Energy Policy 74 (2014) 610–620

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Fiscal impacts of energy efficiency programmes—The example of solid wall insulation investment in the UK ☆

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HIGHLIGHTS

- First assessment of fiscal effects of subsidising energy efficiency technologies in the UK.
- Contribution to debate around wider benefits of funding energy efficiency.
- Original economic modelling.

ARTICLE INFO

Article history:
Received 28 May 2014
Received in revised form
24 June 2014
Accepted 12 August 2014
Available online 28 August 2014

Keywords:
Energy efficiency
Subsidies
Public budgets
Employment

ABSTRACT

Programmes supporting the installation of energy efficiency measures typically incur a cost in the form of subsidies as well as lost VAT income due to reduced energy consumption. Those costs are to some extent offset by the tax receipts and other revenue streams generated as a result of the activities promoted under the programme. In this paper we analyse the budgetary effects of energy efficiency programmes focusing on the example of solid wall insulation in the UK. Three distinct subsidy options have been defined and modelled for the purpose of this research including two policies with varying degrees of direct subsidy and a low interest loan scheme. Our analysis shows that a significant amount of the cost of a scheme funding solid wall insulation would be offset by increased revenues and savings. A loan scheme, due to the high leverage, achieves not only budget neutrality but generates additional revenue for the Exchequer.

1. Introduction

Public policy often provides financial incentives for certain technologies and/or sectors to achieve environmental goals and/or support employment. Such programmes can incur significant cost in the form of subsidies paid for via general taxation. However, the costs of subsidies are to some extent offset by additional tax receipts, savings in unemployment benefits payments, and other revenue streams generated as a result of the activities promoted under the programme (Brown and ANDKöttl, 2012). This effect can even lead to subsidies becoming self-financing—examples include wage subsidies targeted at low-income/ability workers (Brown et al., 2011) and subsidies of tuition fees (Trostel, 1996).

Subsidies are also an important policy instrument in the energy efficiency arena—all IEA country governments use economic instruments (particularly grants) to encourage the uptake of energy efficiency measures enabling consumers to fund those measures and overcome the barrier of high upfront cost (IEA, 2013).

However, there are very few examples of studies analysing the fiscal effect of subsidies in the energy efficiency arena. A recent study from Ireland confirms that a significant proportion of the cost of providing the subsidies is offset by the revenue streams generated (Curtin, 2012). An assessment of the budgetary effects of one of the world's most prominent soft loan scheme for energy efficiency, the German KfW CO_2 Building Rehabilitation Programme, shows that the programme cost are exceeded by the various income streams and savings generated making it budget-neutral or even budget-positive (Kuckshinrichs et al., 2010).

This paper makes a contribution to this emerging body of literature by assessing the fiscal implications of providing financial support to the insulation of solid walled homes in

☆**Note**: This paper is based on an independent report by the Institute for Public Policy Research (IPPR) produced in conjunction with Ricardo-AEA.

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http://dx.doi.org/10.1016/j.enpol.2014.08.007
0301-4215/

the United Kingdom (UK). We have deliberately chosen solid wall insulation as an example as this technology (a) is relatively costly compared to other energy efficiency technologies which is why it requires substantial subsidies, and (b) because it is a measure that is deployed in many countries and one of the most prominent retrofit measures. Furthermore, with the current development around the EU 2030 energy efficiency targets we expect solid wall insulation to become increasingly important. However, had we chosen a set of other energy efficiency retrofit technologies the results of our analysis would not be significantly different, assuming that the total amount of subsidy would be similar. Even though there are differences in the labour intensity of different technologies we have primarily used sources for our analysis based on the energy efficiency sector more generally rather than one particular technology as this data is not (yet) readily available. Our decision to focus our analysis on one of the various technologies available is also a pragmatic choice allowing us to use a limited set of assump tions keeping the model fairly simple whilst being able to scrutinise the evidence which our analysis is based upon. In reality a mix of energy efficiency technologies are supported by public subsidies rather than one single measure which is why the results of our analysis should be seen as indicative and illustrative.

