New mortgage lenders and the housing market.

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Abstract

This paper examines the effect of a new lender's entry into a local mortgage market on the supply of new loans, housing prices and repossessions in areas around its branches. I use the decision of the European Commission to force the UK's largest retail bank to divest a part of its business as a shock to the entry of a new lender, and show that incumbent banks increase mortgage lending in areas where the new bank has its branches. Further, house prices increase by around 5% in the real estate market impacted by the shock. Average transaction numbers and mortgage repossession rates also increase in places where the new bank enters. Overall my results show that increased competition in the banking market can have adverse consequences for risk-taking and financial stability.

Keywords: bank competition, house prices, mortgages, credit supply, bank risk
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1 Introduction

The budgetary consequences of government bailouts of large banks in 2009 rejuvenated the long-standing academic debate on the impact of bank competition on the economy. While traditional research suggests that more concentrated banking systems are less likely to experience a crisis (Keely 1990), the financial meltdown of 2008 showed how costly a crisis can be when it occurs and highlighted a moral hazard problem with allowing banks to be "too big to fail" (Morrison 2011). Consequently, governments around the world increasingly encourage competition in the financial industry hoping that more variety in credit provision can reduce both the probability of a financial crash and its costs to the government (Dickinson et al. 2015). However, these polices have unintended consequences as banking competition affects the way in which financial institutions allocate resources in the economy (Benetton 2018). This study is the first to focus on how a new entrant into the lending market affects mortgage supply and the housing market. The results show that more competition encourages higher lending levels and increases house prices while demand for housing services (reflected in rents) is not affected. Moreover, the average loan granted when competition is more intense is more likely to default. The findings are consistent with the literature claiming that competition induced by policy increases the systematic risk in mortgage markets (Brunnemeier 2009, Scharfstein & Sunderam 2016, Benetton 2018).

The traditional literature on the impact of bank competition on lending focused mainly on lending to firms (Cetorelli & Strahan 2006, Love & Martínez Pería 2014). However, more recent research argues that mortgage markets should be considered separately (Scharfstein & Sunderam 2016, Agarwal et al. 2015, Buchak 2018, Robles Garcia 2019). The key difference between the two types of lending is that mortgage loans have a direct and reciprocal relationship with the market for assets they are secured on. On the one hand, mortgage availability and cost affect house prices. On the other, changes in house prices affect performance of mortgage loans. Although this relationship is an important source of risk for lenders and can affect financial stability (Brunnermeier 2009), its link to competition remains unexplored. However, as many policies intended to encourage competition in the financial sector are aimed at providing more alternatives for retail customers (Dickinson et al. 2015), more research in this area is needed to inform these efforts. I contribute to this debate by showing empirically how banks respond to an entry shock and focus on the impact on the UK mortgage market and house prices.

In general, there are two main theories of the impact of bank competition on their behaviour. One, proposed by Keeley (1990), claims that banks with more market power have higher opportunity costs of bankruptcy which deters risky behaviour. An increase in competition encourages taking more risk as the opportunity cost of failure decreases. In this model, banks faced with higher competition would give riskier loans while banks with more market power would be more stable. More recently, Boyd and De Nicolo (2005) presented a process that increases bank stability under higher competition. They argue that banks with a strong competitive position may exploit their power to charge higher prices. While this increases their profits, borrowers who face high prices but little choice may respond by engaging in more risky projects. This increases the risk of an average loan given by a bank that faces little competition. Several other studies attempt to reconcile the two views (Schaeck et al. 2009, Martinez-Miera & Repullo 2010). While there is no consensus on how competition impacts credit supply and default risk, most studies agree that there should be some impact and call for more empirical research. Furthermore, related research shows that providing evidence for this debate is important not only for credit but also for housing markets. Specifically, Mian and Sufi (2010) show that mortgage credit supply and default risk affect house prices and price volatility.

In practice, there are numerous empirical challenges of studying competition in banking. The most obvious issue is identifying the impact of a new lender on credit supply. Most early studies focus on the correlation between various measures of competition and credit supply. However, as there are numerous factors that can simultaneously affect lending decisions and the level of competition, it is difficult to identify the causal effect of competition. I address this problem by exploiting a natural experiment in which the geographical location of branches of a new entrant into the UK banking sector is determined orthogonally to the economic performance of the area. I take advantage of the fact that most retail customers choose to bank with an institution located close to their place of residence[1] (Ergungor 2010, Gilje et al. 2016) and use GIS methods to construct a measure of competition in a small geographical area based on the presence of a branch of the new entrant. Normally, this measure would be strongly

[1]While this is the case for mortgage loans, in the stock of UK business lending does not seem to be spatially concentrated around branches. Indeed, the coefficient of the distance in km to the nearest branch of that bank regressed on the logarithm of the stock of mortgage lending by a specific bank is -0.026 with an R^2 of 8.3% while in SME lending it is positive and only 0.0088 with an R^2 of 0.86%.

correlated to the economic potential of the location, but in the present study areas that receive a shock to competition are selected based on other criteria.

Specifically, I focus on TSB Bank being divested from the Lloyds Banking Group (LBG). In 2009, the European Commission directed the biggest UK bank to divest some of its Personal Current Accounts (PCA) to a new entity in order to increase competition in the UK's banking sector. Following a long and complex process supervised by both UK and EU officials, LBG transferred 632 branches (out of 2,932) to a new bank called TSB Bank in 2013. Of this, 401 were branches of two legacy networks held by LBG after earlier acquisitions. Importantly, before the European Commission announced its decision, LBG intended to close all branches of one of these networks as they were deemed redundant after a recent large merger[2]. This group of branches lends itself to the identification strategy applied by Nguyen (2019), in which I assume that the change in branch ownership is exogenous to very local market conditions. The remaining 231 branches were selected by transferring one branch in all areas where LBG had multiple branches located very close to each other[3]. Here, the choice of the location is dictated mainly by the requirements of the European Commission which specified the average size, profitability and location with respect to population density of TSB branches. Divesting branches in these locations is therefore also unrelated to their economic performance[4].

I test for possible pre-trends in house prices in all locations that received a branch of the new bank and show that they followed the same trend as the country's average for almost twenty years before TSB opened. However, to ensure that regional labour market trends do not affect my results, I follow Nguyen (2019) and focus on the variation between postcode sectors within the same postcode area.

Furthermore, I also provide an alternative identification strategy that does not assume a random assignment of the treatment to branches and use a distance-to-treated strategy popular in urban economics (Gibbons & Machin 2005, Fisher et al. 2015, Anenberg & Kung 2014, Ellen et al. 2013). Here, the identifying assumption is that the *change* in economic performance of a sector is orthogonal to the distance to the nearest treated branch. It is validated not only by very strong parallel pre-trends but also by the fact that the treatment has no impact on the critical indicators of housing demand (income and

[2]The merger added over 1,100 branches to the network and since the number of redundant branches is small in comparison, it supports the assumption that their location was incidental or at least orthogonal to their economic conditions.

[3]At the time in the UK it was not uncommon for one banking group to have more than one branch on the same high street.

[4]This is especially true in relation to other locations with a choice of branches.

rents). Finally, I match the treated locations to control groups using their observable characteristics and provide robustness and falsification tests.

From its very first days the new bank adopted aggressive customer acquisition strategies and was successful in increasing its market share at the expense of the established banks (CMA 2015). Therefore, replacing a branch of LBG with TSB can be considered an entry shock to local competition. Importantly, the divestment exercise keeps constant a number of variables that are usually correlated to increasing competition and highly endogenous to economic outcomes. For example, the micro location of the branch does not change (which facilitates identification from the distance to the branch). Similarly, many unobserved characteristics specific to banks or branches, such as staff qualifications, also remain unchanged in a divestment but are likely correlated unobservables for an endogenous new entry (Gande et al. 1999; Gormley 2010).

Interestingly, the event offers two different treatments to banking competition; one in which areas are treated by having one of their local banks replaced by a new entrant (here the size of the choice set of available banks remains unchanged) and one in which the choice set in the treated area is increased (in addition to having a new entrant). Unfortunately, it is impossible to observe a case where the choice is increased but there is no entry shock.

Exploiting natural experiments is a popular method of overcoming identification problems in credit market research. For example, changes in banking regulations provide a shock to credit supply linked to changes in house prices documented by Di Maggio and Kermani (2017). However, as Favara and Imbs (2015) note, some changes to regulations may not be fully exogenous to house prices. They address the problem by using lenders unaffected by regulation changes (due to their legal status and geographical location) as a control group. The present study develops this approach and exploits spatial variations in bank competition and their change over time. Since UK banks do not alter their prices between locations, using geographical identification techniques has the additional benefit of controlling for differences in mortgage prices. This provides a setting in which treatment and control groups face identical prices and eliminates the process described by Boyd and De Nicolo (2005). In the absence of this mechanism competition is expected to lead to more risk taking by banks and higher credit supply. Therefore, the hypothesis tested in the present

study is that higher supply of mortgages created by increased bank competition leads to higher house prices.

The main contribution of the present study is to literatures on the impact of bank competition on the real economy and on the impact of mortgage provision on house prices. While the premise that more competition between existing banks increases access to credit to firms and households is supported by a number of studies (Rice and Strahan 2010, Beck et al. 2010, Marquez 2002, Agarwal et al. 2015, Buchak 2018) new entrants and their impact on mortgage credit availability received little attention.

The recent literature on the influence of credit provision on house prices focuses mainly on the recent financial crisis and US markets. Mian and Sufi (2010, 2009, 2011 and 2014) document a link between the recent financial crisis and an expansion in credit supply that preceded it. While it is clear that credit supply increased house prices, the evidence of the impact this had on mortgage risk is unclear. While Di Maggio and Kermani (2017) suggest that credit expansion leads to mortgages being given to riskier borrowers, Adelino et al. (2016) show that more credit supply increases borrowing by risky and safe clients alike. This suggests that banks can expand supply of credit not only by lending to riskier clients but also by lending to safe clients but on riskier terms. The present study contributes to this debate by showing that the impact of increased credit supply is indeed higher in places where access to credit is more likely to be restricted. This includes places with high ethnic diversity and poverty rates. In addition, intensifying competition appears to lead to more house repossession orders being issued by local courts which suggests that, on average, mortgages given in places where competition is higher are more likely to default. Another key contribution to this literature is to demonstrate that house prices react to mortgage supply even after controlling for the key determinants of demand for housing services: income and amenity of the location. This suggests that the change in house prices has to come from the discount rate (price to rent ratio).

The present study also contributes to the literature on the impact of banking competition on bank stability. By examining a natural experiment in bank competition and the effect it has on lending, I provide empirical evidence in support of the theory that higher competition encourages banks to take on more risk. Indeed, I provide first evidence of a process which results in higher bank competition affecting not only banks but also the markets they lend to.

