Capitalization of Central Government Grants into Local House Prices:

Panel Data Evidence from England

by

Christian A. L. Hilber
London School of Economics &
Spatial Economics Research Centre (SERC)

Teemu Lyytikäinen
London School of Economics &
Spatial Economics Research Centre (SERC)

Wouter Vermeulen
CPB Netherlands Bureau for Economic Policy Analysis
VU University
Spatial Economics Research Centre (SERC)

This Version: August 26, 2010

We thank participants of the Urban Institute & Lincoln Institute conference on "The Effects of the Housing Crisis and Economic Downturn on State and Local Governments" held at the Urban Institute, Washington, DC in May 2010, participants of a seminar at the Spatial Economics Research Centre (SERC), London School of Economics in May 2010 – especially Steve Gibbons and Henry Overman – and participants of a workshop on fiscal federalism held at the Barcelona Institute of Economics (IEB) in July 2010 for helpful comments and suggestions. We are grateful to Steven Craig, William Hoyt, Daniel Montolio and Coen Teulings for detailed feedback. This research project is supported by the Spatial Economics Research Centre (SERC). Financial support is gratefully acknowledged. Additionally, Lyytikäinen would like to acknowledge financial support from the Yrjö Jahnsson Foundation. All errors are the sole responsibility of the authors. Address correspondence to: Christian Hilber, London School of Economics, Department of Geography and Environment, Houghton Street, London WC2A 2AE, United Kingdom. Phone: +44-20-7107-5016. Fax: +44-20-7955-7412. E-mail: c.hilber@lse.ac.uk.

Capitalization of Central Government Grants into Local House Prices:

Panel Data Evidence from England

Abstract

We explore the impact of central government grants on local house prices in England using a panel data set of local authorities (LAs) from 2001 to 2008. Electoral targeting of grants to LAs by the incumbent national government provides an exogenous source of variation in grants that we exploit to identify their causal effect on house prices. Our results indicate substantial or even full capitalization. We also find that house prices respond more strongly in locations in which new construction is constrained by physical barriers. Our results imply that (i) during our sample period grants were largely used in a way that is valued by the marginal homebuyer and (ii) increases in grants to a LA may mainly benefit the typically better off property owners (homeowners and absentee landlords) in that LA.

JEL classification: H2, H3, H7, H81, R21, R31.

Keywords: local public finance, house prices, supply constraints, central government grants.

1 Introduction

Most countries have a system for allocating public funds from the central (or federal) government to regional and/or local jurisdictions and for redistributing revenues from higher to lower income areas. Reallocation of financial resources among jurisdictions is not just ubiquitous but also hugely quantitatively important. For example, in the UK local authorities (LAs) receive roughly 60 percent of their funding from central government grants (the remaining funding comes from the council tax, fees and charges), making LAs highly dependent on central government decisions. Other more centralized European countries have similar reallocation schemes.

Although reallocation of higher level tax revenue to lower level jurisdictions may be comparably more important in more centralized economies, intergovernmental transfers are also hugely important in decentralized countries. For example, in the US, states' school finance equalization formulas reallocate significantly more money between school districts than the federal government spends on Medicare or on all federal income support programs combined.

If fiscal grants for a particular area increase, for reasons other than an increase in production costs or service needs (i.e., a windfall gain[1]), a non-Leviathan local government has essentially two options. It can either increase service quality or decrease local tax rates (e.g., the council tax rate in England or the property tax rate in the United States). In both cases the area becomes more desirable and the demand for housing rises. To the extent that the supply side does not fully respond to the demand shock, the primary effect of the grant should be to increase the value of local land and the property that sits on it.

Little is known empirically about whether, under what conditions and to what extent intergovernmental transfers, and in particular central government grants, are capitalized into property prices. In this paper we shed light on these questions by exploring whether the reallocation of financial resources from the British government to LAs is capitalized into house prices. Estimating the causal effect of grants on house prices is challenging because grants are allocated through formulae that include endogeneously determined characteristics of the LA, such as age structure and ethnic composition of the population. To overcome these

[1] Throughout the paper we analyze windfall-type changes in grants (i.e., changes in grants that are *not* driven by changes in production costs or service needs). Compensation of differences in production costs or service needs across LAs is an important aspect of the British grant allocation system.

endogeneity issues and identify the causal effect of grants on house prices we employ an instrumental variable strategy. We utilize strategic political considerations affecting grant allocation at the national level as a source of exogenous variation in grants.

Our results based on panel data (over a period of 8 years between 2001 and 2008) and LA fixed effects as well as IV regressions suggest that an increase in the per-capita grant allocation indeed leads to higher house prices. Moreover, we find evidence on the positive dependence of the house price capitalization rate on physical constraints on housing supply (using elevation range measures).[2] Our core estimates indicate that central government grants are roughly fully capitalized into property values. In a private rental housing market without strict rent controls, a grant-induced rise in value should be passed on to tenants in the form of higher rents. Thus, in areas with less than perfectly elastic housing supply, an *increase* in grants may mainly benefit typically well-off property owners, absentee landlords and homeowners, while leaving private renters indifferent. This mechanism may jeopardize any redistributive aims of the grant allocation system.

Capitalization of central government grants may have a particular relevance in the light of the ongoing 'credit crunch' crisis. One consequence of this crisis is that public finances have come under enormous pressure in virtually all industrialized countries, not least in the United Kingdom. The crisis has also made it very transparent that public finances at all levels of government (national, regional and local) and housing markets are linked in complex and manifold ways. One consequence of the mounting pressure on public finances has been that governments across the globe are looking for novel and ingenious ways to raise additional revenue or cut spending to combat the growing budget deficits.

In the UK in particular, the political pressure to reduce the country's enormous public debt and deficit is very strong. At the same time, the incoming Conservative/Liberal Democrat coalition government has fond plans to devolve central power to the local level. All these political pressures and intended policy reforms will likely impact in a fundamental fashion on the way the central government allocates resources to LAs over the coming years.[3] These changes may well cause adjustment processes on local housing markets, which in turn may

[2] We draw on earlier work by Hilber and Vermeulen (2010) who study long-term supply constraints in England. Hilber and Vermeulen find that house prices in England react more strongly to increases in household earnings in places that have tighter regulatory and physical supply constraints.

[3] For instance, grants to LAs will be reduced by £1.165 billion in 2010-11 and several ring fences on spending are removed to enhance their autonomy (CLG, 2010).

well have important distributional consequences. Our empirical findings that rely on past data imply that this is indeed likely.

2 Background, testable predictions and implications

The question of whether – and to what extent – local public spending and/or local taxes affect house prices has been widely studied. In a seminal paper Oates (1969) suggested that property taxes and public school spending are at least partially capitalized into house prices. Many subsequent empirical studies, whilst using better data, enhancing the methodology and making important qualifications, have largely confirmed this finding (see e.g. the survey articles by Chaudry-Shah, 1988, and Ross and Yinger, 1999; see also e.g. Palmon and Smith, 1998, or Hilber and Mayer, 2009, for more recent evidence). A much broader set of public goods, services and taxes than schools and the property tax have been found to capitalize. For instance, Ihlanfeldt and Shaughnessy (2004) show that impact fees are fully capitalized into land values. However, the impact of central government grants – or more generally intergovernmental transfers – on property prices has received much less attention in this literature.

The theoretical framework developed in Brueckner (1979, 1982) provides a useful starting point for studying the impact of grants on house prices. In this framework, a local government finances the provision of local public services from a local property tax, with the objective of maximizing the value of its housing stock.[4] Following the conventional bid-rent approach, households (with homogeneous tastes, but heterogeneous incomes) are freely mobile between locations, so that they bid for units until the utility from dwelling there equals what they can get elsewhere. As a consequence, both the households' marginal willingness to pay for local public services and the local property tax are fully capitalized into house prices. The local government should set the level of public expenditures such that the capitalized tax needed to finance a further rise in services would just offset the capitalized willingness to pay for them. When this condition is met, public expenditure is *efficient* in the sense that it satisfies the Samuelson condition – at the margin, the aggregate willingness to pay for additional services equals their cost.

