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Conflicting National Policies: The Creation of the Euro and the Rebalancing of Telecommunications Prices

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Abstract

Government departments have diverse interests, and on certain occasions, the need to achieve an objective in one department may lead to the adoption of inefficient policies in other areas, with long-lasting consequences. In this paper, we analyze the rebalancing of the telecommunications tariffs that took place in the European Union before and after the liberalization of the market in 1998. We show that the objective of satisfying the Maastricht inflation condition to allow participation in the European Monetary Union from 1999 led some national governments to block the rebalancing of telecommunications tariffs. Specifically, we demonstrate that in the years immediately before the liberalization of the telecommunications market, those countries that faced greater difficulty achieving the inflation objectives of the Maastricht Treaty reduced, rather than increased, the prices of local telephone calls and line rental. Furthermore, these countries did not intensify efforts to rebalance their tariffs after the creation of the euro. Our paper also shows that in this period the countries that diverged most from the inflation condition invested less in their telecommunications infrastructure.

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1. Introduction

Government departments have diverse interests, and on some occasions, the need to achieve an objective in one department may lead the government to adopt inefficient policies in other areas, with long-lasting consequences. One example of this situation is the rebalancing of the telecommunications tariffs that took place in the European Union before (and after) the liberalization of the market in 1998. Before this liberalization, most national governments kept the tariffs of international and long-distance calls deliberately high in order to cross-subsidize the price of local telephone calls and line rental (monthly subscription fee). The objective of this policy was to facilitate universal access to telephony services, but with the liberalization of the market European authorities thought that these distorted tariffs would be an obstacle for the development of competition (Cherry and Bauer, 2002; Grzybowski, 2008). On this basis, they required member States to rebalance the tariffs of incumbent telecom operators before 1998. However, at this time price rebalancing turned out to be extremely inconvenient for those European countries facing difficulties in satisfying the inflation condition established in the Maastricht Treaty for participation in the euro. In this paper, we show that the more important objective of controlling inflation led some national governments to block the rebalancing of telecommunications tariffs, affecting competition and the investment decisions of telecommunications operators in this critical period.

At the beginning of the 1990s, European countries initiated several important reforms aimed at reinforcing the construction of the European Union and creating a Single Market. One essential policy for this was the liberalization of public services such as telecommunications, electricity and transportation services, with the objective of eliminating entry barriers and increasing the efficiency of European firms. In the case of the telecommunications sector, during the 1980s most European countries were providing services by means of state-controlled national monopolies. However, technological change and reforms initiated by countries such as

the US, the UK and Japan showed European authorities that their large monopolies were inefficient and reduced innovation and the competitive ability of European economies (Levy and Spiller, 1994; Boyland and Nicoletti, 2001; Wallsten, 2002; Li and Xu, 2002, 2004; Duso and Seldeslachts, 2010). This situation led to the liberalization of the market. In 1993, after intense negotiations, all member states agreed to completely liberalize their national telecommunications markets by 1998. The European Commission also established that before 1998 national governments had to rebalance the price of telecommunications services to facilitate the financial stability of incumbent monopolies.

Another important policy adopted by the European Commission to favor the consolidation of the Single Market was the creation of the euro (European Union, 1992; Wyplosz, 1997 and 2006; Jabko, 1999; Dominguez, 2006; De Grauwe, 2016). In 1989, the Commission decided to create the European Monetary Union, and the process culminated in the introduction of the euro at the beginning of 1999. Interestingly enough, the liberalization of basic services like telecommunications and the creation of the monetary union took place in the same period, and were conceived as two policies to enhance the integration of European markets. Despite this, in some countries the stabilization conditions established to create the euro became an obstacle to the rebalancing of telecommunication tariffs.

After the launch of the European Monetary Union in 1990, the Treaty of Maastricht established several criteria that national economies had to satisfy to participate in the euro. One of these criteria was that the inflation level of each participant in the euro could not be higher than 1.5% above the average of the EU economies with the three lowest inflation rates (Kenen and Meade, 2003; Jonas, 2006; Lewis, 2009; Lewis and Staehr, 2010; Paleta, 2010). In 1994, the European Monetary Institute, the precursor of the European Central Bank (ECB), was created with the objective of supervising the attainment of the Maastricht conditions before the

introduction of the euro in 1999.[1] Moreover, it was established that after the creation of the euro it would check that the inflation rates of euro members were not diverging significantly and persistently from a 2% target.

By the time of its creation on January 1 of 1999, the euro zone comprised 11 countries: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxemburg, Netherlands, Portugal and Spain. The euro was later extended to Greece (2001), Slovenia (2007), Cyprus and Malta (2008), Slovakia (2009), Estonia (2011), Latvia (2014), and Lithuania (2015). Despite the successful creation of the monetary union, during the 1990s European countries faced many difficulties in meeting the inflation objectives established by the Maastricht Treaty and adopted several structural reforms and ad-hoc measures to reduce their prices, such as reducing the prices of regulated services. In the case of the telecommunications market, it was expected that the rebalancing of tariffs would increase the Retail Price Index (RPI) and reduce the ability of some countries to satisfy the Maastricht conditions (Calzada and Costas, 2016).

In this paper, we show that in the years immediately before the liberalization of the telecommunications sector, those countries that faced greater difficulty in achieving the inflation objectives of the Maastricht Treaty reduced, rather than increased, the prices of local telephone calls and line rental. Although European authorities supervised the reform of the telecommunications market and enacted several measures to enforce tariff rebalancing, the greater need to meet the Maastricht Treaty's inflation condition led these countries to reduce the price of line rental and local calls. Moreover, these countries did not compensate for this situation by carrying out price restructuring in subsequent years. Our paper also shows that in the years prior to 1998 the countries that diverged most from the Maastricht inflation condition invested the least in telecommunications infrastructure.

[1] The euro was introduced to the world financial markets as an accounting currency on 1 January 1999, replacing the former European Currency Unit (ECU). Physical euro coins and banknotes entered into circulation on 1 January 2002. See https://ec.europa.eu/info/business-economy-euro/euro-area_en

Our study draws from several public data sets. Data on incumbents' prices were obtained from the consultancy agency Teligen, which during the period we examine provided price information to the European Commission. Pricing data are available for all EU countries for the years between 1995 and 2011.[2] We also use information describing the market characteristics obtained from Eurostat, the International Telecommunications Union and the OECD.

The main contribution of our paper is the demonstration that during the creation of the European Single Market and the Monetary Union, the priority objective of participating in the euro led some countries to establish inefficient telecommunication tariffs. This conclusion demonstrates the existence of conflicting interests in government departments and highlights the need to delegate the design and implementation of sector policies to specialized and autonomous agencies to reduce internal conflicts in shaping the national economic policy. Indeed, the need to control inflation explains why the regulation of telecommunications prices in the years before the liberalization of the market was not delegated to specialized regulatory agencies.

