Published in final edited form as:

Energy Policy. 2012 September 1; 48: 506–514. doi:10.1016/j.enpol.2012.05.053.

Policy options for the split incentive: Increasing energy efficiency for low-income renters

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Abstract

The split incentive problem concerns the lack of appropriate incentives to implement energy efficiency measures. In particular, low income tenants face a phenomenon of energy poverty in which they allocate significantly more of their household income to energy expenditures than other renters. This problem is substantial, affecting 1.89% of all United States' energy use. If effectively addressed, it would create a range of savings between 4 and 11 billion dollars per year for many of the nation's poorest residents. We argue that a carefully designed program of incentives for participants (including landlords) in conjunction with a unique type of utility-managed on-bill financing mechanism has significant potential to solve many of the complications. We focus on three kinds of split incentives, five concerns inherent to addressing split incentive problems (scale, endurance, incentives, savings, political disfavor), and provide a detailed policy proposal designed to surpass those problems, with a particular focus on low-income tenants in a U.S. context.

Keywords

Split incentive; Energy poverty; Energy efficiency

1. Introduction

Energy efficiency and weatherization have been characterized as low-hanging fruit for the problems of high energy costs, energy independence, and global climate change. They provide the most clear-cut beneficial solutions, with the highest impact, and often with the greatest payoff of any energy or climate change solution (Davis, 2011; Granade et al., 2009). However, the United States, and many other advanced industrialized nations have so far done relatively little in these areas, particularly for low-income residents, and especially tenants.²

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²This is a well-known issue amongst those who work in energy poverty and/or efficiency implementation. Certainly there have been plenty of programs to address the problem; however, such programs have only been able to address a very tiny proportion of the potential need. For instance, the Weatherization Assistance Program in the U.S. averaged approximately 95,000 homes weatherized each year from 2000 to 2007, yet there are 117 million households in the U.S., of which 35% (39.9 million) are eligible for energy assistance (U.S. Department of Energy, 2012; U.S. Energy Information Administration 2010; and U.S. Census Bureau, 2012).

In this paper we pursue two goals. First, we outline a broad overview of the split incentive problem and its particular issues and hurdles. We also demonstrate its particular and pernicious impact for low-income tenants. Second, we propose a specific policy mechanism designed to improve upon the best current policy approach which combines the success of on-bill financing with improvements for landlord incentives. We argue this approach has the potential to significantly improve the adoption of on-bill financing in all tenant situations, but most importantly can improve energy efficiency and weatherization in rental units for low-income tenants.

Split incentives are defined as “a circumstance in which the flow of investments and benefits are not properly rationed among the parties to a transaction, impairing investment decisions.” (California Sustainability Alliance, 2011). Split incentive problems and a variety of other concerns are the primary reason that energy efficiency weatherization solutions have been implemented at such a low level. Other concerns include capital costs, transaction costs, zoning and housing regulations, lack of energy efficiency knowledge, and quality verification. Further, in many cases utilities are motivated to increase or maintain energy use so that their profits grow or remain consistent. All these concerns significantly hinder the realization of high levels of energy efficiency and weatherization upgrades in the US and elsewhere.³

Arguably, one of the groups that would most benefit from the implementation of residential energy efficiency measures is low-income tenants that are not housed in public housing facilities (with paid heat). Low-income renters often spend the highest percentages of their income on energy and heating costs, yet they receive the lowest amounts of energy per dollar spent because the weatherization and efficiency measures in their rental units are often at the lowest levels of efficiency. Further, most low-income renters have to simultaneously address all of the factors discussed in the previous paragraph. They have the smallest amount of available or discretionary capital costs and income, they must address several forms of split incentive problems (discussed in detail below), and often times they have the least amount of energy efficiency knowledge compared to middle or upper class residents, or to commercial and industrial sectors. The problems inherent in the split incentive issue are particularly challenging for low-income renters.

However, addressing the split incentive problem is often focused on sectors or demographics that have the opportunity to create change at scale, and/or that have better abilities to address “first costs” (e.g., initial capital costs).⁴ For instance, California's Sustainability Alliance Program (which is funded by all utility customers, including the residential demographic) focuses entirely on commercial office buildings, in part because they are the largest user of

³A strong response to the argument for efficiency is that a rebound effect (e.g., Jevons' Paradox) will occur, and consumers will increase their use of energy as it becomes more efficient (Sorrel, 2009). This is an ongoing debate; however, we believe that the benefits of increased efficiency will still strongly outweigh the costs of potential increased usage. Further, past analysis demonstrates that efficiency has still significantly decreased business-as-usual forecasts. For an excellent discussion of these issues see “The Experience with Energy Efficiency Policies and Programmes in IEA Countries: Learning from the Critics” (Howard et al. (2006)).

⁴Throughout the paper we focus on “scale.” In the context of efficiency programs generally, the focus is on commercial and industrial users because they use large amounts of energy, and efficiency reductions can be more easily implemented via economies of scale. In the context of residential efficiency programs, the goal of achieving a program “at scale” refers to the ability to create a program that addresses a significant portion of the potential need. For instance, while the Weatherization Assistance Program in the U.S. has been successful to some degree, it has addressed a tiny percentage of the total residential need for energy efficiency retrofits.

energy in the state. Unfortunately, this leaves low-income tenants with little hope for addressing this pervasive problem.

