How performant are European governments in their housing policies?*

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Abstract: *Governments use a variety of instruments to pursue their housing policies. A clear picture on which policies are best suited to attain the objectives of housing policy is still lacking though. This paper addresses this question by empirically approaching government intervention in the housing sector from the viewpoints of effectiveness and efficiency. Effectivity in housing policy is regarded as affordable housing at reasonable quality made available to all. Efficiency is restricted in this paper to productive efficiency, meaning that administration and production costs are possibly too high given the ouput. Applying the methodologies of the Full Disposable Hull and Data Envelopment Analysis allows us to point out the countries with the most efficient housing policy. By focusing on the particular mix of instruments these countries are using we can then draw policy conclusions.*

JEL-codes: H11, H21, H53

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1. Introduction

Governments use a variety of instruments to pursue their housing policies. They can subsidize the demand side through cheap loans and tax deductions, they can subsidize the supply side through cheap loans to housing corporations, they rely on market forces, or they apply a mix of these measures.
A clear picture on which policies are best suited to attain the objectives of housing policy is still lacking though.
In this paper we will address this question in an empirical way.
The purpose is to approach governement intervention in the housing sector from the viewpoints of effectiveness and efficiency.
Effectivity addresses the question whether housing policy is succesful in attaining its objectives. We mean by the objectives of housing policy that affordable housing at reasonable quality is made available to all. Federcasa (2006) supplies the statistics that allow us to measure these success indicators for housing policy for the member states of the European Union.
Using availability indicators (such as the number of dwellings, the types of dwellings, kind of tenure, the vacancy rate, the number of persons per dwelling, the number of rooms per dwelling, etc.), affordability indicators (such as the share of housing consumption in gdp, rent indexes, the share of households with a heavy financial burden due to housing cost) and quality indicators (the average useful floor area per

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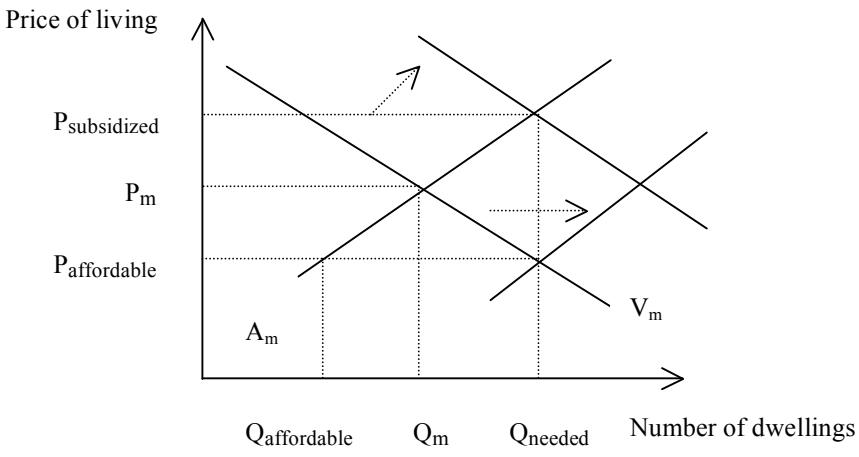
dwelling and per person, the presence of bath or shower and of hot running water, the share of highrise appartments, etc.) global indicators can be constructed that make visible how effective European governments are in reaching the targets of their housing policy.
Second step is efficiency. We focus on productive efficiency, meaning that administration and production costs are possibly too high given the ouput. Again Federcasa (2006) supplies statistics that enable us to construct indices for the government input into housing policy.
Applying the methodology of the Full Disposable Hull/Data Envelopment Analysis (Afonso e.a. 2003) then allows us to point out the countries with the most efficient housing policy. By focusing on the particular mix of instruments these countries are using we can then draw policy conclusions.
The paper is organized as follows. Section 2 describes the policy problem that confronts government in the area of housing and the instruments government has at its disposal to handle housing market failures. Section 3 briefly reviews the methodology and literature on the use of FDH and DEA in the government domain. Section 4 focuses on the output data for housing policy, while section 5 does the same for the input data. In section 6 the efficiency analysis using FDH and DEA is made. Section 7 applies Tobit regressions in order to gain insight into the explanations for the reported effectiveness and efficiency scores. Finally, section 8 provides some concluding remarks.

2. Government intervention in the housing market

The intervention of government in the housing market can be rationalized using the classical arguments from welfare economics (Rosen 1985, Arnott 2008). Firstly the housing market fails in some respect, secondly the outcome of the market, even if this outcome would be Pareto optimal, is not accepted from an equity point of view.
Housing markets failure usually come under the sign of externalities.
Positive externalities are at stake when maintenance decisions made by dwelling owners and tenants do not take into account the pleasure of a well maintained house or garden bestowed on passers-by and neighbours. However this argument can only be of limited validity in explaining the important government intervention in housing.
Negative externalities refer to effects of bad dwelling situations on health, crime, social exclusion,... Rosen (1985) correctly points out however that the housing situation may not be the real problem here but is only an effect of a deeper lying poverty problem.
Correcting these market failures leaves us with a second problem. The market solution may be efficient in terms of Pareto optimality, but nevertheless it can still be a solution which is unacceptable to society because of equity considerations. Rosen (1985) points at the objective of a more egalitarian income distribution. More to the point is the observation that the housing market is not succesful in offering every citizen an affordable and suitable dwelling (Maclennan & Rose 1997, Arnott 2008). The market usually falls short for low income households. Lower incomes tend to fall out of the private housing market and fall or remain into misery. This phenomenon has many faces: unacceptable quality of the dwelling, unsuitable and unlivable dwellings, cramped living quarters, living on campsites, unaffordable rents and real estate prices, homelessness, squatting,...
The regular answer to this problem is given by the second theorem of welfare economics. Through the use of lump sum taxes a more preferred Pareto optimum can

be reached. In practice this solution is generally not working so well. In this respect Arnott (2008) points at the theory of optimal economic policy under asymmetric information. Because of asymmetric information governments have no clear view which individuals or households are in need of a general lump sum transfer. Therefore more targeted policies, like social housing programmes, are in practice better suited to solve the equity problem.
Thus, in this rationale and in terms of public goods theory, housing has features of a merit good. It is in itself not a public good as housing is perfectly excludable and rival in consumption. In the same way as education or health however the supply of housing through the market is not considered to be sufficient from a social point of view, requiring government intervention. Insufficient provision of housing, both in a quantitative and qualitative sense, by the market has negative externalities in terms of social exclusion, negative effects on the health of the population, pauperization, deprivation, criminalization, etc.

