THE EFFECT OF GOVERNMENT GRANTS ON THE UPTAKE I OF HOME INSULATION MEASURES IN THE UK.

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ABSTRACT

This paper examines historical data on Government expenditure on grants for home energy efficiency improvements, and the effect that this had on the uptake of insulation measures. The analysis focuses on loft insulation, this being the main measure that has been targeted by grant schemes. The paper shows that variations in loft insulation uptake between 1974 and 1996 were closely tied to changes to grant schemes. Furthermore, there is a clear correlation between the uptake rate achieved and the level of funding provided by the Government. The results also indicate the extent of the effect whereby householders who would have installed the measure anyway take advantage of the availability of a grant (referred to as the "free-rider" effect). The costs and savings of the loft insulation grants are assessed and it is shown that, even allowing for "free-riders", the grant schemes were highly cost-effective.

Cet article examine les données historiques sur les dépenses publiques du gouvernement du Royaume-Uni en ce qui concerne les allocations pour faire des économies d'énergie dans les habitations. Le résultat de ces allocations sur l'acquisition d'isolation thermique du toit est le point central de l'analyse. Ce type d'isolation a été la cible principale de la plupart des campagnes gouvernementales pour inciter les gens à réduire leur consommation d'énergie au foyer. L'article démontre que les acquisitions de l'isolation du toit entre 1974 et 1996 étaient très liés aux campagnes gouvernementales et, par ailleurs, qu'il y a une corrélation évidente entre le taux des acquisitions et les dépenses publiques. De plus, l'article examine l'effet des ménages qui auraient acquis l'isolation du toit eux-mêmes, sans allocation, mais qui ont tiré avantage des allocations (l'effet des soi-disant "free-riders"). Une analyse des coûts et rendements montre que les allocations ont été très rentables, même si l'on considère à quel point les acquisitions ont été affecté par l'effet des "free-riders".

KEYWORDS

Loft, insulation, Government, grants, expenditure, savings, energy-efficiency, carbon, free-riders, acquisition, uptake, prices.

INTRODUCTION

Efforts to improve the energy-efficiency of homes in the UK began in the mid-1970s. These efforts have intensified over the years with increasingly stringent thermal requirements being applied to new homes via the Building Regulations and with refurbishment of existing homes being promoted through a variety of schemes and incentives. As a result of these actions, the energy-efficiency of the UK housing stock has considerably improved over the past 25 years, such that the average home now uses no more energy than it did in 1970, in spite of greatly

increased standards of living and comfort (Shorrock and Walters, 1998). Of particular importance for the improvement of existing homes has been the schemes that have provided Government grants to householders for the installation of energy-efficiency measures, especially loft insulation. This paper presents an analysis of the historical data on loft insulation grants and quantifies the effect of the schemes on the uptake of loft insulation. It demonstrates that the grant schemes played an important role in increasing the uptake of loft insulation and that, furthermore, they were highly cost-effective.

THE GRANT SCHEMES

Three grant schemes have been considered for this analysis. These are outlined below.

- The Energy Conservation Programme (ECP) provided funding for the improvement of insulation in Local Authority homes. Most of the funds were devoted to the installation of loft insulation. The scheme began in April 1978 and ended in 1990.
- The Homes Insulation Scheme (HIS) ran from September 1978 to 1990 and provided grants to improve private sector dwellings. These grants covered loft insulation and hot water tank insulation. Because of the very different relative costs of loft insulation and tank insulation, it is clear that the majority of the expenditure was accounted for by loft insulation.
- The Home Energy Efficiency Scheme (HEES) began in January 1991 and covered similar ground to the Homes Insulation Scheme when that scheme came to an end. HEES provided grants to low income, elderly and disabled households to improve the energy efficiency of their homes. The measures covered were loft insulation, tank insulation and draught proofing (the measures covered have since been extended but this does not affect the analysis presented in this paper which stops at 1996). Unlike the other two schemes, a large part of the HEES grants were actually for draught proofing rather than loft insulation. However, it is possible using the available information to make good estimates of the number of loft insulation grants and the associated expenditures.

