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Bachelor's degree final project

Public investment and regional income disparities in Spain

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Abstract

The following project aims to analyze the possible existence of a direct relation between public investment and output, with the objective of explaining disparities in terms of income among Spanish autonomous communities.

All sections of the project are purely descriptive. The first one introduces the empirical findings that arise from a study made by the International Monetary Fund on this theme. The second section is focused on the analysis of the evolution of regional per capita GDP throughout the period 2009-2016.

The third section will be dedicated to the analysis of the evolution of public investment over the same period.

Each one of the sections in which the evolution of a certain variable is analyzed over time, has two points of view, first a generic one and then a more specific one that focuses on the analysis of certain regions that due to its characteristics are worth being analyzed more in detail.

Este proyecto persigue el objetivo de analizar la posible existencia de relaciones directas entre la inversión pública y la renta que permitan explicar las disparidades de output entre las distintas regiones de España.

Todas las secciones del proyecto son puramente descriptivas. La primera introduce los descubrimientos empíricos que surgen de un estudio realizado por El Fondo Monetario Internacional en relación con este tema. La segunda sección se centra en el análisis de la evolución del PIB de las distintas regiones de España en el periodo comprendido entre 2009-2016.

La tercera sección estará dedicada al análisis de la evolución de la inversión pública para el mismo rango temporal.

Cada una de las secciones en las que se analiza la evolución de una variable a lo largo del tiempo cuenta con una visión global y una específica de regiones que por sus características merecen ser analizadas más en detalle.

1. Introduction

If you were to leave a legacy to future generations, what would it be?

It is well known that investment whether public or private can have a huge positive impact on the welfare of societies, in terms of increasing productivity and improving living standards (Pérez & Solera, 2017).

Moreover, it has been shown that investing on education, research and infrastructures can help boost productivity and hence income both in the short and long term (Abiad, Furceri, & Topalova, 2015). Apart from that it can also have positive spillovers on nearby countries or autonomous communities depending on the scope of the investment.

Nonetheless, although increasing productivity can result on a whole society being better off, the private sector is not likely investing on such causes basically because the monetary efforts required to do those type of investments are excessively large and the gains from it are usually divided between the whole society.

Therefore, given that the private sector usually chooses not to invest, the public sector must intervene, first in order to avoid market failures and second to be able to allow the country to benefit from all the positive impacts of such investments.

This has not always worked this way, and in fact from the 1990's and up to the beginning of The Great Recession, the private sector was very keen to financing the costs of infrastructures to the extent that its relative weight was higher than that of the public sector (Maystad, 2010). In any case, it has been shown that public investment can have a much more positive impact on societies and it has even got to a point in which it is considered one of the most efficient fiscal strategies that could be undertaken to help a country recover after an economic crisis (Bivens, 2012).

There is something important to bear in mind and that is that, the key to success when it comes to getting the most out of public investment is that it is necessary doing productive and wise allocations of money; i.e. investing on education, hospitals, roads, bridges, water distribution and so on, *exclusively where and when they are needed*. In other words, investing by itself is not enough, what is really necessary is choosing the most appropriate time and project to work on, whether it is physical infrastructure, research or education that can help develop societies and allow those societies to have higher living standards and productivity.

This brings me to the reason why I have chosen public investment as the topic of my final project and that is because I want to be able to find a relation between how public investment is allocated and used and its effects on per capita GDP. By analyzing historical data, I expect to find patterns that allow me to stablish a relation between those two variables.

2. Background

Literature related to the effects that public investment has over income is on trend and has been a topic of interest for many years now.

Back in the 20th century, Keynes (1936) was already analyzing the important effects of public investment on the development of an economy. He would affirm that public investments were key to boost economic growth, mainly after an economic crisis because it could help wages, prices, interest rates and in general the whole economy, go back to its potential.

It has been a long time since then and many authors keep giving great importance to this subject, specially over recent years. The reason why this matter is of interest nowadays is because worldwide economy is still trying to overcome one of the toughest crisis of its recent history and it is taking quite a long time and effort to be able to recover the level of pre-crisis economic indicators.

Due to this, politicians, economists, researchers and many others are trying to find as many answers as possible to the question: how to boost economic growth?

One of the most common answers has to do with pushing public investment up and dedicating it to build more and improve current infrastructures. According to different studies, this is supposed to help boost economic growth due to its effect on aggregate demand and to the possible crowding in effect of private investment (more public investment attracts more private investment), these benefits are part of the short-term effects. When it comes to the long-run effects, it is all related to the increase in the production capacity that is derived from the availability of larger and better infrastructures (International Monetary Fund, 2014).

One of the most interesting works that came across while doing research was that of Abiad et al. (2015), who make use of the previous idea and obtain empirical findings to show that the effects of public infrastructure investment go far beyond increasing living standards and that in fact it gets to improve aggregate demand, modestly crowd in private investment, and alter the supply side through an increase in productivity.

Their work also includes information related to the way public investment should be financed in order to get the most out of it, and according to the evidence found in their research, the best way to finance public investment is through public debt.

They based the analysis on data from advanced economies taking as time range 1985-2013. Their results are robust, and although their approach is based on a country level, certainly, their findings are worth being taken into consideration for the analysis of different scenarios (e.g. extrapolating these results to Spain’s autonomous communities).

All the details of the assumptions and the framework used to analyze the effects of public investment on various economic indicators can be seen in their study.

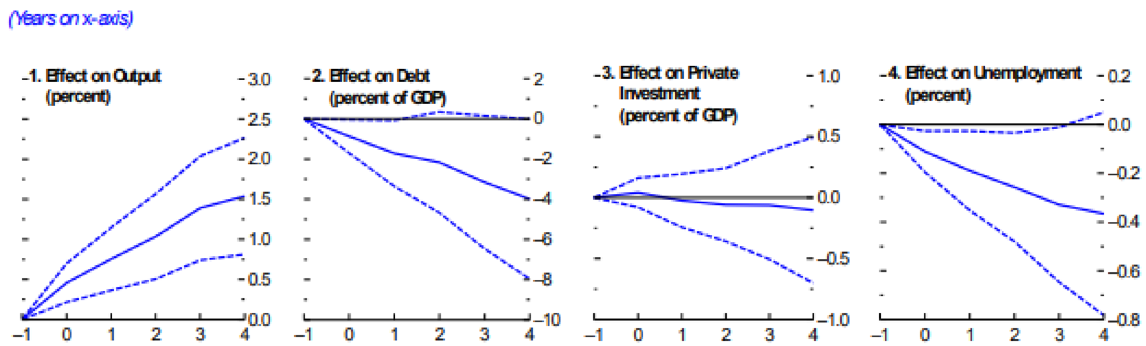
The following figure shows the empirical findings of the analysis. According to the research, an unexpected shock that generates an increase of 1% in public investment as percentage of GDP increases GDP by 0.4% the same year of the shock and keeps having an effect in the medium term with an increase of 1.5% in GDP after 4 years.

Apart from that, in case the public investment increase is financed through public debt, the debt-to-GDP ratio is expected to experience a decrease of around 4% by the fourth year.

Regarding the crowding in effect of private investment, when analyzing it as a percentage of GDP, no big changes are seen. Most likely because the increase in private investment is proportional to the increase in GDP and the effect slips by.

As for the effects on unemployment, the change in public investment is expected to help reduce unemployment by nearly 0.4% by the fourth year.

Figure 2-1 Effect of public investment in advanced economies



Source: International Monetary Fund - (Abiad, Furceri, & Topalova, 2015)
The shock is defined as a 1% GDP increase in public investment spending.
Note: t=0 represents the year of the shock. The dashed lines denote the 90% confidence bands.

As previously mentioned, the data used for this analysis is all focused on advanced economies at a country level, and although it cannot be directly extrapolated into each one of Spain's autonomous communities, what is important about it is to see that based on a large and robust sample, the data shows that public investment in fact has an impact on economic growth and many other relevant economic performance indicators.

Moving on to the analysis of the Spanish case, it is well known that accomplishing high growth rates at a national level implies having most autonomous communities, or at least the biggest ones growing at a very steady pace. Nevertheless, the reality shows that economic growth tends to be very despair among Spain's autonomous communities.

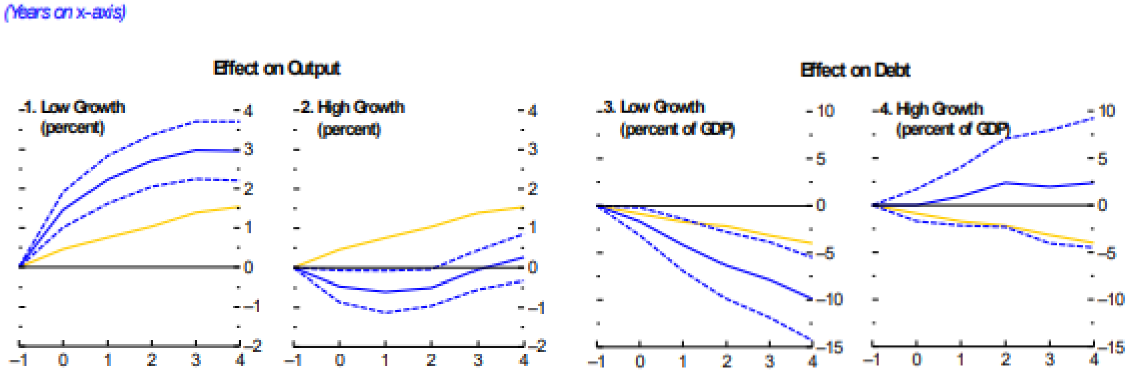
This makes me wonder what makes one region different from another? why some autonomous communities accomplish high economic growth rates while others keep trying at least not to draw back?

My theory is that it is all related to the way public investment is divided between autonomous communities, to the way it is spent and mainly to the real need that the region has. In this sense, according to figure 2.2, the effects of public investment over economic growth differ considerably depending on whether the region needs or does not need a push in public investment.

Knowing if a region needs or not some additional public investment could be based on the economic situation that the region is going through. In that sense, if it is experiencing high growth rates it definitely is less on a need than a region that is drawing back or growing at a very slow pace.

The following figure shows that whenever there is low growth, the results from the previous analysis get enhanced, the opposite occurs when a region already experiments high growth rates. This applies to all the variables analyzed in figure 2.1.

Figure 2-2 Effect of public investment in advanced economies – low economic growth vs high economic growth



Source: International Monetary Fund - (Abiad, Furceri, & Topalova, 2015)
The shock is defined as a 1% GDP increase in public investment spending.
Note: t=0 represents the year of the shock. The dashed lines denote 90% confidence bands.
Yellow lines represent the scenario previously analyzed.

Over the next sections of the project I will analyze the evolution of per capita GDP and public investment in Spain's autonomous communities to try to find patterns in the data that indicate that some autonomous communities have been systematically favored in terms of public investment over others and hence have had more opportunities to grow their economies faster and more steadily.

3. Evolution of regional per capita GDP

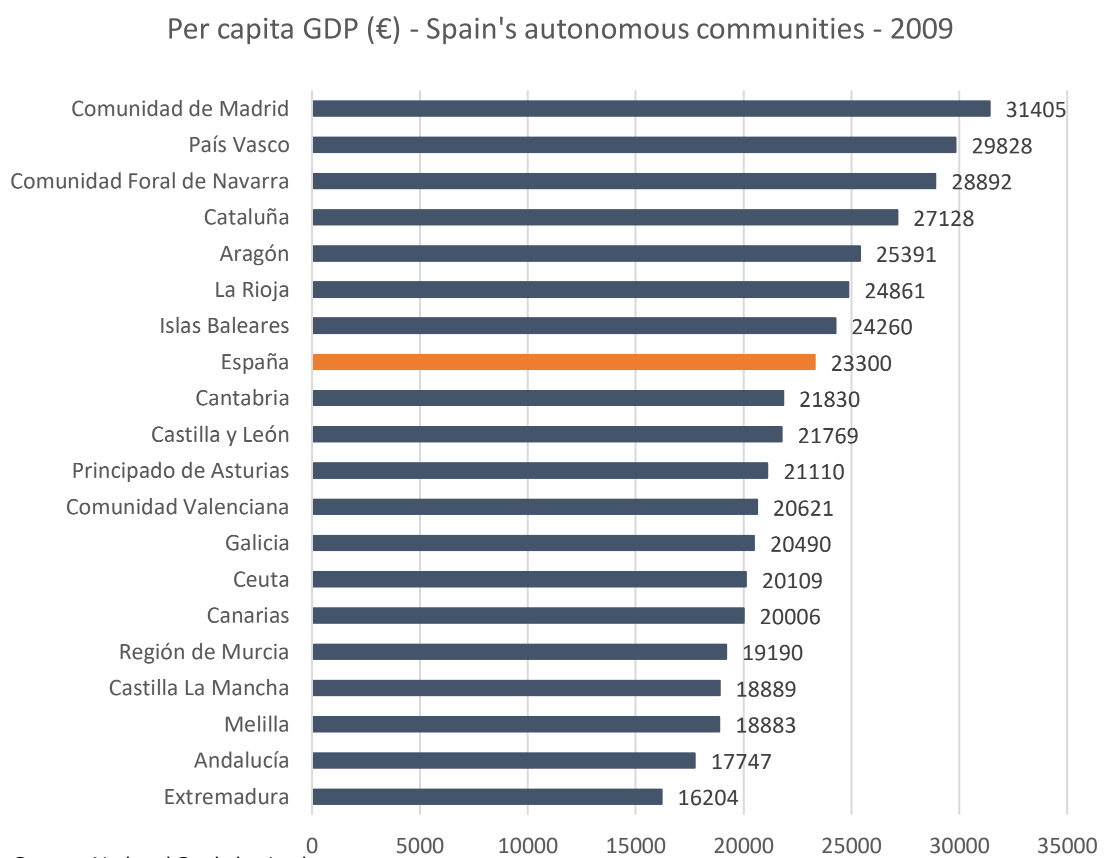
One of the most used indicators when comparing the relative performance of different countries or regions is per capita GDP. Apart from being very useful for comparisons it is with no doubt one of the economic indicators with a highest impact on daily life, given that researchers, politicians and even central bankers base many of their decisions on this variable.

The Gross Domestic Product is defined as the value of all the goods and services produced within a country or region, and per capita GDP is the result of dividing GDP over total population of the country or region, depending on the scope.

GDP allows measuring the productivity of a region over a certain period. Having a high and growing GDP is certainly better than the opposite, because the first situation indicates that the economy of that region is being more productive and hence people in general are better off; nonetheless, it is necessary to keep track of inflation which should be growing at a lower rate than GDP in order for it to be healthy in economic terms.

This section will be focused on the analysis of the evolution of per capita GDP in Spain's autonomous communities during the period 2009-2016.

