SERC DISCUSSION PAPER 66

Evaluating the Effects of Planning Policies on the Retail Sector: Or do Town Centre First Policies Deliver the Goods?

Paul Cheshire (SERC, Department of Geography & Environment, London School of Economics)
Christian A. L. Hilber (SERC, Department of Geography & Environment, London School of Economics)
Ioannis Kaplanis (SERC, London School of Economics)

January 2011

This work is part of the research programme of the independent UK Spatial Economics Research Centre funded by the Economic and Social Research Council (ESRC), Department for Business, Innovation and Skills (BIS), the Department for Communities and Local Government (CLG), and the Welsh Assembly Government. The support of the funders is acknowledged. The views expressed are those of the authors and do not represent the views of the funders.

© P. Cheshire, C. Hilber and I. Kaplanis, submitted 2010

Evaluating the Effects of Planning Policies on the Retail Sector: Or do Town Centre First Policies Deliver the Goods?

Paul Cheshire*
Christian A. L. Hilber*
Ioannis Kaplanis*

January 2011

* SERC, Department of Geography & Environment, London School of Economics,

Acknowledgements
This paper represents work in progress and is still a preliminary draft. We would like to acknowledge the funding provided to SERC by ESRC, DCLG, BIS and the Welsh Assembly. We have benefited greatly from discussions with many colleagues and professional contacts: we would particularly like to mention Henry Overman, Steve Gibbons, Howard Smith and Robin Goodchild and colleagues in the DCLG and at NB Real Estate. We should also thank Gerard Derricks, Yue Yao and Zovanga Kone for their very diligent and capable research assistance and participants in meetings at the University of Aberdeen, the European Real Estate Society, SERC and the European Regional Science Association's annual congresses at which earlier versions of this paper were given. Perhaps most of all we should thank the major supermarket group who gave us access to their store level data but who wish to remain anonymous. The authors are responsible for all errors and interpretation.

Abstract
Few studies conceive of land as a productive factor but British land use policies may lower total factor productivity (TFP) in the retailing industry by (i) restricting the total availability of land for retail, thereby increasing space costs (ii) directly limiting store size and (iii) concentrating retail development on specific central locations. We use unique store-specific data to estimate the impact of space on retail productivity and the specific effects of planning restrictiveness and micromanagement of store locations. We use the quasi natural experiment generated by the variation in planning policies between England, Wales, Scotland and Northern Ireland to isolate the impact of town centre first policies. We find that TFP rises with store size and that planning policy directly reduces productivity both by reducing store sizes and forcing retail onto less productive sites. Our results, while they strictly only apply to the supermarket group whose data we analyse, are likely to be representative of supermarkets in general and suggest that since the late 1980s planning policies have imposed a loss of TFP of some 25%.

JEL Classifications: D2, L51, L81, R32
Keywords: Land use regulation, regulatory costs, firm productivity, retail

1. Introduction

Introductory economics tells us there are three factors of production: land, labour and capital. Unless a student of agricultural economics, land as a factor of production will never be mentioned again. Yet space for some industries is a significant input and that would seem to be true of retailing. This is a sizable sector of the economy – on a reasonable measure of employment, the second largest industry in the UK. Land use policies in the UK have the effect of restricting the availability of land for retail; in addition 'town-centre-first' policy, especially in England, attempts to concentrate retail development on particular sites on expensive central land and so increases the cost and constrains the quantity of retail space. In British cities in the mid 1980s the most expensive land for retail was 250 times as expensive as the most expensive retail land in comparable US cities (Cheshire and Sheppard, 1986).

The British system of land use planning imposes direct restrictions on the supply of land for different, legally defined, categories of use in different locations. The system thus increases the costs of space in all categories of development: notably residential, commercial, wholesale, industrial and retail. The greater is demand for land for a particular use in a particular location, the greater, other things equal, will be the increase in price that is generated. Over the past 20 years a literature has developed analysing the economic effects of these restrictions and planning imposed costs on development. Most of this work has related to the residential sector but more recently studies have begun to analyse the costs in other sectors. Cheshire and Hilber (2008), for example, examined the office sector and concluded that the additional costs imposed by the operation of the land use planning system in Britain were not only substantially higher than in any other country for which it was possible to get the requisite data but over the period 1999-2005 imposed the equivalent of a tax on construction costs of more than 800 percent in the most constricted jurisdiction where demand was strongest – London's West End. Anecdotal evidence, at least, suggests such costs may be significantly higher in the retail sector because of strong town centre first policies and the virtual prohibition of large scale out of town retail developments imposed since 1996.

Many countries' systems of land use regulation constrain space for particular types of development in particular types of location. As Cheshire and Vermeulen (2009) argue there are good reasons relating to problems of market failure that suggest such restrictions could potentially improve overall social welfare. The British land use planning system, however, apart from restricting the supply of space to an extent that appears to significantly reduce overall welfare (see Cheshire and Sheppard, 2002) has many peculiar features that impose costs on development. Most notable perhaps is its reliance on the very time intensive and uncertain system of 'development control' as its mechanism of enforcement. As Mayo and Sheppard (2001) showed long ago this on its own renders the supply of development more inelastic simply by making the planning decision making process stochastic rather than predictable in its outcomes.

In addition development control is likely to mean that the ultimate decisions taken are less 'plan led' (an hypothesis we briefly investigate here) and more politically influenced, and greatly increase the costs of delay and transactions (see, for example, Allmandinger and Ball, forthcoming, or Ball, 2010) associated with the development process. As argued in Cheshire and Hilber (2008) all these costs of compliance will end up negatively capitalised into land prices, as will other costs associated with the planning system, including both the transactions costs involved in negotiating Section 106 Agreements (designed to recoup the value of

'planning gain' for the community) and the value of those Agreements[1]. This is doubly ironic since, of course, this process of capitalisation will be subtracted from any possible value of 'planning gain'. Thus the costliness of the process intended to capture planning gain itself reduces – may even eliminate – the value of planning gain. Indeed it is likely that the compliance costs associated with the planning process renders all development non-viable in many locations.

Griffith and Harmgart (2008) and Haskel and Sadun (2009) provided the first attempt by academic economists to analyse the impact of British planning policy on the productivity of the retail sector. Their work was consistent with the less rigorously based conclusions of the McKinsey Global Institute (1998) who had long since concluded that by preventing the emergence of more productive, large format stores and increasing the costs of space, planning policy was seriously impeding the growth of Total Factor Productivity (TFP) in the British retail sector. Perhaps overlooked, because hidden in a detailed appendix, is the work of the Competition Commission (2008, Appendix 4.4). They had full access to a very wide range of store specific data for the four main supermarket groups for the period May 2005 to May 2006 covering store sizes from 280 to 6,000 m^2. They also had additional if more restricted data for nine other retail groups. Their analysis produced very strong evidence of the importance (and statistical significance) of store size to profitability and TFP – see for example the results reported in Table 6, Appendix 4.4, Competition Commission (2008).

The contribution of the present work is that, unlike Griffith and Harmgart (2008) or Haskel and Sadun (2009), we have access to a wide range of individual store level data complete with full locational details. We also have the same range of store level data for Northern Ireland, Scotland and Wales which allows us to exploit the substantially different planning policies – particularly in Northern Ireland and Scotland – to help identify the impact of planning policies in England. We have full planning decision data for all English local authorities from 1979 to 2008 which allows us to analyse the impact of cross sectional variation in planning restrictiveness within England. A limitation of our study is that strictly our results only apply to the major supermarket group whose data we analyse although it is likely that the findings are representative of the supermarket sector as a whole.

An earlier report, Competition Commission (2000), devoted considerable space to the role of the planning system as a drag on competition in the grocery/supermarket sector and collected a vast quantity of useful and relevant data. Appendix 12.7 of this report, for example, contains careful comparisons of land costs for retail development in various Continental European countries calibrated on a basis as far as possible comparable with those in the UK. The principles of urban economics predict that land costs for any given use will fall with distance from the centre of a city and also fall as city size falls. The values quoted for France, summarised in Table 1, reflect this. According to the Competition Commission (2000) land costs in France were five to ten times lower than in Britain. Estimates for Germany and the Netherlands produced similar patterns as between city sizes and location with respect to city centres and also comparable values to those reported for France. We can therefore reasonably conclude that the cost of land for supermarkets in Britain is at least some five to ten times greater than in similar Continental European countries.

[1] Section 106 Agreements are unknown outside the UK – indeed their cost and complexity means that even within the UK they are not widely known: Crook *et al* (2010) estimated that from 2003 and 2008 between 6 and 7 percent of all non-householder planning permissions in England had S106 Agreements associated with them – an increase since the 1990s. They are a provision within the legislation governing planning which allows LPAs to negotiate with would be developers a requirement to provide 'community gain' – often low cost housing or public facilities of some kind – as a condition of permission. Because of their cost their use increases significantly with the size of proposed development schemes.

Table 1: Land costs for supermarkets in France £ per hectare

City	City Population*	Town Centre	Edge of Centre	Out of town
Paris	2 100 000	3 100 000	700 000	350 000
Lyon	450 000	750 000	230 000	140 000
Reims	187 000	750 000	230 000	140 000
Provincial	Less than 50 000		53 000	

*As quoted in Competition Commission (2000): actual population for functional urban region substantially larger: in 2000 - Paris 10 908 000; Lyon 2 003 000; Reims 400 000.
Source: Competition Commission (2000) Appendix 12.7.

Thus we already have strong evidence that TFP in supermarkets increases with store size, other things equal, and that land and space costs in Britain are an order of magnitude higher than those in Continental European countries and a further order of magnitude greater than in the US (though here the existing evidence is old). From other work on the impacts of land use planning policy on the costs of space it may be reasonable to assume that these inflated land costs are caused by planning policies and that some combination of direct controls on store sizes and higher land costs causing the substitution of space out of production leads to smaller supermarkets in Britain and so reduces TFP in the retail sector. But to date the link to planning policies is only circumstantial and there has been no direct estimation of the quantitative impact of planning policies on TFP although Haskel and Sadun (2009) suggest that the fall in within chain store sizes post-1996 was associated with a loss of 0.4 per cent p.a. in TFP growth. It is the purpose of the project of which this paper is the first output to address this issue, particularly the issue of causation, directly and ultimately quantify it more precisely.

In so far as planning policies reduce TFP in retail then we would expect there to be an inequitable impact on the distribution of welfare. Low productivity will increase store prices and, since poorer households spend proportionately more of their incomes on food and other store sold items, this will reduce the purchasing power of poorer households relative to richer households.

A further purpose of the paper is to explore the specific impact of 'town-centre-first' policy. This is intended to favour town centre retail development. According to ODPM (2004) town centre first policies were introduced to improve access to retail stores by public transport, partly to maintain access for poorer households without access to cars and partly to reduce overall energy use: for 'sustainable development' in other words. As was discussed above, in fact, if the policy reduces TFP in retail then this will differentially reduce the real incomes of poorer households. Moreover for several reasons it seems more likely that it will increase energy used in retail rather than reduce it. There are at least three reasons why it is likely to increase energy use. The first is that in so far as the policy reduces out of town retail and concentrates retail space in existing city centres, it will tend to increase the average distance between households and retail outlets. Households have continued to decentralise over the past thirty years, despite containment policies. In addition to shopping trips being longer they will tend to be in more congested conditions (increasing energy use per mile) and may be more frequent. Frequency will tend to be increased in so far as space in retail outlets is reduced, since package sizes and quantity discounts are likely to be reduced. The third factor relates to the logistics of retail. Smaller stores require more frequent re-stocking and town centre locations imply longer distances from motorways and distribution centres as well as travelling in more congested conditions. Thus it is a reasonable hypothesis that town centre first policies, in so far as they focus retail space towards the centres of towns, will increase, rather than reduce, total energy use in the sector.