[4] We ignore the role of non-residential property in this paper, since central government grants in the UK are by and large spent on services that benefit households rather than firms.

Within this framework, lump-sum grants would enter through the local government's budget constraint, while leaving its objective function unchanged. Hence, a local government would continue to provide public services until the capitalized tax needed to finance a further expansion would just offset the capitalized willingness to pay for it.[5] *At this optimal level of expenditure, additional windfall-type central government grants to a local government should capitalize fully into house prices, irrespective of whether the local government would use them to provide additional/better local public services or cut taxes*. In order to see this, note that additional grants that are fully passed on to households through a lower tax rate should capitalize fully irrespective of the level of public expenditure, but at the optimal level, this effect should be equal to the capitalized effect of additional public expenditure. So in particular, full capitalization may occur even if at the margin, local governments have a high propensity to spend out of central government grants − an empirical regularity that has been dubbed the *flypaper effect* (see e.g. Hynes and Thaler, 1995).

Within the Brueckner framework – assuming that at the margin the propensity to spend out of grants is strictly positive – the condition that the level of spending is chosen optimally is not only sufficient but also *necessary* for full capitalization.[6] Suppose that for some reason spending on public services is below the level where it would maximize the value of the aggregate housing stock. This could be because of institutional constraints (e.g., property tax limits) or simply because local public policy is the outcome of a political process in which many conflicting interests interact. By implication, the capitalized willingness to pay for a raise in expenditure would exceed the capitalized tax needed to pay for it, and since a grant-induced cut in taxes would capitalize fully, a grant-induced raise in expenditure would capitalize more than fully into house prices. By a similar line of reasoning, overspending on local public services would lead to less than full capitalization.

Bradbury et al. (2002) show evidence of underspending on education in a sample of Massachusetts municipalities that were constrained by Proposition 2½, a law that imposes limits on the local property tax. More specifically, they find that municipalities that managed to increase school spending (by raising property taxes – grants do not play a role in their analysis) realized gains in house prices. The authors speculate that underspending on

[5] See Barrow and Rouse (2004) for an extension of the Brueckner framework in this vein, although they apply it to state education aid to local school districts rather than central government grants.

[6] By assuming a positive propensity to spend out of grants at the margin, we rule out the situation of a local government that spends at a suboptimal level, but that passes all additional grants on through lower property taxes so that they capitalize fully. In view of empirical evidence on the flypaper effect, such a situation would seem unlikely to occur.

education was not only related to institutional constraints, but also to a conflict of interests between households with and without children. In this context, Hilber and Mayer (2009) document that whereas the median homebuyer outside of central cities in the US has school-aged children, the median voter does not. Hence, house prices, which are determined by the marginal homebuyer, reflect a strong preference for spending on education, from which the median voter has few or no direct benefits. To the extent that the median voter puts more weight on the tax required for educational spending than on the capitalization of good schools into property values (e.g., in a world with imperfect mobility or attachment to homes), the political process may yield underprovision of educational services from the perspective of the marginal homebuyer.[7] *In such a setting, it is conceivable that local increases in central government grants (of which, in the UK case, a substantial part is spent on education) capitalize more than fully into house prices.*

However, relaxation of some of the more stringent assumptions in the Brueckner framework could yield less than full capitalization of grants, even if public spending satisfies the Samuelson condition. To begin with, the framework assumes costless mobility and perfect substitutability of locations. If places are inherently different and households vary in their appreciation for these differences, then the demand curve for living in a certain place becomes downward sloping: as the population grows, all else equal, the marginal homebuyer has an ever lower willingness to pay for living in the place. By implication, house prices cease to reflect the willingness to pay for local public services of inframarginal households (see e.g. Arnott and Stiglitz, 1979, for an early discussion of this argument), and *grants that are spent on these services may not be fully capitalized*. Furthermore, downward sloping demand introduces a role for supply conditions: capitalization will be stronger in places where housing supply is less elastic, either because of limited availability of developable land (physical supply constraints) or because of regulatory constraints on new residential development. Empirical support for the relationship between capitalization and supply constraints is found for instance in Hilber and Mayer (2009) for the US or in Hilber and Vermeulen (2010) for England.

A second maintained assumption in the Brueckner framework is that grants are not 'wasted', for example, by generating a more complex bureaucracy or by granting higher salaries to public sector workers. A concise literature has proposed bureaucratic theories in this vein as

[7] Of course, as shown in Hilber and Mayer (2009), households without children do support local public schools because of house price capitalization, but possibly not to the same extent as the marginal homebuyer.

an explanation for the flypaper effect (see e.g. Filimon *et al*., 1982, or Wyckoff, 1988). Obviously*, to the extent that grants are wasted, they do not make a location more desirable and would thereby have no impact on housing demand, leaving house prices unaffected.* However, in the UK LAs have little discretionary power in altering public sector wages, corruption is commonly perceived to be quite restrained and there is little evidence of bureaucratic excesses at the local level, so we would not expect local government behavior to be aptly characterized by such bureaucratic theories.

Based on these considerations we can formulate two general, empirically testable predictions.

Prediction 1: An increase in central government grants in one LA, all else equal, should increase house values in that location.

Prediction 2: The increase in local house values should be larger in LAs in which housing supply is more constrained.

As noted above, within the Brueckner framework, full capitalization of central government grants implies an efficient level of spending. Along this line of argumentation, Barrow and Rouse (2004) interpret their finding of full capitalization of state educational aid to local schools as evidence that on average, the level of public school provision is efficient. However, efficiency of local public expenditure is a strong claim as it requires a number of strong assumptions. In particular, households are heterogeneous in many other respects than their income, locations are not perfect substitutes and the cost of mobility is likely positive and varies significantly between different types of households. As discussed above, this could imply either more or less than full capitalization. Hence, an empirical finding of full capitalization could just be a combination of various opposing effects. For instance, heterogeneity in tastes for education could lead to underspending from the perspective of the marginal homebuyer (implying more than full capitalization) and at the same time, some of the grants could be wasted on bureaucracy (implying less than full capitalization), so that on balance full capitalization could not be rejected empirically. Hence, one should be cautious in inferring normative claims from an empirical analysis of capitalization (see also the literature on efficiency of decentralized local governance as surveyed in Ross and Yinger, 1999). A finding of positive capitalization merely rules out the case of a Leviathan government that wastes *all* grants on self-interested bureaucracy.

A finding of substantial or full capitalization also has important distributional consequences. In particular, capitalization may jeopardize any distributional objectives that governed the allocation of grants. In this vein, Wyckoff (1995) developed a simple model (with two communities and three income groups) to demonstrate theoretically that in the case of an urban area in which the central city is not large relative to the metro area, the welfare effect of intergovernmental aid (such as education aid) on poor voters should be expected to be completely offset by higher housing cost. In the UK context, adjustments in the distribution of grants over LAs would thus boil down to redistribution of resources between property owners in gaining and losing LAs without making private renters any better off − although aid may benefit renters in the social sector to the extent that their rents are detached from market rents.

3 Central government grants in England

Even though the UK is regarded as a highly centralized country, local government accounts for about 25 percent of the public sector expenditure (CLG, 2009). The main source of income for local government is grants from the central government. Grants totaled some £93 billion in the fiscal year 2007/8 and made up roughly 60 percent of total local government income. Local council tax levied on residential properties is the second most important source of revenue with a 30 percent share. The remaining 10 percent is covered by various fees and charges. The size of local government, and consequently grant funding, has risen significantly over the past 10 years. Table 1 documents the evolution of grants in the 350 LAs included in the empirical analysis during the period between 2000 and 2008. Grants rose in real terms by 56.2 percent over the period and amounted to £1,654 per person in the fiscal year 2007/8.