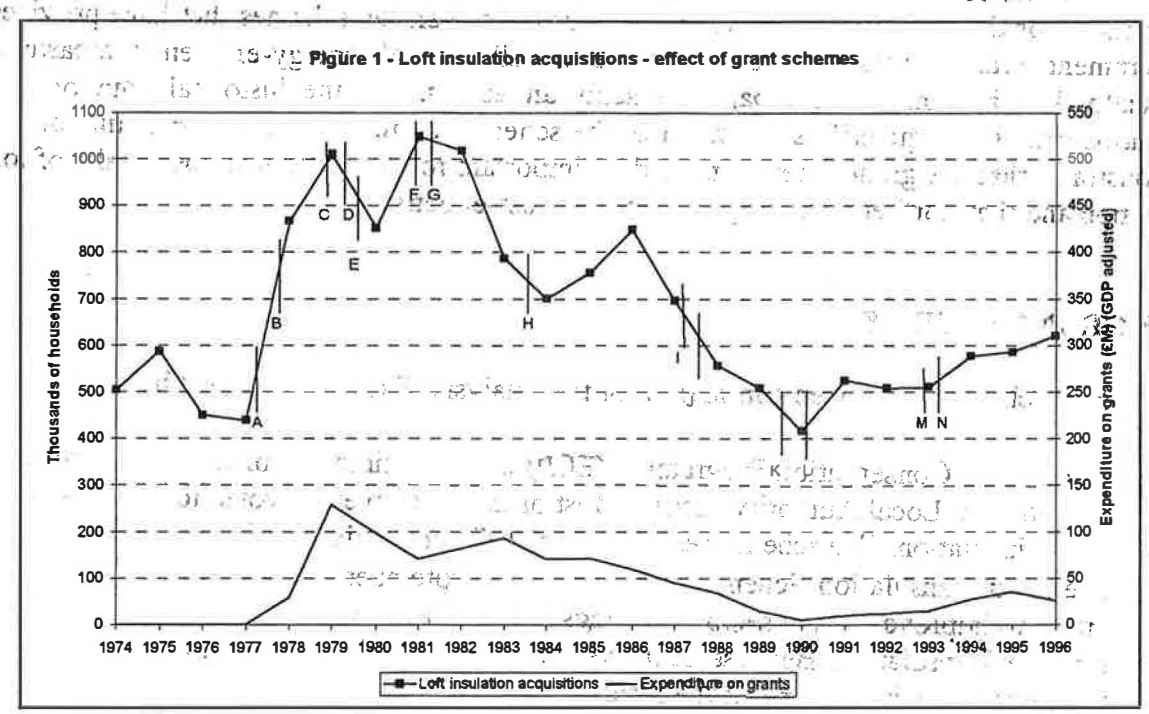
Data on the Energy Conservation Programme and the Homes Insulation Scheme were taken from various issues of Housing and Construction Statistics (see references). Data on the Home Energy Efficiency Scheme were drawn from a consultation document issued by the Department of the Environment, Transport and the Regions in 1996 (see references).

RESULTS

Figure 1 shows a graph summarising the trend in the annual uptake of loft insulation, relating this to important events associated with the three grant schemes which are shown as markers crossing the line, details of which are given in the key below the graph. It is clear that the observed changes in the uptake, which are based on the results of annual market research surveys, are generally as might be expected in response to the events. Thus, for example, the uptake rises quickly in 1978 when the first two grant schemes were introduced but falls markedly after 1988 when the standard Homes Insulation Scheme grant was withdrawn. It rises again when the Home Energy Efficiency Scheme was introduced in 1991.

Also shown on Figure 1 is the total Government expenditure on loft insulation under the three schemes (all expenditures have been adjusted to their 1996 equivalent using the Gross Domestic Product deflator). It is clear from this that the uptake was closely linked to the

expenditure. This is emphasised in Figure 2 where the uptake is plotted directly against the GDP corrected expenditures.