The results indicate that an entry shock in banking has a strong influence on local credit and housing markets. The main finding is that in postcode sectors where LBG branches are converted to TSB house prices are around 5% higher than in the control group. Moreover, credit supply is also higher around TSB branches. Despite the fact that TSB is aggressively increasing its share of the mortgage market by increasing credit supply, other institutions appear to lend slightly more in places where TSB takes over LBG's branches. This shows that incumbent banks expand credit supply in response to the entry shock. Importantly, the entry shock also seems to lead to higher repossession rates in places affected by the treatment, suggesting that the additional loans were driven by originating riskier loans. Unfortunately, it is not possible to distinguish between loans (and defaults) given by the new entrant and incumbent banks using the available data.

Further analysis shows that prices increase the most in places where credit is more likely to be difficult to access. The impact on prices is the highest in places where income is low, poverty rates are high or local population includes a high proportion of people from ethnic minorities. Finally, the results show that banking competition strongly affects the real estate market. Prices increase the most in locations where housing supply is the most inelastic (as defined by Hilber and Vermeulen 2016) and more transactions occur when credit supply increases (consistent with the assumption that providing more credit makes transactions easier (Gorton 2009)). Local house prices do not appear to react to the number of banks that have branches in the area. However, the results cannot rule out the possibility that the lending mechanism works differently in those locations[5].

Section 2 outlines the expected link between bank competition and house prices. Section 3 discusses the data and presents summary statistics. Section 4 discusses the two identification strategies. Section 5 reports and discusses the results. Section 6 evaluates the findings in context of their policy implications. Section 7 summarizes the implications of the paper and offers concluding remarks.

[5]Unfortunately, while it cannot be ruled out, it also cannot be confirmed due to data limitations.

2 Bank competition and house prices.

2.1 House Prices.

To model house prices, I begin with a Rosen-Roback (Roback 1982) setting and recognize that the utility[6] U of living in area i is determined by the area's income I, its flow of local amenities A and the cost of its flow of housing services R:

$$U = I_i + A_i - R_i \tag{1}$$

The flow of housing services can be measured by rents R, which in this framework reflect the demand for housing services driven by income and amenities. Importantly, in a spatial equilibrium, utility is constant between locations as households move until rents reflect the differences between incomes and amenities. Note that in this framework *local* demand is perfectly elastic. The theoretical interpretation of the rent in the spatial equilibrium model is the short/medium term cost of receiving housing services in the area. Rents can can be converted into prices P using a discount rate u (the inverse of the price to rent ratio) so that $P_i = R_i/u_i$.

The two key theories relating prices to rents are the Case and Shiller decomposition approach (1990) and the user cost formula approach (Himmelberg et al. 2005). While early research used mainly the first framework, more recent research finds that the user cost formula performs considerably better when applied to micro data (Hill & Syed 2016). Converting rents determined by the spatial equilibrium into prices using the user cost defines u as:

$$u = f(ir, tc, dc, rp, eg) \tag{2}$$

Where, ir denotes the interest rate, tc denotes a transaction cost, dc denotes a deprecation cost, rp denotes a risk premium of owning and eg denotes an expected capital gain. The identification strategy presented below shows that price changes come from a variation in u by showing that rents are not affected by the treatment. However, this does not show which individual components of the user cost are affected by the treatment. It is therefore impossible to identify the structural parameters corresponding to the individual components separately.

[6] U is equal across all areas and needs no area subscript.

Instead, this paper builds on Shiller (2007) and Duca et al. (2016) and follows the logic that changes in the credit market affect house prices through changes in the interest rate and risk premia. The main benefit of using the UK is that interest rates do not vary across space, which allows a focus on the spatial variation in the risk premium[7]. This leads to a simple prediction that house prices are a function of mortgage supply and can change due to changes in risk premia, even when demand for housing services remains constant.

Another important implication of the spatial equilibrium is that it only applies to house prices and not any of the variables that determine u. This means that the same treatment will have the same impact on housing demand across space but its impact on other housing and credit market outcomes may differ. For example, the number of transactions caused by the credit-induced higher demand will depend on how credit-constrained buyers were before the treatment.

2.2 Credit supply.

As outlined in the introduction, the theoretical literature on banking competition demonstrates that higher competition leads to higher credit supply. This claim is also supported by empirical evidence. This suggests that in a spatial equilibrium the impact on house prices should occur through the key parameters of credit supply that also affect house prices; interest rates and risk premia. While my empirical setting keeps interest rates constant, this paper focuses on risk. To form predictions of how incumbent UK banks react to a new entrant, I characterize local mortgage supply in the UK setting by considering a case of a mortgage lender under rationed credit[8].

A bank determines the optimal quantity of lending to area i by maximizing its total profit (π_i) function. This function is based on revenue derived from the total price of mortgage loans specific to this bank and the corresponding total cost. The marginal cost is the sum of the cost of capital (C) and the cost arising from the risk of the marginal borrower (R). The risk of the marginal borrower is given by their risk premium so that $R = f(rp)$. This links credit supply with house prices given in equation 2. Every additional loan in the area has a higher probability of default so the average cost of default is an increasing function of total lending by the bank. Each location has a different risk profile and its own unique

[7] A case in which changes in prices induce an endogenous changes in expected capital gains is discussed in section 6.2

[8] This assumption is helpful simply to ignore credit demand side by assuming that demand exceeds supply. Adding credit demand to the analysis introduces little insight into the described process and yields the same conclusion while making the analysis more complicated.

'marginal cost of risk' function. In addition, the bank cannot observe the true risk so it can only estimate the real marginal cost of default with an error $R_i(Q) = r_i(Q) + \epsilon_i$. Prices (interest rates) are the same across areas but increase with risk as in the UK mortgage rates vary with LTV and LTI ratios so that marginal prices increase for additional loans ($P(Q)$). Therefore, in each area the bank chooses Q by estimating and maximizing the following total profit function:

$$\pi_i(Q) = \int_0^Q (P(Q) - R_i(Q) - C)dQ \tag{3}$$

The first order condition is simply $P(Q) = R_i(Q) + C$. To moderate possible losses due to the unobserved risk, a bank might want to lend less than suggested by this condition. Therefore, the first order condition adjusted for the risk estimation error will be:

$$R(Q) - f_i(\epsilon_i) = R_i(Q) + C \tag{4}$$

Where f is some area-specific function of the error with which the bank can estimate the local risks of default and can be interpreted as the bank's attitude towards risk. A risk-neutral bank will assume the value of this function to be zero, a risk-taking to be a negative value (reflecting an assumption that the risk is overestimated), while a risk-averse bank might use its maximum expected value. In this setting, $f_i(\epsilon_i)$ is the only local variable that is determined by a decision of the lender and endogenous to local conditions. This makes it clear that the area-specific level of risk accepted by a lender directly affects mortgage supply. Because the level of risk accepted by the lender determines the risk premium of the marginal borrower that enters into the market, it also determines house prices through equations 1 and 2.

2.3 Geography and risk

Research shows that banks choose their attitude towards mortgage risk as a function of capital availability, ownership structure, information asymmetry, regulations and competition (Saunders 1990, Furlong & Keeley 1989, Houston et al. 2010, Konishi & Yasuda 2004, Dell'Ariccia et al. 2017, Ioannidou & Penas 2010, Benetton 2018, Liu 2019). Therefore the shape of f_i as well as the value of ϵ_i should have national and local determinants. In this research, I ignore the national determinants (kept constant in the empirical strategy) and focus on the key local factors: 1) information asymmetry and 2) local branch competition.

Information asymmetry in credit markets could be a national problem and lead to higher values of the error everywhere. However, information asymmetry could also vary between geographical areas since banks with a branch in area i will have a better understanding of credit risk at that location (Nguyen 2019, Degryse & Ongena 2005). Therefore, banks may be willing to supply more credit in locations where they have branches (and all else is equal). Indeed, empirical reports of spatial distribution of lending in the UK confirm that mortgage lending tends to concentrate in areas around branches (Werner 2013).

The second channel through which branch location affects lending is competition for retail customers. Banks maximize the expected profit they can receive from a household across different products. Assuming they face a high client acquisition cost for the first product but low for subsequent ones, they maximize cross-selling benefits by accepting a lower profit (or a loss) on the more popular (or less profitable) products. Since in the UK switching of current accounts is very rare, mortgages are a popular 'gateway' product for retail banks (Miles 2004). Indeed, households usually have current accounts at banks that operate branches close to their homes to reduce travel costs of frequent trips (de Blasio 2009, Ergungor 2010). This leads to banks being willing to accept more mortgage risk (and change f_i) in places where branches are located. Although the profitability of local borrowers on mortgage products could be lower, the overall profit from the household can be the same or higher compared to households in more remote areas (see appendix 9.4 for more detail).

The above paragraph shows that the amount of risk a bank is willing to accept depends on competition it faces. However, as explained in the introduction, forming a general prediction of how banks behave when local competition increases is difficult. Fortunately, a specific prediction can be formed under the restrictions imposed by the structure of the UK mortgage market; 1) mortgage offers do not differ over space in their observable characteristics (prices, LTV and LTI ratios) 2) competition is local and varies over space 3) risk estimation errors and bank risk preferences can vary over space.

It is helpful to illustrate how this prediction emerges with the following example. Imagine that, a random selection of branches (selected from the population) is divested into a new entity and becomes highly motivated to increase their market share (and is willing to sacrifice short-term profits). They can reduce

prices to attract customers from other banks and increase their risk tolerance to allow more customers to qualify for their loans. Because they want to attract customers who will be likely to use their other services, they will concentrate on areas where the branches are located.

The remaining banks see their market share around branches of the new bank fall but cannot respond by reducing prices. Prices do not vary over space so changing prices would compromise their positions in locations where competition does not change. If they want to respond, they have to revise their local risk appetite in places affected by the new bank. If they want to ensure that their portfolios keep the same level of risk, they will choose to accept the loss in market share. However, to protect their market share they may have to allow riskier loans into their portfolios. Given the importance of market share in retail banking, the latter seems more likely.

The magnitude of the effect of increasing local credit supply depends on how many customers in the area have constrained access to credit. For example, after controlling for borrower characteristics and loan terms, existing research shows that households find it more difficult to borrow in places where local economic conditions deteriorate (Ambrose et al. 2002, Agrawal et al. 2015). This is true even if loan prices do not change and illustrates how geographical location may influence access to credit. In addition, research on redlining finds that access to credit is more restricted in geographical locations where a larger share of the population comes from ethnic minorities (Gabriel & Rosenthal 1991, Ross & Tootell 1996). Therefore, in poor neighbourhoods and places where ethnic minority populations are high, expansion of credit supply can be expected to have a higher effect. Later, I show that, ceteris paribus, banking competition has the highest impact on house prices in places where poverty rates are high, income is low or where more residents are from ethnic minorities.

Although simple, the above overview offers some clear predictions for the empirical analysis. First, areas where branches of the new bank are located will see more credit supply. This can happen due to the new bank lowering its risk standards but the existing banks can also start accepting riskier loans. This should lead to two main effects: 1) house prices in those areas should increase while demand for housing services remains constant 2) the average loan should be riskier and the default rate should increase.

