An Roinn Iompair Turasóireachta agus Spóirt

Department of Transport, Tourism and Sport

Investing In Our Transport Future: A Strategic Framework for Investment in Land Transport

Background Paper Ten

Historical Trends and International Benchmarking

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Table of Contents

Table of Figures

1. Introduction

Transport is an enabler of economic growth in both developing and developed countries. It is useful for policy makers to understand historical trends in fixed capital formation, to make fully informed decisions about future investment.

The aim of this paper is to contextualise Ireland's investment in transport over the long term, and to establish a target range for investment based on historic investment levels and other countries' experiences. The paper will examine the long run trend in land transport Gross Fixed Capital Formation in Ireland since the 1950s and compare Ireland's investment level with developed country averages and with subset of comparable developed countries over the last two decades.

Land transport in this paper refers to road and rail Gross Fixed Capital Formation. Where the conclusions suggest a range of investment levels in the future that may be appropriate, it should be remembered that investment needs for transport depend on a number of factors, such as the quality and age of the existing infrastructure stock, geography of the country and the transport-intensity of the country's productive sector, among other things.

The paper is presented as follows; Section 1 gives a brief introduction and outlines some limitations of the data. Section 2 analyses Ireland's long run levels of investment in road and rail, using CSO and national accounts data from 1953 and 1951 respectively. Section 3 uses International Transport Forum (ITF) data to compare Irish road and rail investment levels with developed country averages since 1995. Section 4 compares Irish road and rail investment against a group developed Western European countries that are ranked highest in the World Economic Forum's most recent Global Competitiveness report 2013-2014[1]. Section 5 presents conclusions.

[1] http://reports.weforum.org/the-global-competitiveness-report-2013-2014/

1.1. Data Sources

Different data sources are used in Section 2 and in Sections 3 and 4, therefore caution is advised in making comparisons between the sections. A comparison between the data sources is provided in Appendix 1.

The roads data used in Section 2 are sourced from the ESRI and CSO, and are based on National Income and Expenditure national accounts (Table 15, Gross Domestic Physical Capital Formation at Current Market Prices). The rail data represent fixed capital formation in railways[2] and are sourced directly from the CSO. These data provide the best picture of Irish land transport investment patterns over the last 60 years.

For the international comparison sections (3 and 4), data are sourced from the International Transport Forum's (ITF) infrastructure investment statistics section[3]. The ITF is a distinct inter-governmental organisation within the OECD family, set up under its own protocol and funded by its member governments. It collects land investment data for 26 countries[4] since 1995. Unfortunately, the national data is collected locally, so direct comparisons between countries are difficult because of methodological differences and differences of definitions and coverage. Therefore, the focus in these sections is not on country-to-country comparisons but on comparisons with regional/OECD averages and Ireland's relative difference.

[2] The World Bank defines gross fixed capital formation to include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways

[3] http://www.internationaltransportforum.org/statistics/investment/data.html

[4] The list of countries considered is contained in Table 3, Appendix 1

1.2. Data Definitions

The roads data in Section 2 refer to gross fixed capital formation (GFCF) at current market prices (Table 15) from the national accounts. Fixed capital formation relates to improvement and new construction, with on-going repair and maintenance work excluded. The rail data have been sourced directly from the CSO. These data include investment in fixed infrastructure (railways and buildings) as well as rolling stock and plant and machinery. Land purchases are not included in the data as these purchases are outside the international definition for GFCF.

CSO have based these figures on returns made by CIE and the RPA, so there are some difficulties with precise definitions. Particularly, data on 'building and construction' fixed assets category for rail. These data include expenditure on all public transport, not just rail, although the purchase of buses is a separate category and has been omitted. Most of the expenditure on CIE building and construction includes upgrades and additions of rail stations that in many cases may serve as bus stations also. Confidence in these figures is enhanced by the CSO's suggested that the building and construction figure is related predominantly to rail investment.

The ITF data for rail infrastructure includes land, permanent way construction, buildings, bridges and tunnels, as well as immovable fixtures, fittings and installations connected with them (signalisation, telecommunications, catenaries, electricity sub-stations, etc.), but does not include rolling stock. It is important to note that the data coverage varies from one country to another. This is mainly due to the lack of detailed common definitions and the difficulty for countries in changing their data collection system. Despite the differences in collection and definition across countries, the ITF database is the most comprehensive and consistent land transport investment time-series data available across countries.

2. Land Transport Investment in Ireland 1951-2012

2.1. Rail Investment

Chart 1 below depicts Irish fixed capital formation in railway infrastructure and rolling stock and machinery since 1951 expressed in constant (2012) prices. The data separated investment into its component parts to demonstrate the main drivers of the headline investment trend. Building and construction has maintained the highest value throughout the period with the exception of 1966 to 1968[5], when investment in rolling stock exceeds the other investment headings.

There are two peaks in rolling stock before 1999, both corresponding to investments in DART (Dublin Area Rapid Transit) rolling stock. The first was the initial purchase of carriages and locomotives when the DART service commenced, and the second in 1994 was to increase DART capacity.

Total investment in 1951 was €13.6m in 2012 prices[6,7] (€737,219 in current prices). Rail investment over the period 1951–1998 fluctuated with significant peaks evident in the 1960s, 1970s and 1980s. However, as is evident from the chart, there was a step change in the levels of rail investment over the last 15 years, with investment peaking at €649 million in 2008.

The period 1951 to 1998 can be characterised by low-levels of investment punctuated by shorter periods of increased investment in railway infrastructure with average investment of €125m (2012 prices) per annum. The period after 1999 saw higher levels of rail investment. Over this period average investment increased to €414m per annum. This is associated with the building of the LUAS light rail system in the early 2000s, investment under the National

[5] During this period Irish rail purchased 60 new diesel rail cars.

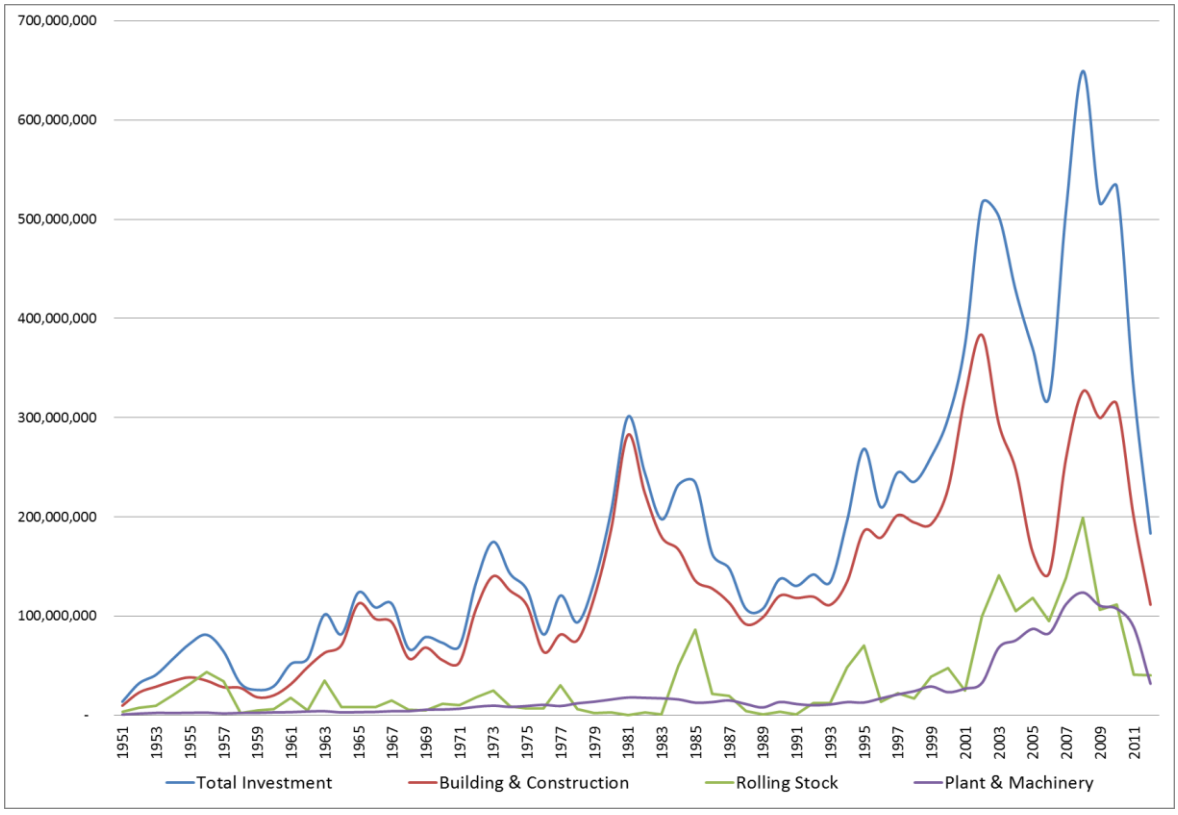
[6] Constant prices: The effect of inflation is taken out. To bring these prices to a constant level, data are adjusted using CSO CPI data. CSO provide a CPI which is based at 1947, we rebased this to 2012 and applied to the long run data.

[7] Rail deflators were sourced directly from the CSO. We have applied specific deflators to each component of rail expenditure; Building and Construction, Rolling Stock and Plant and Machinery.

Development Plan (NDP) 2000-2006, the "Transport 21" investment programme, Kildare Route project, extensive re-signalling, a number of new stations including the new Docklands terminus and the new line and services to the M3 Parkway.

These investment plans were supported by EU structural funds, which contributed to the LUAS light rail development, improvements in the intercity network track and a number of other transport projects.