A	April 78	Energy Conservation Programme (ECP) began. Under the ECP funds were provided for the improvement of insulation standards in Local Authority homes.
B	Sept 78	The Homes Insulation Scheme (HIS) began. The HIS provided grants for the improvement of insulation in private sector homes. Up to 66% grants were available for the insulation of lofts and HW tanks.
C	Nov 79	The HIS was extended to allow grants to public sector tenants.
D	April 80	Separate allocations for insulation work under the ECP were discontinued. Local Authorities now decided how much of their block allocation to devote to such work – expenditure on insulation fell.
E	Aug 80	Grants of 90% (maximum £90) were introduced under the HIS for elderly households on low income.
F	Dec 81	The 90% HIS grant was extended to disabled households on low income.
G	May 82	The maximum 90% grant under HIS was increased to £95. At the same time, the standard 66% grant was limited to a maximum of £69.
H	July 84	Grant aid under the HIS was extended to include the insulation of dwellings with less than 30mm of loft insulation.
I	Feb 88	The standard 66% grant under the HIS was withdrawn. The 90% grant (up to a maximum of £137) was made available to anyone receiving income support, family credit or housing benefit.
J	Aug 88	The 90% grant maximum under the HIS was increased to £144.
K	1990	The Homes Insulation Scheme ended. This date also effectively marked the end of the ECP as expenditures under this scheme dwindled (figures ceased to be collected in England in March 89).
L	Jan 91	The Home Energy Efficiency Scheme (HEES) was introduced. This provided grants to people in receipt of income related benefit. Initially, under HEES, a householder contribution of up to £16 was required.
M	Dec 93	The householder contribution element of HEES was withdrawn.
N	April 94	Householders over 60 and recipients of Disability Living Allowance became eligible for HEES grants.