These can also have some secondary effects that can be shown in the data. First, if the change in credit supply really relaxes the credit constraint, the impact should be stronger in credit constrained locations. In addition, as access to credit is also a transaction friction, the real estate market should also respond and the number of transactions should increase. Finally, the impact of credit supply on housing services and house ownership can be tested separately by testing the impact on rents and on prices interacted with housing supply constraints. I make no theoretical prediction on whether incumbent banks will choose to protect the risk profiles of their existing portfolios or start accepting riskier loans.

3 Data and preliminary analysis.

This study is based mainly on UK postcode geographies. All UK residential and commercial addresses (totalling around 30m) are divided into 1.775m postcode units which are the most detailed postcode identifier (4th tier). These are combined into around 11,000 sectors (3rd tier) which form almost 3,000 districts (2nd tier) and aggregate up to 124 areas (1st tier). The basic unit of observation for the present paper is the postcode sector as this is the smallest area for which bank lending is available. On average, a sector contains around 2,700 addresses (both commercial and residential). Population and geographical size of postcode sectors vary and, in general, little socio-economic data is collected for this geography by the UK government.

Data on house prices is taken from the Land Registry and includes all transactions of residential dwellings in England and Wales. Transaction prices are averaged on a quarterly basis for each sector. The earliest date for housing data is Q1 1995 and the latest Q3 2018 giving a total of over 20 years. Data is restricted only to sectors in which more than 2 transactions occur per quarter (average value is 19) which results in a sample of 8,113 sectors with an average price of £225,842 with a standard deviation of £1,204,772. Data on rents comes from Zoopla Property Group PLC (provided by the Urban Big Data Centre) and has been complied from a property-level database of 0.5m listings per year starting in 2011[9].

Data on mortgage lending comes from UK Finance and includes the total amount outstanding on personal accounts reported by the seven biggest lenders (established/incumbent banks) in Great Britain in each quarter. These account for around 73% of all mortgage lending totalling over £950bn in more than 9,000

[9]The index has been validated by the Office for National Statistics against data from the Valuation Office. Both sources produce similar results while Zoopla's data can be compiled for small geographical areas

sectors. Loans are attributed to sectors based on the address of the mortgaged property. The earliest time period available in this dataset is Q2 2013 and the latest is Q1 2017.

While little socio-economic information is available at postcode sector level, the present study matches each postcode to smaller areas (Lower Super Output Area (LSOA)) which is the second smallest geographical unit used in the 2011 census. This provides cross-sectional information on ethnic diversity profiles for England and Wales. LSOAs are also used to match sectors to other governmental databases such as the English Index of Multiple Deprivation[10] (measured in 2010 for England only) and the Small Area Model-Based Income Estimates[11] (2012 and 2014 for England and Wales). The cross section of affordability ratios (local house prices to income) is based on data from 2012. Information on the relative level of housing supply constrains comes from Hilber and Vermeulen (2016) and is based on Local Planning Authorities[12] and is only available for England. Data on home repossession court orders comes from the Ministry of Justice and gives the total number of orders issued in each Local Authority District[13] (LAD) in England and Wales on a quarterly basis.

Branches of the new bank are diversified across space (see Figure 1) and although they cluster around population centres there is no evidence of concentration in any one region of Great Britain. There are 421 sectors that receive the new bank in the sample for which house prices are available (England and Wales) and constitute around 5.2% of all sectors in the sample. Lending data is available for the whole UK and 5.45% of this sample are locations with the new bank. The 'treated' sectors are distributed across locations with different socio-economic characteristics, which can be seen from Table 1 which lists how many sectors that receive a TSB are in each quintile of the overall distribution (calculated for the full sample) for different variables.

Although sectors that receive a TSB are more likely to be in the lower quintiles of the population for income and material deprivation, the same is true for all sectors with branches of LBG (LBG numbers

[10] Statistics on relative deprivation in small areas in England collected and published by the Ministry of Housing, Communities & Local Government.

[11] The small area model-based income estimates are the official estimates of weekly average (mean) household income at the middle layer super output area (MSOA) level in England and Wales for 2011/12 and 2014.

[12] A Planning Authority is a relatively large administrative area. There are over 350 Planning Authority Areas in England. On average their geographical size is smaller than the size of a postcode.

[13] A Local Authority District is a level of sub-national division of England for local government regions. There are 349 LADs included in the sample of repossession orders. Their size is similar to Planning Authorities and the two geographies are often the same.

Figure 1:

Map of TSB (left) and Lloyds Banking Group (right) branches in the UK in 2013.
(Boundaries indicate Local Authority Districts)

are given in square brackets) so the treated sample simply repeats the LBG pattern. Importantly, the distribution of TSB locations by house prices, lending and affordability ratios is relatively even across quintiles of the population. Comparatively, it may seem that TSB has fewer branches in the top and more in the bottom quintile of depravation and affordability than LBG but it still has at least 40 branches in each quintile. This ensures that each segment of the market is represented in the treatment sample. If there is a selection bias, it is likely to be towards more credit constrained locations which would result in the average impact of credit supply being slightly higher. To address this potential issue, estimated regressions exploit location trends and fixed effects and I present results for several control groups matched using observable area characteristics. However, to show explicitly that location characteristics do not predict being treated, Table 1 also presents an OLS regression of receiving a TSB branch (coded as zeros and ones) on different socio-economic characteristics before Q3 2013. The results clearly show that no variable is significantly correlated to the probability of receiving a TSB branch.

Table 1: Balancing and treatment probability.

VARIABLES	% in 1st Quintile	% in 2nd Quintile	% in 3rd Quintile	% in 4th Quintile	% in 5th Quintile	Treatment probability OLS regression
Income	31.07	21.5	15.89	15.19	16.36	-3.50E-05
	[24.32]	[22.61]	[21.21]	[15.98]	[15.88]	[2.37e-05]
Affordability	21.5	21.5	23.13	20.56	13.32	-0.00156
	[18.29]	[22.71]	[23.12]	[19.8]	[16.08]	[0.00236]
Deprivation Index	29.12	12.29	15.88	18.99	23.73	0.000237
	[11.08]	[6.61]	[23.23]	[29.25]	[29.83]	[0.000174]
Mortgage lending	21.54	25.04	20.03	19.53	13.86	-0.000001
	[13.59]	[20.48]	[22.68]	[23.18]	[20.08]	[0.0001]
House prices Q1 2010	21.26	24.4	19.32	17.63	17.39	1.99E-09
	[21.53]	[22.65]	[20.1]	[18.37]	[17.35]	[6.14e-09]
Constant						0.0820***
Sectors						8,296
R-squared						0.003

Notes: Quintiles of LBG before TSB was created are given in square brackets in columns 1-5. Standard errors in brackets,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ below the estimates in column 6. Due to data limitations income and house prices can only be calculated for England and Wales, while the deprivation index represents the whole of Great Britain. Quintile 1 indicates the lowest values of the distribution, respectively: lowest income, lowest affordability ratios (most affordable houses), lowest house prices and the lowest value of the deprivation index (most deprived areas). The cross sectional regression is calculated for a dummy variable denoting treatment as the dependent variable with covariate values taken before TSB was created (availability dates given in the main body). It includes all sectors in England and Wales.

3.1 Preliminary analysis

In the first step, I regress the natural logarithm of house prices in a sector in a quarter on a series of period dummy variables (with Q1 1995 as base) and sector fixed effects to plot an index of average house prices. I also include a separate series of period dummies for locations that receive a branch of TSB to reflect a trend specific to the treated group. The regression also includes postcode area fixed effects interacted with the time trend. The results are presented in Figure 2 (estimation details and full results are available in appendix 9.1) which shows that house prices increase in sectors where the new bank has branches. Notably, while house prices are higher after TSB is created, before this event they had been tracking the average price trend for England and Wales very closely for almost 20 years. Additionally, figure 6 in appendix 9.2 replicates this approach for rents and shows that average rents in TSB locations are the same as in the rest of the sample both before and after TSB enters.

I also follow this procedure in Figure 3 but use the first difference (flow) in the mortgage lending stock by the 7 biggest banks as the dependent variable. Note that the results clearly reflect a big reduction in lending in Q2 of 2014. This is due to the reported balances being transferred out from LBG (included in data from the 7 biggest banks) to TSB (not included in the reported data).

Finally, figure 4 compares provisions made for non-performing loans before and after TSB is created

Figure 2: House price indices in England and Wales and in sectors that receive a TSB.

Figure 2A: House Price Index (Q1 1995 is 100)

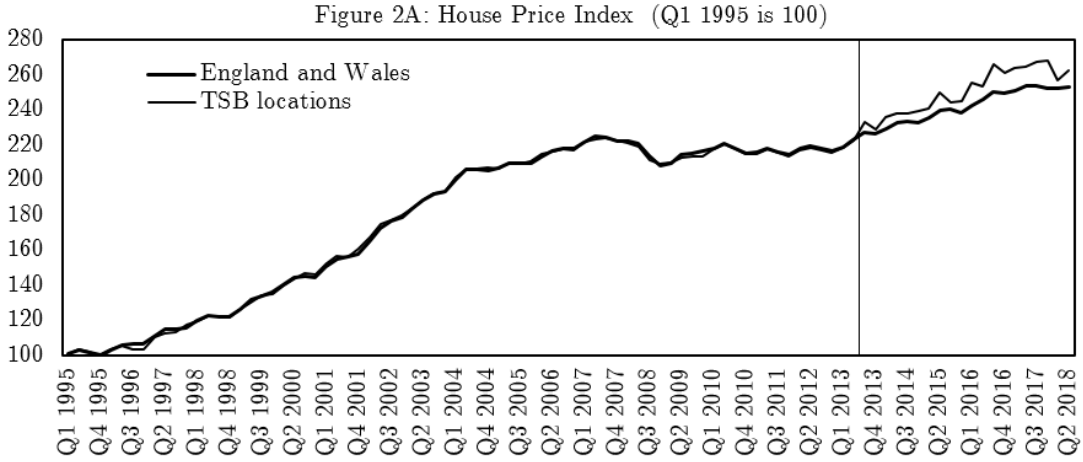
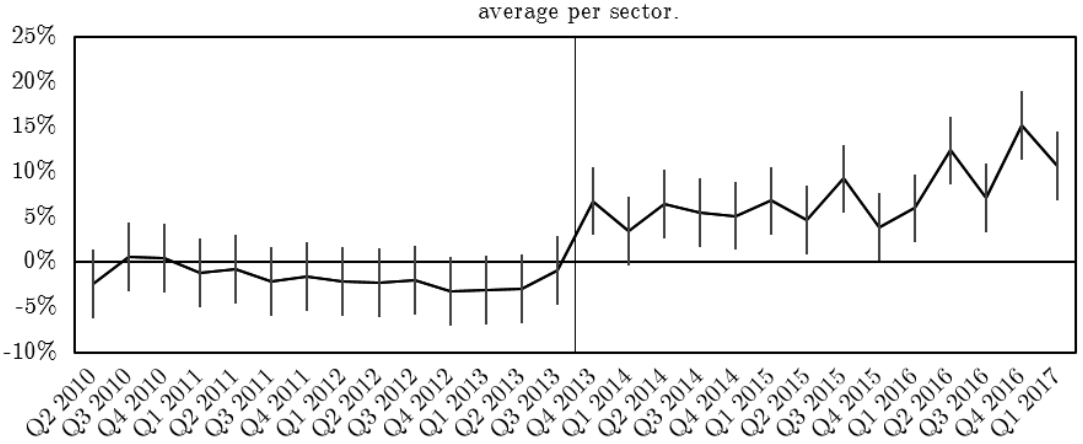


Figure 2B: Difference between house price indeces in TSB locations and E&W average per sector.