Chart 1: Investment in Railway Infrastructure (1951-2012), 2012 Prices

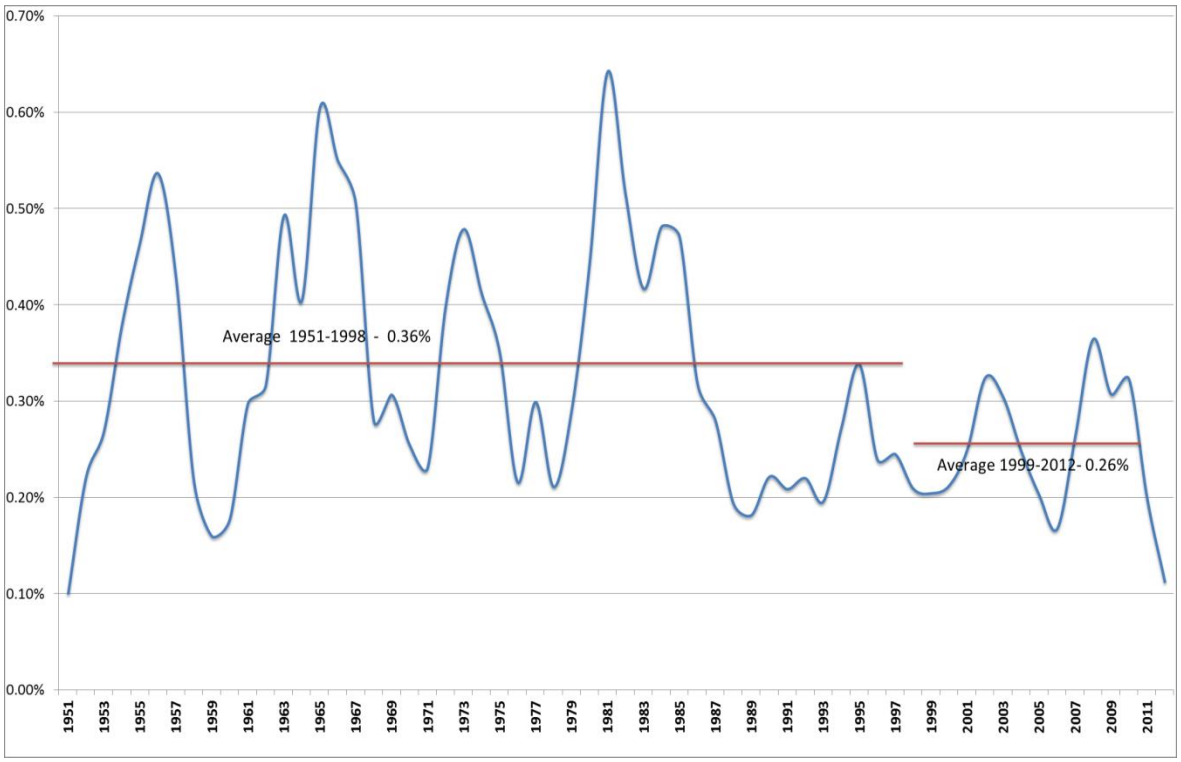


Source: CSO

When total rail investment (infrastructure, buildings, rolling stock and plant and machinery) is examined as a proportion of GDP (Chart 2), we can see that investment ranges between 0.10% and 0.64% from 1951 to 2012, with peaks driven by new infrastructure and rolling stock procurement programmes every decade or so.

Average annual investment as a proportion of GDP in rail from 1951-1998 was 0.31%. In the more recent period (1999-2012), average investment was 0.25% of GDP. For the entire period (1951-2012) average rail investment was 0.31% of GDP. Although rail investment increased significantly in real terms after 1998, this was not the case when measured as a proportion of GDP, as there were periods of significantly higher rail investment as a proportion of GDP in the 1960s, 1970s and 1980s.

Chart 2: Investment in Railways (Building, Construction, Rolling Stock and Plant and Machinery) as a % of GDP (1951-2012), 2012 Prices

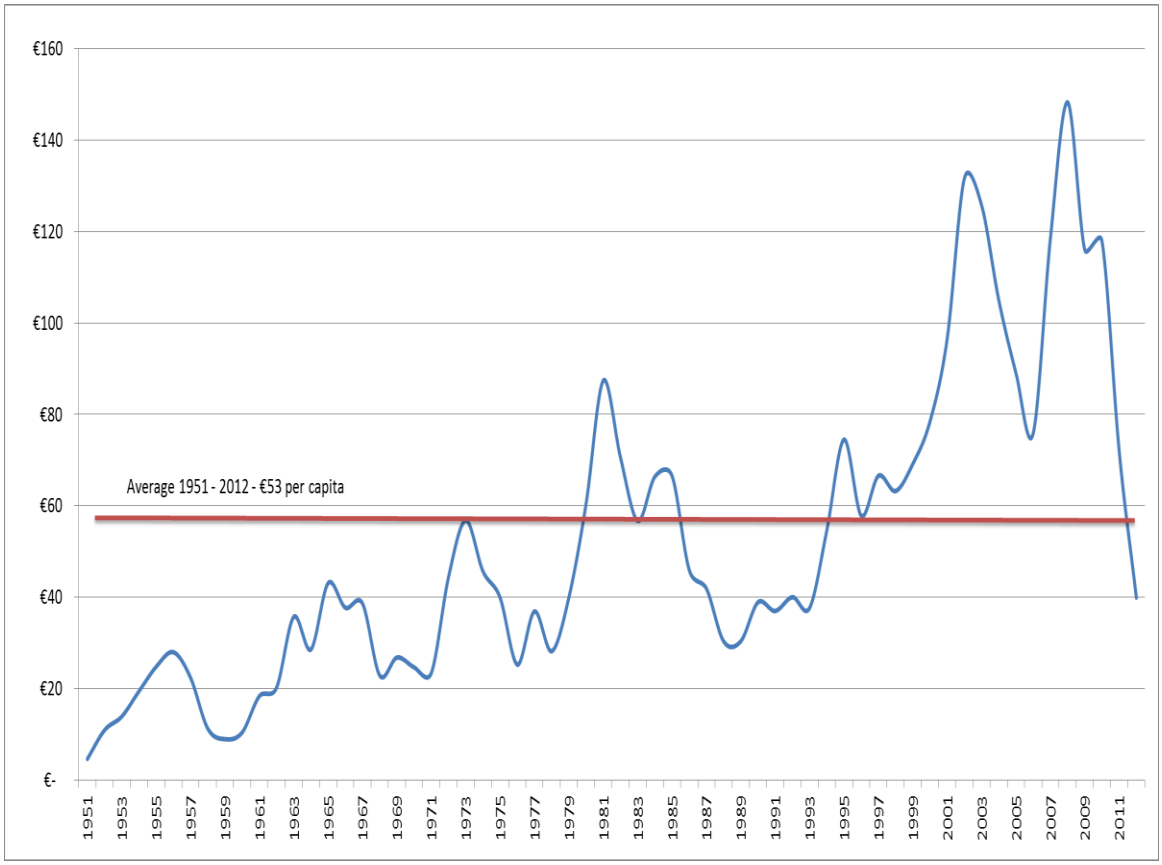


Source: CSO

When rail investment is examined on a per capita basis (Chart 3), a gradual increase in investment over time is evident.

Over the period 1951-1998, average investment per capita was €38 p.a. (2012 prices). Over the most recent period (1999-2012), average investment per capita increased to €99. The peak investment per capita occurred in 2008 at €148. Over the entire period (1951-2012) investment per capita averaged €52 per annum.

Chart 3: Investment in Railways (Building, Construction, Rolling Stock and Plant and Machinery) Per Capita (1951-2012) 2012 Prices



Source: CSO

Rail Investment – Summary

In absolute terms, rail investment increased significantly in the period after 1998, although there was also a major peak in investment in the early 1980s. Although railway investment increased very significantly in absolute terms (and on a per capita basis) in the period after 1999, when examined relative to GDP this period, surprisingly, shows a lower level of investment than the average for 1951-1998.

Investment in railway infrastructure (railways and buildings) demonstrates significant variability over time, as does investment in rolling stock, with significant investment peaks occurring on average once a decade. In a number of years investment levels spiked (1960s,

1970s etc.), driven by new and improved infrastructure, two new urban rail systems (DART and Luas) and rolling stock procurement programmes.

Rail investment (infrastructure, rolling stock and plant and machinery) during the period 1953-2012 averaged 0.32% of GDP.

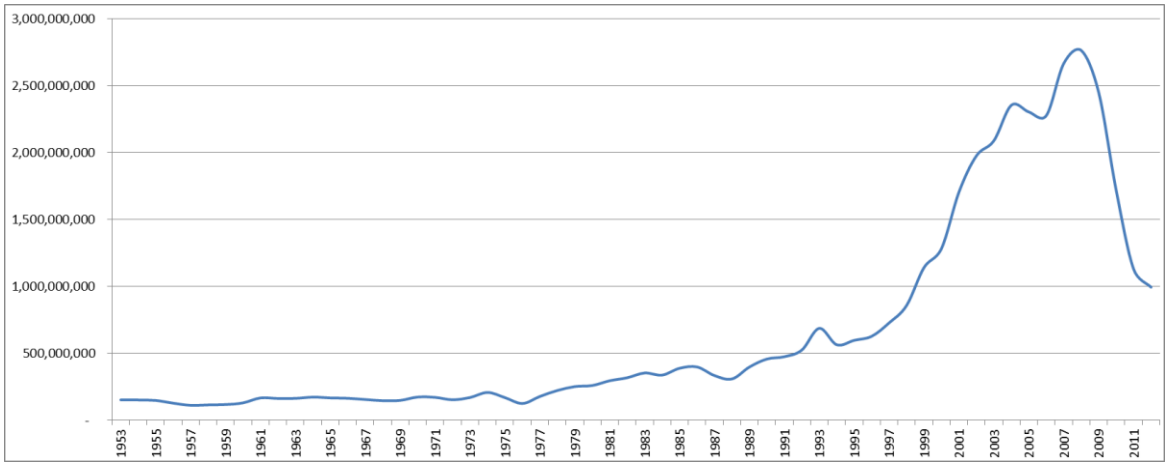
2.2. Road Investment

Chart 4 below shows road investment levels over the longer term in Ireland, from 1953 to 2012. The data are in 2012 prices i.e. the effect of inflation is stripped out.

