State Aid projects notified by each Member State over the period 2003 to 2018 (without regard to the size of the State Aid represented by each notification). We find that notifications are unevenly distributed amongst Member States. More than half of the cases originate from large, heavily populated Member States – Germany, the UK, and Italy – but France and Spain have made relatively fewer notifications. There is no clear relationship between population density and the number of notifications made by a Member State. The large Member States referred to above all have population densities in excess of 200 persons per km². In contrast, Sweden (24 persons per km²), Latvia (31), Estonia (30) and Finland (18) have all made relatively few notifications. That said, the very high population density of the Netherlands (498), Malta (1450) and Belgium (372) would seem to explain their relatively low use of State Aid.

We might expect the ‘less developed’ post-2004 accession Member States, who are amongst the largest recipients of Regional Development aid, to be over-represented in the data. In fact, of this group, only Poland has made a relatively high number of notifications. One possible reason for the under-representation of post-2004 accession Member States may be that there will tend

to be a greater role for State Aid in Member States where the prospect of commercial provision of broadband infrastructure by the private sector is weaker. In other words, we might expect State Aid would increase as coverage approaches 100% and as extending coverage becomes ever less commercially viable. Whilst rural coverage is below 50% – as it has been in many post-2004 accession Member States – we might expect there opportunities for further expansion of coverage by privately financed operators and for policymakers to be reluctant to intervene.

The volume of State Aid notifications made by a Member State provides, at best, a very imperfect explanation of observed changes in broadband coverage performance over time. A better indication is likely to be provided by considering the size of the overall budget, the annual budget (since many notified State Aid projects envisage expenditure being incurred over a number of years rather than all falling within the year in which the measure is approved), or the aid intensity (i.e., the share of public funds as a proportion of the total projected expenditure).

Our analysis of budgets reported on the Commission’s website suggests that the average overall budget is of €342 million (on a sample of 114 cases) and an aid intensity of 73% (on a sample of 77 cases). An aid intensity of about 75% means that three quarters of the total funding requirement is met by public funds. However, we would not attach much weight to these statistical results, since the standard deviations for these statistics are very high and we show below that the results are significantly distorted by a single notification from France.⁸

Table 2 shows that budgets vary significantly by Member State (as well as between different notifications made by the same Member State) and that a single notification (of a budget of €13 billion) explains why France far exceeds any other Member State and that little weight should be attached to aggregated results. Figure 2 shows total expenditure on State Aid by Member State, based on our analysis. We note that results appear broadly consistent with the fact that Italy and France have allocated a significantly higher proportion of their European structural fund budgets to broadband than Germany, the UK or Spain (See Feasey et al., 2018). Moreover, if our sample is representative of total expenditures, then State Aid allocated to broadband by Italy and France (€22.5 billion) is almost 1.4 times greater than the sum of State Aid allocated

⁸Information on the annual budget is reported in only 12 cases, and ranges from €1 million to €2 billion, with an average of €190 million.

by all the other Member States combined (€16.5 billion).

Differences in absolute levels of State Aid expenditure may of course reflect differences in the size of Member States, both in terms of geography and population. How developed is the legacy copper network may also influence the cost of upgrading the network. We have explored the existence of a correlation between the number of copper lines in a country and our State Aid variables, and found no clear and significant relation.

Figure 2 also shows broadband State Aid expenditure per capita for each Member State. First, this confirms that France has notified the largest expenditure of State Aid on a per capita basis by a significant margin, with Italy also a significant user of public subsidy for broadband. Second, this confirms that Germany and the UK have notified significant expenditures, but far lower on a per capita basis than France or Italy. This shows that the total number of notifications made by a Member State is a poor indicator of its commitment to broadband State Aid on a per capita basis. It also shows that none of the post-2004 ‘less developed’ Member States have notified significant State Aid expenditure on a per capita basis, with the exception of Croatia (and to a lesser extent Latvia and Slovenia). Expenditure in Member States such as the Czech Republic (€1.2 per capita), Bulgaria (€2.7 per capita) and Romania (€4.1 per capita) is very low, suggesting a much greater reliance on commercial provision in these countries. The figure also shows that some ‘developed’ Member States have very low State Aid expenditure per capita, including the Netherlands (€1.5 per capita) and, more surprisingly, Sweden (€7 per capita). By contrast, while Austria has a relatively modest State Aid budget over the period, it appears to have one of the largest expenditure per capita.

5.2 Number of cases over time

Figure 3 shows the number of cases notified to the European Commission by year. The number of notified cases increased up to a peak of 18 per year in 2010 but has been decreasing since (particularly since 2012), despite the expanding scope of the State Aid rules. This may be explained, at least in part, by: (1) The increasing use of State Aid to meet broadband coverage objectives after 2003 in terms of extending ‘basic’ broadband (generally provided using ADSL technologies) to households in rural areas which would not otherwise be served by privately

funded operators (many of these measures were completed by 2010); (2) The increasing use of national framework programmes, or “umbrella schemes” after 2010, which replace the need for numerous smaller municipal projects to be notified.

Figure 4 shows that the total value of State Aid expenditures notified has increased since 2010, while the number of notified cases was declining. The figure also highlights that the number of notified State Aid cases is a poor indicator of total expenditure in Europe. Year 2016 had amongst the lowest number of notifications to the Commission, but a €13 billion measure from France ensures that 2016 had by far the largest total State Aid budget, of over €17 billion.

Finally, one can observe an increasing trend towards plans for the deployment of Next Generation Access (NGA).⁹ Figure 5 shows that basic broadband measures were the most common until 2011. There was then a shift towards NGA, which seems to be related to the commission’s attempt to steer State Aid towards the promotion of high-speed broadband. It could also be related to the fact that NGA networks were first rolled out by the private sector and then started to be supported with public funds for their deployment in costly areas.

5.3 Aim of State Aid measures

Public subsidy of broadband infrastructure could be undertaken to achieve one of two purposes – to extend network coverage to areas where private sector deployment was never expected to be viable without subsidy, or to accelerate the rate of deployment of new broadband technologies in areas where existing operators may otherwise face weak incentives to upgrade their infrastructure. Our analysis of the notification letters suggests that the scope of State Aid has, at least to date, remained largely confined to extending broadband coverage in areas which Member States have identified as ‘white’, rather than introducing additional competition or accelerating technology upgrades in ‘grey’ areas.

According to the EU Guidelines (2013), ‘white’ areas are defined as “those in which there is no broadband infrastructure and it is unlikely to be developed in the near future”, ‘grey’

⁹Next Generation Access (NGA) networks are defined by the European Commission as “wired access networks which consist wholly or in part of optical elements and which are capable of delivering broadband access services with enhanced characteristics (such as higher throughput) as compared to those provided over already existing copper networks.”

areas as “those in which one network operator is present and another network is unlikely to be developed in the near future,” whereas in ‘black’ areas “there are or there will be in the near future at least two basic broadband networks of different operators and broadband services are provided under competitive conditions”. A ‘served’ area corresponds to an area where at least one operator is present.

We observe that 86% of notifications relate only to white areas, 7% to grey areas and 4% to white and grey areas.

White areas are typically geographic areas with a low population density, and hence, high costs of infrastructure deployment, which makes private investment less likely. The State Aid Guidelines also contemplate that public funds are used to ensure that households in rural areas obtain access to broadband services on terms and at prices which are broadly comparable with (and potentially below) those available to those living in ‘competitive’ areas. However, the concern that households in white areas will tend to have low incomes and that State Aid is required to ensure that the prices are affordable does not seem to have been a significant feature of Member States’ thinking, at least when justifying the State Aid measure in the notification to the Commission. We find that 76% of cases mention low density of population as a reason to use State Aid, 67% mention the high cost of deploying the network in the area and only 10% the low income of local population.

In order to address the gap between private sector costs of provision and the willingness to pay, State Aid could be used to support the provision of subsidies (in the form of vouchers) to households and businesses (rather than to the owner of the infrastructure), which reduce the costs which they face in connecting to the network. Our analysis of the notification letters suggests that this has not been a priority for Member States, and that extending coverage has been the primary objective (95% of cases). Only 2 cases were exclusively based on demand-side measures.

In terms of the expected beneficiaries of the intervention, Table 3 shows that a large part of the broadband infrastructure that is deployed is intended to serve both residential households and businesses (about 49% of measures). 23% of measures mention only residential consumers and 16% mention as target residentials, businesses and public sectors. However, there is a

small but significant number of measures (7.7%) which appear targeted at delivering broadband to businesses in rural areas (likely to be small business parks or Metropolitan Area Networks (MANs)).¹⁰

Table 4 presents the technologies described in the notified projects. We find an equal share of projects for broadband (46%) and for NGA (46%), the remaining share being projects relying on 4G, WinMax or Wifi or a mix of broadband and NGA. For 70 measures, the speed targeted is also declared and thus a classification along the EC's definition is possible. According to its definition, 'Basic broadband' corresponds to speeds between 144 Kbps and 30 Mbps; 'Fast broadband' to speeds between 30 and 100 Mbps; and 'Ultra-fast broadband' for speeds higher than 100 Mbps. Having found that the number of broadband State Aid measures notified peaked in 2010 and that the vast majority relates to white areas, it is not surprising to find that the majority of notifications (57%) refer to 'Basic Broadband' rather than to Fast Broadband (30%) or to Ultrafast Broadband (13%). Our analysis of the broadband speed requirements which are specified in the notifications results in an average speed of 25.6Mb/s, and a range between 256kb/s (i.e. broadband in 2003) to 100MB/s (but not above). We have also analysed how the technologies referred to in the notifications for which we have relevant data (either in terms of a description of the technology or an expected speed) change over time. As previously discussed, Figure 5 shows that basic broadband is the most common technology until 2011, after there is a switch towards public support for the deployment of NGA networks.

5.4 Sources of funds

The analysis of the notifications provides some information on the composition of the State Aid funds that are mobilised. Table 5 shows the results of our analysis for a sample of notifications.