The data on grants used in this study is provided by the Chartered Institute of Public Finance and Accounting (CIPFA). With English data, the measurement of grants received by LAs is not straightforward since the distribution of functions to different levels of local government varies across areas, and grants for different service blocks are paid to the level of government responsible for the block. LAs can be divided into four classes based on the structure of local government. The first class of LAs is London Boroughs that form the Greater London Area (GLA). In the GLA most services are provided at the LA level (by London's Boroughs) but the upper level GLA is responsible for some services, such as fire protection, police and

transport. The second and third LA types are Unitary Authorities and Metropolitan LAs that have essentially a single-tier structure with only one level of local government responsible for all public services. However, in some Unitary Authorities and Metropolitan LAs, some functions take place at a strategic level through joint boards and arrangements. Typical services provided through joint boards are police and fire protection. The fourth group is LAs in non-metropolitan counties (so called 'shire counties') that have a two-tier structure. In non-metropolitan LAs the higher level county councils are responsible for much of the services, such as education, social services and waste management, and lower level district councils are responsible for other services, e.g. waste collection, housing and local planning. In non-metropolitan counties, roughly 25 percent of grants go directly to the LA and the rest go to the county authority. Our data includes 32 London Boroughs, 45 Unitary Authorities, 34 Metropolitan LAs and 237 non-metropolitan LAs. Table 1 illustrates that London's Boroughs get the highest grant amounts per capita and have seen the largest increases in grants between 2000 and 2008. Metropolitan LAs and Unitary Authorities have higher grant-levels and they saw larger grant increases than non-metropolitan LAs.

Grants for each service block are paid to the authority responsible for the block. Since the distribution of benefits of upper level grants to lower level LAs is not known, we have apportioned grants for upper level authorities to LAs based on population. For some Unitary Authorities and Metropolitan LAs upper level grants may be missing since the data lack clear identifiers for participation in joint boards. Roughly £8 billion worth of grants to joint boards were not allocated to any LA and are missing from the analysis. The apportioning of upper level grants to LAs and missing grants may cause some measurement error in the grant variable which may lead to attenuation bias in the simple fixed effects estimates of the effect of grants on house prices. Our instrumental variables strategy – outlined in Section 4.2 – will correct for the attenuation bias due to measurement error, in addition to correcting for the bias due to the possible endogeneity of grants.

The English grant system is fairly complicated and there have been several changes over the years, leading to substantial reallocation of grants across LAs. To avoid problems of comparability over time, the grant variable used in the empirical analysis includes all grants and we do not attempt to analyze differential effects of various types of grants. The two main categories of grants in the current system are so called Specific and Special Grants and the Formula Grant. Specific and Special Grants are distributed by individual government departments and currently make up more than 50 percent of all grants. Specific and Special

Grants include more than one hundred individual items ranging from £29 billion to schools in the form of the 'Dedicated Schools Grant' to smaller items such as the 'Guns, Gangs and Knives' grant (£57 million) and the 'Rural Social and Community Program' grant (£334,000). The Formula Grant allocates funds to LAs through formulae including population, social structure and other characteristics of authorities. The Formula Grant also includes a fiscal equalization component as the amount of grants is adjusted based on the council tax base. The equalization system does not lead to reverse causality between house prices and grants in a fixed effects setting since assessed property values that are used as the tax base are based on house prices in 1991 or 1993 and no reassessments have been made since then. Some of the specific and special grants are ring fenced which, at least in principle, means that LAs have to use the money to provide specified services, but it is not clear how ring fencing is enforced in practice. The Formula Grant is not earmarked even though it is divided into several service blocks. CLG (2008 and 2009) provide a more detailed description of the grant system.

The data does not include LA level information on spending, but Table 2 shows aggregate local government spending by sector in 2001/2 and 2007/8. The single most important sector in terms of spending is education with a roughly 40 percent share of total spending. Spending increased between fiscal years 2001/2 and 2007/8 by about 23 percent in real terms. More than half of the increase was made up of education spending. As pointed out in Section 2, the fact that the lion's share of grant amount increases during our sample period was spent on local schools is relevant for our empirical analysis. This is because the 'marginal homebuyer' – who determines house prices – likely values spending on primary and secondary schools more than the median voter (Hilber and Mayer, 2009).

4 Empirical analysis

4.1 Data

We use panel data on 354 LAs in England from 2001 to 2008. In the empirical analysis the sample size reduces to 350 as LAs with missing variables are dropped. The dependent variable in the regressions is a local house price index constructed using transaction price data obtained from the Land Registry. The price index is corrected for changes in the mix of dwelling types, but constant quality indices cannot be constructed since the house price data lacks detailed housing attributes. Hence, the price measure is imperfect and may increase

standard errors but is not likely to bias estimation. Hilber and Vermeulen (2010) describe the construction of the price index in more detail. The explanatory variable of interest is central government grants per capita received by the LA (described in Section 3).

In addition to house prices and grants, the data include demographic and socio-economic variables, indicators of physical constraints to new housing construction, and the number of council seats held by each mainstream political party. The demographic and socio-economic variables are used as control variables in the regressions. They include male weekly earnings based on the Annual Survey of Hours and Earnings (ASHE) , as well as the age structure of the population, the number of secondary school pupils, the number of non-white pupils, the number of pupils eligible for free school meals and the number of unemployment benefit claimants. All latter variables are derived from the Office for National Statistics (ONS). The measure of physical housing supply constraint used in this study is the altitude range defined as the difference between the lowest and highest point in the LA. The underlying elevation raster/grid data was derived from Land-Form PANORAMA DTM. Data on council seats held by different parties was derived from the BBC website. We use this data to construct our instruments for grants. Summary statistics for all the variables appearing in the regressions are given in Table 3.

4.2 Empirical specification

In order to test Prediction 1 that an increase in grants for a LA increases house prices, we first estimate LA fixed effects models of the log of the house price index on grants per capita and control variables. Least-squares estimation of this semi-log specification minimizes the relative deviation of predicted from observed house prices. Hence, estimates are less sensitive to outliers than in a linear model, in which the absolute deviation is minimized. The basic model can be written as

$$(1) \qquad Ln(P_{it}) = \alpha_t + \beta G_{it} + \lambda X_{it} + \gamma_i + \mu_{rt} + \eta_{kt} + u_{it},$$

where P_{it} is the house price index in LA i in year t, G_{it} is total annual grants per capita received by the authority and X_{it} denotes other LA attributes affecting house prices. LA fixed effects γ_i capture unobserved LA attributes that are constant over time. We also include region-year fixed effects μ_{rt} to control for unobserved shocks that are common for a region and LA type-year fixed effects η_{kt} to allow for differential shocks in more and less urbanized areas.

In order to test Prediction 2 that capitalization of grants varies with physical supply constraints, we interact constraints with grants. The 'interaction model' can be written as

$$(2) \qquad Ln(P_{it}) = \alpha_t + \beta_1 G_{it} + \beta_2 G_{it} C_i + \lambda X_{it} + \gamma_i + \mu_{rt} + \eta_{kt} + u_{it},$$

where C_i is a measure of physical supply constraints. We use altitude range as a proxy for the ease of building new housing in the LA (see also Hilber and Vermeulen, 2010, and Saiz, 2010).[8] Regulatory constraints are not included in the analysis since Hilber and Vermeulen (2010) find that they are endogenously determined. The instrumental variables strategy used in Hilber and Vermeulen (2010) does not provide sufficient variation in regulatory constraints for the purposes of this study. Since altitude range is constant over time its main effect is included in LA fixed effects and does not appear in the equation.