Figure 1: Loft insulation uptake – effect of grant schemes

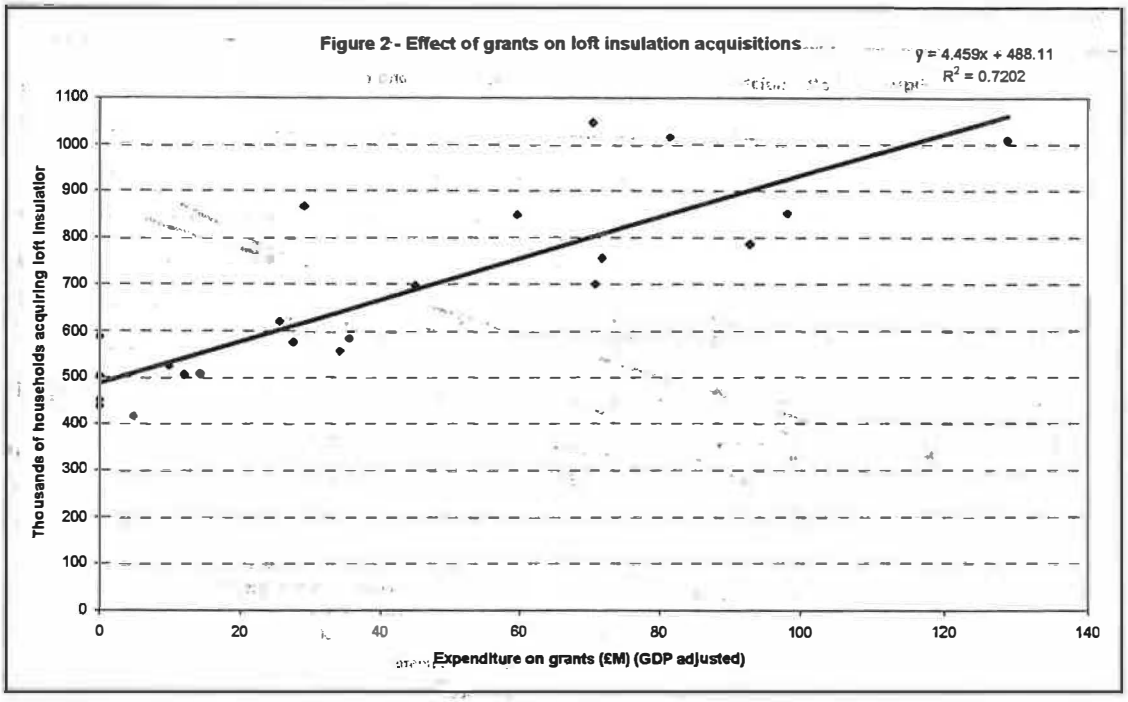


Figure 2: Effect of grants on loft insulation uptake

As figure 2 shows, the correlation between loft insulation uptake and the expenditure is quite good. It indicates that for each £1M spent on grants, the loft insulation uptake rate can be increased by about 4.5 thousand homes per year. In other words, each extra acquisition requires an input of about £225 from the Government (although it needs to be remembered that the HIS and ECP grants included other, much less costly, measures, so this does slightly overestimate costs for loft insulation alone). Further analysis of the regression line shown on figure 2 indicates that the slope and intercept are both highly significant at the 0.5% level (as is the case for all the regression results presented in this paper).

Given the typical costs of other measures relative to loft insulation, this analysis allows estimates to be made of the funding levels that might be required to achieve improved uptake rates for other measures. The analysis is therefore important for helping to indicate, for the housing sector, the costs and feasibility of achieving any overall carbon emissions targets that the UK Government commits itself to.

The free-rider effect

The number of grants associated with the grant expenditure in any year can be extracted from the available information. These data are shown in figure 3 where it is clear that there is a strong correlation. This illustrates the robustness of the GDP adjustment that has been made to expenditure figures. Also included on figure 3 is the same loft insulation uptake data shown in figures 1 and 2, except that these have now been filtered to remove new homes, for which the insulation grants were obviously not available.

Removing the new homes from the data only slightly alters the gradient of the regression line although, obviously, the intercept is reduced considerably. It can be seen from figure 3 that the two regression lines cross. The difference between the two lines represents those households that acquire loft insulation without a grant. The number of such households when there is a grant expenditure of £20M is shown as an example. The difference between the intercept and this number represents those households that would probably have installed loft insulation anyway if there had been no grant available, but who took advantage of the grant.

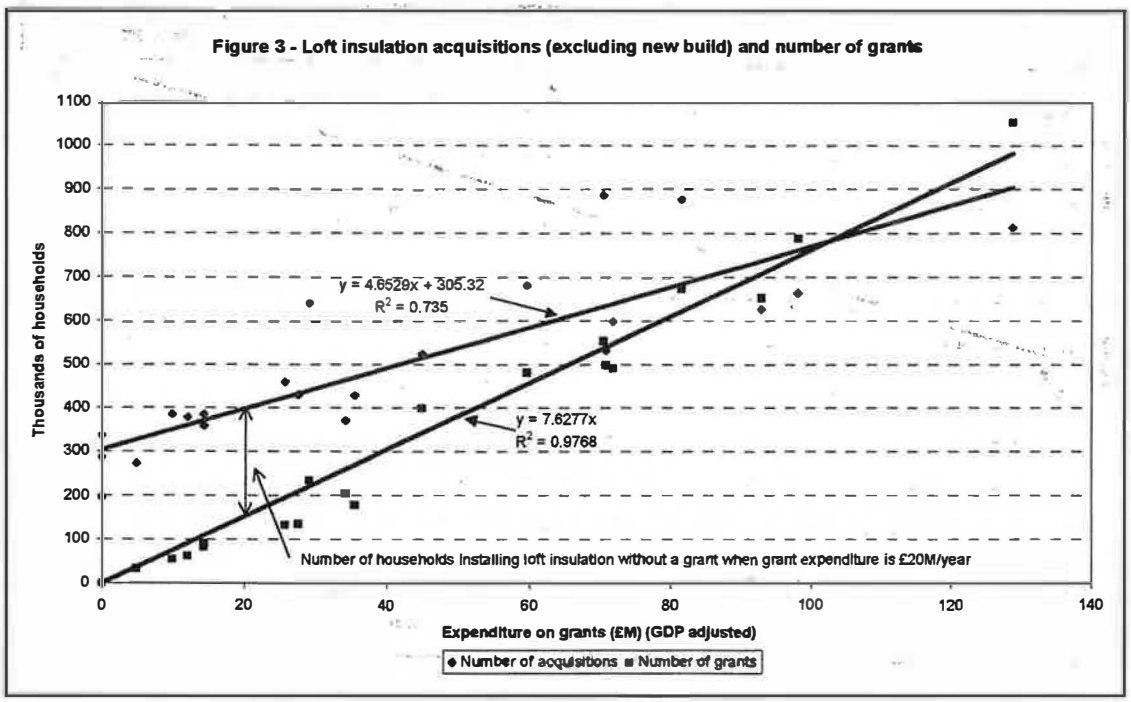


Figure 3: Loft insulation acquisitions (excluding new build) and number of grants