Figure 3-1 Per capita GDP – Spain's autonomous communities



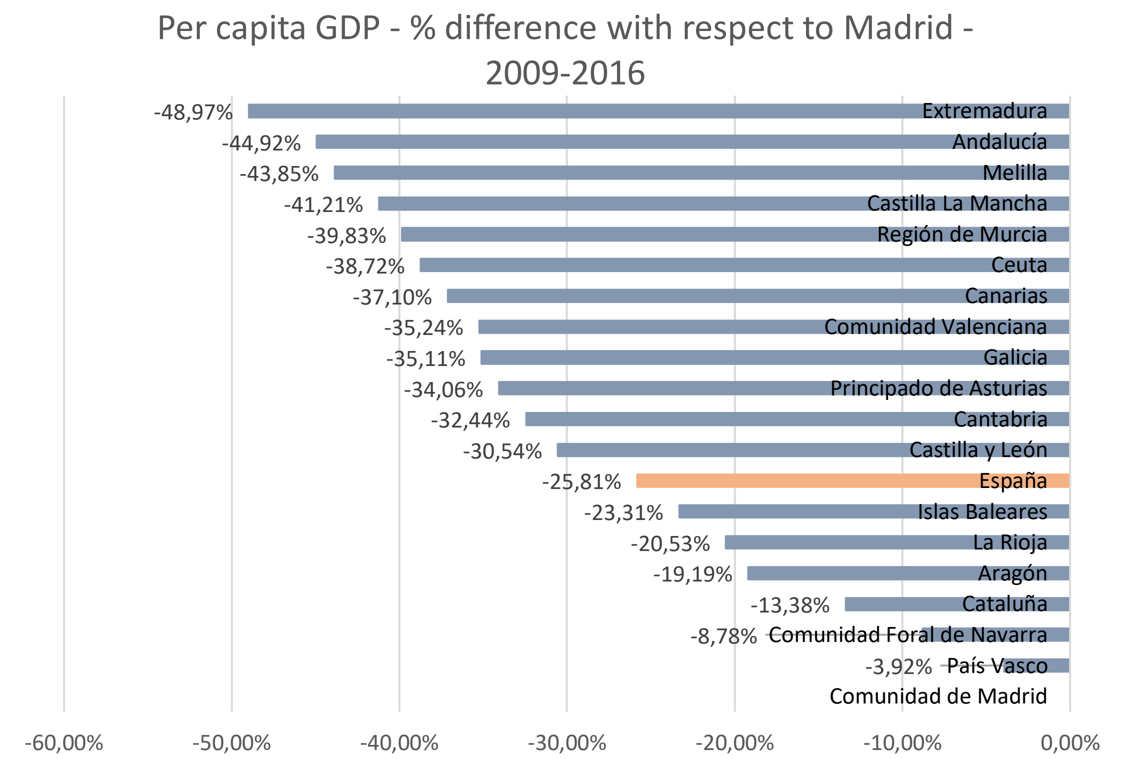
Source: National Statistics Institute
Own elaboration

As it can be seen in figure 3-1, during 2009 some autonomous communities had a much higher per capita GDP than the country's average.

Specifically, Madrid, Basque Country, Navarra, Catalonia, Aragon, La Rioja and the Balearic Islands, all managed to have a higher per capita GDP than the other autonomous communities during the period 2009-2016.

But, what can be considered the most interesting is that there are quite large disparities even among the previously mentioned regions. For example, as it can be seen in figure 3-2, from 2009-2016, per capita GDP in the Balearic Islands was 23,3% lower than that of Madrid.

Figure 3-2 Per capita GDP – % difference with respect to the Community of Madrid



Source: National Statistics Institute
Own elaboration

Even when comparing just the first and the third autonomous community, Navarra has a per capita GDP that is around 9% lower than that of the capital.

These differences get more noticeable when comparing those regions with above the average per capita GDP vs those below the average. For example, comparing the first and the last autonomous community, it can be seen that Extremadura's per capita GDP is almost 50% lower than that of Madrid.

Given that the period of analysis is broad and there are many autonomous communities, the next section will be dedicated to the analysis of only 9 regions. They are: Madrid, Navarra, Basque Country, Catalonia, Balearic Islands, Castilla Leon, Melilla, Andalusia and Extremadura. They can be considered a rich subset with very particular characteristics and something very clear that defines them which is their position in the ranking every year. The first four always get the highest positions of the ranking in terms of per capita GDP, in the following order: Madrid, Basque Country, Navarra and Catalonia.

Then in the middle of the ranking and right above Spain's average, there are the Balearic Islands.

Also, in the middle but right below the average, Castilla Leon stands every year.

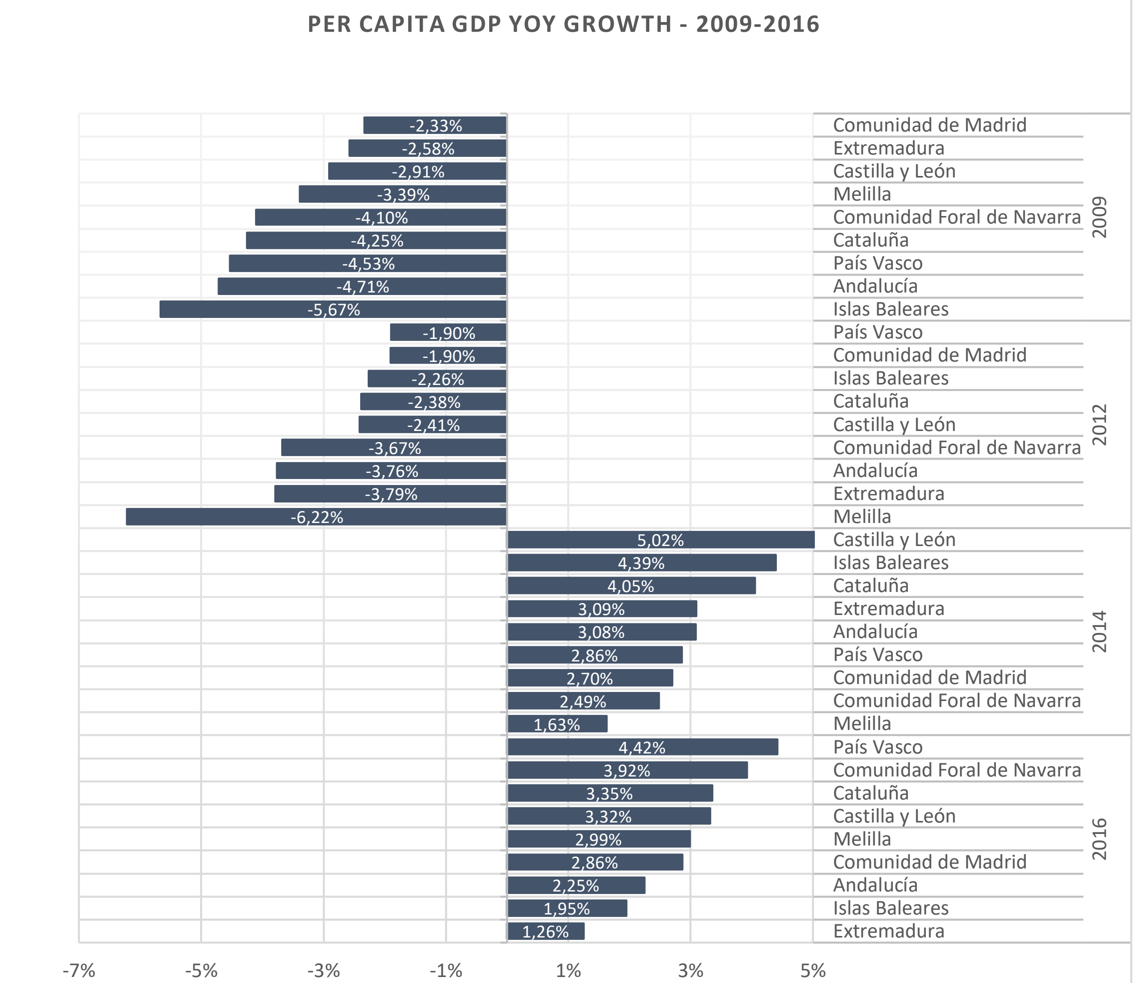
At the bottom part of the ranking Melilla, Andalusia and Extremadura can be found.

These 9 autonomous communities can provide a very complete picture of income distribution in Spain and therefore, the following section of the project will be exclusively dedicated to the analysis of per capita GDP growth rates in those regions.

3.1 Regional per capita GDP growth rates

As I previously mentioned, year after year Madrid, the capital of the country gets the first place in terms of per capita GDP. Systematically, as well, Extremadura gets the last position in the ranking.

Figure 3-3 Per capita GDP YoY growth rate



Source: National Statistics Institute
Own elaboration

Despite this, as it can be seen in figure 3-3 when analyzing the evolution of YoY growth rates, during 2009, although all autonomous communities were experiencing decreasing growth rates, Extremadura was the second region, right before Madrid with a less dramatic fall. Castilla Leon and Melilla also managed to have a more moderate decrease than other regions. In the analyzed subset the Balearic Islands saw a decrease in GDP of around 6% with respect to 2008. While Extremadura's growth rate stood at -2,58% with respect to the previous year.

Apart from that, when analyzing the growth rate of 2014, it can be seen that Castilla Leon, Extremadura, the Balearic Islands and Andalusia were able to grow at a higher rate than Madrid or any other autonomous community such as the Basque Country or Navarra that have a much higher per capita GDP in the ranking.

Nevertheless, in 2016 per capita GDP growth rates were dominated by the Basque Country, Navarra and Catalonia, apart from that, Castilla Leon and Melilla accomplished a higher growth rate than that of Madrid. During this year the other autonomous communities experienced increasing growth rates, but they were certainly more modest.

This data shows a pattern and that is that the autonomous community that occupies the top section of the ranking (i.e. Madrid) is the one that draws back the least whenever there is an economic crisis but are also the one that grows more modestly when the economy is going upwards again.

The differences between those autonomous communities go far beyond per capita GDP; they can be considered opposites in terms of overall development, infrastructures, business, population and so on.

So, questions arise once again, what is being done incorrectly in Extremadura? And not only there but also in Castilla Leon, Andalusia or the Balearic Islands? How are these autonomous communities different from Madrid, the Basque Country, Catalonia or Navarra? And mainly, why is it that during certain years the first four communities accomplished higher growth rates?

Possibly, based on the findings of Abiad et al., (2015) the answer to the last question could be related to the fact that whenever a region is in need of an economic boost (e.g. during or after an economic crisis) the positive effects of public investment get enhanced. The opposite occurs whenever the region is already growing at a steady pace (e.g. the case of Madrid), in this situation all public investment dedicated to the region has an impact but is way less benefitial.

In the next section I will analyze the evolution of public investment in those 9 regions over the same period to try and find some answers to the previously mentioned questions.

4. Evolution of public investment – general analysis

As initially mentioned, public investment allows a country to benefit from certain goods and services that would not likely exist if there was not a public sector.

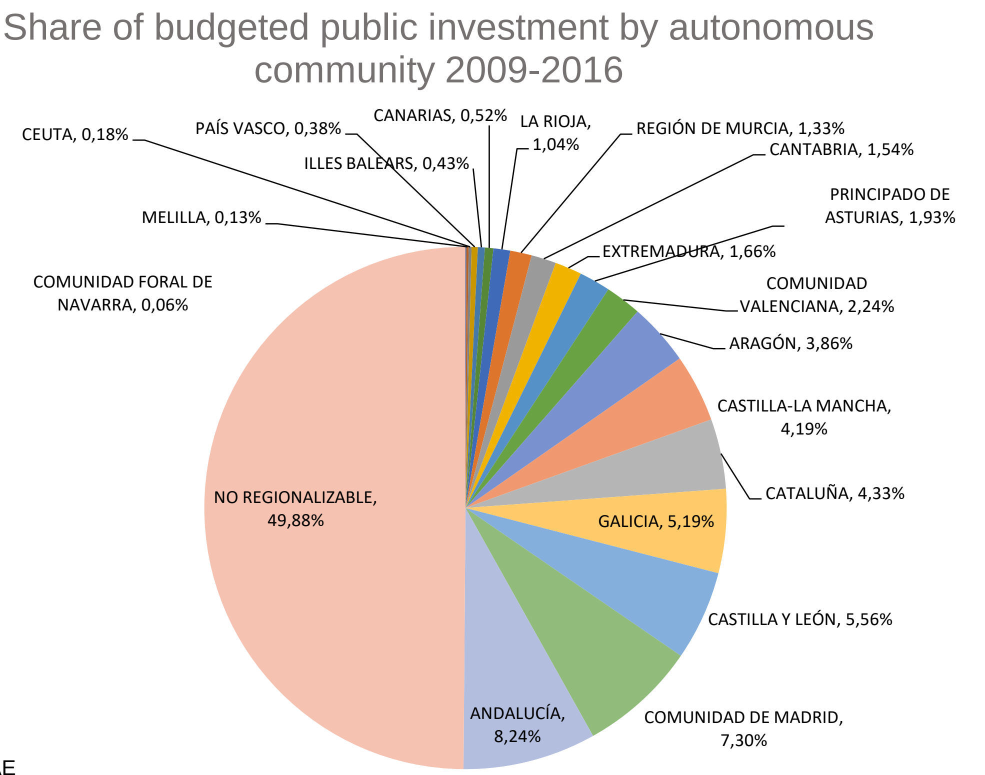
Public investment is introduced every year as part of the government budget. It is presented in various divisions, such as functions, policies, regions and type of budget.

Public investment in Spain is divided in two typologies:

Public investment with limited budget: the objective of this type of investment is basically to work as a limit to the amount of investment that can be dedicated to a certain region or policy. It is managed by the central government.

Public investment with estimated budget: the objective of this type of investment is to provide agents that belong to the corporate public sector with an estimate of the amount that can be spent on a region or policy. It is mainly dedicated to AENA, railway societies and so on.

Figure 4-1 Share of public investment by autonomous community – Budgetary version



Source: IGAE
Own elaboration

The previous figure shows the share of budgeted public investment by region, adding up the two types of budget (the corporate one and that of the general government), for the period 2009-2016.

On the one hand, figure 4-1 shows that for the period of analysis, the top 3 regions that got the highest share of public investment were: Andalusia (8,24%), Madrid (7,3%) and Castilla Leon (5,5%).

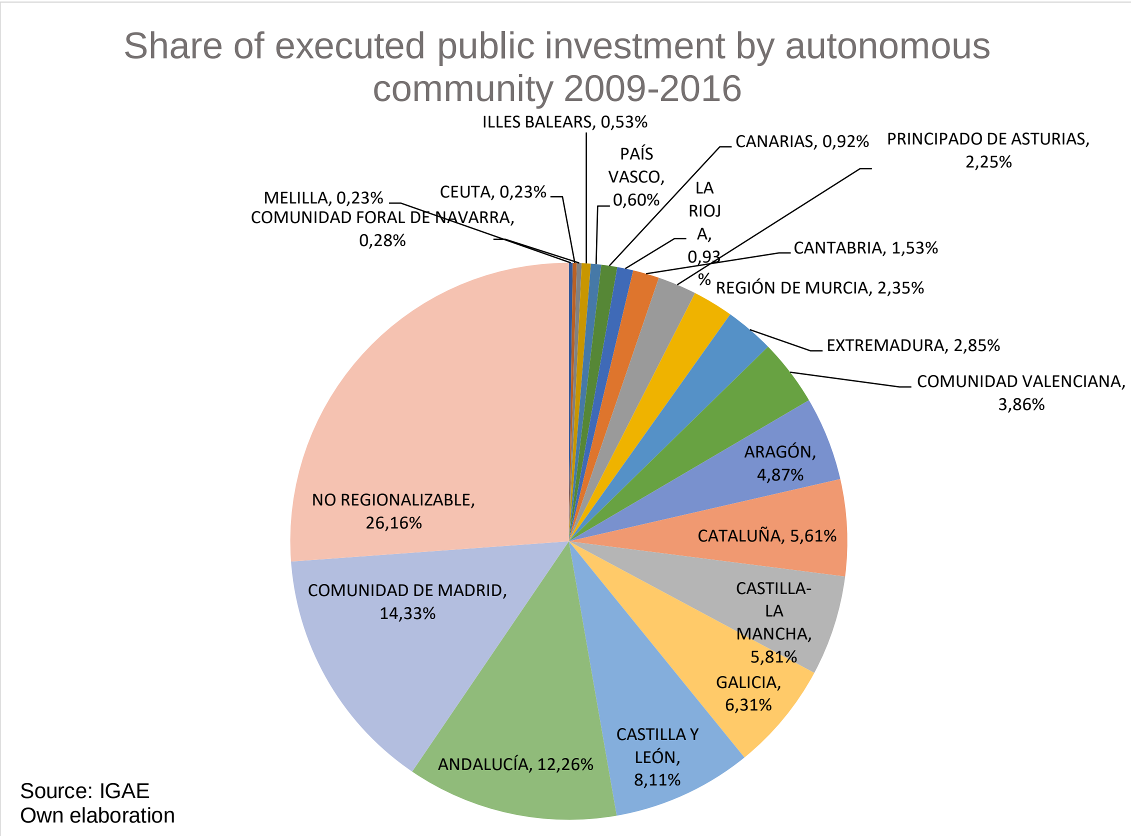
On the other hand, figure 4-1 also provides information about the communities that got the smallest share. It can be seen that there are 6 autonomous communities that got 1% or less of total public investment. These regions are: La Rioja, Balearic Islands, Canary Islands, Navarra, Ceuta and Melilla.