In 2005, residential energy use was 22% of all energy use in the United States (Brown and Wolfe, 2007, 7). However, residential energy use is approximately 33% of all efficiency potential in the United States (Granade et al., 2009, iv). Residential rental households accounted for 2.39 quadrillion BTUs of energy consumption, or approximately 28% of all U.S. residential households. 35% of households in the U.S. are eligible for energy assistance and within rental households, 88% pay all energy costs directly (i.e., neither heat nor electricity is paid by the landlord) (U.S. Energy Information Administration, 2010). Thus, the split incentive problem – low-income tenants paying their own energy costs – likely accounts for at least 1.89% of all energy use in the United States, and 8.6% of energy use in the residential market.

In 2009, total U.S. energy expenditures were \$1.06 trillion (Energy Information Administration, 2009). Extrapolated, this means that energy expenditures for low-income tenants were approximately \$20 billion. Average household energy expenditure in 2009 was \$2101 (Department of Energy, 2011). Average efficiency savings from weatherization alone are \$436 (Eisenberg, 2010, 7). Thus weatherization alone accounted for a 20% reduction in energy and utility costs. Other estimates for energy efficiency allow for savings of up to 55% (Lawrence Berkeley National Laboratory, 2011). Thus, solving the split incentive issue and implementing efficiency would create savings in a range of \$4–11 billion dollars per year.⁵

Energy poverty is an often overlooked phenomenon in which low-income householders allocate a disproportionate share of their income to utilities-related expenses. As of 2009, the Census Bureau determined that approximately 14% of the population was living below the poverty line (Smith, 2010). Low-income households may spend 10% of their total income on energy, and beyond 20% for very low-income households as compared to an average 3.3% for non-low-income households (Baxter, 1998; Kaiser and Pulsipher, 2006). In Britain, energy poverty accounts for approximately 8–13% of the population (Boardman, 2010, chap. 2).⁶ These energy expenditures are usually not factored into overall housing expenses that are used to determine entitlement benefits such as housing subsidies (i.e., “Section 8” housing assistance in the U.S. context), which offset the cost of housing but not utilities expenditures. High utility and energy costs put low-income renters at greater risk of housing instability and homelessness, and increase the risk of debt accumulation for non-participatory household members such as children, and health-related consequences (Hernández and Bird, 2010). To date, efforts toward home energy efficiency have overwhelmingly been geared toward middle and upper class Americans.⁷ The concept and practice of “going green” within the realm of housing has commonly been marketed and consumed as a matter of luxury, yet the core principles of conservation are well aligned with

⁵There is no strict one-to-one relationship between energy consumption (BTUs) and energy expenditures (US\$) but this data and extrapolation certainly provides a useful rough approximation.

⁶Measuring Energy Poverty is a complex, difficult task. See Pachuri and Spreng, *Measuring and Monitoring Energy Poverty* for an excellent discussion (Pachauri and Spreng, 2011).

⁷For instance, the Recovery through Retrofit Initiative came out of a White House based report from the “Middle Class Task Force and the White House Council on Environmental Quality (2009).

the lifestyle habits of the economically disadvantaged brought on by privation rather than privilege.⁸ We demonstrate throughout this paper that greater emphasis on residential energy conservation among the poor will likely pay significant economic and environmental dividends well into the future.

This paper will specifically focus on low-income tenants who function under “Section 8” or the Housing Choice Vouchers Program of HUD (Department of Housing and Urban Development).⁹ Typically Section 8 tenants pay for market rentals that receive a market price (as determined by the local housing agency). The program determines what the low-income tenants are able to pay, and the vouchers are used to make up the difference. The program benefits low-income tenants, as well as the elderly and the disabled. Section 8 has two main components consisting of mobile vouchers and entire buildings subsidized through the program. Subsidized buildings often include electricity, gas, and water in the cost of rent. The critical concern here is that while mobile vouchers provide tenants with the freedom of choice, tenants are more likely to rent apartments from private landlords who in turn do not cover utilities or optimize energy efficiencies in the home.

In the U.S., 3.1 million households receive Section 8 housing. Another approximately 1.2 million households live in public housing units, managed by some 3300 Housing Authorities or Agencies (U.S. Department of Housing and Urban Development, 2011). Despite the fact that Section 8 is a very large component of residential housing, virtually nothing has been done to address tenant efficiency and weatherization in this context. As recently as 2008, the office of Housing and Urban Development did not even discuss the split incentive problem, yet they still spent over \$5 billion dollars in energy assistance that ultimately went to gas and electric utilities (U.S. Department of Housing and Urban Development, 2008b).