Road investment levels were very stable in real terms from 1953 to 1976, ranging from €112m to €208m. From 1976, investment began to gradually increase to a peak in 1993. From 1996 investment levels increase rapidly to reach the highest level in state history in 2008.

After 2008, investment decreases rapidly and investment in the most recent year (2012) is back at 1998 levels.

Chart 4: Irish Road Investment (1953-2012), 2012 Prices

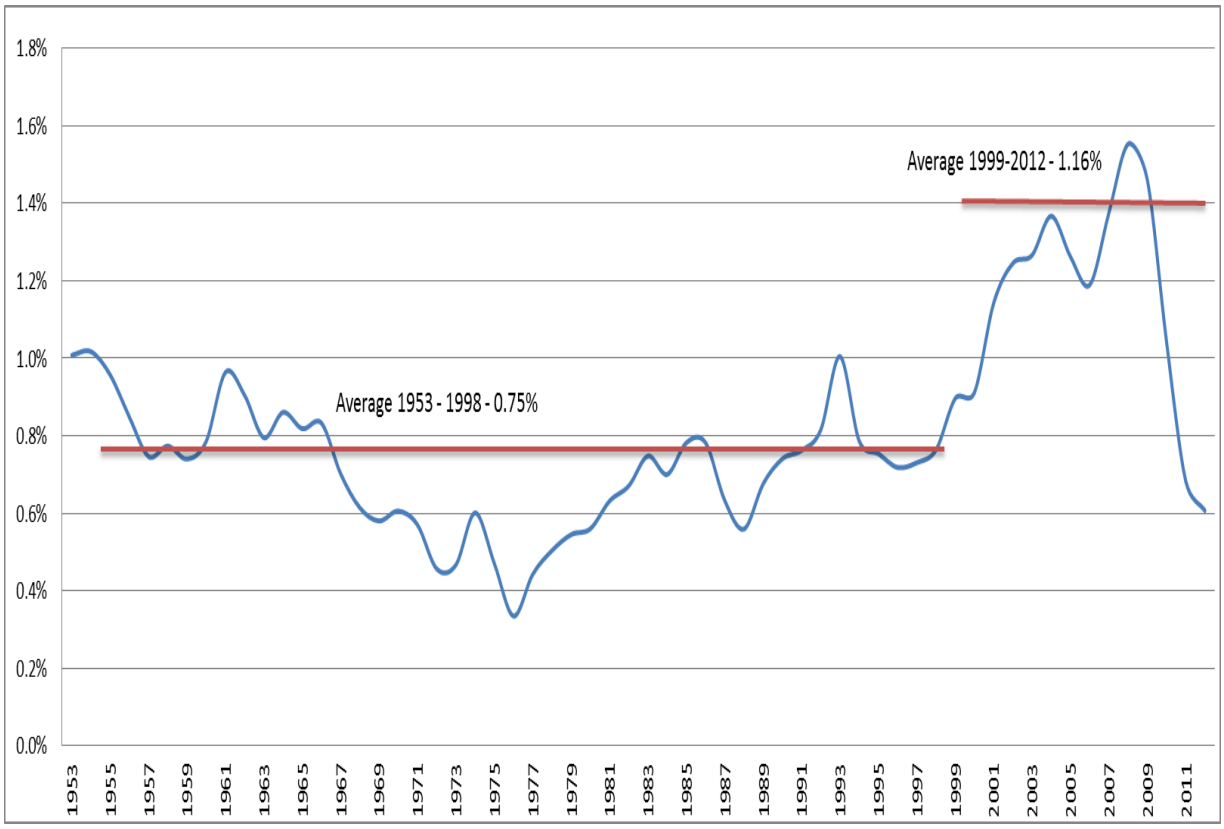


Source: CSO

Chart 5 below shows that road investment as a percentage of GDP has been relatively volatile in Ireland over the past 60, years ranging from 0.33% of GDP in 1976 to 1.55% in

2008. It also shows that a step change in investment occurred around 1999, and there followed 10 years of historically elevated investment. Over the period 1953 to 1998, annual road investment averaged 0.71% of GDP. However, in the period 1999-2011, road investment averaged 1.14% of GDP, although in the last couple of year's investment levels have been returning to historical norms.

Chart 5: Irish Road Investment as a % of GDP (1953-2012), Current Prices

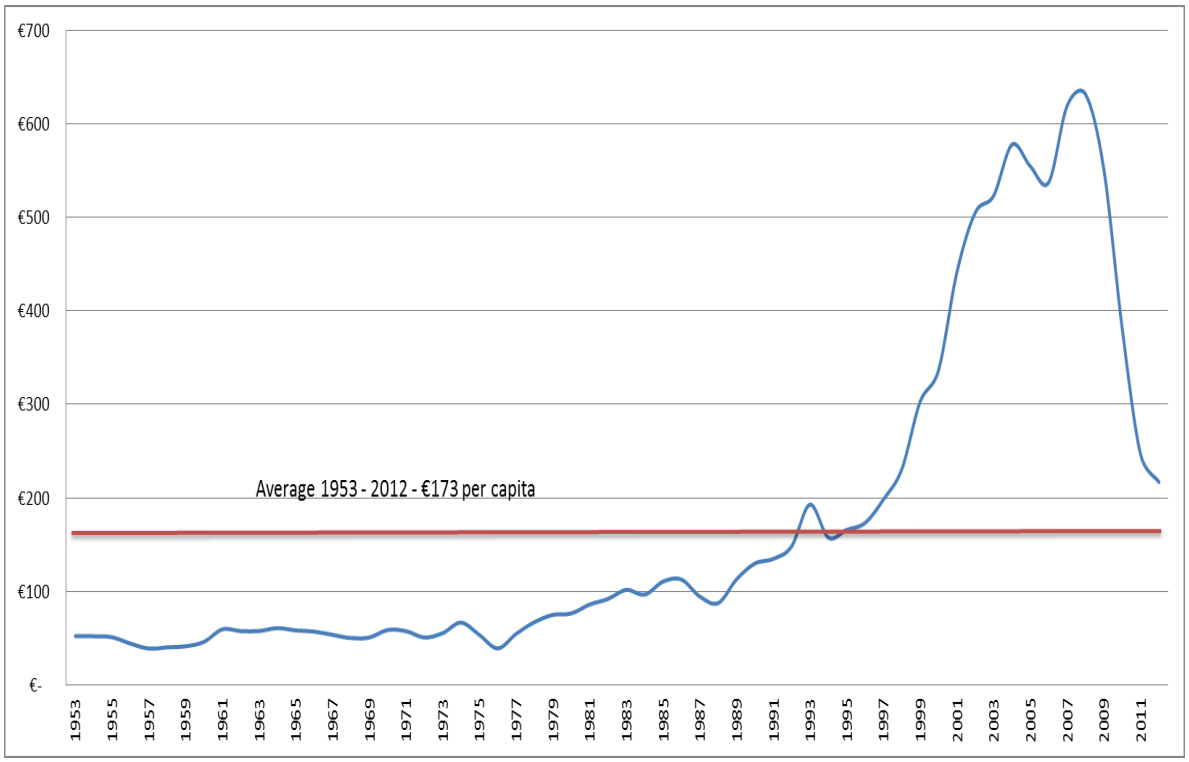


Source: CSO

The increase in resources dedicated to road investment in the 2000s is even more evident when examined on a per capita basis (Chart 6). Between 1953 and 1976, road investment per capita was stable in real terms, ranging between €39 and €67 per capita (2012 prices). Investment per capita then began to increase slowly from 1976 onwards, reaching €193 in 1993(2012 prices). After 1993, road investment per capita increased very rapidly, as real incomes per head rose in Ireland, peaking at €632 per capita in 2008.

Long run Irish road investment per capita is €173 (2012 prices). Investment was below €102 per person from 1953 to 1983. From 1983 to 2003, investment per capita increased on average by 10% per year. Investment declined slightly in 2005 and 2006 and then increased to its highest rate in 2008 (€632). From 2009 to 2012, investment per capita declined again and the most recent figures indicate investment per capita has returned to 1998 investment levels. For the most recent period (1999-2012) average investment per capita was €459 per annum.

Chart 6: Irish Road investment per capita (1953-2012), 2012 Prices



Source: CSO

Road Investment – Summary

The section has examined road investment patterns in Ireland since 1953 in real terms as well as relative to GDP and population. Road investment in real terms remained stable between 1953 and the mid-1970s, before increasing gradually throughout the 1980s and early 1990s, and then increasing rapidly from the late 1990s onwards.

When presented as a proportion of GDP, road investment levels over the period occupy a narrower range, albeit with significant year on year fluctuations, as periods of higher national income allowed greater diversion of resources to public capital programmes. Unlike rail, investment in road as a proportion of GDP increased from the late 1990s onwards, and was significantly above the long run average during this period. Average investment as a percentage of GDP over the full period 1953-2012 was 0.81%. From 1953-1999 average investment was 0.71% of GDP and average investment in the most recent period (1999-2012) was 1.36% of GDP.

Examining investment levels on a per capita basis, the pronounced increase in the resources diverted to the roads from the late 1990s becomes even more apparent as real investment levels become a multiple of the long run averages.