These two groups give us the idea of the amount that almost all autonomous communities from the subset are supposed to receive, but there are two that do not fit neither of the groups: Catalonia is supposed to receive 4,3% of total investment, and Extremadura 1,66%.

It is important to bear in mind that there is a very relevant share of public investment that cannot be regionalized. In this sense, 50% of total public investment in the period of analysis could not be attributed to a single autonomous community.

I would like to emphasis that even though the government budgets the amount that is going to be dedicated to each autonomous community every year, in the end it is just a budget and the reality shows that what is executed differs considerably with respect to what was initially planned.

Figure 4-2 Share of public investment by autonomous community – Executed version 2009-2016[1]



[1] Due to data availability, I will only analyze the period 2009-2016. Apart from that, data from 2013 was not available so I work under the assumption that from 2012-2013 public investment remained constant.

As it can be seen in figure 4-2, the executed version of public investment shows that some regions have been benefited. In this sense, Madrid, Castilla-Leon, Andalusia and Catalonia received considerably more money than what was initially planned on budget. Apart from that, Castilla La Mancha, Galicia and many other autonomous communities also ended up getting more money to invest.

It draws the attention that over the period of analysis both Andalusia and Madrid got a very similar share of public investment, that was between 12%-14%.

Nevertheless, according to the findings in the previous section, these two autonomous communities are always on the opposite site of the ranking in terms of per capita GDP.

Regarding the communities that got the smallest share, the picture does not differ too much and La Rioja, Balearic Islands, Canary Islands, Navarra, Ceuta and Melilla in fact received less than 1% of total public investment. As for Extremadura, the region ended up receiving 2,85% of total public investment.

Now, moving on to the analysis of the subset, the next section focuses on two ideas, first the analysis of the evolution of budgeted vs executed investment and second the way public investment is spent in each one of the autonomous communities chosen to deepen the analysis: Madrid, Basque Country, Navarra, Catalonia, the Balearic Islands, Castilla Leon, Melilla, Andalusia and Extremadura.

5. Evolution of public investment – subset analysis

5.1 Public investment in Madrid

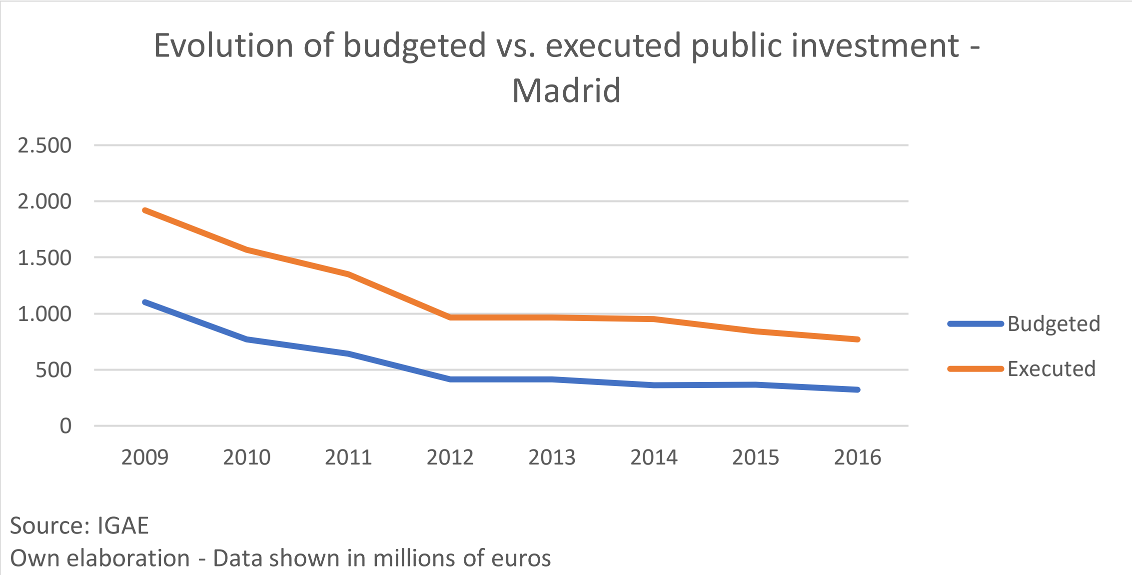
Madrid, Spain's capital is considered one of the most developed cities in the country and not only that, but also of the world (Jung, 2011). As mentioned in section 1, Madrid always gets the first position in terms of per capita GDP, it is considered a great place to live and to work. But how did they get to this point?

As previously seen Madrid is one of the communities that year after year receives the highest amount of public investment, not only in terms of what is initially planned but what actually ends up being executed.

The following graph shows the evolution of budgeted vs. executed investment from 2009-2016. It can be seen that every year Madrid finally receives almost twice as much public investment as initially planned on budget. It should be taken into consideration that when analyzing just the budgeted public investment Madrid usually occupies either the first or second position in terms of relative share of public investment. The same happens when analyzing the executed version, with the difference that in absolute terms the money received by Madrid is twice as much as initially planned.

It is clear that for some reason Madrid has been benefited in terms of public investment, and this could certainly be the reason for it occupying always the first positions of the per capita GDP ranking.

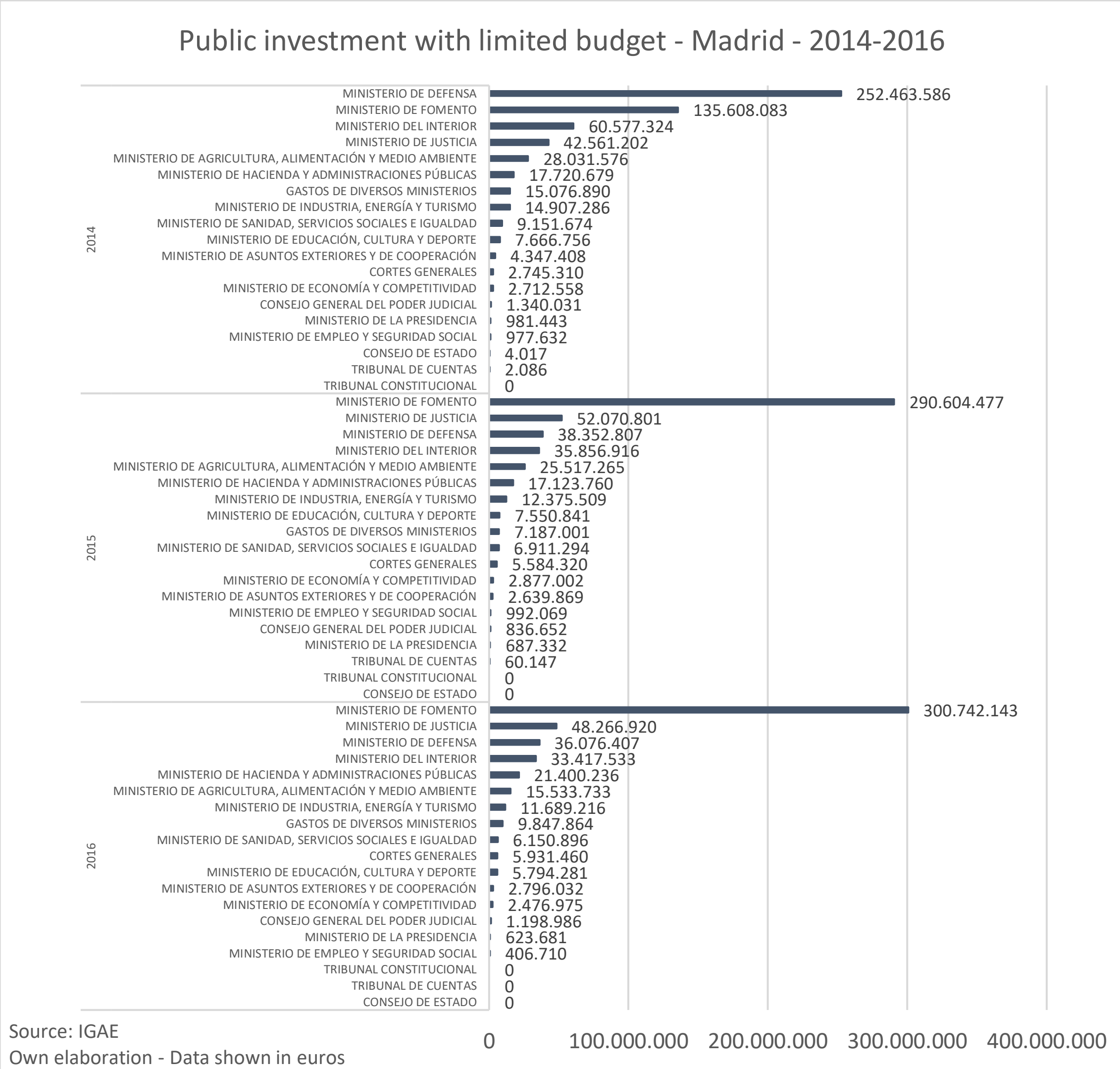
Figure 5-1 Evolution of budgeted vs. executed public investment - Madrid



Now, what is not so clear is the reason why Madrid has received a preferential treatment. One of the hypothesis that I would like to introduce at this point is that it could be related to the political party that holds the power in each autonomous community. In the case of Madrid, for the whole period of analysis, the People's Party held the power in the government.

Regarding how investment is spent, as previously mentioned, many researchers advocate that the best way to get the most out of public investment is by dedicating it into the improvement of infrastructures. The following graph shows how public investment is distributed in Madrid between the different ministries and organizations that are part of the corporate public sector.

Figure 5-2 Public investment with limited budget – Madrid



When it comes to public investment with limited budget, as it can be seen in figure 5-2, most of it in Madrid is usually spent by three ministries: The Ministry of Public Works, the Ministry of Defense and the Ministry of Justice.

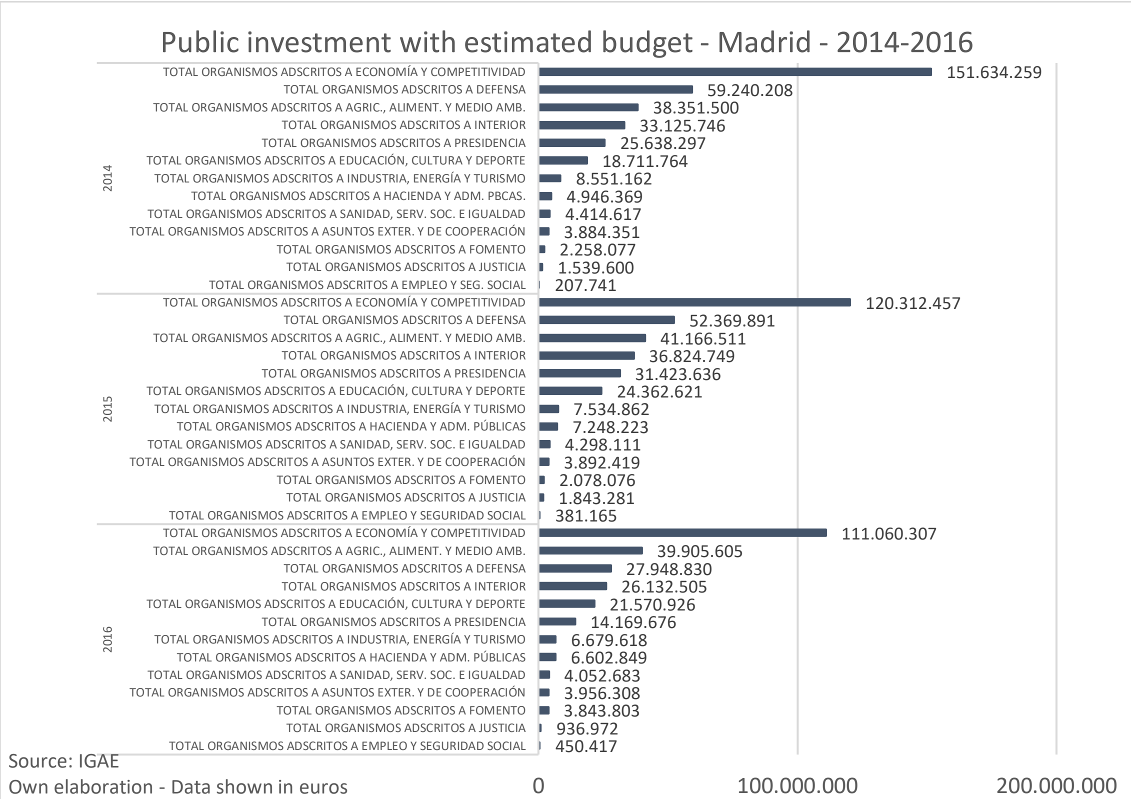
The first Ministry is the one that takes care of all infrastructure related matters such as bridges, railways, airports and so on. Dedicating investment to this type of policies is supposed to be one of the most efficient ways of spending public investment, and the one that gives the highest returns in terms of economic growth boost.

From 2014-2016, Madrid dedicated around 726 million euros to the Ministry of Public Works. In relative terms, it represented over 45% of all limited public investment for the period of analysis in the region. While the policies made by the Ministry of Defense and the Ministry of Justice represented 20% and 8% of public investment, respectively.

The Ministry that usually gets the biggest share is that of Public Works. Nevertheless, in 2014, Madrid dedicated over 250 million euros to the Ministry of Defense, displacing the Ministry of Public Works to the second position in the ranking; this year investment dedicated to the Ministry of Defense was 86% higher than that of the Ministry of Public Works.

Regarding public investment with estimated budget, the biggest share of it goes to all the institutions related to Economics and Competitiveness. They get around 40% of all estimated public investment in Madrid (see figure 5-3).

Figure 5-3 Public investment with estimated budget – Madrid



As figure 5-3 shows, public investment with estimated budget gets spent mostly by 3 institutions: first, as I already mentioned, go those related to Economics and Competitiveness, and then on second and third position depending on the year go the institutions related to Defense and that of Agriculture, Foods and Environment.

From 2014-2016 Madrid dedicated over 640 million euros to those three institutions, which in relative terms represented around 68% of all estimated public investment in the capital.

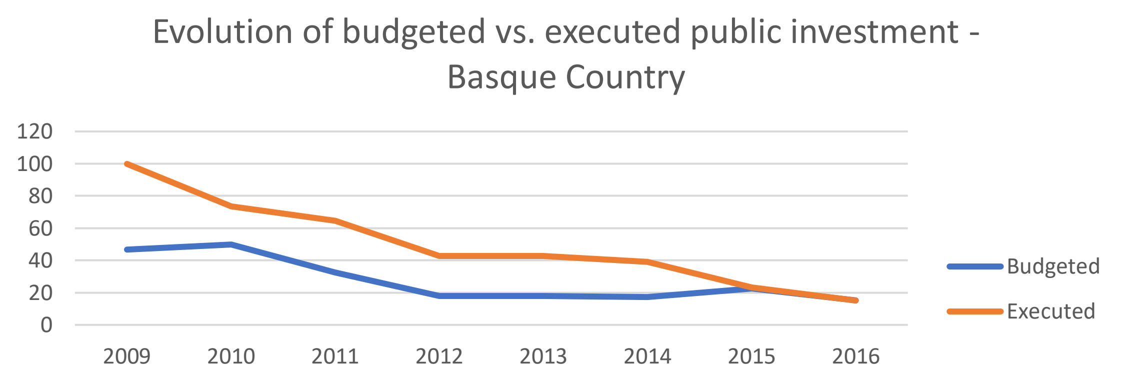
It is important to bear in mind that Madrid also dedicates part of its estimated public investment to the institutions that are part of the Ministry of Public Works; from 2014-2016, 8 million euros were spent by these institutions. In relative terms, it represented a 0,9% of total public investment with estimated budget in Madrid.

