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(In)convenient stores? What do policies pushing stores to town centres actually do?

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Abstract
England′s Town Centre First Policy, introduced in 1996, restricted the opening of new retail and other 'traditional town centre activities' to 'Town Centre' (TC) locations. The aim was to halt the decay of high streets. We explore the impact of the policy on the supply and location of grocery shops and patterns of shopping by comparing English with Scottish TCs before and after the policy change in England. Using store level census data, we show first that supply trends for grocery stores in TCs were similar in both countries prior to the implementation of the policy. After the policy took effect, however, stores in TCs increased relatively more strongly in England, but with no change in grocery employment. Second, using survey data, we show that the policy changed the composition of shops in TCs in favour of convenience-type shops supplied by the "big four" grocery chains. However, although it increased the number of TC shops, the policy had no effect on the number of shoppers choosing TC locations.

Key words: land use planning, retail location, shopping destinations, town centre, decay of high street.
JEL codes: L81; R14; R33; R38

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1. Introduction

Planning policies intended to have wider impacts on spatial patterns of living, shopping, working and the carbon footprint of urban living have been on the rise since the 1950s and are popular in Western Europe and North America.

This paper explores the impact of a policy implemented in England in June 1996, *Town Centre First Policy* (TCFP). This was intended to restrict new establishments in 'traditional town centre' activities from locating out of town. Its main impact was to restrict the growth of out-of-town shopping. It had a particular influence on the supply and location of grocery shops, employment in the grocery sector and patterns of grocery shopping. We explore the actual effects of this policy employing plant-level census data and unique survey data on shopping destinations and by comparing English with Scottish "Town Centres" (TCs) before and after the rigorous policy change in England.

TCFP is an exceptionally rigid example of a wider class of policies designed to steer retail (and other types of traditional town centre activities such as restaurants, professional services or wider office employment) activity to traditional TCs (Department of the Environment 1996). Its aims were clear: they were to protect the traditional role and function of TCs, forcing not just new shops to locate in them but other 'traditional' TC activities as well. A subsidiary aim was to improve shopping accessibility using public transport by encouraging so-called multiple trips; that is, combining shopping, access to personal services and recreation in a single trip – and the use of public transport. The issue of declining TCs or 'the death of the high-street' has been in the British public debate since the mid-1970s[1]. Since 2019 the deterioration of traditional high streets accelerated as a result of the COVID-19 pandemic.[2]

In its aim of reviving TC locations, TCFP is representative of other planning policies intended to have wider impacts on economic activity, spatial patterns of living and working and the carbon footprint or environmental costs of urban life. Examples of such policies include 'growth' or 'containment boundaries' designed to make cities more compact and pedestrian-friendly; those for new settlements; or policies associated with 'New Urbanism', designed to generate more compact development and try to ensure people to work, live and enjoy urban amenities all in the same community.[3] England's TCFP was also directly comparable to policies introduced in the same era

[1] See for example the Department of the Environment (1977) summary of *The Inner Area Studies*.
[2] https://www.theguardian.com/business/2021/sep/05/more-than-8700-chain-stores-close-in-2021-analysis-shows https://www.theguardian.com/business/2019/oct/24/retailers-cut-85000-jobs-in-past-year
[3] See for instance Llewelyn-Davis (2002).

in, for example, Denmark, Germany, The Netherlands or Sweden, aimed at protecting the position of traditional TCs. Guimarães (2016) provides a useful survey of such policies.

Planning policies directly affect new development and so, in the current context, can influence shop openings using regulation: they can make it "difficult" to open a certain type of store using a licensing system or more complex application processes. Frequently policies have some degree of flexibility, so do not eliminate but rather reduce the number of new stores in the target locations.

There is a growing body of evidence both on the extent and on the impact of a range of containment policies on jobs, prices and productivity: for example, studies for France by Bertrand and Karmarz (2002); for the Netherlands by Evers (2002); for the US by Basker (2005, 2007) and Basker and Noel (2009) using data for Walmart; for Italy by Schivardi and Viviano (2011); for Spain by Sanchez-Vidal (2019); for the UK by Haskell and Sadun (2012), Cheshire *et al.* (2015) or Sadun (2015); for Uruguay by Borraz *et al.* (2014); and for Wales by Jones *et al.* (2021). These all find significant detrimental economic impacts measured for a variety of outcomes, such as employment or total factor productivity. These detrimental impacts were most substantial in the cases of Bertrand and Karmarz (2002), for France, and Cheshire *et al*. (2015), for England.

There are, of course, significant economic reasons why certain types of activity are attracted to town centre locations. An early contribution was by Hotelling (1929) who analysed the role of competition for market access where consumers are distributed over space or preferences, leading to concentrated location (although his analysis was more general than just for location, even just economic activity). A more obvious force is agglomeration economies in services such as retail – although with more influence for specialised retail than groceries – restaurants or certain types of entertainment (see, for example, Leonardi and Moretti, 2022, for a recent quantitative analysis). Obvious examples of entertainment districts would be London's theatre district or New York's Broadway. Some recent studies have suggested such agglomeration forces may be becoming more influential especially for younger, college-educated people (see for example, Couture and Handbury, 2020; or Davis *et al*., 2019). Other studies have focused on the positive effects of physically concentrating shops in specific places. For example, Koster *et al.* (2019) investigated shopping externalities, Wrigley *et al.* (2009) and Lambiri *et al.* (2019) looked at linked trips, and Hanson (2016) explored the relocation of cinemas from out of town to TCs. These studies, however, are about the underlying forces leading to town centre concentration of shops, restaurants and entertainment. In this paper, in contrast, we focus on the impact of policies which attempt to force such concentration without consideration of the role of agglomeration economies or consumer preferences.

In England, although policy had exerted some pressure to push retail to such locations since 1988, TCFPs as introduced in the revised 1996 PPG6, rigidly restricted the opening of new retail units to traditional TCs (see Cheshire *et al*. 2015 for a more detailed discussion). TCFP, although nationally initiated, was – as with all English planning policies – implemented at the local authority level. From 1996 the policy imposed two 'tests' before new retail units could be granted permission: the first was the 'needs' test: this required a developer to demonstrate the local community "needed" more shopping space. This test was formulaic and based on the existing total area of retail space per head of population in the Local Planning Authority (the relevant English local jurisdiction). The second test was the 'sequential' test. This required the would-be developer to demonstrate that, compared to the proposed site, no more central site, approved in the local plan, was available: but such a site only had to be legally available; it might, in fact, be owned by a competitor or not be for sale. The practical effect of this new TCFP, therefore, was not just to restrict new retail development to locally defined TCs but to control the specific site(s) on which new development was permitted.

Policy in Scotland (our 'control area') did not directly follow that in England (our 'treated area'), although in 1996 policy did steer local planners to favour TC locations for new retail by declaring, that for retail, TCs were 'preferred locations'. However, unlike in England, policy included an explicit aim of maintaining a 'competitive and innovative retail sector', it did not introduce a 'sequential test until 2006 and retained a statement that it was not the role of planning to 'protect existing interests or restrain competition'. A revised policy came into effect in Scotland in 1998, which gave more emphasis to directing retail development to TCs and added leisure uses to those where the preferred location for development was in TCs in the name of 'sustainability' and access via public transport; but the guidance continued to instruct planners to assist in maintaining 'an efficient, competitive and innovative retail sector offering consumer choice'; the 'needs' test was not introduced.

In our empirical analysis, we compare English with Scottish TCs before and after the rigorous policy was introduced in England. That is, our analysis is akin to a Difference-in-Differences (DiD) setting with the caveat being that we compare differences in the intensity of treatment, with a much more rigorously treated (English TCs) and a less and later treated area (Scottish TCs). Put differently, we should expect that any effects we estimate for the impact of the English TCFP, will be lower bound values of 'true' impacts since the policy was not entirely absent in our control area, Scotland.