In this table, we report if the notifications mention the presence of various sources of funds in their budget (for 103 cases). We find that 63% of measures involved European Structural Funds such as the ERDF and EAFRD, while 49% of cases mentioned the presence of Regional funds, and 48% the presence of national funds. For the small number of notifications that report the corresponding amount, the size of funds contributed by national Member State authorities

¹⁰MANs are local networks which provide high data connection speeds, typically at the city-level.

(‘the State’) are, on average, the largest at around €134 million per measure and over €1 billion in some individual cases. This is followed by contributions from European funds, which range from €88 to €119 million. Regional authorities tend to contribute less (€49 million on average), and local authorities even less (€18 million per measure).

Table 6 shows that the combination of structural and state funds is the most observed scenario (18% of cases), followed by the combination of structural and regional funds (15% of cases). Measures which rely exclusively on structural or state funds represent 13% and 12% of cases, respectively.

For a sub-set of this sample (59 out of the 102 notifications assessed above), it has been possible to determine the actual composition of funds in the measure. Figure 6 shows that, for a limited sample of State Aid notifications, the largest proportion of funds is actually represented by European Structural funds which represent around 39% of funding commitments. 29% of the average budget is covered by regional authorities, 19% by the Member State (at the national level) and 10% by local municipalities, with the 3 remaining percent being covered by other European funds.

We have also been able to decompose the sources of funds for those Member States which appear in our sample of 59 measures (recognising that these measures may not themselves be representative of all measures notified by any individual Member State), and the results are shown in Figure 7. This reveals a very large variation in the use of different Member State measures of different sources of funding. Many of the post-2004 accession or less developed Member States, such as Poland or the Baltic States, appear to rely primarily or wholly on European structural funds for broadband State Aid measures. In contrast, Germany, France, Italy, Spain and the United Kingdom have a greater proportion of funds contributed by the Member States themselves. Italy and France’s relatively low proportion of European structural funds is somewhat at odds with the fact that these Member States allocate higher proportions of their European structural funds to broadband than do Germany, the UK or Spain. However, we also found above that Italy and France have outspent the rest of Europe combined by a factor of almost three in terms of total State Aid expenditure on broadband, so their relatively low proportion of European structural funds likely reflects a very large contribution from other

national and municipal sources of funds.

As discussed earlier, the average aid intensity is 73% (computed for a sample of 77 cases). Based on the notified amount of public funds involved in the projects and the declared aid intensity, we can retrieve the budget expected to be covered by private funds. Based on 50 cases, we can compute that this amount ranges from €0 to €1 billion, with an average of €129 million and a standard deviation of €260 million. Once again, we should take these numbers with caution, because they are influenced by a single and very large notification from France. Figure 8 shows the breakdown, including funds from the private sector, for 26 cases for which the full budget was available.

5.5 Form of aid

Direct grants represent by far the most common form of financial support and represent the selected instrument in over 95% of cases. Other instruments, such as interest rate subsidies, guarantees, or loans, are much less widely adopted. This may be because forms of debt other than State Aid are available from the EIB to support broadband deployment, whilst the Juncker Plans's EFSI and Connecting Europe Funds also provide other financial instruments to reduce risk for private lenders and/or to provide quasi-equity.

It appears that the vast majority – over 90% – of the tenders for State Aid funds employ an open tender, consistent with the requirements of the State Aid Guidelines. In over 70% of cases notified to the Commission, it is stated that the tender or tenders will be awarded to the ‘most economically advantageous offer’, and in a similar proportion the principle of ‘technological neutrality’ is explicitly endorsed (although this is no more than a restatement of the Guidelines). The use of an open tender process is now firmly established and does not appear to be controversial, even if the outcomes of individual procedures are sometimes the subject of complaints.

The contracts which have been tendered for the deployment of broadband infrastructure are varied in many respects, and range from 1 to 20 years, with the majority of them signed for 3 or 5 years. We recognise that ‘duration’ may refer to different things in different contexts (e.g., duration of ownership of assets before they revert to the public authorities or duration of

funding).

Similarly, it appears that the ownership models used by Member States differ significantly. Table 7, which reflects a limited sample and should be treated with some caution, suggests that a relatively high proportion of notified measures have involved the provision of State Aid for the deployment of infrastructure which would then remain under public ownership, with only a minority of cases clearly involving the provision of grants to privately owned operators to deploy assets over which they would then retain ownership. Given that we have found relatively high levels of average aid intensity amongst the notified measures, with public authorities contributing around 75% of the total funds on average, it is perhaps not surprising that public authorities will wish to benefit from the ownership of the assets they are financing. We would also expect some correlation between the ownership model and the nature of assets that are subsidised.

Table 8 shows that about 45% of projects involve operations only at the upstream (wholesale) level, whereas about 51% operate at both the upstream (wholesale) and downstream (retail) levels. Table 10 shows that the vast majority – at least 88% – of the wholesale-only measures relate to publicly owned or operated infrastructure, but a very small proportion of them are privately owned and operated. Table 9 shows that the vast majority – at least 86% – of the wholesale-only measures relate to publicly owned or operated infrastructure, but a very small proportion of them are privately owned and operated.

5.6 Form of wholesale regulation

State Aid rules require recipients of public funds to share access to their infrastructure with third parties and are thereby subject to wholesale access obligations. The notification letters provide some details of the basis on which such access is to be provided. Our analysis finds, first, that wholesale obligations are imposed in 95% of notified cases. In around 65% of these cases, the prices for wholesale access are to be benchmarked to those which are set by national regulatory authorities when imposing obligations on operators with significant market power, or (in exceptional cases) which otherwise arise under competitive conditions. In 5% of cases,

no wholesale price regulation is envisaged at all.¹¹ We have also analysed the duration of the wholesale access obligations in the sample of notified cases for which we have such data. Most—about 65% of the 74 measures for which this information is available—introduce obligations for a period of 7 years, as required by the State Aid Guidelines, but some Member States have imposed longer durations (including 8% for the lifetime of the network), and some shorter.

Some form of retail price regulation is also envisaged in 26% of notified cases, although in the majority of these this is limited to benchmarking of retail prices against those prevailing elsewhere in ‘competitive’ areas. Retail price regulation has receded in Europe during the period in which the notifications to the Commission have been made.¹² Nonetheless, it is interesting to find that a significant number of Member States do not appear to have regarded wholesale price regulation and access obligations as being sufficient, in themselves, to safeguard consumer interests or to ensure that prices of broadband services in the downstream market would address the social inclusion objectives of the measures.

Finally, we analysed the clawback mechanisms proposed in the notified measures. Clawback mechanisms allow public authorities to ‘claw back’ their funds if overcompensation occurs: if the subsidised project generates (excess) profits, part or all of them are transferred back to the public institution. Excess profits can occur if realized demand is higher than anticipated or costs of deployment are lower than originally planned. Although the guidelines are clear about the situations in which the clawback mechanism should be implemented by Member States, we observe significant heterogeneity in the way it is described in the notifications. While some countries give detailed level of profits, demand and time horizon which determine their technical implementation, others remain vague or simply declare that the mechanism will be discussed with the winner of the tender. In the measures that we analysed, the clawback mechanisms set targets

¹¹We have examined these six cases to understand why. Four of these cases were related to measures involving the provision of broadband services only to the public sector and were not regarded as State Aid by the Commission. One was withdrawn by the Member State and one—in Germany—remains to be explained.

¹²The movement towards less retail regulation was initiated by the 2006 review of the EC’s ‘Regulatory Framework for Telecommunications of 2003.’ The review of EC guidelines encouraged NRAs to regulate the telecommunication markets “at the highest possible level of the value chain in order to let competition develop as much as possible in downstream markets.” The rationale for this decision is discussed by Gurpegui and Kordasiewicz (2007), for example. Member States removed retail regulation more or less rapidly following the publication of the 2006 Guidelines. For example, OFCOM in the UK ceased imposing retail regulation in July 2006 (<https://www.ofcom.org.uk/consultations-and-statements/category-1/retail>). In France, retail deregulation occurred in September of the same year (<https://archives.arcep.fr/index.php?id=9356&L=1#c13394>).

in terms of demand and/or profits, sometimes both. Clawback on profits is the most common in the measures (58%), followed by a clawback on demand and profits (10%) and a clawback on demand only (5.4%). A significant part (27%) of the notifications make no reference to a clawback mechanism, notwithstanding the requirements of the State Aid Guidelines. One of the reasons given by the Member States is the excessively high cost of monitoring and implementing such mechanisms compared to the size of the notified projects.

5.7 The approvals process itself

Our analysis reveals that around 43% of notified State Aid cases have been subject to pre-notifications consultations between the Commission and the Member State concerned, something which the Commission has sought to encourage. Despite this, the Commission sought additional information in over 70% of cases. Interestingly, most broadband State Aid measures appear uncontroversial and only a small minority (6.2%) have prompted one or several complaints to the Commission.¹³

Given concerns, which underpin the State Aid rules, that public funds might unfairly favour particular competitors or otherwise distort competition, and given the propensity for litigation within the European telecoms sector more generally, it is perhaps surprising that this figure is not higher. Whether a significant expansion in the scope and scale of State Aid for broadband would attract more complaints from industry participants is unclear to us.

The outcome of all 129 original notifications in the period 2003 to 2018 can be derived from either the Commission's website or an analysis of the notification letters, with the results being consistent between the two. It shows that the vast majority – over 92% – of measures were approved by the Commission, allowing Member States to release the funds and proceed with their projects. About 6% of all cases, or 8 notifications, were found not to constitute State Aid at all and only two notifications were rejected. In one case (Netherlands), the Member State was prevented from proceeding to implement the project and in the other (Italy), the notification was withdrawn.

¹³Among the eight cases where one or several complaints were received by the EC, six were filed by local or national operators offering broadband, satellite or cable connectivity (in the UK, Italy and the Netherlands) and the two others by association of operators (in Czech Republic and in the Netherlands).

As noted above, the high approval rate does not mean that the Commission does not have influence over the design of broadband State Aid projects or that the notification and approvals process is otherwise superfluous. Commission staff considers that the high proportion of approvals indicates that Member States anticipate and seek to remove potential objections from the Commission before they notify. This is done either by the Member State first self-assessing the project against the Guidelines and/or by informal pre-notification discussions. Even if notifications are eventually approved, the use of public funds could be frustrated if the approvals process resulted in long delays in the start of the project.