Notes: All values are 'indexed' which means that they are measured as the difference to the base period (Q1 1995 for 2A and Q1 2010 for 2B). The vertical line indicates the time of treatment - opening TSB Bank.

Figure 3: New lending indices in England and Wales and in sectors that receive a TSB.

Figure 3 A: New lending index by established banks.

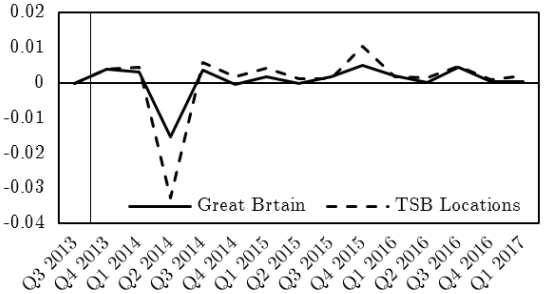
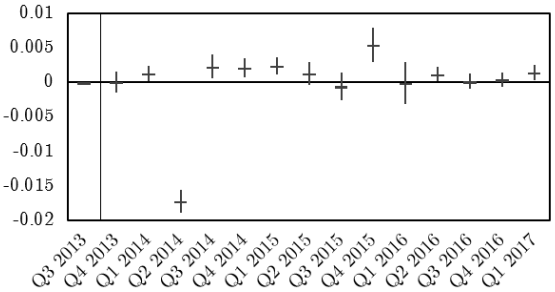
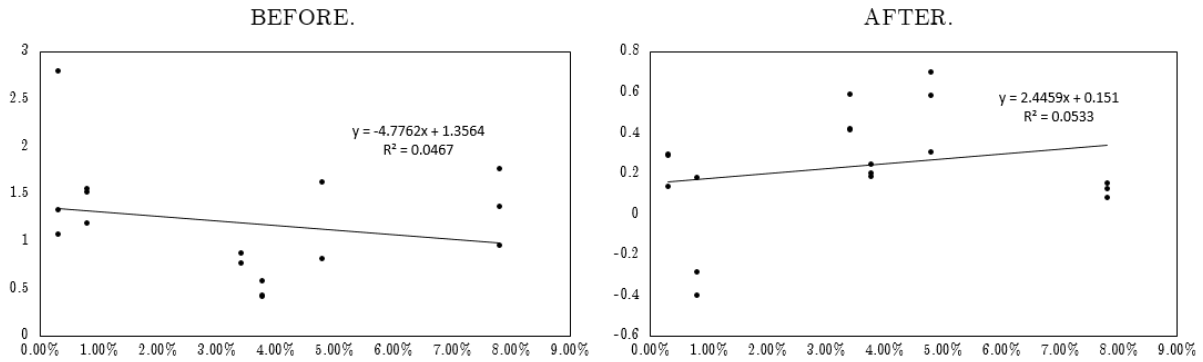


Figure 3 B: Difference between new lending for TSB locations and Great Britian.



Notes: All values are 'indexed' which means that they are measured as the difference to the first available period (Q3 2013) so the reported value of the index in this period is 0. The treatment occurs at the end of the first period so that the first affected values are reported in the second period (Q4 2013). The big shock in Q2 2014 is due to the fact that this was the period when the balances of TSB stopped being reported as part of LBG. The vertical line indicates the time of treatment - opening TSB Bank.

Figure 4: Loan provisions over total loans by 6 largest mortgage lenders in the UK (vertical axis) against an index of exposure to locations where TSB enters (horizontal axis) before and after TSB is created.



Notes: The BEFORE figure includes years 2010, 2011 and 2012 while the AFTER figure includes 2014, 2015 and 2016. Each of the 6 banks is represented by a dot in each year. Data on loan provision ratios comes from annual statements but comparable data was unavailable for Santander UK. The index of exposure to TSB is created by taking the percentage of each's banks total lending that is given in postcode sectors where TSB has more than 5% of the market. The data for this comes from UK Finance and the index was measured in Q2 2014. Exposure index values are: Lloyds Banking Group Plc 7.80%, Santander Consumer (UK) Plc 4.78%, HSBC Bank Plc 3.77%, Barclays Bank Plc 3.40%, Royal Bank of Scotland Group 0.79% and Clydesdale Bank Plc 0.30%.

between banks that have different 'exposure' to the new entrant. Exposure is measured as the share of each bank's total loan portfolio in postcode sectors where TSB had loans[14] amounting to more than 5% of the total lending by the 7 biggest lenders (reported by UK Finance). The figure shows that banks whose lending was more exposed to areas where TSB enters, make higher provisions for under-performing loans after (but not before) the new bank is created. In general, I am unable to provide robust results at bank and loan levels due to data limitations. However, using provisions as a high level measure of risk exposure suggested by Taylor (2019) seems to indicate that the entry shock in 2013 had some high level effects.

4 Identification and empirical strategy.

4.1 Identification through selection of branches.

The first identification strategy assumes that the location of TSB's branches was unrelated to the economic performance of their surrounding areas. While this may seem like a strong assumption, there is a number of reasons to believe that it is valid in the specific context of the natural experiment. First, the incentives of LBG to divest branches in a particular type of locations (good or bad) were unclear. LBG had to consider not only its strategy and competitive position but also the ability to sell the newly created bank. Divesting only branches performing well (or poorly) would compromise future performance through lower profits from operations (or from the sale of the divested bank). Indeed, the regulators pressured

[14]The stock of lending by TSB at sector level is measured by the drop in lending of LBG when TSB's balances were subtracted.

LBG into creating a network of 'competitive' branches (CMA 2015). I discuss the specific institutional environment below, but to strengthen this identification strategy I also exploit the fact that that the economic performance of an area is less localised than the impact of a branch (Nguyen 2019). In my regressions I use an interaction term of postcode areas with time periods to focus on within-area variation. This adjusts for any unobserved economic conditions that develop similarly in sectors within the same postcode area. Furthermore, this approach relaxes the identification assumption to a claim that locations that receive a branch of TSB follow the same economic trends as neighbouring locations (within the same postcode area).

While there is no question that LBG chose which branches to divest, it is still possible that reasons for this choice were orthogonal to the outcome variable. Since Figure 2 clearly shows parallel pre-trends, it gives strong support to the key assumption that the location of TSB's initial branches is exogenous to their economic performance before divestment. The European Commission was very clear that its goal was to increase competition in the UK retail banking. It specified very strict criteria for the new bank including a condition that at least 43% of GB's population had to be within 2 miles of the branch and requirements for the average floor space of branches.

Furthermore, there were several operational issues including issuing a banking license for the newly created bank, selecting trained staff for the new bank's back office operations and giving the new entity enough office space[15]. Indeed, anecdotal evidence from the author's conversations with LBG senior managers, suggests that operational issues were the primary concern for the team responsible for the divestment project.

LBG addressed these concerns by building the operations of the new bank on the network of two sub-brands it held at the time; Lloyds TSB Scotland, which was operating under a separate license with a headquarters in Edinburgh, Scotland[16] and Cheltenham and Gloucester (C&G), which was a brand it acquired in 1995 and restructured in 2007[17]. More information about how these brands were acquired and created is available in appendix 9.5. Although, some head office operations of these sub brands were located in different centres, their branches were fully integrated into the LBG network, had the same staff and served all LBG customers.

[15]Note that LBG owned many office buildings it occupied and many of its leases were long term commitments. There was also an issue of locating the headquarters of TSB in a prime office location.

[16]Note that it did not have branches in other parts of the UK.

[17]The restructuring process involved closing 31 branches and dismissing over 300 employees.

Importantly, before LBG was forced to divest, it announced that it would close all branches of C&G and most of the staff would lose their jobs as the branches were deemed redundant after a recent acquisition. TSB Bank was formally opened in September 2013 with 4.5 million customers, 8,600 employees and £23 billion in loans. The divestment process was closely scrutinised by policymakers and independent commissions.

Although using legacy brands simplified the divestment process and satisfied the requirements for average profitability, it did not identify enough branches and failed to meet the geographical 'reach' criterion. To overcome this problem LBG included in the divestment package one branch from all places where it held multiple branches located very close to each other[18]. While in this case there was potential for LBG to select the branch they considered to be underperforming (as long as the profitability criterion was satisfied), this was not determined by the economic performance of the location.

In summary, a strong case can be made that the expected economic performance of the local area had no influence on the decision to divest branches in England and Wales (Lloyds TSB and C&G). Locations with more than one branch of LBG offered the same local performance to both the divested and the retained branches so there was no incentive to divest them on this condition. While the number of branches can be a signal for the economic strength of the area, the empirical specification controls for this factor. A different but equally strong argument can be made for economic conditions around C&G branches. The claim that branch closures after a large merger are not related to the economic performance of their region is a very popular identification assumption in the literature on the impact of branches on local outcomes (Nguyen 2019, Calem and Nakamura 1998, Scharfstein & Sunderam, 2016). In the case of LBG, the branches were not closed but were designated for closure in 2009 after a merger[19].

4.2 Identification through distance to TSB branches.

It seems reasonable to assume that, in the absence of the treatment, *changes* in local economic conditions at sector level are orthogonal to the distance of that sector to the nearest branch of TSB for two reasons. First, Figure 2 reveals that house prices in locations with a TSB branch did not show a tendency to

[18] At the time it was common for UK retail banks to have multiple branches on the same high street or within the same postcode sector. LBG used all such locations to select additional branches for TSB.

[19] The merger (described in appendix 9.5) added around 1,100 branches to the portfolio taking the total number of branches throughout the UK to over 3,000.

grow faster than in the rest of England and Wales before the new bank was created. Second, summary statistics from section 3 show that the postcode sectors that receive a TSB are neither concentrated geographically nor overrepresented in any of the national quintiles of the listed credit access constrains criteria. I also validate this assumption in figure 5 and show that the distance to the nearest branch of TSB has a stable impact on house prices before the new bank is created but changes afterwards. This provides the second source of identification as sectors that are located next to each other and share the same economic conditions receive different levels of treatment because their distance to the nearest TBS is different. Importantly, this assumption holds even if TSB branches were selected endogenously based on the economic characteristics of their postcode sectors (Gibbons & Machin 2005, Fisher et al. 2015, Anenberg & Kung 2014). This is because identification is achieved through the change in the spatial structure of prices around branches rather than their location.