England and Scotland provide a suitable environment for applying the DiD methodology to estimate the causal impacts of the TCFP policy. England and Scotland have both been part of one nation-state for more than 300 years and are comparable to autonomous regions within a country (for example, Catalunya and the Basque Country in Spain). Perhaps the closest parallel might be that between US States. Apart from having been used in other studies in the context of retail, chain stores operate as national chains over the whole territory of Great Britain, applying common policies (see Cheshire *et al.* 2015). The same is true for large companies in other sectors, such as car manufacturing. There is a common language, and their legal systems, although differing, have the same basis in common law. Most taxation is at the UK level, as are transport networks, although again, each nation has some control. Planning policy in both countries is implemented at the lowest level of government but under a national framework. Planning is a policy area over which there is perhaps most country-specific variation. While it may be true that with devolution and the rise of the Scottish National party there may have been an increasing degree of divergence between England and Scotland, this is recent. Devolution and the creation of the Scottish parliament only happened around 1998/2000, and the first Scottish National Party government was not until 2007.

To conduct our DiD-analysis, we first employ plant-level census data to document that the parallel trend assumption holds in our data. That is, we show that supply trends for grocery stores in TCs were similar in both countries up to 1998.[4] The number of grocery stores in TCs increased relatively more strongly in England from 1999 up to 2008. In contrast, grocery employment remained unchanged. Second, we use survey data to study the impact of the English TCFP on shopping destinations. We find the policy encouraged the growth and concentration of grocery destinations in English TCs but had no effect on the number of shoppers choosing these locations. The share of supermarket destinations (vis-à-vis smaller stores) and shoppers in TCs decreased while the "big four" grocery chains, which re-focused on convenience store-type shops in TCs, increased their share of both destinations and shoppers. Overall, our results imply that, even though the policy was 'successful' in pushing more physical grocery stores to TCs, this did not attract more shoppers, nor did it have any effect on local employment in the grocery sector in TCs.

We are not the first to exploit the differences in TCFP between England and Scotland in order to understand the impact of the policy. A few papers have shown that the restrictions imposed by TCFP in England have had a significant and negative economic effect on retail, or specifically,

[4] Although, the TCFP was introduced in England in 1996, because of planning and construction lags, we would not expect the policy to affect the supply of new stores until at least 2 years after the policy change.

supermarket total factor productivity (TFP): Haskel and Sadun (2012) identified a 40% fall in multi-store retail chains' TFP; Cheshire *et al.* (2015) found a 32% loss for a representative new store as well as other impacts; Sadun (2015) found that small independent retailers in England were harmed by increased competition from new small central supermarkets.

Our paper contributes to this literature. To the best of our knowledge, we are the first to explore the impact of a stringent containment policy not only in terms of its impact on actual retail location patterns (number of stores, employment, and average size of shops), but also on consumer shopping destinations, including the number of shoppers and characteristics of destinations. Thus, we offer a much more comprehensive understanding of the effects of regulation and physical city-planning and reveal the limitations of judging containment policies in terms of physical fabric alone. The fabric may change, but if it is not used, or underused, this limits the impact of such policy. We focus on the grocery sector as it was one of the sectors where the policy had most impact (Haskel and Sadun 2012; Cheshire *et a*l., 2015) but in which underlying agglomeration forces might be weaker; and also, for data-driven reasons, because for this sector, we can combine several datasets to provide a complete picture of its impacts, including changes in supply and destinations.

The paper proceeds by explaining our data sets and how we identify TCs in a comparable way across the whole of Scotland and England. We then describe our empirical approach and how we attempt to identify causal processes. Section 4 moves on to describe the results. We first demonstrate that there were pre-treatment parallel trends. Next, we estimate the impact of TCFP on store numbers and characteristics using official data and then refine that analysis just for a pre- and post- treatment year. We use a unique proprietary dataset that identifies both specific stores and where consumers do their main shopping. Section 5 concludes.

2. Data sources and definitions

To estimate any impact of TCFP, the first essential task is to define the geographical areas the policy targeted, that is, TC-areas. However, when the policy was introduced, no exact definitions were suggested – it was up to each Local Planning Authority to choose their own. Given our aim to quantify the effects of the policy in a rigorous way and our DiD methodology, we need not just precise definitions of TCs, but definitions applying comparably in both England and Scotland. To achieve this, we defined comparable TCs in an earlier publication (Cheshire *et al*. 2018), and it is these we use here. This definition sought to replicate as closely as possible the quasi-official definitions of TCs for England and Wales (first delineated nearly five years after TCFP was

introduced[5]) but using data available for both England and Scotland in years preceding the policy change. We adapt the ODPM (2004a) methodology to construct shapefiles which delineate the areas where central activities are concentrated, based on the range of activities identified as characteristics of TCs: the particular uses of buildings, commuting inflows and infrastructure endowments. In the full dataset, there are 1,062 such TC-areas in Britain, 79% of them in England, 13% in Scotland and 8% in Wales. Appendix Figure 1 illustrates the TC-areas around Manchester (England, Panel A) and around Edinburgh (Scotland, Panel B).

Our analysis exploits two large grocery sector-specific datasets, each with its own advantages. The first is officially generated by the Office for National Statistics (ONS): the *UK Business Register and Employment Survey* (BRES)**,** accessed via NOMIS. It provides information on supply – number of 'plants' (i.e., in the retail sector, stores) and employment by location. This, therefore, allows us to measure the store opening choices of grocery/supermarket firms. The BRES dataset assembles information on the location and size of all industrial sectors, including grocery, by plant across Britain. It gives values for small geographical areas (postcode sectors) for stores (or 'plants') and employment based on establishment administrative data. It is an annual survey, used as the official source for employee and employment estimates in the UK by detailed geography and industry classification. We use data for both stores and employment at the postcode sector level for the grocery sector (5211 – Retail: non-specialised food stores), which is the sector closest to the definition of grocery shops used in our other data source, the National Survey of Local Shopping Patterns (NSLSP), discussed below. The BRES data is available for 1991, 1993 and 1995 and then annually from 1996 until 2008. There is information on employment by full-time (FT) and part-time (PT) status, allows us to approximate the FT-equivalent employment. We can also calculate the share of PT and female employment over the total for the sector. We combine the number of establishments and FT-equivalent employment to calculate average store size with respect to number of employees. For the years 1998 and 2008, we also have information on the number of stores by size (1-4 employees, 5-10 employees, 11-24 employees, and 25+ employees), so we can explore the changes in the composition of stores by size over time between these two years.

The BRES data is provided for the approximately 10,500 postcode sectors in Britain. Postcode sectors are larger than are the majority of TCs. To estimate the number of grocery shops opening in any TC in any year, therefore, we have to apportion the BRES data to TC geographies. For the

[5] The definitions of TCs for England and Wales were commissioned by the Office of the Deputy Prime Minister and identified as *Areas of Town Centre Activity* (ATCAs) (Thurstain-Goodwin and Unwin 2000; ODPM 2004a).

universe of postcodes in the UK (almost two million[6]), there is information on their area, the number of residential and business addresses and if the postcode is urban or rural. Some TC shapefiles spread over more than one postcode sector or cover only some parts. Using postcode-specific information on the number of businesses for these small locations, we can calculate the share of each postcode sector in each TC and use these as weights to apportion data from the higher geography (postcode sector) to the smaller one (TC).[7] As illustrated in Appendix Figure A2, we can precisely geolocate postcodes in each TC and postcode sector. We then calculate shares of businesses located in different TC-postcode sector combinations and use this to impute the data from postcode sectors to TCs so we can construct a yearly panel of TCs in England and Scotland with grocery supply information.

The second dataset – the *National Survey of Local Shopping Patterns* (NSLSP) – relates to grocery shopping destinations, reflecting consumer choices. It is a unique commercial dataset on grocery shopping not used in academic research before. The NSLSP was developed by retail specialists in the real-estate firm Global Commercial Real Estate Services (CBRE). The survey was established in 1995, first published in 1996, and then run annually from 1998 onwards. Approximately one million households a year are asked where they did their main shopping for different goods. For grocery shopping, the survey contains information on the location of respondents and which specific shop they considered their 'main' destination and where it was located. The data supplied to us is aggregated in an origin (of consumers) and destination (grocery shops) matrix for two years, 1998 and 2008. There is information on the number of consumers picking each destination choice. This is weighted to make it representative of the population.