2. Theory

The split incentive issue is a well-known principal-agent problem within rational choice economics generally (de T'Serclaes and Jollands, 2007, 25). Agency problems refer to any situation in which a principal pays an agent for a service or good. The theory demonstrates that principals often have different goals and information than an agent who supplies them with goods or services. The split incentive problem is rife with differences in both. Therefore, the principal-agent theory is a valuable approach for understanding problems evident in the split incentive particularly those regarding the incentive structure for landlords, tenants and utility companies. The primary responses to principal agent problems are either in the form of contracts which align the incentives of the two actors, or via government regulation. Our analysis will consider a variety of approaches in both arenas.

The split incentive problem has two broad types, with a possible third variant. First, split incentive problems are most well-known as a split between landlord and renter. In this situation, a landlord (agent) buys and supplies all of the components of a potentially energy efficient apartment or home. This includes appliances (refrigerator, stove, furnace, air

⁸The concern for environmentalism and elitism is not new. It was discussed overtly as early as 1986 (Morrison and Dunlap).

⁹Similar programs exist in other OECD nations. Thus, the importance of addressing split incentive problems for low-income tenants has implications that go far beyond the United States.

conditioning, dishwasher, etc.) as well as building shell efficiencies (insulation, roof, windows, doors). Their incentive is to supply these at the lowest possible cost (not the highest efficiency), because they do not pay the energy or utility bills. Alternately, the tenant (or principal) pays the energy bills, and has high incentives to increase efficiency, but no control over the means to do so.

The second kind of split incentive problem in residential landlord/tenant scenarios, and also in homeowner and commercial lease situations, is the problem of the temporal split incentive. In this situation, the agent has no idea for how long they will reside in their current location. If one is going to move relatively soon, or does not know if they will move, then a high upfront capital cost investment in efficiency is quite risky if a move is possible in the next 2–8 years.

According to the 2007 American Housing Survey, homeowners stay where they are for about nine years whereas renters move every two (The Economist, 2009; U.S. Department of Housing and Urban Development, 2008a). Further, some efficiency investments have payoffs that accrue on an even longer timescale. For instance, the installation of solar panels often has an average payoff (even with regulatory incentives) of 15 years or longer.

A third form of split incentive issue (though not usually characterized as such) occurs with respect to utility companies and residential rate payers. Most utility companies make their profit via rate of return regulation, in which their profit is determined by a set percentage of how much of a commodity they sell (electricity or gas). Their incentive is obviously to sell more energy. However, utility companies are also often simultaneously in charge of overseeing, providing information, or acting as intermediary for energy efficiency programs.¹⁰ The upside to this intermediary role is that utility companies can stave off large debts accumulated by low income ratepayers who struggle to afford the energy they use. However, the downside is that increasing energy efficiency acts to reduce the profits of a utility (if they are paid proportionate to how much gas or electricity they sell), so they have little incentive to run such a program well.¹¹

The response to this problem has been to adjust utility regulation by using decoupling, in which profits are no longer linked (i.e., decoupled from) the selling of the energy commodity. Many American states have adopted variants of decoupling and significantly improved the incentives for utility companies to oversee high quality energy efficiency programs (Center for State Innovation, 2008; Regulatory Assistance Project, 2011). While this paper will not address decoupling issues extensively, this aspect of utility regulation is an important component of any attempt to address the split incentive problem.

Low-income tenants in private housing have the potential to suffer from all three forms of split incentives. As a result, programs to address energy poverty and split incentives have primarily addressed the problem via direct funding of weatherization. However, such

¹⁰This is because they are otherwise a very logical choice for the implementation of energy efficiency measures. There is an already-established program of communication, billing, and energy related administrative procedures for energy consumers in a given region.

¹¹Certainly, some utility-run weatherization programs have been successful, though not in addressing the other split incentive problems. Utilities are the logical and critical partner for efficiency programs as we discuss later.

funding programs suffer from several problems. First, they are underfunded. Second, they do not take advantage of the fact that weatherization and efficiency investments are ultimately self-financing (if the split incentive problem is solved). Finally, low-income energy efficiency may also be ignored because politically, the funding of low-income assistance is politically fraught. It is a “third rail” in much national, state, and local politics. Generally, much of the focus in Washington for weatherization, retrofitting, and new energy efficient construction is on commercial buildings, and within the residential sector, the middle class.

3. Split incentives: Unique problems in private, low-income housing

While the split incentive is a pervasive problem across all sectors, it is especially acute for low-income residents. The insidious nature of the split incentive problem particularly for private, low-income rental housing suffers from five problems simultaneously: scale, endurance, incentives, savings, and political disfavor. First, any solution to the split incentive problem has to occur at a large enough scale to have significant impact. For instance, weatherization programs are typically focused on cheap or deferred loans, or direct grant funding. The concern here is that these forms of funding for weatherization certainly address the split incentive problem (particularly direct grants) but it is an extremely inefficient and non-scaleable way to address the problem. Under current economic and political circumstances, direct government financing of the total potential energy retrofit market is unlikely in the United States.

Second, a policy solution should be designed such that it has endurance and be relatively self-sustaining. This is a particularly difficult concern for comprehensive (i.e., the “concierge” type programs described below) or multi-faceted policy programs that address energy retrofits. These types of program typically have a very small footprint, or they last 2–5 years without being able to sustain a longer provision of services. The difficulties in providing an all-inclusive suite of services (energy education, analysis, comprehensive retrofits) require a large set of logistics, bureaucratic structure, and resources (Table 1).