5.2 Public investment in the Basque Country

When analyzing the evolution of public investment with limited budget in the Basque Country, one can start seeing quite interesting differences with respect to Madrid.

First of all, when comparing the evolution of budgeted vs executed public investment, it can be seen that both during 2015 and 2016, budgeted and executed investment were very close, almost equal, at around 23 million euros. During the rest of the period executed investment surpassed the budgeted one, and during some years it did get to double the amount like in Madrid (see figure 5-4).

Figure 5-4 Evolution of budgeted vs. executed public investment – Basque Country



Source: IGAE
Own elaboration - Data shown in euros

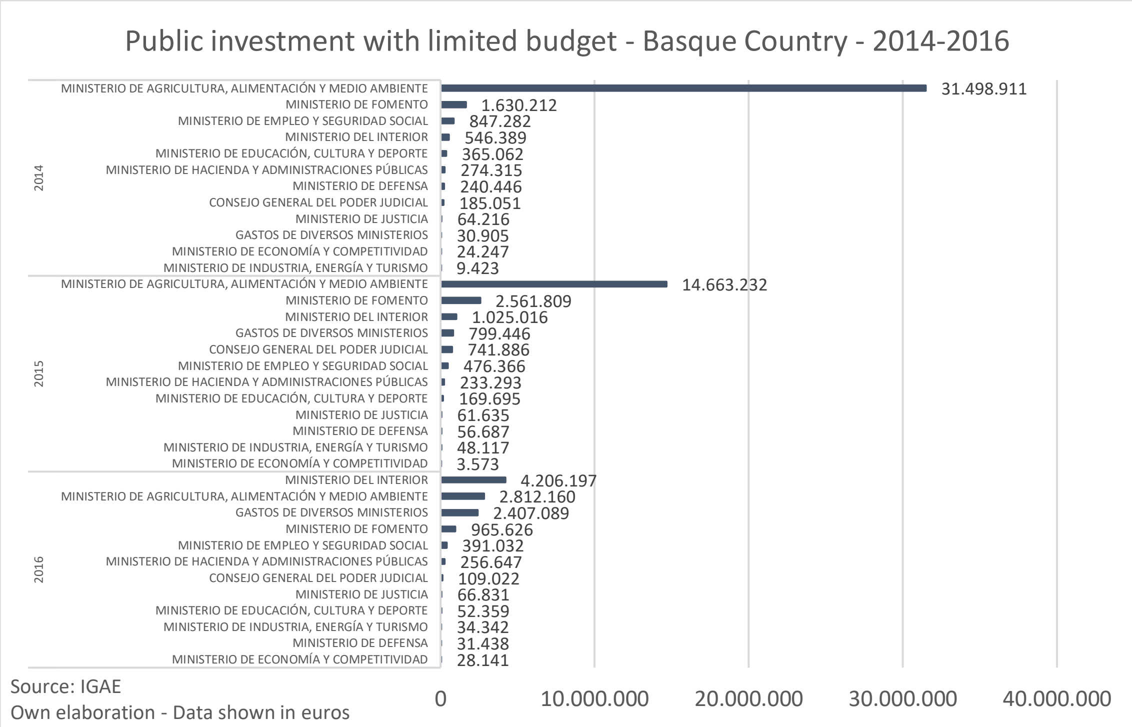
In the case of the Basque Country there have been 2 different political parties holding the power over the period of analysis: from 2009-2012, the political party in charge of the government was the Spanish Socialist Worker's Party; from 2012 onwards, the party in charge was the Basque Nationalist Party.

Apart from this, when comparing the absolute values of public investment, during the period of analysis, the Basque Country had 67 million euros to dedicate to its public investment with limited budget and 9.4 million euros to dedicate to its public investment with estimated budget, while Madrid got 1.600 million euros and 953 million euros respectively.

With respect to the way it was spent, around 7% of the public investment in the Basque Country was dedicated to the Ministry of Public Works. Whilst, for the same period, Madrid dedicated over 45% of its public investment to the same Ministry.

Not only is it interesting to see the differences in relative terms, but also in absolute terms. During the period of analysis, it can be seen that public investment spent by the Ministry of Public Works in the Basque Country (5 million euros) is 99% lower than that of Madrid (72 million euros).

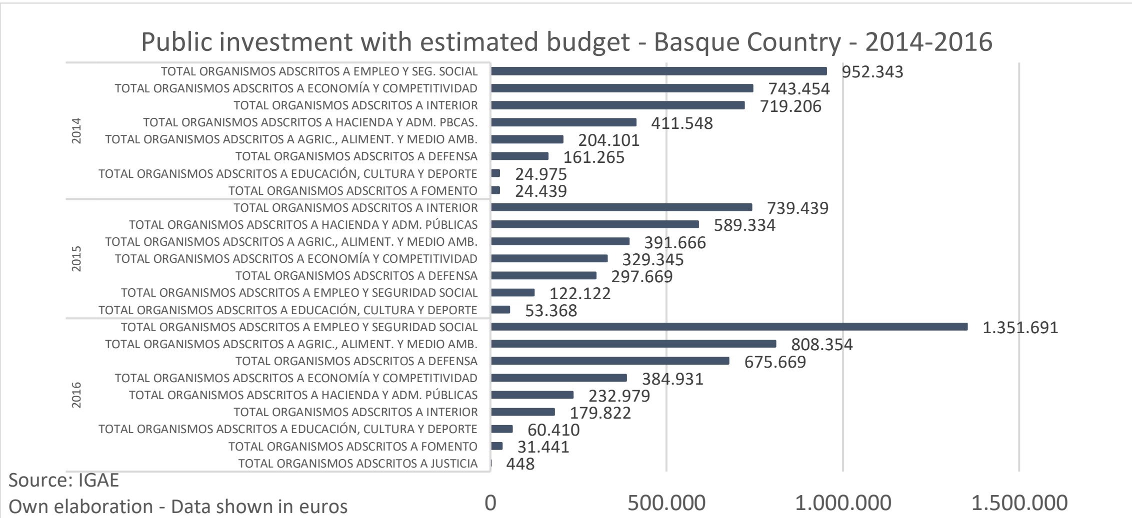
Figure 5-5 Public investment with limited budget – Basque Country



The Basque Country dedicates most of its public investment with limited budget to the Ministry of Agriculture, Foods and Environment, in relative terms it represents over 72% of total limited public investment. Regarding the ministry in second position, this place goes to the Ministry of Interior which received around 5.7 million euros (8% of total limited public investment). The ministry in third position is that of Public Works, which ended up receiving 5.1 million euros (7.5% of total limited public investment in the region).

As for the way public investment with estimated budget is spent, most of it is used by the institutions that are part of the Ministry of Employment and Social Security (around 25%). A little share of the public investment with estimated budget is also dedicated to the Ministry of Public Works, but it only represents a 0,5% of total estimated public investment (see figure 5-6).

Figure 5-6 Public investment with estimated budget – Basque Country



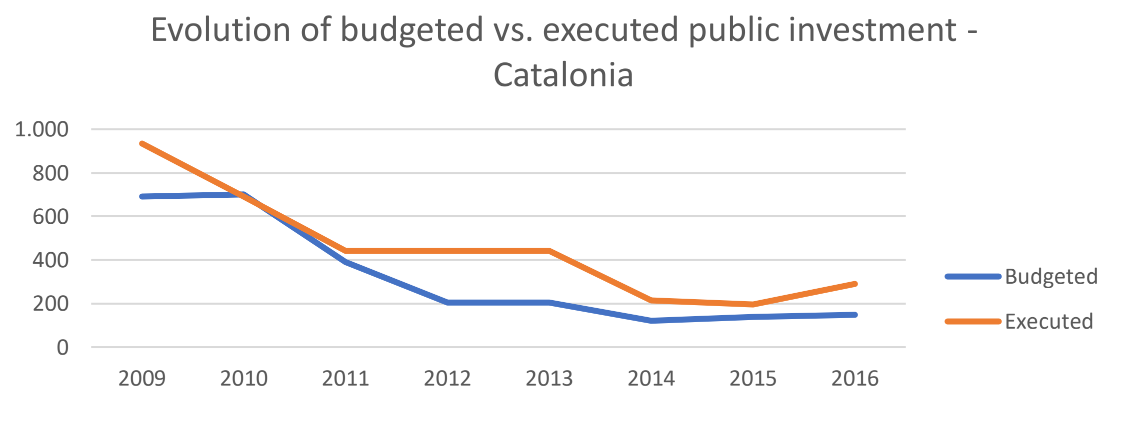
Although both Madrid and the Basque Country dedicate less than 1% of their public investment with estimated budget to the institutions that are part of the Ministry of Public Works, when comparing the absolute terms, Madrid dedicates 8 million euros, which is almost the same amount that the Basque Country has for its total estimated public investment (9.2 million euros).

5.3 Public investment in Catalonia

Analyzing the evolution of budgeted vs executed public investment in Catalonia shows that it is one of the autonomous communities that ends up receiving a very similar amount with respect to what was initially planned on budget.

For the whole period of analysis, Catalonia ended up receiving 40% more money than what was budgeted, but during 2010 and 2011 both amounts were almost equal.

Figure 5-7 Evolution of budgeted vs. executed public investment – Catalonia



Source: IGAE
Own elaboration - Data shown in millions of euros

When it comes the to political parties that have held the power in Catalonia, during 2009 the political party in command was the Socialist's Party of Catalonia. From 2010 and up to 2016 the one in command was the Democratic convergence of Catalonia (center-right wing party).

Regarding how Catalonia spends its public investment, figure 5-8 shows that year after year it is mainly dedicated to the Ministry of Public Works. From 2014-2016 Catalonia dedicated over 528 million euros to this Ministry, which in relative terms accounts for up to 90% of its total public investment.

As for the other ministries, that of Agriculture, Foods and Environment always occupies the second position, during the period of analysis Catalonia dedicated 25 million euros to this Ministry, it represents 4% of its total public investment.

The third ministry every year is that of Treasury. From 2014-2016 this Ministry received 13 million euros (2% of total public investment in the autonomous community).

Figure 5-8 Public investment with limited budget – Catalonia

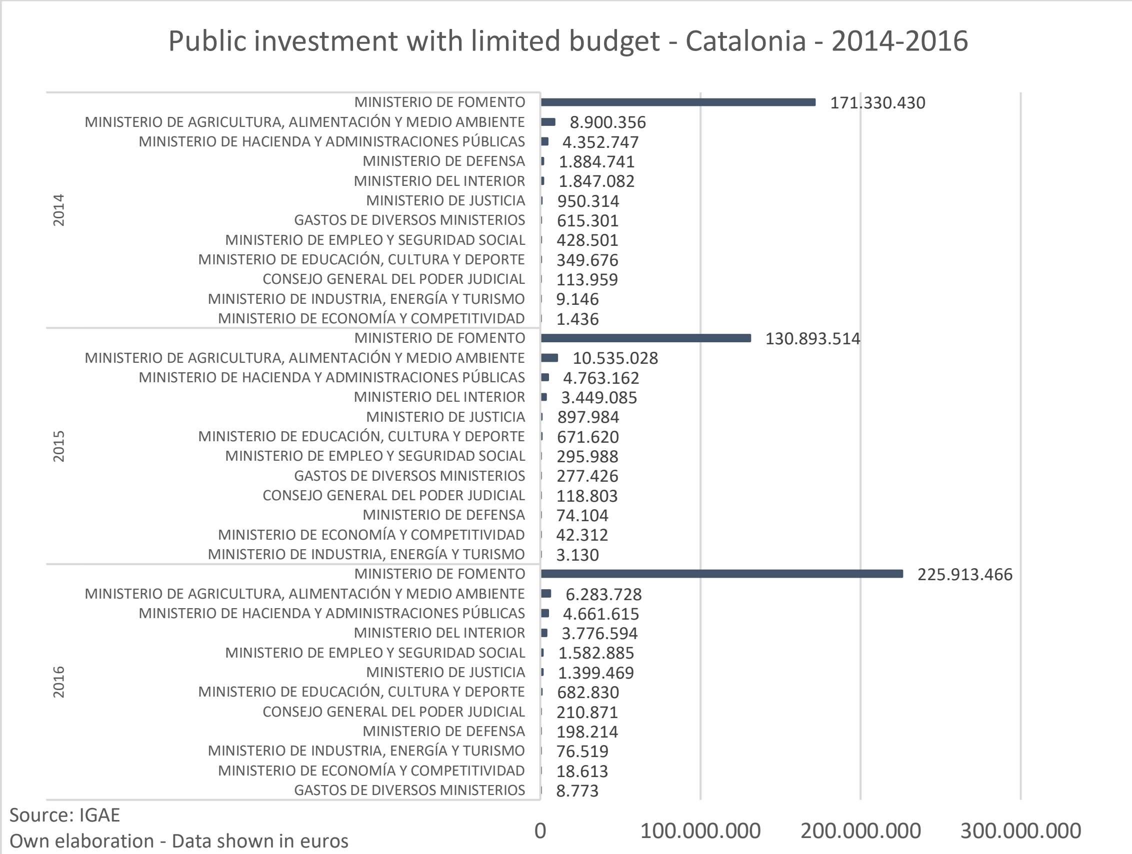
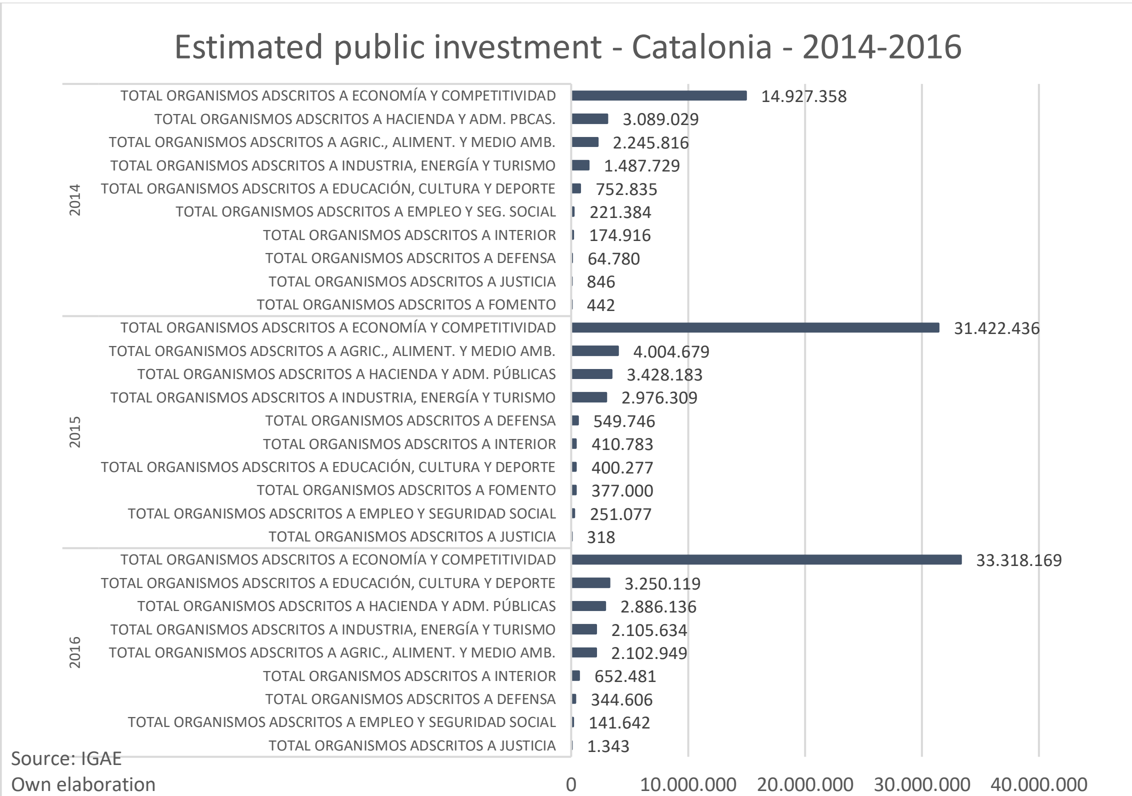