We exploit the NSLSP dataset to locate grocery destinations and shoppers and allocate these to our TCs. We have access to data by postcode sector of origin of the consumers and shop of destination (which we can exactly geolocate). For the destination shops we know their full address, their chain and trading name (also the group they belong to) and their category (supermarket, convenience store, freezer centre or other). From the chains they belong to we can identify the stores belonging to the then "big four" supermarket companies (Tesco, Sainsbury's, Asda and Morrisons), freezer companies (Iceland and Farmfoods), discount chains (LIDL and ALDI) and premium stores (Waitrose and Marks & Spencer). We can also calculate the number of shoppers for all these types of grocery stores. We use the postcode information for the destination shop to

[6] So roughly corresponding to street blocks - 15 addresses on average.

[7] The information on the number of businesses and residential addresses in each postcode comes from the Post Office Postcode Address Files (PAF). This information was supplied as part of the ONS National Postcode Statistics Directory up to 2012.

exactly geolocate it into each TC and then we aggregate the information on the number of destinations and shoppers (total and by characteristics of the destination) for TCs in England and Scotland for the years 1998 and 2008.

One important difference between the BRES and the NSLSP is that the former survey provides aggregates of the total number of grocery stores at different geographies, while the latter survey provides information for all the specific stores identified in the survey as main grocery destinations (which we can aggregate spatially) and the origin and number of shoppers using each store. Satisfactorily, the total number of grocery store estimates correlate highly (between 60-80%), at both postcode sector and Town-Centre level, but, given the sample size and the variable they capture (supply of stores versus main grocery destinations), mechanically NSLSP totals are lower than those computed from BRES data. Using information on both dimensions, supply of stores and grocery destinations, we can get a more complete assessment of the impact of the policy.

An important advantage of the BRES is that it provides data from 1991 onwards, so for a number of years pre-dating the introduction of the rigorous TCFP in England in 1996. This allows us to test for parallel pre-trends. The NSLSP was only available for two years, but it is much more detailed, spatially more precise and, crucially, has numbers and origins of shoppers as well as information on shops.

The outcome of this process of spatial aggregation is that we end up with two independent datasets for England and Scotland. The first is a yearly TC-panel of grocery stores from the BRES (stores and employment). The second is a 1998 and 2008 TC-panel with information on total grocery destinations and shoppers, including destination store characteristics. We use both these datasets to provide insights and estimates of the impact of TCFP on both the supply of grocery shops and the custom attracted to destinations in the grocery sector (which reveal choices).

We provide summary statistics of the data used in our main analysis in Table 1.[8]

[8] We apportion the business counts and employment data from larger geographical units (postcode sectors) to generally smaller town centres. Thus, in some cases the numbers are below one and are not integers. We opted not to round the data to avoid inflating the numbers.

TABLE 1
Summary Statistics

	Mean	Std. Dev.	Min.	Max.
Panel A: BRES sample (all years 1991-2008)				
England (N=11,952)				
Number of stores	3.78	4.29	0.0039	50.34
Employment	90.8	118.1	0.0168	3515.8
Share part-time employment	0.625	0.121	0	1
Share female employment	0.623	0.108	0	1
Scotland (N=1,840)				
Number of stores	2.62	4.66	0.0101	54.93
Employment	48.01	84.3	0.0641	827.4
Share part-time employment	0.628	0.128	0	1
Share female employment	0.642	0.112	0	1
Panel B: NSLSP sample (1998 and 2008)				
England (N=826)				
Number of destinations (stores)	2.03	1.18	1	12
Percentage supermarkets	0.702	0.343	0	1
Ratio convenience stores to supermarkets	0.106	0.382	0	4
Percentage "Big 4"	0.310	0.352	0	1
Percentage Frozen	0.083	0.191	0	1
Percentage Premium	0.192	0.288	0	1
Scotland (N=92)				
Number of destinations (stores)	1.83	1.46	1	12
Percentage supermarkets	0.723	0.366	0	1
Ratio convenience stores to supermarkets	0.111	0.327	0	1.5
Percentage "Big 4"	0.400	0.420	0	1
Percentage Frozen	0.128	0.263	0	1
Percentage Premium	0.080	0.188	0	1

Notes: Panel B. The sample size for the variable 'ratio convenience stores to supermarkets' is 690 for England and 72 for Scotland. The min. and max. values for the number of stores and employment in the BRES data are not integers and the min. values can be smaller than one as we apportion from postcode sectors to generally smaller TCs. We decided not to round these to avoid inflating the data, especially in smaller TCs.

3. Empirical methodology and identification

We employ a spatial DiD-methodology to estimate the impact of the TCFP on patterns of shopping behaviour. To implement this, we compare TC-areas in the (much more intensively) treated country (England) with those in the 'control' country (Scotland).

The first and most obvious issue is the fact that the policy was implemented in England in June 1996, but we only have detailed spatial data on retail locations and shopping behaviour from the NSLSP from 1998. This has two implications.

First, the policy change pre-dates our NSLSP sample period by two years. Supportive of our use of 1998 as the 'pre-treatment' year, however, is the fact that there is a very significant lag[9] between any decision to build or acquire new shops to comply with new policy and those shops physically being available. This means, in fact, that 1998 is a plausible pre-policy year in terms of observable stores. To support this claim, we refer to the Competition Commission, which reports that the process of land assembly for new stores typically takes 18 months and negotiating the path through the planning process a further 10 to 12 months (Freeman *et al*. 2008, paragraphs 7.47 and 7.48). To this period should be added the time needed for construction, presumably at least 6 months. Thus, there will be a lag between any decision to build a new store and its physical completion of typically around three years or more. This implies that the relevant *effective* treatment period is from 1999 onwards (consistent with the findings from our event study-analysis). This of course ignores the possibility of anticipation effects, which could pre-date the start of the effective treatment period.

Second, and related, we cannot use the NSLSP data to test the assumption of common pre-trends for grocery shopping destinations. We can, however, employ our data derived from the BRES apportioned to TCs and an event study design, to test for pre-trends in the total supply of grocery stores and to provide further evidence of the impact of TCFP on the number and location of grocery stores.[10]

To do so, we first examine the aggregate evolution of the (log) number of stores and employment in the sector of interest in English and Scottish TCs over time. Panels A and B of Figure 1 show the first set of results from this unconditional exercise. We plot the logs of the total number of grocery stores and total employment in the sector over time in TCs for each country. As Figure 1 illustrates, the evolution of both variables was similar in the two countries prior to 1999 – the effective treatment year – and also prior to 1996 – the year when the policy was introduced. This is not, however, a sufficient test to conclusively verify that the two variables had similar trends before TCFP was implemented in England.

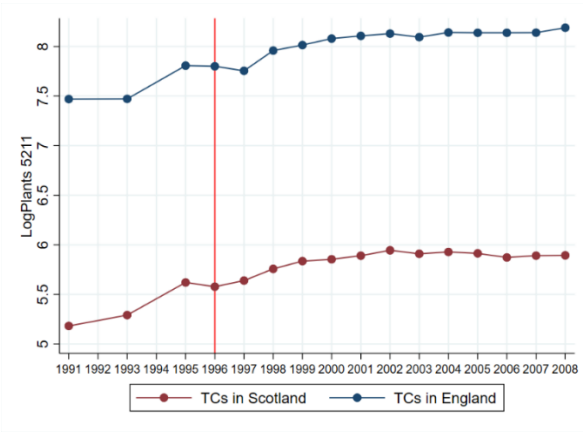
[9] This lag is particularly significant in England because of its complex planning process (see, for example, Cheshire 2018).

[10] Our estimates for shopping destinations thus rely on the assumption that the common trends in the total supply of stores from the BRES also apply to the trends in the number of grocery destinations as observed by the NSLSP.