Figure 9, derived from data published on the Commission’s website, shows the average number of days between the formal notification of a case and the final decision, by year. This suggests that the average time taken to process a notification has been increasing between 2011 and 2016, but has been reducing again in the past two years. This may be because the Commission has encountered (a relatively small number of) more complex cases since 2011, perhaps reflecting the shift away from the relatively straightforward task of extending basic broadband towards the more complex task of accelerating upgrades to NGA in ‘grey’ as well as ‘white’ areas. It may also reflect the greater average size of the budget involved since 2012 – although we note that the Commission seems to have been able to reduce the time taken to approve projects since 2016 despite average budgets remaining much higher than before. Figure 10 presents data which seems to support the hypothesis that notifications of measures with larger budgets tend to require more time to process, even though the differences are not statistically significant.

Figure 11 shows that there is also a large degree of variation in the time between notification and decision across Member States. This may reflect differences in the complexity of the measures that are notified and/or differences in the capabilities of the Member States concerned (e.g., in responding to requests for further information from the Commission). It may also reflect the varying political priorities of Member States, who are invited twice a year by the Commission to prioritise their State Aid requests so as to ensure that more urgent cases (such as bank rescues) are addressed ahead of others.

5.8 Relationship between timing of State Aid and private sector broadband provision

We referred earlier to the relationship between State Aid measures and the performance of the private sector in terms of delivering the coverage of different broadband technologies over time. We suggested that policymakers may be reluctant to intervene with public subsidies if broadband coverage is still comparatively low and the opportunities for further private sector investment seem comparatively high. In this sub-section, we seek to explore this issue further, combining our analysis of the notifications to the European Commission with data on both broadband coverage and broadband adoption or penetration which the Commission has published under its ‘Digital Scoreboard’ initiative since 2008. The Commission’s dataset includes, for every Member State: (1) Standard fixed broadband coverage (as % of households) from 2011 to 2017, (2) Rural standard fixed broadband coverage (as % of households) from 2011 to 2017, (3) Fixed broadband take-up (subscriptions/100 people) from 2004 to 2018. Data on coverage is missing from 2008 to 2010, so we have relied upon information from IDATE reports for 2009 and 2010 and from an OECD report for 2008.¹⁴ Note that our objective here is to highlight some interesting correlations, not to claim any causal impact.

Figure 12 shows the number of notified cases against the level of standard broadband coverage in the relevant Member State at the time of notification to the Commission. This shows that the vast majority of notifications occur once a Member State has already achieved basic national broadband coverage of at least 95% of households. This is consistent with our finding that the majority of notifications relate to the objective of extending coverage to ‘white area’ in which there is no pre-existing broadband infrastructure and no prospect of private sector deployment. The same conclusion arises if we compare total State Aid expenditure (rather than number of notifications) against national broadband coverage, shown in Figure 13.

We have also considered State Aid expenditure on NGA against NGA coverage, as shown in Figure 15. This reveals that State Aid has generally been used to accelerate NGA deployment at a much earlier stage than was the case for basic broadband coverage. We noted above that

¹⁴We have information on broadband coverage for 91 cases out of 129, on rural broadband coverage for 82 cases, on NGA coverage for 54 cases and information on take-up for 127 cases.

European policymakers seem to have waited until the private sector has delivered standard broadband coverage of over 95% before turning to State Aid to extend coverage beyond that. They seem to have been much more willing to intervene to promote NGA deployment whilst NGA coverage remains at below 70%. €22.1 billion of the €33.9 billion allocated to extending NGA deployment was spent whilst national NGA coverage was still below 70%. This may reflect a view that private sector provision of NGA will always be more limited, relative to standard broadband, or it may reflect a greater impatience on the part of policymakers to wait until the private sector has exhausted the investment opportunities available to them. Either way, the finding has interesting implications for the use of State Aid as we move from NGA to ultrafast broadband and the opportunities for private sector deployment of ultrafast broadband infrastructure may be more limited still, and the time required to do so even longer.

The relationship with rural broadband coverage, both in relation to cases notified and the corresponding levels of expenditure, is less stark than in relation to national broadband coverage, as discussed above. However, as shown in Figure 17 and Figure 16, only a few State Aid measures have been notified until rural broadband coverage has achieved at least 80% (the equivalent figure for national coverage being 95%).

The relationship between State Aid notifications or expenditure and levels of adoption or ‘take-up’ of broadband services is also of interest. Figure 18 and Figure 19 show that State Aid tends to be used to extend broadband coverage whilst take up of broadband by households within areas already served by the private sector remains at less than 40%. Moreover, a significant number of measures is notified and an even greater proportion of expenditure has been committed whilst mean adoption rates (across our sample) stand at less than 20%. This would suggest that the State Aid framework has tended, deliberately or otherwise, to allocate funds to measures which favour extending coverage of networks over those which promote higher levels of adoption of services. Social inclusion objectives appear to be framed in terms of ensuring that households in rural areas have access to the same broadband services as their urban counterparts, but disregard the fact that the majority of those urban households may not actually be subscribing to such services.

Finally, having noted the lack of robust empirical research on the relationship between State

Aid and broadband coverage performance, we show in Figure 20 data on national and rural broadband coverage and broadband adoption alongside the volume of State Aid notifications over time. It indicates that broadband coverage and broadband take-up across Member States has grown steadily over the period 2004 to 2017. Take-up has grown from under 10% to over 30% in the period. Standard broadband coverage in Europe has been at high levels (above 90%) since 2011. Casual observation does not suggest any obvious causal relationship between these variables and the volume of State Aid notifications being submitted to the Commission. On the other hand, mean rural broadband coverage has expanded from 80% in 2011 to over 90% in 2017. ‘Rural broadband coverage’ refers to infrastructure deployed in areas with a population density of less than 100/km² and so is likely to refer to infrastructure that is less attractive for private sector investors to support. Changes in rural coverage may be attributable to the impact of State Aid and the gains after 2012 to the large volume of State Aid notifications that were made in the period between 2010 and 2012, even though this cannot be proved here.

5.9 Modification of existing cases

Uncertainties on the level of demand or regarding the costs and time required to deploy the infrastructures resulted in the need for some Member States to modify their original projects. To do so, they had to notify the reasons and proposed changes to the Commission.

Among the 129 original cases, 102 were never modified, 16 modified once, 4 modified twice and one was modified three times. Modifications aim at extending or changing existing measures.¹⁵ Table 10 shows that Germany accounts for 37% of all modifications, in excess of its share of original notifications (16.3%). This is mainly due to a particularity of German schemes which set the maximum amount of aid to 500,000€ per individual project, an amount which has been increased in many cases.

As shown in Table 11, the increase of the initial budget is the most common justification for a modification, with a global budget and/or aid amount increase being notified for a high share of modifications: 48% involve a budget increase, 22% an aid amount increase, and 11% an

¹⁵They are found under various names: amendment (48%), modification (22%), prolongation (22%), alteration (4%) and extension (4%).

intensity increase. Changes in intensity or aid amount are often related to the lack of available funds from municipalities that were supposed to cover part of the investment cost. Duration is also a common element in modifications, with 41% of the modifications involving an extension of duration, varying from one to five years. We also observe that some modifications aim at softening the constraints initially planned for the selection procedure, because the notified procedure failed at attracting applicants¹⁶ or was perceived as hardly compatible with the scale and complexity of the measure.¹⁷ The clawback mechanism was also revised or simply abolished in two cases.

6 Conclusion

In this paper, we have examined how public funds, or State Aid, have been used to support the deployment of broadband infrastructure in Europe since 2003 and considered the lessons that may be drawn from that experience. It is the first study to undertake a systematic analysis of all of the 163 broadband measures notified to the European Commission by Member States between 2003 and 2018.

We identify two waves of State Aid for broadband: one for the deployment of basic broadband, and a more recent one for the roll out of next-generation access networks, capable of delivering high-speed broadband access. The use of State Aid is very heterogeneous across Member States, with a few large countries representing the bulk of the cases, both in terms of number of cases and budget. The objective of most plans is to expand broadband coverage rather than, for example, increase take-up. The typical project relies mainly on public funds, with an average aid intensity of 73%, and involves a direct grant, an open tender, and a contract for 3 to 5 years. Access obligations are imposed on networks deployed with State Aid, using a benchmarking approach in most cases. The vast majority of the measures were approved by the European Commission, but for many of them, the Commission asked for additional information during the approval process. Finally, we show that notifications are associated with a relatively high level of broadband coverage in notifying countries, suggesting that public investment is

¹⁶SA. 46203 Poland.

¹⁷SA. 34 199 United Kingdom.

taking over from private investment.