2.3. Combined Land Transport Investment (Road and Rail)

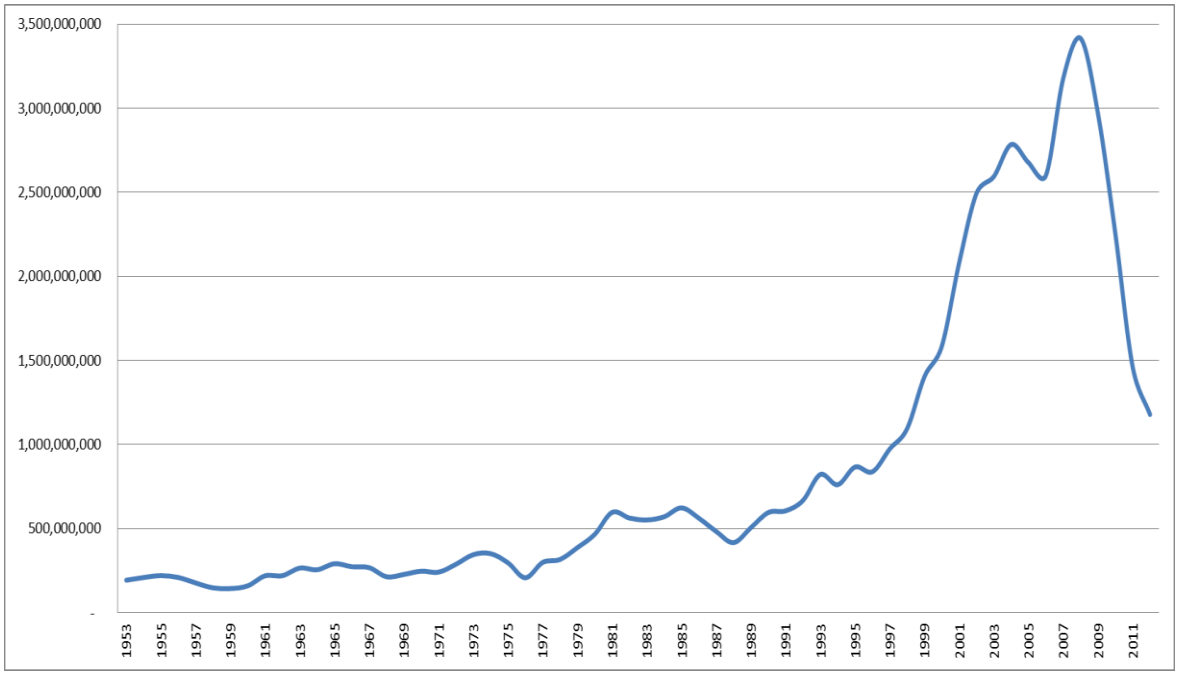
Long run investment in both modes (rail and road) is illustrated in Chart 7 below. The average annual (1953-2012) investment over both modes was €865m (2012 prices).

From 1953 to 1978, land transport investment was comparatively stable, ranging from €143m to €386m per annum (average €241m). However, investment increased steadily in real terms from the mid-1970s. From 1974 to 1985, land transport investment grew at an annual average rate of 7% in real terms (from €351m in 1974 to €623m in 1985). A sharp dip in investment occurred between 1986 and 1988. Between 1989 and 1996, investment grew at 8% per annum.

Between 1997 and 2002, land transport investment grew at an unprecedented 21% per annum. Land transport investment peaked in real terms in 2008 at €3.4bn. Between 2009 and 2012, investment fell by 60%, and has now returned to 1998 levels in real terms.

Over the period 1999-2012, land transport investment averaged €2.3bn per annum.

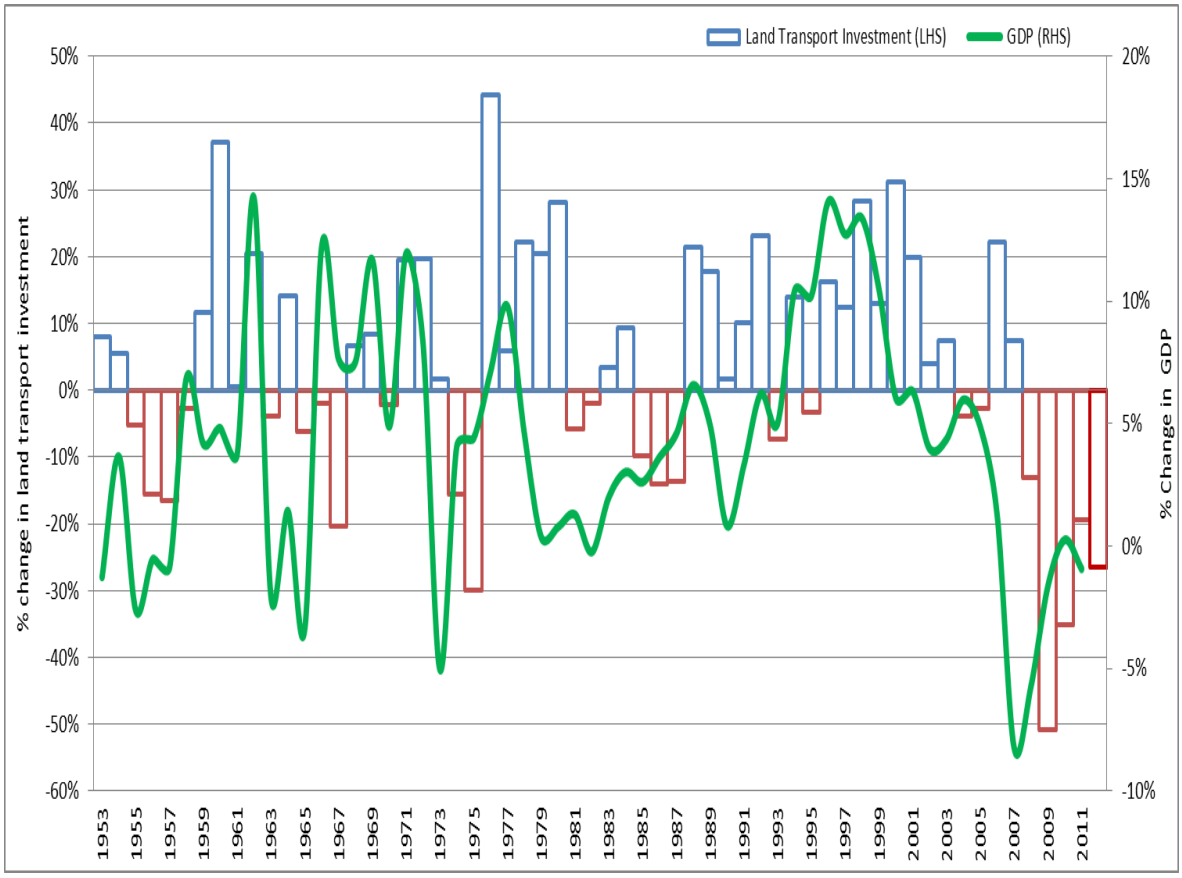
Chart 7: Long Run Road and Rail (Combined) Transport Investment (1953-2012), 2012 Prices



Source: CSO

Chart 8 illustrates the annual growth rate in land transport investment over the period 1953-2012. The volatility of annual spending decisions regarding transport investment is evident, with almost as many years of negative growth rates as positive growth rates. This Chart illustrates the pro-cyclicality of land transport investment budgets in Ireland over a sixty-year period.

Chart 8: Annual Rate of Growth in Real Transport Investment and GDP (1953-2012), 2012 Prices

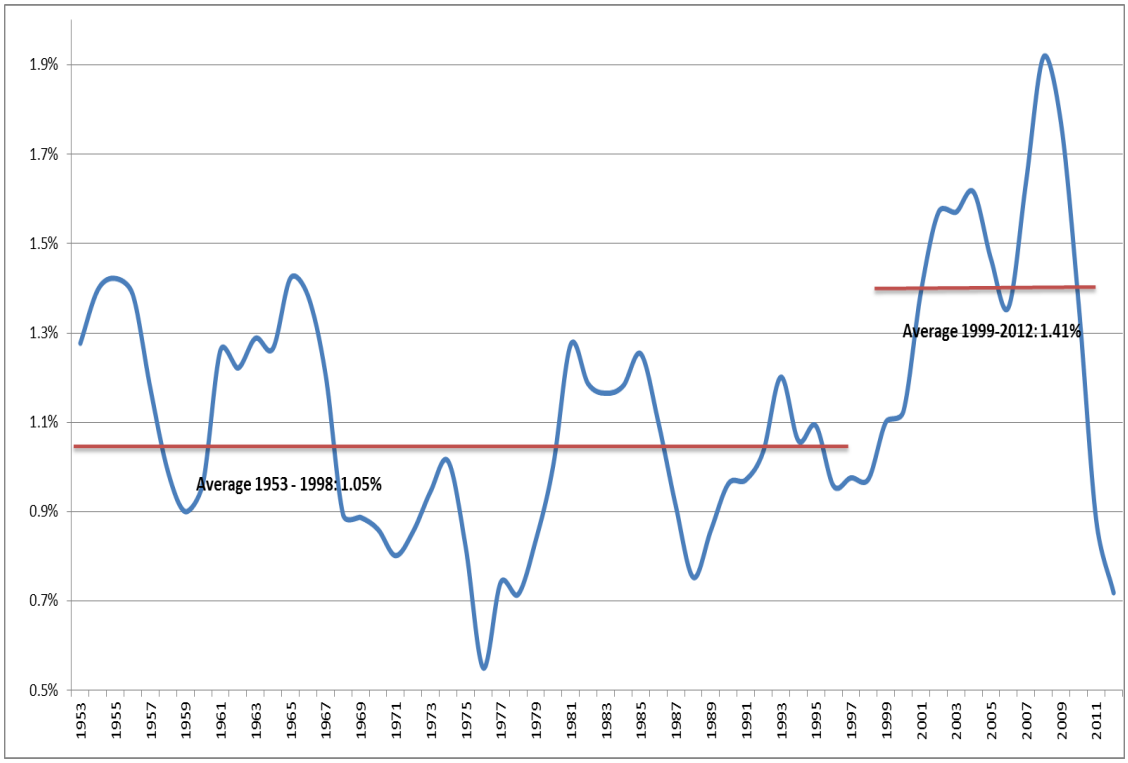


Source: CSO

Chart 9 below shows land transport investment as a percentage of GDP over the last 58 years. Transport investment as a percentage of GDP in the 1950s was relatively high: from 1953 to 1957, investment was over 1.33% of GDP. After this investment levels vary through the 1960s, 1970s and 1980s, decreasing to their lowest level in 1976 (0.55%). Investment recovers in the late 1970s until 1981 when it again declines for a couple of years. From 1999 onwards, investment grew steadily, peaking in 2008 at 1.9% of GDP.