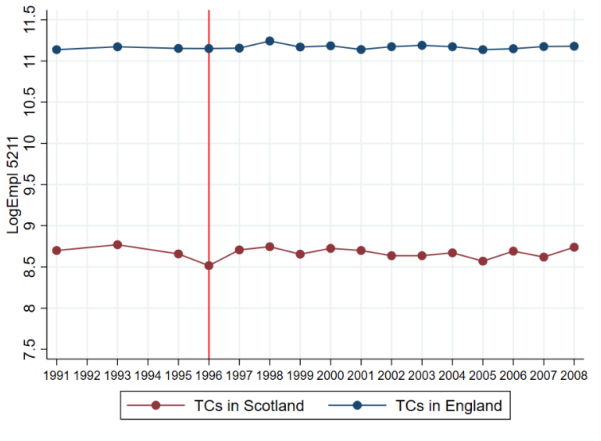
FIGURE 1

Total log Number of Stores and log Employment in TCs by Year and Country

PANEL A: Log number of stores



PANEL B: Log employment



To test for this more rigorously, we perform a parallel trend assumption test using an event study design applied to the BRES data, comparing TC numbers of grocery shops and employment in the two countries. We estimate the following fixed effects-specification

$$\text{Log } Outcome_{jt} = \sum_{t=1991}^{1995} \boldsymbol{\beta_t}\left(\boldsymbol{England_j} * \boldsymbol{Year_t}\right)$$

$$+ \sum_{t=1997}^{2008} \boldsymbol{\gamma_t}\left(\boldsymbol{England_j} * \boldsymbol{Year_t}\right) + \lambda_j + \rho_t + \varepsilon_{jt}, \qquad (1)$$

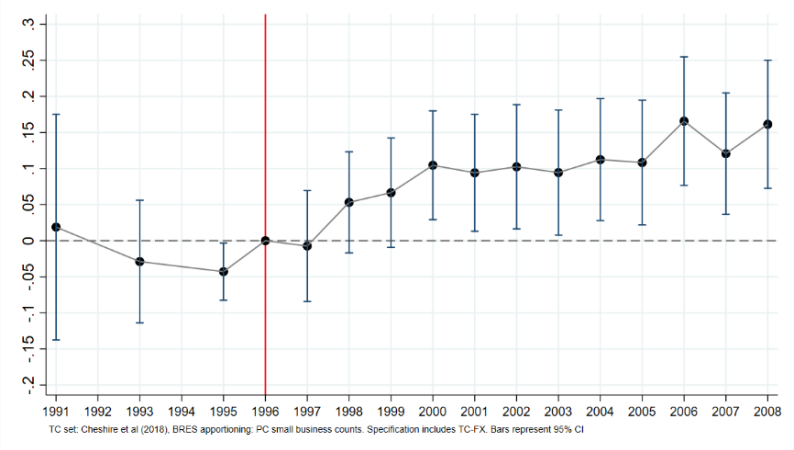
where j and t denote town centre locations and years, respectively, λ_j and ρ_t are the town centre- and year-fixed effects, and where we interact year dummies with a dummy for TC-locations in England, for both, years before and after 1996. The excluded year is 1996 (the year policy was changed). As outcomes, we use the log number of grocery stores, log employment (FT equivalent) and log average store size (employment/stores), comparing English and Scottish TCs in years before and after 1996. In addition, we look at the shares of PT and female employment in the sector to explore the possibility that the composition rather than the volume of employment might have been affected by the policy. We use a balanced panel of TCs over time, 862 TCs over 13 years, which amounts to 13,752 observations.

Appendix Table A1 shows the results of estimating specification (1) with year- and TC-fixed effects. Figures 2 and 3 plot the coefficients of the $England \times Year$ interactions from Appendix Table A1 for a better visual assessment of parallel trends. The coefficients show if, with respect to 1996, the trends in both countries were different before and after the change in policy in England.

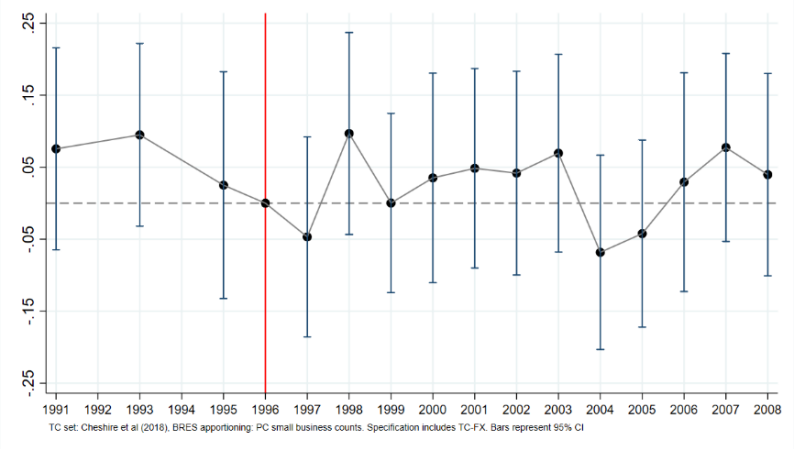
Figure 2 plots the $England \times Year$ coefficients for log number of stores, log total employment (FT equivalent) and log employment per shop (size) using the England and Scotland TC samples.

FIGURE 2
Event Study to Test for Parallel Trends (BRES 1991-2008)

PANEL A: Log of total stores



PANEL B: Log total employment (Full time equivalent)



PANEL C: Log average employment per store

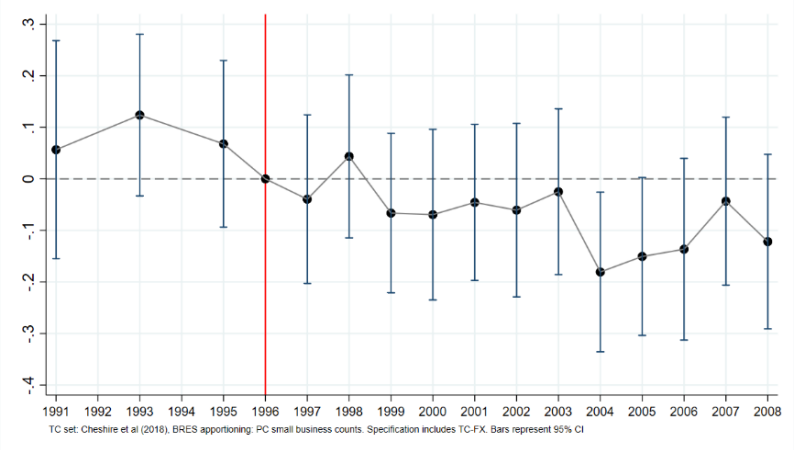
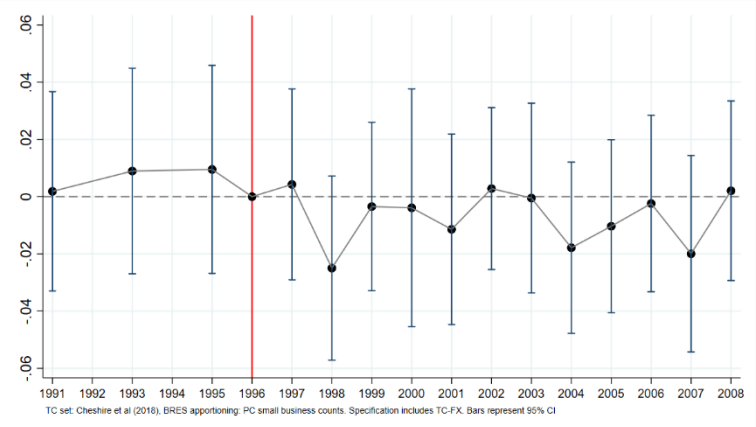


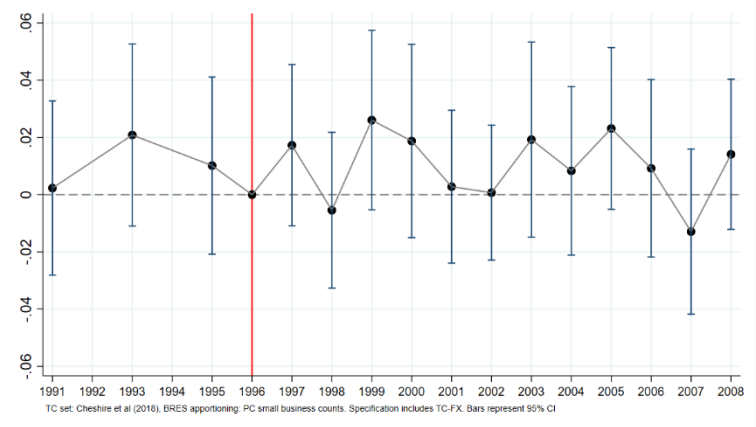
Figure 3 shows the same but for the shares of PT and female employment. If these coefficients are not different from zero, this implies that the trends in English and Scottish TCs were not statistically different. This is the case pre-policy for all the variables analysed. This confirms that the trends for all the relevant variables that can be measured for TC locations in both countries were similar *pre-policy* (pre-1996). No coefficients were significant in the interactions for the years 1991 or 1993 for any outcome and only one (the log total number of stores) is borderline significant for 1995.