The following analysis shows how, if the Exchequer receipts from energy efficiency investments are taken into account, the cost to government of supporting the technology is significantly lower than might otherwise be assumed. A key factor which affects the level of exchequer revenues generated is the amount of subsidy the Government provides towards the cost of an installation. Three distinct subsidy options have been defined and modelled for the purpose of this research:

- **Option 1—private householder scheme**: For this scenario we have assumed a 2:1 funding ratio for the funds invested by government and private householders. This is equivalent to the level of subsidy the Government makes available through the UK's Green Deal cashback scheme although it varies according to measure (DECC, 2014).
- **Option 2—social housing scheme**: For this scenario we have assumed a 1:1 funding ratio for the funds invested by government and social housing providers. This is equivalent to the level of subsidy provided by energy suppliers assumed under previous energy efficiency programmes in the UK (HM Government, 2008).
- **Option 3—loan scheme**: For this scenario we have assumed that government issues subsidies to a financial intermediary that provides low interest loans similar to the German KfW scheme with a 1:4 funding ratio for the funds invested by government and private householders (calculated based on Federal Ministry of Transport, Building and Urban Development, 2011; Kuckshinrichs et al., 2009).

To assess the impacts on the Exchequer of these different subsidy options we have built a bespoke economic model. The model takes account of five distinct types of exchequer revenue:

- value-added tax (VAT) paid when installing solid wall insulation;
- corporate tax income paid by all companies involved in the solid wall insulation supply chain;
- income tax generated by jobs directly and indirectly created (since estimates of induced jobs are inherently uncertain these can be omitted from the assessment);
- avoided costs of unemployment, as job creation lead to reduced social benefit payments; and
- savings for the health budget achieved as the health of occupants of buildings receiving solid wall insulation is improved and they require less health treatment.

The model does not include VAT impacts that occur due to reduced energy consumption. We can expect this to be net positive because it can be assumed that a large proportion of any cost savings will be reinvested by consumers and spent on goods and services with a higher VAT rate (domestic energy consumption is subject to a reduced 5% VAT) (Cambridge Econometrics and Verco, 2012).

The model assesses the impact of a scheme to support the uptake of solid wall insulation measures across the UK's domestic housing stock. Using a set of peer-reviewed and accepted assumptions, the model estimates the effects of a subsidy scheme implemented. Several assumptions and simplifications had to be made to assess the overall costs and benefits of the scheme.

For each of the three subsidy options we have modelled exchequer revenues in two ways. The 'low revenue scenario' is conservative and includes all of the subsidy cost but excludes some of the revenue streams identified above, specifically the income tax from induced jobs, the avoided cost of unemployment from induced jobs and the reduced NHS spending due to health improvements. We have done this because there are larger uncertainties associated with these revenue streams. By contrast, the 'high revenue scenario' includes all of the cost and all of the revenue. Crucially, our model shows the Exchequer revenues generated in the same year that subsidy costs are paid out. By doing so, it illustrates the net impact on the public finances in any single fiscal year.

The paper is structured along four distinct sections: First, we provide background information on the different options modelled and the overarching context and aim of the study. Second, the methodology and the data used are presented in detail. Third, we present the results of the analysis for each of the options modelled. Finally, we conclude and raise questions for further research.

2. Methods

The model assesses the impact of a scheme to support the uptake of solid wall insulation measures across the UK's domestic housing stock on the Exchequer. Using a set of peer-reviewed and other validated assumptions where no peer-reviewed evidence exists (see Section 2.2 for a detailed discussion of the assumptions made and the sources used), the model estimates the effect of a subsidy scheme implemented according to the following inputs values:

1. Subsidy as % of capital cost (materials+labour+VAT) required to complete the insulation works: depending on scenario.
2. Number of properties insulated per year: 100,000.

Several assumptions and simplifications had to be made to assess the overall costs and benefits of the scheme. The investment to be financed includes the cost of labour and material plus VAT and it will be covered by:

- private finance: percentage of costs that private households are expected to pay directly (Option 1+2) or through a loan (Option 3); and
- subsidy: percentage of costs covered by the Exchequer in the form of a non-repayable grant (Option 1+2) or through a loan (Option 3).

The three options analysed thus are: (Table 1).

This section provides the source of the modelling assumptions and how they have been combined to create a set of three options