The paper is structured as follows. In section 2, we review the literature related to our research. In section 3 we present the conceptual framework of the paper. In section 4, we describe the data and the empirical model. In section 5, we report and comment on the econometric results. Finally, section 6 summarizes and concludes.

2. Contribution to the literature

A substantial body of economic literature shows the relevance of the political ideology (Olson, 1965; Romer and Rosenthal, 1987) and the influence of interest groups (Stigler, 1971; Beker, 1983; Peltzman, 1976) and countries' institutional organizations (Lijphart, 1999; Henisz and

[2] Data on prices are available in the reports provided by the consultancy agency Teligen for the Commission since 1998, but Teligen provided us with information for the years 1995–1997.

Zelner, 2006; Duso and Seldeslacht, 2010) in the formation of public policies. Our paper shows that national governments have diverse objectives and that the prioritization of these objectives might lead to inefficient policies that affect other economic activities. Our analysis focuses on the conflict between the control of inflation and tariff rebalancing in the telecommunications sector, but there are other examples of conflicting policies, such as the tension between environmental protection and economic growth, competition policy and the protection of national firms, and the sanitary measures needed to control the COVID-19 pandemic and the measures needed to promote the reactivation of the economy. As explained by Duso and Seldeslacht (2010), while the traditional private interest view of regulation stresses the role of interest groups in the formation of policies, this approach does not model policy-making bodies (governments, policy makers, and regulatory agencies), which create and shape the regulatory process.[3] Governments and politicians care about the policy outcome and focus on the objectives that they consider as socially more relevant and that offer them more internal and international political support. Our paper shows that the need to achieve some of these objectives might act as an internal justification for relegating other policies, or even for adopting inefficient policies.[4]

Our paper is also related to the extensive literature analyzing the liberalization of the telecommunications market (Li and Xu, 2004; Grajek and Röller, 2012), although this is the first empirical work examining how the control of inflation in the years before and after this liberalization affected the prices of telecommunications services. Several papers concerning this period have analyzed problems such as the effect of competition on the diffusion of

[3] Duso and Seldeslacht (2010) explain that politicians make their choices not only to be re-elected, but also because they genuinely care. This implies that decisions of politicians may not be in line with the preferred policy of interest groups (Kalt and Zupan, 1984).

[4] The literature on Public Administration has examined how Europeanization has changed national administrative systems, which has affected the beliefs and roles of public employees, the time and resources devoted to EU-related work, and the impact of Europeanization on national ministries and agencies (Bach et al., 2013; Bach et al., 2015; Egeberg, 1999 and 2009; Geuijen et al., 2018; Knill, 2001; Lægreid et al., 2004; Mastenbroek and Princen, 2010; and Müller et al., 2010).

telecommunications services, the relevance of regulatory agencies (Edwards and Waverman, 2006), the privatization of national monopolies, and the regulatory design (Ros, 2003; Berg and Gutierrez, 2000; Wallsten, 2001; Wallsten, 2003).

A few papers have studied the prices of fixed-line telephony during the liberalization process. Boylaud and Nicolletti (2000) examined the effects of competition on productivity, prices and quality in long-distance domestic and international telephone calls in 23 OECD countries from 1991 to 1997. They found that liberalization had immediate benefits on productivity and prices after its announcement. Grzybowski (2008) analyzed the impact of the regulation of fixed-line telephony on prices for residential consumers during the period 1998–2002 using data from the consultancy agency Teligen. He found that the regulation of carrier pre-selection and number portability reduced average prices across the EU by 8.2%. Moreover, the regulation of termination charges to access incumbent networks reduced incumbent national prices at peak time, but had no impact on local calls. Bacchiocchi et al. (2011) analyzed fixed-line telephony prices for 15 EU countries for the period 1997–2003, showing that privatization had a limited role in explaining the prices of international, national, and local calls, and connection charges. Moreover, they found that privatization and liberalization contributed to reducing the prices of local calls, which is in contrast with the idea of tariff rebalancing. Other papers have analyzed the effect of technological change and regulation on the prices and diffusion of mobile services (Bauer, 2003; Gruber and Verboven, 2001; Grzybowski, 2005).

Very few papers have considered tariff rebalancing in telecommunications markets. Ros and Banerjee (2000) analyzed a group of 23 Latin American countries in the period 1995–96 and concluded that tariff rebalancing, privatization, and network technology upgrades reduced the proportion of unmet demand for basic residential services in a country. Cherry and Bauer (2002) presented descriptive evidence of tariff rebalancing in the US and Europe during 1994–2000. They found that in the EU, usage charges dropped significantly for residential customers (−37.0%) and business customers (−44.4%) and that the bulk of the decrease happened after

the full liberalization of the voice telecommunications markets in 1998. During 1997–2000 local residential usage charges were fairly stable and the long-distance components decreased fairly dramatically in the EU (−52.7%). As a result, the share of fixed components in the total basket costs increased by 44.56% for residential users.

Finally, our paper contributes to the literature that analyzes the relevance of political and social environments in the performance of regulated industries. Levy and Spiller (1994) showed how a country's institutional endowment at the macro-political level determines the possibility of arbitrary administrative discretion and affects the performance of telecommunications firms. Connected with this idea, the empirical literature has shown that investment in telecommunications is associated with policy stability (Henisz, 2000; Henisz and Zelner, 2001; Andonova and Diaz-Serrano, 2009). Different literature has shown that independent regulatory agencies have a substantial impact on the entry and investment decisions of private firms (Gutierrez, 2003; Gutierrez and Berg, 2000; Fink et al., 2002; Bortolotti et al., 2006; Edwards and Waverman, 2006). Despite this, there is little evidence on how government internal conflicts might lead industry regulators to abandon their mission. One exception is Joskow (1973 and 1974), who explained that in the late 1960s the US regulatory commissions in charge of the electricity sector were more concerned about the increase in prices than about an accurate application of the rate of return regulation.[5] Finally, our paper is related to Duso and Seldeslacht (2010), who examined liberalization in the mobile telecom industries during the period 1991–1997 for 24 OECD countries. They showed that while strong incumbents and pro-regulation governments slowed down the liberalization of the telecommunications market, governing

[5] Joskow (1974) claimed that "it does not appear that regulators have been concerned with regulating rates of return per se. The primary concern of regulatory commissions has been to keep nominal prices from increasing." He added that the "rapid inflation had quickly changed a very passive and inactive "rate of return" regulatory process into a very active and continual process of administrative rate of return review".

bodies that favored a small welfare state sped up entry. Moreover, in line with the agency theories of regulation, they found that independent industry regulators slowed down liberalization.[6]

3. Conceptual framework

3.1. Telecommunications liberalization and tariff rebalancing

In the 1980s, European institutions were very concerned about the bad state of their telecommunications services, and more specifically, about the loss of competitiveness and innovative capacity of the EEC with respect to the United States. It was considered that the excessive fragmentation of national markets and the entry barriers imposed by national monopolies were an obstacle to the development of the service. An illustration of this situation is that in this period the per capita consumption of telecommunications services in the EEC was approximately one third lower than that of the United States, while the demand for advanced services was growing much more slowly (Little, 1983).