4.3 House prices and local banking.

This paper assumes that credit markets are local and the main geographical unit of observation is imposed by data availability to be the postcode sector. Nonetheless, using sectors as a unit of observation has some shortcomings. The geographical boundary of a sector may be somewhat arbitrary and credit markets may cross sector boundaries. I test if using different geographies affects the results by replicating the headline results reported for postcode sectors for postcode districts (one level up in the postcode geography hierarchy) in appendix 9.3. There are no significant differences in the results when a larger geographical area is considered.

4.4 Measuring competition.

Many studies, including ones on banking, measure competition using Herfindahl or Lerner indices or a similar measure of market concentration (Petersen & Rajan 1995, Jiménez et al. 2013). However, due to data limitations, the present study uses an alternative indicator and simply focuses on an 'entry shock' as a shock to competition following Cetorelli (2004). The approach is similar to exploiting variances in an index of market concentration, except the present study focuses on a single exogenous shock. Indeed, TSB's entry is affecting competition very directly as the new entity is created with the intention of increasing competition and is setting itself ambitious goals to increase their market share from the very

beginning[20] (CMA 2015).

4.5 The lending mechanism, credit constrains and real estate markets.

To confirm that prices increase in TSB locations due to higher credit supply, I analyse mortgage lending in those areas. Based on the theory presented above, I test three predictions. First, I check if the established banks react to changes in competition by lending more and if total supply of credit increases. I start by measuring the competitive response of an individual incumbent bank. By comparing its lending in locations affected by the shock to the rest of its portfolio, I can show how a single bank's lending responds to the shock. Importantly, it is possible to show an increase in aggregate credit supply in an area without measuring it. After TSB is created it increases its market share of mortgage loans from 1.4% in 2013 to 2.03% in 2016. Therefore, if lending by incumbent banks increases around its branches, total credit supply is higher.

Second, I check if increases in overall credit supply have stronger effects in more credit constrained locations (Agarwal et al. 2015, Buchak 2018, Liu 2019). To test this I compare the effect of increased competition within the treated sample (places where credit access is the least constrained versus places where it is the most constrained).

Third, I test if more risky loans are accepted in places where TSB enters. Although loan level data is not available, I can analyse the number of repossessions. This data is only available at Local Authority District level, so the investigated relationship is between the number of TSB branches opened and the increase in the number of repossessed homes.

Furthermore, to validate the claim that the increase in house prices is indeed caused by the expanded supply of credit, I also consider characteristics of local real estate markets. Specifically, I look at the average number of transactions per sector and check if the impact of increased credit supply is stronger in places with more constrained housing supply.

4.6 Empirical specification.

The basic estimation equation applied in the study is based on the standard difference-in-difference approach and the baseline regression is specified as:

[20] This could be viewed as similar to a situation when an established bank adopts a more aggressive strategy. However, note that large established banks have much higher 'franchise value' which makes them less likely to adopt a risky strategy.

$$
\begin{aligned}
HP_{it} =& a + \beta_i + \beta_t + \beta_1 A_i \times Y_t + \beta_2 TSB_i \times AFT_t + \beta_3 CHO_i \times TSB_i \times AFT_t \\
&+ \beta_4 MULT_i \times AFT_t + \epsilon_{it}
\end{aligned} \tag{5}
$$

Where HP is a natural logarithm of an average house price in sector i at time period t, β_i is a sector i fixed effect, A_i is the postcode area of the sector, β_t is a period fixed effect included as a vector of dummy variables for each time period in the sample (with period one removed from estimation as baseline), Y is a vector of dummy variables for year in the sample (with year one (2010) removed from estimation as baseline) and TSB is a binary indicator taking the value of one if the sector receives a TSB and zero otherwise, AFT is a dummy variable taking the value of one after TSB is created and zero otherwise, CHO is a dummy variable taking the value of one if after the new bank is created the sector has branches of both TSB and LBG and zero otherwise, $MULT$ is a dummy variable taking the value of one if the sector has multiple branches of any major bank.

The impact of CHO cannot be individually identified and (because there is no individual CHO coefficient) β_2 should be interpreted as the joint impact of the interaction term $TSB \times CHO \times AFT$ and the impact of more choice $CHO \times AFT$. However, is possible to control for the fact that locations with multiple branches of established banks may see their house prices develop differently than other sectors by including $MULT_i \times AFT_t$ in the regression.

The same specification is used to estimate the impact of the treatment on all other outcomes of interest, except the dependent variable is substituted. The second identification strategy is estimated in using the same specification except the treatment variable is replaced with the distance to the nearest branch of TSB in km if the distance is less than 12km. Importantly, in this approach sectors at different distances from TSB branches act as control groups for each other and any pre-existing spatial linkages are taken away using the sector-level fixed effect.

To evaluate the impact of competition in places where credit is rationed, I divide the sample into quintiles (as summarized in section 3) and test for different responses of house prices to an increase in competition. Formally the regression is specified as follows:

(6)

$$HP_{it} = a + \beta_i + \beta_t + \beta_1 A_i \times Y_t + \beta_2 TSB_i \times AFT_t + \beta_3 CHO_i \times TSB_i \times AFT_t + \beta_4 MULT_i \times AFT_t$$
$$+ \beta_5 \Sigma_{k=1}^{k} Q_{ik} \times TSB_i \times AFT_t + \beta_6 \Sigma_{k=1}^{k} Q_{ik} \times CHO_i \times TSB_i \times AFT_t + \beta_7 \Sigma_{k=1}^{k} Q_{ik} \times AFTER_t + \epsilon_{it}$$

Where $k \in (1, 2, 4, 5)$ and Q_{ik} are dummy variables that equal one if sector i is in the corresponding quintile and zero otherwise. Note that quintile 3 is removed as a baseline so that the reported coefficients reflect the difference to the middle quintile. In addition, I include a series of controls for quintile-specific trends to reflect the fact that credit rationing criteria may be correlated with local economic conditions and the growth rate of local house prices. The same specification is used to test if the impact on house prices differs depending on housing supply constraints.

5 Results.

5.1 House prices - main results.

Table 2 presents results of the impact of increasing competition on house prices specified in equation 5. Following Adelino et al. (2016), it presents results for both fixed (columns 1 and 3) and random effects (columns 3, 4 and 5) specifications to confirm that the treatment effect is significant both within and across sectors. I also demonstrate that the effect of competition is not affected by local price trends by reporting results both with (columns 2, 4 and 5) and without (columns 1 and 3) a control for a postcode area trend. In Column 5, I replace sector fixed effects with a time-invariant dummy variable for the presence of TSB. Its effect is not statistically significant demonstrating that without the treatment these places had the same house prices as the control group. The most important result is the fact that on average prices in places where a TSB branch is created are higher by around 7% after the new bank opens its doors but not before. While there is some variation of this estimate between different specifications, it remains close to this value and highly statistically significant. The impact of increased choice is not only very small but also changes its sign when price trends are introduced. Although the result for choice needs to be interpreted with caution (as discussed in section 4), it appears that increasing the choice between existing credit providers when a new player enters the market does not have an effect on house prices.

Table 2: Baseline regression results: house prices and TSB branches.

	[1]	[2]	[3]	[4]	[5]
TSB	0.0782***	0.0708***	0.0782***	0.0698***	0.0813***
	[0.00771]	[0.00761]	[0.00771]	[0.00760]	[0.00768]
Choice	-0.00472	0.00534	-0.00642	0.00409	-0.00688
	[0.0103]	[0.0102]	[0.0103]	[0.0102]	[0.0102]
Multiple	0.118***	0.107***	0.119***	0.109***	0.125***
	[0.00792]	[0.00781]	[0.00792]	[0.00781]	[0.00786]
TSB - FE					0.0145
					[0.0166]
Observations	231,557	231,557	231,557	231,557	231,253
R-squared	0.151	0.187	0.0325	0.523	0.6213
Sectors	8,296	8,296	8,296	8,296	8,213
Sector FE	Yes	Yes			
Area Trend		Yes		Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes
Bank FE					Yes

Notes: Standard errors clustered at sector level in brackets,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. TSB and Choice denote interaction terms with AFT and reflect treatment coefficients. Columns 1 and 2 use sector fixed effects while 3 and 4 use a random sector effect. Columns 1 and 3 do not include postcode area – period interactions while 2 and 4 include this control. Column 5 does not include sector fixed effects but includes a series of dummy variables to control for the presence of a major bank. These controls equal 1 if the sector has a branch and 0 otherwise and is constant throughout all periods.

The key assumption of the second identification approach is that the distance to a TSB branch was not an indicator of a trend in house prices before the treatment. This is demonstrated in Figure 5[21]. It shows how the effect of increasing competition affects postcode sectors around the newly created branch of TSB by interacting the effect of TSB reported in table 2 (column 2) with distance to the nearest branch[22]. Part A of the figure shows that the impact of the distance to the nearest TSB branch on prices did not change between 2010 and 2012 but started changing in 2013 and settled onto a new level in 2015. Notably, the sector fixed effect adjusts for all time invariant effects such as the size of the postcode sector, its transportation connections, population density or socio-economic characteristics.

The results clearly show that the impact of increasing competition decreases with the distance to the newly created bank. In a way, these results reflect the intensity of the shock to competition. The magnitude of the impact on house prices 3km away from the nearest TSB branch is less than 1% (compared to locations more than 12km away) which suggests that this is the likely range of the effect. Importantly, this is driven not by behaviour of customers but by the preference of banks to offer better mortgage terms to customers who live close to their branches.

[21] For clarity of exposition on a smaller figure years are used instead of quarters. When using quarters the results resemble Figure 2 and give the same conclusion.

[22] Postcode sectors are grouped into bins of the average distance to the nearest TSB branch

Figure 5: Distance to TSB and house prices.

Figure 4A: The impact of distnace to the nearest TSB branch on house prices over time.

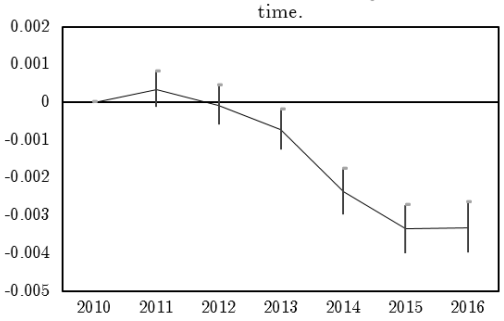
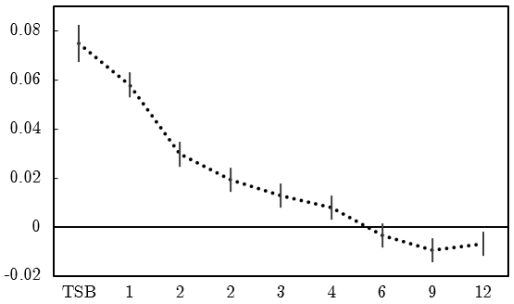


Figure 4B: Distnace to TSB branch and house prices after 2013



Notes A: The results are based on a regression of house prices on the distance to the nearest branch of TSB interacted with the time period and includes sector FE, area trends while using 2010 as baseline.
Notes B: The horizontal axis gives the average distance (in km) for the group of sectors (TSB denotes a sector with a branch), the vertical axis gives the estimated impact on house prices. Areas before treatment and more than 12km away are used as the baseline.