Graph 1: Intervention in the housing market



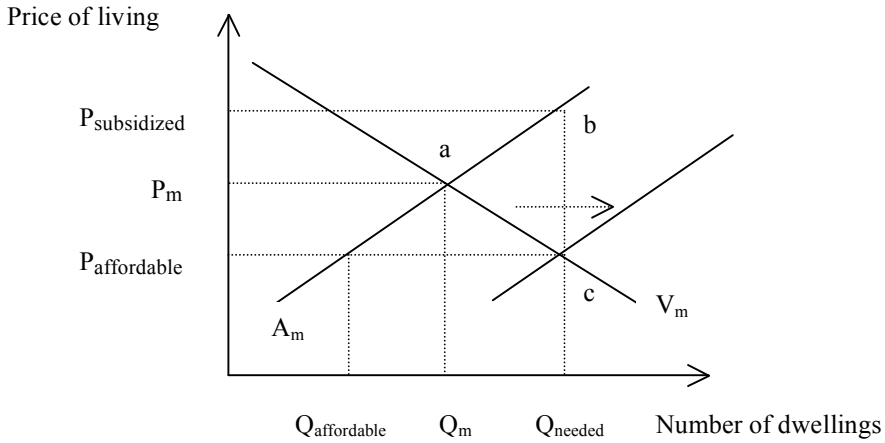
Government has then several methods to intervene. Oxley (2000) provides us with a long list of possible instruments, ranging from, i.a., housing vouchers or allowances over housing consumption credit support and subsidization of housing supply with or without price and allocation conditions to state supply with or without market allocation.
The impact of these instruments can be illustrated using graph 1. In this graph market equilibrium is reached with price P_m and quantity Q_m. At this equilibrium point there is a shortage of dwellings of Q_mQ_{needed} to the effect that part of the population is lacking a proper dwelling place.
The government can then intervene to alleviate the housing need by

- stimulating housing supply through subsidies, own production, cheap loans,... which shifts supply to the right and makes for a new equilibrium in point ($P_{affordable}$,Q_{needed}); the effort per dwelling required by government is the difference between $P_{subsidized}$ and $P_{affordable}$;
- supporting demand for housing through housing subsidies and/or tax deductions shifting demand to the right; again the effort required by government is the difference between $P_{subsidized}$ and $P_{affordable}$;

- regulating the price of living by fixing it at $P_{affordable}$; without further government intervention supply drops to $Q_{affordable}$ and government is forced to subsidize demand, supply or both;
- adopting a mix of the abovementioned measures.

Government intervention has a number of effects in terms of welfare economics. We illustrate them for a supply side subsidy by using graph 2.

Graph 2: Welfare economic effects of government intervention in the housing market



The supply side subsidy costs for the government is given by the rectangle $P_{affordable}P_{subsidized}$bc. There is an increase in producer surplus of $P_mP_{subsidized}$ba while consumer surplus increases with $P_mP_{subsidized}$ca. The net effect of these three changes is the triangle abc and corresponds to the deadweight loss. The housing policy thus entails a cost to society in terms of a loss in efficiency. For a democracy this can be perfectly desirable and justified.

Graphs 1 and 2 depict a world in which the government is perfectly capable of quantifying and remedying the housing problems. Even then there is a negative effect on the efficiency of the housing market. Moreover and obviously this partial equilibrium approach does not take into account effects of the government intervention on other markets.

A perfect remedy for a policy problem is rare. Usually market failure is followed by government failure causing extra losses on top of the inevitable efficiency losses. Government failure can be approached from several points of view.

A first viewpoint is the effectiveness of government intervention. The central point here is whether policy is succesful in meeting its objectives. With respect to housing policy the task is to find out whether there is affordable and suitable housing for everyone. This is mainly an empirical and practical task. Afonso e.a. (2003) have set the tone for this approach for the general government sector.

A second viewpoint is efficiency. Regardless of whether the objectives are met, there has been an input of resources, taxpayers money by the government. In principle the efficiency relationship between inputs and outputs can be analyzed.
There are two kinds of possible inefficiencies (Pestieau 2006).
The first one is productive inefficiency and becomes visible through administrative and production costs which are too high. The reference for this phenomenon in the government sector is Afonso e.a. (2003).
The second one is distributive inefficiency, which means that the government efforts do not or insufficiently reach the targeted groups, while non-targeted groups unintendedly profit from these efforts. This phenomenon is known in Flanders as the Matthew effect,at least as far as social spending is concerned (Deleeck 2008). Romijn & Besselink (2008) analyse the phenomenon for the Dutch housing rental market.

In this paper we will focus on the effectiveness and productive efficiency of housing policies.

3. Effectiveness and efficiency of government spending

The challenge is to find a way to operationalize the insights about effectiveness and productive efficiency.
A useful literature for that matter, using techniques such as Free Disposable Hull (FDH) analysis and Data Envelopment Analysis (DEA), has been around for a while. These techniques are well known in operational analysis and especially DEA has known thousands of applications in the business environment. Also non-profit or public organizations that convert inputs into outputs have been the subject of studies in this vein (see Pestieau (2006) for an overview). Coelli, Rao and Battese (1998), Sengupta (2000), Thanassoulis (2001) and Simar and Wilson (2003) give good introductions into these techniques.
The application of these techniques to aggregate levels whereby the performance of government policies and even entire governments are compared has been a recent development however. In the recent decade the work by Afonso a.o. (2003) has triggered a body of studies. Beside studies that look at the efficiency of governments as a whole (Afonso a.o. 2003, Afonso a.o. 2005), especially education and health haven been analyzed (Afonso & St. Aubyn (2006), Badescu (2006), Eugene (2008)).

To our knowledge housing policies have never been analyzed in this way. Closest come studies such as Buckley & Tsenkova (2001) and Lux (2003).
Buckley & Tsenkova (2001) develop a set of indicators of performance and policy for transition economies. The context in which they use these indicators is different from ours. They explore the dynamics of housing market systems in thirteen socialist economies. Their data set is totally different from ours. They do not use FDH, DEA or similar technique.
Lux (2003) explicitly addresses efficiency and effectiveness of housing policies in six Central and Eastern european countries. His approach is descriptive. Like Buckley & Tsenkova (2001) he is mainly concerned with the dynamics of policies.

In what follows we will give a non-technical, intuitive description of the FDH and DEA techniques and the way they are applied on a aggregate level.

In a first step the effectiveness of government spending is analyzed and in two further steps efficiency is analyzed.
Afonso (2003) construct seven subindicators for the performance of government. The first four reflect the core objectives of governments and the related spending: a well functioning government administration (measured using statistics on corruption, red tape, quality of the judiciary and the size of the underground economy), a well educated population (measured by enrollment in secundary education and by OECD education attainment indicators), a healthy population (measured by infant mortality and life expectancy) and a good public infrastructure (measured by communciation and transport infrastructure quality). The other three subindicators reflect the classical Musgravian government functions: redistribution (proxied by the income share of the 40 % poorest households), stabilisation (measured by the variation in growth and inflation rates) and allocation (measured by gdp per capita, gdp growth and unemployment figures).

For every country in the sample (containing all OECD member states) an aggregate indicator is calculated which is the recalculated relative to the average of all countries that is set at 1 (the public sector performance (PSP) indicator). A higher figure means a better performance than a lower one.
Next the results are related to the government spending envolved in reaching the objectives. The higher this ratio (the public sector efficiency (PSE) indicator) the less inefficient this spending is.