Third and fourth, any solution to a split incentive problem has to provide incentives to both the principal and the agent, and must address how those monetary savings are split up. These two issues are one of the most difficult concerns to address. Attempting to provide incentives to both parties (principal/agent – landlord/tenant) can create transaction costs which can erase or decrease the potential savings. Addressing how the benefits are divided between principal and agent in a way that is consistent, even if tenants are changing, can be a particularly problematic issue.

Finally, the degree of political disapprobation for public programs that address concerns for the poor have proven to be contentious in recent history, particularly in the United States. The rise of neo-conservative values in the last 30 years has resulted in waning support for assistance to the underprivileged among politicians across the political spectrum. Policy solutions which focus on the poor, even if well-designed, market-based, or transformative, receive little attention and can be politically controversial even for mainstream, moderate, or progressive politicians in the U.S. context. With regard to the split incentive problem, where

such programs do not currently exist, the potential political disfavor would only serve to amplify the lack of solutions.

4. Policy responses

A wide variety of policy responses exist that attempt to address split incentive problems generally, or specific aspects of them. However, few, if any, exist that address the specific problems of low-income tenants, and certainly none currently exist that do not impose considerable regulatory constraints and/or disincentives for landlords that are willing to provide low-income housing.

Broadly, these policy responses function in one of three ways. First, some policies function on a specialized contract basis. These programs attempt to solve policy responses by the creation of an agreement that has been specifically designed to circumvent problematic aspects of split incentives. Second, it is possible to address the problem from a conventional policy design approach via regulation. Regulatory approaches or mandates can be extraordinarily effective but are often politically unpalatable, have enforcement concerns, and can be difficult in any situation where voluntary participation is required. Finally, “All-In” services can also be extraordinarily effective but are generally very expensive, and thus very hard to implement at any kind of scale. An overview of these responses is discussed below and shown in Table 1.

5. Contractual approaches

Green or Energy efficiency leases constitute a mutual agreement between a landlord and tenant in which both parties agree to provisions that maximize energy efficiency. The costs of capital improvements and upgrades to appliances incurred by the landlord are offset by increased rent to tenants. The difference is returned to the tenant in cost savings on utility expenses as well as a mutual subscription to energy conservation. Experts suggest that the conditions of green leases be agreed upon collaboratively so as to ensure that both parties are working together to achieve higher standards in energy efficiency. This practice is increasingly common in commercial lease agreements. However, a recent feasibility report in San Francisco suggests that green leases in the residential sector are cost-effective as reflected by low administrative costs and high yields in carbon savings potential (San Francisco Planning and Urban Research Association-SPUR, 2011).

A major barrier to the wide-spread adaptation of green leases in low-income housing are the underlying assumptions that the landlord will carry out and maintain capital improvements while working collaboratively with tenants to ensure a maximum return on investment. New York City has recently passed a comprehensive set of laws under the “Greener, Greater Buildings Plan” to reduce the carbon emissions of large buildings. This initiative sets rigorous efficiency requirements coupled with an “Energy-Aligned lease” geared toward commercial properties to provide incentives for building owners to recover costs associated with retrofit upgrades using a pass-through mechanism in which tenants pay according to predicted energy savings (New York City Department of Planning, 2011). Such programs do not exist for low-income residential housing.

Energy Efficiency Mortgages are another contractual option. In the United States, this has primarily taken place most recently as Property Assessed Clean Energy Financing (PACE). PACE financing is set up so that a municipality can offer bonds to investors and use the money to finance energy and efficiency retrofits. The financing for the retrofit is paid back by an additional charge on the property tax bill. Thus the retrofit benefits and costs remain with the property regardless of who the owner or the tenant may be. These benefits are virtually always significantly larger than the costs of the increased charge in the property tax bill. More importantly, it solves the temporal split incentive problem. Even if a property owner moves sooner than they might have, both the benefits and the costs of the energy retrofit remain with the property. It also solves the problem of up-front capital costs; all the initial financing comes from the program. Between 2008 and 2010, 24 states adopted legislation allowing for PACE financing (PACENow, 2011).

Sadly, the PACE financing model ran into significant problems in 2010. The U.S. mortgage authorities Freddie Mac and Fannie Mae refused to finance mortgages with PACE liens, effectively killing the program. This occurred because PACE loans involve municipal assessments and are assigned first lien status (i.e., in cases of default, they are paid off to the municipality before the main mortgage is paid to the lender). The Federal Housing Financing Agency argued that this, in addition to other linked effects, increased risk to the mortgage industry (Cox, 2010; Larson, 2011; Woody, 2010). As of early 2012, the FHFA is developing a comprehensive set of legislative rulings for PACE, but the outcome of this is unlikely to be solved soon.