Estimating the effect of grants on house prices is challenging since grant allocation is based on LA attributes – such as the demographic composition – that are likely to be correlated with factors affecting house prices. Moreover, changes in the grant allocation policy may be affected by house prices or underlying determinants of house prices, which would imply that the grant policy is endogenously determined. Our first identification strategy is to estimate equations (1) and (2) by fixed effects panel regression including a flexible set of controls. In these regressions, identification is based on variation in grants within LAs over time, after controlling for region-year and LA type-year fixed effects that control for unobserved region and LA-type specific shocks affecting grants and house prices. In addition, we include LA attributes that control for endogeneity due to changes in important demographic and socio-economic factors driving grants and possibly house prices. The LA attributes include variables that are associated with the burden of providing public services. Thus, if control variables adequately control for any increases in the burden, the coefficient on the grant variable should reflect the effect of a windfall type change in grants that is not accompanied by increases in production costs or service needs.

Even with a detailed fixed effects structure and a good set of controls, it is likely that issues related to the endogeneity of the grant policy itself remain. Moreover, the approximate apportioning of county level grants based on population and missing upper level grants for some LAs participating in joint boards leads to measurement error that can cause downward

[8] We have also experimented with an alternative (exogenous) proxy for the ease of building new housing, namely, the standard deviation of the slope (a measure of 'ruggedness'). Our results are virtually unchanged when we use this alternative measure.

bias in the coefficient of grants. Attenuation bias due to measurement error is known to be magnified in panel data fixed effects estimation (Wooldridge, 2002). To fully address the endogeneity concerns and the possibility of attenuation bias due to measurement error in the grant variable, we employ an instrumental variable strategy, which we discuss below.

Instrumental variable strategy

The distribution of funds to different areas through the grant system is not only driven by changes in the demand for services and the costs of producing them. It is quite likely that political considerations play an important role. We propose an instrumental variable approach that utilizes political considerations affecting grant allocation as a source of exogenous variation in grants. In the UK, the Labour party formed the national government over the period covered by the data. We argue that the Labour party may have used the grant system to allocate more money to areas where it dominates the local council by a narrow margin.

Our approach builds on a large literature on *electoral targeting* of government transfers, see e.g. Cox (2009) for a survey. The general idea is that these transfers, or other types of targetable benefits, are made conditional upon victory of the relevant candidate or party, so that voters are persuaded to support it. Whether transfers should be targeted at core voters, i.e. voters with a relatively strong preference for a party (Cox and McCubbins, 1986), or swing voters (Lindbeck and Weibull, 1987), is a major controversy within this literature.[9] However, Cox (2009) argues that the logic of targeting swing *districts* is more compelling than the logic of targeting swing voters, because it can make the difference between winning and losing a seat. There is no such discrete jump in rewards to a party when it sways particular groups of voters in a single-district setting.

Several empirical studies support the idea that transfers are targeted to swing districts or regions. For instance, Wright (1974) finds that New Deal spending was higher in states in which voting in presidential elections was more volatile. Dahlberg and Johansson (2002) document that the incumbent Swedish government favored regions with many swing voters in the distribution of grants from a program to support ecological sustainable development.

In the wake of this literature, we argue that Labour had an interest in securing dominance in LA councils and that it persuaded voters by implicitly conditioning grant allocation on local election outcomes. Although the distribution of seats in the national parliament does not

[9] Dixit and Londregan (1996, 1998) provide an encompassing model.

directly depend on the outcome of LA council elections[10], one would expect that Labour can more easily realize its policy aims and secure votes in upcoming national elections in LAs where it dominates decision making. In LAs where the party has a very clear majority, there is less to gain from electoral targeting of grants. We include Labour's share of local council seats as a control variable and use the following two instruments for grants to capture the idea of targeting LAs with marginal Labour dominance:

- Labour's dominance in the council (a dummy variable that gets the value one if Labour has more seats than Conservatives and Liberal Democrats together);
- The interaction of Labour's share of seats with the dummy variable for dominance;

All else equal, Labour's dominance is expected to have a positive effect on grants and the interaction of the dummy for Labour's dominance and Labour's share of seats is expected to have a negative sign. Labour's share of seats could also have an independent positive effect on grants if the Labour government truly cared about the wellbeing of Labour voters. However, we include this variable merely as a control variable and not as an excluded instrument because Labour's share may be correlated with omitted factors affecting housing prices. The indicator for Labour dominance and its interaction with Labour's share of seats give sufficient variation in grants to identify the effect of grants on house prices. Grants presumably reward election outcomes and the adjustment of the grant formulae may take some time. Hence, we use political variables at t-2 as instruments for grants in fiscal year starting in t-1 and ending in t. A contemporaneous effect on grants may also be possible if the Labour government gets early information on shifts in Labour's support through opinion polls, for instance. We also estimated the model using instruments measured at t-1 or both t-2 and t-1 and the results were very similar.

The formation of the council cabinet is a complicated process and it is not clear which number of seats gives a party the dominance in the cabinet. Hence, the definition of the indicator for dominance as Labour having more seats than the two other main parties is somewhat arbitrary. We argue that an absolute majority (over 50 percent of seats) would probably be an overly strict condition for dominance of the council whereas being the biggest

[10] Local elections are held more often than national elections, but their frequency differs because LAs are organised in different ways. In some LAs all of the councillors are elected every four years while other LAs elect half of the councillors every two years. Finally, in some LAs a third of the councillors are elected every year for three years with no elections in the fourth year.

party is perhaps too loose.[11] We tested other potential definitions for Labour dominance in the first stage regression and found that our preferred Labour dominance variable based on having more seats than the two other main parties together predicts changes in grants better than alternative measures.

Labour dominance in the LA council and its interaction with Labour's share are valid instruments if they affect house prices only through their effect on grants. We argue that other potential effects of changes in Labour's dominance on prices are likely to be non-existent or miniscule relative to the effect through grants. One concern about the instruments is that the political structure of the council may lead to adjustments in local public services and council taxes, even if grants are unchanged, which could in turn capitalize into house prices. According to Brueckner's (1979, 1982) model discussed in Section 2, marginal adjustments in the mix of council taxes and local public services do not affect house prices if the tax service bundle is close to the level that maximizes house values. Intuitively, if taxes and services in a LA are set at a level that maximizes house values, the marginal benefit from services equals the marginal benefit of private consumption and people are indifferent between small increases in taxes and services. By contrast, a windfall type increase in grants for one LA may have a big impact on local house prices as the costs are borne by the whole country while the benefits are local. Hence, the effect of a change in grants on house prices is of a different order of magnitude than the possible effect of a change in the combination of council tax and services due to a change in the political composition of the council.

The instrumental variables strategy can lead to inconsistent estimates if changes in Labour's dominance are correlated with other factors affecting house prices that are outside the model. We argue that controlling for the linear effect of Labour's share of seats, region-year fixed effects and authority-type-year fixed effects together capture the most important regional price determinants, such as productivity and income shocks, that may be related to Labour's dominance. With these control variables, the remaining variation in the instruments is likely to be exogenous. There is no single component of grants or type of adjustment in the grant allocation criteria through which we would expect the governing Labour party to support its local politicians. There are many ways in which the government can attempt to allocate more grants to LAs where it has marginal dominance. Firstly, the government can influence the sectoral budgets and favor sectors that are disproportionately important for LAs where its

[11] Having more seats than the Conservatives and Liberal Democrats together is not equivalent with an absolute majority since minor parties have seats in many LAs.

support is strong but not uncontested. Secondly, the government can put more emphasis on allocation criteria that are important for the strategically important LAs. The government makes frequently numerous small adjustments to the formulae on which the allocation of grants is based and new Specific and Special Grants are introduced to finance various initiatives. We believe that the implications of these adjustments for LAs with different political composition are carefully examined by the government before approval when the proposal is in preparation. Indeed, anecdotic evidence is suggestive that the Labour government may have influenced the allocation in several subtle ways to channel grants strategically to LAs where the incumbent Labour county cabinet needs support. [12] All these adjustments together provide the exogenous variation in grants that the instrumental variables approach utilizes.