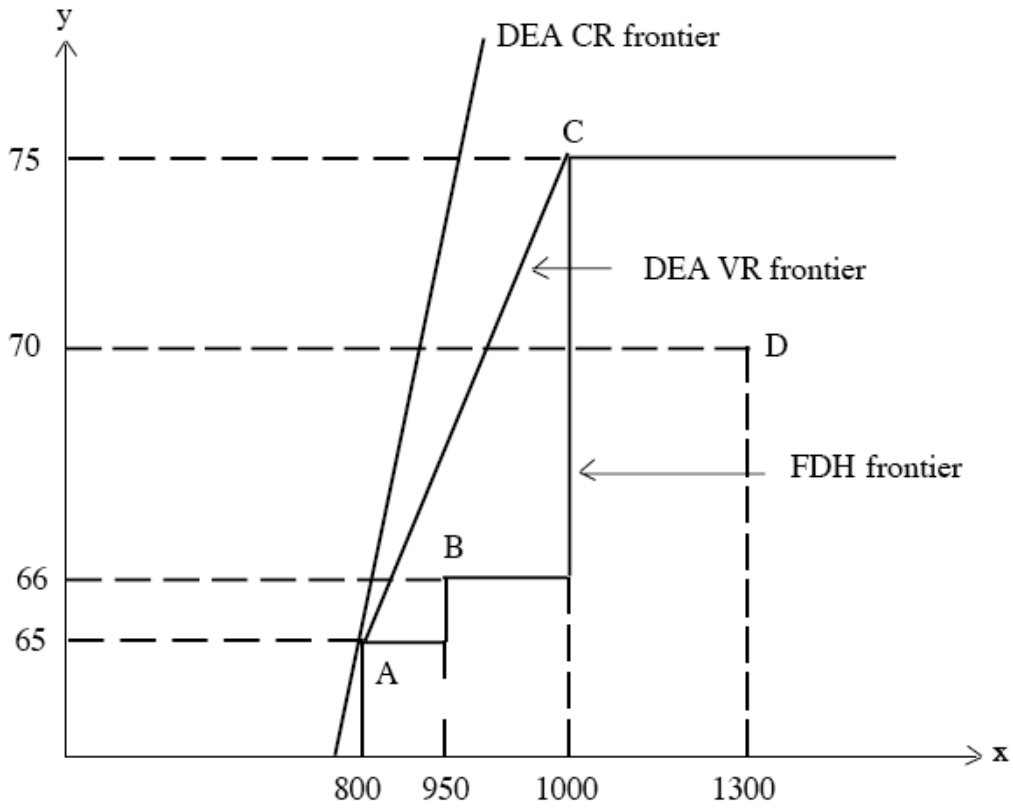
In a further step, and this is were FDH and DEA come into the picture, the most efficient countries are taken as the reference to calculate an input efficiency score (IES) and an output efficiency score (OES). The IES takes spending relative to gdp as the starting point. The most efficient countries are given a score of 1. The other countries' score is lower and reflects how much resources are spilled in those countries. The OES starts from the performance indicators. The most efficient countries are set at 1. For the other countries the relative performance vis-à-vis these efficient countries is calculated.

The underlying methodology is that of the efficiency frontier which is used both in FDH and DEA.

Free Disposable Hull

Graph 1 shows a possible FDH production frontier, using output and input indicators.

Graph 1: The efficiency frontier in the FDH and DEA approach



Source: Afonso & St. Aubyn, 2005.

The public spending of countries A, B, C and D is shown on the horizontal axis. On the vertical axis their output score is set out. The four countries are situated at different positions in the graph, meaning that the efficiency differs between countries. Country D for example uses more input than country C while it's output is less. Thus D is less efficient than C. Country C is on the efficiency frontier, which means that there are no countries that provide the same output as country C with less input. Countries A and B also are on the efficiency frontier. The inefficiency of country D can be measured by taking the vertical distance between point D and the efficiency frontier. In the graph this distance is 5 units. This approach is called the output orientation because the actual output is compared to the potential output. The input orientation looks at efficiency in terms of the spending and takes the horizontal distance between point D and the efficiency frontier. In the graph this distance is 300 which let us conclude that the inefficiency is about 24 % (=300/1300) of total spending. By comparing each individual country with the efficiency frontier a country ranking is possible.

Data Envelopment Analysis

Another non parametric method is DEA. The most important difference with FDH is that DEA allows for a convex efficiency frontier. It also allows for variable returns.
In FDH suboptimal countries are compared to 'real' countries, while in DEA the comparison is to a 'virtual' country. In DEA the points of reference on the efficiency frontier do not belong to a real country, but are calculated using the equation of the straight line between the two neighbouring real countries.

In graph 1 the efficiency frontier is given along DEA lines There is an efficiency frontier with constant returns (DEA CR frontier). This line goes through the origin and passes A. With variable returns the efficiency frontier turns right at A to pass through C (DEA VR frontier).
Compared to FDH country B has now become inefficient, while it was efficient under FDH. With FDH more countries will be considered as efficient than with DEA. Countries that are efficient under FDH are not necessarily efficient under DEA, while a DEA efficient country will also be FDH efficient (Afonso, St. Aubyn, 2004).

4. Output data for housing policy

A reasonable objective for housing policy is to guarantee sufficient housing at a reasonable price. Maclennan a.o. (1996) state that 'accessibility, affordability and quality have been at the core of European housing policies and they remain important concerns.'
Accessibility involves access to adequate housing, including management and maintaining services. We prefer to translate this objective into availability, implying a sufficient supply of housing.
Affordability aims at restricting the burden of housing payments.
The quality objective has to do with the standards of construction and maintenance.
For all three objectives it is clear that lower income households are the main targets, since government intervention in housing is mostly done out of equity considerations (see section 2).

This means that the data on the output of the housing policy should ideally deal with the quality, availability and affordability. For a period of time such data are available for the member states of the European Union. In 1991 the first 'Housing statistics in the European Union' were published. The most recent edition covers data for the 25 countries that belonged to the European Union in 2005/2006 (Federcasa 2006). The quality of the data is not always very high. Indicators are not always reported for all countries, sometimes data are lacking for a given year and replaced with data of another year.
The data reported by Federcasa (2006) are usually non monetary scores (m^2 per dwelling, the number of dwellings per 1000 inhabitants, the percentages of households with financial problems due to housing costs,...). The data usually cover the years 2003 and 2004.
Firstly, they are rescaled such that a larger score also means a better score in terms of quality, availability and affordability.
Secondly there is the problem of the implicit weights of the indicators. There is no good solution to this problem. Afonso a.o. (2003) deal with this problem in a

halfhearted way. Some of their indicators are on a scale of 1 to 10, other ones are expressed in percentages of gdp, still others in number of years (life expectancy), for some indicators the measure is unclear (quality of communication and transport).
In this paper we choose to set the score of the best performing country for each variable at 100 and not to intervene any further in the weighing.

Another point of discussion is whether the scores should be standardised. Eugène (2008) f.i. corrects using the arithmetic mean and the standard deviation:

$$OS_i = (O_i - AM)/ SD$$

where

OS_i is the standardised indicator for an outcome for country i,
O_i is the indicator for an outcome for country i before standardisation,
AM is the arithmetic mean of the different countries considered for this outcome and
SD the standard deviation of the different countries considered for this outcome.

The problem with this method is that the recalculated figures do not provide an anchor to execute a FDH/DEA analysis and therefore should be rescaled again to make that possible. We thus do not standardize our data.
A consequence of the choices made concerning the data is that the calculated input and outputscores and input- en outputefficiencyscores have no meaning in an absolute sense, but only have something to say in a relative sense.

We will now go through the three performance aspects of housing policy: quality, availability and affordability.

Quality of housing

The measuring of quality was done using the following statistics:

- the surface in m^2 per completed dwelling;
- the occupied dwelling stock in m^2 per person;
- the average number of rooms per completed dwelling;
- the percentage of the dwelling stock that has a bath or shower;
- the percentage of the dwelling stock that has central heating
- the percentage of the dwelling stock dating from after 1945;
- the percentage of non multi-family dwellings in the total dwelling stock;
- the percentage of non high-rise dwellings in the total dwelling stock.

The central heating indicator brings along the complication that in regions with a warm climate central heating should not necessarily be regarded as a surplus.