The lack of initiative by the EEC became apparent after the breakup of AT& T in 1984, and when the UK and Japan privatized their public monopolies and liberalized their telecommunications markets. In 1984, the "American challenge" forced the European Parliament and the Council of Ministers of the EEC to launch a coordinated program to reform the telecommunications sector. Later on, the Directorate General XIII of the European Commission, encouraged by the creation of the European Single Market in 1993, undertook a comprehensive analysis of the telecommunications market in the *Green paper on the development of the Common Market for telecommunications services and equipment* of 1987. This document contained a Telecommunications Program in which the Council and the Commission agreed to liberalize the

[6] They explained that the cost of delegating to specialized regulators is that these may not implement policies reflecting the government's preferences. "Regulators may abuse their informational advantages to collude with industry incumbents. This agency problem is to some extent confirmed by the observation that regulators who are financed by industry incumbents have a (weak) tendency to slow down liberalization ".

terminal equipment market and the value-added services, harmonize the existing networks, promote the creation of Europe-wide services, and separate the regulation and operation of telecommunications services. The terminal equipment market was liberalized in 1988 and the value-added services in 1990. Moreover, the 1990 ONP Framework Directive of 1990 established the conditions of access and open use of the existing telecommunications networks. This was the first major blow to national monopolies and initiated the harmonization of telecommunications infrastructure across the ECC.

In 1992, the European Commission reviewed the results achieved by the "first European liberalizing wave" and sent two communications to the Council of Ministers identifying two important problems affecting the market. In the first communication, it pointed out that the rebalancing of tariffs of incumbent national operators had been insufficient, except in the case of the UK where the market was liberalized in 1982. In the second, it explained that the ongoing reforms were not enough to help Europe get out of the deep economic crisis that it was experiencing, and stressed the importance of incorporating the new information technologies into economic and social life. After this, in 1993 the European Council of Ministers resolved to completely liberalize fixed telephony services in all countries before January 1, 1998. To overcome the reluctance of some countries to open their markets, the Council established three conditions that each country had to satisfy: 1) adjustment of the tariffs to costs; 2) universal coverage of the basic telephone service, which required the deployment of fixed telephony in peripheral regions;[7] and 3) high usage of basic telephony services by the whole population.

In addition to the liberalization of voice telephony, this "second liberalizing wave" also established the liberalization of telecommunications infrastructure by 1998. At the beginning of the 1990s, there was a large mosaic of transmission networks in the EEC that in many cases

[7] The European Council gave Spain, Portugal, Greece and Ireland 5 more years to liberalize telephony services, arguing that they needed significant investment to universalize access to their services.

were not interconnected and were not inter-operative.[8] To solve this problem, in 1996 a European Directive established the total abolition from January 1, 1998 of special and exclusive rights in voice telephony and the supply of public telecommunications networks.[9]

After the liberalization of 1998, the telecommunications market experienced a substantial transformation. Hundreds of operators entered the market offering new and specialized services, mobile telephony and the Internet began to expand, and cable and satellite television services began reaching larger audiences. However, investment in new infrastructure occurred at a much slower pace than expected. This led national and European authorities to introduce new technical regulations, such as those affecting interconnection, portability, and numbering (Cave et al., 2019). An important measure for this objective was the "unbundling of the local loop", established on January 1, 2001, which allowed entrants to use the incumbent's local exchanges to access consumers.[10]

After 1998, the European Commission reviewed the state of the market and decided to deepen the reforms to accelerate the process of technological convergence between the fixed, mobile and television services. At the European summit in Lisbon in June 2000, the Heads of State and Government of the EU decided to promote more intensive reform of the market to boost the modernization and growth of European economies. In 2002, in the midst of a global crisis in the telecommunications sector, a new regulatory framework, the so-called "telecom package", was approved.[11] The new legislation integrated many of the partial regulations introduced in previous years into a new coherent and harmonized system. This set of measures

[8] In 1994, the Green Book on telecommunications infrastructure and cable television networks set out the principles for regulating the use of infrastructure. The Green Book was published in two parts: (1) Principles and Calendar (COM 94/440); and (2) Common Approach (COM 94/682).
[9] Directive 96/19/CE, March 13th, 1996.
[10] Regulation (EC) No 2887/2000 on the unbundling of the local loop. This measure was considered as an intermediate step in the so-called "ladder of investment", which promoted the entrants' progressive investments in their own networks (Cave, 2006;Cambini and Jiang, 2009; Bourreau et al., 2010; Bacache et al., 2014; Briglauer et al., 2013; Vogelsang, 2013; Cave, 2014; Calzada and Martínez, 2014a and b).
[11] The Telecoms Package was adopted in 2002 and amended in 2009. It included four Directives: Directive 2002/20/EC, 'Authorization Directive'; Directive 2002/19/EC, 'Access Directive'; Directive 2002/22/EC, 'Universal Service Directive'; Directive 2002/58/EC, 'Privacy and electronic communications.

completed the liberalization process, if we take this to be the political process aimed at breaking the national monopolies, introducing new competitors and eliminating legal barriers to entering the sector.

It is important to note that despite the leadership of the European authorities throughout this process, the timing of the liberalization process was always controlled by national governments. They maintained state control over the incumbent monopolies and continued setting heavily distorted price structures for political reasons (Boylaud and Nicoletti, 2000; Thatcher, 2001; Bel et al., 2006; Calzada and Costas, 2016).

Disputes between the European Commission and individual countries were frequent in the years after liberalization. In Directive 96/19/EC the European Commission established the need to rebalance tariffs before liberalization. However, not all countries followed these instructions. Cherry and Bauer (2002) reported that in its Fifth and Sixth Reports on telecommunications regulatory reform, the Commission noted the reluctance of some Member States to conclude rate rebalancing, but no further actions were taken (European Commission, 2000). On the other hand, newly privatized telecommunications operators in Spain and Italy complained in front of the European Commission that their countries had not complied with the tariff rebalancing instructions.[12] In a similar vein, on 6 December 2001, the European Court of Justice handed down a judgment in a dispute between the Commission and France over the mechanism for financing the universal service. The Court backed the Commission's position, and argued that France had also failed to complete the rebalancing of tariffs.[13]

3.2. The European Monetary Union and the inflation criteria

[12] See, the European Commission press releases IP/01/1226, ip/00/1523, and IP/01/1898. More information in https://ec.europa.eu/commission/presscorner/detail/en/IP_00_1524. In the case of Italy, in 2000 the European Commission suspended the infringement proceedings initiated in 1998, following the decision of the Italian regulator to increase Telecom Italia line rental in 2001.