FIGURE 3
Event Study to Test for Parallel Trends (BRES 1991-2008)

PANEL A: Share Part-Time employment over total



PANEL B: Share Female employment over total



Furthermore, the results reported in Appendix Table A1 and in Figures 2 and 3 provide insight into the impact of the policy *after its introduction* by examining the coefficients in years post 1996. The figures plot the coefficient at a 5% significance level, with Appendix Table A1 providing more information on the size and standard error of the coefficients.

Apart from validating the application of a DiD-design, in combination, these results suggest several important insights. First, the assumption of a significant lag between the introduction of TCFP and having a noticeable impact on store numbers seems consistent with what is observed (Panel A of Figure 2). The figure also shows that store numbers only rose statistically significantly after 1998 – the year for which the 'before policy' data is available from the NSLSP. Overall, this would seem to validate 1998 as the pre-policy impact year.

Second, the policy initially only seemed to influence store numbers. This is consistent with the finding of Haskel and Sadun (2012): retail employment in TCs actually fell as national chains bought out existing traditional retailers to get TC presence as quickly as they could due to the delay the planning and land assembly process imposed on the construction of new stores. In this initial process, they increased labour productivity in their newly acquired stores, reducing employment. This, of course, is relative to the legacy-independent stores they acquired: not relative to a new greenfield out-of-town store (see Cheshire *et al*., 2015). In so far as they constructed new stores, these were smaller TC minimarts – average shop size fell in the first years after the change in TCFP (see paragraphs 4.45ff in ODPM 2004b). It was only after 2004 that the national chains started to expand with bigger supermarkets in TCs, so total employment began to rise and average store size recovered.

Having shown that pre-trends (i.e., trends before 1996/97, and particularly before 1999) were not statistically different in England compared to Scotland, we can move on to applying the DiD-methodology to study the effects of the policy on several outcomes using both the BRES and NSLSP data.

For reasons already discussed, we use 1998 and before as 'pre-policy' years and 1999 onwards as 'post-policy' years. This has the additional advantage of being able to analyse both datasets consistently. We also provide estimations where we divide the post-period into two sub-periods: 1999-2003 and 2004-2008, reflecting the point above that the reaction of the large supermarket chains changed over time as they were able to construct new stores rather than just acquire existing independent stores within TCs. We use either the whole TC year sample or restrict the analysis to just the two years, 1998 and 2008. Doing the latter exercise provides a direct comparison between

results using the BRES data and those using the NSLSP data. In a robustness check, we used 1996 as a threshold to define pre- and post-periods using BRES data. Results are very similar, further supporting our choice of 1998 as 'pre-policy' year in both instances. Next, we estimate the following fixed effects specification

$$\log Outcome_{jt} = \boldsymbol{\beta_1}\left(\boldsymbol{England_j} \times \boldsymbol{Post_t}\right) + \lambda_j + \rho_t + \varepsilon_{jt}, \quad (2)$$

where *j* and *t* denote town centre locations and years, respectively, and where λ_j and ρ_t are the town centre-and year-fixed effects. Our coefficient of interest is $\boldsymbol{\beta_1}$, which captures the differential effect of the (more intensively) treated English TCs post-policy (>1998). In all estimations, we cluster the standard errors at the TC-level. All the TCs are wholly contained within just one of the countries. When we use two sample years (1998 and 2008), the year dummies collapse to a year-2008 (post) dummy.

4. Results

4.1. TCFP impact on aggregate TC grocery supply

In Tables 2 and 3 we present the results of estimating DiD-models using the BRES data. Table 2 uses all the years available (1991, 1993 and 1995 and 1996 to 2008). We use 1998 as the year after which we define the post period. Table 3 shows results for 1998 as pre-year and 2008 as post-year to mimic the sample years of the NSLSP. The tables show the results for the log total number of stores (column 1), log total employment (column 2), log employment per store (column 3), share of PT- relative to total employment (column 4) and share of female relative to total employment (column 5).

Using all years 1991 to 2008 in Panel A of Table 2 and defining years from 1999 as post-period, we find significant post-policy increases in the number of stores. In contrast, our results indicate that the TCFP did not significantly affect total full-time equivalent employment. These two findings jointly give rise to a statistically significant negative effect of the policy on the size of the average store in English TCs. This is consistent with the national chains moving into TCs, in order to increase their TC presence post-policy, displacing or taking over more traditional independent retailers, in line with Sadun (2015). We find no impact on the composition of employment.

Panel B of Table 2 documents our findings when we divide the post-period into two sub-periods: 1999-2003 and 2004-2008. As noted above we pick these years because there was evidence of a clear change of strategy from big supermarket chains that initially extended out-of-town stores and took over small TC independent shops, then, around 2004, started opening smaller in-town

convenience stores of their own in central locations (ODPM 2004b). Columns (1) and (3) reveal that, even though the effects occur in both subperiods, it is the latter period where we see the stronger results on log number of stores and size of stores. The effects on total grocery employment (column 2) or on the composition of employment (columns 4 and 5) remain insignificant in both periods.

TABLE 2
Difference in Difference Estimates Using BRES Data – All Years

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Log number of stores	Log employment	Log Employment per store	Share part-time employment	Share female employment
PANEL A: Post 1998 onwards					
England × $Post$ 1998	0.114***	-0.018	-0.132***	-0.006	0.003
	(0.032)	(0.025)	(0.040)	(0.007)	(0.005)
TC fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	13,792	13,792	13,792	13,792	13,792
Adj. R^2	0.94	0.90	0.60	0.18	0.21
No of clusters (TC)	862	862	862	862	862
PANEL B: 1999-2003 and 2004-2008					
England × 1998 − 2003	0.094***	-0.002	-0.095**	-0.003	0.006
	(0.032)	(0.030)	(0.044)	(0.008)	(0.006)
England × 2004 − 2008	0.135***	-0.034	-0.169***	-0.010	0.001
	(0.035)	(0.028)	(0.044)	(0.008)	(0.006)
TC fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	13,792	13,792	13,792	13,792	13,792
Adj. R^2	0.94	0.90	0.60	0.18	0.21
No of clusters (TC)	862	862	862	862	862

Notes: TC census data on Sector 5211 (Retail: Non-specialised food stores etc.) from Annual Business Inquiry accessed via NOMIS. *, **, *** indicate significance at 1, 5 and 10% level. Standard errors are clustered at the TC-level. Sample years 1991, 1993, 1995 and 1996 to 2008. Data apportioned from postal sector to TC based on NSPD small business counts. TC definition from Cheshire *et al.* (2018).

Panel A of Table 3 shows the results using BRES data, but only using years 1998 (pre) and 2008 (post) in order to provide comparable estimates to the NSLSP sample, for which we only have these two years of data. It confirms the positive impact on total number of stores and the negative impact on store size, while the effects on employment and its composition remain insignificant.