The number of such "free-rider" households at any grant expenditure level can be estimated from the regression lines on figure 3. The resulting equations are:

$$N = 2.98\,x \qquad (x < 102)$$

$$N = 305 \qquad (x \geq 102)$$

Where N is the number of households in thousands and x is the grant expenditure in £M/year.

Thus, the results indicate that there could be as many as 305 thousand "free-riders" when the grant expenditure level reaches about £100M/year. This means that in the early years of the Homes Insulation Scheme, when expenditures were at about this level, almost all loft insulation acquisitions in existing homes would have been with grant assistance. In fact, further analysis of the data reveals that, over the entire period 1978 to 1996 and including new homes, about 50% of all loft insulation acquisitions were undertaken with grant assistance. Thus, the grant schemes were an extremely important factor in improving the overall energy efficiency of the housing stock during that period.

Savings due to loft insulation grants

Using the information discussed in this paper it is possible to estimate the savings that have been achieved due to loft insulation grants. Accounting for comfort effects, this indicates that the housing stock now consumes about 51 PJ/year less due to loft insulation grants, which is equivalent to about 0.9 MtC/year (million tonnes of carbon/year) or £261 M/year. Between 1978 and 1996 the cumulative national energy saving due to the grants is estimated at 713 PJ (13 MtC) or just over £4bn in 1996 money. In contrast, the grant expenditure over this period was £0.93bn, so the grants were highly cost-effective. Allowing for the contributions that householders themselves made to the purchase (estimated at £302 M) the total savings exceed the total costs by a factor of 3.3 and there is a net benefit of £214 per tonne of carbon saved.

The "free-rider" households can be removed from the calculations using the equations derived above. This then indicates the savings that definitely would not have happened in the absence of a grant. These calculations indicate cumulative savings of 449 PJ (8MtC) or just over £2.5bn. This is well in excess of the expenditure on grants. Including the householder contributions, a ratio of savings to costs of 2.1 is calculated, and there is a net benefit of £159 per tonne of carbon saved.

RESULTS FOR OTHER MEASURES AND THE EFFECT OF FUEL PRICES

Lack of space precludes detailed discussion of the results that have been obtained for other measures. However, it is worth noting that hot water tank insulation uptake follows a similar pattern to that for loft insulation, which is not surprising given the way that the grant schemes tied these two measures together. The detailed results indicate that each £1 M spent on grants (and mainly destined to loft insulation) increases the acquisitions of tank insulation by 3.1 thousand. What is more surprising is the fact that the grants seem to have had an effect on cavity wall insulation uptake, even though they did not cover this measure. The results indicate that each £1 M spent on grants for other measures increases the uptake of cavity wall insulation by about 890 households. This suggests that grant schemes, and the publicity surrounding them, have an effect on people's awareness about the benefits of energy efficiency, and that this results in them being more willing to undertake energy efficiency improvements, including measures for which there is no grant aid available.

The potential effect of fuel prices has also been investigated but the conclusion is that these played very little part in the observed uptake patterns for insulation measures. The analysis shows that a 1% increase in fuel price only increases the uptake of loft insulation by about 4.3 thousand. Furthermore, the coefficient associated with this variable is not quite significant at the 20% level (contrast with the grant variable which is highly significant at the 0.5% level).

CONCLUSIONS

This paper has analysed historical data on Government grants for loft insulation and has quantified the effect of those grants, including an assessment of the extent of the free-rider effect. The results are relevant for estimating for the housing sector the possible costs and feasibility of achieving the UK Government's overall carbon emissions targets.

This work was supported by the Global Atmosphere Division and the Research, Analysis and Evaluation Division of the UK Department of the Environment, Transport and the Regions. The opinions expressed are those of the author and do not necessarily represent the views of the UK Government.

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