Vermont has recently adopted legislation that addresses this lien problem. However, their new model has higher financing costs than previous PACE financing schemes, precisely because the PACE loan is now a tertiary lien-holder. This significantly reduces the financial enticement and payoff of energy efficiency, though it does not eliminate it (Adamczyk, 2011). As of early 2011, national legislation with bi-partisan support is pending that would mandate PACE programs as superordinate lienholders (PACE Assessment Protection Act of, 2010). There is significant pushback from the mortgage and real-estate financing industry, and it is unclear whether the legislation will pass or be significantly modified. More recently, Efficiency Maine has implemented a large scale PACE program across the state which apparently targets renters as well as home-owners.

A third contractual model is on-bill financing (or on-bill repayment). This is a loan program that provides money for weatherization improvements that are then paid back through the utility company bill (Fuller et al., 2009; Interviewing Service of America, Inc., 2009). Such a program can be very beneficial, similar to PACE financing but without lien problems. However, a significant concern is that on-bill financing models most often focus on providing services to live-in homeowners (i.e., owner-occupied homes), not tenants, or low-income owners.¹²

¹²The original intent of on-bill financing programs was to target renters. Further, innovative programs do exist: the HowSmart Program from Midwest Energy targets tenants as well as home owners, and could be adopted by low-income tenants (although it is not specifically targeted to them). It is not clear to what degree these programs can address concerns for scale. We appreciate the input of an anonymous reviewer in bringing these programs to our attention.

For instance, recent pilot programs conducted in Massachusetts have focused on rental programs that specifically omit low-income tenants. The OBR (on-bill repayment) working group in Massachusetts argues that low-income programs should not be eligible for on-bill repayment because.

Customers who are eligible for low-income programs should be directed in [sic] the carefully tailored low-income programs, which provide 100% of the funding for energy efficiency measures for eligible participants. All parties seek to avoid overleverage for any customer, including the most vulnerable customers in the lowincome sector.

(Massachusetts Department of Energy Resources, 2010, 5).

Unfortunately, this creates a difficult paradox. Clearly the need for large programs of energy retrofits exists, and is most needed by low-income tenants who are afflicted by energy poverty. However, low-income programs that provide 100% funding (e.g. concierge services) are unlikely to be funded by policymakers and politicians at anywhere near the level required to address the scale of the problem.¹³ Further, grant based weatherization programs really do not address the split incentive problem, they just bypass it in an expensive, unrealistic manner. The recent analysis conducted by the Working Group in Massachusetts still grapples with the problem of the split incentive in rental properties; the burden undertaken by a landlord, and benefit accruing to a tenant.

In particular, on-bill financing models grapple with several significant complexities. First, on-bill financing programs are usually administered by the utility company (gas or electric). However, a utility will have strong disincentives to efficiently administer any program that reduces the amount of energy it sells (and thus its profit). As discussed earlier, this is yet another form of split incentive. Any jurisdiction wishing to adopt some sort of on-bill financing model administered by an energy utility should have a decoupling program in place to address this issue. In the U.S. context, this is generally done via state legislation.

Second, complications of landlord-tenant relationships also aggravate matters. Should default occur by the tenant on the utility bill, there are several questions. Who bears the burden of the defaulted payment: the landlord, utility, government agency, or financial company backing the loan? In the case of partial payments, which parts of the bill are paid first, the energy portion, or the retrofit loan portion; or is the entire bill paid by the government agency backing the program? While these are not unsolvable problems, they must be addressed carefully in any on-bill policy design.

A final concern for on-bill financing is the degree of incentive for a landlord to go forward and initiate participation (and the concurrent transaction costs of overseeing an efficiency upgrade).¹⁴ Recent discussions in the Massachusetts model suggest that a landlord should

¹³This is not just unique to the U.S. For instance, London's concierge program was defunded, and UK problems with this issue are outlined in Boardman (2010). This is also in large part because the degree of need (discussed in the earlier part of the paper) is so large.

¹⁴A variety of other legal concerns exist that are not addressed here but which we expect can be addressed as legislation is developed. For a detailed discussion, see Legal Issues in Financing Energy Efficiency: Creative Solutions for Funding the Initial Capital Costs of Investments in Energy Efficiency Measures (Van Nostrand, 2011).

pay some portion of the efficiency investment separately, “the landlord would be required to pay in an upfront amount (which itself could be financed separately) equal to the amount needed to reduce the expected finance costs to some percentage below expected savings.” (Massachusetts Department of Energy Resources, 2010, 26) The logic behind this is that the landlord would be gaining an efficiency investment in their property that would increase its overall value. This is likely a problematic assumption because of the significant transaction costs of program bureaucracy and construction oversight that any landlord will have to undergo. We address this concern specifically in our policy recommendations later in the paper.

6. Regulatory approaches

One solution for energy and efficiency implementation can be the adoption of green building codes. This is a far broader solution that crosses demographic lines and applies to residential housing, either owner-occupied or rental, and across all income levels. For instance, in the United States, many municipalities have adopted building codes that require high levels of building energy efficiency and LEED (leadership in Energy and Environmental Design) Certification and are created by the U.S. Green Building Council (U.S. Green Building Council, 2011).