TABLE 3

Difference in Difference Estimates Using BRES Data – 1998 and 2008 Only

PANEL A: TC grocery store characteristics – pre (1998) and post (2008) only					
	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Log Number of stores	Log employment	Log Employment per store	Share part-time employment	Share female employment
England × Post	0.084**	-0.100	-0.184**	0.028	0.014
	(0.041)	(0.081)	(0.090)	(0.018)	(0.013)
Post (2008)	0.126***	0.042	-0.084	-0.019	-0.008
	(0.038)	(0.075)	(0.083)	(0.017)	(0.012)
TC fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	1,904	1,904	1,904	1,904	1,904
Adj. R^2	0.95	0.89	0.58	0.19	0.26
No. of clusters (TC)	952	952	952	952	952

PANEL B: Store size – pre (1998) and post (2008) only				
	(1)	(2)	(3)	(4)
	Store has 1-4 employees	5-11 employees	11-24 employees	25+ employees
England × Post	0.038	-0.015	-0.042**	0.019
	(0.023)	(0.021)	(0.017)	(0.015)
Post (2008)	0.008	-0.012	0.035**	-0.031**
	(0.022)	(0.020)	(0.015)	(0.014)
TC fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	1,904	1,904	1,904	1,904
Adj. R^2	0.49	0.19	0.27	0.48
No. of clusters (TC)	952	952	952	952

Notes: TC census data on sector 5211 (Retail: non-specialised food stores etc.) from Annual Business Inquiry accessed via NOMIS. *, **, *** indicate significance at 1, 5 and 10% level. Standard errors clustered at the TC-level. Sample years 1991, 1993, 1995 and 1996 to 2008. Data apportioned from postal sector to TC based on NSPD small business counts. TC definition from Cheshire et al. (2018).

For the two years 1998 and 2008, we have additional data on the number of stores by different size: 1-4, 5-11, 11-24 or 25 or more employees. We calculate the share of these stores over the total and show the results in Panel B of Table 3. This reveals the impact of TCFP on the structure of store sizes. The increase in the total number of stores would appear to be accounted for by a relative increase in England post-1998 in the number of small stores with 1-4 employees (albeit the effect is borderline insignificant at the 10.5%-level) and a relative decline in the share of larger

stores with 11-24 employees. The effect of the policy on the two other store sizes (5-10, and 25 or more employees) is statistically completely insignificant. Again, this appears to be consistent with the post-policy increase in TC stores resulting from national chains moving to increase their TC presence and buying out traditional smaller stores, and increasing TFP so reducing employment in them, or building new small minimarts. The entrance of small-sized 'freezer centres' in TCs could also be part of the explanation for our findings.

4.2. Town Centre First Policy impact on town centre grocery destinations

Moving to the analysis of the impact of the policy on shopping patterns, we adjust the NSLSP data in 1998 and 2008 to TCs in England and Scotland and calculate several aggregates that describe shopping patterns in central areas. The survey asks respondents to identify their *main* shopping destination for groceries, including the actual store. This means the number of stores mentioned in the survey corresponds to the sub-sample of the population of all stores identified by the consumers as their main destinations (that is, their choices). It also implies the NSLSP store numbers may show some bias towards bigger supermarkets as compared to corner shops. Nevertheless, the total number of TC stores from the two sources are highly correlated (R^2s over 0.8).

An advantage of the NSLSP data is that it allows us to estimate the number of consumers choosing TC shops and the characteristics of those shops. Such information is not available in any other dataset we are aware of. Compared to the analysis with BRES data, the results here reveal *shopping choices*, not only store numbers or openings. We can further exploit the data to construct variables on the composition of shops by chain and category.

Table 4 documents the results of the DiD analysis estimating specification (2), but using NSLSP data for 1998 and 2008 instead of BRES data. Panels A and B of Table 4 show the results for the number of destinations and shoppers, respectively. We report the results for several outcomes, which are indicated in each column. We present the results for the full model with TC-fixed effects and include a post year dummy ($Post = 2008$), and standard errors clustered at the TC-level. The coefficient $England \times Post$ reports the impact on treated TCs (i.e., TCs in England) post-policy (i.e., in 2008).

The results in Panel A of Table 4 complement the results based on our analysis using BRES data. The policy increased the number of grocery stores *chosen* by consumers in TCs as their main grocery destination (column 1). We also find that consumers choose fewer supermarkets (as a share of the total that includes convenience stores, frozen food centres and other stores) (column (2) and that the ratio of convenience- to supermarket stores increased as a result of the policy

(column 3). Finally, consumers chose more stores from the then "big four" and frozen food centres (which had no presence in TCs in 1998) and fewer premium supermarkets.

TABLE 4
Difference-in-Differences Results for NSLSP Sample – 1998 and 2008

PANEL A: *Dependent variable:* Grocery destinations						
	(1)	(2)	(3)	(4)	(5)	(6)
	Log total	Percentage super-markets	Ratio convenience stores / super-markets	Percentage "Big 4"	Percentage Frozen	Percentage Premium
England × Post	0.214***	-0.204***	0.152**	0.241***	0.212***	-0.047*
	(0.080)	(0.065)	(0.071)	(0.080)	(0.040)	(0.027)
Post (2008)	0.000	0.078	-0.000	-0.273***	-0.119***	0.054**
	(0.077)	(0.062)	(0.065)	(0.078)	(0.037)	(0.025)
TC fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	918	918	762	918	918	918
Adj. R^2	0.64	0.45	0.09	0.50	0.15	0.73
No. of clusters (TC)	459	459	381	459	459	459
PANEL B: *Dependent variable:* Grocery shoppers						
	(1)	(2)	(3)	(4)	(5)	(6)
England × Post	0.186	-0.107*	0.004	0.272***	0.123***	-0.003
	(0.222)	(0.062)	(0.027)	(0.086)	(0.036)	(0.029)
Post (2008)	-0.590***	0.038	0.013	-0.277***	-0.052	0.011
	(0.215)	(0.059)	(0.010)	(0.083)	(0.034)	(0.027)
TC fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	918	918	762	918	918	918
Adj. R^2	0.66	0.45	0.01	0.60	0.13	0.71
No. of clusters (TC)	459	459	381	459	459	459

Notes: TC data from National Survey of Local Shopping Patterns (CBRE). *, **, *** indicate significance at 1, 5 and 10% level. Standard errors clustered at the TC-level. Sample years 1998 and 2008. TC definition from Cheshire et al (2018).

Panel B of Table 4 replicates the same specifications, but with grocery shoppers rather than grocery destinations as dependent variable. Column (1) reveals that the policy had no impact on the total number of shoppers choosing TC locations in England post-98. Columns (2) to (5) suggest that the TCFP decreased the share of supermarket shoppers and increased the share of "big four" and frozen food centre shoppers, while it did not affect the share of convenience and premium store

shoppers. All in all, this suggests the policy, while it had a significant impact on the location and numbers of physical stores, did not increase the total number of consumers in England frequenting TCs. Additionally, by opening smaller convenience store-type shops, the then "big four" chains and the newly established frozen food centres managed to get a larger share of the total number of consumers.

4.3. Measures of the economic significance of TCFP impact

Evaluating the impact of TCFP is made difficult by the obvious issues of endogeneity and reverse causation. We would argue that confining our analysis only to changes in town centres and employing a DiD approach, provides some confidence with respect to the causal effects of TCFP in English TCs with respect to changes in store numbers, types of stores, employment and shopper destination choices in TC stores. However, an important stated aim of the policy was to encourage 'linked trips' for TC activities and, by implication, reduce distances travelled by shoppers. As is discussed below, isolating the pure causal effects of TCFP on shopping trip lengths has additional problems associated with joint causation.

Despite these difficulties, it is still useful to try to convey some notion of the likely scale of the effects of TCFP, both for the built form of cities and in terms of economic outcomes, such as employment. The work in this paper estimates the statistical significance of some impacts but this gives little idea as to their economic size. In an earlier paper (Cheshire *et al.*, 2015) some of us did investigate the causal impacts of TCFP on Total Factor Productivity (TFP) and concluded these were not just statistically significant, but very large economically. In the supermarket chain studied, TCFP had directly led to a TFP loss of 32 percent.

Here, to convey some idea of the size of the TCFP impacts we have focused on, we offer some simulations, the results of which are summarised in Table 5.