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Appendix

Notified measures across Member States

Figure 1 – Broadband coverage in 2017 and total State Aid budget 2003-2018

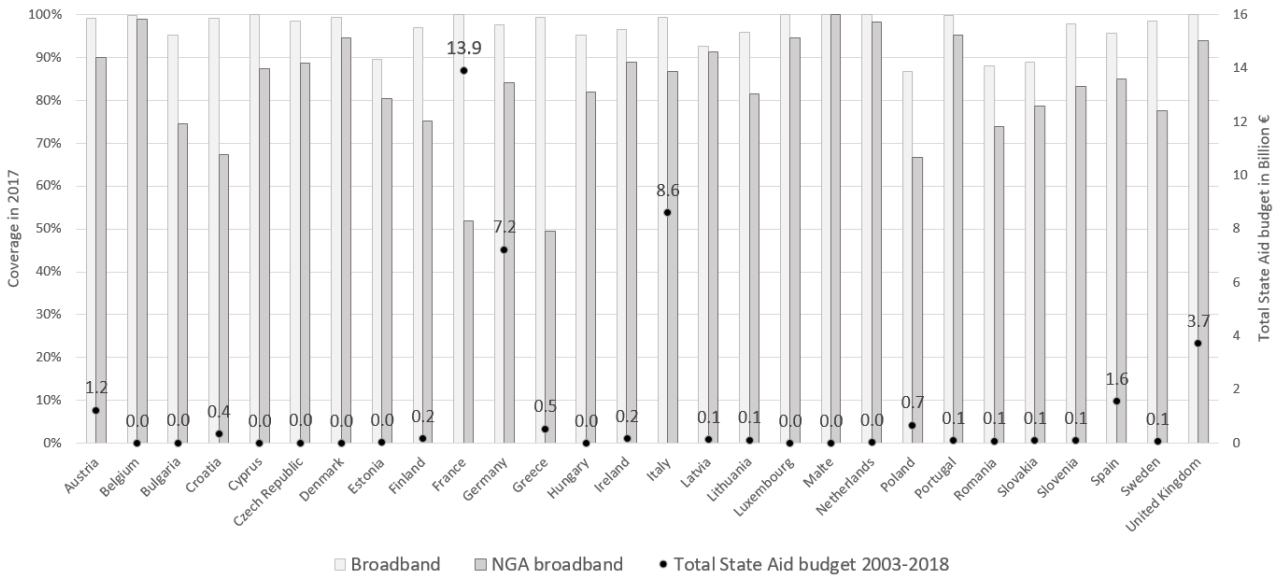


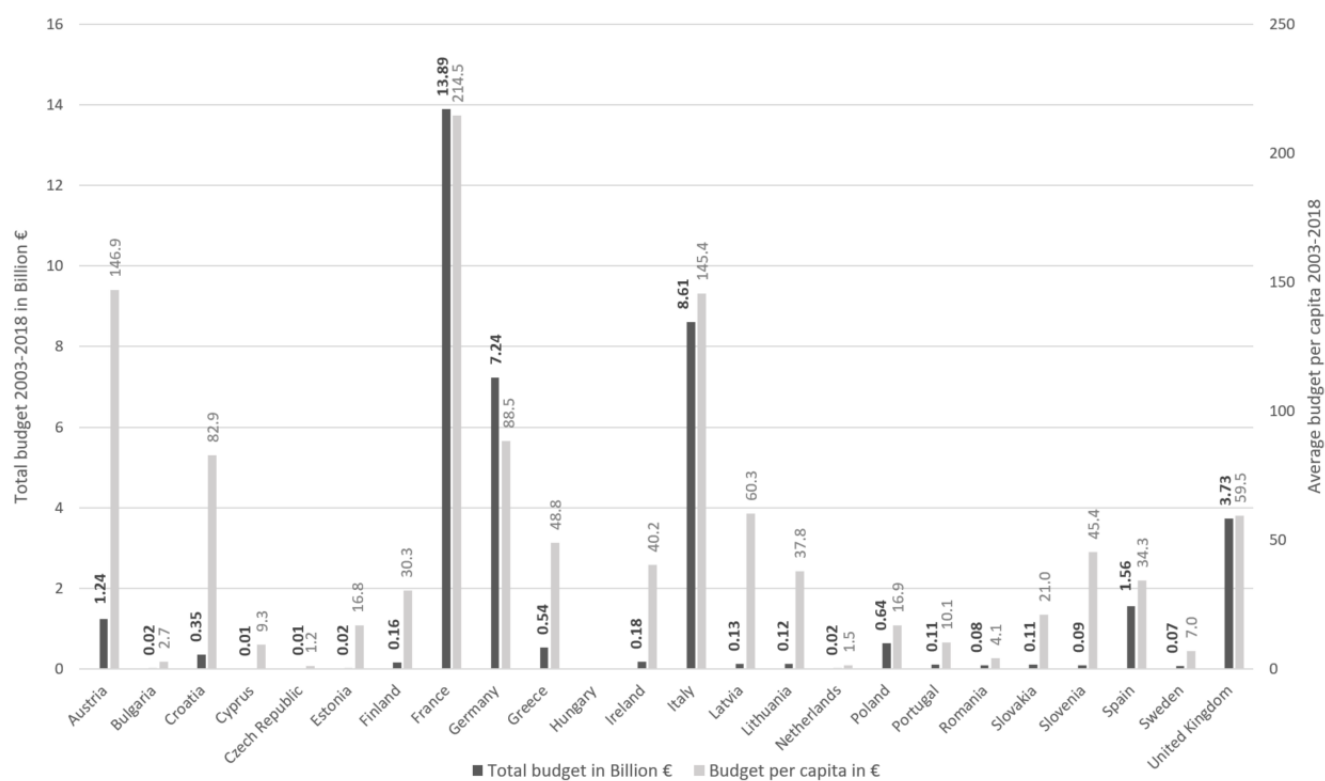
Table 1 – Share of notifications, by Member States

	Freq.	Percent
Austria	6	4.65
Bulgaria	1	0.78
Croatia	2	1.55
Cyprus	1	0.78
Czech Republic	1	0.78
Estonia	1	0.78
Finland	3	2.33
France	6	4.65
Germany	21	16.28
Greece	4	3.1
Hungary	1	0.78
Ireland	4	3.1
Italy	20	15.5
Latvia	2	1.55
Lithuania	4	3.1
Netherlands	3	2.33
Poland	10	7.75
Portugal	1	0.78
Romania	1	0.78
Slovakia	1	0.78
Slovenia	1	0.78
Spain	9	6.98
Sweden	2	1.55
United Kingdom	24	18.6
Total	129	100

Table 2 – Average, minimum and maximum budget by Member States (in Millions €)

	Mean	Min	Max
Austria	247.2	26.0	1000.0
Bulgaria	20.0	20.0	20.0
Croatia	176.7	101.4	252.0
Cyprus	7.5	7.5	7.5
Czech Republic	12.2	12.2	12.2
Estonia	22.4	22.4	22.4
Finland	54.1	10.4	132.0
France	2315.3	2.2	13000.0
Germany	361.9	0.1	3000.0
Greece	133.8	50.0	250.0
Hungary	N/A	N/A	N/A
Ireland	90.0	10.1	170.0
Italy	430.5	3.8	4000.0
Latvia	63.6	8.2	119.0
Lithuania	29.3	1.7	60.5
Netherlands	12.5	6.9	18.0
Poland	64.3	4.3	352.3
Portugal	106.2	106.2	106.2
Romania	84.0	84.0	84.0
Slovakia	113.2	113.2	113.2
Slovenia	92.5	92.5	92.5
Spain	195.2	6.5	400.0
Sweden	33.1	28.1	38.0
United Kingdom	233.4	0.9	1800.0
Total	341.6	0.137	13000