Over the period 1953-1998 the average investment rate was 1.05% of GDP. However, in the period 1999-2012 annual investment was 1.39% of GDP. The long run average level of transport investment over the 58-year period (1953-2012) was 1.13% of GDP.

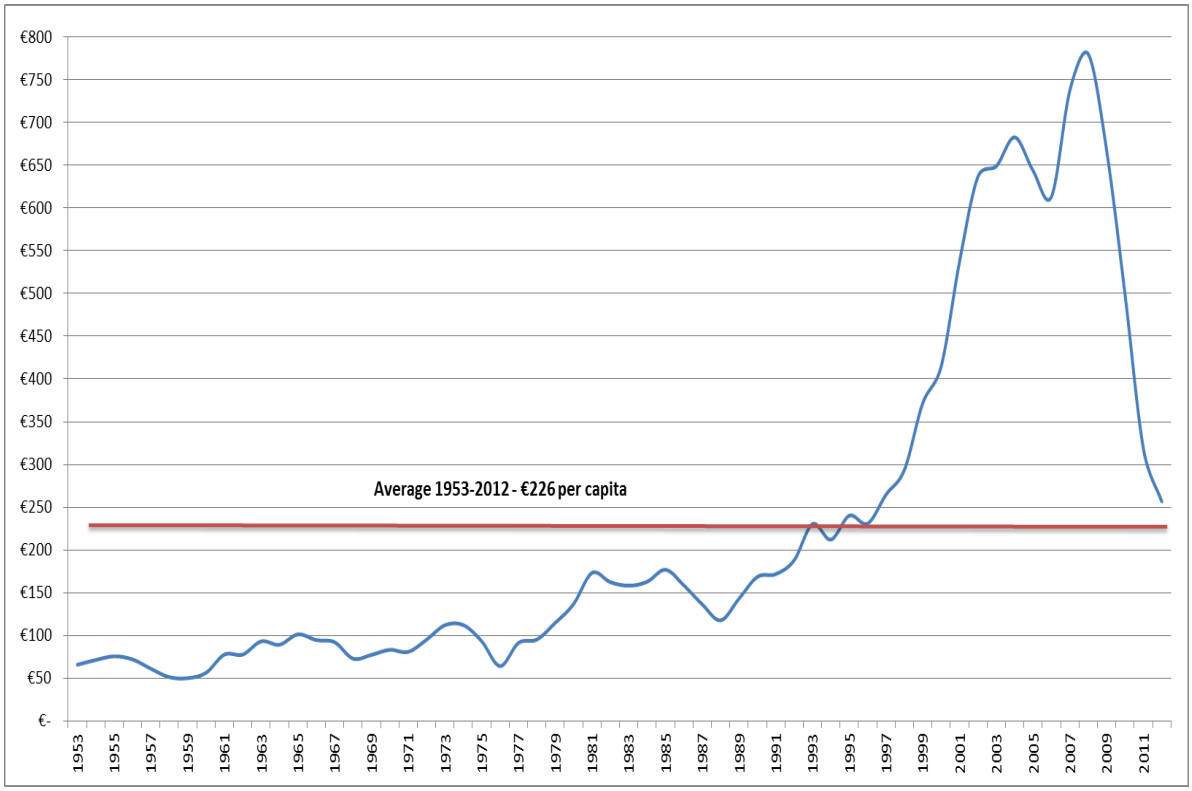
Chart 9: Combined transport investment as a % of GDP (1953 – 2011), 2012 Prices



Source: CSO

Turning to Chart 10 below, land transport investment per capita was relatively stable from 1953 to 1976 (ranging from €50 to €112, average €80 p. a.). The first period of growth on a per capita basis is evident from 1976 (€64) to 1985 (€177). Following a decrease between 1986 and 1988, investment per capita thereafter increased rapidly, reaching a peak in 2008 at €780. As in the previous charts, there was a rapid decline between 2008 and 2012.

Chart 10: Land Transport investment per Capita (1953-2011), 2012 Prices



Source: CSO

Land Transport (Road and Rail) - Summary

Investment in land transport in Ireland (road and rail) was relatively stable in real terms between 1953 and 1978, averaging approximately €242m per annum in 2012 prices. However, after this, transport investment began to grow in real terms, as the wealth of the country increased. From 1986 to 1988 however, land transport investment declined in real terms. Transport investment expanded massively in real terms from the late 1990s onwards. Between 1997 and 2002, transport investment grew by an average of 21% per annum, to peak at €3.4bn in 2008. Between 2009 and 2012, investment fell by 60%, and in 2012 was back at the level of 1998.

When measured as a proportion of GDP, land transport investment displays much volatility from year to year, and appears to be relatively pro-cyclical in terms of the business cycle. From the 1950s to the 1990s, transport investment as a proportion of GDP is volatile, but is

generally in the range 0.6% to 1.4% of GDP. In the late 1990s, investment as a proportion of GDP begins to climb steadily, and the 10-year period 1999-2009 is characterised by investment levels that are significant higher than historical norms (1.5% versus 1.13%)

From 2008 land transport investment as a share of GDP began to fall rapidly so that by 2012 it was below the long run average over the period (0.72% versus 1.13%of GDP).

Table 1 summarises the historical average levels of investment for road, rail and total land transport. The table reports the long run average level of investment over the period 1953-2012, as a proportion of GDP and GNP, and per capita. It also reports the investment level for the most recent year available, 2012.

For combined land transport, this long run average stands as 1.13% of GDP, and €226 per person in 2012 prices. Transport investment ramped up massively in the period post 1999 and the average for this period is provided seperately (1.39% of GDP and €558 per capita). In the period before 1999 (1953 – 1998) investment as a proportion of GDP was lower and more volatile relative to the more recent period. Average GDP investment for this period (1953 – 1998) was 1.05% and per capita investment, in constant prices, was €125 per person.

Table 1: Summary of Land Transport Investment Levels in Ireland

	1953-2012	1953-1998	1999-2012	2012
% of GDP				
Railways (infrastructure, rolling stock, and plant and machinery)	0.32%	0.34%	0.25%	0.11%
Roads	0.81%	0.71%	1.14%	0.61%
Total Land Transport	1.13%	1.05%	1.39%	0.72%
% GNP				
Railways (infrastructure, rolling stock, and plant and machinery)	0.34%	0.35%	0.30%	0.14%
Roads	0.88%	0.73%	1.36%	0.75%
Total Land Transport	1.22%	1.08%	1.65%	0.89%
Per Capita	€	€	€	€
Railways (infrastructure, rolling stock, and plant and machinery)	53.12	39.20	98.87	39.94
Roads	172.91	85.89	458.85	216.86
Total Land Transport	226.04	125.09	557.73	256.80

Investment Share Versus Mode Share

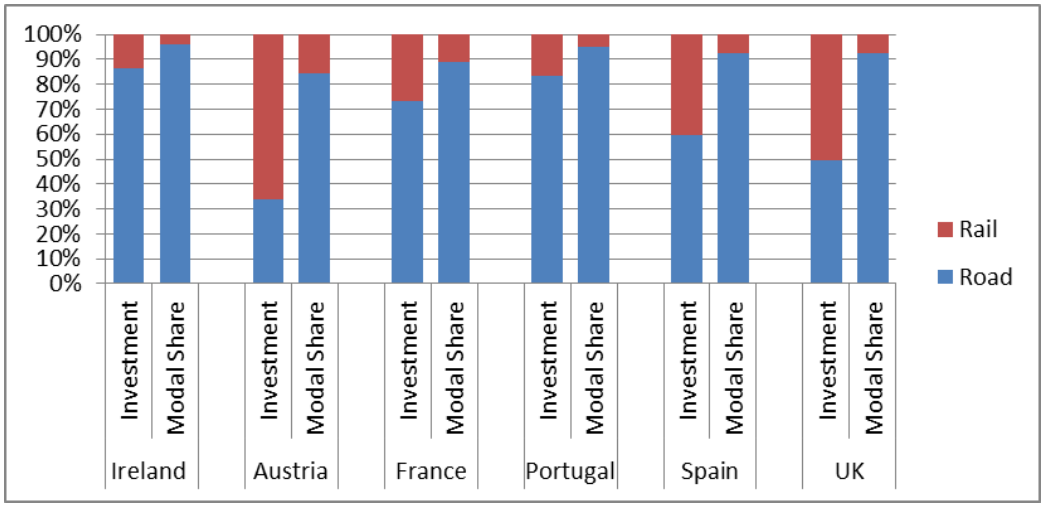
OECD countries, particularly those in Western Europe, have been investing an increasing share of land transport budgets in rail. The share of rail investment has increased from 15% to 23% for the OECD from 1995 to 2010[8]. In Western European countries, the share of investment in rail infrastructure has increased steadily from around 20% in 1975 to 40% in 2010. The increasing share of rail investment in Western Europe countries is a reflection of

[8] International Transport Forum (ITF) (http://www.internationaltransportforum.org/statistics/StatBrief/2012-06.pdf)

political commitment to the development of railways, driven by sustainability and economic efficiency arguments.

Over the period 1953 to 1998, according to CSO data rail's share of land transport investment in Ireland averaged 32%. However over the period 1999-2012 this dropped to 18%. Chart 11 below illustrates how the share of invesment for road and rail compares to their mode shares for a selection of European countries[9]. It can be seen that for each of these countries rail recieves a disproportionate share of investment, relative to its mode share. There is a closer match in Ireland between investment levels and mode share in road and rail, compared to Austria and the UK, where rail recieves a much larger share of investment. This seems to support the view that transport policy has prioritised rail investment in many European countries.

Chart 11: Investment share and mode share for European Countries



Source: European Commission

[9] Data are taken from *EU Transport in Figures, Statistical Pocketbook 2011*, European Commission.

3. Irish land transport investment compared to a developed country average

3.1. Introduction

The previous section reviewed Ireland's Investment in road and rail Transport since 1953, using CSO data on Gross Fixed Capital Formation (GFCF). This section will compare Irish investment to a 21 county (developed country) average. The aim is to contextualise investment levels through examining how they compare to other countries over time.