To the extent that the instrument reflects exogenous variation in grants, the IV-specification will estimate the effect of a windfall type change in grants that is not offset by a change in the burden of service provision due to changes in the need for services or production costs.

Maps 1 and 2 illustrate the relationship between Labour's support and grants. Map 1 shows Labour's share of seats in 2002 and Map 2 illustrates relative changes in grants per capita between 2002 and 2008. Areas where Labour's support is strong often got large increases in grants. The first stage regressions reported in the next section show that LAs with marginal Labour dominance got disproportionately higher grant amounts during the sample period.

4.3 Results

Table 4 reports results for the base specification (equation 1), testing Prediction 1 that changes in grants are capitalized into house prices. The first four columns show fixed effects estimates without instruments and the last three columns show the instrumental variables estimates. The coefficient on the grant variable gives the semi elasticity of house prices with respect to grants per capita in the fiscal year starting in April of year t-1 and ending in March of year t. The units are £1,000. The control variables for demographic and socio-economic

[12] Anecdotic evidence on the Internet supports the view that political considerations affect grant allocation. See in particular the following quotes: "The shires still voted Tory and they have suffered for it. More money has been spent in Labour-controlled cities, while the means of calculating grants given to local authorities was fiddled to penalise the shires." (http://www.telegraph.co.uk/news/uknews/1560018/Gordon-Brown-urged-to-support-UK-farmers.html; last accessed on August 26, 2010), and: "DEFRA staff have admitted that they ran computer projections of the results for umpteen different formulae for "needs-based" assessment of central government grants in order to choose one that particularly favoured Labour-controlled local authorities. These formulae have been repeatedly changed over the last dozen years as control of local authorities have shifted." (http://www.leftfootforward.org/2010/03/tory-cheek-on-council-tax-rises/; last accessed on August 26, 2010).

attributes of LAs are measured in year t-1 in order for them to better capture the LA attributes on which the allocation of grants is partly based. Earnings are measured in year t.

The first column of Table 4 reports results for a specification with LA fixed effects that capture time invariant unobserved LA characteristics and year fixed effects that capture shocks that are common for the whole economy, such as interest rates. The coefficient on grants is positive but insignificant. In column (2) we include region-year fixed effects for ten regions and the coefficient rises to 0.04 and becomes significant at the ten percent level.[13] Region-year fixed effects control for changes in the overall grant-levels over time in the region and other regional factors. Hence, the coefficient on grants is based on changes in grants that are higher or lower than the average increase in the region. In column (3) we add authority type-year fixed effects (three authority types[14]) to control for the fact that more urban areas may have experienced different price shocks than less urbanized areas during the time period. The coefficient increases further to about 0.06 and becomes significant at the five percent level. In column (4) we add control variables that are likely to affect both grants and house prices. The results are roughly the same as in column (3) without controls. The coefficient of 0.06 implies that a one standard deviation increase (£490) in grants per capita leads to a 3 percent increase in local house prices.

Overall, the results in columns (1)–(4) of Table 4 suggest that grants have a positive, albeit relatively small, effect on local house prices. However, the fixed effect regression results may be biased if there are time-varying LA attributes missing from the model that affect local house prices and are correlated with changes in grants per person. The instrumental variables regressions reported in columns (5)–(7) of Table 4 address this endogeneity issue by utilizing the local election outcomes to construct instruments for grants as discussed in Section 4.2.

First stage regressions for the IV regressions in Table 4 are reported in Table A1 of the Appendix. Columns (1), (2) and (3) of Table A1 correspond to columns (5), (6) and (7) of Table 4 respectively. Our two instruments, the Labour dominance indicator and its interaction with Labour's share of seats, have the expected effects on grants per capita in all the specifications and the magnitudes of the coefficients are plausible. Kleibergen-Paap F-statistics indicate that the instruments are strong; hence there is no reason to suspect weak

[13] The regions are: East Midlands, East of England, North East, North West, Inner London, Outer London, South East, South West, West Midlands, Yorkshire and The Humber.

[14] The authority type division used is: Metropolitan LAs and London Boroughs, Unitary Authorities, two-tier authorities (non-metropolitan LAs). Metropolitan LAs and Unitary Authorities are typically more urbanized than two-tier authorities.

instrument bias in the estimates. The coefficient on Labour's share of seats, which is a control variable, is positive but insignificant in all the specifications.[15] The dummy variable for Labour dominance is positive and highly significant and the interaction of Labour dominance and Labour's share of seats is negative and highly significant in all the specifications. The first stage results indicate that LAs with marginal Labour dominance get higher grants than otherwise similar LAs with very strong Labour dominance or low Labour support. For example in column (3) the coefficients of the political variables imply that a Labour dominated LA where Labour holds 40 percent of seats gains £35 per person. An increase in Labour's share to 50 weakens the effect to £22. The effect of Labour dominance turns negative when Labour's share reaches 67 percent.

The IV regressions in columns (5)–(7) of Table 4 give substantially higher estimates for the capitalization effect of grants than the simple FE regressions reported in columns (1)–(4). In column (5), which includes region-year fixed effects, the coefficient of grants is 0.17 and it is significant at the five percent level. In column (6) we add LA type-year fixed effects and the coefficient becomes 0.28 and is still significant at the five percent level. The inclusion of LA attributes as controls in column (7) does not seem to affect the capitalization coefficient, but the standard error increases as the instrument becomes weaker. Even after including the LA attributes the impact of grants is significant at the 10 percent level.

Supply constraints

In Table 5 we examine whether capitalization is stronger in LAs in which housing supply is constrained by physical barriers, which are proxied by altitude range. The first three columns document results for fixed effects regressions with different specifications and the last three columns show the instrumental variables estimates. The altitude range is standardized, such that the coefficient on the interaction term can be interpreted as an increase in the coefficient on grants if the altitude range increases by one standard deviation (171 meters).

In the FE regressions reported in columns (1)–(3) of Table 5, both the grant variable and its interaction with altitude range are positive and highly significant. The positive interaction term suggests that grants have a more pronounced effect on house prices when new construction is more constrained. The results are robust to changes in the specification. In all the FE regressions the coefficient on grants increases from roughly 0.08 to 0.11 when the

[15] We tested the robustness of the results for dropping the Labour's share of seats variable and the results remained virtually unchanged.

altitude range increases by one standard deviation. Columns (4)–(6) report the IV results for the supply constraint model. Grants per capita and its interaction with the altitude range variable are instrumented with the Labour dominance indicator and its interaction with Labour's share of seats as in Table 4 and, in addition, their interactions with altitude range. As in Table 4, the coefficient on grants in the IV-specifications is much larger than the corresponding coefficient in the FE-specifications. The interaction term is positive and highly significant suggesting that capitalization is stronger in LAs with more constrained supply. The relative increase in the capitalization coefficient, when the altitude range increases by one standard deviation, is roughly 20 percent. The Kleibergen-Paap F statistic is 12.4 and 9.3 in columns (5) and (6) respectively, in which more control variables are added to the IV specification, so there may be some small sample bias in these estimates. We also estimated the model by Limited Information Maximum Likelihood (LIML), which is a less precise but less biased alternative to the Two-Stage Least Squares estimator. The results were virtually unchanged. This suggests that there is no reason to suspect severe weak instrument bias in our estimates. Overall, the results of the supply constraint models suggest that the capitalization rate is substantially higher if construction of new housing is constrained by physical barriers.

Capitalization rate

Next we quantify the results by calculating the capitalization rates implied by the grant coefficients in Tables 4 and 5. The capitalization rate of grants can be expressed as

(3) *Capitalization rate = (β*average house value)/(average household size**£1,000*/r)*,

where β is the coefficient on grants and r is the discount rate. The term in the first parenthesis is the estimated average increase in house values when grants in an average LA go up by one unit (£1,000 per person). The second term is the present value of the one unit (£1,000) increase in grants for a dwelling with average household size. The average house value in our data is roughly £194,000 and the average household size in England was 2.4 during the sample period. We calculate the capitalization rate with three different discount rates r = 0.03, r = 0.04 and r = 0.05. Yinger *et al.* (1988) point out that the appropriate discount rate is the real discount rate. The average real interest rate during the period between 2000 and 2008 calculated as the average UK banks' base rate less inflation is roughly 3 percent. Adding a 1 percentage point risk premium yields r = 0.04, which we believe to be our most sensible estimate of the discount rate.