While green building codes are arguably a superb approach to increasing building energy efficiency at scale, they have two significant drawbacks. First, and most importantly, the building codes generally only apply to new construction, and have no impact on pre-existing housing and attempts to implement retrofits. Further, in the context of low-income rentals, this problem is amplified because the vast majority of low-income rental housing is not new construction. So while green building codes are a comprehensive way to implement more energy efficient housing, they have little impact on the split incentive problem for low-income tenants. Second, green building codes are a regulatory mandate. They are opposed by the National Association of Home Builders and are opposed by citizens who have concerns for freedom and “environmental fascism.”¹⁵ (Koch, 2008) While this debate is certainly beyond the scope of this research, it is clear that voluntary mechanisms are more likely to gain a much higher percentage of willing participants in any program, and much more likely to gain significant political support.

Similarly, low-income rental mandates for energy efficiency can certainly solve problems of energy efficiency, but are likely to create severe disincentives for participation in government programs for low-income tenants such as Section 8 because of the regulatory mandate. Even if such programs provide additional funding for energy upgrades, the added mandates and accompanying bureaucracy and costs can create a severe disincentive for landlords to participate.

¹⁵The comments section for this news story includes claims of “socialist plots”, “left wing fascism”, etc. We mention this only to emphasize the degree of political schism that this approach seems to create.

7. All-in or “concierge” services and grants

The Weatherization Assistance Program (WAP) provides assistance to low-income householders in making their homes more energy efficient. WAP focuses on cost savings by reducing heating and cooling costs through improvements in the structural components of dwellings where low-income residents live. The program was first implemented in 1973 during which time volunteers used caiking and weather stripping as means to offset energy costs. Today, the program consists of advanced technologies and professional installers, a shift that has proven to be cost-effective and essential to providing much-needed relief to low-income householders with respect to home energy costs (U.S. Department of Energy, 2011). A concern is that the focus for most WAP programs in the states has been direct grants for efficiency upgrades. This is in large part because the administration and implementation of any other kind of program for low-income tenants is plagued by the split incentive. However, the Energy Program Consortium, a non-profit amalgamation of government and other non-profit groups has noted, “many assume that the low-income sector is relatively small and that the best approach for aiding this sector is to provide 100% grant assistance for energy efficiency improvements. This approach has many limitations. At the current rate of grant assistance funding, for example, it will take more than 100 years to make all low-income housing energy efficient.” (Brown and Wolfe, 2007, iv)

Even more broadly all-embracing than the United States' weatherization assistance program are concierge service models. This model focuses on complete, or “all-in,” transformation of rental housing. These programs not only focus on the delivery of weatherization upgrades but concurrent education, behavioral implementation, and even harmonized policy such as demand response programs for electricity usage. Programs such as the Green London Concierge Service (“Green Homes Concierge Service”, 2011) and the BC Green Landlords Project (Abbott, 2009) provided significant services, loans, grants, education, and a comprehensive degree of oversight from beginning to end. Not surprisingly, these programs achieved high levels of efficiency and reduced energy use. However, unsurprisingly, the Green London program had very high costs and was converted to a conventional energy efficiency program. The British Columbia Project is ongoing and is attempting to address many of the concerns raised in this research. Nonetheless, despite their success in increasing efficiency in low-income rental housing, these approaches suffer from the problems of any comprehensive grant based program: a lack of resources, high cost, small scale, lack of long-term stability, and absence of political support.

8. Optimal policy characteristics

What would a program to address low-income tenant split incentives look like? We argue that such a program would need to have several different important facets, as follows:

- Voluntary
- Landlord incentive
- Tenant incentive
- Savings exist

- Durability (inspections)
- Costs addressed primarily by Savings (not by government or private grants)
- Transparent

Several policy options discussed previously, particularly regulatory approaches, are problematic because they are mandatory in nature. It can be difficult for HUD to recruit landlords willing to take on low-income tenants. They must already accommodate a variety of government regulations and other associated non-financial costs. It is critical that any program attempting to address the split incentive is primarily voluntary in nature, particularly for landlords providing low-income units.

Incentives in the form of savings must accrue to both landlord and tenant to address the split incentive problem. In order to reduce the burden of energy poverty among low-income renters, there must be some savings that accrue to the landlord. While this seems perverse, there is a significant cost of time, oversight, and transaction management for anyone adopting energy or efficiency upgrades. Landlords must manage contracts, regulatory constraints, lost rent for construction, application procedures, and other hurdles. These have real costs, and thus landlords need real enticement to take part. On-bill financing schemes have had clear success in the context of owner-occupied pilot programs. For instance, utilities in Hawaii and Kansas have achieved significant efficiency improvements in their territories using this approach. (Johnson et al., 2011) What is not clear is whether there are enough economic incentives to be put in place in the context of incentives for low-income tenants and landlords. We address this concern in our recommendation below.

In order to achieve a program that can function at a high scale, funding must ultimately accrue from energy efficiency savings; not from government programs or grants such as the weatherization program or via comprehensive concierge services.