[13] Case C-146/00. See XXXIst Report on Competition Policy 2001, European Commission. https://ec.europa.eu/competition/publications/annual_report/2001/en.pdf.

Several papers have studied the economic and policy process followed for the creation of the European Monetary Union (EMU) and its effects (Buiter, 2005; Jonas, 2006; Dobrinsky, 2006; Wyplosz, 2006; Paleta, 2012).[14] The process can be divided into three stages. In 1989, the European Council of the EU established that the first stage towards the creation of the EMU would begin in 1990. In this stage, the members of the European Monetary System (EMS) abolished all existing capital controls and cooperation between the central banks increased. In 1991, the Treaty of Maastricht set out the framework for stages two and three for the creation of the EMU.[15] The Treaty established several criteria to be part of the EMU, which required the convergence of the economies participating in the Eurozone and the establishment of a common monetary policy.

The second stage of the EMU began in 1994, with the creation of the European Monetary Institute (EMI), the precursor of the European Central Bank (ECB). One of the missions of this institution was to supervise the satisfaction of the Maastricht criteria. Regarding price stabilization, it was established that inflation in each country could not "*exceed by more than 1.5 percentage points that of, at most, the three best performing Member States in terms of price stability*".[16] This condition had to be satisfied to participate in the third stage of the EMU, and was kept during the enlargement of the EU from 15 to 28 countries in subsequent years. This measure was considered essential to allow the ECB to effectively carry out a common monetary policy, and to avoid inflation differentials that could lead to imbalances that would require structural interventions or the abandonment of the euro by some countries. Other criteria included in the Treaty were to have participated in the European Exchange Rate Mechanism II for at least 2

[14] Jabko (1999) explained that the EMU resulted from the evolution of structural interests and macroeconomic ideas in the context of a pre-existing European monetary system. He also highlighted the role of European Commission officials in the dissemination of the idea that the EMU was a solution to the problems created by financial globalization.

[15] The Treaty of the EU established the introduction of a monetary policy (Article 3a TEU), implemented by a single and independent central bank (Article 4a TEU), with price stability as a primary objective.

[16] The inflation criterion was established in Article 1 of the Protocol on Convergence Criteria of the Maastrich t Treaty (European Union, 1992).

years without devaluation or substantial exchange rate tensions; that the government budget deficit could not exceed 3% of GDP; and that public debt could not exceed 60% of the GDP (Lewis and Staehr, 2010). The satisfaction of the criteria determined whether a country had achieved "sustainable convergence" and thus was qualified to adopt the euro.[17]

According to the Maastricht Treaty, the final decision on adopting the euro had to consider the Convergence Reports from the European Commission (EC) and the European Monetary Institute (EMI) and later on the ECB.[18] By 1994, none of the EU Member States had fulfilled the convergence criteria and most of them did not satisfy the deficit targets, but in 1995 the Cannes European Council confirmed the start of the Economic and Monetary Union in 1999 and the Madrid European Council decided to name the new currency the 'euro'. After this, Member States increased their efforts towards convergence (Delivorias, 2015). In 1997, only Finland, Luxembourg and Portugal met all criteria, but by 1998 11 Member States satisfied them. In 2000, Greece also met the convergence criteria and was able to adopt the euro. As a result, 12 countries eventually adopted the euro and a common monetary policy: Austria, Belgium, Finland, France, Germany, Greece, Italy, Ireland, Luxemburg, Netherlands, Portugal and Spain.

The third stage of the EMU began in 1999, and during this period, the primary objective of the ECB was price stability. The ECB established that national inflation rates could not diverge significantly and persistently from a target of 2% (ECB, 2004). The empirical evidence shows that in this period the dispersion of the inflation rates in the eurozone decreased steadily, reaching the lowest level in 1999, although it then increased and remained stable for some years (Gregoriou et al., 2006). In the period 1999–2001, the inflation rate increased, reflecting several price shocks, such as the 300% rise in oil prices between early 1999 and mid-2000, the

[17] Wyplosz (2006) and De Grauwe (2003) stated that the main purpose of the criterion was to bind South European countries with traditionally high inflation to the lower inflation typical for Germany.

[18] See https://ec.europa.eu/economy_finance/publications/european_economy/convergence_reports_en.htm for a review of the Convergence Reports since 1998. The report of 1998 assessed the first group of countries that adopted the euro, and the report of 2000 assessed Greece and Sweden using the inflation reference value of 15 EU countries. In 2006, Lithuania and Slovenia were assessed considering 25 members, and in 2007 Malta and Cyprus considering 27 members.

depreciation of the common currency over this period, and significant increases in food prices in 2001.[19]

3.2.1. A common measure of inflation

The measure that the European authorities have used to examine the evolution of inflation in each country is the annual HICP inflation (Harmonized Index of Consumer Price), which is calculated on a monthly basis. For each month, the annual HCPI inflation rate is defined as the percentage change in the 12-month average HICP index relative to the same index one year earlier. This measure ensures that the time series of the annual HICP inflation is relatively smooth (Lewis and Staehr, 2010). The HCPI reflects the prices of consumer goods and provides a common measure of inflation that allows comparisons among countries.

According to the Maastricht Treaty, during the period January 1996 to December 1998 the inflation reference value was 1.5% plus the average inflation of the three best-performing EU countries in terms of inflation control. The three best performers during 1996 were Sweden (0.78%), Finland (1.06%) and Luxemburg (1.16%). As a result, the inflation reference value was 2.5%. In 1997, the three best performers were Austria (1.158%), Finland (1.21%) and Ireland (1.23%) and the inflation reference value was 2.7%. Finally, in 1998, the three best performers were Germany (0.59%), France (0.66%) and Austria (0.82%) and the inflation reference value was 2.19%. In the case of Greece, where stage two of the euro adoption process was delayed to the end of 2000, the inflation reference value was 2.04% in 1999 and 2.82% in 2000. On the other hand, since January 1999 the inflation reference value has been 2%. We used these reference values in our empirical analysis to calculate the degree of misalignment of each country with respect to the reference rate:

[19] Several papers have examined the impact of the euro on trade flows within the EMU area and with non-EMU countries, the consequences for the reduction of inflation and convergence in the eurozone. See for example, Mackowiak et al. (2009) for a review of different studies.