Figure 5-9 Public investment with estimated budget – Catalonia



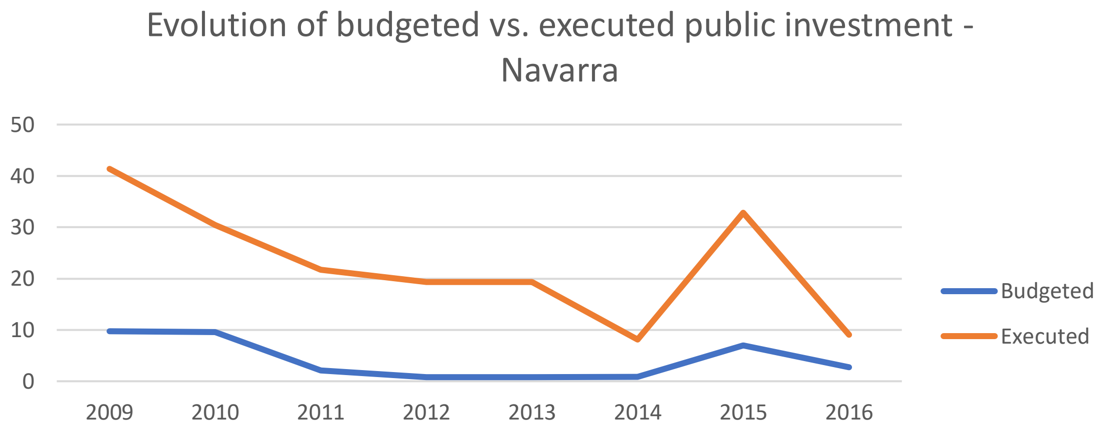
When looking at how Catalonia spends it public investment with estimated budget, figure 5-9 shows that over 70% of it goes to the institutions that are part of the Ministry of Economics and Competitiveness.

Second position goes to the institutions that are part of Ministry of Agriculture, Foods and Environment, which received over 8 million euros (7% of total public investment with estimated budget in the region). As for the third position, it goes to institutions that are part of the Ministry of Industry, Energy and Tourism, they received over 6 million euros during the period of analysis which accounts for over a 5% of public investment with estimated budget in Catalonia.

5.4 Public investment in Navarra

The following figure shows that from 2009-2016 Navarra received around 182 million euros for its public investment (both limited and estimated budget) instead of the 34 million euros that were initially planned. This represents an increase of almost 400% with respect to the budgeted version.

Figure 5-10 Evolution of budgeted vs. executed public investment - Navarra



Source: IGAE
Own elaboration - Data shown in millions of euros

Moving on to a more granular analysis, from 2014-2016, Navarra received in total 39 million euros for its limited public investment, and 10M for the estimated one.

As for the way it was divided between the different Ministries, the one that got the biggest share was the Ministry of Agriculture, Foods and Environment (76%), in absolute terms it adds up to 29 million euros.

Regarding the Ministry of Public Works, it only received 3% of total limited public investment, which in absolute terms represents around 1.2 million euros.

When it comes to the political parties, from 2009-2016 in Navarra, there were three different groups during the period of analysis: first the People’s Party, then Navarrese People’s Union and finally a union of political parties that are on the spectrum of the center-right wing.

As for public investment with estimated budget, Navarra dedicated most of it to institutions that are part of the Ministry of Agriculture, Foods and Environment (56% over total).

Some of it was also dedicated to the institutions that are part of the Ministry of Public Works, but it only represented a 1,3% over total (see figure 5-12).

Figure 5-11 Public investment with limited budget – Navarra

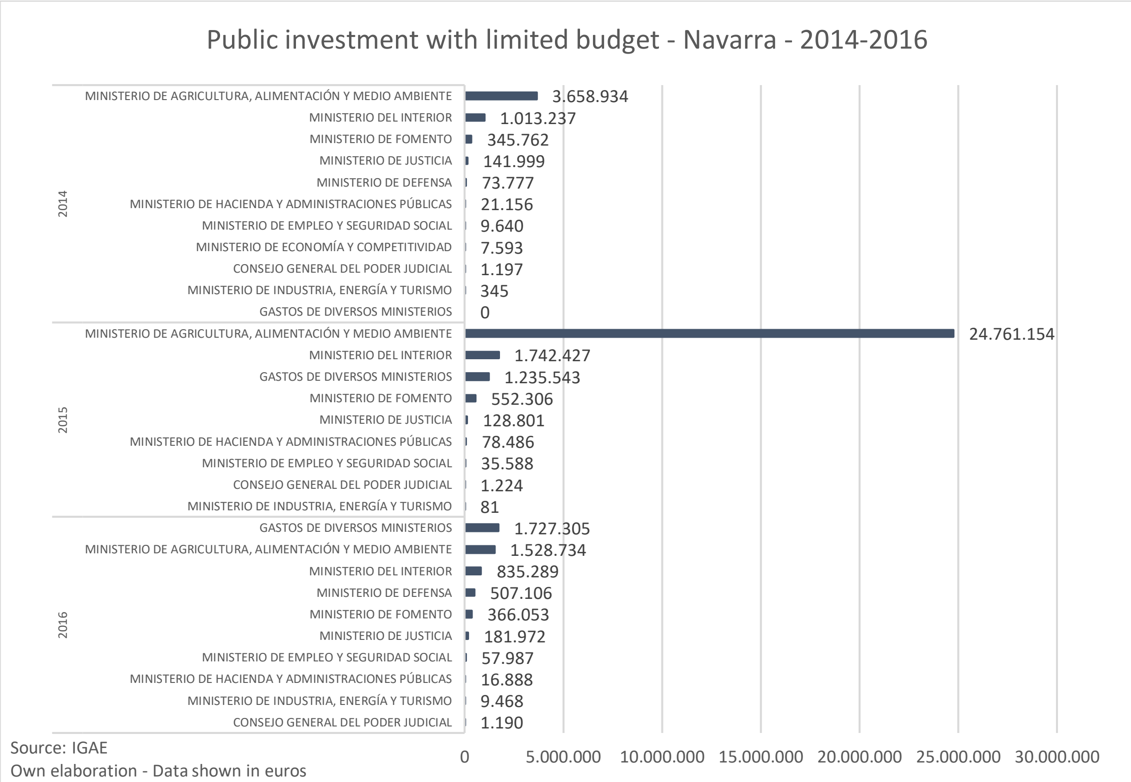
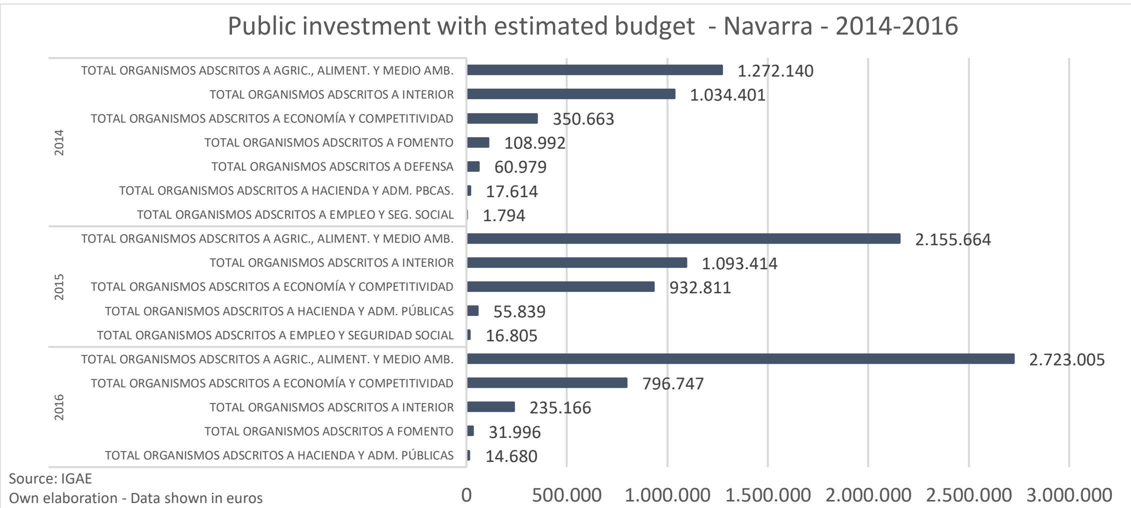


Figure 5-12 also shows that for the period of analysis, Navarra only chose to dedicate around 0,1% of its public investment with estimated budget to the institutions that are part of the Ministry of Public Works; in absolute terms it would only add up to 140.000 euros.

Figure 5-12 Public investment with estimated budget – Navarra



When analyzing the total amount dedicated by Navarra to the Ministry of Public Works whether it is directly through limited budget or more indirectly through estimated budget, it can be seen that the autonomous community only dedicated 1,4 million euros to policies related to the building or improvement of infrastructures.

5.5 Public investment in the Balearic Islands

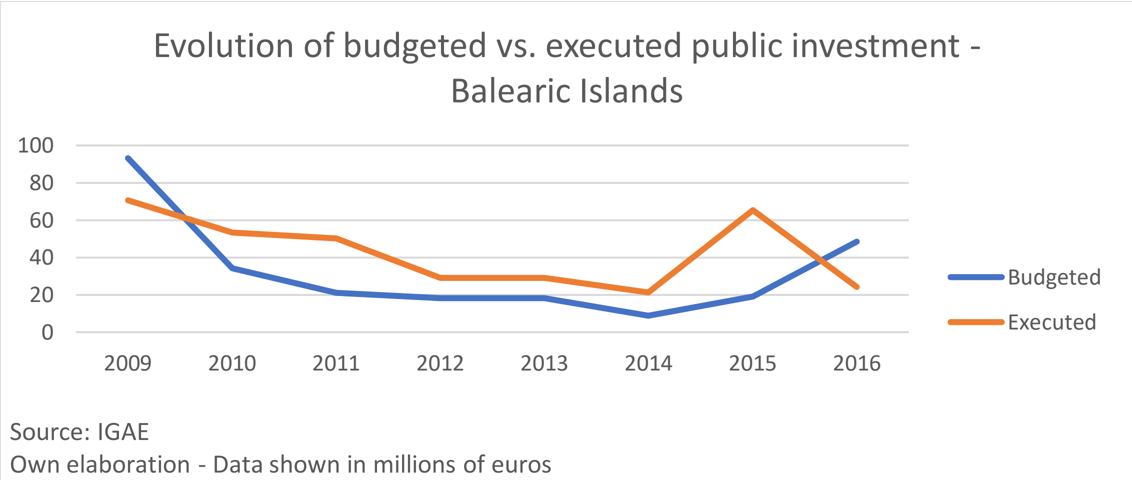
The Balearic Islands have sometimes been considered discriminated with respect to the rest of the autonomous communities.

This could certainly have an argument on the fact that it is one of the autonomous communities that receives the least amount of public investment, apart from that, when analyzing the behavior of budgeted vs. executed public investment, it has been shown that most autonomous communities either double or get almost twice the amount of public investment that was initially planned.

Nonetheless, in the case of the Balearic Islands, the executed version barely surpasses the budgeted one by 30% (see figure 5-13).

Still, the amount received by the Balearic Islands is considerably higher than that received by Navarra, and even under this condition, the later has a higher per capita GDP.

Figure 5-13 Evolution of budgeted vs. executed public investment – Balearic Islands

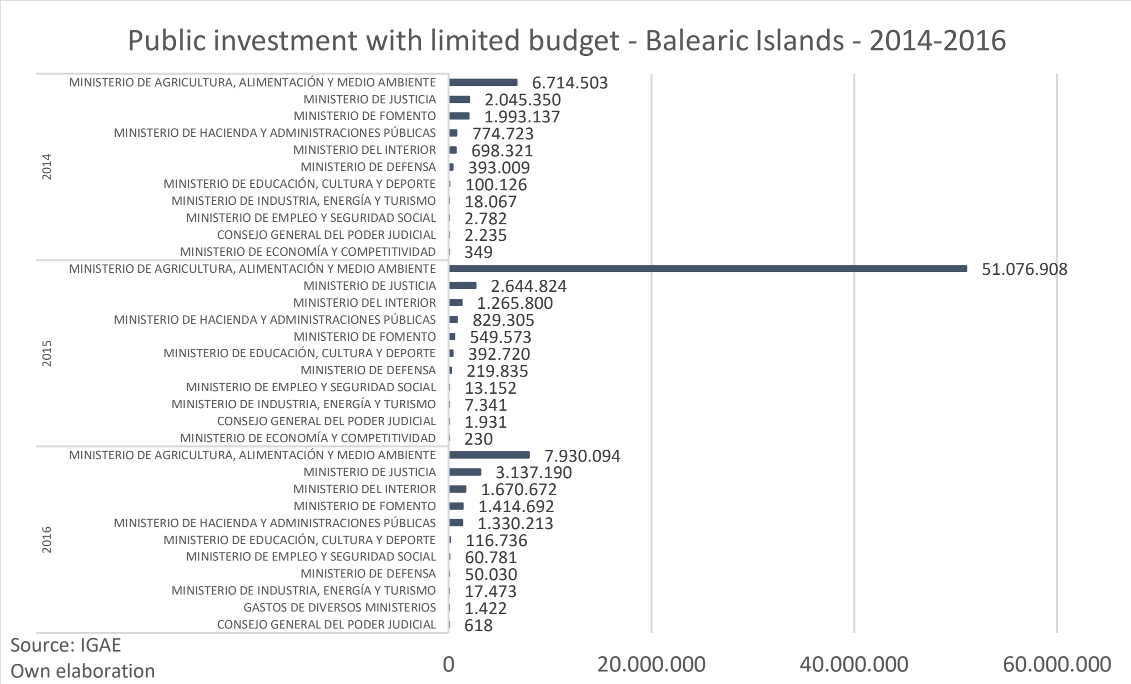


During the period of analysis, the Balearic Islands had 2 different political parties holding the power; from 2007-2011 it was held by the Spanish Socialist Worker's Party, then from 2011-2015 it was held by the People's Party, and finally again from 2015 until now, the political party in command is the Spanish Socialist Worker's Party.

Moving on to how the Balearic Islands spend their public investment, from 2014-2016, the autonomous community received 85M in concept of public investment with limited budget and 25 million euros in concept of public investment with estimated budget.

Most limited public investment was spent by two ministries: The Ministry of Agriculture, Foods and Environment (76%) and the Ministry of Justice (9%).