5.2 House prices - matched samples.

Table 2 relies on postcode sectors that do not receive a branch of TSB as a control group. A possible concern for identification is that the treated sectors are not identical to non-treated sectors and thus the average treatment effect could be biased. An alternative method of choosing a control group is to match the treated sectors to non-treated ones based on observable characteristics and estimate a more accurate treatment effect. The disadvantage of this solution is that it ignores unobservable factors and may actually increase hidden biases in estimates (Heckman 1997). In this context, using the full sample provides a more reliable estimate of the average treatment effect if parallel pre-treatment trends can be demonstrated (Smith and Todd 2005). Nevertheless, using different control groups is useful as a robustness test.

Table 3 replicates the results presented in table 2 but uses different control groups. Column 1 includes only sectors that have at least one branch of any major bank and excludes all other areas. Column 2 uses only areas where LBG has branches after 2013 (ones which were not divested) as a control group. Column 3 compares areas that receive a TSB to areas with at least one branch of Barclays Bank PLC. Column 4, 5 and 6 use a logit-based propensity score matching. The process matches all treated postcode sectors to non-treated sectors based on cross-sections of observable characteristics in 2010 or at the earliest date for which data is available (house prices, income, affordability ratio, ethnic diversity, mortgage lending levels). Column IV shows results against just one nearest propensity-neighbour. Column V uses three nearest propensity-neighbours. Column VI takes advantage of the fact that with three nearest neighbours

there is enough spatial variation in the sample to exploit local trends in house prices and includes area trends. Column 7 adds a new variable to the specification: PSM - an interaction of a dummy variable that denotes a sector being matched as a control sector (using propensity score) and AFT. This reflects a trend in house prices in the matched control group against the rest of the sample.

As expected, there is some variation in the magnitude of the treatment effect when using different matching criteria but all results seem to support the conclusion that the average treatment effect is an increase in house prices. Results based on propensity score matching suggest that the magnitude is slightly lower than 7% (reported in table 2) and closer to 5% which I adopt as a conservative estimate of the treatment effect. However, it is important to note that matching on observables has limitations when, as in the present study, variables are spatially correlated. It is particularly problematic that both the outcome (house prices) and the treatment variables (access to credit) are correlated across space. Therefore, the closest match identified by propensity scoring is most often the closest neighbour (by geographical distance). Indeed, the average distance between treated sectors and their neighbours matched using propensity scores is just 0.98km. This is a very short distance compared to the average distance (2.93km) between treated and non-treated sectors reported in column 1 (where the control group is composed of all sectors that have a branch of any bank other than TSB). Therefore, it appears that using distance as an indicator of treatment intensity (as in figure 5) is indeed a valid approach.

Table 3: Regression results: branch competition on house prices using matched control groups.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
CTR branches	Any bank	LBG	Barclays	Matched	Matched	Matched	Full sample
TSB	0.0907***	0.055***	0.0933***	0.047***	0.049***	0.0457***	0.04753***
	[0.01143]	[0.00857]	[0.0174]	[0.00939]	[0.00889]	[0.00912]	[0.00988]
Choice	-0.00364	–	-0.0342	0.00249	-0.00113	-0.00174	-0.00488
	[0.0103]	–	[0.0219]	[0.01169]	[0.011]	[0.0112]	[0.00103]
Multiple	0.112***	0.1667***	0.1138***	0.1343***	0.1943***	0.1849***	0.1183***
	[0.00931]	[0.0132]	[0.01478]	[0.01212]	[0.01414]	[0.0144]	[0.00792]
PSM							0.0128***
							[0.00258]
Observations	67,954	28,378	21,331	34,365	70,093	70,093	231,557
R-squared	0.158	0.176	0.169	0.17	0.174	0.223	0.152
Sectors	3,244	997	756	785	1,417	1,417	8,296
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Area trend						Yes	Yes

Notes: Standard errors clustered at sector level in brackets,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. TSB and Choice denote interaction terms with AFT and reflect treatment coefficients. Columns 1, 2 and 3 use control groups based on the presence of bank branches, columns 4, 5 and 6 use control groups based on propensity score matching. Note that in column 2 the Choice variable is redundant as there are no sectors in the control group that do not have a branch of LBG. Column 4 includes the nearest match and column 5 includes three nearest matches. Note that one non-treated sector can be matched to multiple treated sectors. Column 6 includes matched group trends. PSM is an interaction of a dummy variable that denotes a sector being matched as a control sector [using propensity score] and AFT.

5.3 House prices - robustness and falsification tests.

As explained in section 2, the impact of TSB branches is expected to occur through the discount rate and have no impact on rents. I therefore include rents as a control variable in Table 4 and demonstrate that although it is a significant determinant of prices, it has little impact on the estimate of the treatment effect. This is a powerful argument in favour of the claim that the reported effect does not occur due to unobserved changes in local economic conditions but is attributable to changing discount rates. Another useful falsification test is presented in column 2 where I demonstrate that branches of Barclays had no impact on prices of houses in their sectors. This shows that there was no change in the housing market driven by proximity to bank branches that coincided with TSB's opening. Again, adding rents makes little difference to this specification. Finally, in columns 4 and 5 I use the first difference in local income between 2010 and 2014 as the dependent variable and demonstrate that TSB had no impact on income changes. This is another powerful test of the channel through which TSB's branches affect prices. It shows that the key determinant of housing services demand remained unaffected by the treatment so the change had to come from another source. Column 6 confirms this by showing the same for rents.

Table 4: Regression results: Robustness and falsification tests.

	(1) ln(price)	(2) ln(price)	(3) ln(price)	(4) d.ln(income)	(5) d.ln(income)	(6) ln(rent)
TSB	0.0821***	0.0616***	0.0661***	0.00440	0.00294	0.00294
	[0.0193]	[0.00522]	[0.00625]	[0.00383]	[0.00672]	[0.00441]
Choice	0.0161	0.0228	0.0369		-0.000354	-0.000354
	[0.0260]	[0.0216]	[0.0240]		[0.00798]	[0.00593]
Multiple	0.0963***	0.111***	0.0967***		0.0146**	0.00967
	[0.0219]	[0.0208]	[0.0219]		[0.00585]	[0.00463]
ln(Rent)	0.0576***		0.0580***			
	[0.00697]		[0.00697]			
Barclays		0.00526	0.00755			
		[0.0167]	[0.0192]			
Sector FE	Yes	Yes	Yes			Yes
Year FE	Yes	Yes	Yes			Yes
Area trend	Yes	Yes	Yes			Yes
N	156336	231500	156336	8246	8246	190415
R^2	0.834	0.835	0.834	0.272	0.273	0.944

Notes: Standard errors in brackets,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. TSB and Choice denote interaction terms with AFT and reflect treatment coefficients. Columns 1, 2, 3 and 6 use price while 4 and 5 income as the dependent variable. The number of observations changes different data (across space and time) is available for different variables (for example rent is only available from 2012 while income only for two time periods). First difference regressions in columns 4 and 5 do not include fixed effects.

5.4 Lending.

Table 5 presents regression results with lending flow by established banks as the dependent variable. Once again, the area trend control is used to focus on the within-area impact of TSB's presence (columns 1 and 2)[23]. The results clearly show that the biggest lenders in the UK react to TSB's entry by increasing lending in places where the new bank has branches. Note that this is the case despite the fact that TSB is consistently increasing its market share. This shows that aggregate lending increases in sectors with TSB. Columns 3 and 4 show this explicitly for Barclays Bank Plc. One of the biggest banks in the UK seems to lends more in places where TSB is created than in other locations (disregarding area-trends[24]). Section 2 argued that the response of the incumbent banks is an empirical question. The results show that they lend more. This exposes them to more risk (demonstrated in section 5.6) but protects their market share. Moreover, when the treatment in column 4 is split into C&G, Lloyds Scotland and Lloyds TSB branches, only the last is not statistically significant and positive. This is likely due to the fact that there is also a less statistically significant negative effect of increasing the choice of lenders correlated with having a branch of both TSB and Barclays. This suggests that increasing competition through choice (rather than

[23]Unfortunately, there is only one period before the treatment: Q3 2013 so it is impossible to demonstrate parallel pre-trends.

[24]Column 4 presents a statistically insignificant result for the treatment in general but the coefficient has a positive sign. This is consistent with the claim that the total amount of lending in the treated sectors is higher but the results loose precision with area trends (lending by TSB is not recorded in spatial data but increases).

through allowing a new entrant) might not have the same positive effect on lending. However, it needs to be noted once more that in the present study there are no sectors where the increase in choice occurs independently of creating a TSB branch.

A limitation of this result is that that since lending data only covers around 75% of the market, it is possible that the presented increase in lending occurs due to larger banks increasing their market share and not due to overall increase in credit supply. While this does not affect the identification of the causal link between competition and prices, it brings into question whether they are related through increasing overall credit supply or through increasing credit supply by the biggest 7 banks. According to UK Finance, the market share of the top 7 banks decreased from 75.8% in 2013 to 74.57% which makes the latter explanation less likely.

Table 5: Regression results: competition and new lending.

Lender	All established banks		Barclays Bank	
	[1]	[2]	[3]	[4]
TSB	0.00817***	0.00820***	0.00641**	0.00124
	[0.000938]	[0.000960]	[0.00308]	[0.00318]
Choice	-0.00354**	-0.00336**	-0.0046	0.000735
	[0.00145]	[0.00147]	[0.00476]	[0.00484]
Multiple	0.000592	0.000543	0.00439	0.00584
	[0.00114]	[0.00114]	[0.00379]	[0.00380]
Obs.	137,463	137,463	127,091	127,091
R-squared	0.066	0.077	0.007	0.01
Sectors	9,269	9,269	8,562	8,562
Sector FE	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes
Area trend		Yes		Yes

Notes: Standard errors clustered at sector level in brackets,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The dependent variable is change in stock of mortgage lending by sector. TSB and Choice denote interaction terms with AFT and reflect DID treatment coefficients. Due to data limitations there is only one period in which there was no treatment: Q3 2013. Columns 1 and 3 do not include postcode area – period interactions while 2 and 4 include this control. Columns 1, 2, 5 and 6 report results for lending by the biggest 7 banks in the UK [around 75% of mortgage lending] while columns 3 and 4 report lending by Barclays bank PLC only.

5.5 Access to credit.

Table 6 adjusts the results from table 2 for the position of sectors in national rankings of credit accessibility constrains. The rankings are constructed based on the criteria discussed in section 2 and listed in section 3 (measured before the new bank is created). All results are consistent with the expectation that higher competition makes access to credit easier and that its impact is stronger in places where credit is more constrained. Columns 2 and 3 show that competition has a stronger effect on house prices in places where income is low and deprivation levels are high. Column 4 shows a stronger effect in places where residents

are less likely to be white.

Table 6: Regression results: credit access rankings and the effect of competition on house prices.