$$\tilde{I}_{it} = I_{it} - I_t^* \quad (1)$$

where I_{it} reflects country i inflation in period t and I_t^* is the inflation reference established by the Maastricht Treaty in this period. Figure 1 shows inflation in the eurozone in the period 1995–2009. During 1996–1998, inflation differentials were constantly negative in Austria, Belgium, Finland, France, Germany and Luxemburg, while Ireland, Italy, Portugal and Spain exhibited both positive and negative differentials (Gregoriou et al., 2006; Dominguez, 2006). During 1999–2005, relatively large positive deviations from the policy reference value were observed in Greece, Ireland, Netherlands, Luxemburg, Portugal and Spain. Notice also that in May 1998, when the European Council decided about EMU membership, only Greece exhibited a significant positive inflation misalignment. This difference was reduced later and Greece joined the EMU in January 2001. The objective of our empirical analysis was to examine whether the size of the price misalignment in the period 1996–2010 led national governments to concentrate their efforts towards the reduction of inflation and led them to stop tariff rebalancing.

Figure 1.
Harmonized index of consumer prices in the Eurozone (1996-2009)

Source: HICP — inflation rate, annual average rate of change Eurostat.

4. Empirical framework

4.1. Econometric model

To examine how the Maastricht inflation objectives affected tariff rebalancing in the telecommunications market, we estimated the following regression model:

$$\Delta \ln(y_t) = \rho \ln(y_{t-1}) + X_{it}\beta + \gamma \tilde{I}_{it} + \sum_{t=1996}^{2009} \lambda_t (\tilde{I}_{it} \cdot d_t) + \mu_i + \delta_t + e_{it} \qquad (2)$$

where y_t represents the outcome variables (line rental, price of local calls, price of intra-province calls, price of national calls, and public investment in telecommunications) for country i at year t. The model includes country fixed-effects, μ_i, and time fixed-effects, δ_t, that consider 3-year dummies covering the period 1996–2009. In this regard, the first dummy is for the period 1996–1998, which reflects the 3 years before the liberalization of the telecommunications market. The variable $\tilde{I}_{it}$ is an indicator variable defined in Equation (1) that picks up the differential between the inflation in country i at year t and the inflation target established by the Maastricht Treaty. On the other hand, $\tilde{I}_{it}\delta_t$ is the interaction between the inflation differential and the 3-year dummies. The coefficients associated with these interactions λ_t are our main parameters of interest, and measure the impact on the outcome variables that are associated with differentials between a country's inflation and the Maastricht inflation threshold in a particular period. Note that a negative coefficient for these variables implies that in the time interval t the countries exhibiting a large inflation differential reduced their telecommunications prices, or their investments.

Equation (2) also includes a lag of the outcome variable. This is because the growth rate for the outcome is dependent on the level of the outcome in the previous year. On the other hand, X_{it} contains a set of country controls: type of ownership of the incumbent

telecommunications operator, market structure, log of the number of fixed-telephone subscriptions, and the GDP per capita. The model in equation (2) is a linear fixed-effects model, which is estimated by OLS after the demeaning of the variables. Standard errors are clustered at country level.

4.2. Data

The estimation of equation (2) uses as outcome variables the telecommunications tariffs and the investments in telecommunications infrastructure in the countries that have participated in the euro. Information about the tariffs was obtained from the consultancy agency Teligen, which during the period examined provided tariff information to the European Commission.[20] Our data set covers the period 1995–2009 and focuses on the European countries participating in the euro. The use of Teligen tariffs entails two important advantages. First, the data provides information about the tariffs of the incumbent telecommunication operators, which are the only ones that had tariffs regulated in this period. Second, the data includes information on the cost of line rental (monthly subscription fee), local calls (3 km) and national calls (50 km and 200 km, respectively), which allowed us to study tariff rebalancing in the countries participating in the euro. To make homogeneous comparisons, all tariffs refer to a 10-minute call on a Wednesday at 11 am, have been converted to US$ using the Purchasing Power Parities (PPP), and include VAT.[21]

Information on the countries' Public Telecommunication Investment (excluding spectrum fees) was collected from the OECD Communications Outlook.[22] In the late 1990s and the early 2000s telecommunication operators invested large amounts of resources in long-

[20] A summary of this information can be obtained from *Report Telecoms Price Development, from 1998 to 2010*. European Commission, Directorate General for Information Society. Teligen Strategy Analytics.
[21] Some of the papers reviewed in the introduction considered baskets of services to calculate the average expenditure of consumers with low, moderate and high expenditure on telecommunications services. This information is not useful for analyzing tariff rebalancing. Cherry and Baluer (2002) used data from Teligen for the period 1997–2000. We used detailed data from Teligen for the period 1995–2009.
[22] https://www.oecd.org/sti/broadband/oecdcommunicationsoutlook2011.htm

distance networks. This was a period of rapid expansion in demand and operators had to upgrade their networks due to technological developments and the liberalization of the market. Operators´ investments decreased substantially after the dotcom crisis in 2002. At the end of the 2000s investments were more related to local access networks, including wireless networks (3G and the first 4G), upgraded copper networks (e.g. DSL), cable television networks, and fiber networks (FTTH).

To calculate countries' misalignment with respect to the Maastricht inflation criteria defined in equation (1), we used the Harmonized Index of Consumer Prices (HICP). The HICP is a harmonized consumer price index that is calculated by national statistics institutes, and is published by Eurostat. Following the Maastricht Treaty, the HICP was used to make comparisons between consumer price inflation in the EU and in the euro area, and to analyze the countries' satisfaction of convergence and stability conditions for entry into the euro.[23] After the creation of the euro, the HICP was used to examine the price stability of potential new members of the EMU.

Equation (2) also includes a group of control variables reflecting the characteristics of the national telecommunication markets and a country's economic situation. Specifically, we used the OECD indicators "Public Ownership" and "Market Structure".[24] The variable "Public Ownership" shows the percentage of shares owned, either directly or indirectly, by the government in the largest operator in the sector, for fixed-line and mobile services. The variable takes values between 0 and 6, with 6 indicating that a firm is completely state-owned. The variable "Market Structure" reflects how many firms compete in the same market in the sector (fixed-line network; fixed-line services; and mobile services), and also reflects the entrants'

[23] In 1995, the European Union's Council of Ministers adopted a regulation providing the legal basis for the establishment of a harmonized methodology for compiling consumer price indices in the Member States and European Economic Area countries (Regulation (EC) No 2494/1995).