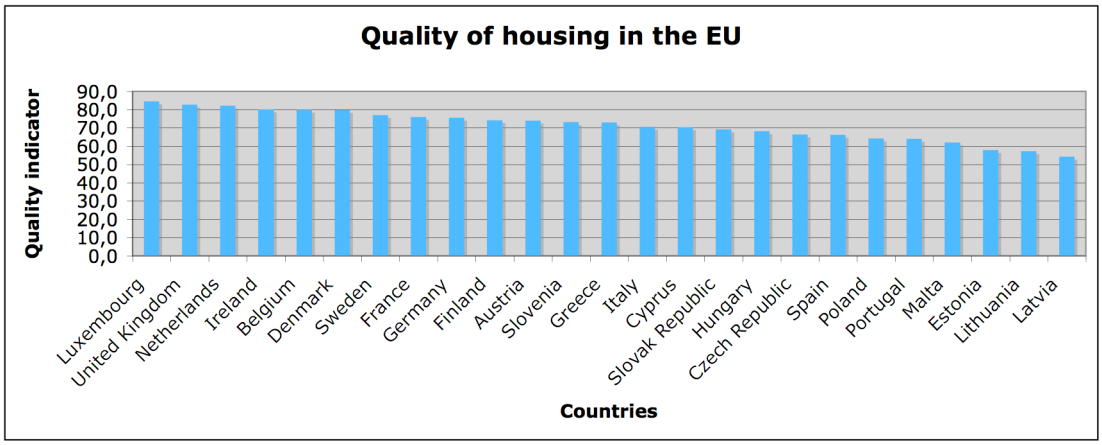
As stated above the score per indicator was set at 100 for the best performing country. Then for each country the arithmetic mean was calculated over the number of data available for that country. The result of this exercise is shown in table 1 and in graph 2.

Luxembourg has the highest quality of housing, closely followed by the United Kingdom, the Netherlands, Ireland, Belgium and Denmark. This group is within a range of 5 percentage points between the scores of 84,7 and 79,8.

Table 1: Quality of housing in the EU

	Quality	Ranking		Quality	Ranking
Austria	74,1	11	Latvia	54,4	25
Belgium	80,0	5	Lithuania	57,4	24
Cyprus	70,5	15	Luxembourg	84,7	1
Czech Republic	66,4	18	Malta	62,2	22
Denmark	79,8	6	Netherlands	82,2	3
Estonia	57,9	23	Poland	64,4	20
Finland	74,2	10	Portugal	64,1	21
France	76,1	8	Slovak Republic	69,4	16
Germany	75,6	9	Slovenia	73,3	12
Greece	73,0	13	Spain	66,3	19
Hungary	68,3	17	Sweden	77,0	7
Ireland	80,3	4	United Kingdom	82,9	2
Italy	70,8	14			

Graph 2: Quality of housing in the EU-25



A second group with Sweden, France, Germany, Finland, Austria, Slovenia and Greece follows within a range of 4 percentage points between scores of 77 and 73.
In a next range of appr. 4 percentage points between 70,8 and 66,3 are Italy, Cyprus, Slovak Republic, Hungary, Czech Republic and Spain. Then come Poland, Portugal and Malta between 64,4 en 62,1. The three Baltic states make up the rear guard between 57,9 and 54,4.

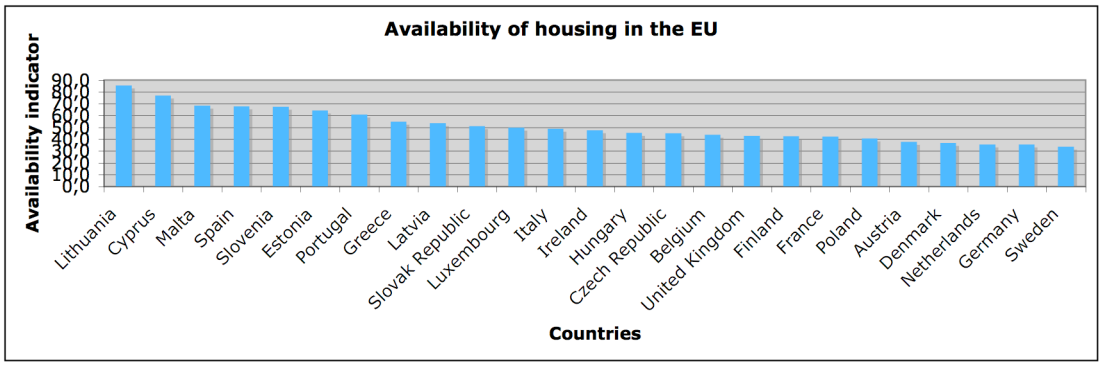
Availability of housing

For availability of housing the following data were available:

- the number of dwellings per 1000 inhabitants;
- the percentage of dwellings occupied by the owner;
- the share of social renting dwellings in the total dwelling stock;
- share of households not living in overcrowded houses for the income group lower than 60 % of the median income;
- share of households owning their accommodation for the income group lower than 60% of the median income of all households.

Again all data were rescaled by setting the country with the maximum score at 100. Per country the average was taken for the available indicators. The results are shown in table 2 and graph 3.

Graph 3: Availability of housing



Compared to the quality score it stands out that completely other countries head the ranking. The three Baltic states now are in the top ten with Lithuania in first place. Also Malta is in the top places (third), while the Netherlands are at the back.
Further point of interest is that the differences between countries are larger for availability than for quality. The range between head and tail is more than 50 percentage points, while in quality the range was only 3 percentage points.

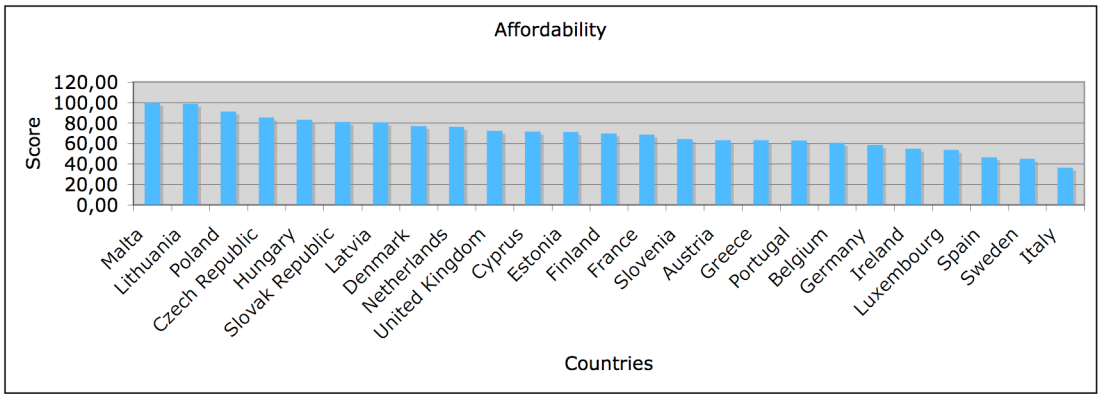
Table 2: Availability of housing

	Availability	Ranking		Availability	Ranking
Austria	37,8	21	Latvia	53,8	9
Belgium	44,0	16	Lithuania	85,5	1
Cyprus	77,0	2	Luxembourg	49,9	11
Czech Republic	45,3	15	Malta	68,5	3
Denmark	37,0	22	Netherlands	35,7	23
Estonia	64,5	6	Poland	40,8	20
Finland	42,7	18	Portugal	60,9	7
France	42,4	19	Slovak Republic	51,1	10
Germany	35,5	24	Slovenia	67,5	5
Greece	54,9	8	Spain	67,9	4
Hungary	45,6	14	Sweden	33,7	25
Ireland	47,7	13	United Kingdom	43,0	17
Italy	48,9	12			

Affordability of housing

For affordability only two indicators are available.
The first is the share of households without financial burden due to housing cost. Like before the country with the highest score was set at 100.
A second indicator was constructed using the relative price level indices for housing costs (gross rent, fuel and power) and the relative price level for total consumption. For both indexes the EU-25 mean was set at 100, the total consumption index was then divided by the index for housing costs and the country with the highest index (the country where housing costs are cheapest compared to the general price level) was set at 100.
The affordability indicator is then the average of the two scores.