This hypothesis is not tested in the present paper, however, although we do test the extent to which town centre first policies have in fact concentrated retail space towards the centre of towns rather than just restricted the total space for retail use.

The paper proceeds as follows. Section 2 briefly sets out the key elements of planning policy with respect to retail and summarises some of the findings so far as to their effects. The next section establishes more formally our hypotheses and our methodological approach, especially with respect to identifying the causal processes at work and the specific role of planning policies. The following section describes the data we use. In Section 5 we analyse the data in terms of the observed patterns of store location, store size and the price of space and draw some conclusions from this circumstantial evidence. Section 6 presents the main analysis, estimating a production function for our store group which includes space as an input and then shows how store size is influenced by planning policies. We use these relationships to estimate the TFP impact of planning policy. The final section summarises some conclusions and discusses some of the problems with this provisional analysis and what additional data and tests are necessary.

2. Existing Land Use Policies and their Evolution

This description focuses on policies as they have developed in England but there are interesting and significant differences, both in the precise form and the timing, of policies for retail as between England, Wales, Scotland and Northern Ireland. While policy in Wales has tended to follow that in England closely, differences between these two countries and Northern Ireland and Scotland are significant. These differences are discussed in more detail in Section 6.

Although restrictions on out of town retail developments had been emerging in England since 1988, 'Town Centre First Policies' - in broadly their current form - were introduced in PPG6, published in 1996. The policy had a number of objectives which, as the evaluation of the policy (ODPM, 2004) pointed out, conflicted. On the one hand the purpose of PPG6 was to redirect development, not just in retailing but in all 'key town centre uses', including leisure, office development and other uses, such as restaurants, to town centres. But the policy's objective included "maintain(ing) a competitive, efficient and innovative retail sector". As ODPM, 2004 pointed out, this was not consistent with the other objectives of the policy. Moreover although the policy was supposed to encourage local authorities to plan for the wider revitalisation of town centres with a 'plan-led' approach, in practice it came to be seen as primarily a development control tool to prevent out of town development rather than 'positively plan for towns centres'. ODPM (2004) states that the policy "…may have acted as a brake on retail development, and has yet to deliver any widespread renaissance in the role of smaller towns and district centres."

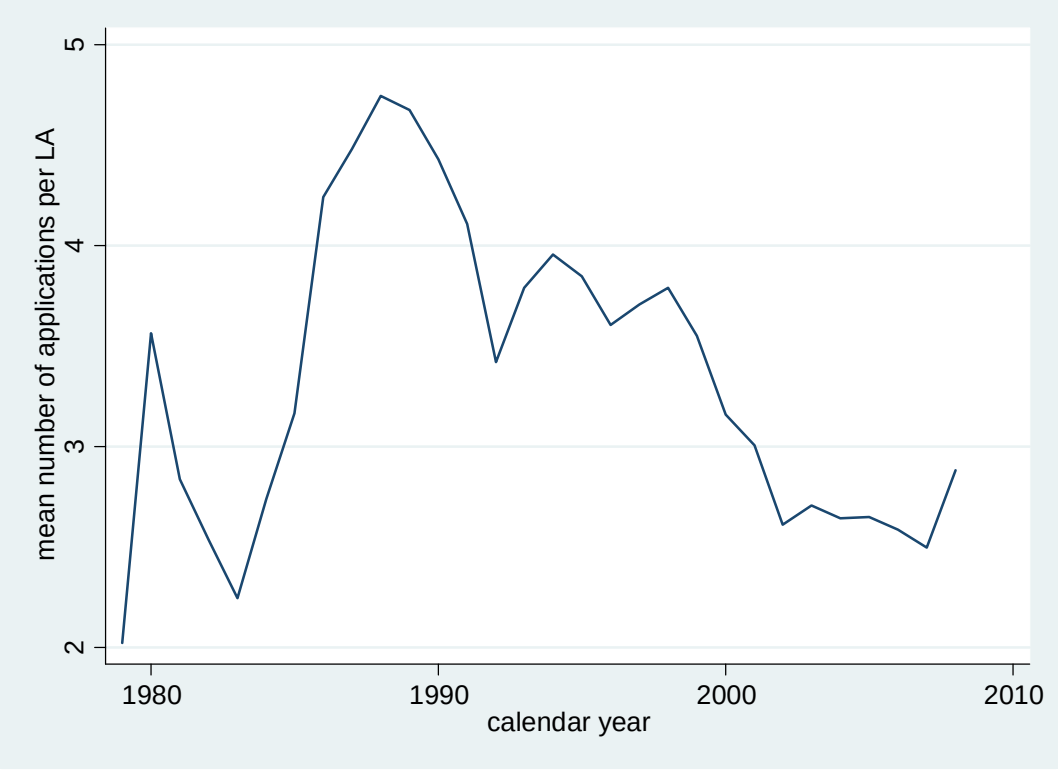
There were strong commercial pressures in the early 1980s for the development of so-called Regional Shopping Centres (RSC) – essentially large scale, car-based, out of town malls. Merrryhill in Dudley and the Metro Centre in the North East were prototypical examples. Planning Policy was initially formulated in the first PPG6 published in 1988. This took a largely neutral view of such developments, accepting their commercial logic but tried to steer them away from Greenfield sites and direct them to areas of derelict land such developments could reclaim. The best example of this was perhaps the last RSC to be actually developed, Bluewater, near Dartford in Kent, built on the site of the chalk workings acquired by Blue Circle Cement: the origin of most to the Portland cement used to construct 19th and early 20th Century London. That Bluewater was not opened until 1999 tells one

something about the deliberate nature of the development process as it interacts with the British planning system.

PPG6 (1988) further determined that planning policy should not be used to inhibit competition. Policy was revised in PPG6 (1993) which attempted to balance out-of-town and in-town retail development on the belief according to ODPM (2004) that the free market would 'under provide' in-town retail development. This heralded the first serious tightening of planning policy in relation to large format, out-of-town development.

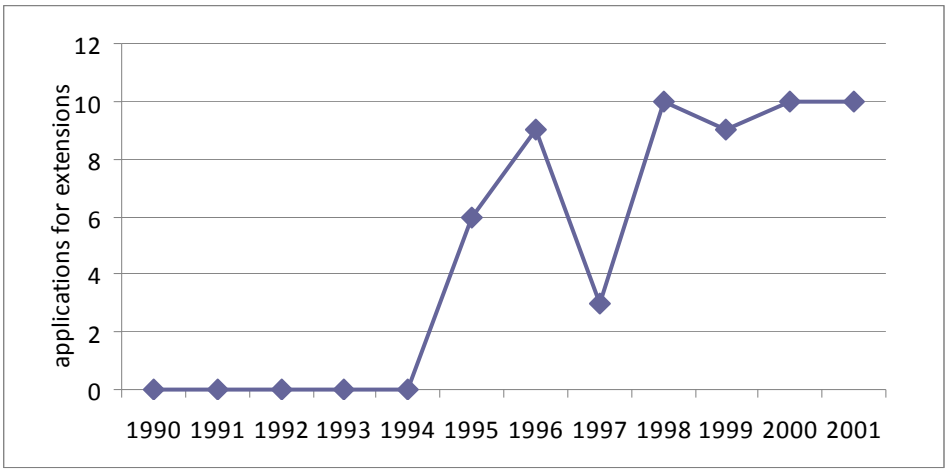
The radical change in policy came in 1996, however, with a new PPG6. This strongly redirected retail (and other traditional town centre uses) to town centres. Far from attempting to avoid 'unnecessary regulation' as previous policies had done, it put the emphasis firmly on 'town centre first'. PPG6 introduced a 'sequential test' designed to rule out all possible sites before allowing an out of town site even to be considered. A potential developer had to show that suitable sites in town centres were not available before proposing to develop an edge-of or out-of town site; and then to demonstrate that a site in an existing centre - whether a district or neighbourhood centre - was also not available. According to ODPM, 2004 the underlying rationale for the change in policy was that town centre sites were the most 'sustainable' "…on the premise that town centres are the most accessible locations by alternative means of transport and facilitate 'linked trips' thereby reducing the need to travel." (ODPM 2004 page 21).

Figure 1: Number of applications for major retail developments, 1979-2008: mean per local authority per year



Source: Department for CLG.

Figure 2: Applications for extensions to foodstores, 1990 to 2001

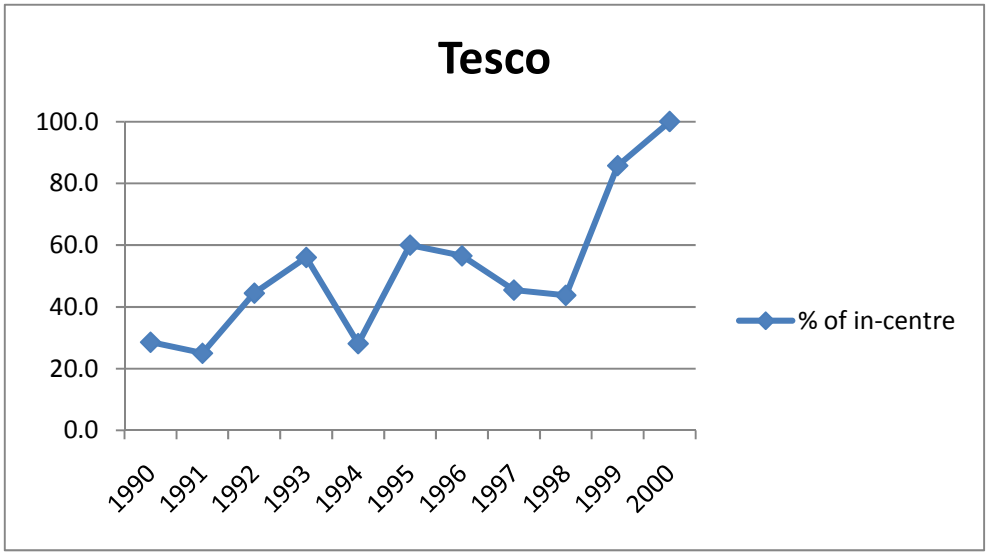


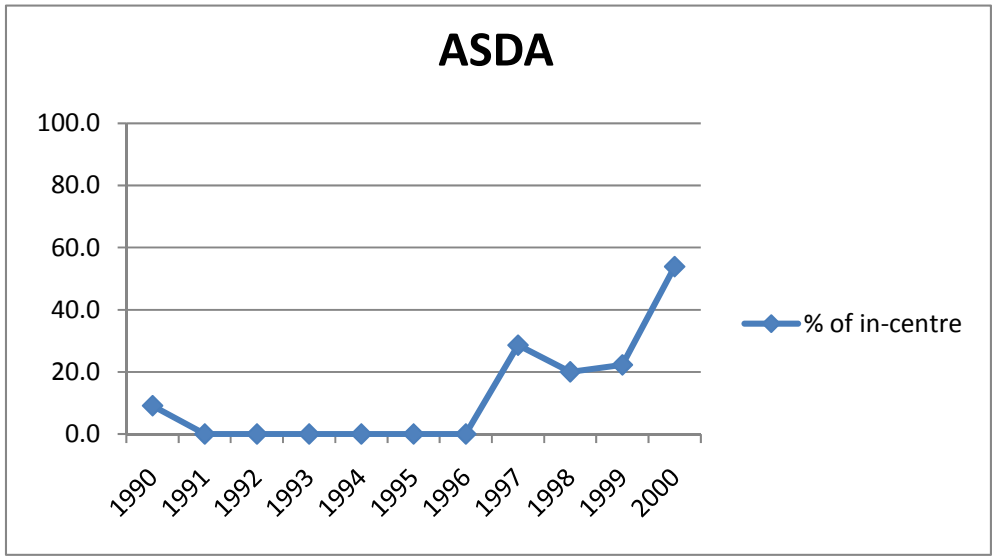
Source: ODPM 2004.