Figure 2 – Total notified budget, by Member States



Notified measures over time

Figure 3 – Number of cases over time

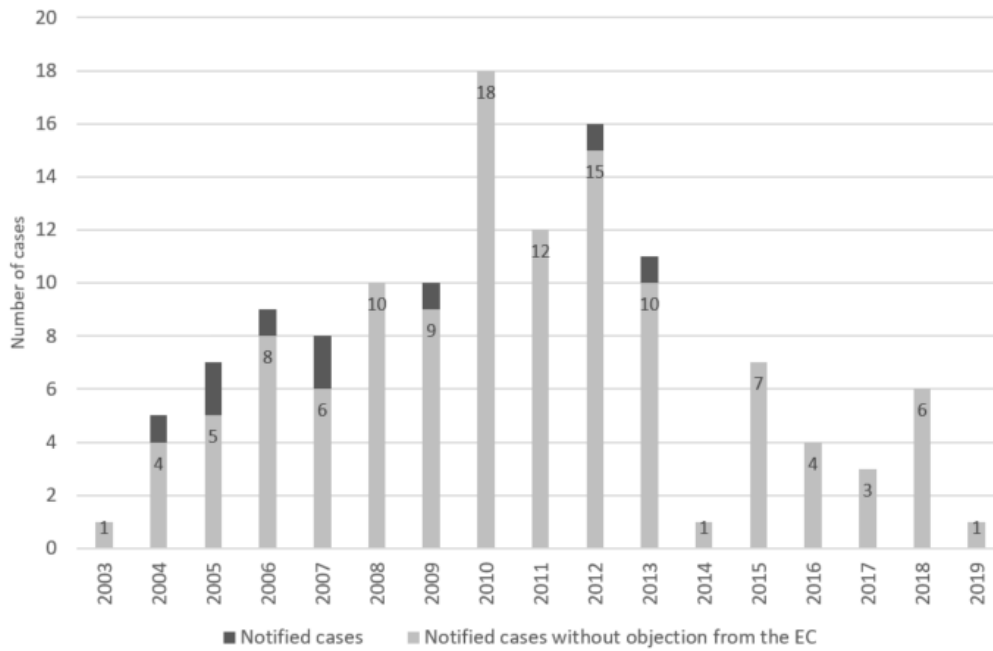


Figure 4 – Total notified budget over time

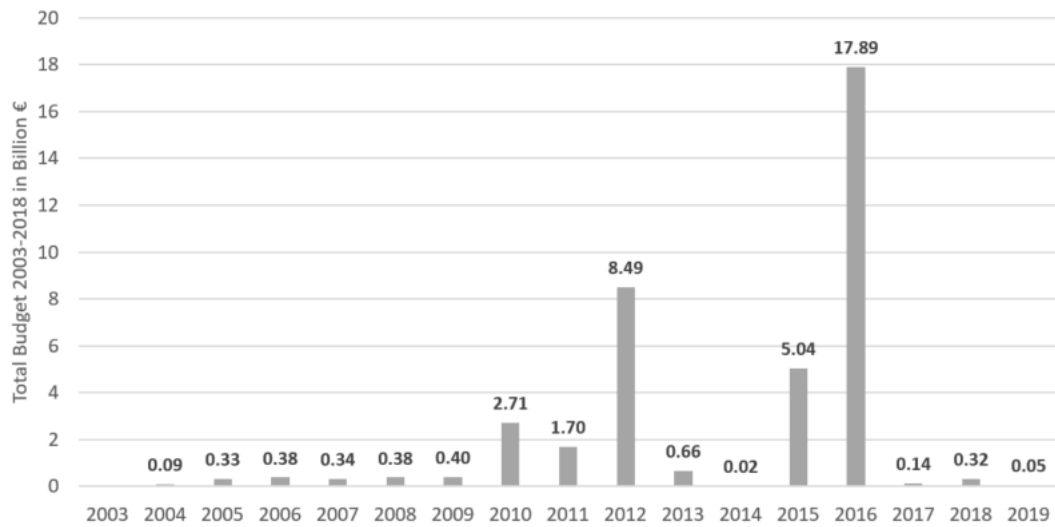
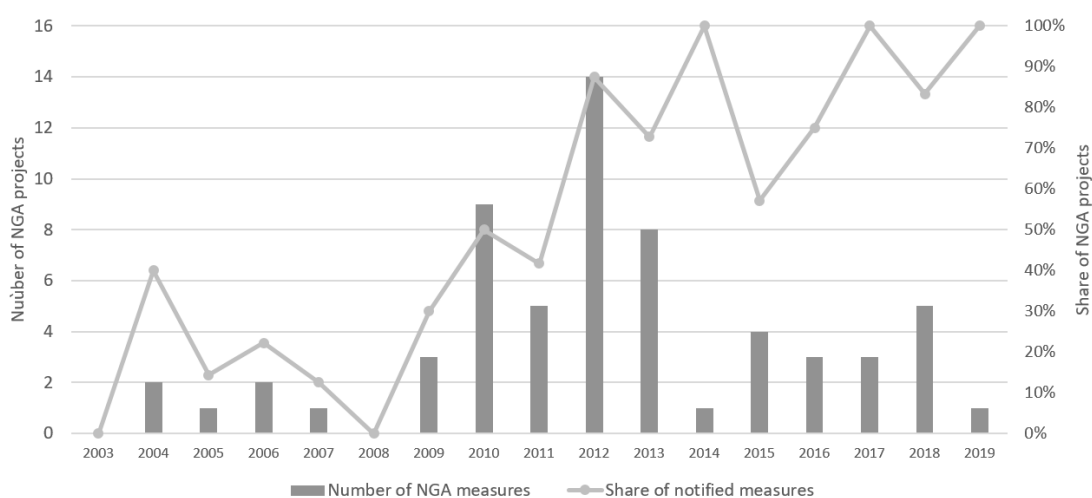


Figure 5 – Number and share of NGA projects



6.1 Aim of State Aid measures

Table 3 – Beneficiaries of notified measures

	Freq.	Percent
Businesses only	10	7.75
Public sector only	4	3.1
Residential and Businesses	63	48.84
Residential and Public Sector	1	0.78
Residential only	30	23.26
Residential, Businesses and Public Sector	21	16.28
Total	129	100

Table 4 – Technologies as declared in the notifications

	Freq.	Percent
Broadband	59	46.1
Broadband	37	28.9
Basic Broadband	10	7.8
Advanced Broadband	5	3.9
High Speed Broadband	5	3.9
ADSL	1	0.8
VDSL2	1	0.8
NGA	59	46.1
NGA	48	37.5
FTTx	11	8.6
Other/Mixed technologies	10	7.8
3G/4G	4	3.1
WiMax	1	0.8
Wifi	1	0.8
Basic Broadband and NGA	4	3.1
Total	128	100.0

Sources of funds

Table 5 – Sources of funds

	Presence of funds (0/1)		Amounts	
	Obs	Mean	Obs	Mean
Funds from Structural Funds	103	0.63	39	88.06
Funds from Regions	103	0.49	31	48.83
Funds from State	103	0.48	28	134.17
Funds from Municipalities	103	0.21	13	18.18
Funds from other European Funds	103	0.39	2	119.00

Table 6 – Sources of funds: combinations

	Freq.	Percent
Structural and State Funds	19	18.45
Structural and Regional Funds	15	14.56
Regional Funds	13	12.62
Structural Funds	12	11.65
State Funds	7	6.80
Regional and Municipal Funds	6	5.83
Structural, Regional and State Funds	6	5.83
Regional and State Funds	5	4.85
Structural, Regional, State and Municipal funds	4	3.88
Structural, State and Municipal Funds	4	3.88
Municipal Funds	3	2.91
Structural and Municipal Funds	3	2.91
Regional, State and Municipal funds	2	1.94
State and other European Funds	2	1.94
Structural and other European Funds	2	1.94
Total	103	

Figure 6 – Notified budget breakdown per source of funds (for 59 cases)

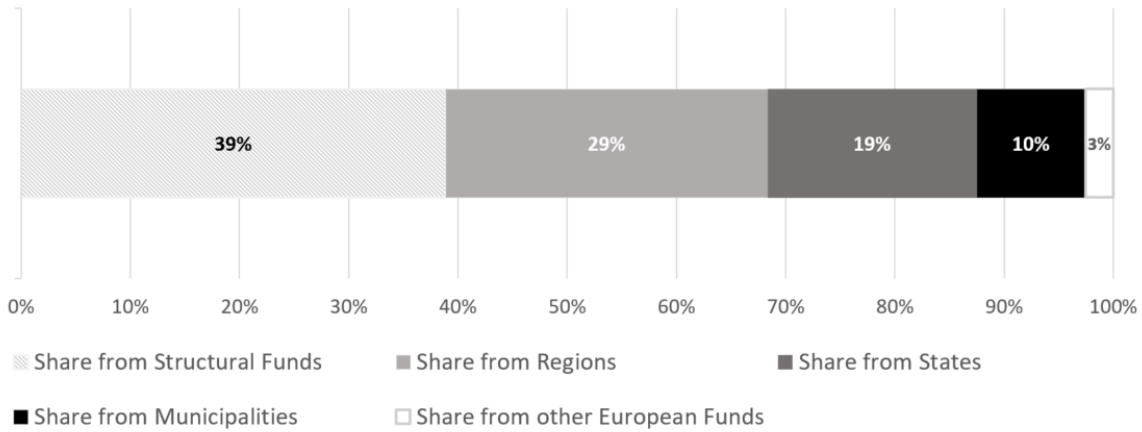


Figure 7 – Notified budget breakdown per source of funds by Member States (for 59 cases)

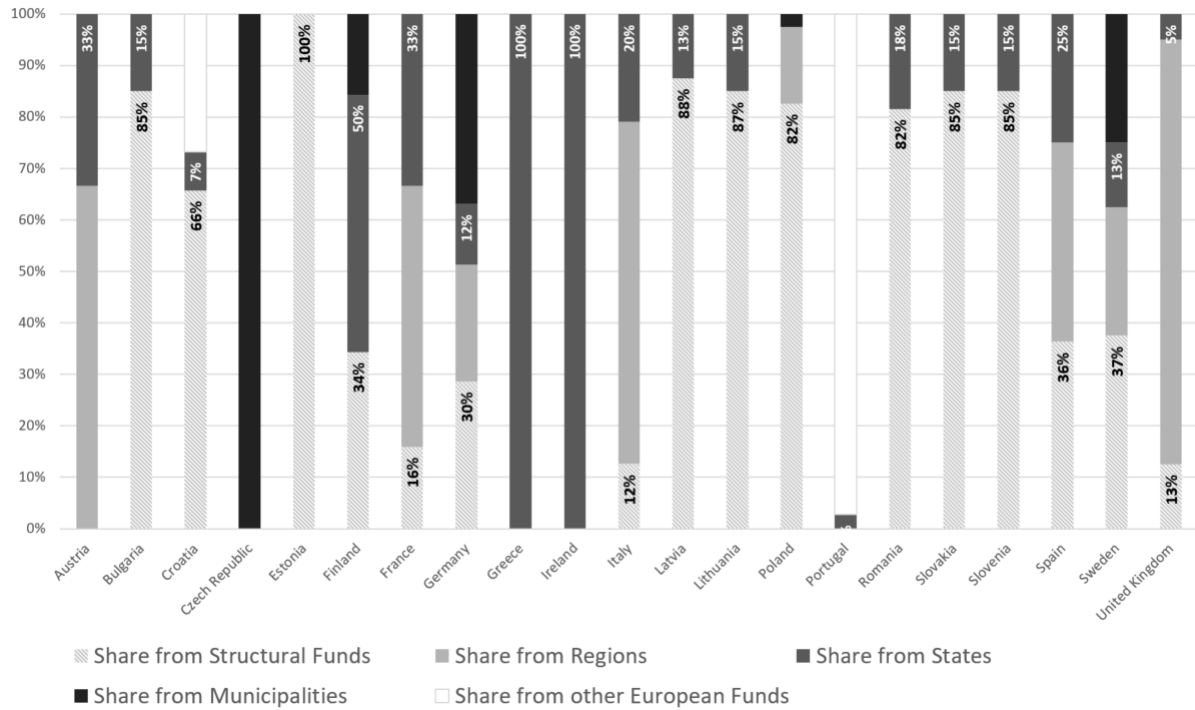
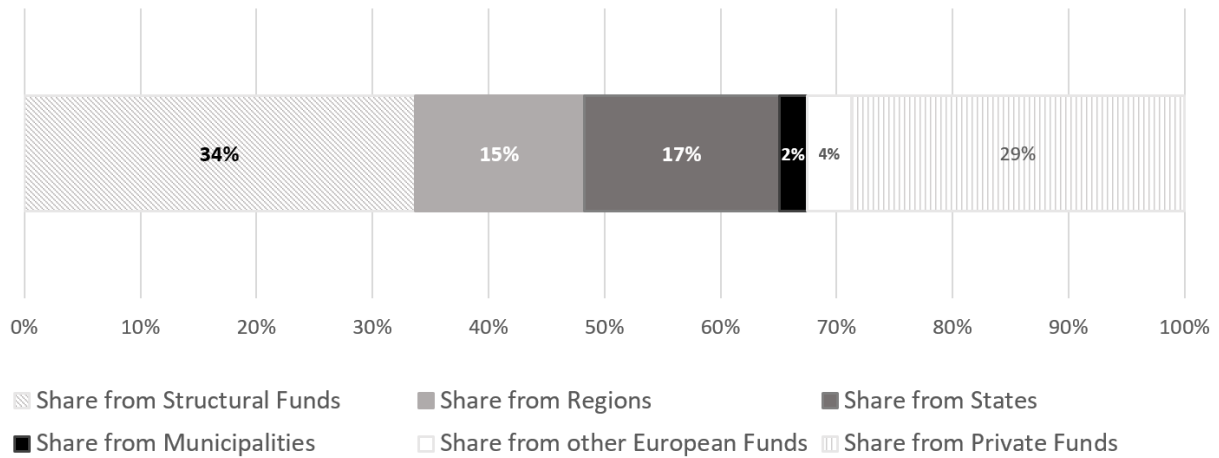