Graph 4: Affordability of housing



Malta has the highest score in affordability and Italy the worst (see table 3 and graph 4). The difference between them is large, appr. 64 percentage points.

The first seven countries in the ranking belong to the new member states: Malta, Lithuania, Poland, Czech Republic, Hungary, Slovak Republic and Latvia. Probably the communist past when housing was provided free by the government is still a factor here. Behind this group are Denmark, Netherlands and UK. At the bottom there is besides Italy also Spain and Sweden. The low position of Italy is due to the high burden of housing costs. Only a very small share of houeseholds does not have any problemes in financing their household costs.
Focusing on the relative price of housing we see the same countries at the top of the ranking as in the total affordability ranking (see table 4). Only Portugal has also relatively cheap housing.

Table 3: Affordability of housing

Austria	63,41	16
Belgium	60,58	19
Cyprus	71,67	11
Czech Republic	85,61	4
Denmark	76,97	8
Estonia	71,13	12
Finland	69,71	13
France	68,61	14
Germany	58,41	20
Greece	63,30	17
Hungary	83,21	5
Ireland	54,79	21
Italy	36,30	25
Latvia	80,58	7
Lithuania	98,76	2
Luxembourg	53,91	22
Malta	100,00	1
Netherlands	76,37	9
Poland	91,16	3
Portugal	62,81	18
Slovak Republic	81,11	6
Slovenia	64,42	15
Spain	46,48	23
Sweden	45,14	24
United Kingdom	72,27	10

Table 4: Relative price of housing

	price level		price level
Malta	100,00	Spain	65,35
Lithuania	98,76	Greece	65,12
Poland	91,16	Slovenia	64,42
Portugal	87,85	Sweden	59,39
Czech Republic	85,61	Denmark	59,02
Slovak Republic	84,12	Finland	58,53
Hungary	83,21	Belgium	58,47
Latvia	80,58	France	56,18
United Kingdom	74,98	Germany	54,73
Cyprus	71,67	Ireland	54,50
Estonia	71,13	Netherlands	52,73
Italy	68,87	Luxembourg	49,45
Austria	67,71		

Total output score

The country which best attains the general objectives of housing policy is Lithuania.

Graph 5: Total output score

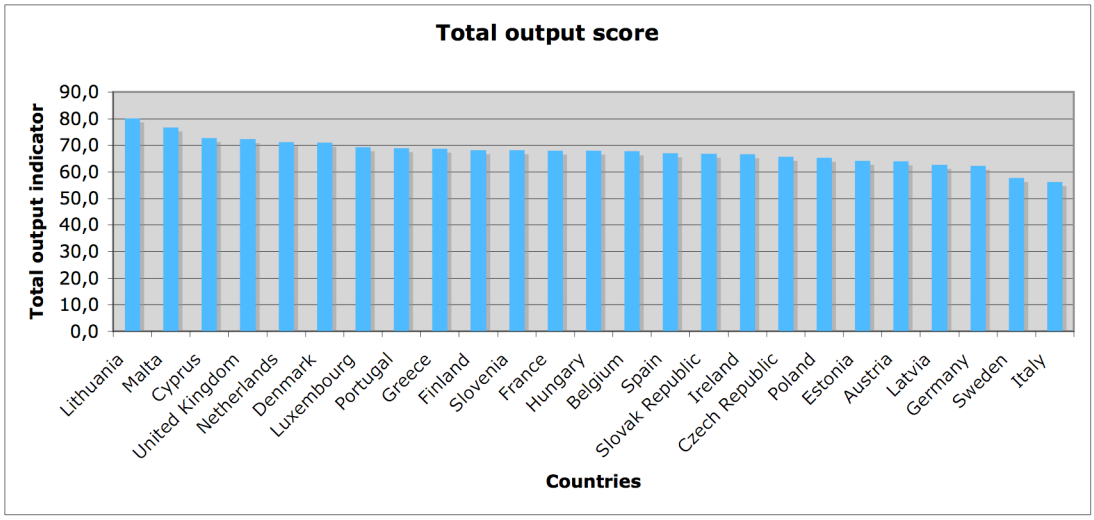


Table 5: Total output score

	quality	availability	affordability	average score	Rank
Austria	74,1	54,5	63,4	64,0	21
Belgium	80,0	62,8	60,6	67,8	14
Cyprus	70,5	75,9	71,7	72,7	3
Czech Republic	66,4	44,8	85,6	65,6	18
Denmark	79,8	56,4	77,0	71,1	6
Estonia	57,9	63,4	71,1	64,2	20
Finland	74,2	60,7	69,7	68,2	10
France	76,1	59,3	68,6	68,0	12
Germany	75,6	52,8	58,4	62,3	23
Greece	73,0	70,1	63,3	68,8	9
Hungary	68,3	52,1	83,2	67,9	13
Ireland	80,3	64,6	54,8	66,6	17
Italy	70,8	61,4	36,3	56,2	25
Latvia	54,4	52,9	80,6	62,6	22
Lithuania	57,4	83,9	98,8	80,0	1
Luxembourg	84,7	69,2	53,9	69,3	7
Malta	62,2	67,7	100,0	76,6	2
Netherlands	82,2	55,3	76,4	71,3	5
Poland	64,4	40,2	91,2	65,2	19
Portugal	64,1	80,1	62,8	69,0	8
Slovak Republic	69,4	50,2	81,1	66,9	16
Slovenia	73,3	66,8	64,4	68,2	11
Spain	66,3	88,1	46,5	67,0	15
Sweden	77,0	50,9	45,1	57,7	24
United Kingdom	82,9	62,0	72,3	72,4	4

It's average score is 80. Next comes Malta with a score of 76,6. 21 out of the 25 countries that were examined reach a score in a range of 10 percentage points between 72,7 and 62,3. Sweden and Italy close the ranking with resp. 57,7 and 56,2.

The question can be asked whether there is a relationship between the constituting part of the outputscore, f.i. an inverse relationship between the quality and the affordability can be imagined. In table 6 we report the correlation between the three indicators. Between quality and affordablility there is indeed a significant correlation with a coefficient of -0,47.

Table 6: Correlation between scores

Correlation	*Quality*	*Affordability*	*Availability*
Quality	1		
Affordability	-0,47*	1	
Availability	-0,13	-0,19	1

*Correlation is significant at the 0.05 level (2-tailed)

5. Input data for housing policy

Maclennan a.o. (1996) already pointed at the very high diversity in the levels and forms of government intervention in housing in the European Union. He reports on the one extreme spending figures on housing of more than 3 % of gdp in countries such as the Netherlands, Sweden and the UK, and on the other extreme government expenditure on housing of less than 1 % of gdp in Portugal, Spain and Greece.
The diversity is also present in the forms of intervention with some countries depending highly on supply side support while other countries choose to intervene more through the demand side.
Furthermore these different choices concerning spending and means of intervention are not consolidated. Lux (2003) points out that in the 1980's and 1990's several European countries experienced 'reforms of housing policies, significant cuts in public housing expenditure and a move away from the relatively expensive supply-side subsidies towards less costly support through income-tested housing allowances (i.e. demand side subsidies)'.
With the accession of ten new member states in 2004 the heterogeneity in housing policies even increased, adding to the picture the transition from almost completely state owned housing systems to more market oriented systems.