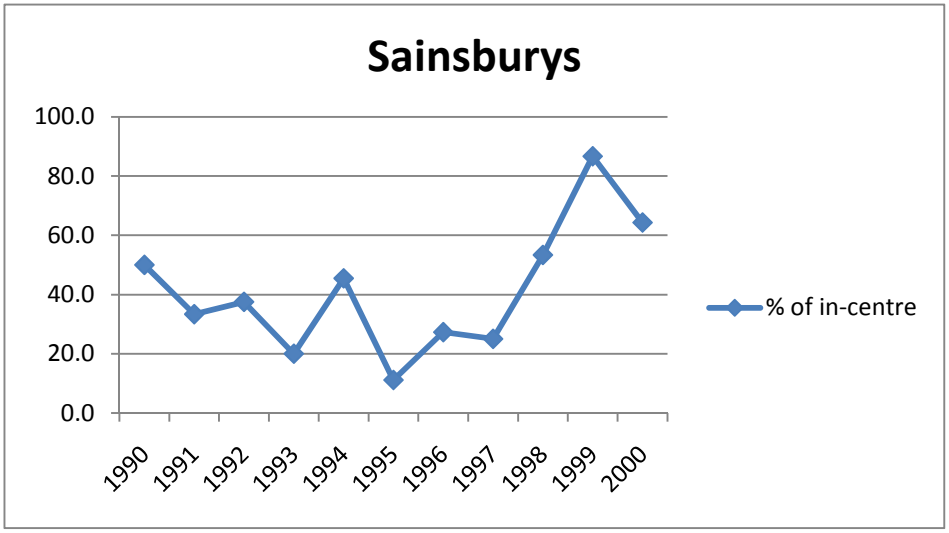
As Figures 1 to 4 show, the change of policy was reflected in radical changes in the number, location and types of developments. According to Barker (2006a) in 1971 around 65 per cent of new retail space was being constructed in town centres: by 1996 this proportion had fallen to 23 percent. Following the change in policy it had risen again to over 40 percent by 2003.

Applications for major retail developments (Figure 1) fell sharply from 1993 and trended downwards thereafter although there was a cyclical upturn in 2005-06. This was compensated for by an even more noticeable upturn in applications for *in situ* extensions (Figure 2) – far less influenced by the change of policy and in existing productive sites. In-centre store openings increased and out-of centre openings declined (Figure 3). This change in locational pattern was more visible in some groups, such as Tesco, than it was in others. Finally as Figure 4 shows, the sharp reduction in store development – illustrated in Figure 1 – was reflected in an older stock of buildings in the retail sector than in any other economic sector.

Figure 3: Big supermarkets respond: in-centre openings as % of all, 1990-2000

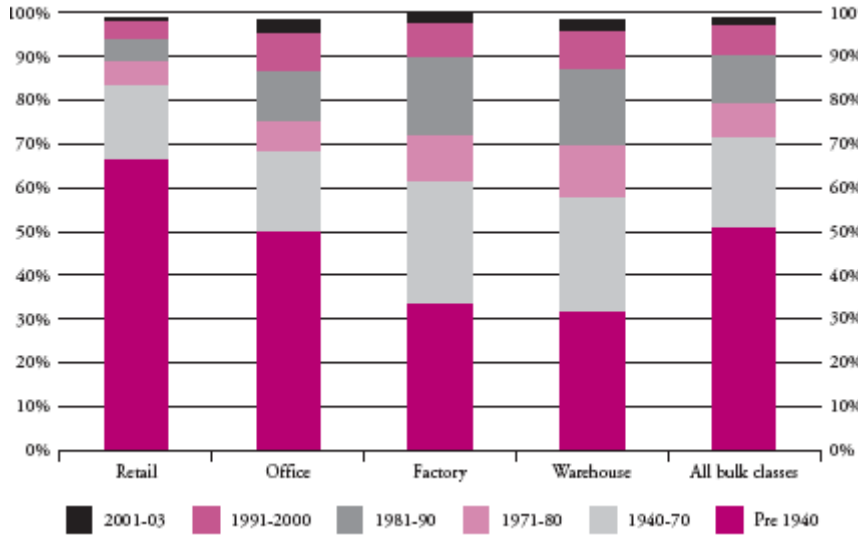






Source: Authors calculations of IGD data.

Figure 4: Age of building stock by use category



Source: Barker 2006a.

3. Our Hypotheses and Approach to Testing

The hypotheses we are interested in testing are then as follows. The first is to confirm the findings of the Competition Commission (2008) that larger stores are associated with higher TFP but to do so in a way which makes it possible to test whether the operation of the planning system has a causal role in reducing store sizes. In so far as this is the case we then seek to quantify the reduction in productivity in the retail sector – or more accurately in the major supermarket group for whom we have data - generated by a more restrictive planning policy. Planning policies may both directly restrict store size or format and site characteristics via town centre first policies but in addition, the restriction on space for retail may increase the price of such space and so cause it to be substituted out of production further reducing TFP in the sector. That is there are two separate routes by which planning policy may reduce TFP in retailing.

1. By increasing the price of space in general it reduces store sizes: although retailers may still successfully choose profit maximising store sizes, the higher cost of space causes space to be substituted out of production, increasing costs and leading to efficiency losses compared to the space use that would have been employed had the price of space not been increased by the constraint on land supply for retail;
2. Separately policy may force stores (by the sequential test, for example, or just forcing location to be in town centres) to be on perhaps smaller and/or less productive sites than would otherwise have been selected. As discussed in Section 6 this effect would work via reduced consumer welfare reducing stores sales other things equal.

To test these hypotheses we need detailed store level data with exact store location so other geographic/spatial data which is relevant and may influence store productivity can be included in the analysis. Furthermore we need store location because of the fact that the characteristics of the location with respect to the centre of urban areas may plausibly be causally linked to store productivity and the planning system is operated at the level of Local

Planning Authorities (LPAs) and despite a national policy may vary in its restrictiveness from LPA to LPA. It is to the issue of data that we now turn.

4. Data

The dataset used has individual store-level information on a full set of stores from a major supermarket group who has given us access to their data but wishes to remain anonymous. Variables include sales (for food and non-food items), various measures of floorspace, (including the presence of a mezzanine floor) and employment. Furthermore, store characteristics like total opening hours, the number of parking spaces and store format have been obtained. The store location is available at full postcode level and grid references have been obtained as well.

Some key summary statistics are shown in Table 2. In total there are 357 stores in the UK with all or most variables reported for 2008. Out of the total of 357 stores, 336 are food-formats and 21 non-food formats. Since non-food formats are quite different to the food-format stores, they are considered as a special case and either excluded from the analysis or a dummy is added. From the food-format stores, there are 55 defined by the company as 'small stores', 252 'superstores' and 29 'supercentres'. The small type stores have a mean floorspace of 25,000 sq.ft., the superstores 49,000 sq.ft. and the supercentres 85,000 sq.ft. Overall net floorspace varied from a low of just over 8,000 sq ft to a high of more than 100,000 sq ft. Our measure of employment varied from 32 to 471.

The vast majority – 95 percent - of employees are paid on an hourly basis with the rest on a salaried basis. This information has been used to construct a full-time equivalent of employment since the hourly contracted staff worked part-time while the salaried staff were full-time. Staff remuneration and individual hours were not available from the company so in the results reported here to obtain a measure of Full Time Equivalent (FTE) labour inputs at the store level, the simple assumption is made that salaried employees are full time and hourly workers are on average half time. See Section 6 for further rationale for this assumption.

Table 2: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Sales/employment	357	4246	544	2349	5706
Sales (£)	357	921115	406300	73978	2056014
Employment (FTE)	357	213	85	32	471
Net floorspace (sq.ft.)	357	46710	17352	8313	101091
Gross floorspace (sq.ft.)	357	81633	31095	15076	180000
Food floorspace (sq.ft.)	357	27819.6	10144.7	0	54290
Non-food floorspace (sq.ft.)	357	18890.5	9859.5	671	52576
Net/gross floorspace (ratio)	357	0.58	0.07	0.33	0.83
Density (empl/1,000 Sq.ft)	357	4.57	1.10	1.01	7.40
Non-food format (dummy)	357	0.06	0.24	0	1
Mezzanine (dummy)	357	0.17	0.38	0	1
Parking spaces	356	576	264	82	2000
Years since first opening	357	14.4	10.5	1	43
Total weekly opening hours	357	119	29	64	168
Population within 10mins	357	81226	43706	5532	229246
Car ownership share within 15 minutes drive	357	0.70	0.08	0.45	0.88
Competition variable	357	4.97	3.49	0.29	23.30
Rateable value (2005)	323	1266813	652147	96000	3690000

The data on planning outcomes comes from CLG and is at the Local Planning Authority (LPA) level. The information we have so far is, as noted above, only for England and thus corresponds to a subset of 269 stores. The main variables used in order to capture the restrictiveness of planning regulation in the LPA are the refusal and the delay rates. The former corresponds to the ratio of rejected to total planning applications for major projects. These are available by category e.g. residential, retail, etc. The refusal rates for both major retail and major residential projects have been used. The delay rate corresponds to the ratio of planning applications that have been left pending for more than 13 weeks. We also have applications at the LPA level per person. These planning data run from 1979 to 2008.

Others have used planning variables such as these (see for example Cheshire and Sheppard, 1989; Preston *et al*, 1996 or Hilber and Vermeulen, 2010). The reason for using these variables is to devise a measure of 'planning restrictiveness' at the Local Authority level. The most obvious variable to use is the refusal rate although it might be expected that more restrictive LPAs would also have more delayed decisions so that the delay and refusal rates would be positively correlated. Given the cyclicality of application rates for development one might think of the mean refusal or delay rate for the whole period as the best indicator for the individual LPA.