It is possible that either landlord or tenant may be concerned that the other party is pursuing an energy efficiency upgrade to much higher benefit than the other. Policy transparency, communication, and fairness in benefits are important concerns in any public policy design (Stone, 2001). This is critical between landlord and tenant. Other key issues for the success of on-bill financing schemes include innovative or alternative credit approval models, such as those used by NYSERDA in New York. (Zimring, 2011)

Finally, any program must have both durability and longevity. The longevity will occur if many of the other concerns just discussed are appropriately designed.

9. Policy recommendation: On-bill financing (with split incentive mechanisms)

A carefully designed on-bill financing Program can be developed and implemented with a variety of modifications to address multiple concerns for addressing split incentive problems in privately supplied low-income housing (e.g., Section 8 Housing in the U.S.). Such a program would address all of the concerns discussed in the previous paragraphs. A variety of

modifications for such a plan would be needed to successfully address low-income rental efficiency upgrades.

First, such a program would have to ensure that it does not conflict with first-lien prioritization for federally funded mortgages. This concern is the key concern for PACE programs in the United States. However, recent legislation in Vermont has attempted to address this problem by allowing jurisdictions to finance PACE programs as second lienholders, thus addressing this problem. As noted earlier however, doing this serves to increase the costs of financing, and reduces the financial incentives of energy efficiency upgrades. On-bill financing can be implemented without interfering with mortgage lien status, with fewer transaction and administration costs, and with somewhat easier regulatory constraints. This approach does not eliminate risk and associated financing costs, but it reduces them.

A significant concern for on-bill financing involves the concern for non-payment default, particularly with low-income tenants who experience energy poverty. This in turn increases interest costs, program affordability, positive cost-benefit, and payback. We address this concern in our discussion of financing options below.

A critical step towards creating effective low-income housing that is energy efficient is to create a voluntary model. An on-bill financing program's first benefit is its non-mandatory nature (similar to PACE). Avoiding mandated programs reduces landlord willingness to participate in low-income housing programs, and provides more support for legislation. Further, one must provide some incentive to landlords to take part. We suggest a program in which a small monthly payment is garnished on the utility bill for the first five years, or smaller amounts for smaller or shorter loans. Obviously, the actual amounts and terms can be adjusted. Fig. 1 shows two possible examples of such a scheme. The payment would go to a landlord on a yearly basis in the form of an actual check (\$120 in the first example shown in Fig. 1). This would help reinforce and make obvious the tangible benefits of taking part in the program. Prior to each year's payment, the unit would be subject to a brief inspection by a program employee to ensure that maintenance of the unit's energy efficiency components were still optimally functioning. If the unit has problems, the landlord would not receive payments until they were addressed.

Discussion of on-bill financing models in Massachusetts has focused on an argument for landlord investment. Thus, landlords should have some portion of investment responsibility in any efficiency upgrade for a rental unit. The logic is that the value of their property will be increased over the long-term, and thus they should have some responsibility for investing in that increased value. However, this is likely a simplified and unrealistic proposition. If this were the case, the split incentive problem would not be such a serious problem. Landlords would be happily investing in energy efficiency upgrades to increase the value of their long-term investment. It is clear that is not occurring. There are significant costs to managing the process of any energy efficiency upgrade, even if one is a single family homeowner, never mind a landlord. A rental owner, particularly one that rents to low-income tenants, has even more regulatory issues and hurdles to address. Instead, our proposition suggests an alternative: landlords must commit the property to low-income rental for the period of the

loan financing. Should a landlord decide to sell to a new owner unwilling to take on the obligation, or if they convert from low-income tenancy, they must pay an amortized repayment.

Any on-bill financing program has to occur in a state that has implemented a decoupling program. As discussed earlier, decoupling and assessment of a utility by performance standards is a more beneficial approach. Otherwise it is likely that utility implementation of on-bill financing for weatherization could be lack-luster.

10. Financing options

It is entirely possible that the financial benefit of such a program – given administrative costs, financing risk, and landlord incentive – would not exist in a conventional financing scenario. There are two possible financial subsidy approaches to these financing needs, either or both of which could be pursued. First, money from the Weatherization Assistance Program could be used to secure credit risk (thus lowering interest charges on the loan), to directly lower and/or eliminate interest payments, and to create a fund for the coverage of default loans. Using WAP money in this manner allows for the development of a long-term program that has the potential to reach many more low-income tenants who cannot otherwise surmount the split incentive problem. If such a program is successful it has the potential to upgrade far more low-income rental units without having to finance direct grants to low-income tenants (which is sometimes politically untenable).

Second, many states have “systems benefit charges” that are assessed on utility bills to create a fund for different kinds of energy efficiency programs. An on-bill financing program for low-income tenants such as this seems the most deserving form of program for this sort of financial support. Examples already exist of pilot programs in which systems benefit funds or other efficiency monies have been directed to utility programs finance zero interest or low-interest on-bill financed efficiency loans (Jewell, 2009). Another related source of financing could be the use of auction funds from carbon trading markets such as the Regional Greenhouse Gas Initiative or the Western Carbon Initiative. Both of these carbon markets allow for the use of funds raised in carbon allocation auctions for efficiency programs.