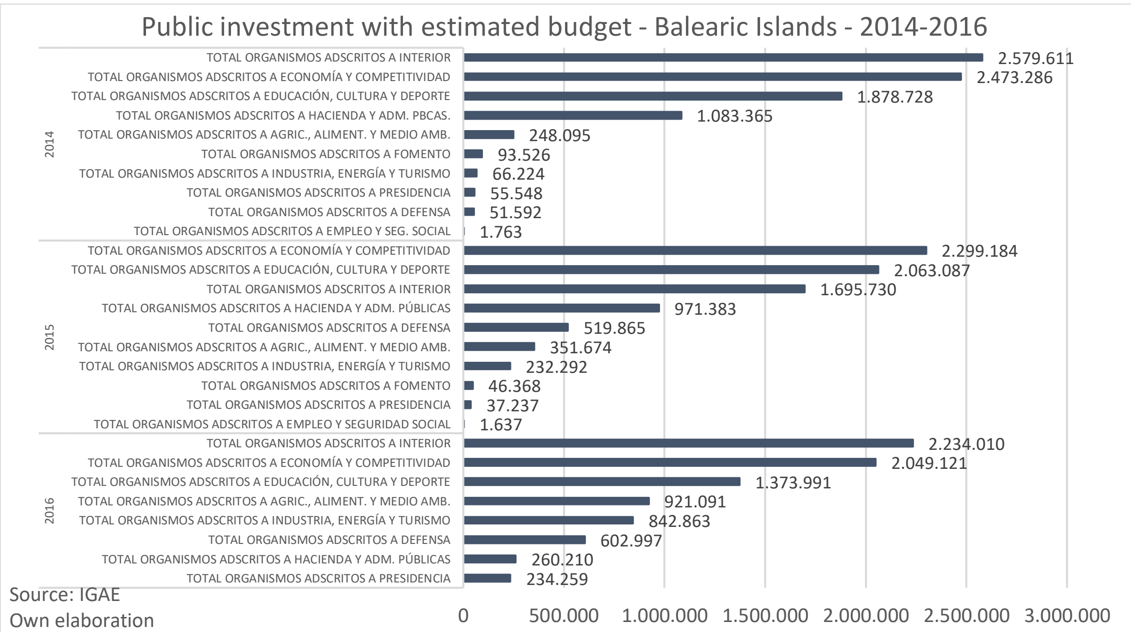
Figure 5-14 Public investment with limited budget – Balearic Islands



Usually the third ministry is that of Interior, but in 2014, the Ministry of Public Works occupied the third position in the ranking.

This coincides with the year that the Balearic Islands accomplished a higher per capita GDP growth rate and it might represent a sign of the importance of this Ministry when it comes to boosting growth. Later, I will analyze the evolution of public investment dedicated by each autonomous community to the Ministry of Public Works. The analysis will show how the Balearic Islands have made efforts in terms of trying to push up investment during different years.

Figure 5-15 Public investment with estimated budget – Balearic Islands



Nevertheless, during the whole period, the Ministry of Public Works only received 4% of total limited public investment (see figure 5-14).

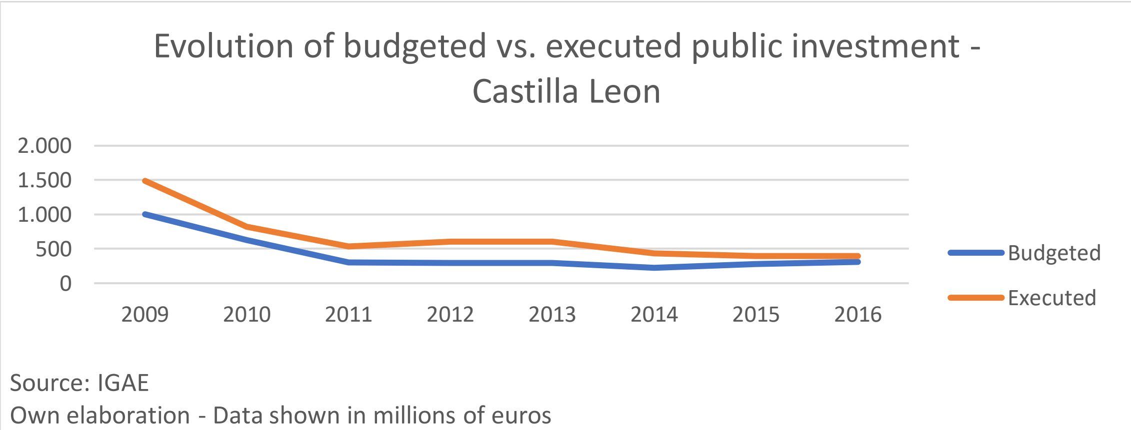
As it can be seen in figure 5-15, public investment with estimated budget, is mostly spent by three institutions: Those that are part of the Ministry of Defense (26%), then those that are part of the Ministry of Interior (25%), and finally those that are part of the Ministry of Education, Culture and Sports (21%).

Regarding the institutions that are part of the Ministry of Public Works, only 0,5% of estimated public investment is dedicated to this Ministry.

5.6 Public investment in Castilla Leon

Figure 5-16 shows how budgeted and executed public investment have evolved throughout the years in Castilla Leon, as it can be seen, budgeted public investment is certainly below the executed one. During the period of analysis (2009-2016) Castilla Leon ended up receiving over 5.000 million euros (58% more than what was planned on budget).

Figure 5-16 Evolution of budgeted vs. executed public investment – Castilla Leon



Ever since 2001, the political party in charge of Castilla Leon has been the People's Party.

To give an answer to the question: how does Castilla Leon spend its public investment? We need to look at figures 5-17 and 5-18 which show how public investment with limited budget and estimated budget was divided between the different ministries from 2014-2016.

In figure 5-17, it can be seen that the Ministry that receives the biggest share is that of Public Works (from 2014-2016 this Ministry was given 728 million euros which accounts for up to 76% of total public investment with limited budget in the region).

The Ministries in second and third position are: The Ministry of Agriculture, Foods and Environment (183 million euros, 17% of total public investment) and the

Ministry of Defense (25 million euros, 2,5% of total public investment), respectively.

Figure 5-17 Public investment with limited budget – Castilla Leon

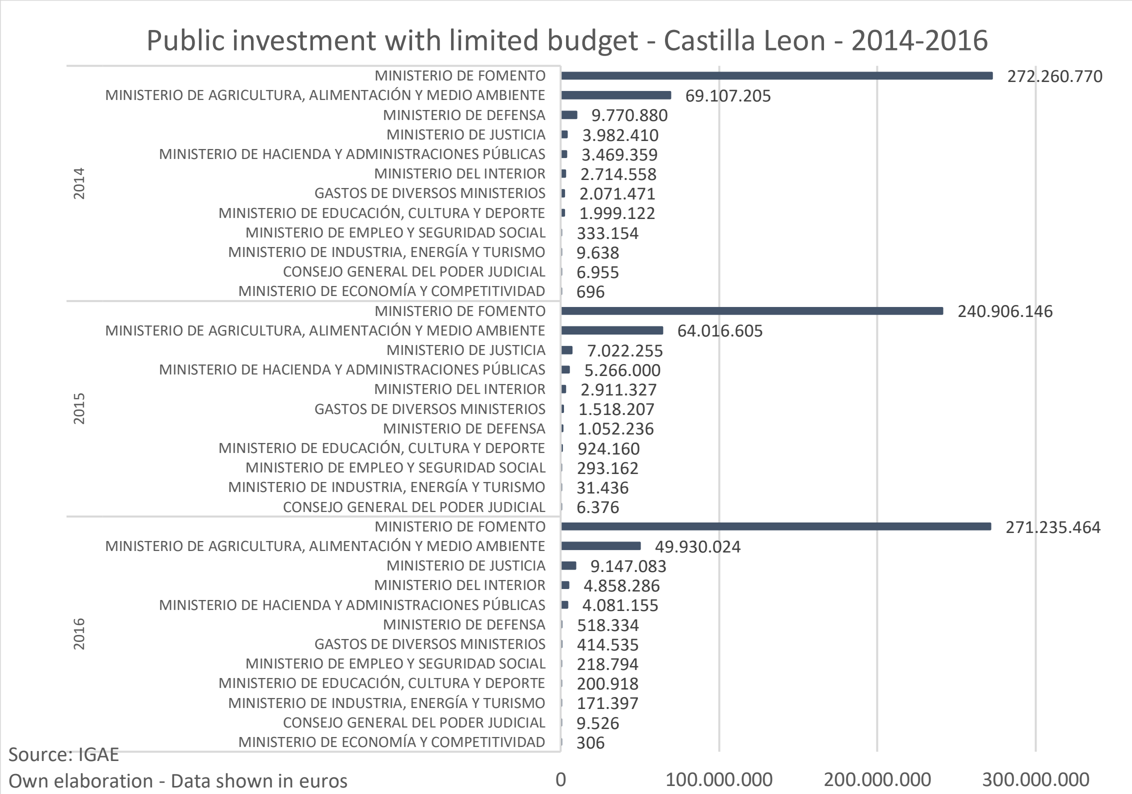
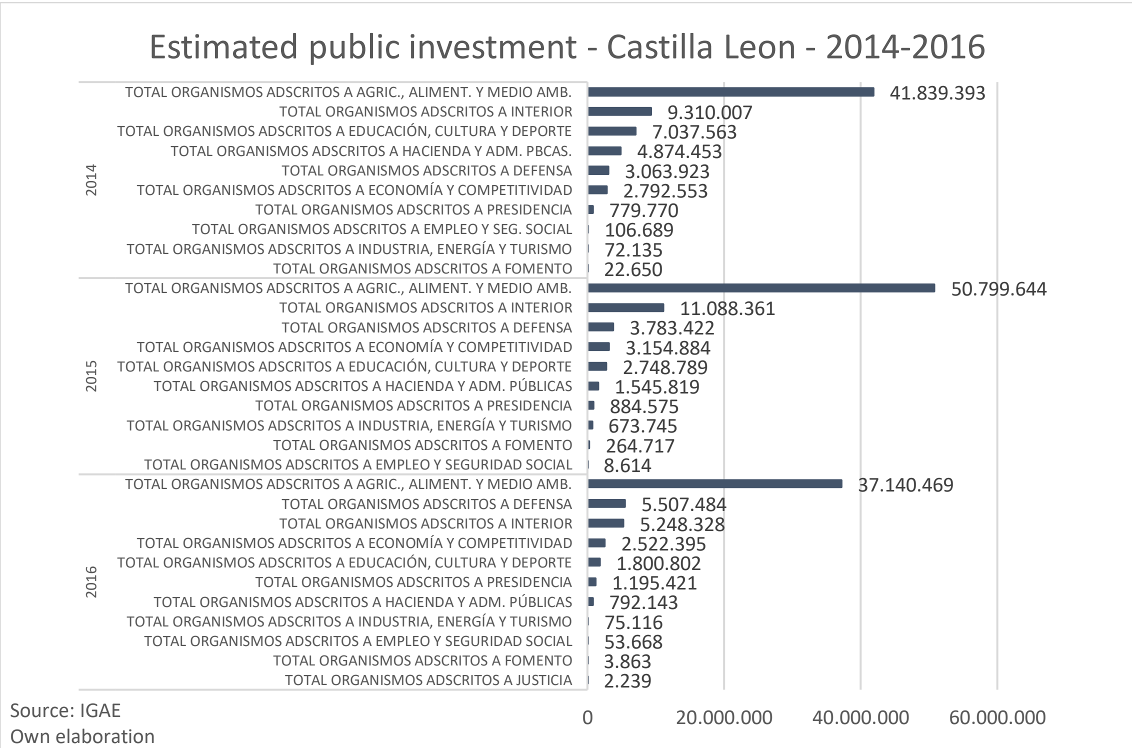


Figure 5-18 Public investment with estimated budget – Castilla Leon



It is interesting to compare the amount of public investment that Castilla Leon dedicated to the Ministry of Publics Works with respect to that dedicated in Madrid.

For the moment, it is the only autonomous community that has dedicated more of its public investment to this ministry.

To be more precise, Castilla Leon spent over 784 million euros, while Madrid dedicated 726 million euros to the same ministry. This represents a difference of -1.1% in Madrid with respect to Castilla Leon.

Regarding how Castilla Leon spends its public investment with estimated budget, it can be seen that most of it gets spent by the institutions that are part of the Ministry of Agriculture, Foods and Environment. From 2014-2016 these institutions received almost 130 million euros which accounts for up to 65% of total public investment.

The institutions in second position are those that are part of the Ministry of Interior. During the period of analysis, they received over 25 million euros which represents up to 12% of total public investment in the region.

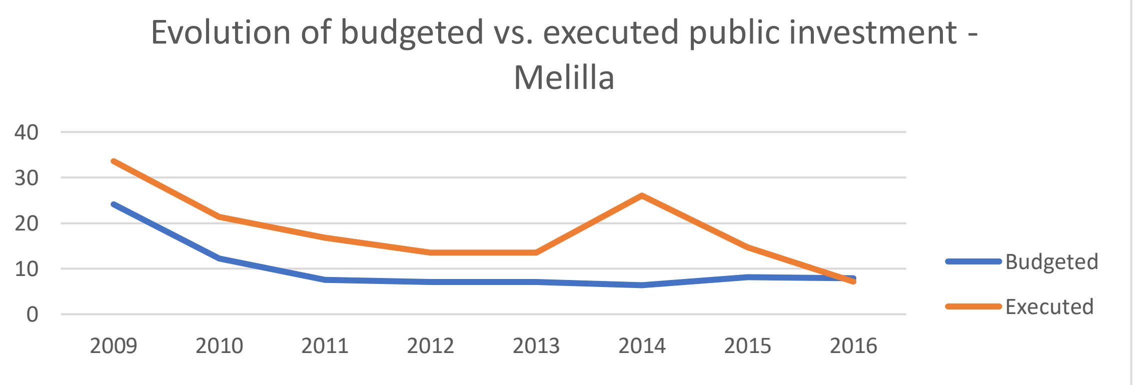
Occupying the third position, there are the institutions that are part of the Ministry of Defense. They received around 12M during the period of analysis, which represents over 6% of total public investment.

Finally, when it comes to the institutions that are part of the Ministry of Public Works, it can be seen that Castilla Leon dedicated less than 300.000 euros to these institutions. In relative terms it represents less than 0,1% over total public investment with estimated budget.

Nonetheless, as previously seen, in Castilla Leon most public investment with limited budget is dedicated to this Ministry

5.7 Public investment in Melilla

Figure 5-19 Evolution of budgeted vs. executed public investment – Melilla



Source: IGAE
Own elaboration - Data shown in millions of euros

Melilla also belongs to the group of autonomous communities that constantly receive much more public investment that initially planned.

As figure 5-19 show, from 2009-2016, almost every year Melilla received much more money than initially budgeted. In total it added over 86% more when compared to budget.

Nevertheless, it is interesting to keep track of the absolute values. In this case, Melilla only received 147 million euros to invest. It is in fact the autonomous community that received the less money to invest from 2009-2016.