It is well known, however, that there is a potential endogeneity problem with such measures since the behaviour of developers may be influenced by the behaviour of LPAs. Since applications cost significant resources, would-be developers may hold back from making applications in LPAs known to be restrictive, so no refusal results. Indeed there may be prior negotiations before any application is made and when it is clear an application will not be likely to be successful it may not come forward. Equally, more restrictive LPAs may not have more or longer delays: they might just refuse a higher proportion of applications or very fewer applications may come forward. There is, however, a counterforce of restrictiveness. Although the probability of success may be lower in LPAs known to be more restrictive, thus discouraging would-be developers from applying, the payoff from successful

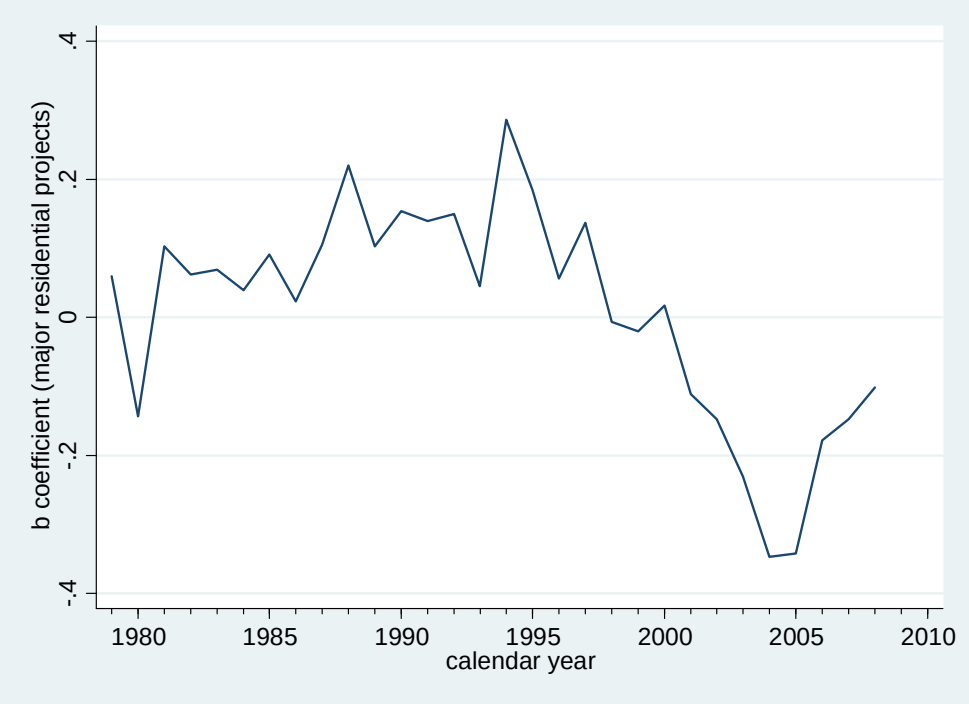
applications will be higher because permissions are scarcer. This will tend to increase the flow of applications and – given that the LPA is restrictive – the refusal rate. Although we do not know *a priori* which of these two incentives will be stronger, we suspect the 'discouraged developer effect' should prevail.

As is discussed in more detail below this possible endogeneity of planning measures makes identification of causality problematic. Our approach to this problem is to devise instruments. We have identified four possible instruments. The first is to exploit the change in planning policy heralded by the 1996 PPG6. As observed in section 2, this made major retail projects much more difficult, especially out of town projects, and led to a substantial reduction in applications for major retail development but increased applications for store extensions since these remained relatively less affected. In LPAs already actually restrictive in 1996, therefore, one should not expect any significant change in the refusal rate. LPAs which prior to the change of policy had been relatively unrestrictive, however, should be expected to have increased in their measures of restrictiveness following the change in policy. So the instrument would be the *change* in refusal rate noted between a mean of say 1990 to 1995 and 1997 to 2000. The problem with this instrument is that applications for major retail development are sufficiently rare that for individual LPAs there are not enough applications to provide a reliable measure.

A second possible instrument can be constructed from the change in the delay regime initiated in 2002 when performance targets were introduced for LPAs with respect to the proportion of applications decided within 13 week for major *and* minor developments separately. Prior to the change, targets related to all applications together and since there are many applications for minor development relative to major development, more restrictive LPAs prior to this change could use delays for major development to restrict development overall but still have met their decision time target for all development applications. Following the introduction of the new targets, therefore, it became much more difficult explicitly to delay applications whether for major or minor developments so that more restrictive LPAs would no longer tend to have both higher refusal rates and more delays[2]. So again the change in the relationship between refusals and delays, or the change in the delay rate itself, would be the appropriate instrument from a mean of 1994-96 to the mean of 2004-06.

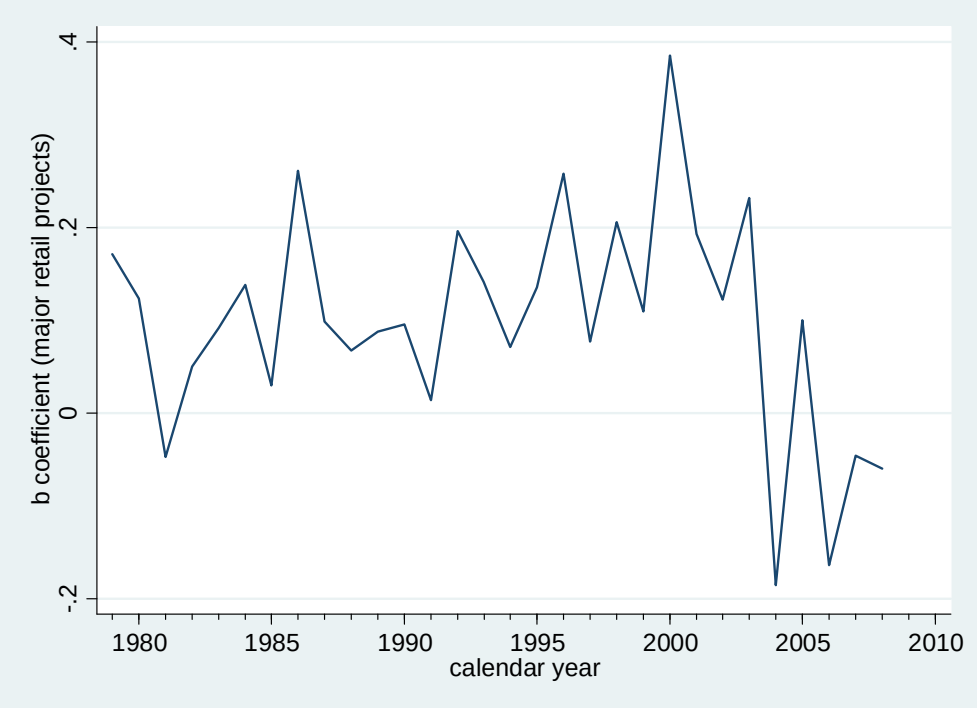
[2] As Ball (2010) shows, however, delay is very much more complicated than the simple measure of time between application and decision (as well as unrecorded prior periods of negotiation). If delay is taken as the elapsed time from first application to final decision then Ball reports it is 43 weeks on average and more than a year for over 41 percent of sites - excluding time taken in discussions prior to the first application. LPAs get down to 13 weeks delay per application by rejecting applications but allowing a further revised application. Ball's analysis relates to residential development.

Figure 5: Plotting the coefficients from regressing refusal rate on delay rate: residential (major) 1979-2008



Source: Department for CLG.

Figure 6: Plotting the coefficients from regressing refusal rate on delay rate: retail (major) 1979-2008



Source: Department for CLG.

Figures 5 and 6 show the estimated value of the regression coefficients for LPAs between their refusal and delay rates for each year from 1979 to 2008 for major residential

and major retail. We observe that for nearly every year prior to 2002 these measures of restrictiveness were positively associated. From 2000, however, the relationship became negative and was strongly negative for 2004-2006 when the new targets were well established. This is more obvious for major residential than for major retail but then there are far more applications for major residential so random error should be less.

A third instrument is to exploit the difference in restrictiveness associated with political control. A number of authors (Haskell and Sadun, 2009 or Hilber and Vermeulen, 2010, for example) have noted that Labour controlled LPAs – or LPAs with historically stronger Labour representation, tend to be less restrictive than Conservative dominated LPAs. They use a measure of local voting outcomes as an instrument with some success.

A final instrument would follow the logic of Cheshire and Hilber (2008) and use the local unemployment rate as an instrument. It can be argued that as unemployment rises, or where it is higher, LPAs have a greater incentive to be less restrictive with respect to employment creating development.

We plan to explore these instruments as the work develops but for the time being only have results using the straight measure of refusals or delays and the political composition of LPAs.

5. Circumstantial Evidence on Planning Policy, Store Location and Land Prices

In this section we use the data to investigate how the planning system appears to have influenced land values and the spatial pattern of store sizes, testing several hypotheses related to the wider interests of our study. The results suggest that types of locations as identified by the planning system bear little relation to functional definitions: town centres for planning purposes are apparently not systematically what most people would think town centres to be. Moreover land prices for stores in Britain do not follow the pattern observed in France. They are uniformly high in all locations and land for retailing seems to be most expensive in the scarce out of town locations where, in an unconstrained world, we would expect urban land to be cheapest. Moreover, although in parts of the country where there is least demand, store sizes do seem to be smaller as demand becomes sparser, for the 80 percent of locations with greater market potential there is no tendency for store sizes to increase as demand for retail space might be expected to increase. This supports the supposition outlined in Section 3 above, that the planning system is likely to reduce TFP in retail via two distinct routes: it increases the price of retail space everywhere so causing stores to be smaller and, given the results reported in Section 6, less productive but additionally and separately via its concern for the micromanagement of store locations, constrains stores to be smaller and located on specific, less productive sites than would otherwise be the case. In this section we present circumstantial evidence while in Section 6, in which we estimate a production function, we explore these effects in a more rigorous and theoretically based way as well as testing the causation more rigorously.

Table 3a simply tabulates stores by their official classification for planning purposes into ‘location types’. Since the planning system deals in legal rather than economic or functional classifications and notoriously lacks systematic and strategically binding local Development Plans (an assessment in January 2010 judged that the majority of LPAs did not have an ‘up to date development plan’ – a requirement for the implementation of PPG6 and its successor PPS6 - Thomas Eggar LLP, 2010) ‘location types’ for planning purposes may bear only a slight relationship to location as commonly understood. This partly reflects the reliance on the process of development control with the non-transparency and politicisation

of decisions that seems to arise as a consequence. A particular and notorious case is that of Dudley, which following the development of a truly out-of-town regional shopping mall, Merryhill, when Dudley LPA found it difficult to permit enlargement and further development following the introduction of PPG6 in 1996 decided to re-classify Merryhill as a 'town centre'.

Table 3a: Number of stores and average floorspace by 'location type'

Location Type	No of stores	Mean Net floorspace (sq.ft.)	S. D.
Town Centre	46	42609	15429
District Centre	41	45564	18053
Suburban Centre	25	44732	10202
Edge of Centre	63	43598	16527
Out of Town	123	50889	17459
Destination	13	63760	22824
Retail Park	25	52015	14063
Non-food Format	*21*	*28279*	*5086*

Table 3b: Floorspace costs by 'location type'

Location Type	Rateable value 2005/net floorspace (in £/sq.ft.)	S.D	Rateable value 2005/gross floorspace (in £/sq.ft.)	S.D.	Rateable value 2010/net floorspace (in £/sq.ft.)	S.D.	No of stores
Town Centre	23.5	6.7	12.9	3.6	33.5	8.9	45
District Centre	24.7	6.9	14.4	4.6	37.1	9.5	39
Suburban Centre	27.8	4.7	15.3	2.5	35.9	6.7	21
Edge of Centre	26.3	6.0	15.0	3.8	36.2	6.9	60
Out of Town	26.7	5.8	15.4	3.5	37.8	6.6	112
Destination	31.8	3.8	17.6	3.8	41.2	4.9	12
Retail Park	27.8	9.3	16.2	6.3	40.6	14.4	21
Non-food Format	13.8	4.5	9.9	2.8	17.4	5.6	13
All stores	25.7	6.8	14.8	4.1	36.1	9.0	323

Tables 3a & b provide credibility for this suspicion. They tabulate average store sizes and a measure of the costs of floorspace by 'location type' as classified by our store group for planning purposes. Store sizes vary little between location types: the mean size of 'town centre', District centre', Edge of Centre' and Suburban centre' shows almost no variation. 'Out of town', 'Retail Park' and 'Destination' stores are rather larger, on average, but not remarkably so, except for the small category of 'Destination' stores'. Rateable value per square foot is the most accessible measure of price and has been shown in previous work (Mehdi, 2003) to be closely correlated with market measures of price. We see from Table 3b that there is no obvious relationship between price of space and 'location type'. In France (see Table 1) land values for retail use fall as predicted by the monocentric model with distance from city centre and as city size falls. In 21st Century Britain no such relationship is apparent[3]. Town centre store space is in fact the cheapest followed by that in District Centre

[3] An interesting point to note is that in Cheshire and Sheppard (2005) land values for retail in Reading, Berkshire – a medium sized and prosperous town 60kms west of London – were reported for 1984. They were

stores. The most expensive space is in the notionally out of town locations, Suburban centres, Retail Parks and Destination Stores. Essentially space costs did not vary systematically with respect to the classification of location for planning purposes.