[24] The OECD indicators summarize regulatory provisions in several sectors, such as telecoms, electricity and air passenger transport. The ETCR indicators are described in detail in the OECD Economics Department Working Paper No. 530 "Product market regulation of non-manufacturing sectors in OECD countries: measurement and highlights". See also https://www.oecd.org/regreform/reform/44754663.pdf

market share (domestic fixed-line telephony and international fixed-line telephony). This indicator takes values between 0 and 6, with 0 being the case in which the entrants in the market have the largest share. We also obtained information on the number of subscriptions for 100 inhabitants for fixed and mobile telephone services and for broadband subscription from the International Telecommunications Union[25]. Finally, another control variable included in the model is the GDP per capita, which was obtained from the OECD.

Table 1 shows the summary statistics for all variables used in the empirical analysis, separating the countries that satisfied the inflation conditions from those that did not. The two groups of countries exhibit similar characteristics, in terms of the number of fixed-telephony subscribers, the incumbent's operator ownership and the market structure. We also observed that on average the two groups went through a process of tariff rebalancing, increasing the cost of line rental and the prices of local calls and decreasing the prices of long-distance calls.

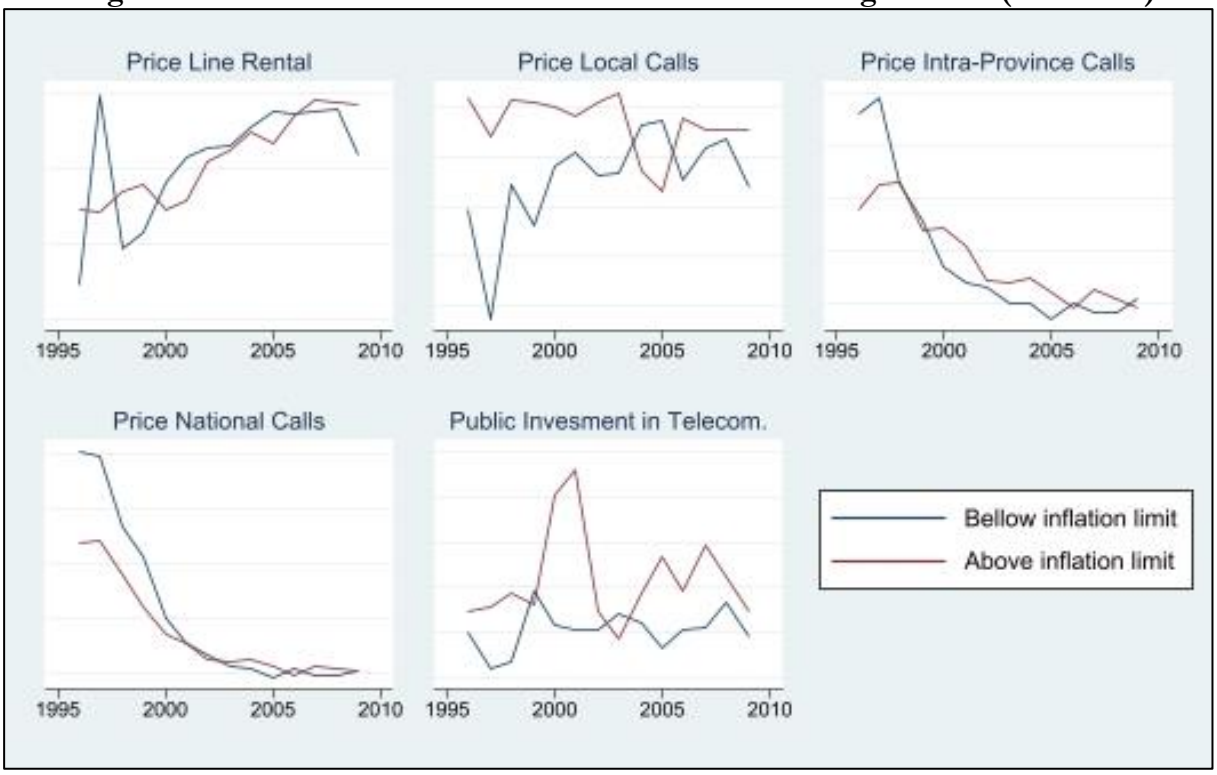
Table 1. Summary statistics

	Countries bellow inflation limit		**Countries above inflation limit**	
	Mean	**s.d.**	**Mean**	**s.d.**
log(fixed tel. subscriptions per 100 inh.) - FTS	3.952	0.215	3.700	0.302
log(price line rental) – PLR	2.953	0.230	2.988	0.311
log(price local calls) – PLC	-0.642	0.320	-0.762	0.350
log(price intra-province calls) – PPC	0.016	0.616	0.094	0.556
log(price national calls) – PNC	0.157	0.729	0.321	0.725
log(pub. Invest. in telecom.) – PIT	7.540	1.336	6.944	1.505
ΔFTS	0.009	0.121	0.010	0.105
ΔPLR	0.031	0.098	0.025	0.148
ΔPLC	-0.025	0.273	-0.080	0.234
ΔPNC	-0.064	0.212	-0.112	0.248
ΔPIT	0.003	0.265	0.030	0.261
Ownership	2.337	2.115	3.461	2.368
Market structure	2.314	1.342	3.506	1.847
GDP pc	10.257	0.271	10.040	0.512
Inflation rate	1.711	1.480	5.135	7.465
Differential between inflation and objective	-0.520	0.779	1.950	2.517

[25] See http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

Finally, Figure 2 plots the outcome variables of the European countries participating in the euro, differentiating between countries satisfying the inflation condition (blue line) and those that did not satisfy it (red line). The four first panels reflect the tariffs of the incumbent telecommunications operators, demonstrating a clear increase in the cost of line rental and in the prices of local telephone calls, and a strong reduction in the prices of intra-province and national calls. However, in the case of those countries that did not satisfy the inflation condition, the evolution of line rental costs and of the tariffs of local calls in the years before and after the creation of the euro seemed to be driven by a different pattern. The fifth panel shows the country's investment in telecommunications infrastructures. Here we can also see a different pattern of evolution in the two groups of countries, with a high increase in investments in countries that did not satisfy the inflation condition after 1998, and with a reduction of investments in other countries.

Figure 2
Average tariffs and investments in the EU countries launching the euro (1996-2009)



Source: Own figure based on Teligen data

5. Empirical results

This section examines the overall effect of the Maastricht inflation criteria on the telecommunications market. Table 2 presents the results of the estimation using equation (2) for the whole set of outcome variables. The first four columns show the effect of the inflation condition on tariff rebalancing. The indicator variable $\tilde{I}_{it}$, is a continuous variable that reflects the differential between inflation in country *i* at year *t* and the objective of the inflation condition. The coefficient of this variable shows the effect of the inflation misalignment during the reference period 2008–09. This variable was positive for the cost of line rental and negative for the prices of the three types of calls. However, the coefficient was only significant for national calls. This suggests that in this period the countries with the greatest difficulties controlling their inflation experienced a stronger reduction in the prices of long-distance calls.