	[1] Baseline	[2] Income	[3] Deprivation	[4] Race
TSB	0.0782***	0.0782***	0.0418***	0.0318***
	[0.00771]	[0.0138]	[0.0118]	[0.0122]
Choice	-0.00472	-0.00101	-0.00118	0.0225**
	[0.0103]	[0.0103]	[0.0106]	[0.0102]
Multiple	0.118***	0.122***	0.110***	0.0771***
	[0.00792]	[0.00785]	[0.00798]	[0.00783]
Quintile 1		0.0275*	0.131**	-0.0584***
		[0.0160]	[0.0509]	[0.0183]
Quintile 2		0.00292	-0.0179	-0.0285
		[0.0171]	[0.0355]	[0.0173]
Quintile 4		-0.0231	0.022	0.0689***
		[0.0185]	[0.0296]	[0.0153]
Quintile 5		-0.0121	0.0362	0.0397***
		[0.0182]	[0.0270]	[0.0153]
Observations	231,557	231,317	231,557	231,317
R-squared	0.151	0.157	0.152	0.172
Sectors	8,247	8,247	8,247	8,247
Sector FE	YES	YES	YES	YES
Period FE	YES	YES	YES	YES
Area trend	YES	YES	YES	YES
Quintile Trend	YES	YES	YES	YES

Notes: Standard errors clustered at sector level in brackets,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. TSB and Choice denote interaction terms with AFT and reflect DID treatment coefficients. Column 1 presents the baseline specification for a subsample of sectors for which data on credit rationing criteria is available. The remaining columns are estimated on the same sample. Quintile 1 indicates the lowest values of the distribution, respectively: lowest income, lowest rates of ethnic diversity (fewest white residents), lowest house prices and the lowest value of the deprivation index (most deprived areas).

5.6 Reposessions.

Table 7 shows that the number of mortgage repossessions in Local Authority Districts (LAD) is higher in areas that receive more TSB branches. Column 1 shows a simple correlation between the number of TSB sectors per LAD and repossessions within it. It is clear that since Q3 2013 there were more houses repossessed in places with more TSB branches. Columns 2 to 5 use categorical dummy variables to show explicitly that the number of repossessions increases with the number of sectors where TSB has branches. While the effect of a single TSB is small (around 2%) the combined effect increases with the number of branches. However, as only 8 LADs have more than 4 TSB sectors, the results for high numbers of treated locations are imprecise and become insignificant when controls for regional trends and non-mortgage repossessions (from renters) are added (to ensure that the result is not caused simply by higher house prices). Column 6 shows that there were no differences in repossessions until after TSB is created. In fact, the impact on repossessions becomes significant only two years after TSB is created (in 2015). This is consistent with the fact that risky loans take some time to default and result in repossessions.

Figure 6 shows that the estimates for years 2015 and 2016 are consistently suggesting that the number of repossessions increased in LADs with more TSB branches.

Although the data is aggregated, the available evidence is consistent with the expectation that the 'additional' loans given when TSB is created are more likely to default. Not only the number of repossessions increases in locations that receive a branch of TSB after the new bank is created but the magnitude of the effect is also strongly correlated to the number of branches opened and increases over time[25].

Table 7: Regression results: the natural logarithm of the number of mortgage repossessions in LAD as a function of the number of TSB branches.

VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]
#TSB	0.0154***					
	[0.00281]					
#TSB = 1 [n=122]		0.0202**	0.0289**	0.0233**	0.0266**	
		[0.0102]	[0.0132]	[0.0101]	[0.0131]	
#TSB = 2 [n=63]		0.0243**	0.0356*	0.0285**	0.0309	
		[0.0122]	[0.0209]	[0.0121]	[0.0207]	
#TSB = 3 [n=32]		0.0539***	0.0753***	0.0587***	0.0580**	
		[0.0156]	[0.0288]	[0.0154]	[0.0286]	
#TSB = 4 [n=8]		0.0776***	0.110**	0.107***	0.110**	
		[0.0284]	[0.0477]	[0.0283]	[0.0472]	
#TSB = 5 [n=3]		0.102**	0.0963	0.149***	0.091	
		[0.0454]	[0.0616]	[0.0453]	[0.0611]	
#TSB = 6 [n=5]		0.139***	0.112	0.181***	0.108	
		[0.0354]	[0.0685]	[0.0354]	[0.0679]	
#TSB x 2011						-0.00234
						[0.00590]
#TSB x 2012						0.00473
						[0.00590]
#TSB x 2013						0.00456
						[0.00681]
#TSB x 2014						0.0102
						[0.00901]
#TSB x 2015						0.0294***
						[0.00907]
#TSB x 2016						0.0373***
						[0.00970]
Observations	8,295	8,295	8,295	8,295	8,295	8,295
R-squared	0.892	0.892	0.893	0.894	0.895	0.895
LADs	348	348	348	348	348	348
LAD FE	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES
Region FE			YES		YES	YES
Other Def				YES	YES	YES

Notes: Standard errors clustered at LAD level in brackets,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. TSB is the number of sectors with a TSB branch per LAD [it equals zero before Q3 2013]. The numbers in brackets denoted with n= are the number of LADs that meet the condition. Region FE is an interaction of the time fixed effect with the administrative region of the UK, Other Def is a variable that gives the number of non-mortgage repossessions.

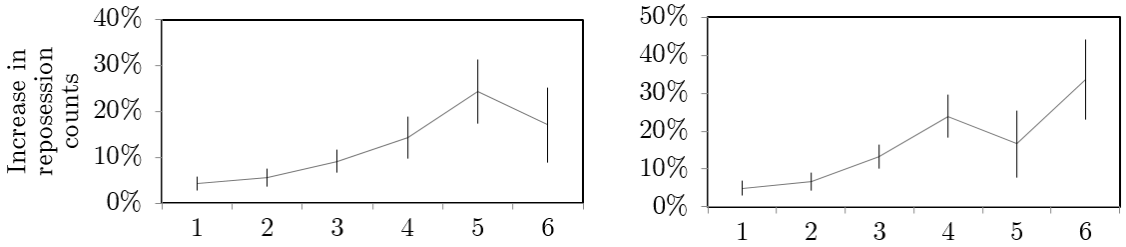
[25] Average house prices increased in all LADs included in the sample throughout the analysed period. This results in the overall number of repossessions being relatively low (average of 8.16, standard deviation of 37.58) so the reported percentage increase means relatively few additional cases. Note also that this means that repossessions are due to delinquencies rather than negative equity. In addition, most UK mortgages are full recourse loans thus strategic defaults are unlikely. Therefore, repossessions offer little insight into defaults related to changes in the value of collateral. Nevertheless, the results are consistent with the premise that banks are more likely to give mortgages to customers who eventually fail to repay their loans in places where competition is higher.

5.7 Real Estate markets.

Results presented in Table 8 demonstrate the impact of banking competition on the real estate market. As argued by Adelino et al. (2012) it is possible that buyers with better access to capital could bargain less hard. This manifests itself in a higher number of transactions per quarter that occur in places where competition increases (columns 1 and 2). An even stronger impact on the number of transactions occurs in sectors where the choice of finance providers is increased. This seems to indicate that when borrowers have a greater variety of finance providers available to them, buying or selling a house is easier. This is consistent with the existing literature which demonstrates that access to credit increases liquidity in the housing market (Brunnermeier 2009, Han & Strange 2015).

There is also clear evidence that house prices react more to an increase in bank competition in places where housing supply is more restricted. Columns 3 and 4 show that increasing competition has a stronger impact in places where supply is inelastic. This is true for models capturing variations both within (column 3) and across sectors (column 4). These results support the claim that an increase in local bank competition stimulates demand from home buyers.

Figure 6: Number of TSB branches and mortgage repossessions. (2015 left and 2016 right)



Note: the vertical axis is the average percentage change in the number of repossessions against locations where no TSB was created.

Table 8: Regression results: banking competition and real estate.

	Number of transactions		House Prices	
	[1]	[2]	[3]	[4]
TSB	0.811***	0.500*	0.125***	0.0553**
	[0.262]	[0.258]	[0.0258]	[0.0255]
Choice	1.658***	1.588***	0.0281	0.0276
	[0.350]	[0.345]	[0.0245]	[0.0246]
Multiple	1.068***	0.26	0.198***	0.209***
	[0.269]	[0.265]	[0.0167]	[0.0167]
Supply constraints				
Quintile 1			-0.129***	-0.0433
			[0.0311]	[0.0303]
Quintile 2			-0.139***	-0.0465
			[0.0429]	[0.0422]
Quintile 4			-0.0614	0.0529
			[0.0395]	[0.0386]
Quintile 5			0.0364	0.174***
			[0.0430]	[0.0423]
Observations	231,557	231,557	141,954	141,954
R-squared	0.298	0.329	0.115	0.113
Sectors	8,296	8,296	7,706	7,706
Sector FE	Yes	Yes	Yes	
Period FE	Yes	Yes	Yes	Yes
Area Trend		Yes		
Quintile Trend			Yes	Yes

Notes: Standard errors clustered at sector level in brackets,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. TSB and Choice denote interaction terms with AFT and reflect DID treatment coefficients. Columns 1 and 2 present results for the number of house transactions (excluding special transaction such as a sale of a repossessed property) per sector. Columns 3 and 4 present results for house prices. Quintile trend of supply constraints is overlapping with some area trends therefore area trends are not included for supply constraints.

6 The impact of a new lender.

6.1 *Choice with new entrant* or just *new entrant* - common marginal price effects but potentially different mechanisms.

The existing theoretical literature argues that competition affects credit supply but does not define an empirical measure of competition. In practice, empirical papers usually define competition intensity as a

function of expansion strategies of competing firms or the number of competitors. The present paper mainly follows the former approach but presents some evidence relevant to the latter. Overall, the results suggest that the main effect on prices comes from a change in the strategy of one of the competing entities rather than from a change in their number.

In particular, having a larger choice of banks as well as a new entrant reduces the effect of the new entrant on credit supply (table 5) and increases its impact on the number of transactions (table 8). These results are consistent with the claim that housing demand is subject to the spatial equilibrium specified in equation 1 while the credit market mechanism that affects it is not. The mechanism interacts with area characteristics. Locations that are treated with more choice as well as a new entrant are likely different in many ways than locations that simply replace LBG with TSB. The observed reaction of house prices is subject to the spatial equilibrium so that the marginal utility of living in all areas is equal before and after the treatment. The process through which prices arrive at this point in each area after the treatment depends on the area's characteristics. In this light, the fact that $Choice \times TSB$ does not influence prices shows that the demand from the marginal buyer is determined by the TSB treatment (Rosen 1974). This does not mean that the number of competitors has no effect on prices, as this effect is not visible from the natural experiment.

The spatial equilibrium does not apply to 'mechanism variables' like the flow of lending or the number of transactions. They are measures of activity in credit and housing markets respectively. The fact that $Choice \times TSB$ has an effect on them in tables 5 and 8 means that 1) the number of competitors likely has an effect on the mechanism or/and 2) *Choice* areas have unobserved characteristics that have an effect on the mechanism.