Table 6 reports capitalization rates implied by the regression coefficients in Tables 4 and 5 with different assumptions on the discount rate. Panel A of Table 6 refers to the base estimates reported in Table 4. Panel B relates to the supply constraint regressions in Table 5 and compares the capitalization rate in a LA with low altitude range (= mean – one standard deviation) with an LA with high altitude range (= mean + one standard deviation).[16]

In panel A of Table 6, capitalization coefficients implied by simple fixed effect regressions vary from 0.1 to 0.25, whereas the capitalization coefficients implied by the IV regressions vary from 0.4 to slightly above full capitalization. The IV estimates in columns (6) and (7) of Table 4 are our preferred estimates for the price effect of grants. Using these estimates for β and the discount rate of four percent – our most sensible guess – yields a capitalization coefficient of roughly 0.9 suggesting that grants are almost fully capitalized. It should be noted that the capitalization rate is based on the assumption that the increase in grants is permanent. If there is uncertainty about whether the grant increase is permanent, the present value of the grant increase in equation (3) will be too high and the capitalization rate is underestimated. Hence the capitalization rate of 0.9 may well be an underestimate for the capitalization rate of a permanent grant increase. Overall, the point estimates suggest that grants may be roughly fully capitalized into house prices. The finding of nearly full capitalization is, however, not entirely conclusive as the confidence intervals for the coefficient on grants are quite broad.

Panel B of Table 6 reports capitalization rates implied by the supply constraint regressions. We have selected the fixed effects estimates in column (3) and the IV estimates in columns (5) and (6) of Table 5 to calculate the implied capitalization rates for low and high altitude range LAs. The fixed effects estimates and a discount rate $r = 0.04$ yield a capitalization rate of 0.17 for the low altitude range LA and 0.34 for the high altitude range LA. The IV estimates are again substantially higher. Assuming $r = 0.04$, the IV specification without LA attributes as controls (third and fourth column of Panel B) implies a capitalization rate of 0.7 in less constrained LAs and 1.17 in more constrained places. When LA attributes are added as controls (the last two columns of Panel B), the capitalization rate is 0.62 with low altitude range and 1.07 with high altitude range. The finding that capitalization rates are higher in

[16] In the lower panel we use different mean house values for low and high altitude range. They were obtained by running an OLS regression of mean house value on altitude range and a constant and calculating the predicted mean house value for the low and high altitude range. The predicted value is about £208,000 for the low altitude range area and £182,000 for the high altitude range area.

more constrained LAs is in line with the view that LAs are not perfect substitutes and the demand for housing in a locality is downward sloping.

5 Conclusions

Central government grants in the UK are allocated in such a way that LAs are compensated for fiscal burdens associated with unfavorable demographic and socioeconomic population compositions. However, our identification strategy unveils that this allocation has also been influenced by strategic political considerations, as the Labour party targeted grants to areas where it gained marginal dominance after local elections. This source of exogenous variation in grants represents a windfall type of grant, and our empirical findings suggest that increases in this windfall type of grant are roughly fully capitalized into house prices. Furthermore, the impact of grants on house prices appears to be stronger in locations in which new construction is constrained by physical barriers. One implication of our findings is that local governments appear to use grants in ways that are valued by the marginal homebuyer. There is little evidence to suggest that LAs spend their financial resources largely on self-interested bureaucracy.

The May 2010 elections in the UK generated a very significant political change. The new coalition government of Conservatives and Liberal Democrats (which replaced the outgoing Labour government that was in power for 13 years) is likely to enact major policy changes that will lead to a significant reallocation of resources from the central government to LAs. Moreover, the political swing will likely lead to a reallocation of resources across LAs. This reallocation of resources represents a windfall type grant independent of whether the new grant system is closer to the ideal of compensating for local burden or not. Our findings imply that the changes at the local level will likely be capitalized into property prices.

What are the policy implications of these changes? Property owners (homeowners and absentee landlords) will either significantly gain or lose, depending on whether they live in LAs that observe relative increases or decreases in grants. In contrast, assuming that windfall type grants increase rents as well as house prices, private renters should largely be unaffected by the changes (greater desirability is compensated by higher rents and vice versa).[17] In other

[17] Whether social renters are also subject to redistribution depends on whether social rents reflect changes in the desirability of a LA or not. The weaker the inter-temporal correlation of social rents and private rents, the more affected social renters will be by the 'redistribution lottery'.

words, the grant system and changes in the allocation of grants generate substantial redistribution among property owners in different parts of the country, leaving (private) renters unaffected.

More generally, our findings imply that the British grant system has very substantial unintended consequences in that it generates massive redistribution of resources without helping the most disadvantaged individuals as well as the less fortunate in the most disadvantaged places. To illustrate this argument, consider for example an increase in the "Guns, Gangs and Knives" grant intended to help people living in disadvantaged areas / the inner city poor. Our findings imply that the possible crime prevention effects or lower taxes would increase house prices and rents in inner cities, which are largely populated by renters. Beneficiaries of the change are (the few) homeowners as well as landlords who own most of the inner city properties. Private renters would likely not benefit from the additional funding because they pay via higher rents for the benefits of the grant increase. Social renters may benefit to the extent that the grant increase does not affect their rents.

One policy implication of our findings is that it may be more effective and efficient to "help people rather than places". In addition to the fact that the grant system has substantial unintended distributional consequences, these grants are financed at the national level, mainly with income taxes, which in turn are associated with significant deadweight losses. Our results suggest that lower income tax rates, less grant-induced redistribution but more direct help to disadvantaged people could achieve the same distributional outcome at potentially significantly lower cost. Such a reform could contribute towards lessening the fiscal pressures that have been mounting during the ongoing economic / public finance crisis.

References

Arnott, R. and J. Stiglitz (1979) "Aggregate land rents, expenditure on public goods, and optimal city size," *Quarterly Journal of Economics* 93, 471-500.

Barrow, L., Rouse, C.E. (2004), "Using market valuation to assess public school spending," *Journal of Public Economics* 88, 1747-1769.

Bradbury, K.L., Mayer, C.J., Case, K.E. (2001) "Property tax limits, local fiscal behavior, and property values: Evidence from Massachusetts under Proposition 2½," *Journal of Public Economics* 80, 287-311.

Brueckner, J.K. (1979) "Property values, local public expenditures and economic efficiency," *Journal of Public Economics* 11, 223-245.

Brueckner, J.K. (1982) "A test for allocative efficiency in the local public sector," *Journal of Public Economics* 19, 311-331.

Chaudry-Shah, A. (1988) "Capitalization and the Theory of Local Public Finance: An Interpretive Essay," *Journal of Economic Surveys* 2, 209-243.

CLG (2008) *A Guide to the Local Government Finance Settlement.* Department for Communities and Local Government, London.

CLG (2009) *Local Government Financial Statistics England No.19 2009.* Department for Communities and Local Government, London.

CLG (2010) *Local government contribution to efficiencies in 2010-11.* Department for Communities and Local Government, London.

Cox, G. (2009) "*Swing Voters, Core Voters and Distributive Politics*, in: Shapiro, I., Stokes, S.C., Wood, E.J. and Kirshner, A.S. (Eds.), Political Representation, New York: Cambridge University Press.

Cox, G.W. and M.D. McCubbins (1986) "Electoral Politics as a Redistributive Game," *Journal of Politics* 48, 370-89.

Dahlberg, M. and E. Johansson (2002) "On the Vote-Purchasing Behavior of Incumbent Governments," *American Political Science Review* 96, 27-40.