Figure 5-20 Public investment with limited budget - Melilla

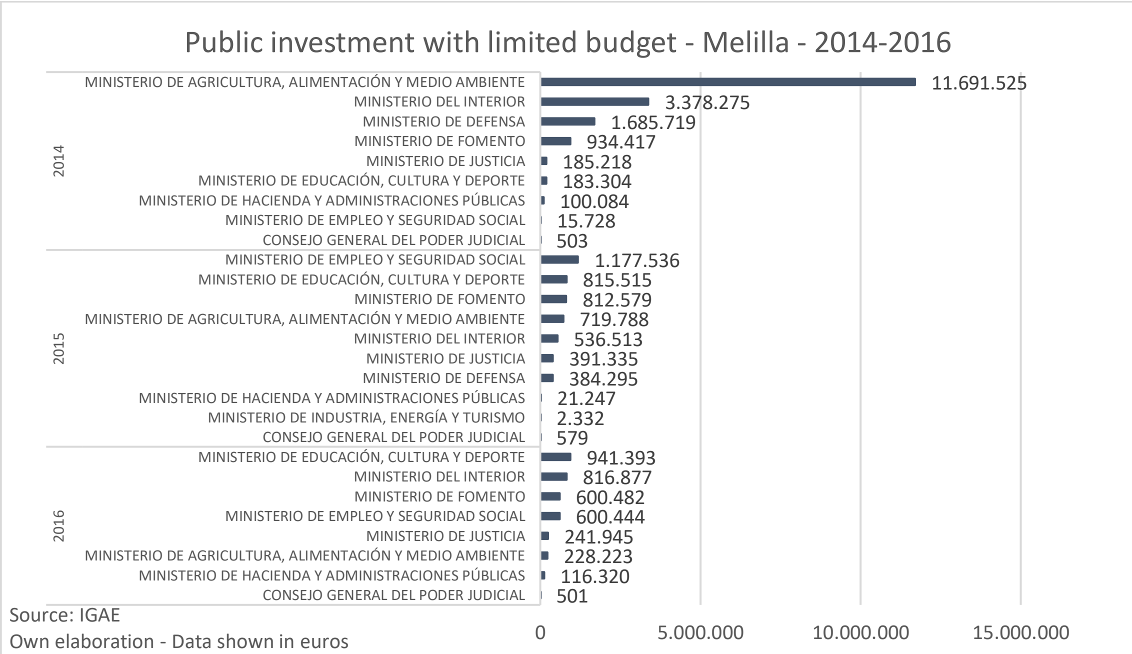
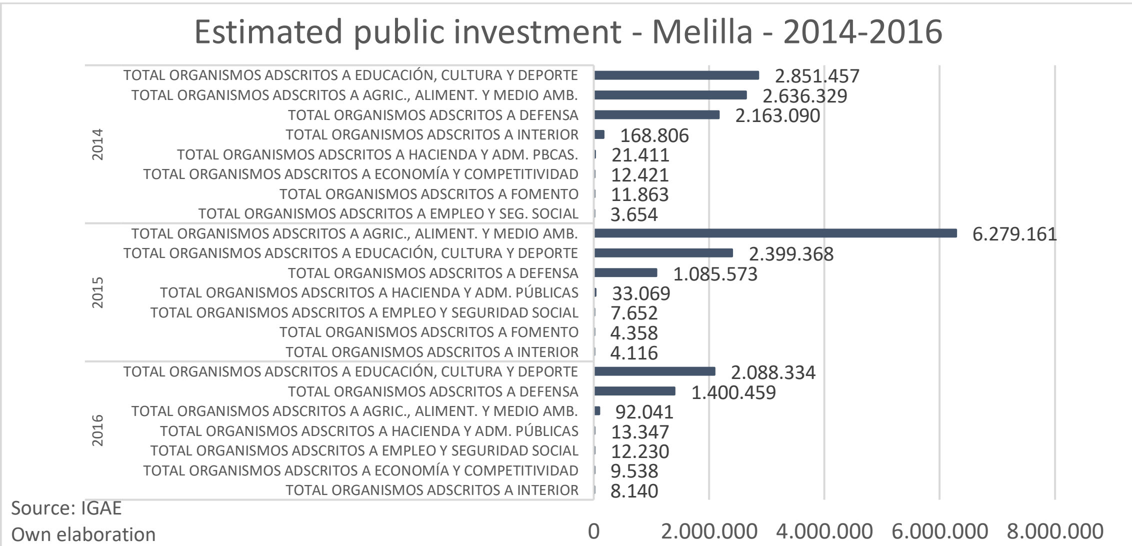


Figure 5-21 Public investment with estimated budget – Melilla



Moving on to the way Melilla divides its public investment with limited budget, figure 5-20 shows that from 2014-2016, Melilla dedicated over 12 million euros to the Ministry of Agriculture, Foods and Environment. Which in relative terms represents over 47% of public investment with limited budget in the region.

The ministries in second and third position are that of Interior, which received over 4,7 million euros during the period of analysis (17% of public investment with limited budget), and the Ministry of Public Works, which ended up receiving an 8% of public investment with estimated public budget (around 2,3 million euros).

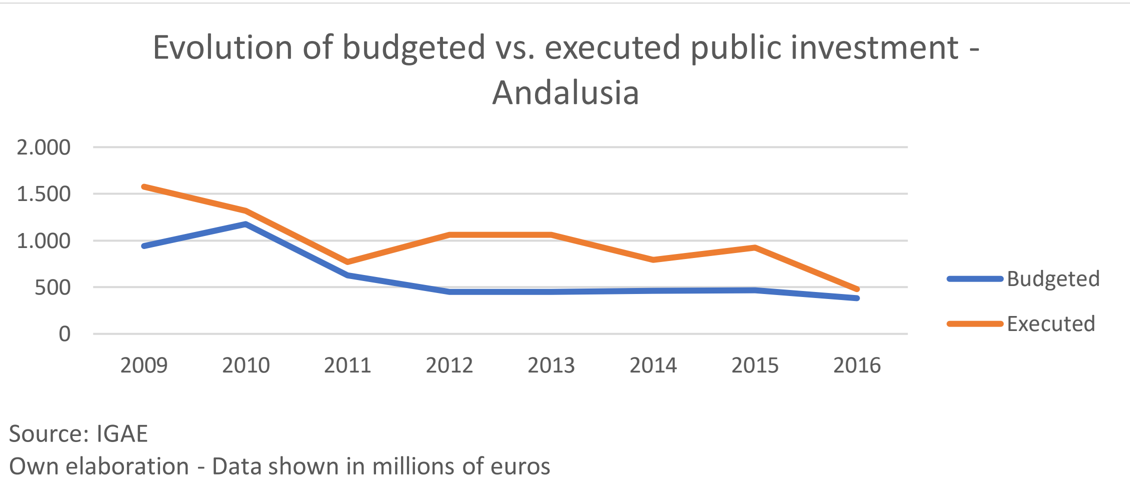
As for public investment with estimated budget, Melilla received almost the same amount as the one received through its public investment with limited budget. From 2014-2016 Melilla could dedicate over 21 million euros to the institutions that are part of the corporate sector. In this sense, the institutions that received the biggest shares were those that are part of the Ministry of Agriculture, Foods and Environment (these received over 9 million euros which in relative terms represent over 40% of public investment with estimated budget in the region). In the second position can be found the institutions that are part of the Ministry of Education, Culture and Sports (they received more than 7 million euros which adds up to a 34% of public investment with estimated budget in the region). The third position goes to the institutions that are part of the Ministry of Defense. In the case of Melilla, these institutions ended up receiving more than 4 million euros which in relative terms represents over 21% of public investment with estimated budget in the autonomous community.

The political party holding the power in Melilla during the whole period of analysis has been the People's Party.

5.8 Public investment in Andalusia

As previously mentioned, Andalusia and Madrid have received a very similar share of total public investment during the period of analysis. Nonetheless, while Madrid more than doubled the amount of budgeted public investment, Andalusia only received 60% more than what was initially planned.

Figure 5-22 Evolution of budgeted vs. executed public investment – Andalusia



It can be seen that during 2010, 2011 and also 2016, the executed version of public investment was very close to that of the budgeted one.

When analyzing the political parties that held the power during the time range of analysis, it can be seen that Andalusia has always been managed by the Spanish Socialist Worker's Party.

Given that Andalusia and Madrid ended up receiving a very similar share of public investment, it is interesting to compare both in absolute and relative terms how each autonomous community decided to allocate its public investment.

As it can be seen under section 5.1, from 2014-2016, Madrid dedicated over 726 million euros to the Ministry of Public Works, which in relative terms accounts for up to 45% of its total public investment with limited budget.

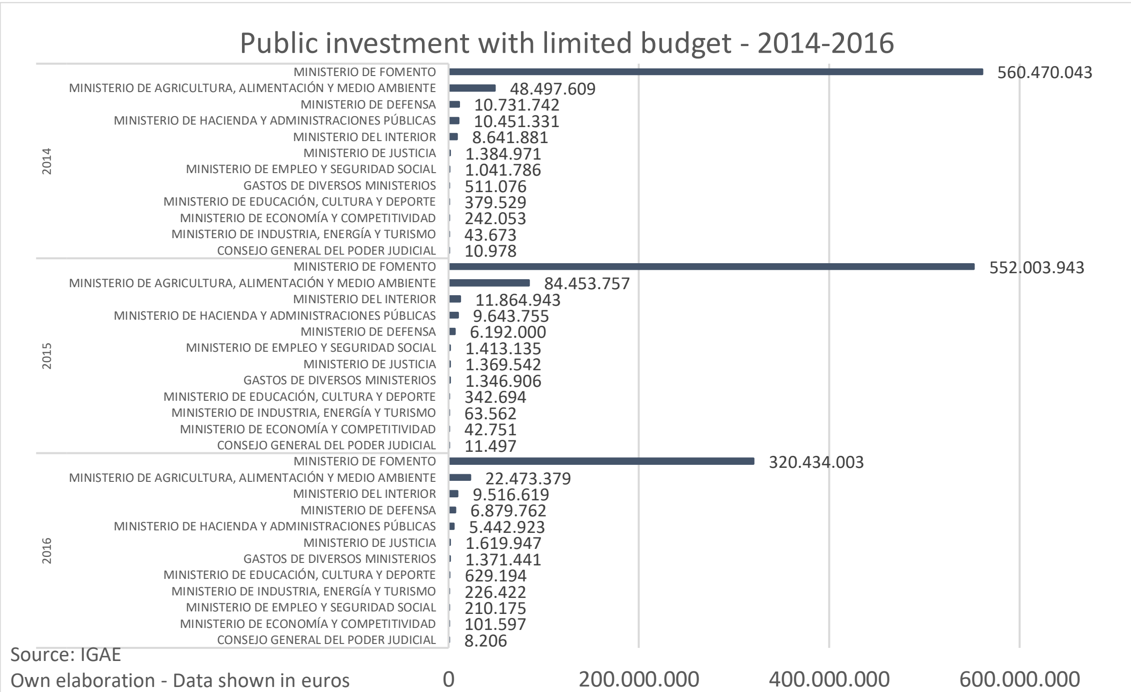
When it comes to Madrid, most of the money received by the Ministry of Public Works came from the limited budget, while the estimated one was mostly dedicated to 3 Ministries that are not related to Public Works.

Now, moving on to Andalusia the following graphs show how this region spent its public investment.

First of all, when analyzing the public investment with limited budget, it can be seen that Andalusia dedicates even more money than Madrid and Castilla Leon to this Ministry. From 2014 to 2016, Andalusia dedicated over 1.432 million euros to the Ministry of Public Works, which in relative terms represents over 85% of limited public investment in Andalusia.

The ministries on second and third position are the Ministry of Agriculture, Foods and Environment (9,2%) and the Ministry of Interior (1,79%).

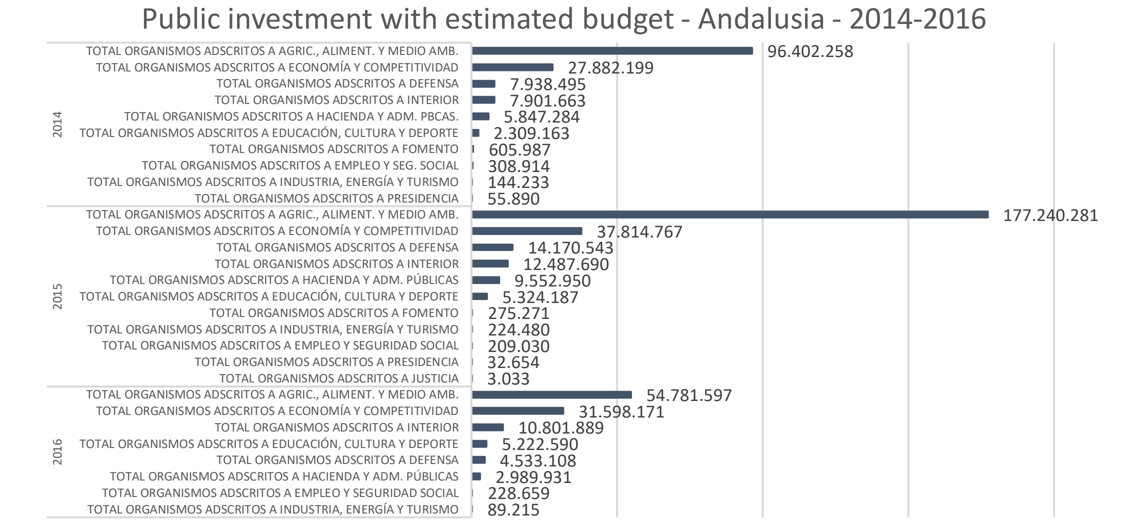
Figure 5-23 Public investment with limited budget – Andalusia



As for the way public investment with estimated budget is spent, as it can be seen in figure 5-3, Andalusia and Madrid have many things in common. Both autonomous communities have the following institutions in their top 3, although in a different order: when it comes to Andalusia first of all go the institutions that are part of the Ministry of Agriculture, Foods and Environment (63%), then go those that are part of the Ministry of Economics and Competitiveness (18%) and on third place goes the institutions that are part of the Ministry of Defense.

These institutions occupy the top three in Madrid as well, although in a different position (see figure 5-3).

Figure 5-24 Public investment with estimated budget – Andalusia

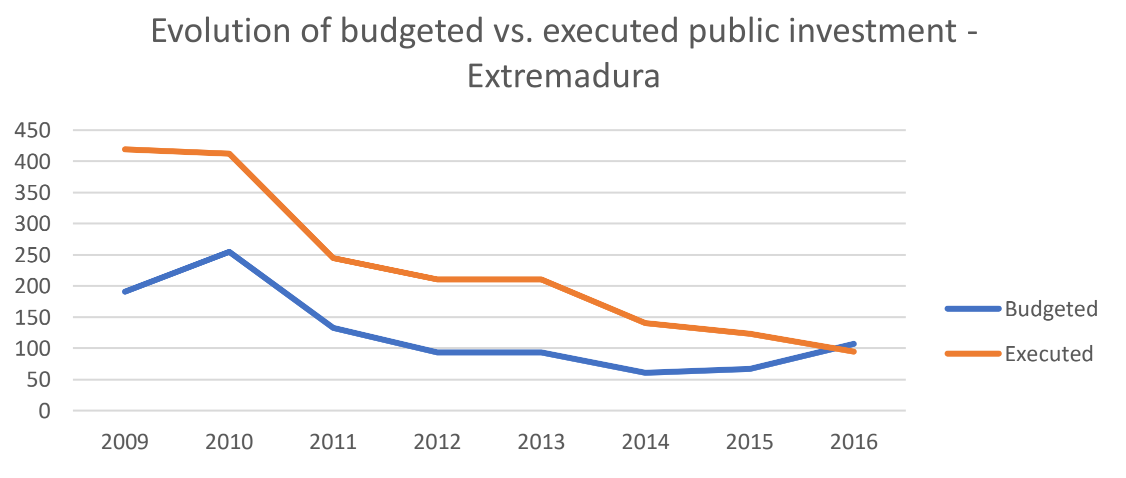


Source: IGAE
Own elaboration - Data shown in euros

5.9 Public investment in Extremadura

Extremadura is one of those autonomous communities that receives twice as much investment as what was initially planned.

Figure 5-25 Evolution of budgeted vs. executed public investment – Extremadura



Source: IGAE
Own elaboration - Data shown in millions of euros

Only during 2016, the budgeted amount was slightly higher than the executed one. Still it should be taken into consideration that the amounts of public investment dedicated to Extremadura from 2009-2016 are over 400% higher than those dedicated to the Balearic Islands. This could explain why during a couple of years Extremadura accomplished higher growth rates than the Balearic Islands.

Regarding the political parties, just like in the Balearic Islands, in Extremadura there have been 2 political parties in charge of its government for the period of analysis: first the Spanish Socialist Worker's Party, then the People's Party and once again the Spanish Socialist Worker's Party.

Moving on to how money has been spent, from 2014 to 2016, Extremadura received in total 358M to invest. 265 million euros were part of the limited budget and 92 million euros part of the estimated one.