Data in the following sections come from the OECD International Transport Forum (ITF) database on transport forum investment. These data cover the period 1995 - 2010 for 49 countries, although some countries have not reported in particular years (i.e. Irish data for rail GFCF is not reported for 2008-2010). The details of which countries have not reported data in particular years is provided in Appendix 1. While non-reporting of data for countries, creates its own issues, this database is the only consistent source of historical transport investment data for a panel of countries.

A subset of 21 developed countries were chosen based on a *developed* countries list provided in the Statistical Annex[10] of the UN report "World Economic Situation and Prospects 2013", new EU countries as described in report have been omitted from the developed country metric as presented below due to the historically large investment sums associated with new entrants to the EU. Countries included in the developed country metric are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States.

Table 3 in Appendix 1 compares the investment levels for the different categories of transport for Ireland as represented in CSO and ITF data. The notes accompanying the ITF data indicated it does not include urban roads for Ireland. In the ITF data 65% of counties

[10] Available at: http://www.un.org/en/development/desa/policy/wesp/wesp_current/2013country_class.pdf

report data on urban spending, while these data are missing for the remaining countries. The ITF data do not include investment in rolling stock[11].

3.2. Land Transport Gross Fixed Capital Formation

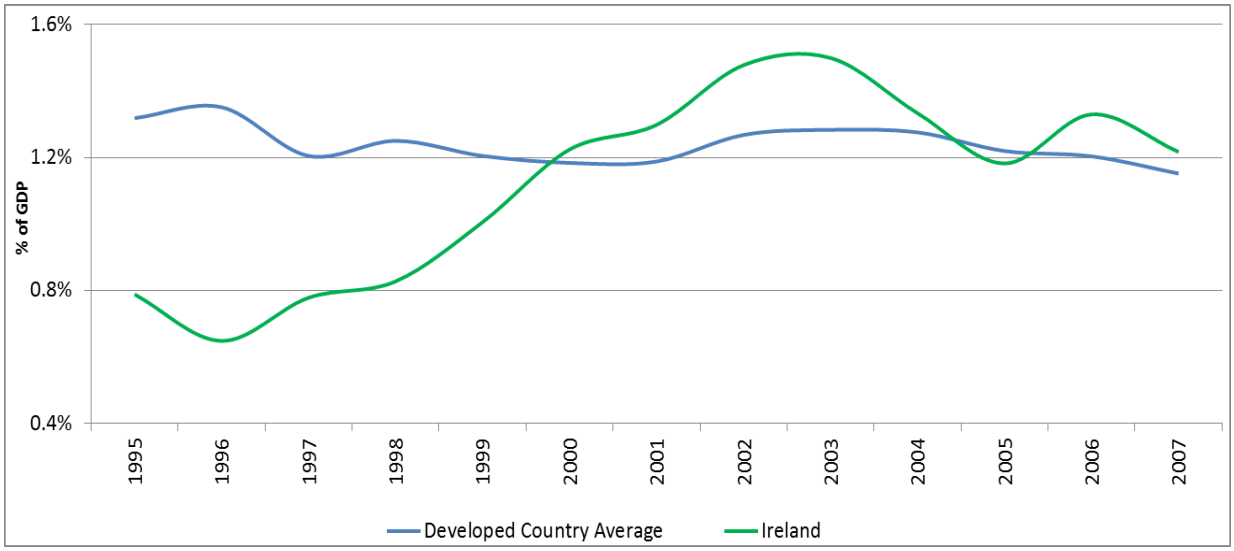
This section will examine how Ireland compares to the developed country under the combined heading of road and rail investment the results below show the real expenditure on transport infrastructure as a proportion of GDP within these countries. The analysis is limited to 1995-2007 as there is no rail data for Ireland in the ITF dataset for 2008-2010.

Over the period 1995-2007, it is evident that Irish land transport investment as a proportion of GDP was above the developed country average from 1998 to 2007. Irish investment lagged behind the developed country average from 1995-1998, post 1998 investment peaked at 1.5% of GDP in 2003 and then declined to 1.18% in 2005 before increasing slightly to 1.22% of GDP in 2007.

Average investment for the developed countries was of 1.23% GDP over the time period, compared to Irish investment of 1.12% of GDP.

[11] Understanding the Value of Transport Infrastructure: Guidelines for Macro-Level Measurement of Spending and Assets, 2013; International Transport Forum, OECD.

Chart 12: Irish and developed country Road and Rail Investment as % of GDP (1995-2007)

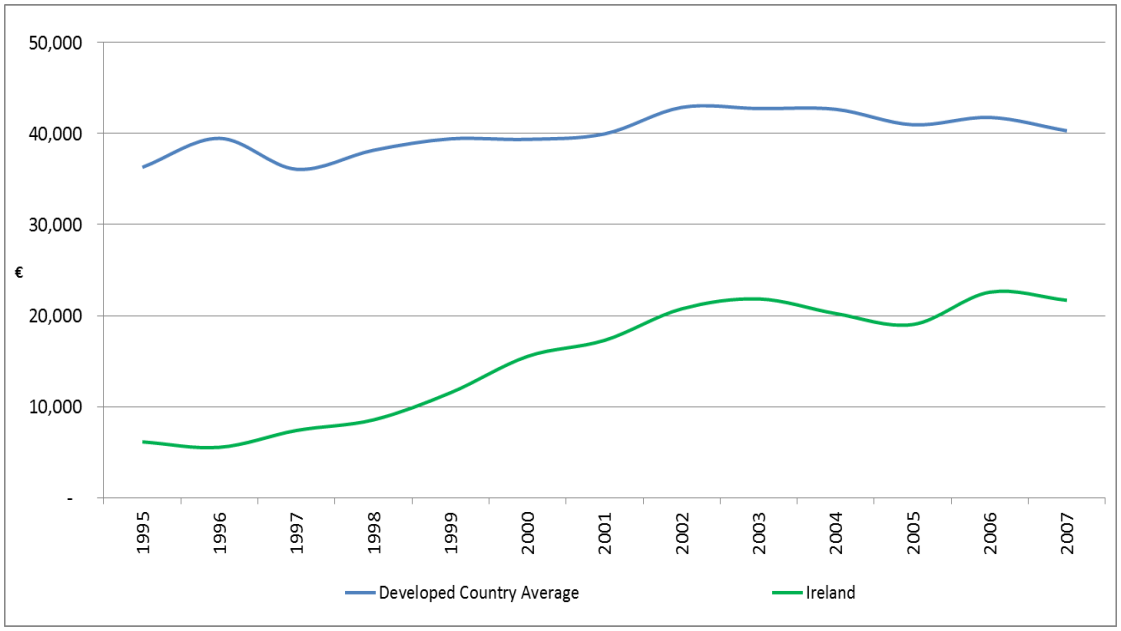


Source: OECD

Chart 13 suggests that Irish investment relative to the size of the country has been well below the developed country average over the period 1995-2007. Irish average investment per km^2 was €15,231 while the developed country average investment per km^2 was €40,019 – excluding Japan the largest spending country the average investment is €33,820[12]. Developed country investment per unit area has been converging slowly since the late 1990s as Irish investment levels have grown more quickly than the developed country average. By 2007, Ireland's investment per km^2 at €21,686 was 54% of the developed country average investment levels.

[12] Investment per km² in Japan is extremely high (average investment 268,741 per annum). Japan has adopted a policy of heavy investment in infrastructure in an attempt to inject demand into its flagging economy, and there is evidence of over investment in infrastructure in Japan.
http://www.nytimes.com/2009/02/06/world/asia/06japan.html?pagewanted=all&_r=0 and
http://www.reuters.com/article/2013/02/21/us-japan-construction-idUSBRE91K1BM20130221

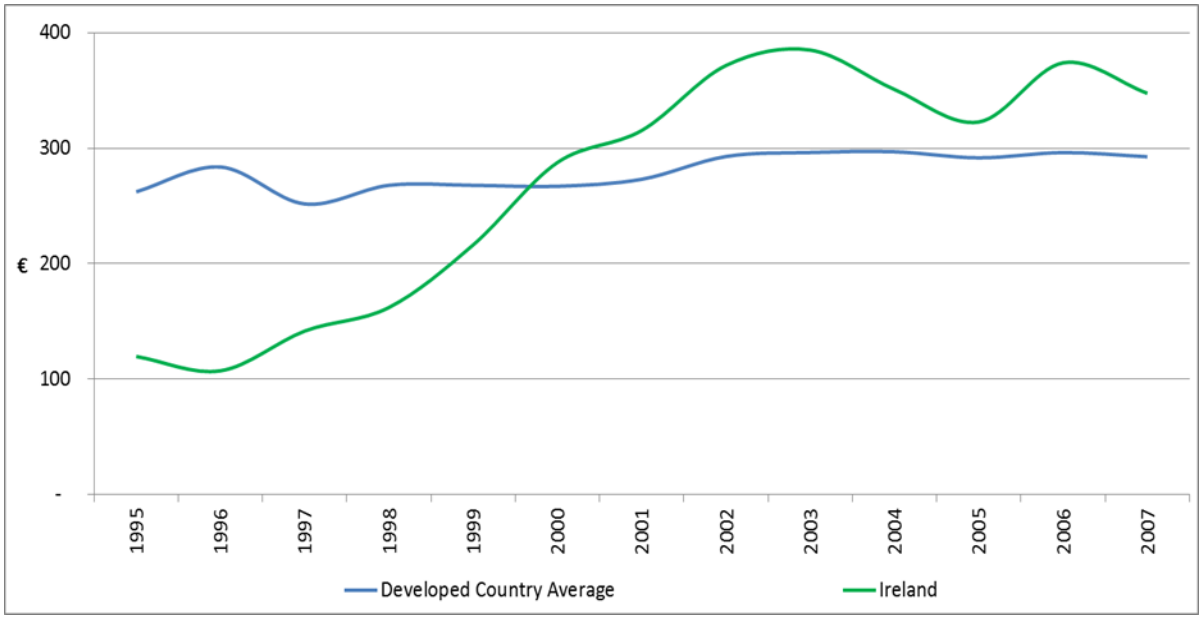
Chart 13: Irish and developed country Road and Rail investment per km^2, constant euro



Source: OECD, World Bank

Chart 14 below illustrates land transport infrastructure per capita. Irish investment per capita up to 1998 (average investment 1995-1997: €123 per capita) was relatively low and below the developed country average, over the same period, of €266 per capita. However, post 1997 Irish investment per capita increased above the developed country average, from 1998 to 2007 Irish average investment per capita was €313 per capita whereas developed country investment was €217 per capita. For the full period (1995-2007), developed country average investment was €281, whereas Irish average investment was €269.