11. Concerns for policy design

This policy proposal may have limitations or concerns. The first and most obvious is to determine real-world costs for such a program. If implementation of such a scheme ends up requiring high levels of subsidy and resource support, then it has little advantage over other approaches. Early discussions and analysis seem to indicate that benefits should still outweigh costs, or that a minimal level of subsidy would suffice. Proponents of energy efficiency argue that weatherization and other upgrades should ultimately pay for themselves. If this approach cannot do that to some reasonable extent, then it should be abandoned.

A second concern is to determine the appropriate balance of incentives for both landlord and tenant. It is not clear what degree of incentive is needed to spur landlords to significantly

invest in energy efficiency for their low-income rental units. Further, it is clear that low-income tenants, who face remarkable levels of energy poverty, require as much support as can possibly be derived from a program.

Third, when PACE emerged as an important program in 2008 and 2009, many thought it was the solution for the split-incentive problem in the residential homeowners market. Obviously, the decision by the banks, financing agencies, and the FHFA demonstrated that this enthusiasm was short-lived. It is possible that this approach could run into similar, unknown problems or unintended consequences.

12. Conclusion

Given the concerns just discussed, the next steps for this research agenda are to implement a serious pilot program in conjunction with a utility. The authors also plan to investigate a variety of financial models of this program using real-world data. Both of these forms of research can help determine whether this new approach to a well-established, and so far unsolved, problem can provide real solutions.

The split incentive problem needs serious attention. It accounts for just under 2% of all U.S. energy use, and is responsible for the highest degree of inefficiencies for the poorest and most in-need citizens. If addressed effectively, it could create savings of \$1.2 billion per year for consumers who most need this form of assistance. An on-bill financing problem that is effectively designed to address the incentives of tenant, landlord, and utility company is the most promising policy approach to solving this concern.

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Highlights

- We demonstrate the significant impact of the split incentive on low-income tenants.
- We discuss split incentive characteristics, and policy failures.
- We described an on-bill financing model with unique features.
- This policy has protections and incentives for tenants and landlords.

Loan amount:	\$6000	Loan amount:	\$3800
Financing:	3% @ 15 years (interest rate subsidized)	Financing:	0% @ 7 years (interest rate subsidized)
Financing cost per month:	\$43	Financing cost per month:	\$45
Landlord Incentive per month:	\$10 (first 5 years)	Landlord Incentive per month:	\$5 (first 4 years)
Projected energy savings per month:	\$67 in electricity and heating costs	Projected energy savings per month:	\$54 in electricity and heating costs
Monthly Savings for Tenant:	\$14 (first 5 years) \$24 (years 6-15) \$67 (years 16 and on...)	Monthly Savings for Tenant:	\$4 (first 5 years) \$9 (years 6-7) \$54 (years 8 and on...)
Landlord Incentive	5 x \$120 yearly payments total: \$600		4 x \$60 payments total: \$240

Fig. 1.

Two examples of an on-bill financing scheme for low-income rental unit(s).

Table 1

An overview of policy responses to the split incentive problem.

	Description	Benefits	Concerns
<i>Contracts</i>			
Green or energy efficiency lease	Landlord and tenant agreement to conserve energy, where landlord retrofit investments are trickled down to tenant.	<ul style="list-style-type: none"> Higher rents offset by lower utility costs. Mutual commitment to conservation. 	<ul style="list-style-type: none"> Requires cooperation from landlord and tenant. Continual capital improvements and maintenance necessary. Currently geared toward commercial leases.
Energy efficiency mortgages (PACE financing)	Externally funded loan attached to the property.	Capital improvements can be done at one time and paid in installments.	<ul style="list-style-type: none"> Benefits remain with the property and lien complicates property resale. Liability for property owner.
On-bill financing	Capital improvements are tied directly to utility company payments.	Capital improvements can be done at one time and paid in installments with no lien issues.	Usually focused on live-in homeowners, not tenants.
<i>Regulation</i>			
Green building codes	Application of higher energy standards for new construction.	Potential to benefit all new housing developments, including buildings for low-income tenants.	<ul style="list-style-type: none"> Only applies to new construction. Higher rent prospects along with higher construction and maintenance cost can create bias against low-income tenants.
Low-income rental mandates	Mandate of higher energy standards for low income housing.	Potential for high scale implementation in low-income rental housing.	Creates serious disincentive to provide low-income housing.
<i>All-in Services</i>			
Weatherization assistance program	<ul style="list-style-type: none"> National weatherization program, usually implemented as grants. Differs from state to state. 	<ul style="list-style-type: none"> Has highest reach; especially under the U.S. Stimulus Program. Variety of policy programs and state differentiation/experimentation. 	<ul style="list-style-type: none"> Cannot be implemented at scale because of cost; inefficient. No follow-up for maintenance. Hardly used for low-income rental housing.
Concierge Services	Small niche programs designed to provide comprehensive efficiency assistance with education.	Highest success rate for efficiency gains and behavioral improvements; addresses poverty concerns effectively.	<ul style="list-style-type: none"> Cannot be implemented at scale because of cost. Highest expense.