Federcasa (2006) provides data on the input of housing policy in the EU member states. Many data are lacking however, some countries report only partial data, other do not report at all. As a result Cyprus, Germany, Hungary, Italy, Latvia and the UK drop out of the further analysis.
We are left with useful statistics for 19 countries covering the following aspects of housing policy:

- direct supply side subsidies for housing;
- newly provided public loans;
- total outstanding public loans;

- direct demand side subsidies;
- total volume of indirect support.

From the reported data it is not always clear to which category the spending instruments belong. We therefor consider public loans to be granted by government to public institutions in order to provide for affordable housing. New and outsanding loans overlap each other. We choose to use the newly provided loans.
Taken together with direct supply side subsidies for housing we use these data as indicators for the supply side of housing policy.
Indirect support concerns a.o. tax incentives in housing. We consider those as belonging tot the demand side policies. Taken together with the direct demand side subsidies they offer us a way to quantify the demand side of housing policy.

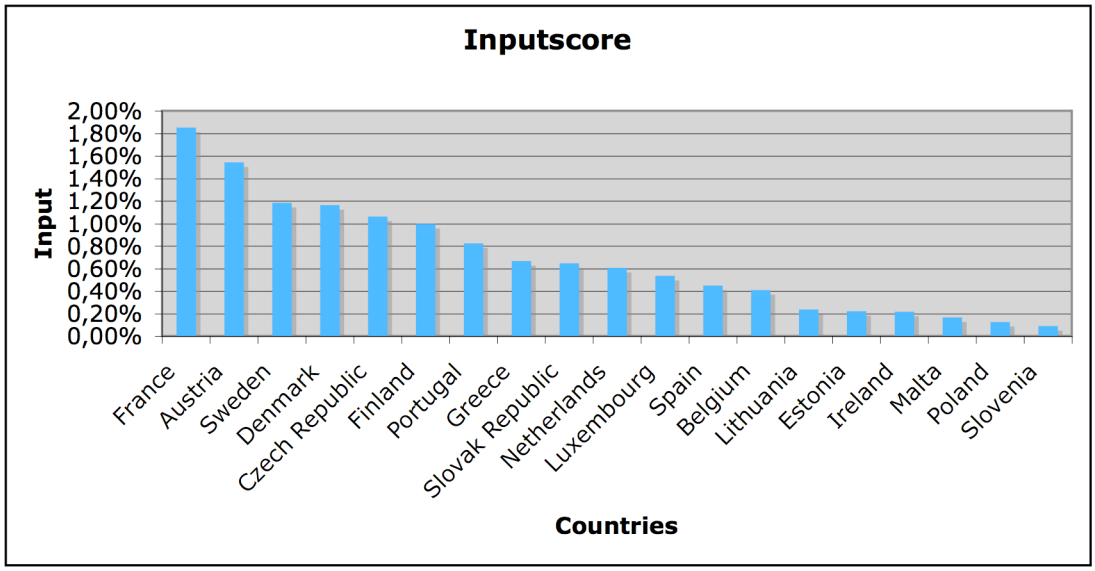
The original Federcasa data are expressed in euro. We relate them to gdp in order to correct for the varying economic size of the countries (see table 7 and graph 6).
Not surprising, there are large differences in the degrees that countries make use of the various instruments. France spends most in terms of gdp (1,85 %), while Slovenia spends only 0,09 % of gdp on housing, or 30 times less.

Table 7: Public finance instruments in housing policy (% gdp)

	supply side measures	demand side measures	inputscore	share supply measures	share demand measure
Austria	1,46%	0,09%	1,55%	94,17%	5,83%
Belgium	0,36%	0,05%	0,41%	88,06%	11,94%
Czech Republic	0,21%	0,85%	1,06%	19,76%	80,24%
Denmark	0,39%	0,78%	1,17%	33,55%	66,45%
Estonia	0,06%	0,16%	0,22%	27,18%	72,82%
Finland	0,34%	0,65%	1,00%	34,44%	65,56%
France	0,38%	1,48%	1,85%	20,34%	79,66%
Greece	0,67%	0,00%	0,67%	99,65%	0,35%
Ireland	0,22%	0,00%	0,22%	97,98%	2,02%
Lithuania	0,02%	0,22%	0,24%	8,92%	91,08%
Luxembourg	0,00%	0,54%	0,54%	0,00%	100,00%
Malta	0,14%	0,03%	0,17%	81,82%	18,18%
Netherlands	0,23%	0,38%	0,61%	37,46%	62,54%
Poland	0,12%	0,00%	0,12%	100,00%	0,00%
Portugal	0,22%	0,61%	0,83%	26,03%	73,97%
Slovak Republic	0,33%	0,31%	0,65%	51,40%	48,60%
Slovenia	0,08%	0,02%	0,09%	83,68%	16,32%
Spain	0,00%	0,45%	0,45%	0,00%	100,00%
Sweden	0,07%	1,11%	1,19%	6,31%	93,69%

Some countries almost exclusively turn to the supply side: Austria, Greece, Ireland, Poland. Other countries almost exclusively choose demand side instruments: Lithuania, Luxemburg, Spain.

Graph 6: Inputscores



6. Efficiency analysis

In this section we integrate output and input data. This should allow us to gain insight in the efficiency of the policies that have been followed.

Output-input scores

A first and simple approach to the efficiency question is to relate the output scores to the input scores. We set the highest scoring country Slovenia at 100 and rescale the score of the other countries (see table 8).

Table 8: Output/inputscore (Slovenia = 100)

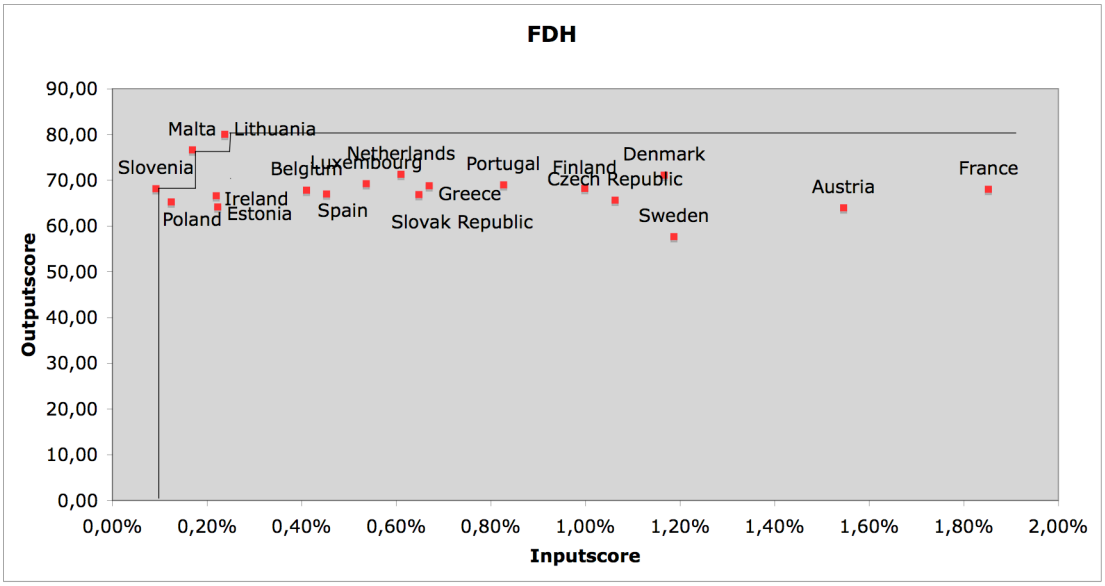
Austria	5,59	Luxembourg	17,42
Belgium	22,29	Malta	61,19
Czech Republic	8,33	Netherlands	15,77
Denmark	8,23	Poland	70,93
Estonia	38,89	Portugal	11,25
Finland	9,22	Slovak Republic	13,93
France	4,96	Slovenia	100,00
Greece	13,86	Spain	19,97
Ireland	40,88	Sweden	6,56
Lithuania	45,48		

The results of this exercise are strongly influenced by the strong spread of the input scores, while the output scores show less spread.