Chart 14: Irish and developed country investment per capita, constant euros



Source: OECD

3.3. Summary – Developed country land Transport Comparisons

Using ITF data, Irish land transport investment as a share of GDP and per capita has been above the developed country average over the period of 1995 -2007. Irish investment as a proportion of GDP was significantly below the average in 1995, but increased to 1.5% of GDP in 2003, then falling below the average for 2005 before slightly increasing above the average for the final two years of the analysis.

From 1995-2007, average investment as a proportion of GDP (1.1%) was below the developed country average of 1.2% and the same is true for investment per capita in Ireland (€269) compared to developed country average (€280). When measured by land area, Irish investment per km^2 was also below the developed average (€40,019 or €33,820 excluding japan) for all years considered.

Given the rapid declines in real road investment in Ireland since 2008 it is likely that Irish investment as a proportion of GDP have declined significantly below developed country average levels of investment in the period since 2007.

4. Irish land Transport Investment compared to highly competitive developed countries

4.1. Introduction

This section compared land transport investment levels in Ireland to a selection of developed countries. The countries have been chosen based on their ranking in the Quality of overall infrastructure table in The Global Competitiveness Report 2013-2014[13], the countries that will form this part of the analysis are Switzerland, Finland, Austrian and France[14].

4.2. Land Transport Fixed Capital Formation

Irish investment as a proportion of GDP is compared to the top ranking developed countries in the World Economic Forum's Competitiveness report 2013-2014, in chart 15 below. While average Irish investment was 1.12% over the period (1995-2007), Swiss investment (the highest for the group) was 2.55%. Finnish average investment was 0.88% while average investment in France over the period was 1.22%. Infrastructure investment peaked form most countries in 2003 or 2004.

Over the period Ireland's investment level was below the average for all years except, 2002 and 2003 when Irish investment marginally exceed the average. Overall average Irish investment was 83% of the average.

[13] Available at: http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf

[14] WEF ranking: Switzerland - 2, Finland - 3, France - 6 and Austria - 8

Chart 15: Irish and highly competitive Western European land transport investment as a % of GDP

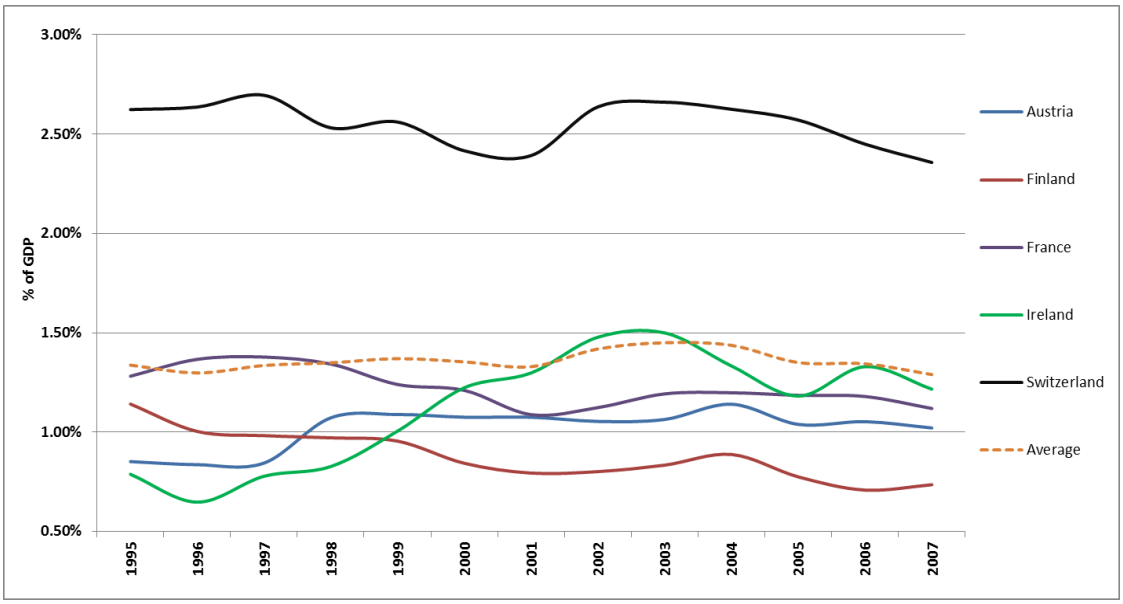
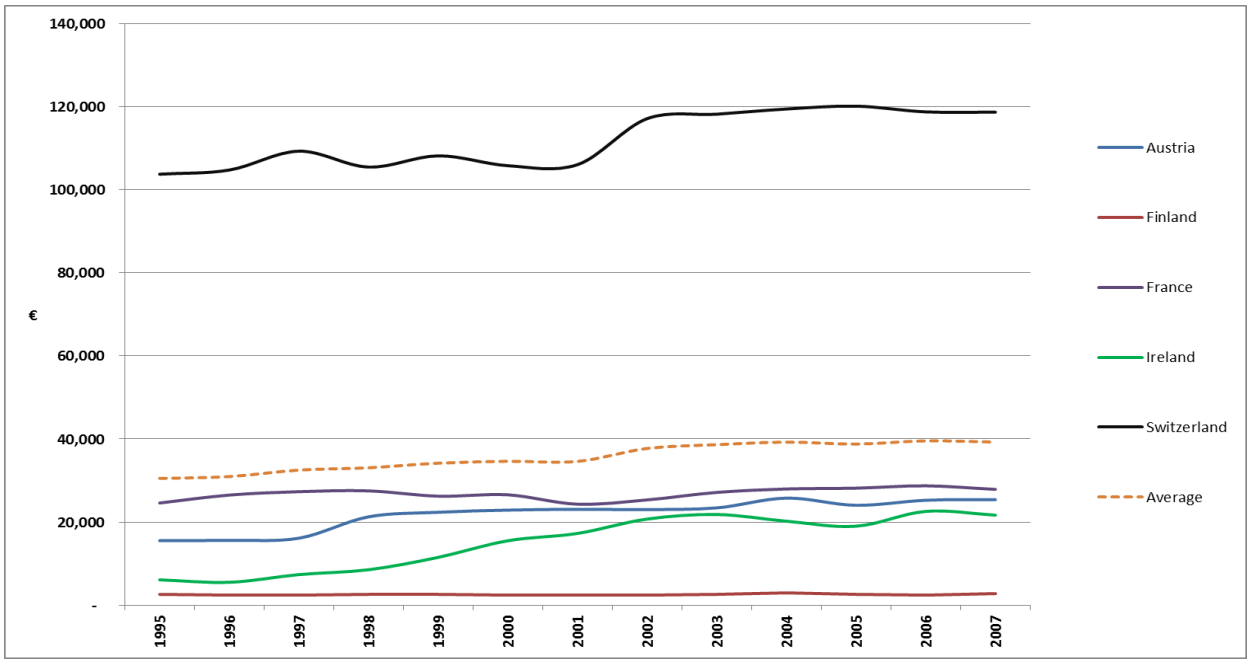


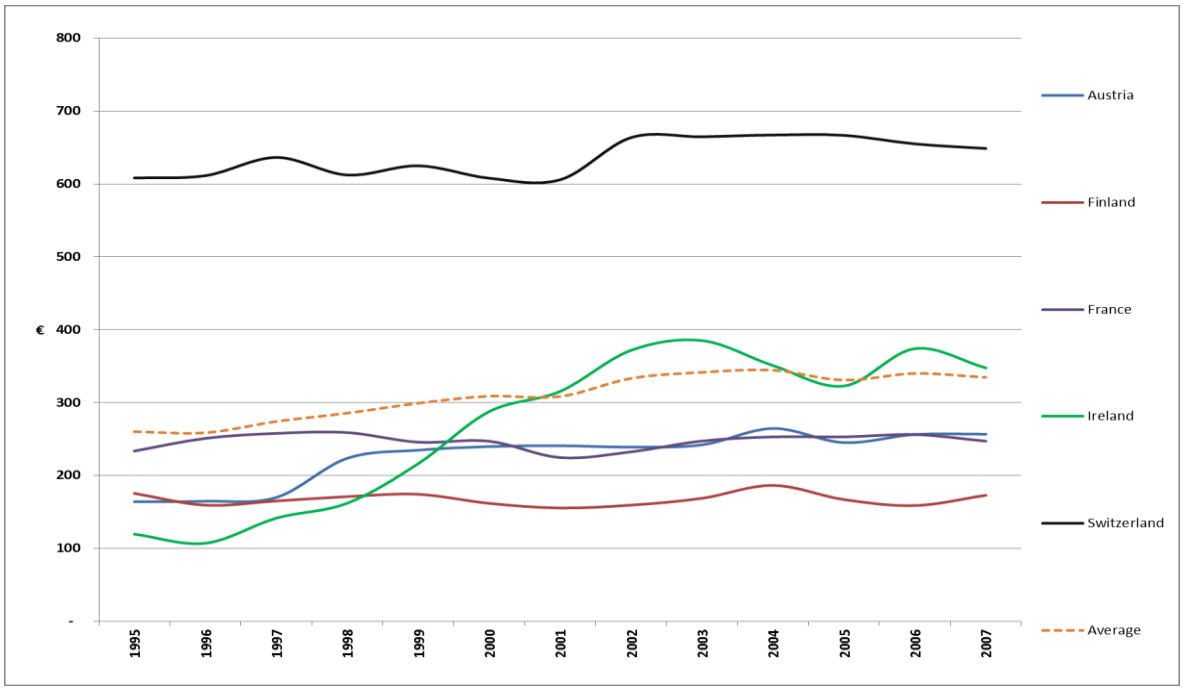
Chart 16 below shows transport investment per unit area, in terms of investment per km^2. All countries show a net increase in the amount of transport investment per km^2 between 1995 and 2007. Average investment for all countries is €309 per capita compared to Irish average investment of €269.