So we might expect the net outcome of PPG6 - even if it differentially restricted out of town locations and introduced new constraints to site choice - would have been to have restricted yet further all retail development in every location. If that was the case two consequences might follow.

The first consequence would be that store size would become only weakly related to location vis à vis the centre of (large) built up areas or the spatial distribution of demand. In remoter and lower density areas with less market potential, stores might be smaller because, although the price of space was raised and so space substituted out of production and technological efficiencies lost ('route 1 as identified in Section 3) still stores reached their profit maximising size given the low total demand in the area they served. Demand would not support a larger store, although if land were cheaper, stores would in general be bigger and more productive. As population densities - or 'market potential'- increased, however, 'route 2' would begin to operate, and both price effects and direct regulatory constraints would keep store sizes smaller. So below some observed population density (or market potential measured as total population within 10 minutes drive times) stores would be smaller as market potential fell further, but above that threshold stores would no longer tend to get bigger as economic potential increased because of direct regulatory constraints on store sizes.

The second consequence would be a general increase in land and space prices for retail regardless of location. So that instead of observing a typical 'rent-gradient' with space prices falling with distance from town centres and with respect to city sizes, space costs would appear to be relatively flat and higher everywhere. Indeed since space was most restricted in out of town locations where stores were likely most productive, space costs might actually rise with distance from functionally measured town centres.

These propositions are explored in Table 4 and Figures 7a/b and 8. We divide stores into those in the lowest quintile of market potential measured as the population within a 10 minutes drive time and the 80 percent of stores in locations with higher economic potential. It is worth noting that these low market potential stores are relatively concentrated in Wales and Scotland. As we can see from Figure 7a, overall stores do not on average get very much larger in areas with greater market potential. In an unrestricted world one would be reasonable to expect a continuous increase in mean store size as individual stores served more people. This lack of a strong response in store size to market potential is confined to the stores in areas of higher potential, however. At the lower end of the distribution there is a strong relationship between increasing market potential and mean store size. This is estimated in Table 4. If store size is regressed on economic potential then within the lower quartile of potential the response of store size to a given increase in potential is larger by a factor of 7.5; similarly the R2 is far higher for this bottom quintile. The weak overall relationship is driven by the stores in high demand locations, suggesting such stores may be directly restricted from being larger.

---

classified into 7 zones according to distance from the town centre. The mean price per unit acre of land for retail use was estimated to fall from £28,000,000 in the innermost zone 1, to zone 2 £14.000, 000; zone 3 £11,500,000; zone 4 £8,900,000; zone 5 £3,500,000; zone 6 £5,700,000 and zone 7 £2,500,000 (Cheshire and Sheppard, 2005, Table 2). The evidence for a period substantially pre-dating the change in policy in 1996 shows a declining price for retail space with respect to distance from the centre as would be predicted from urban economic theory.

Figure 7a: Floorspace vs. population within 10m drive time

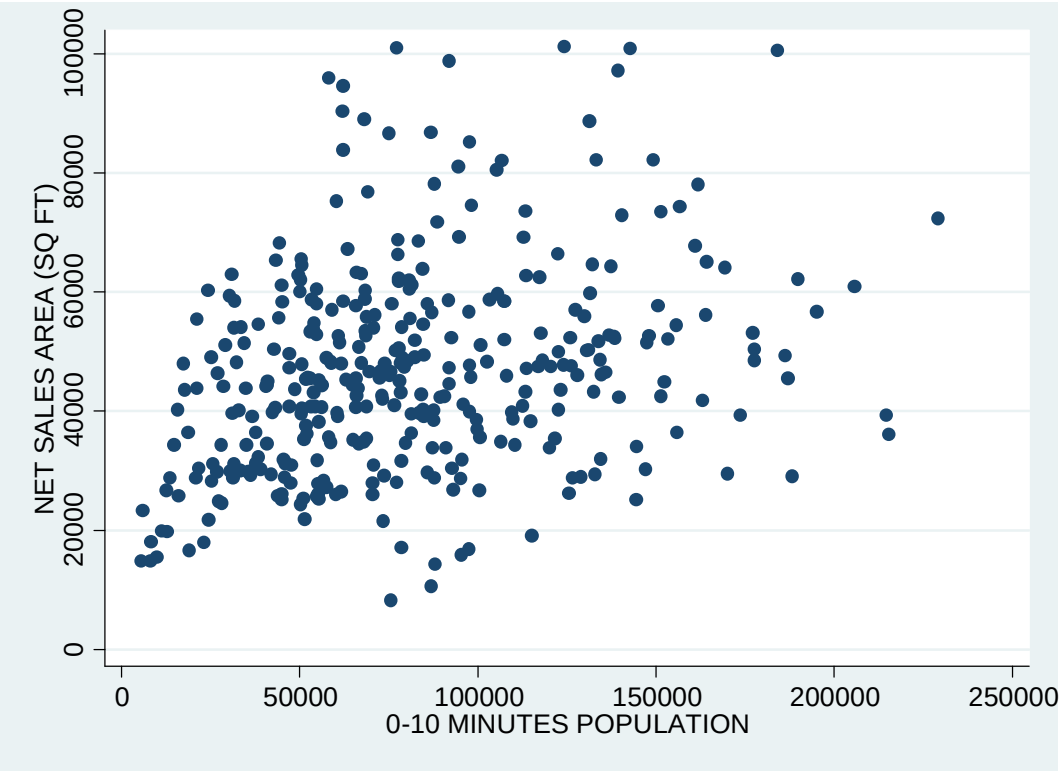


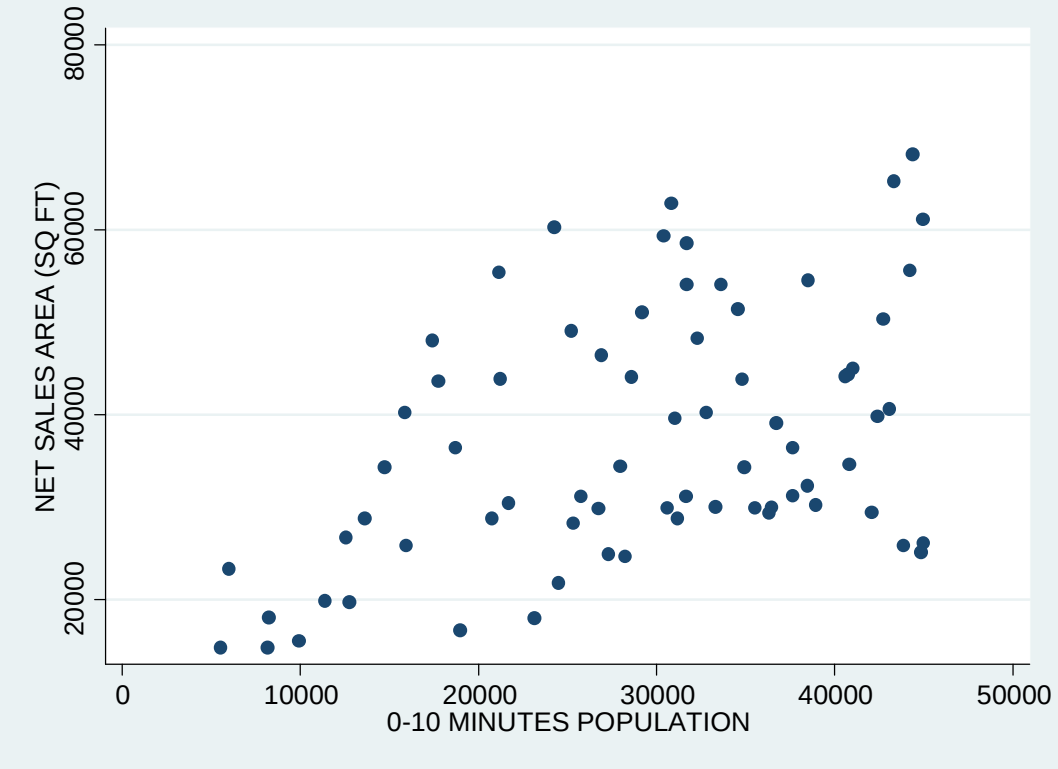
Figure 7b plots the relationship just for those stores in locations in the lowest quintile of economic potential. The strong relationship is easily visible.

Table 4: Floorspace vs. Population within 10mins drive time (market potential)

	(1)	(2)	(3)
Dependent variable: floorspace		<20% of stores	>20% of stores
Population within 10mins drive time	0.119***	0.559***	0.0741***
	(0.0201)	(0.125)	(0.0257)
Constant	37052***	20939***	42093***
	(1723)	(3613)	(2551)
Observations	358	72	286
R-squared	0.090	0.206	0.027

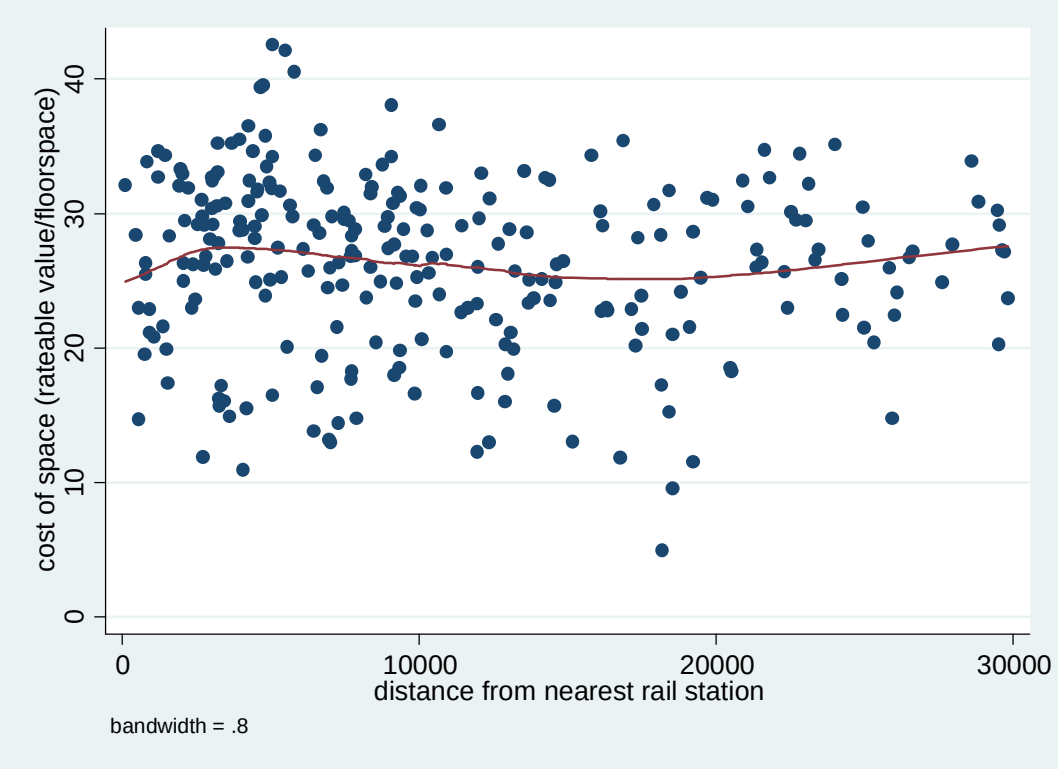
Robust standard errors in parentheses

Figure 7b: Floorspace vs. population within 10m drive time- the bottom quintile



We explore the second this proposition by examining how price per sq ft. varies with actual measured distance from the centres of built-up areas or urban regions: i.e. examine the land rent gradient for retail space. We saw from Table 1 that in France this appeared to follow exactly the general pattern predicted from urban economic theory. Is this the case in the UK or has the planning system simply so restricted space for retail everywhere that there is no such pattern? We identified city centres not in terms of their legal designation for planning purposes but in terms of functional or physical indicators. The Ordinance Survey identifies city centres for all larger settlements and in addition major rail stations (excluding a few edge of town parkway stations or anomalies such as Cambridge) are closely identified with city centres. We tried both measures and both yield similar results but Figure 8 shows those for major railway stations. The line shows the smoothed trend. We can see that the price of retail space rises very locally with respect to distance (in metres) from major railway stations but beyond about 2 km there is no tendency for space costs to rise further: certainly none for space costs to fall as would be expected on the basis of the monocentric model in an unconstrained world.