The ministries that received the highest shares were, first the Ministry of Agriculture Foods and Environment with a 53% of total share and then the Ministry of Public Works with 38% of share.

The third and fourth position go either to the Treasury or to the Ministry of Justice, depending on the year.

When it comes to public investment with estimated budget, first in the ranking are the institutions that are part of the Ministry of Agriculture, Foods and Environment. In total these received 84% of total public investment with estimated budget in Extremadura (see figure 5-27 for more details).

Figure 5-26 Public investment with limited budget – Extremadura

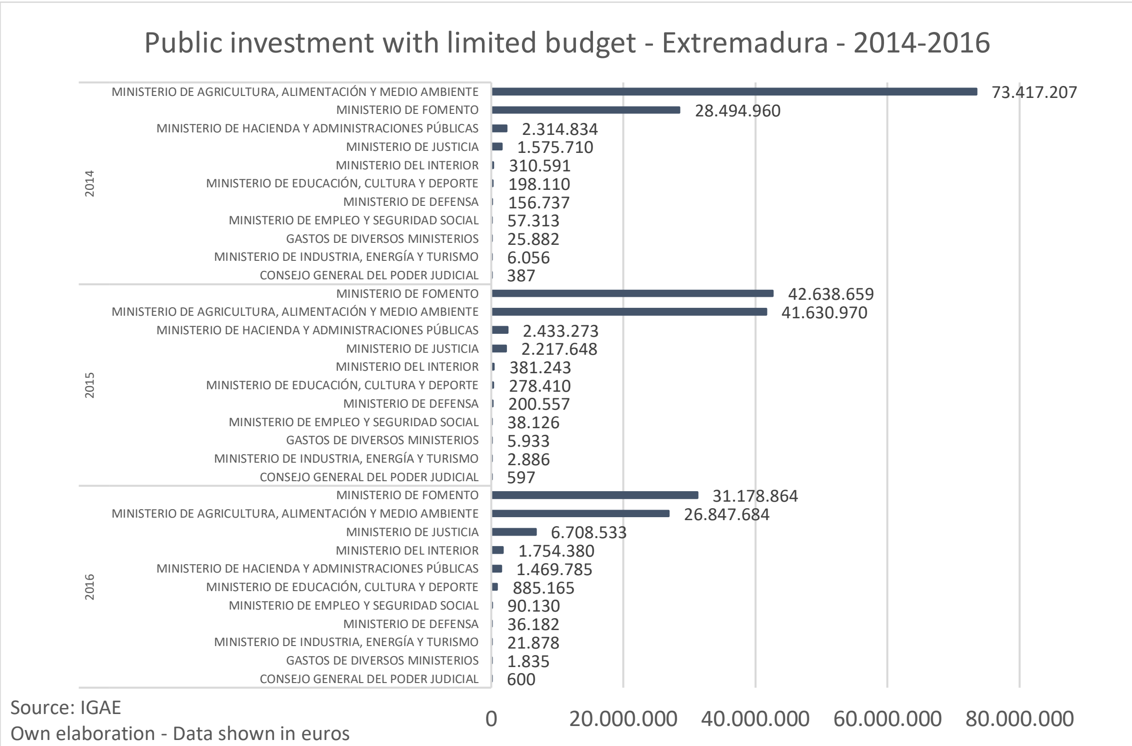
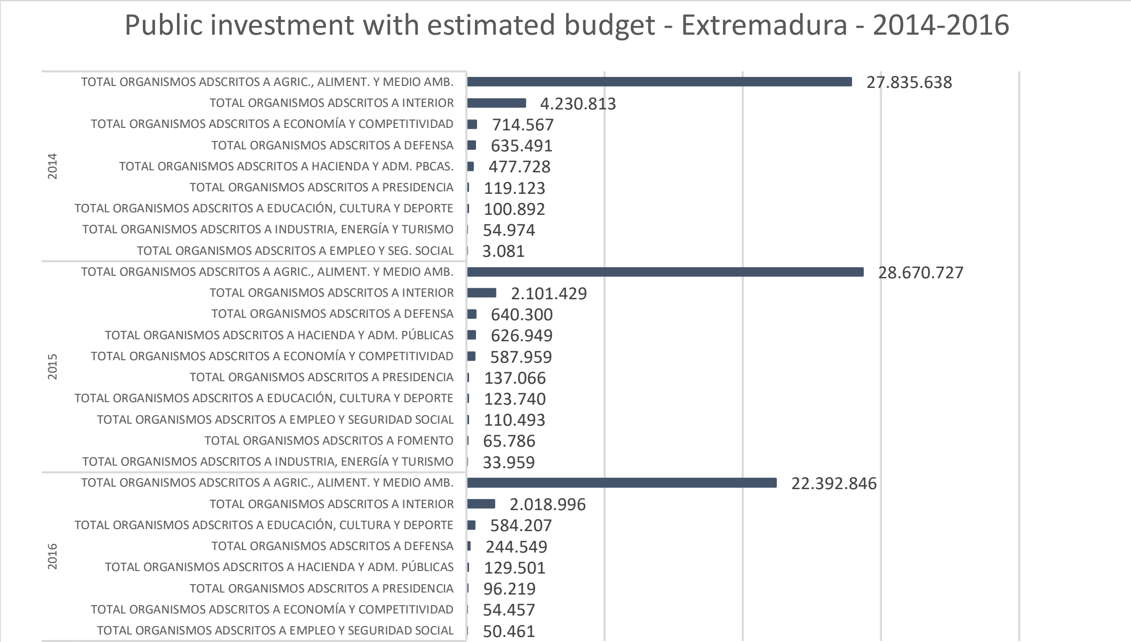


Figure 5-27 – Public investment with estimated budget – Extremadura



Source: IGAE
Own elaboration - Data shown in euros

Just to sum up, out of the subset there are 4 autonomous communities that in relative terms received less than 90% the amount received by Madrid during the period of analysis. Apart from that, there are 3 autonomous communities that received between 50%-80% less than Madrid to dedicate in terms of public investment. There is just one autonomous community that received a similar share and that also had a very similar way of spending the investment which is Andalusia. This autonomous community even got to receive more public investment with limited budget from 2014-2016 (see figure 5-28).

Figure 5-28 Public investment % difference with respect to Madrid

Autonomous community	% difference with respect to Madrid
Madrid	
Limited budget	
Estimated budget	
Andalusia	**-14,18%**
Limited budget	4,58%
Estimated budget	-45,78%
Castilla León	**-51,97%**
Limited budget	-35,86%
Estimated budget	-79,11%
Cataluña	**-72,69%**
Limited budget	-63,42%
Estimated budget	-88,30%
Extremadura	**-86,01%**
Limited budget	-83,48%
Estimated budget	-90,26%
Balearic Islands	**-95,67%**
Limited budget	-94,68%
Estimated budget	-97,35%
Basque Country	**-96,98%**
Limited budget	-95,77%
Estimated budget	-99,00%
Navarra	**-98,05%**
Limited budget	-97,57%
Estimated budget	-98,86%
Melilla	**-98,13%**
Limited budget	-98,35%
Estimated budget	-97,77%

Source: IGAE
Own elaboration

To finish this analysis, throughout the whole project the importance of dedicating public investment either to the improvement or creation of infrastructures has been mentioned many times given that many researchers point out that this is key to helping boost economic growth.

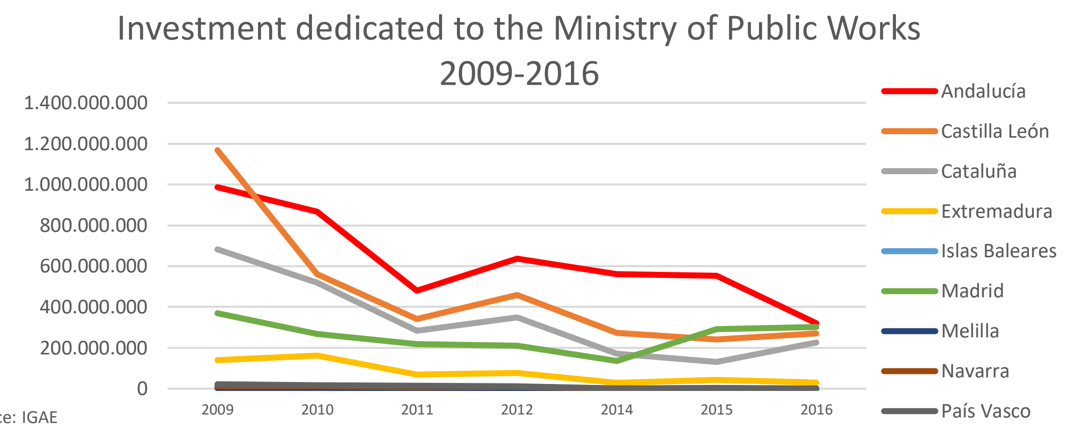
As previously mentioned, the most common way of dedicating efforts to this cause is by allocating economic resources to the Ministry of Public Works, the one in charge of developing and maintaining physical infrastructures in Spain.

Therefore, the following figure shows in comparison the amount dedicated by each autonomous community to this Ministry in terms of public investment with limited budget[2].

It can be seen that the autonomous community that spent the largest amount of money during the period of analysis was Andalusia (4.402 million euros from 2009-2016).

The autonomous communities in second and third position are Castilla Leon and Catalonia with 3.310 million euros and 2.361 million euros respectively.

Figure 5-29 Investment dedicated to the Ministry of Public Work by autonomous community



Source: IGAE
Own elaboration - Data shown in euros

Autonomous community	Amount dedicated to M. of Public Works
Andalucía	4.402.544.735
Castilla León	3.310.382.732
Cataluña	2.361.618.702
Madrid	1.794.643.793
Extremadura	551.480.548
País Vasco	70.429.647
Navarra	40.548.024
Melilla	14.404.930
Islas Baleares	8.302.819

Source: IGAE
Own elaboration

[2] Figure 5-29 only shows public investment with limited budget dedicated to the Ministry of Public Works, because the weight of estimated budget for matters related to this Ministry is so modest.

It draws the attention that when analyzing the whole period Madrid is not part of the top 3 autonomous communities that dedicated the most money to this Ministry any more. Nevertheless, when analyzing just the period 2014-2016 Madrid was part of the top 3, going over Catalonia. What remains unchanged is the fact that Andalusia and Castilla Leon are the autonomous communities that dedicated the most to the Ministry of Public Works.

When looking at the lower part of the figure, no big changes are seen with respect to what has already been analyzed, Extremadura, the Basque Country, Navarra, Melilla and the Balearic Islands, out of the subset are the autonomous communities that dedicated the less to the Ministry of Public Works.

Paying special attention to the Balearic Islands, it can be seen that from 2009-2016 only 8 million euros were dedicated to this Ministry. When comparing it to the amount spent by other autonomous communities such as Andalusia, Madrid or even Melilla, it can be seen that the Balearic Islands dedicate so little to this Ministry. For example, when comparing it directly to Andalusia, the amount dedicated by the Balearic Islands represents as little as 0,19% of the total amount dedicated by Andalusia. This share is also less than 1% in all other communities such as Catalonia, Castilla Leon and Madrid.

When comparing it to Extremadura, the amount spent by the Balearic Islands represents a 1,51% of that spent by Extremadura.

The situation does not look much better when comparing it to Navarra or the Basque Country.

The only autonomous community from the subset that gets closer to the Islands in terms of public investment dedicated to the Ministry of Public Works is Melilla. When comparing the amount dedicated by the Balearic Islands to the improvement or creation of physical infrastructures to that dedicated by Melilla, it can be seen that the amount spent by the first barely represents a 57% of the total amount dedicated by the second.

6. Findings and conclusions

Throughout the project various hypothesis have been analyzed in order to find a relation between economic growth and public investment.

The first theory is that the regions that grow the most in terms of per capita GDP receive higher amounts of public investment.

This idea could not be confirmed since regions such as Andalusia and Extremadura were occupying the highest positions in the ranking of executed public investment, but they were growing at a slower pace than other regions that dedicate less money to public investment.

The second theory is that what matters is not exactly the total amount received but rather how that money gets spent, primarily focusing on spending the money received on the improvement and creation of physical capital.

As just seen, this idea cannot be confirmed either because again, Andalusia, Castilla Leon or Extremadura occupy a position on the top part of the ranking of autonomous communities that dedicate more efforts to these policies.

Whilst Madrid, Navarra or the Balearic Islands are either on the middle or bottom part of the ranking.

Nonetheless, as seen in figure 3-3 regions such as Andalusia are always decreasing more than others or growing at a slower pace.

The third theory is all related to the political party that holds the power. In this case, the data analyzed shows that those regions in which the political party holding the power is more on the left spectrum of politics tend to receive an amount of executed investment that is slightly closer to the budgeted one. Nevertheless, a conclusion should not be drawn here because it does not apply to all autonomous communities analyzed (e.g. Andalusia, which ended up receiving 7.981 million euros, instead of the 4.955 million euros that was supposed to receive).

The last hypothesis is that what matters the most when it comes to boosting economic growth is that the region is in need of a push. This last hypothesis could be confirmed by looking at the example of the Balearic Islands, although it is one of the regions that receives the less, in 2011 it pushed up the amount dedicated to the Ministry of Public Works, by increasing it over 4700% with respect to the previous year (it went from 47.689 euros to 2 million euros). Back in 2009 the Balearic Islands was one of the regions that was falling the most in terms of per capita GDP out of the subset, experiencing a dramatic fall of -5,7% with respect to the previous year.

After the economic efforts trying to push up the amount of public investment dedicated to the Ministry of Public Works, it was the third autonomous community with the least dramatic fall in per capita GDP with respect to 2011, right behind Madrid and the second autonomous community with the highest per capita GDP YoY growth rate in 2014 (see figure 3-3).

These findings could build a direct relation between the effects of public investment on a depressed economy vs the effects on an economy that does not need a push.

To conclude I consider it is extremely necessary to keep doing research on this theme since the more knowledge we get from it, the more we will all be able to benefit. After all, putting our efforts into a well-managed public investment could have a great impact in the way we currently live and more importantly, the way our future generations will live.

7. References

Abiad, A., Furceri, D., & Topalova, P. (2015). *The macroeconomic effects of public investment: evidence from advanced economies.*

Bivens, J. (2012). *Public investment - The next "new thing" for empowering economic growth.*

Bivens, J. (2014). *The Short- and Long-Term Impact of Infrastructure Investments on Employment and Economic Activity in the U.S. Economy.*

De Jong, J., Ferdinandusse, M., Funda, J., & Vetlov, I. (2017). *The effect of public investment in Europe: a model based assessment.*

Eichengreen, B. (2015). *Secular Stagnation: The long view.*

European Central Bank. (2016). *Public investment in Europe.*

Gómez de Antonio, M. (2001). *Un análisis desagregado del impacto del stock de capital público en el crecimiento de la renta per cápita.*

Hahn, H. (2014). *Understanding Gross Domestic Product.*

International Monetary Fund. (2014). *World economic outlook - chapter 3.*

Jung, J. (2011). *The Top Five Smartest Cities In Spain And Why The US Should Care.*

Kamps, C. (2006). *New estimates of government net capital stocks for 22 OECD countries.*

Keynes, J. M. (1936). *The general theory of employment, interest and money.*

Maystad, P. (2010). *Public and private financing of infrastructure - Evolution and economics of private infrastructure finance.*

Ortega, E., & Peñalosa, J. (2012). *The Spanish economic crisis: key factors and growth challenges in the euro area.*

Pérez, J., & Solera, I. (2017, Octubre). *Developments in public investment during the crisis and the recovery.*

Rabnawaz, A., & Sohail Jafar, R. (2015). *Impact of public investment on economic growth.*

Warner, A. (2014). *Public investment as an engine of growth.*

Woodford, M. (2011). *Simple Analytics of the government expenditure multiplier.*