Chart 16: Irish and Western European land transport investment per km^2



When examined on a per capita basis (Chart 17 below), Ireland has, from a low base invested the second highest share in infrastructure over the period. The average level of investment per capita from 1995 to 2007 was €309, compared to €269 for Ireland.

Chart 17: Irish and Western European land transport investment per capita



Investment per capita can be separated into two periods. The first is 1995 – 2002, during which Ireland had a very high investment growth rate per capita averaging 21% growth per year. The second period is (2003-2007) when Irish average investment per capita declined by 1% per year.

4.3. Conclusions - Developed Western European countries with high infrastructure quality

From the analysis above, there are a number of significant messages. When compared to a number of comparator countries, Ireland has invested less as a percentage of GDP in land transport since 1995. Although Irelands investment grew as a portion of GDP in the late 1990's and early 2000s investment levels drop below the average in 2007 and these are likely to have receded even further with capital allocations to transport declining significantly post 2008. The message of underinvestment is reinforced when examined on a unit area basis. However, when examined on a per capita basis, Irish investment levels are more comparable to Western European norms, averaging slightly below the average of the five countries over the period.

5. Conclusions

As a proportion of GDP, Ireland invested 0.32% in rail on average between 1953 and 2012. There are peaks in rail investment every couple of decades, often driven by new rolling stock procurement programmes. In absolute terms, rail investment in Ireland grew very significantly after 1999. However, this increase in rail investment was driven by increases in national income and GDP, and investment in rail as a proportion of GDP actually fell over the period 1999-2012, to 0.25%. This is in contrast to most Western European countries where rail's share of land transport investment has been increasing, and now stands at 40%, compared to approximately 18% for Ireland.

In contrast to rail, Ireland's level of investment in roads has increased over time as a proportion of GDP. Road investment in real terms remained constant between 1953 and the mid-1970s, before increasing gradually throughout the 1980s and early 1990s, and then increasing rapidly from the late 1990s onwards.

Over the period 1953-2012 Irish investment in land transport (road and rail) ranged from 0.6% to 1.9% of GDP, with the long run average being 1.13%. The average for the period 1953-1998 was 1.05%, which rose significantly to 1.39% in the period 1999-2012. This was driven by increases in road investment rather than rail during this time. However, by 2012, investment had dropped to 0.72% of GDP, and has fallen further since.

According to the ITF, since the 1990s land transport investment in Western European countries has remained relatively constant between 0.8% and 1.0% of GDP. For Western European countries the investment share of GDP declined steadily from 1.5% in 1975 to 1% in 1982, after which it levelled off. However the ITF cautions against setting a rigid target for land transport investment as a share of GDP, as there is no theoretical basis for it, and transport investment needs depend on a number of factors, such as the quality and age of the existing infrastructure, geography of the country and the transport intensity of the country's productive sector among other things.

Significant volatility is evident in annual spending decisions on road and rail investment in Ireland since the 1950s, with large changes in allocations from year to year. This illustrates the pro cyclicality of land transport investment budgeting in Ireland over a sixty-year period.

Using the ITF data, Irish land transport investment as a share of GDP or per km² has been below a selection of highly ranked developed country average. Over the period 1995-2007, average investment as proportion of GDP in Ireland (1.1%) was below the developed country average of 1.2%. The same is true for investment per km² in Ireland, which in Ireland averaged €15,231, compared to developed country average of €40,019 (€33,820 when Japan is omitted).

When measured on a per capita basis, however, Irish investment averages are above the developed country average. Irish average investment per capita is €269 whereas OECD investment is €280 per capita over the time period 1995-2007. Given the rapid declines in real road investment in Ireland since 2008 it is likely that Ireland's per capita investment levels have converged to the developed country average in the period since 2007.

When compared to a small group of Western European that achieve high rankings in the WEF Competitiveness report specifically for infrastructure competiveness (Switzerland, France, Austria and Finland), Ireland invested less in land transport as a proportion of GDP over the period 1995-1999, post 1999 Irish investment is comparable with the average GDP investment for these highly ranked countries. Over this period 1995-2007, Ireland's investment levels were 83% of the average for this group of countries.

Appendix 1

Comparison of CSO and OECD/ITF Data on Transport Investment

Table 3 below compares Irish transport investment levels as a percentage of GDP as represented in the CSO/National Accounts data and in the International Transport Forum (ITF) data. There are likely to be significant differences in definitions and methodologies between both organisations. The ITF does not include urban road infrastructure data for Ireland, whereas the CSO data contains all gross fixed capital formation in roads. For rail data the ITF data includes land, permanent way constructions, buildings, bridges and tunnels, as well as immovable fixtures, fittings and installations connected with them (signalisation, telecommunications, catenaries, electricity sub-stations, etc.), but it does not include rolling stock. CSO data includes capital stock of fixed assets[15] as well as rolling stock.

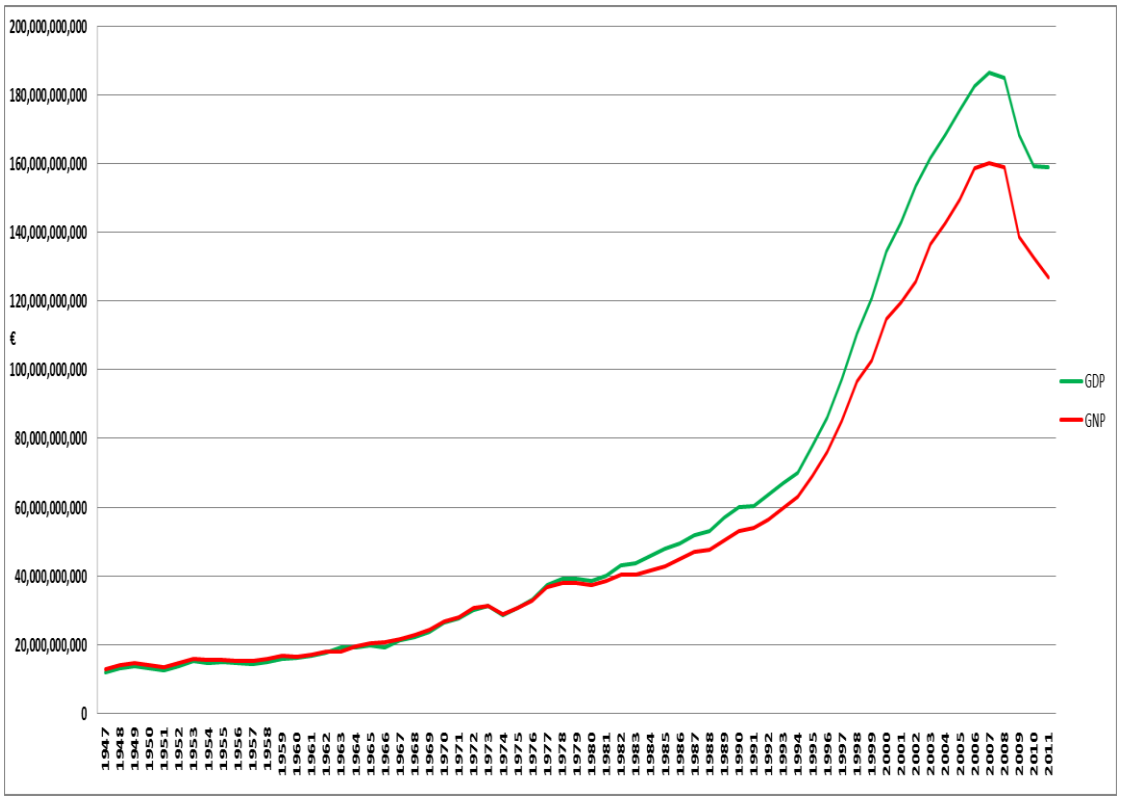
The ITF data used here does not include expenditure on maintenance, only investment. The ITF define investment expenditure as "*expenditure on new construction and extension of existing infrastructure, including reconstruction, renewal and major repairs of infrastructure"*. It defines maintenance expenditure as "*expenditure for keeping infrastructure in working order*". The distinction between investment and maintenance expenditure in transport is not clearly defined and may be a factor in differences between the CSO and ITF data as well as between individual countries in the ITF data.

Table 2: Ireland's Transport investment 1995-2007

% GDP	CSO/National Accounts	ITF
Road	1.05%	1%
Rail(Infrastructure only)	0.17%	0.12%
Rail(Rolling Stock only)	0.06%	N/a
Total (Road & Rail)	1.30%	1.12%

[15] All capital investment, this is defined as new works and improvements that go beyond the requirements of normal repair and maintenance.

Chart 18: Irish GDP and GNP, constant prices (2012)



Source: CSO

Table 3: Sample Countries and Years of Unreported Data – OECD/ITF Analysis

Country	Rail Unreported	Road Unreported
1. Australia		
2. Austria	2008-2010	2008-2010
3. Belgium	2010	2010
4. Canada		
5. Denmark	1996-1997	
6. Finland		
7. France		
8. Germany		
9. Greece	1995-1999,2008-2009	1995-1999,2008-2010
10. Ireland		2008-2010
11. Italy	2010	2010
12. Japan		
13. Luxembourg		
14. Netherlands		
15. Norway	2010	
16. Portugal		
17. Spain		
18.. Sweden		
19. Switzerland		2010
20.United Kingdom		
21. United States	2004-2010	