Dixit, A., and J. Londregan (1996) "The Determinants of Success of Special Interests in Redistributive Politics," *Journal of Politics* 58, 1132-55.

Dixit, A., and J. Londregan (1998) "Ideology, Tactics and Efficiency in Redistributive Politics," *Quarterly Journal of Economics* 113, 497-529.

Filimon, R., T. Romer and H. Rosenthal (1982) "Asymmetric information and agenda control: The bases of monopoly power in public spending," *Journal of Public Economics*, 17, 51-70.

Hilber, C.A.L. and C. J. Mayer (2009) "Why do households without children support local public schools? Linking house price capitalization to school spending," *Journal of Urban Economics* 65, 74–90.

Hilber, C.A.L and W. Vermeulen (2010) "The Long-Term Impact of Supply Constraints on House Prices in England," August, mimeo, London School of Economics.

Hines, J.R. and R.H. Thaler (1995) "Anomalies: the flypaper effect," *Journal of Economic Perspectives* 9, 217–226.

Ihlanfeldt, K. and T. Shaughnessy (2004) "An Empirical Investigation of the Effect of Impact Fees on Housing and Land Markets," *Regional Science and Urban Economics* 34, 639-661.

Lindbeck, A. and J. Weibull (1987) "Balanced Budget Redistribution and the Outcome of Political Competition," *Public Choice* 52, 273-97.

Oates W. E. (1969) "The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalization and the Tiebout Hypothesis," *Journal of Political Economy* 77, 957-971.

Palmon, O., and B.A. Smith (1998) "New evidence on property tax capitalization," *Journal of Political Economy* 106, 1099-1111.

Ross, S.L., Yinger, J (1999) *Sorting and voting: A review of the literature on urban public finance*, in: P. Cheshire, E.S. Mills (Eds.), The Handbook of Urban and Regional Economics, vol. 3, Amsterdam: North-Holland.

Saiz, A. (2010) "The geographic determinants of housing supply," forthcoming *Quarterly Journal of Economics*.

Wooldridge, J. M. (2002) "*Econometric Analysis of Cross Section and Panel Data,*" The MIT Press.

Wright, G. (1974) "The Political Economy of New Deal Spending: As Econometric Analysis," *Review of Economics and Statistics* 56, 30-8.

Wyckoff, P.G. (1988) "A bureaucratic theory of flypaper effects," *Journal of Urban Economics* 23, 115-129.

Wyckoff, P.G. (1995) "Capitalization, equalization, and intergovernmental aid," *Public Finance Quarterly* 23, 484–508.

Yinger, J., H.S. Bloom, A. Borsch-Supan, and H.F. Ladd (1988) *Property taxes and house values: The theory and estimation of intrajurisdictional property tax capitalization*. Boston: Academic Press, 1988.

TABLES

Table 1
Evolution of grants in 2000's (in year 2008 pounds per capita)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	% change 2000 - 2008
England	1059	1112	1152	1317	1500	1562	1605	1655	1654	56.2
London Boroughs	1712	1794	1898	2222	2610	2660	2760	2848	2842	66.0
Metropolitan LAs	1134	1199	1237	1424	1636	1711	1746	1785	1778	56.8
Unitary LAs	1010	1061	1093	1236	1385	1456	1484	1532	1539	52.4
Non-metropolitan LAs	835	873	898	1010	1123	1176	1208	1250	1252	50.0

Table 2
Evolution of local government spending in 2000's (in year 2008 pounds)

	Net expenditure (£ million)			
	2001-02	2007-08	Real increase %	Real increase (£ million)
Education	29708	39602	33.3	9894
Highways and transport	3471	5595	61.2	2123
Social Services	13085	18385	40.5	5300
Housing (rent assistance)	7419	2469	-66.7	-4950
Cultural, environmental and planning	7313	9830	34.4	2517
Police and fire	10827	13358	23.4	2531
Other services	3727	3645	-2.2	-82
Total	75550	92884	22.9	17334

Table 3
Summary statistics for regression sample

Variable	Mean	Std. Dev. Overall	Std. Dev. within	Min	Max
ln(house price index)	7.467	0.229	0.185	6.581	8.567
Grants/pop (£1,000)	1.254	0.490	0.205	0.596	4.238
Ln(average male weekly earnings)	6.277	0.178	0.080	5.760	7.007
Age 16-29/pop %	16.9	3.9	0.581	10.7	36.8
Age 30-44/pop %	21.9	2.5	0.676	13.4	35.1
Age 45-64/pop %	22.5	2.4	0.303	12.6	27.7
Age 65 and higher/pop %	19.6	3.9	0.522	8.7	34.1
Secondary school pupils/1,000 pop	62.7	10.8	4.933	17.5	102.3
Pupils non-white/1.000 pop	5.4	8.0	2.484	0.1	55.7
Pupils eligible for free school meal/1,000 pop	34.1	29.5	11.342	1.1	358.0
Unemployment benefit claimants/1,000 pop	11.9	6.6	1.387	3.1	42.2
Altitude range (kilometers)	0.209	0.171	0.000	0.005	0.975
Labour's share of council seats	0.267	0.246	0.077	0	0.983
Labour dominated LA	0.215	0.411	0.207	0	1

Table 4
Capitalization of grants

	Fixed Effects regression				IV regression		
Dep. Var ln(price)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grants/pop	0.019	0.041*	0.059**	0.061**	0.166**	0.277**	0.291*
	[0.019]	[0.024]	[0.027]	[0.027]	[0.081]	[0.124]	[0.166]
Labour's share of seats					0.02	0.022	0.022
					[0.017]	[0.017]	[0.015]
Ln(earnings)				0.009			0.014
				[0.017]			[0.015]
Age 16-29/pop				0.006			-0.001
				[0.006]			[0.007]
Age 30-44/pop				0.014			0.005
				[0.010]			[0.010]
Age 45-64/pop				0.021**			0.008
				[0.008]			[0.011]
Age 65 and over/pop				0			0.003
				[0.008]			[0.006]
Secondary school pupils/pop				0.001**			0.001***
				[0.000]			[0.000]
Non-white pupils/pop				-0.003***			-0.005***
				[0.001]			[0.002]
Free school meal eligibility/pop				-0.001*			-0.001***
				[0.001]			[0.000]
Benefit claimants/pop				-0.007***			-0.008***
				[0.001]			[0.001]
Year fixed effects	YES	YES	YES	YES	YES	YES	YES
Local authority fixed effects	YES	YES	YES	YES	YES	YES	YES
Region*year fixed effects		YES	YES	YES	YES	YES	YES
LA type*year fixed effects			YES	YES		YES	YES
Kleibergen-Paap first stage F					43.5	22.7	16.8
Hansen's J (p-value)					0.278	0.364	0.495
N	2446	2446	2446	2446	2439	2439	2439
R-sq, within	0.916	0.967	0.967	0.969	0.966	0.964	0.967

Robust standard errors in brackets
* p<0.1, ** p<0.05, *** p<0.01

Table 5
Capitalization of grants and physical supply constraints

	Fixed Effects regression			IV regression		
Dep. Var ln(price)	(1)	(2)	(3)	(4)	(5)	(6)
Grants/pop	0.077***	0.086***	0.082***	0.249***	0.295**	0.267
	[0.026]	[0.028]	[0.027]	[0.090]	[0.126]	[0.162]
Altitude range*Grants/pop	0.032***	0.032***	0.029***	0.086***	0.092***	0.087***
	[0.009]	[0.009]	[0.009]	[0.019]	[0.021]	[0.020]
Year fixed effects	YES	YES	YES	YES	YES	YES
Local authority fixed effects	YES	YES	YES	YES	YES	YES
Region*year fixed effects	YES	YES	YES	YES	YES	YES
LA type*year fixed effects		YES	YES		YES	YES
Control variables			YES			YES
Kleibergen-Paap first stage F				20.5	12.4	9.3
Hansen's J (p-value)				0.911	0.942	0.887
N	2446	2446	2446	2439	2439	2439
R-sq, within	0.968	0.968	0.97	0.965	0.964	0.967