The coefficients associated with the dummy time intervals reveal that the prices of the three types of calls increased to a greater extent in the period 1996–1998 than in the reference period 2007–2008. Moreover, the prices of local and intra-provincial calls also showed higher relative increases in the intervals 1999–2001 and 2002–2004 than in the reference interval.

Our parameters of interest, i.e. those associated with the interaction between the 3-year dummies and the indicator of inflation misalignment ($\tilde{I}_{it}\,\delta_t$), reflect how national governments adjusted the prices of the incumbent operators in the periods in which they did not satisfy the Maastricht inflation condition. Our results show that in the period 1996–1998 (before the launch of the euro) those countries that were further away from satisfying the inflation criteria *reduced* the cost of line rental and prices of local calls more (or increased them by a smaller proportion), and *increased* the prices of national calls more (or decreased them by a smaller proportion). The coefficient for intra-provincial calls was also positive, although not significant. The coefficients for the period 1999–2001 and 2005–07 had the same sign, but were not significant. Finally, the coefficients for the period 2002–2004 had the opposite sign, and were not significant. Hence,

these results confirm our hypothesis that before the creation of the euro the countries with the greatest difficulties in satisfying the Maastricht inflation conditions were those that progressed less in the rebalancing of telecommunications prices. As explained in Section 3.1, two examples of this situation are the cases of Spain and Italy, where the newly privatized operators denounced their national governments to the European Commission because they were not undertaking tariff rebalancing and this was creating an access deficit.

Considering the effect of the Maastricht inflation conditions on investment, we found that the interaction of the time intervals and the Inflation indicator ($\tilde{I}_{it}\,\delta_t$) had a negative and significant coefficient for the period 1996–1998, and a negative and non-significant coefficient for the other periods. This implies that in the period before liberalization the countries with greater inflation misalignment invested *less* in the maintenance and expansion of their network. This suggests that the lack of complete tariff rebalancing in this period before the creation of the euro could reduce the resources available for incumbent telecommunications to expand their networks.

Next, we discuss the results for the control variables included in the model. First, we note that the lag of the outcome variables had a negative sign and was significant in all specifications. This justifies the use of a dynamic model to examine the determinants of telephone calls. The results indicate that the change in the outcome variable was smaller in those countries starting from higher prices when the prices were rising (rental line and price of telephone calls) and from lower prices when the prices were decreasing (prices of intra-province and national calls). The variable for public ownership was not statistically significant in any of the outcome variables considered. Moreover, the variable for market structure shows that the more concentrated the market (the variable takes higher values) the lower the line rental and the prices for national calls. This result clearly shows that in the periods in which incumbents faced less competition they were under less pressure to rebalance their prices.

The analysis of the penetration of fixed telephony (fixed-telephone subscriptions per 100 inhabitants) revealed that it had an important impact on prices. Countries with a larger increase in the penetration level in the previous year set a higher line rental and charged lower prices for telephone calls. Thus, a 1% higher penetration implied a 0.26% increase in the cost of line rental, a 0.17% decrease in the tariffs for local calls and a 0.5% decrease in the prices of intra-provincial and national telephone calls. Finally, we found that those countries with a larger increase in the GDP per capita in the previous year set a higher line rental and a higher tariff for local calls. Moreover, they invested more in the maintenance and expansion of the telecommunications network.

Overall, our analysis shows that in the period 1996–98, those countries that did not meet the inflation condition of the Maastricht Treaty did not rebalance their telecommunications tariffs according to the European Commission liberalization directive. This situation also affected investment by incumbent telecommunications operators in the years before the opening of national markets.

We completed our analysis by examining whether the countries that did not rebalance tariffs for telecommunications services before 1998, due to the more urgent need to meet the Maastricht inflation criteria, did so in subsequent years. Our hypothesis was that telecommunications authorities and operators in these countries would have been able to negotiate with national governments a subsequent adjustment of prices. In Table 3, we replicate the previous analysis, but instead of using the inflation indicator of equation (1) to identify countries with an inflation misalignment, we consider the dummy variable $\tilde{D}_{i,96}$, which takes the value 1 for countries that did not meet the inflation condition in 1996. The results obtained for the interaction of the time interval 1996–98 and this dummy variable (d96-98* $\tilde{D}_{i,96}$) confirm our previous finding that countries that did not satisfy the inflation condition in this period did

not rebalance their tariffs. Moreover, the coefficient of the interactions for the other periods shows that these countries did not intensify efforts to rebalance their prices in subsequent years.

Table 2
Effect of inflation misalignments on the incumbent's prices and investments.

	Δlog(PLR)	**Δlog(PLC)**	**Δlog(PPC)**	**Δlog(PNC)**	**Δlog(Invest.)**
$\log(y)_{t-1}$	-0.383***	-0.358***	-0.496***	-0.362***	-0.473***
	(0.0508)	(0.0487)	(0.0607)	(0.0546)	(0.0576)
Ownership_{t-1}	0.00643	-0.00107	0.00965	0.0132	0.0310
	(0.00681)	(0.00801)	(0.0182)	(0.0164)	(0.0203)
$\text{Market structure}_{t-1}$	-0.0173*	0.00961	0.0113	0.0678***	0.0152
	(0.00999)	(0.0113)	(0.0259)	(0.0237)	(0.0288)
Fix-tel. subscriptions (per 100 inh.)$_{t-1}$	0.262***	-0.174*	-0.597***	-0.507**	0.00369
	(0.0793)	(0.0934)	(0.214)	(0.204)	(0.238)
$\log(\text{GDP pc})_{t-1}$	0.279**	0.328**	0.289	0.284	0.557**
	(0.112)	(0.129)	(0.292)	(0.265)	(0.268)
$\tilde{I}_{it}$	0.00876	-0.000309	-0.0169	-0.0332*	0.0368*
	(0.00833)	(0.00990)	(0.0222)	(0.0200)	(0.0191)
Year dummies (Base: 2008-2009)					
$d_{96\text{-}98}$	0.00178	0.155**	0.511***	0.287*	0.112
	(0.0617)	(0.0733)	(0.169)	(0.163)	(0.163)
$d_{99\text{-}01}$	0.0381	0.0970*	0.249*	0.119	0.196
	(0.0488)	(0.0581)	(0.135)	(0.129)	(0.130)
$d_{02\text{-}04}$	0.0246	0.0751*	0.189*	0.103	0.0285
	(0.0364)	(0.0432)	(0.0993)	(0.0921)	(0.101)
$d_{05\text{-}07}$	0.0265	0.0147	0.0757	0.0325	0.130*
	(0.0263)	(0.0313)	(0.0706)	(0.0643)	(0.0770)
Interactions					
$d_{96\text{-}98} * \tilde{I}_{it}$	-0.116***	-0.0353**	0.00901	0.0575*	-0.0575**
	(0.0146)	(0.0172)	(0.0376)	(0.0338)	(0.0275)
$d_{99\text{-}01} * \tilde{I}_{it}$	-0.0159	-0.00180	0.0282	0.0367	-0.0320
	(0.0151)	(0.0182)	(0.0396)	(0.0357)	(0.0349)
$d_{02\text{-}04} * \tilde{I}_{it}$	0.00128	0.0101	-0.0607	-0.0408	-0.0582
	(0.0195)	(0.0231)	(0.0522)	(0.0470)	(0.0354)
$d_{05\text{-}07} * \tilde{I}_{it}$	-0.0312	-0.00800	0.0214	0.0518	-0.0335
	(0.0218)	(0.0259)	(0.0583)	(0.0525)	(0.0448)
Constant	-2.727**	-3.006**	-0.885	-1.221	-2.455
	(1.178)	(1.385)	(3.113)	(2.805)	(2.886)
Observations	208	208	208	208	236
R-squared	0.571	0.308	0.345	0.309	0.321