Figure 8: Cost of space vs. distance from nearest rail station (<30k distance)



6. Results from the Production Function Approach

We follow a total factor productivity approach (TFP) in this section, the main empirical analysis. A Cobb-Douglas functional form is applied with factors of production floorspace, labour and capital. We have only one year's data available so cannot use a panel approach and sales (turnover) are used as the dependent variable. It is understood however that the retailer whose data we have access to, has a policy of uniform mark-ups by broad product type across all stores, so sales per store should be closely correlated with gross margins and value added. The gross margins measure of output is reached by deducting the value of purchased goods (P_wQ_w) from sales (PQ) - ideally intermediate inputs (like lighting, electricity etc.) should be deducted as well (P_mM) but we do not have the data necessary to calculate gross margins more accurately.

Therefore, the main econometric specification is the following:

(1) $$Y = A\, F^{\beta 1}\, L^{\beta 2}\, K^{\beta 3}\, e^{\gamma X}\, e^{u}$$

In log terms (1) can be expressed as:

(2) $$\ln Y_i = \beta_0 + \beta_1 \ln F_i + \beta_2 \ln L_i + \beta_3 \ln K_i + X'_i\, \gamma + X'_\alpha\, \delta + u$$

(Returns to Scale (RTS) = $\beta_1 + \beta_2 + \beta_3$)
Notes:
Y: sales of store *i*; or gross margins $Y= PQ - P_wQ_w$ or $Y= PQ - P_wQ_w - P_mM$
F: floorspace; L: labour; *K*: capital for store *i*

X_i: vector of store specific controls
X_a: vector of area specific controls

Figure 9 shows a scatter of the main relationship in which we are interested: that between 'productivity' and floorspace. We can see immediately that, holding the number of employees constant, there is a general relationship between store size and total factor productivity and that, as expected, productivity rises with store size.

Figure 9: Relationship of productivity (sales/employment) to net floorspace

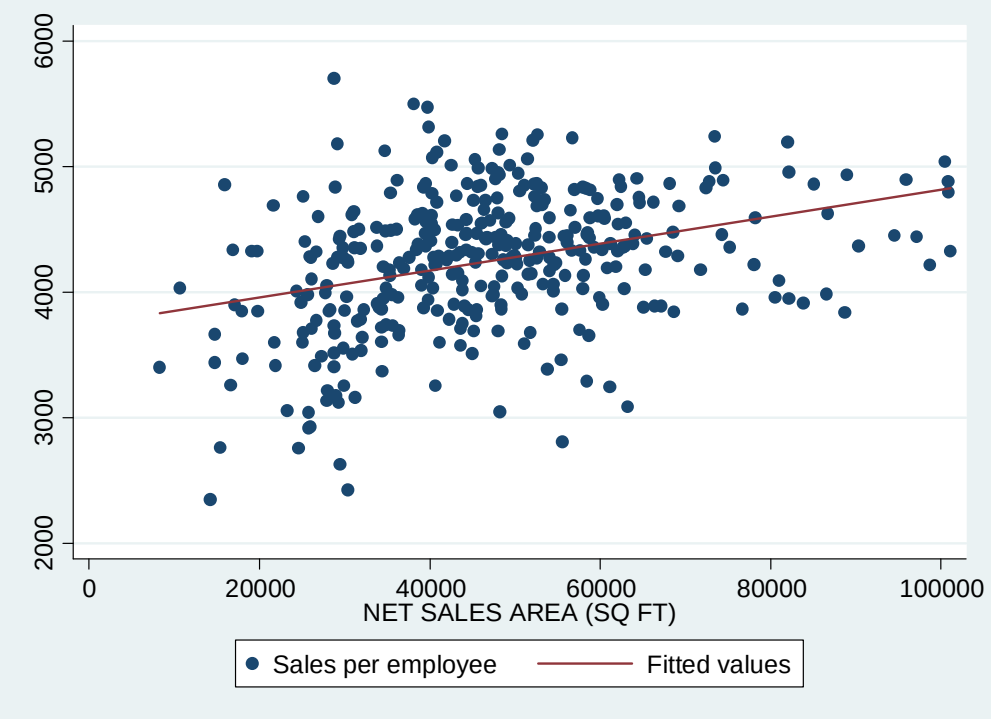


Table 5 shows the results of fitting such a model with some additional controls. One problem is that we do not have exact information on labour hours per store, only a head count of salaried staff who we assume are fulltime, and hourly paid staff who we assume are half time. So we construct an approximate measure of full-time equivalent employment (FTE) by multiplying the headcount of hourly-paid staff by 0.5 and salaried staff by 1. As we have experimented both ways, we know that this estimate of FTE employment gives slightly better results than just adding up hourly-paid and salaried staff.[4]

The measure of floorspace used is net floorspace. This is more sensible theoretically, but also it gives reassuringly better results than when using gross floorspace. In the specification that includes both net and gross floorspace as regressors the latter becomes insignificant. Table 5 shows the results of a simple TFP approach with appropriate controls. The first control is for the presence of a mezzanine; it is widely known in the retail trade that mezzanine floors tend to generate less sales per unit area than the ground floor does. Further relevant controls are for labour inputs measured as employment in FTEs, non-food format stores and for total opening hours.

[4] We experimented with refining these measures using ASHE data at the LA level on hours worked for the specific occupational categories covering retail workers but concluded that the company's own data although somewhat approximate were more accurate than making implicit assumptions that workers in a given occupation and LA worked similar hours regardless of which retailer/store employed them.

Table 5: Basic results from a TFP approach with total sales as output variable

	Dependent variable: Log(total sales)					
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	UK *No* FEs	UK *With* FEs	England *No* FEs	England *With* FEs	Scotland, Wales, NI *No* FEs	Scotland, Wales, NI *With* FEs
Net Floorspace	0.120***	0.108	0.149***	0.158**	0.151*	0.0286
	(0.0457)	(0.0725)	(0.0565)	(0.0791)	(0.0871)	(0.136)
Employment	0.894***	0.897***	0.841***	0.848***	0.965***	0.985***
	(0.0476)	(0.0748)	(0.0615)	(0.0910)	(0.0839)	(0.115)
Mezzanine dummy	-0.0409**	-0.0283	-0.0382*	-0.0448	-0.0503	0.0191
	(0.0185)	(0.0310)	(0.0207)	(0.0347)	(0.0391)	(0.0635)
Non-food format	-0.148**	-0.179*	-0.260***	-0.253**	0.0942	-0.0217
dummy	(0.0740)	(0.106)	(0.0900)	(0.124)	(0.120)	(0.161)
Hours	0.00105***	0.00112***	0.000937***	0.00104**	0.00126***	0.00114
	(0.000269)	(0.000422)	(0.000352)	(0.000516)	(0.000415)	(0.000691)
Years since opening	0.00939***	0.00795**	0.0122***	0.00981**	0.000900	0.0102
	(0.00265)	(0.00397)	(0.00300)	(0.00430)	(0.00686)	(0.0111)
Years since opening	-0.000212***	-0.000183*	-0.000269***	-0.000218*	-5.79e-05	-0.000318
squared	(6.61e-05)	(0.000112)	(7.30e-05)	(0.000118)	(0.000198)	(0.000324)
Population within 10	0.0590***	0.0510**	0.0522***	0.0638**	0.0367	-0.000234
minutes drive time	(0.0138)	(0.0251)	(0.0177)	(0.0283)	(0.0295)	(0.0531)
Car ownership share	0.000976	-0.00111	0.000740	-0.000313	-0.00194	-0.00507
within 15m	(0.000736)	(0.00174)	(0.000891)	(0.00192)	(0.00170)	(0.00448)
Competition	-0.00534**	-0.00399	-0.00553**	-0.00544	-0.0135*	0.00290
	(0.00234)	(0.00347)	(0.00242)	(0.00361)	(0.00767)	(0.0107)
TTWA FEs	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*
Scotland		-0.0718*				(omitted)
		(0.0391)				
Wales		-0.0371				0.148***
		(0.0551)				(0.0482)
Northern Ireland		0.256***				0.261**
		(0.0830)				(0.121)
Constant	6.739***	7.005***	6.808***	6.524***	6.526***	8.404***
	(0.311)	(0.594)	(0.356)	(0.580)	(0.534)	(1.190)
Observations	357	357	269	269	88	88
R-squared	0.965	0.981	0.966	0.980	0.969	0.988

Notes: All regressors (except hours, car ownership, competition and dummies) are logged so that they can be interpreted as elasticities. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

It is worth emphasising that one would not expect space to have constant marginal productivity across store types. One would expect it to be most important as an input in supermarkets, household goods and more bulky items such as furniture or electrical goods. Adding a dummy for non-food format stores confirms this expectation. We also add a variable for the age of the store. Experimentation showed this was most effectively represented as a quadratic. We also control for the characteristics of store catchment areas – competition from other stores in the area, the economic potential of its location measured as population within 10 minutes drive-time and – crudely measured by car ownership share – local income and accessibility levels. The competition variable captures the degree of

competition to which each store is exposed. It is estimated by applying a distance decay function to the five nearest stores from each of the two main competing retail groups. As expected higher values of this 'competition measure' are associated with lower store sales.