These simulations address three questions:

1) What was the change in employment in the retail sector in English TCs following the introduction of TCFP?

To quantify this we apply the estimated coefficient from our preferred model - Table 3, Panel A, column 2, for retail TCFP-induced employment change in English TCs between 1998 and 2008 to simulate what retail employment in them would have been had it behaved as it did in Scottish TCs.

TABLE 5
Simulations of costs of TCFP: Changes in English TCs post TCFP

Variable	Change compared to 1998	% Change compared to 1998
Total employment in Retail Sector 5211	-4,791	-5.62
Number of stores	+697	+23.4
Size of stores (by mean numbers in employment)	-8	-23.5
Mean shopping trip distance		
- Crow fly distance	-478.2 [a)]	-4.21
- 'Time' distance (adjusted for congestion)	-152.6 [b)]	-2.08

Notes: [a)] Mean in metres per shopper. [b)] Mean in congestion adjusted metres per shopper.

We then show the result in terms of both absolute change in job numbers (-4.791) and as a percentage change relative to retail employment in English TCs in 1998 (-5.62%). While the relevant coefficient on total employment change is not statistically significant, it is positive and appears to be the outcome of two significant effects working against each other: an increase in TC store numbers but a reduction in employment per store. So this simulation is of their net effect on total English TC retail employment change.

2) What was the change in the number and size of TC stores in England following the introduction of TCFP?

We simulate this in an analogous way using the results from Table 3, Panel A, but this time from columns 1 and 3. Again there are two effects which work in opposite directions. Store numbers in English TCs increased (by 697) but, at least in employment terms, stores became smaller (by 8 employees per store). As already discussed, the results from Table 2. Panel B, column 1 suggest that the increase in store numbers, so new store construction, in English TCs was substantially stronger after 2003. In the data available there is no measure of physical size of stores – only numbers of employees per store. Since, as they replaced independents in TCs, the chains almost certainly improved productivity, this will tend to underestimate the increase in retail floorspace in English TCs. In addition, since construction costs are substantially higher on brownfield sites in TCs than in out-of-town greenfield sites, our simulations will not capture likely increased construction expenditures on store space in England compared to Scotland.

3. What was the change in shopping trip distances and/or times in England following the introduction of TCFP?

Again we apply an analogous method to simulate this outcome. We try to answer this question: given the results in Table 4, Panel B, and the known origins and shopping destinations in 1998 and

2008. We simulate what would have been the mean distance travelled by shoppers in England in 2008 if their origin locations had remained the same but their choice of TC destinations had changed proportionately as was observed in Scotland. In this case we measure distance in two ways: as crow-fly distance and as estimated time-distance using Department for Transport data on Average Annual Daily Flows by Local Authority.

For this simulation the problem of joint causation is a particular concern. The length of shopping trips will be influenced not only by where shops are located but by where people (shoppers) live. We observe where and what size shops were before the policy had an impact and afterwards in two countries. Equally we observe the patterns of shopping trips in both countries before and after policy implementation. However, in drawing conclusions as to the causal impact of TCFP on the distance travelled for shopping trips, it is essential to acknowledge that where people choose to live is, in part, albeit probably a small part, influenced by the convenience their housing choice provides for access to shops. Equally retailers in deciding where to locate new shops will take significant account of (changes in) residential locations in addition to the costs and problems of building new shops in different locations. Our data and methods do not allow us to simultaneously account for the influence of TCFP on residential choice, so in simulating changes in shopping trip lengths the issue of joint causation is even more relevant than it is in estimating impacts on just stores.

These caveats aside, our simulation of shopping trip distances following TCFP suggests there was in England a small reduction in metres travelled by shoppers, although the reduction in crow-fly distance (-478 metres or -4.21%) was larger than that estimated in terms of the 'time' distance (-153 metres or -2.08%), which takes into account the fact that post TCFP implementation a higher proportion of trips were in more congested areas (so more time consuming). Again it must be noted any residential re-location is ignored and this is not costless.

5. Conclusions

The results reported in this paper show that the impacts of TCFP on the location of grocery shops, employment in the sector and patterns of shopping were significantly more nuanced and complex than policymakers surely intended. The policy did increase the number of TC stores, but this – certainly in the earlier years following the introduction of the policy – was wholly explained by more, smaller stores. Total TC retail employment, if anything, was reduced, and the average store size fell. It has been shown elsewhere (Cheshire *et al*. 2015) that the TCFP seriously reduced Total Factor Productivity of newly opened supermarkets in England – by an estimated 32 per cent –

although a part of that fall seemed to be caused by the specific controls the TCFP gave to planners to determine the precise sites of new stores within TCs. Our results here complement those results. The "big four" national chains seemed to find workarounds by buying up existing traditional independent shops in TCs and by opening new branded minimarts. But there was no increase in the number of shoppers choosing TC locations.

To summarise, the policy had a huge cost in terms of foregone productivity and changed the physical location and form of new shops but without achieving any significant revival of TC shopping. At the same time, it reduced TC employment, particularly full-time employment, in the retail sector. The highly restrictive new TCFP introduced in England in 1996 can be seen as another example of the old adage that 'you can lead a horse to water but not make it drink'.

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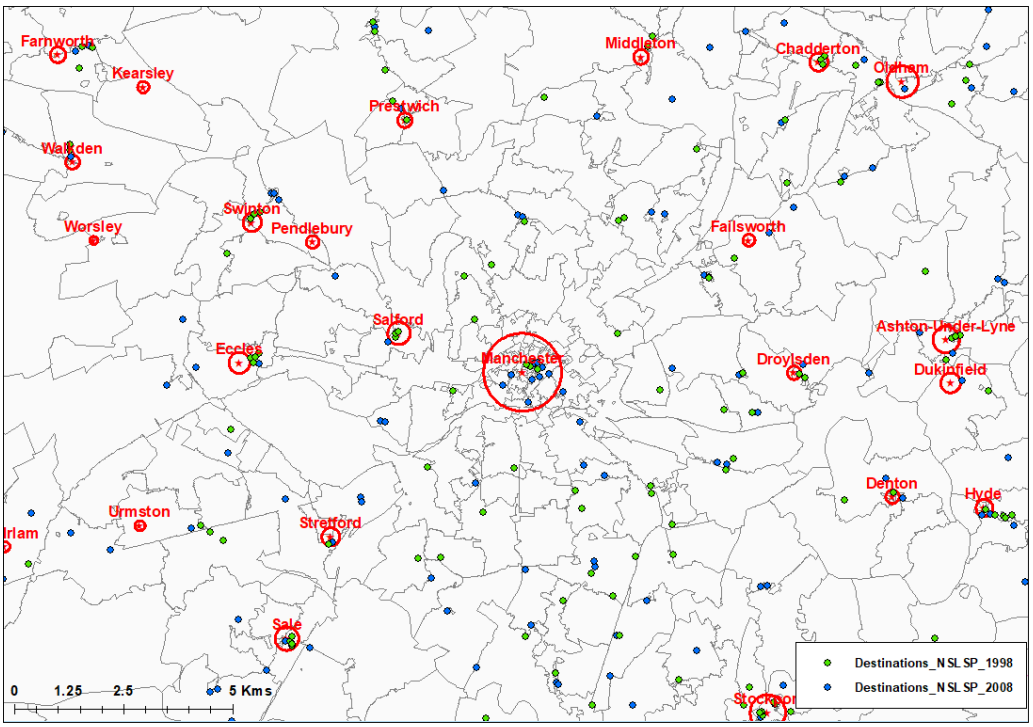
APPENDIX

FIGURE A1
Illustration of Town Centres

PANEL A: Town Centre-areas around Manchester (England)



PANEL B: Town Centre-areas around Edinburgh (Scotland)