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 3.
Effects of inflation misalignments in 1996 on the incumbent's prices and investments.

	Δlog(rental)	**Δlog(PLC)**	**Δlog(PPC)**	**Δlog(PNC)**	**Δlog(Invest.)**
$\log(y)_{t-1}$	-0.553***	-0.376***	-0.500***	-0.361***	-0.492***
	(0.0537)	(0.0470)	(0.0598)	(0.0542)	(0.0585)
Ownership_{t-1}	0.00299	-0.00422	0.0135	0.0159	0.0342*
	(0.00765)	(0.00779)	(0.0180)	(0.0164)	(0.0205)
$\text{Market structure}_{t-1}$	-0.00919	0.0204*	0.00440	0.0611**	0.0166
	(0.0112)	(0.0110)	(0.0258)	(0.0239)	(0.0287)
Fix-tel. subscriptions (per 100 inh.)$_{t-1}$	0.335***	-0.190**	-0.522**	-0.483**	0.0785
	(0.0890)	(0.0915)	(0.212)	(0.203)	(0.241)
$\log(\text{GDP pc})_{t-1}$	0.354***	0.356***	0.274	0.308	0.674***
	(0.122)	(0.121)	(0.278)	(0.254)	(0.257)
Year dummies (Base: 2008-2009)					
$d_{96\text{-}98}$	0.0520	0.202***	0.487***	0.286*	0.169
	(0.0691)	(0.0707)	(0.164)	(0.158)	(0.159)
$d_{99\text{-}01}$	0.0221	0.117**	0.183	0.107	0.188
	(0.0553)	(0.0568)	(0.132)	(0.126)	(0.128)
$d_{02\text{-}04}$	0.0166	0.0734*	0.167	0.129	0.0239
	(0.0428)	(0.0438)	(0.102)	(0.0943)	(0.105)
$d_{05\text{-}07}$	0.0281	0.0209	0.0398	0.0328	0.131
	(0.0312)	(0.0319)	(0.0732)	(0.0670)	(0.0821)
Interactions					
$d_{96\text{-}98} * \tilde{D}_{i,96}$	-0.213***	-0.158***	0.0754	0.0249	-0.0631
	(0.0544)	(0.0563)	(0.127)	(0.115)	(0.132)
$d_{99\text{-}01} * \tilde{D}_{i,96}$	-0.0520	-0.0613	0.215*	0.0636	0.124
	(0.0537)	(0.0560)	(0.124)	(0.112)	(0.132)
$d_{02\text{-}04} * \tilde{D}_{i,96}$	0.00589	0.0432	-0.0430	-0.177	0.0318
	(0.0514)	(0.0525)	(0.120)	(0.109)	(0.126)
$d_{05\text{-}07} * \tilde{D}_{i,96}$	-0.0268	-0.0179	0.101	-0.00420	0.0190
	(0.0503)	(0.0517)	(0.118)	(0.107)	(0.118)
Constant	-3.268**	-3.272**	-1.013	-1.553	-3.829
	(1.270)	(1.288)	(2.946)	(2.678)	(2.784)
Observations	208	208	208	208	236
R-squared	0.452	0.344	0.354	0.308	0.311

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

6. Conclusions

This paper has shown that in the years immediately before the liberalization of the telecommunications sector, those countries that faced greater difficulty in reaching the inflation objectives set out in the Maastricht Treaty did not rebalance their tariffs according to the liberalization Directives. Although the European authorities supervised the reform of the telecommunications sector and enacted several measures to enforce price rebalancing, the greater need to meet the Maastricht Treaty's inflation objectives led these countries to reduce, rather than increase, the cost of line rental and the prices of local calls. Our paper also shows that those countries that did not rebalance their prices also exhibited a reduction in their investments in these years.

The idea of this paper contributes to the literature analyzing the relevance of political and social environments for the performance of regulated industries (Levy and Spiller, 1994). We show that governments prioritize their objectives and might implement inefficient policies that are effective for reaching their objectives. As shown by Duso and Seldeslacht (2010), one aspect often neglected in the traditional private interest view of regulation is that policy-making bodies might have conflicting interests, and governments and politicians focus on the objectives that they consider as socially more relevant and that give them more political support. The use of regulated tariffs in the years before the creation of the euro is a good example of the existence of these conflicting interests.

An aspect not addressed in the paper is the increasing relevance that regulatory agencies have had for shaping the telecommunications policy after liberalization. Some years after the liberalization of 1998, most European governments delegated the regulation of the market to semi-autonomous agencies for efficiency gains and reasons of credible commitment to long-term policy goals (Bach et al., 2015). This situation led to the fragmentation of the administrative system and to changes in governance that have required additional political supervision,

accountability, and policy coordination. The Europeanization process has strengthened the position of national regulatory agencies and has made the implementation of sectorial policies less dependent on the government's priority objectives.

Another aspect not considered in this research is the possible differences in the national telecommunications operators in the years before liberalization. One could argue that if those countries with higher misalignments regarding the Maastricht inflation condition were also those that could benefit more from cost reductions and efficiency gains, then those countries could have reduced all their tariffs and at the same time rebalanced their tariffs. This is a hypothesis that we cannot test with the available information. However, the legal disputes that took place in this period between the incumbent operators in France, Italy and Spain and their national governments about tariff regulation and the accumulated access deficits lead us to conclude that these potential efficiency gains were not enough to compensate for the absence of tariff rebalancing.

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