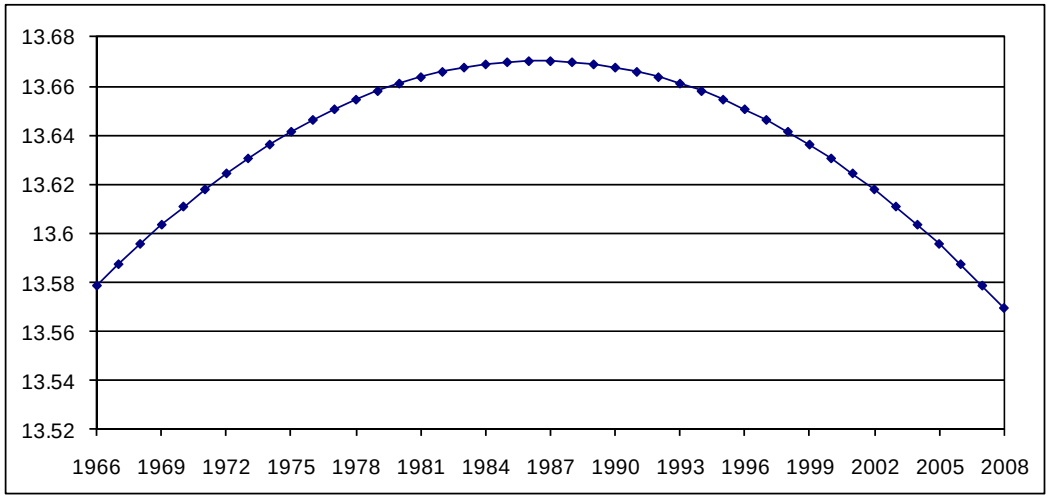
In addition, we estimate models with area fixed effects and for English stores separately from those located in Scotland, Wales and Northern Ireland. The argument for including area fixed effects is that there may be unobserved (time-invariant) variables specific to certain areas. We use Travel to Work Areas (TTWAs) to capture these possible area effects on the grounds that TTWAs are defined to be economically self-contained in the sense that people who live within a given TTWA tend also to work in the same area; and so it may be supposed, tend to shop within that area too. The first two columns in Table 5 show results for the UK, first without and then with TTWA fixed effects. Columns (3) and (4) document the same specifications but only for England. The last two columns of the table report the same model specifications estimated only for Scotland, Wales and Northern Ireland. We report results separately for England only and for Scotland, Wales and Northern Ireland only as the two areas are distinctly different from each other in terms of their planning policies, in particular in terms of the introduction and the relevance of town centre first policies. Moreover, so far we only have the measures of planning restrictiveness for LPAs in England so when we later assess the impact of regulatory constraints on store size, we need to confine our analysis to English stores only. In column (2) we also include dummies for Scotland, Wales and Northern Ireland since planning policies and perhaps other factors vary between those countries and also vary as between those countries and England.

All models suggest an increasing TFP with store size. In all models without area fixed effects and in the case of all the models estimated on the data for the English stores alone (even with fixed effects), the effect of store size on TFP, all else held the same, is statistically significant. In all models except for the one estimated in column (3) there is unambiguous evidence of increasing returns to scale since the co-efficients on space and employment add to more than 1: given that there is some interaction between employment and the hours a store is open then the evidence for increasing returns is arguably somewhat stronger.

The age of the store is a particularly interesting control. We are observing something like a natural experiment since Town Centre First policy is tighter in England than in the other three countries and was introduced earlier (Competition Commission, 2000, Appendix 12.3). By comparing the results from the models estimated on the English stores (models reported in columns 3 and 4) with those estimated on stores in Scotland, Wales and Northern Ireland (columns 5 and 6), one can easily see that the effect of age of store on productivity is highly significant in England but not at all significant elsewhere. Moreover for the English stores it is clearly quadratic. The oldest stores are – as would be expected – less productive other things equal. Store productivity increases for stores founded during the 1960s and 1970s but only until around 1986. Productivity in stores founded after then begins to fall and, as can be seen from Figure 10, the very newest stores are the least productive of all. It might be expected that productivity levels would take time to reach their maximum in any store and that there would need to be some bedding down. However this process might at most take 2 years: it is not remotely plausible that getting a new store up and running at its most efficient level takes more than 20 years. The estimated best fit relationship for date of founding and store productivity is graphed in Figure 10 using the co-efficients shown in Table 5, column (4). There is of course some error associated with estimating the peak store age for productivity but its growth closely reflects the period of innovation with larger format, out of town stores during the 1970s and 1980s and the peak and subsequent decline closely tracks the progressive tightening up of planning policy for retail in England from 1988 and strongly suggests that one impact of the changes in planning policy has been to make stores less productive for any given size. An obvious interpretation is that this results from policy

forcing retail to less productive locations and sites: that is, it reflects what was defined as the 'route 2' source of impact on retail productivity defined in Section 3.

Figure 10: Productivity by year of opening: controlled for all other factors



However we should spell out more clearly the form this productivity penalty takes. What the data are telling us is that controlling for all other factors, including store size, sales per store fell systematically for stores founded after town centre first policies began to seriously bite. This however can only come through the consumer welfare side since we do not measure costs. The hypothesis is that stores were constrained to less productive sites but the impact on logistic costs for the company is not captured in our data. What appears to be captured is the impact on customer experiences and satisfaction. In town stores are more difficult to get to and may be more subject to stock control problems (both storage facilities and delivery systems are likely to be less efficient). The range of goods, especially pack sizes, may be less attractive for customers. Equally out of town easy to reach by car stores allow quicker and less stressful shopping and a greater chance of finding items the customer needs because delivery systems are more efficient. So any additional costs imposed on the store group by the micromanagement of site selection imposed by town centre first policies would be partially (e.g. with delivery-associated costs) reflected in our data but far from fully measured.

The interpretation of the relationship between year of store foundation and productivity is made more plausible still by two other pieces of evidence. The first is that we know Town Centre First policies were introduced earlier and applied more rigorously in England than elsewhere (Competition Commission, 2000, Appendix 12.3). Although Wales adopted quite similar policies in 1996 the guidance continued to stress the need for a competitive retail sector and the application may have been more flexible at least until 2005. In Northern Ireland policies for the retail sector did not attempt to micromanage retail location and site choice at all until 1996 and then with significantly less emphasis on town centre first. For example the sequential test was not introduced, the need to retain a competitive and innovative retail sector was given some emphasis and the case for out of town retail was accepted in principle. Scotland tightened up its town centre first policy only in 1998 and did not recognise the necessity of applying a needs test although it did introduce a sequential test on site selection.

A second explanation of why older stores are more productive could be that as the store group expanded and built more stores over time, it chose the most productive and attractive to customer locations first. The most obvious measure of an attractive location is

the population within a 10 minute drive time. The correlation between the age of the store and population within 10 minutes drive time for English stores is wholly non-significant (R= -0.019, P=0.76). That for stores in the rest of the UK is 0.260, P=0.014. In other words there is no significant relationship at all between the measure of location attractiveness and store age in England. In the less constrained rest of the UK there is a significant if not strong positive relationship. So, although in the less constrained rest of the UK there is some tendency for the older stores to be in locations with higher market potential since this is included as an independent variable in Table 5, its impact is controlled for even in Scotland, Wales and Northern Ireland in the estimation of the store productivity - store age relationship.

The role of planning

We have persuasive evidence, therefore, that the tightening up on out of town stores in England started in 1988 and the micromanagement of store locations imposed with the full-blooded town centre first policies introduced in 1996 was associated with a decline of store productivity from the late 1980s in England. However another issue is whether cross sectional variation in the restrictiveness of the planning system also influences store productivity. The most obvious way in which to investigate this is to see whether there is a direct relationship between indicators of planning restrictiveness at the LPA level and store size: does more restrictive local planning policy make stores smaller and so reduce TFP? We have already argued that there are two distinct routes or mechanisms which could generate this outcome and they are certainly not mutually exclusive. The first is that by constraining the supply of space, planning policy increases its price, thereby causing a substitution of space out of production. While also having the effect of reducing TFP this would be an 'efficient', cost minimising adaptation by stores to distorted factor prices. The second route is that 'town centre first' policy might be forcing stores to locate on smaller sites and in less productive locations and so be directly constraining the size of stores and productivity of stores. Our approach so far does not allow us rigorously to discriminate between these mechanisms. However it seems extremely likely that the measured effect of store age on TFP discussed above reflects the impact of the town centre first policy. While the evidence is that wider containment policies have had the long standing effect of increasing the price of retail space (see, for example, Cheshire and Sheppard, 1986) nevertheless cross sectional variation in planning restrictiveness might be expected to be related to systematic variation in retail space prices between LAs.

Table 6: Does planning restrictiveness affect the net floorspace area of stores?
(TSLS estimates using share of Labour seats at the local councils as instrument)

	TSLS: *Second stage* Dependent variable: log (net floorspace area)					
	(1)	(2)	(3)	(4)	(5)	(6)
	All English stores	>1980	>1990	All English stores	>1980	>1990
Refusal rate:	-0.746	-1.088*	-1.515*	-1.050	-2.097*	-2.608
major residential projects	(0.532)	(0.582)	(0.834)	(1.079)	(1.230)	(2.338)
Population within 10 minutes				0.199***	0.125*	-0.0452
drive time				(0.0700)	(0.0735)	(0.163)
Car ownership share within				0.00457	0.00486	0.000482
within 15 minutes drive time				(0.00549)	(0.00588)	(0.00745)
Competition				-0.0154	-0.0153	-0.0265
				(0.00954)	(0.0105)	(0.0214)
TTWA FEs	*No*	*No*	*No*	*Yes*	*Yes*	*Yes*
Observations	254	217	132	254	217	132
	TSLS: *First stage* Dependent variable: **refusal rate (major residential projects)**					
Share Labour seats	-0.192***	-0.190***	-0.196***	-0.148***	-0.140***	-0.126***
	(0.016)	(0.015)	(0.017)	(0.027)	(0.030)	(0.040)
Controls and FEs (included instr.)	*No*	*No*	*No*	*Yes*	*Yes*	*Yes*
Kleibergen-Paap rk Wald F stat.	153.1	165.9	131.4	30.0	22.0	9.8

Notes: **Instrumented variable in bold.** The sample is restricted to food format stores that are located in England. The refusal rate is calculated as the ratio of declined major residential project applications to the total number of applications and averaged over 1979-2008 (the period for which regulation data exist). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Stock-Yogo weak ID test critical values: 10% maximal IV size: 16.38, 15% maximal IV size: 8.96, 20% maximal IV size: 6.66 and 25% maximal IV size: 5.53.

Table 6 shows the results of relating store size to local planning policy using the data for food format stores only. We have planning outcomes for every LPA in England from 1979 to 2008. Since we do not as yet have this information for Scotland, Wales or Northern Ireland we have to drop stores in those countries from the analysis reducing the number of observations from 357 to 254. As is argued in Hilber and Vermeulen (2010) there are good reasons for taking the long term mean of measures of planning restrictiveness to eliminate one source of endogeneity. Here we take the average refusal rate of major residential projects in an LPA for the period 1979-2008 as our measure of LPA restrictiveness[5]. We use the data for major residential rather than major retail because there are insufficient applications for major retail developments to yield statistically reliable indicators of regulatory restrictiveness. As Table 6 indicates more restrictive LPAs were associated with smaller stores: residential refusal rates are negatively correlated with floorspace.

Because of endogeneity concerns with respect to the use of the refusal rate we use an IV approach. Table 6 shows the results using the share of labour councillors at the local elections over the period 2000-2008 as an instrument for the refusal rate of major applications for residential projects. The logic for using political composition as an instrument is as set out in Sadun (2008) or in Hilber and Vermeulen (2010). Low and middle income Labour voters traditionally care more about the availability of jobs, prices in shops and housing affordability

[5] For models (3) and (6) which use data only for stores founded since 1990 we tried using the mean of our planning restrictiveness measures just from 1990 to 2008. The results were essentially unchanged.

and less about protection of house values (fewer low income residents own homes) by preventing development.[6] It may also be the case that concern for protecting green fields from development is a normal good. Higher income voters are more concerned with preventing development on green field sites than are lower income ones. Hence, we would expect the local share of votes for the Labour party to be negatively associated with the restrictiveness of the local planning system. The first stage results reported in the bottom panel of Table 6 confirm this. The coefficient on the share Labour seats variable is negative and strongly significant. The values of the Kleibergen-Paap F-statistic reveal that in all models except that reported in column (6), weak identification is not a problem and even in model (6) bias is likely to be small.