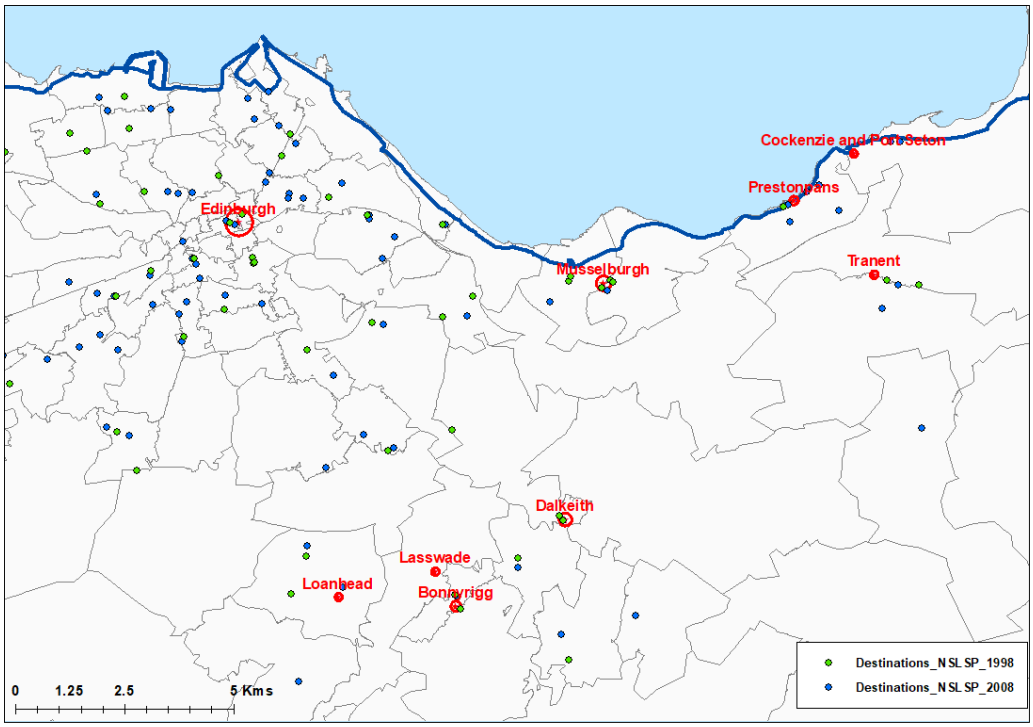
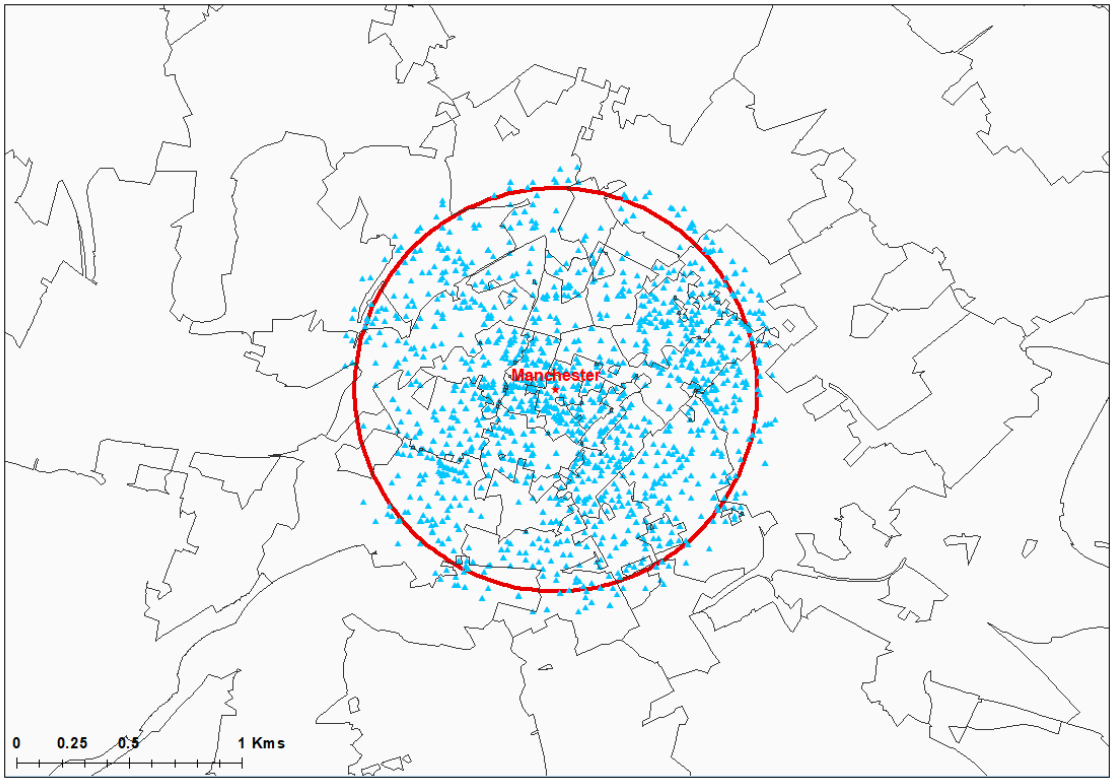


FIGURE A2

Illustration of Data Imputation Approach



Note: The red circle denotes the TC-area. The blue triangles denote postcodes containing small businesses in the National Statistics Postcode Directory. The borders delineate postcode sectors.

TABLE A1
Event Study Coefficients

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Log total number of stores	Log employment	Log Employment per store	Share part-time employment	Share female employment
England × 1991	0.019	0.075	0.057	0.002	0.002
	(0.08)	(0.071)	(0.108)	(0.018)	(0.016)
England × 1993	-0.029	0.095	0.124	0.009	0.021
	(0.043)	(0.065)	(0.08)	(0.018)	(0.016)
England × 1995	-0.043**	0.025	0.068	0.01	0.01
	(0.02)	(0.08)	(0.082)	(0.019)	(0.016)
England × 1997	-0.007	-0.047	-0.039	0.004	0.017
	(0.039)	(0.071)	(0.083)	(0.017)	(0.014)
England × 1998	0.053	0.097	0.044	-0.025	-0.005
	(0.036)	(0.071)	(0.081)	(0.016)	(0.014)
England × 1999	0.067*	0.000	-0.066	-0.003	0.026
	(0.039)	(0.063)	(0.079)	(0.015)	(0.016)
England × 2000	0.105***	0.035	-0.069	-0.004	0.019
	(0.038)	(0.074)	(0.084)	(0.021)	(0.017)
England × 2001	0.094**	0.048	-0.046	-0.011	0.003
	(0.041)	(0.071)	(0.077)	(0.017)	(0.014)
England × 2002	0.102**	0.042	-0.061	0.003	0.001
	(0.044)	(0.072)	(0.086)	(0.014)	(0.012)
England × 2003	0.094**	0.069	-0.025	0.000	0.019
	(0.044)	(0.07)	(0.082)	(0.017)	(0.017)
England × 2004	0.112***	-0.068	-0.181**	-0.018	0.008
	(0.043)	(0.069)	(0.079)	(0.015)	(0.015)
England × 2005	0.108**	-0.042	-0.151*	-0.01	0.023
	(0.044)	(0.066)	(0.078)	(0.015)	(0.014)
England × 2006	0.166***	0.029	-0.136	-0.002	0.009
	(0.045)	(0.077)	(0.09)	(0.016)	(0.016)
England × 2007	0.121***	0.077	-0.043	-0.02	-0.013
	(0.043)	(0.067)	(0.083)	(0.017)	(0.015)
England × 2008	0.161***	0.04	-0.122	0.002	0.014
	(0.045)	(0.072)	(0.086)	(0.016)	(0.013)
N	13792	13792	13792	13792	13792
AdjR2	0.94	0.9	0.6	0.18	0.21
# clusters (TC)	862	862	862	862	862

Notes: Omitted year is 1996. TC census data on sector 5211 (Retail: non-specialised food stores etc.) from Annual Business Inquiry accessed via NOMIS. *, **, *** indicate significance at 1, 5 and 10% level. Standard errors are clustered at the TC-level. Sample years 1991, 1993, 1995 and 1996 to 2008. Data apportioned from postal sector to TC based on NSPD small business counts. TC definition from Cheshire et al (2018). Left hand side variables in logs.

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