Figure 8 – Notified budget breakdown per source of funds, with private funds (for 26 cases)



Form of aid

Table 7 – Final ownership of the infrastructure

	Freq.	Percent
Public	29	48.33
Private: operator	13	21.67
Different possibilities	6	10
Public: Region	6	10
Non-profit organization	2	3.33
Private	1	1.67
Public/Private: Joint Venture	1	1.67
Public: State	1	1.67
Public: Municipality	1	1.67
Total	60	100

Table 8 – Layers

	Freq.	Percent
Wholesale	58	45.31
Wholesale and Retail	65	50.78
Several possibilities	5	3.91
	128	100

Table 9 – Ownership by infrastructure type

	Wholesale only		Wholesale and Retail	
	Freq.	Percent	Percent	
Public	31	88.6	6	26.1
Region	5	14.3	4	17.4
State	1	2.9	1	4.3
No detail	25	71.4	1	4.3
Private	1	2.9	13	56.5
Operator	1	2.9	12	52.2
No detail	0	0.0	1	4.3
Others	3	8.6	4	17.4
Public/Private Joint Venture	0	0.0	1	4.3
Non-profit organization	2	5.7	0	0.0
Different possibilities	1	2.9	3	13.0
	35	100.0	23	100.0

The approvals process itself

Figure 9 – Time between notification and decision by the EC

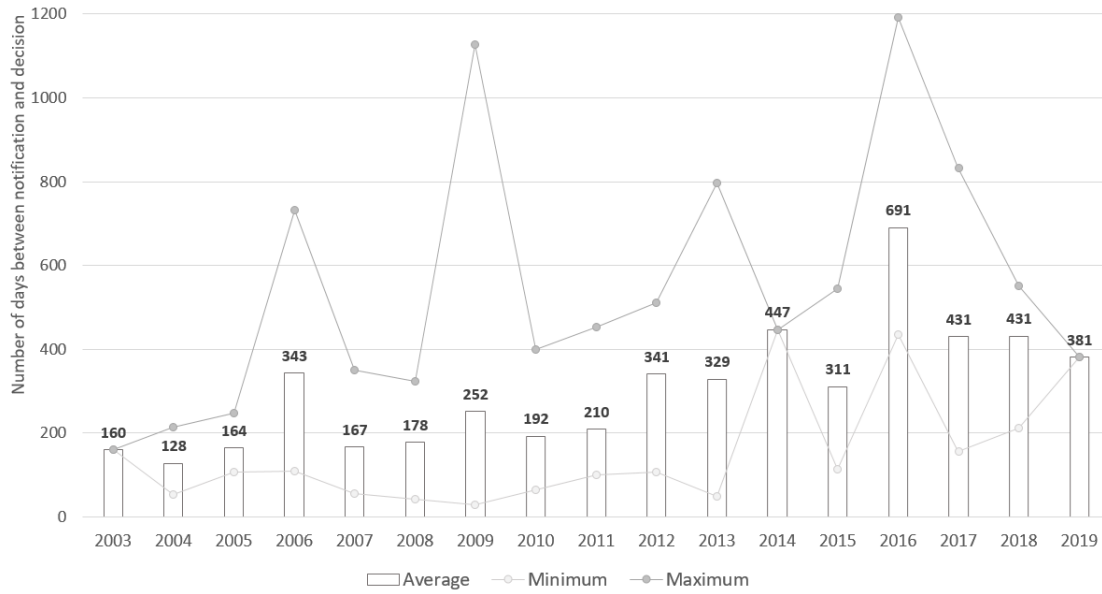


Figure 10 – Average number of days between notification and decision, per range of budget magnitude

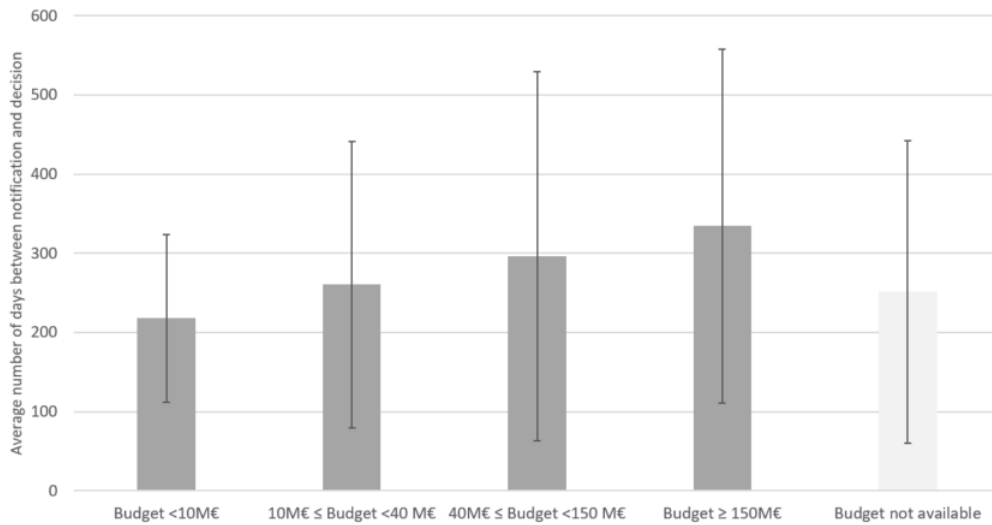
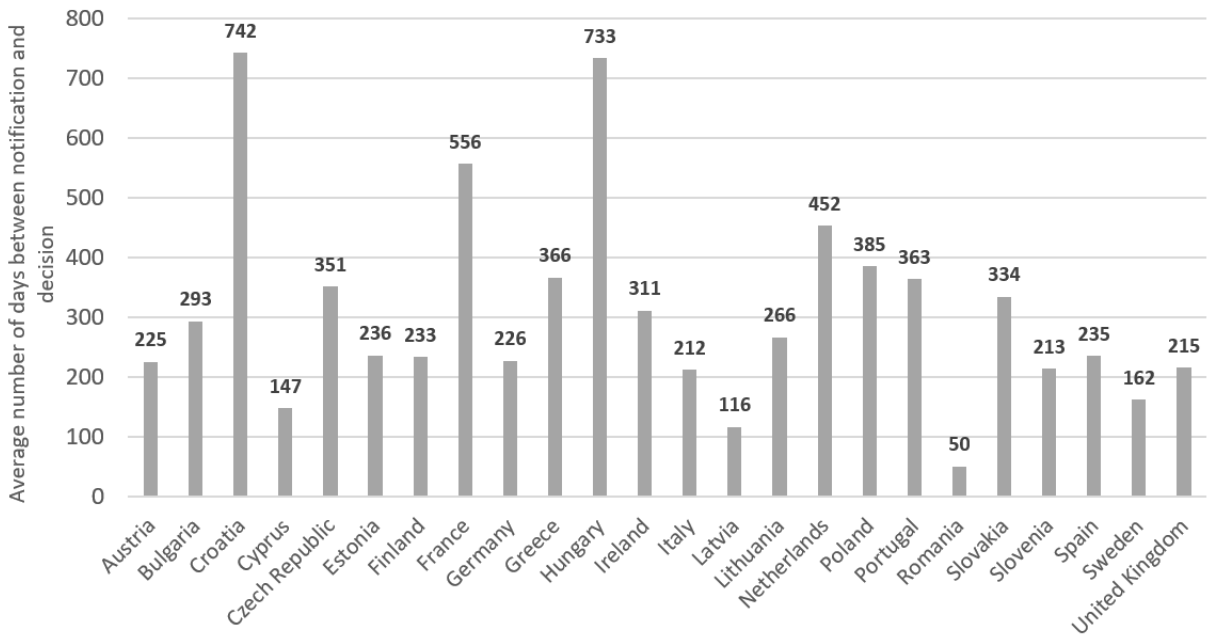


Figure 11 – Average number of days between notification and decision, per country