DEA-FDH-analyse

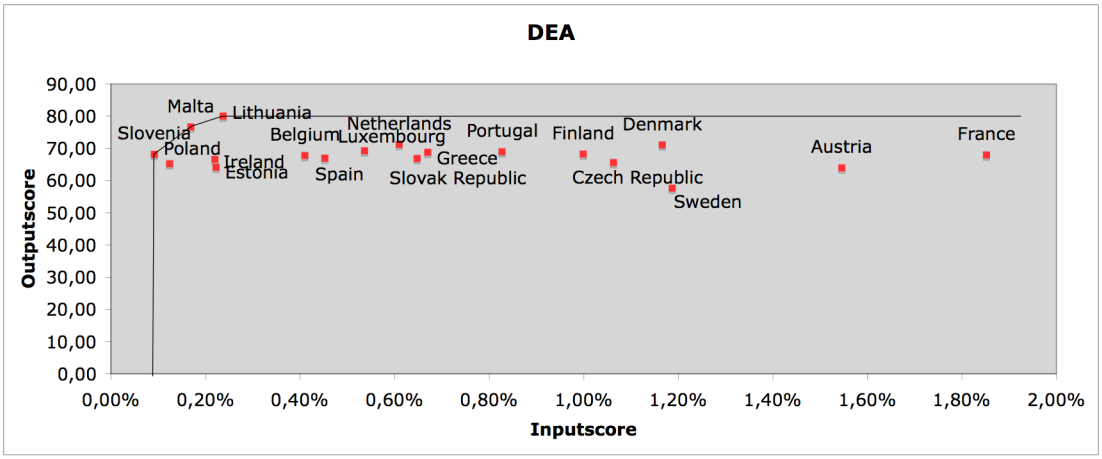
As stated before an alternative approach to the efficiency question is FDH/DEA-analysis. In the actual context of the data that we use there is only a very limited difference between both methods. As shown in graphs 7 and 8 the efficiency frontier only differs between both methods for the short distances between Slovenia and Malta and between Malta and Lithuania. We continue with DEA because in that approach the efficiency frontier is fixed slightly more accurate than in the FDH approach.
In this approach three countries are on the efficiency frontier, Slovenia, Malta and Lithuania. Their input and output oriented efficiency is set at the maximum of 100. The input and output oriented efficiency of the other countries is then calculated relatively to these three countries.
For the input related efficiency Slovenia is the reference country for Poland, Ireland, Estonia, Belgium, Spain, Slovak Republic, Czech Republic, Sweden, Austria and France. We note a strong spread in this efficiency, reflecting the above mentioned spread in the input scores (see table 9).

Graph 7: The FDH approach



The best scoring country after Slovenia is Poland with a score of 74,12. This means that Poland could/should have reached the same result as Slovenia with 25 % less input providing it would have handled this input less inefficient. The worst performing country with Slovenia as the reference is France. With 95 % less input the same result as Slovenia could have been reached if France was as efficient as Slovenia.
A number of countries (Denmark, Finland, Greece, Luxembourg, the Netherlands and Portugal) have a reference point that lies between Slovenia and Malta. No country has a reference point between Malta and Lithuania.

Graph 8: The DEA approach



From the viewpoint of output orientation Poland has as reference point a virtual country on the efficiency frontier between Slovenia and Malta. The score of appr. 90 means that Poland attains 10 % less output with the same input as this virtual country. For Estonia, Ireland and Luxembourg the reference point lies between Malta and Lithuania. The worst performing country in this group is Luxembourg with a score of appr. 73 %.

Table 9: Input and output oriented efficiency in the DEA approach

	Input efficiency	Rank	Output efficiency	Rank
Austria	5,95	18	79,92	17
Belgium	22,41	7	84,69	10
Czech Republic	8,66	16	81,96	15
Denmark	10,16	14	88,81	6
Estonia	41,31	6	80,91	16
Finland	9,25	15	85,22	9
France	4,97	19	84,95	11
Greece	14,61	11	85,97	8
Ireland	41,86	5	84,09	12
Lithuania	100,00	1	100,00	1
Luxembourg	18,99	10	72,99	18
Malta	100,00	1	100,00	1
Netherlands	19,70	9	89,04	5
Poland	74,12	4	90,98	4
Portugal	12,02	13	86,18	7
Slovak Republic	14,20	12	83,55	14
Slovenia	100,00	1	100,00	1
Spain	20,33	8	83,66	13
Sweden	7,75	17	72,04	19

A large group of countries has Lithuania as a reference point: Austria, Belgium, Czech Republic, Denmark, Finland, France, Greece, the Netherlands, Portugal,

Slovak Republic, Spain and Sweden. They score between 80 (Austria) and 89 (the Netherlands).

7. Causes for differences in effectiveness and efficiency

After the analysis of the differences in effectiveness and efficiency of housing policy in the EU the next step is a search to explain these differences.

We consider the following dependent variables. Firstly the effectiveness as shown by the global output score. Next we take a look at the components of the global output score, quality, availability and affordability. Last there is input efficiency and output efficiency.

For the explanatory variables we look in the first place at the various policy types. Does it make a difference whether countries choose to stimulate the demand side rather than the supply side? Which choice leads to more effectiveness and less inefficiency?
To verify this in an empirical manner we constructed an indicator measuring the share of direct and indirect demand side subsidies in total subsidies.
Next we have to consider that the success of housing policy can possibly be explained by influences outside housing policy.
The first that springs to mind are the efforts of households themselves. The more that private households invest in housing the less market failure there is and the less is the need for government to intervene. Therefore we look at gross fixed capital formation in housing as a share of gdp. A variant is household consumption on housing as a share of total household consumption.
A possible influence could also be differences in preferences regarding to housing, having to do with a differences in climate. In a warm climate there may be less need for inside living space.
To check for this possibility we took as indicator the average yearly temperature for the capital of each country.
A next possible explanatory variable could be population density. A high population density leads to a smaller living space per capita, which could be considered to be a less qualitative housing situation.
We also consider living standards. The expectation is that a higher welfare level has a positive effect on the quality, the availability and affordability of housing. Gdp per capita in pps (EU = 100) is used as an indicator.
The savings rate could have an influence, more specifically with regard to affordability. The higher the savings rate (the gross savings rate for private households) the easier it should be for private households to bear the financial burden of buying or building a property.

The relevance of these various possible explaining variables was tested by applying a Tobit regression. Tobit regression is recommended because of the limit (maximum 100) applied to the output indicators.

We now discuss the results of the regression analysis (see table 10).
Regarding overall effectiveness we find a significant negative correlation for the savings rate and housing consumption.

When we look at the composing parts of the effectiveness score we find a positive and significant relationship between quality of housing and climate, gdp per capita and population density. There is a negative correlation with housing investment.
For availability we find a negative significant correlation with housing consumption. This time for the policy type and for climate. A deand oriented subsidy policy has a negative impact (coefficient -14,46). A warmer climate seems to be positively correlated to availability. We find a coefficient of 1,66.
For affordability we find a negative correlation for the climate, gdp per capita and housing consumption and a positive correlation with population density.