Robust standard errors in brackets
* p<0.1, ** p<0.05, *** p<0.01

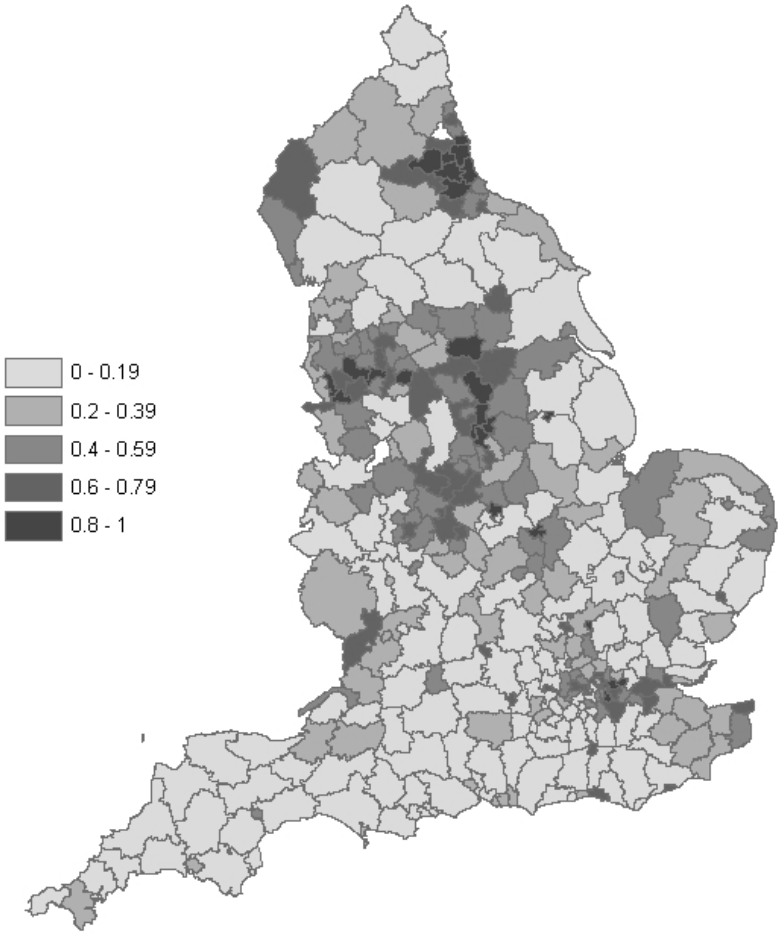
Table 6
Quantitative effects (capitalization rates with different assumptions)

Panel A: base regressions						
Table/Coulmn	4/2	4/3	4/4	4/5	4/6	4/7
Model	FE	FE	FE	IV	IV	IV
Coefficient	0.041	0.059	0.061	0.166	0.277	0.291
Capitalization rate if r = 0.05	0.166	0.238	0.247	0.671	1.120	1.176
Capitalization rate if r = 0.04	0.133	0.191	0.197	0.537	0.896	0.941
Capitalization rate if r = 0.03	0.099	0.143	0.148	0.403	0.672	0.706
Panel B: altitude range regressions						
Table/Coulmn	5/3	5/3	5/5	5/5	5/6	5/6
Model	FE	FE	IV	IV	IV	IV
Altitude range*	Low	High	Low	High	Low	High
Coefficient	0.053	0.111	0.203	0.387	0.18	0.354
Capitalization rate if r = 0.05	0.214	0.421	0.880	1.467	0.780	1.342
Capitalization rate if r = 0.04	0.171	0.337	0.704	1.174	0.624	1.074
Capitalization rate if r = 0.03	0.129	0.253	0.528	0.880	0.468	0.805

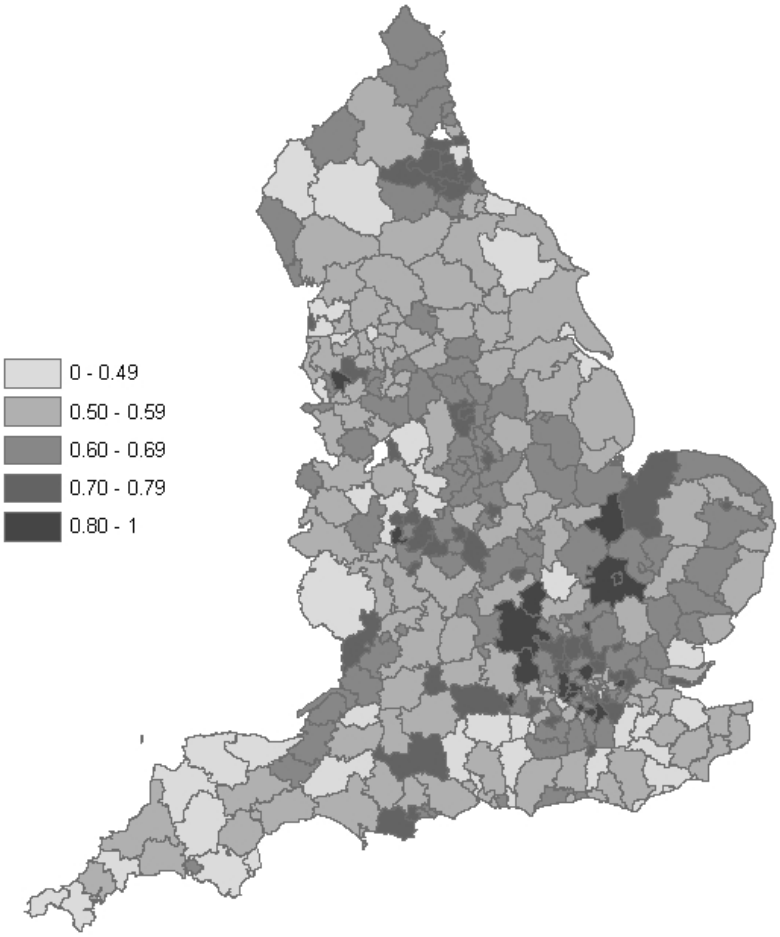
* Low altitude range = mean – std. dev. and high altitude range = mean + std. dev.

MAPS

Map 1
Labour's share of council seats in 2002



Map 2
Relative changes in grants per capita 2002 – 2008 (nominal)



APPENDIX TABLES

Table A1
First stage of IV corresponding to Table 4

Dep. Var grants/pop	(1)	(2)	(3)
Labour dominance	0.185***	0.123***	0.089***
	[0.036]	[0.030]	[0.022]
Labour dominance* Labour's share of seats	-0.364***	-0.238***	-0.152***
	[0.069]	[0.060]	[0.044]
Labour's share of seats	0.044	0.019	0.018
	[0.048]	[0.041]	[0.033]
Ln(earnings)			-0.021
			[0.023]
Age 16-29/pop			0.038***
			[0.011]
Age 30-44/pop			0.065***
			[0.022]
Age 45-64/pop			0.061***
			[0.015]
Age 65 and higher/pop			-0.002
			[0.014]
Secondary school pupils/pop			-0.001*
			[0.000]
Pupils non-white/pop			0.009**
			[0.004]
Pupils eligible for free school meal/pop			0
			[0.000]
Unempl. benefit claimants/pop			0.001
			[0.002]
Local authority fixd effects	YES	YES	YES
Region*year fixed effects	YES	YES	YES
Authority type*year fixed effects		YES	YES
Kleibergen-Paap first stage F	43.5	22.7	16.8
Hansen's J (p-value)	0.91	0.94	0.89
N	2439	2439	2439
R-sq, within	0.945	0.956	0.959

Robust standard errors in brackets
* p<0.1, ** p<0.05, *** p<0.01