Relationship between timing of State Aid and private sector broadband provision

Figure 12 – Total number of cases, by range of broadband coverage

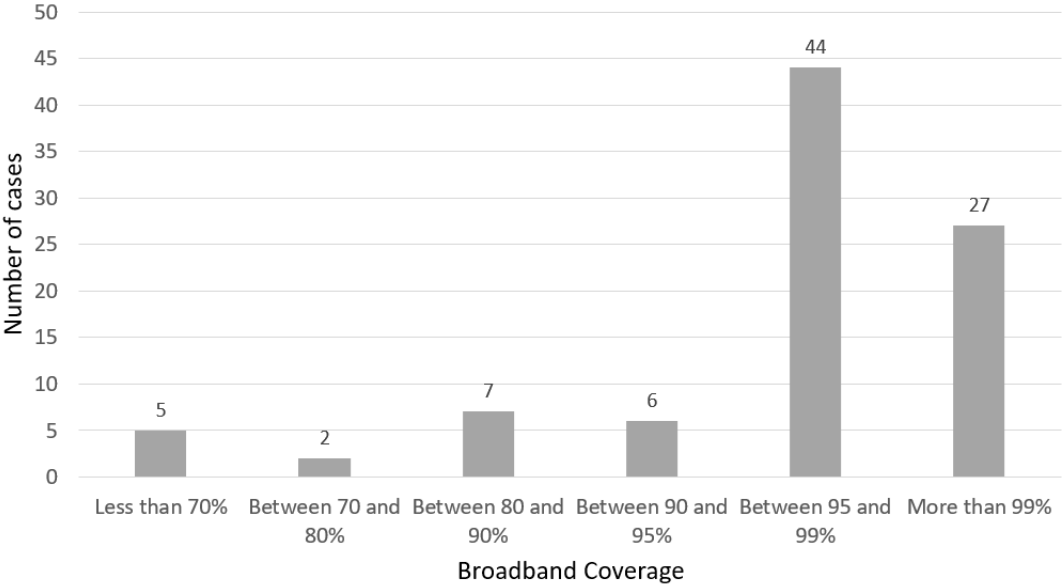


Figure 13 – Total notified budget, by range of broadband coverage

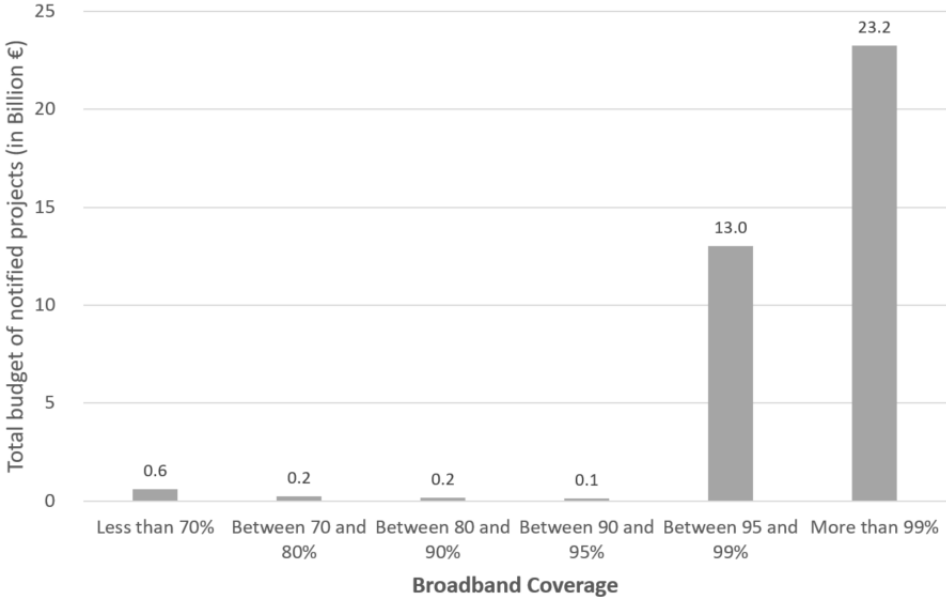


Figure 14 – Total number of cases, by range of NGA coverage

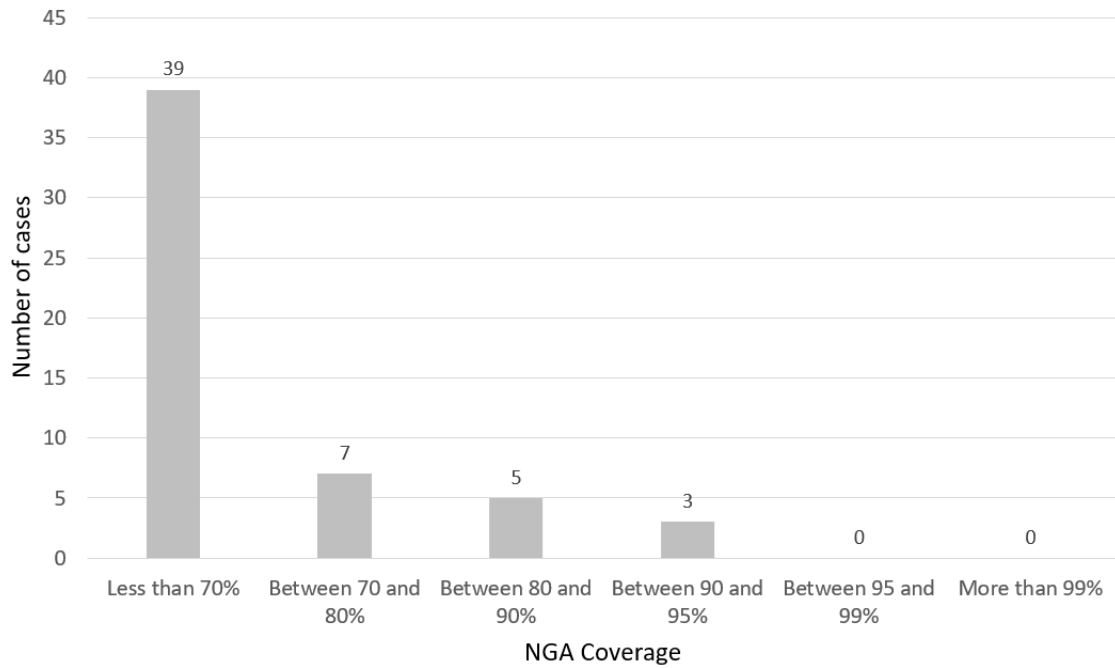


Figure 15 – Total notified budget, by range of NGA coverage

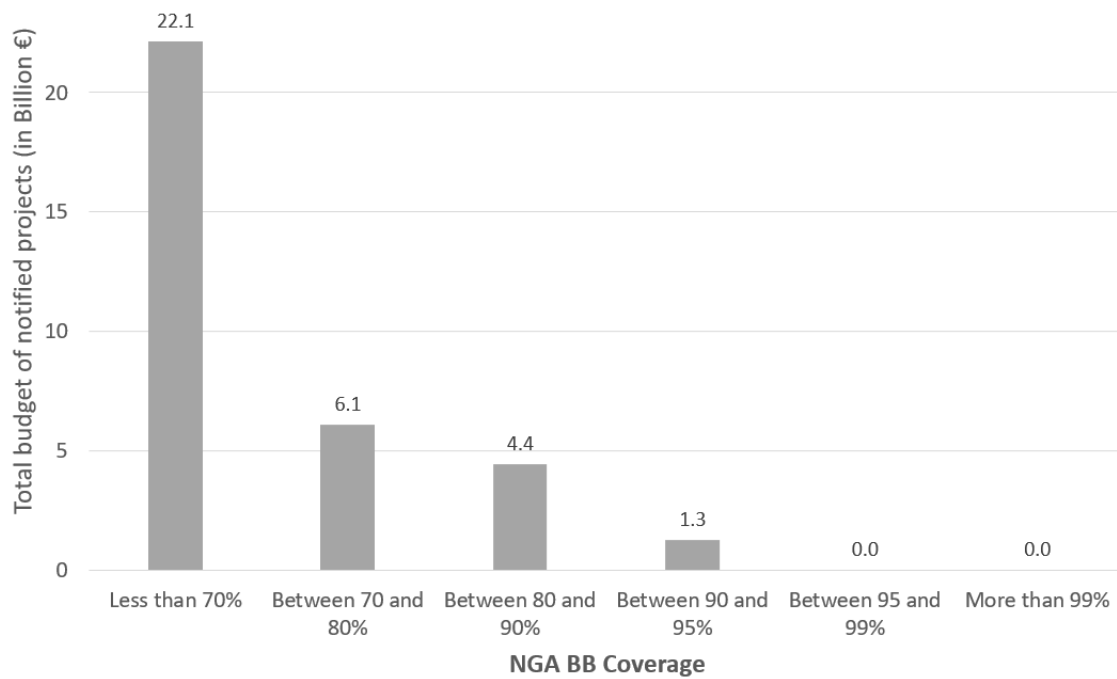


Figure 16 – Total number of cases, by range of broadband coverage in rural areas

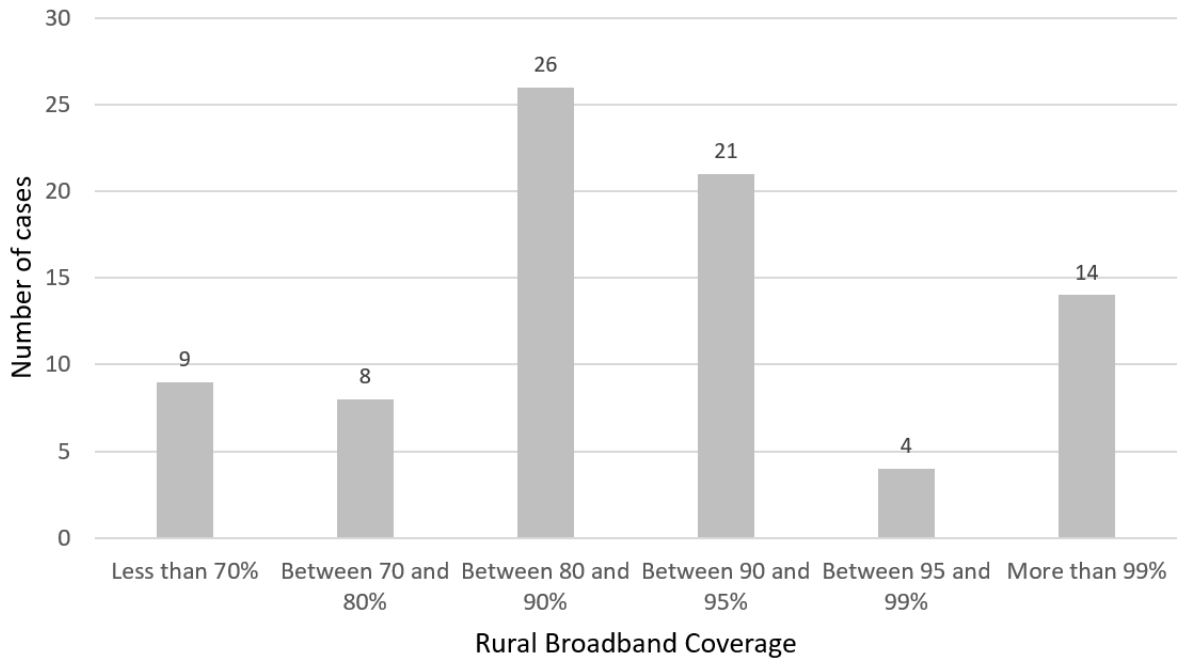


Figure 17 – Total notified budget, by range of broadband coverage in rural areas

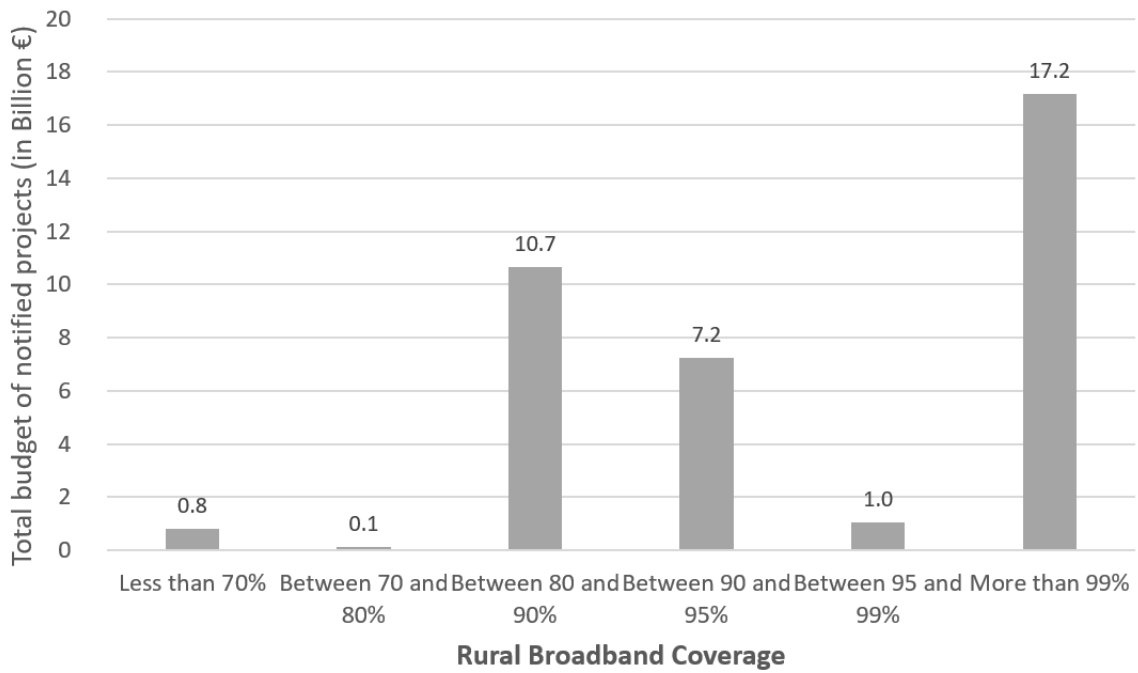


Figure 18 – Total number of cases, by range of broadband take-up