Table 10: Tobit regression results

	1	2	3	4	5	6	7
Overall effectiveness	-1,64	-0,25	-0,02	-0,41*	0,01	135,13	-85,65*
Quality	3,17	0,58*	0,25*	0,02	0,02	-217,35*	36,84
Availability	-12,09	0,75	-0,04	-0,37	-0,03	503,24	-160,52*
Affordability	3,99	-2,07*	-0,26*	-0,86	0,05*	119,26	-133,26*
Input efficiency	30,75	-5,39*	-0,67*	0,48	-0,01	525,34	-269,79
Output efficiency	3,83	-0,89	-0,13	-0,06	0,01	229,58	-102,4*

*Coefficient is significant at 5% level
1 = total demand side subsidies as share of total subsidies
2 = average yearly temperature in the capital
3 = gdp per capita
4 = savings rate
5 = population density
6 = investement in housing in % of gdp
7 = share of housing in total consumption

For input oriented efficiency we find a negative significant correlation with average temperature and standard of living.

For output oriented efficiency we only find a negative significant correlation with housing consumption.

8. Conclusions

In this paper we tried to shed some light on how succesful the EU member states are in their housing policies.
In terms of overall effectiveness we find that Lithuania is most succesful, while Luxemburg has the highest quality, Lithuania the best availability and Malta the best affordability. At the low end of the rankings Italy scores worst in overall effectiveness, while the Baltic states have the worst housing quality, Sweden the worst availability and Italy the worst affordability.
In terms of input into the housing policy we find that there is a large spread. France spends 30 times more on housing policy in terms of gdp than Slovenia. While some countries almost exclusively use demand side subsidies others almost exclusively turn to supply side measures.
Next we turned to a DEA analysis of efficiency of housing policy. The efficiency seems to be highest in Lithuania, Malta and Slovenia. The other countries are much

less input efficient than these three countries. The output oriented efficiency of the other countries varies between 72,04 % and 90,98 % .
In the last section we looked for explanatory variables for the differences in effectiveness and efficiency. We did not find what we hoped for, namely a correlation with the type of policy that is chosen by governments.

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Annex 1

Tabel A1: Original statistics for quality of housing[1]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Austria	101	38,3	4,1	98,3	90	25,7	52,1	n.a.
Belgium	105	n.a.	4,7	96	73	31,5	25,1	4,3
Cyprus	197,6	n.a.	5,4	99	27,3	7,4	n.a.	n.a.
Czech Republic	100,7	28,7	2,9	95,5	81,7	24,7	56,5	33,8
Denmark	107	52,4	3,8	95	98,2	40	38,8	10,4
Estonia	89,1	27,7	3,6	67,1	59	23,6	68,2	n.a.
Finland	90,2	36,3	3,6	99	92,3	10,4	57,6	22
France	111	37,5	4	98	91	33,2	43,3	15,9
Germany	113,9	40,1	4,4	n.a.	90,8	27,1	53,9	6
Greece	124,6	30,6	3,8	97,8	62	10,3	40,6	n.a.
Hungary	94,1	28	n.a.	87,2	52,9	20,8	33,6	23,2
Ireland	105	35	5,6	94	59	17,4	8,6	n.a.
Italy	76,5	36,5	4,2	99,2	94,7	24,1	74,7	22,7
Latvia	92,1	23,9	2,4	67,3	65,2	24,8	70,9	n.a.
Lithuania	106,2	23	2,5	69,6	71,6	29,5	61,2	n.a.
Luxembourg	120,2	49	5,5	94,2	92,3	30,8	29,1	16,2
Malta	n.a.	34,3	n.a.	100	3,3	25,9	n.a.	n.a.
Netherlands	115,5	41	4,2	100	90	21,7	31,1	6,7
Poland	107,5	22,9	3,7	87	77,8	23,2	63,1	38,9
Portugal	88,9	n.a.	4,3	65,6	3,8	14,4	22,6	21,6
Slovak Republic	131,7	26	3,2	92,8	74,3	10	51,5	37,5
Slovenia	108,7	30,9	2,8	92,3	79,1	22,9	28,4	12,4
Spain	100,6	31,3	5	99	9,4	13,1	47,5	30,6
Sweden	94	44,5	4,2	100	100	27,2	51,9	n.a.
United Kingdom	82,7	44	4,7	99	94	34	18,7	2,4

(1) surface in m^2 per completed dwelling;
(2) occupied dwelling stock in m^2 per person;
(3) average number of rooms per completed dwelling;
(4) percentage of the dwelling stock that has a bath or shower;
(5) percentage of the dwelling stock that has central heating
(6) percentage of the dwelling stock dating from after 1945;
(7) percentage of non multi-family dwellings in the total dwelling stock;
(8) percentage of non high-rise dwellings in the total dwelling stock.
n.a.: not available

[1] the years for which figures are reported vary from country to country and cover the period 2001-2005

Source: Federcasa (2006)

Annex 2

Table A2: Original statistics for availability of housing[1]

	(1)	(2)	(3)	(4)	(5)
Austria	421	51	23	17	46,5
Belgium	409	68	7	6	59,9
Cyprus	415	68	n.a.	n.a.	n.a.
Czech Republic	438	47	20	n.a.	n.a.
Denmark	456	49	19	3,5	38,7
Estonia	463	96	4	n.a.	n.a.
Finland	503	63	18	10	42,6
France	513	57	17	15,8	45,5
Germany	477	45	6	14,4	32,5
Greece	500	74	0	23,4	87,3
Hungary	423	93	3	71,5	n.a.
Ireland	400	79	8	15	67,6
Italy	479	73	5	36,7	65,1
Latvia	403	77	1	n.a.	n.a.
Lithuania	375	91	n.a.	n.a.	n.a.
Luxembourg	391	68	n.a.	22,4	44,9
Malta	331	70	n.a.	n.a.	58,9
Netherlands	422	56	34	2,6	32,1
Poland	314	57	12	n.a.	n.a.
Portugal	482	75	n.a.	22,8	61,7
Slovak Republic	318	85	4	n.a.	n.a.
Slovenia	408	84	6	n.a.	89,5
Spain	462	82	n.a.	18,5	83,4
Sweden	486	38	18	15,1	29,5
United Kingdom	430	69	20	5,2	51

(1) number of dwellings per 1000 inhabitants;
(2) percentage of dwellings occupied by the owner;
(3) share of social renting dwellings in the total dwelling stock;
(4) share of households not living in overcrowded houses for the income group lower than 60 % of the median income;
(5) share of households owning their accommodation for the income group lower than 60% of the median income of all households.

n.a.: not available

[1] the years for which figures are reported vary from country to country and cover the period 2001-2005

Source: Federcasa (2006)

Annex 3

Table A3: Original statistics for affordability of housing[1]

	(1)
Austria	49,6
Belgium	36,7
Cyprus	n.a.
Czech Republic	n.a.
Denmark	29
Estonia	n.a.
Finland	35,4
France	29,4
Germany	42,7
Greece	41,8
Hungary	n.a.
Ireland	49
Italy	53,5
Latvia	n.a.
Lithuania	n.a.
Luxembourg	51,8
Malta	n.a.
Netherlands	28
Poland	n.a.
Portugal	49,6
Slovak Republic	21,18
Slovenia	n.a.
Spain	56,4
Sweden	47,9
United Kingdom	34,8

(1) share of households with financial burden due to housing cost
n.a.: not available

[1] the years for which figures are reported vary from country to country and cover the period 2001-2005

Source: Federcasa (2006)