The first three models are estimated without TTWA fixed effects or controls; the second set of three models includes both controls for exogenous influences on store size and also TTWA fixed effects. These models arguably provide the stiffest test. Model (5), which includes these controls and fixed effects and relates to the period covered by the planning data would seem, therefore, to provide the best consistent estimate of the impact of restrictiveness and to confirm that planning restrictiveness has a direct casual influence on influence on store size and so on TFP in retailing.

Table 6 thus provides evidence indicative of a causal relationship from more restrictive local planning policies to smaller store sizes. However there is scope for further experimentation with other possible instruments as outlined in Section 4.

Estimated impact on total factor productivity

The quantitative estimates of the relationship between the age of a store and its normalised productivity and between LPA restrictiveness and store size can be converted into direct estimates of the overall impact of planning policies on TFP in the retail sector. The results of this exercise are shown in Table 7.

The estimates shown in the top panel of Table 7 use the relationship between age of store and normalised productivity to simulate what productivity for an average store in 2006 – chosen as the date of opening by which it could reasonably be assumed that the store had reached full operating efficiency by 2008 – would have been, if the rate of productivity had continued to grow between 1986 and 2006 at the rate observed for the period 1966 to 1986 (0.46% per annum). This in other words provides our counterfactual productivity estimate for 2006 stores. We then show productivity for a representative store built in 1986. This gives a measure of how productivity would have been in 2006 stores if productivity growth had stopped in 1986 – still 1986 stores showed a loss of TFP of 8.7 percent compared to our counterfactual. The third value shows the productivity of a representative 2006 store as it actually was estimated to be in 2006, allowing for the store age productivity estimate. We can see that this represented a loss of productivity of 16.0 percent compared to our counterfactual.

[6] Homeowners have strong incentives to behave as NIMBYs (Not-In-My-Own-Backyard) and oppose new residential construction nearby as more local housing supply or poorer views (due to the new sites) adversely affect house prices. While renters may also like nice views, they are likely to be at least partially compensated for deteriorating views by being able to negotiate lower rents.

Table 7: Quantitative estimates of planning policy impact on retail TFP

Representative store: All values at sample mean except…	Specification	Predicted weekly sales per square foot	Loss in productivity
Store built in **2006** – ***but annual productivity growth since 1986 assumed at estimated rate for 1966-1986***	T5 (4)	£20.85	(Base)
Store built in **1986** (prior to introduction of Town Centre First Policy)		£19.03	-8.7%
Store built in **2006** (post introduction of Town Centre First Policy)		£17.52	**-16.0%**
Store with lowest level of regulatory restrictiveness (based on sample)	T5(4) + T6 (5)	£19.34	(Base)
Store with average level of regulatory restrictiveness		£18.54	-4.1%
Store with highest level of regulatory restrictiveness (based on sample)		£17.62	**-8.9%**
Total Impact on TFP			**-24.9%**

Notes: † Values are based on sample size mean net floor area and parameter estimates are taken as indicated from Tables 5 and 6.

There are two reasons why even this value may be a conservative or lower bound estimate of the productivity loss imposed by town centre first policies. As Haskel and Sadun (2009) report, productivity in the British retail sector actual grew in the first 5 years of the 1990s at a rate of 0.38% pa. This, however, compares with an annualised rate of productivity growth in the US of 0.49% and, in the US, this productivity growth accelerated sharply in the second half of the 1990s to 3.23% per annum. Given this evidence from the US, to assume a constant rate of productivity growth in British retailing over the whole 1966 to 2006 is thus likely to be a low rather than high estimate. The second factor is that we are not including additional costs imposed on the firm. These are likely to include more expensive logistics given that stores were increasingly located in more congested areas in town centres, farther from motorway access, and were smaller, with less store space, so requiring more frequent re-stocking.

To this estimate of a loss of productivity of 16.0 percent directly attributable to town centre first policies must be added, however, an estimate of the impact of increasing land prices and reduced store sizes in the most restrictive LPAs. This is shown in the second panel of Table 7. Here again two values are shown: the first is based on the difference in store sizes (and so TFP) associated with the difference between the least restrictive application of policy and that of the mean LPA; the second is based on the difference between the least and most restrictive authorities. These imply a loss of TFP of either 4.1 or 8.9 percent. Again, given the implausibility of even the least restrictive LPA having had no impact on the price of retail land (for example see Appendix 12.7 of Competition Commission, 2000) both values seem likely to be lower bound estimates. Thus overall our estimates suggest that 24.9 percent is likely to be too low rather than too high an estimate of the aggregated loss of productivity in the retail sector produced by planning policies.

7. Conclusions and Further Developments

We have not so far been able to discriminate rigorously between the impact of direct constraints on store sizes and locations and increased space costs as sources for this reduction in store sizes and productivity. In addition some of the variables can potentially be improved

as can some of the estimation. Some of these improvements, although time consuming, are straightforward. We can collect data for and test additional instruments such as local unemployment rates in LPAs and LPA behaviour changes following the introduction of PPG6 in 1996. Other improvements would require more difficult to get data (such as additional years of store level information) and further analysis.

The results we have, however, strongly suggest that planning policies – in particular town centre first policies – directly cause a significant reduction in total factor productivity in retailing – at least in the case of the large supermarket sector. We have shown that if output is measured as turnover then productivity does rise with store size. Furthermore our evidence is indicative that more restrictive local planning regimes generate smaller stores. This was shown by using the mean 1979-2008 refusal rate for major residential developments for each LPA as a measure of 'regulatory restrictiveness'. One concern with the refusal rate measure is that it may be endogenous and that, as a consequence, the estimated impact of regulation on floorspace may be biased. In order to address this concern we employ an instrumental variable approach and exploit exogenous variation derived from the political composition of local councils in charge of planning policy in order to identify the causal and unbiased effect of regulation on floorspace. We have thus reasonably established that more restrictive planning regimes generate smaller stores and smaller stores are less productive. We have also presented a range of persuasive but more circumstantial evidence which suggests that the tightening of planning policy with respect to retail development – especially out of town retail development in 1996 – caused a drop in store development, an increase in space prices and a levelling out of the rent structure with respect to distance from town centres. This last effect is consistent with a more general restriction of land supply for retail in all locations.

Since this tightening of planning policy came earlier and was substantially more restrictive with respect to store locations in England than elsewhere in the UK, the significant negative impact estimated on productivity for English stores alone, built since the late 1980s, can be reasonably interpreted as a measure of the impact of town centre first policy. This provides us with, in effect, a natural experiment and the results are, therefore, more persuasive still with respect to tying in town centre first policies to a significant reduction in total factor productivity in the supermarket sector. Estimating the cumulative impact of this on store productivity by 2006 indicated there had been a loss of 16 percent. Adding this to the impact of variations in cross sectional restrictiveness between LPAs in their application of planning policies indicates an aggregate loss of TFP of almost 25 percent since the late 1980s as a result of planning policies and their applications by LPAs.

This, of course, is a gross economic cost not a measure of net costs. Restrictive planning policies may also generate some benefits not measured here. One further intended step in this research project is rigorously to investigate the impact on the carbon footprint of town centre first policy. The great advantage of estimating a credible, if lower bound value for the total cost of planning policies in terms of retail productivity, is that even if it fails to estimate any benefits it should improve policy decisions. Planning policy may generate some gains, such as preserving the existing appearance of town centres (even if, as Sadun, 2008, shows, it reduces town centre retail employment) but it would seem important to have an estimate of the costs of such benefits. In particular it should help to think more systematically about what precisely such benefits might be and whether they could be achieved at lower cost to productivity.

References

Allmandinger, P. and M. Ball (forthcoming) 'Explaining the Paradox of Performance Improvements and Delay in Development Control', *Urban Design and Planning* (accepted and awaiting publication).

Ball, M. (2010) *Housing Supply and Planning Controls; the impact of planning control processing times on housing supply in England*, National Housing and Planning Advice Unit, Research Report.

Barker, K. (2006a) *Barker Review of Land Use Planning; Interim Report - Analysis*, London: HMSO.

Barker, K. (2006b) *Barker Review of Land Use Planning; Final Report - Recommendations*, London: HMSO.

Cheshire, P.C. and C.A.L. Hilber (2008) Office Space Supply Restrictions in Britain: The Political Economy of Market Revenge, *Economic Journal*, **118**, (June) F185-F221.

Cheshire, P.C. and S. Sheppard (1986) *The Economic Consequences of the British Land Use Planning System: a pilot study*, Final Report to the ESRC.

Cheshire, P.C. and S. Sheppard (1989) 'British Planning Policy and Access to the Housing Market: some empirical estimates', *Urban Studies*, **26**, 5, 469-85.

Cheshire, P.C. and S. Sheppard (2002) 'Welfare Economics of Land Use Regulation', *Journal of Urban Economics,* **52**, 242-269.

Cheshire, P.C. and W. Vermeulen (2009) 'Land Markets and their Regulation: The Welfare Economics of Planning', In H.S. Geyer (ed) *International Handbook of Urban Policy*, Vol 2: *Issues in the Developed World*, Cheltenham: Edward Elgar, 120-151.

Competition Commission (2000) *Supermarkets: A Report on the Supply of Groceries from Multiple Stores in the United Kingdom*, London.

Crook, A.D.H., R. Dunning, E.T. Ferrari, J.M. Henneberry, S. Rowley, C.A. Watkins, F. Lyall-Grant, S. Monk and C.M.E. Whitehead (2010) *The incidence, delivery and value of planning obligations in England*, in 2007-2008 London: Department of Communities and Local Government.

Griffith, R., and H. Harmgart (2008), 'Supermarkets and Planning Regulation,' CEPR Discussion Papers 6713, C.E.P.R. Discussion Papers.

Haskel, J. and R. Sadun (2009) 'Regulation and UK Retail Productivity: evidence from microdata', IZA DP No 4028, February.

Hilber, C.A.L. and W. Vermeulen (2010) *The impacts of restricting housing supply on house prices and affordability*, London: Department for Communities and Local Government. (www.communities.gov.uk/documents/housing/pdf/1767142.pdf)

Mayo, S. and S. Sheppard (2001) 'Housing Supply and the Effects of Stochastic Development Control', *Journal of Housing Economics*, **10**, 109-128.

Mehdi, M. (2003) *The capitalisation of business rates: an empirical study of tax incidence in six London boroughs*, LSE PhD thesis.

McKinsey Global Institute (1998) *Driving Productivity Growth in the UK Economy,* London

ODPM, (2004) Policy Evaluation of the Effectiveness of PPG6, London: Office of the Deputy Prime Minister.

Preston, I., Ridge, M. and S. Wood (1996) 'The Impact of the UK Planning system on House Prices', mimeo.

Sadun, R., (2008) 'Does Planning Regulation protect independent retailers?', CEP Working Paper N.888, August.

Spatial Economics Research Centre (SERC)
London School of Economics
Houghton Street
London WC2A 2AE

Tel: 020 7852 3565
Fax: 020 7955 6848
Web: www.spatialeconomics.ac.uk

SERC is an independent research centre funded by the Economic and Social Research Council (ESRC), Department for Business, Innovation and Skills (BIS), the Department for Communities and Local Government (CLG) and the Welsh Assembly Government.