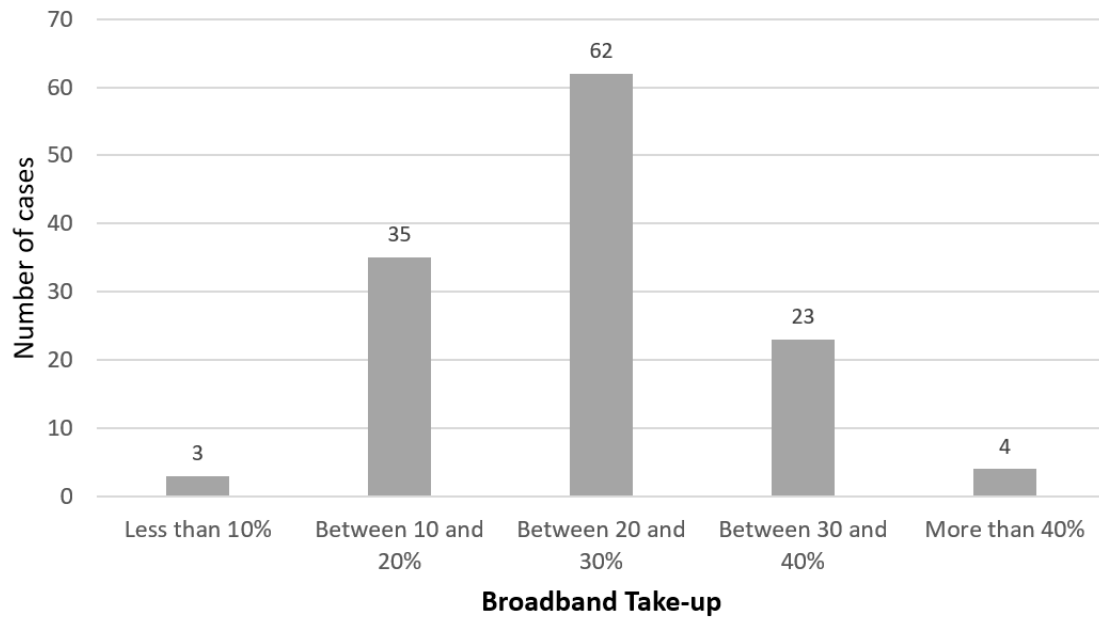


Figure 19 – Total notified budget, by range of broadband take-up

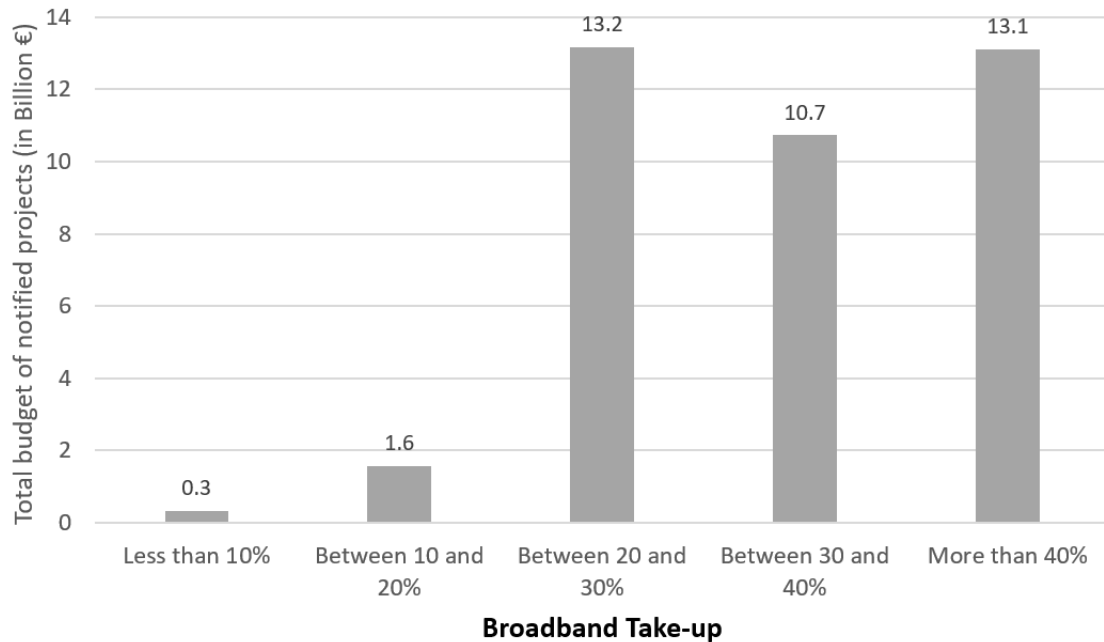
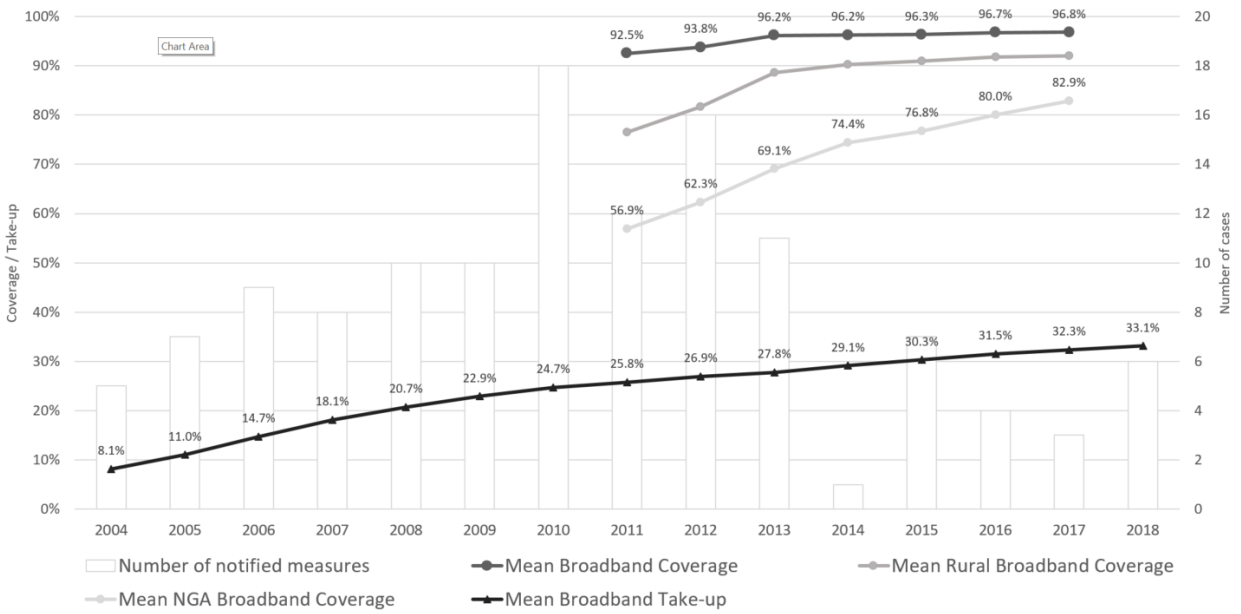


Figure 20 – Notified measures, coverage and take-up



Modification of existing cases

Table 10 – Modifications of existing measures, by Member States

	Freq.	Percent
Austria	1	3.7
Finland	3	11.11
Germany	10	37.04
Greece	2	7.41
Italy	2	7.41
Lithuania	2	7.41
Poland	1	3.7
Portugal	1	3.7
Sweden	2	7.41
United Kingdom	3	11.11
Total	27	100

Table 11 – Reasons for modifications

	Obs	Mean
Modification of measure budget	27	0.48
Modification of the aid amount	27	0.22
Modification of intensity	27	0.11
Modification of duration	27	0.41
Modification of the geographical scope	27	0.11
Modification of the attribution procedure	27	0.07
Modification of the clawback mechanism	27	0.07