6.2 Direct and indirect effects.

The estimated average effect on house prices is around 5% and this seems high in response to a very small increase in the flow of lending (less than 1%). However, a large ownership demand elasticity of credit supply is not entirely surprising. In fact, Best and Kleven (2017) found that a 1% increase in the collateral price of housing increases house ownership demand by around 4%. Moreover, it is important to remember that the reported effect is the change in the willingness to pay of an average marginal buyer and buyers can sort. The treatment stimulates local demand by increasing access to

credit in small areas. This means that house prices are set by a small set of buyers with the highest willingness to pay who are self-selected from a large (buyers can come from any area) population of credit-constrained buyers. This interpretation is supported by the fact that more credit-constrained locations (where there are more constrained buyers) seem to have higher price effects. In this case, the estimated effect should not be interpreted as the average effect of changes in banking competition on the average willingness to pay across the population but as a 'local' estimate specific to the natural experiment. In this light, the externally valid conclusion from this paper is that new entrants affect credit supply and prices. However, the magnitude of the treatment effect depends on how credit and housing markets are structured.

Market structure is important because there could be indirect effects (occurring through different mechanisms than a pure expansion of mortgage credit supply). The most natural indirect effect is a small boom in the regional economy stimulated by an expansion of credit supply in business lending (Strahan 2004). Since higher banking competition leads to greater supply of credit to firms, it is possible that local economic activity improves. However, in the current paper this seems unlikely for several reasons. First, business lending is not as concentrated around branches as mortgage lending, thus the economic effect should not be as strongly spatially correlated to the location of the treated branches as the price effect is. Second, an economic upturn would usually be correlated to higher incomes. However, table 4 shows that the the treatment remains unaffected even after controlling for income. In fact, income does not seem to be affected by the treatment at all. Finally, in equation 1 economic conditions enter through rents and user costs. Yet, after controlling for rents there is no change to the treatment effect. It is therefore clear that the focus should be on the user cost.

Changes in the user cost could also be subject to an indirect effect. While, some of the determinants of the user cost such as the interest rate, transaction or deprecation costs are unlikely to be affected by the treatment, this is not tested directly. Furthermore, it is possible that the final component of the user cost (the expected capital gain) may be a function of recent changes in prices. Indeed, Glaeser and Nathanson (2017) argue that expected changes in prices are a function of recent changes in prices. They also demonstrate that if this is the case, small exogenous changes in prices will lead to an endogenous trend that will 'overvalue' the exogenous shock. Szumilo (2018) makes a similar point by showing that if prices follow endogenous trends, the impact of exogenous shocks may be overstated by as much as one

third. Therefore, if recent price changes affect expected capital gains, it is possible that the reported total impact of 5% is higher than the direct effect of credit supply.

6.3 Large scale effects.

Overall, the results show that banking competition has a strong impact on mortgage and credit markets. However, they do not show if increased competition is a good policy choice. While a full welfare analysis is beyond the scope of this paper, it is possible to note two important implications of the results.

First, competition stimulates credit supply. The additional supply comes from lenders accepting more risk. The additional risk reduces profit margins on mortgage lending which is unfavourable for lenders. Moreover, it has negative consequences for financial stability as it increases the likelihood of lenders defaulting. However, these risks are far easier to quantify, report and manage than business loans used in the landmark theoretical papers by Keeley (1990) or Boyd and De Nicolo (2005). Therefore, the impact of additional mortgage risk on stability is likely to be small. It is not clear if the additional credit supply benefits borrowers (Boyd and De Nicolo 2005). It will benefit those whose credit used to be constrained due to asymmetric information about their credit worthiness[26], but not those whose credit was constrained due to their inability to make repayments[27].

Second, higher mortgage supply leads to higher house prices. In general, the literature on welfare effects of increasing house prices tends to suggest that increases in house prices decrease general welfare (Bajari et al. 2005, Li Yao 2007)[28]. While lenders generally benefit from higher prices because they can lend more, they are negatively affected if prices are exposed to more systematic risk. This paper shows that house prices seem to have a component attributable to credit availability and this component exposes banks to more risk. Indeed, recent research shows that while this risk is unlikely to be recognized by banks, it can contribute considerably to true risk exposure and to stability of the lending institutions (Landvoigt 2016, Justiniano et al. 2019).

In conclusion, it is difficult to judge if the positive effects can outweigh the negative effects and whose

[26] Borrowers who know that they can repay the loan but cannot demonstrate this to the bank.
[27] Borrowers who want to borrow because they are risk-loving but are unlikely to repay the loans.
[28] There may be benefits for some groups but the overall effect seems to be negative.

position should receive more weight in policy making. However, it appears that increasing competition in mortgage provision negatively affects borrowers who overestimate their ability to repay mortgages and stability of lending institutions that are not aware of the impact their decisions have on the risk they face.

7 Conclusions.

This study develops and tests a claim that a new entrant into a local mortgage market increases mortgage credit supply and house prices. In summary, the results show that banks faced with increased competition respond by increasing lending. This increases house prices by around 5% but has no impact on demand for housing services (reflected by rents) or on income. Although I cannot observe loan-level risk directly, indirect evidence shows that increasing credit supply means giving riskier loans. This has important implications for policy design as it shows that encouraging new entrants into the mortgage credit market could have adverse consequences of increasing the average risk of a mortgage loan and price to rent ratios.

In locations where competition increases, house prices are more volatile because they are inflated by the additional credit supply. Consequently, banks hold loans that are not only more likely to default but also secured on properties with more volatile prices. This further contributes to the risk exposure of mortgage providers when competition intensifies (Brunnermeier 2009).

Finally, more competition between mortgage lenders contributes to house prices growing faster than incomes and increases the average house price to income ratio. This has important implications for housing affordability and is a key concern for housing policy in many countries around the world (Girouard et al. 2006).

8 References.

Adelino, M., Schoar, A., & Severino, F. (2012). Credit supply and house prices: evidence from mortgage market segmentation (No. w17832). National Bureau of Economic Research.

Adelino, M., Schoar, A., & Severino, F. (2016). Loan originations and defaults in the mortgage crisis: The role of the middle class. The Review of Financial Studies, 29(7), 1635-1670.

Agarwal, S., Amromin, G., Chomsisengphet, S., Landvoigt, T., Piskorski, T., Seru, A., Yao, V. (2015). Mortgage refinancing, consumer spending, and competition: Evidence from the home affordable refinancing program (No. w21512). National Bureau of Economic Research.

Allen, F., & Gale, D. (2004). Competition and financial stability. Journal of Money, Credit, and banking, 36(3), 453-480. Allen, Franklin, and Douglas Gale, (2000), Comparing Financial Systems (MIT Press)

Anenberg, E., & Kung, E. (2014). Estimates of the size and source of price declines due to nearby foreclosures. American Economic Review, 104(8), 2527-51.

Ausubel, L. M. (1991). The failure of competition in the credit card market. The American Economic Review, 50-81.

Bajari, P., Benkard, C. L., & Krainer, J. (2005). House prices and consumer welfare. Journal of Urban Economics, 58(3), 474-487.

Bayer, P., Ferreira, F., & McMillan, R. (2007). A unified framework for measuring preferences for schools and neighborhoods. Journal of political economy, 115(4), 588-638.

Beck, T., Demirgüç-Kunt, A., & Maksimovic, V. (2004). Bank competition and access to finance: International evidence. Journal of Money, Credit and Banking, 627-648.

Beck, T., Levine, R., & Levkov, A. (2010). Big bad banks? The winners and losers from bank deregulation in the United States. The Journal of Finance, 65(5), 1637-1667.

Benetton, Matteo. Leverage regulation and market structure: A structural model of the uk mortgage market. Working Paper, 2018./par Benetton, M., Bracke, P., Garbarino, N. (2018). Down payment and mortgage rates: evidence from equity loans./par Berger, A. N., & Hannan, T. H. (1989). The price-concentration relationship in banking. The Review of Economics and Statistics, 291-299.

Bertrand, M., Schoar, A., & Thesmar, D. (2007). Banking deregulation and industry structure: Evidence from the French banking reforms of 1985. The Journal of Finance, 62(2), 597-628.

Best, M. C., & Kleven, H. J. (2017). Housing market responses to transaction taxes: Evidence from notches and stimulus in the UK. The Review of Economic Studies, 85(1), 157-193.

Boyd, J. H., & De Nicolo, G. (2005). The theory of bank risk taking and competition revisited. The Journal of finance, 60(3), 1329-1343.

Bracke, P. (2015). House prices and rents: microevidence from a matched data set in Central London. Real Estate Economics, 43(2), 403-431.

Brunnermeier, M. K. (2009). Deciphering the liquidity and credit crunch 2007-2008. Journal of Economic perspectives, 23(1), 77-100.

Buchak, Greg, Gregor Matvos, Tomasz Piskorski, and Amit Seru. "Fintech, regulatory arbitrage, and the rise of shadow banks." Journal of Financial Economics 130, no. 3 (2018): 453-483.

Campbell, S. D., Davis, M. A., Gallin, J., & Martin, R. F. (2009). What moves housing markets: A variance decomposition of the rent–price ratio. Journal of Urban Economics, 66(2), 90-102.

Case, K. E., & Shiller, R. J. (1990). Forecasting prices and excess returns in the housing market. Real Estate Economics, 18(3), 253-273.

Cetorelli, N. (2004). Real effects of bank competition. Money, Credit, and Banking, 36(3), 543.

Cetorelli, N., & Strahan, P. E. (2006). Finance as a barrier to entry: Bank competition and industry structure in local US markets. The Journal of Finance, 61(1), 437-461.

CMA – Competition and Markets Authority (2015). A RETIAL MAKRET BANKING INVESTIGATION – TSB Case Study. Available at:
https://assets.publishing.service.gov.uk/media/555dc4d140f0b666a200000e/TSB_Case_Study.pdf

de Blasio, G. (2009). Distance and internet banking. In The Changing Geography of Banking and Finance (pp. 109-130). Springer, Boston, MA.

Degryse, H., & Ongena, S. (2005). Distance, lending relationships, and competition. The Journal of Finance, 60(1), 231-266.

Dehejia, R. (2005). Practical propensity score matching: a reply to Smith and Todd. Journal of econometrics, 125(1-2), 355-364.

Dell'Ariccia, G., Laeven, L., & Suarez, G. A. (2017). Bank leverage and monetary policy's risk-taking channel: evidence from the United States. the Journal of Finance, 72(2), 613-654.

Devereux, M. P., Lanot, G. (2003). Measuring tax incidence: an application to mortgage provision in the UK. Journal of Public Economics, 87(7-8), 1747-1778.

Di Maggio, M., & Kermani, A. (2017). Credit-induced boom and bust. The Review of Financial Studies, 30(11), 3711-3758.

Dickinson, S., Humphry, D., Siciliani, P., Straughan, M. R., & Grout, P. A. (2015). The Prudential Regulation Authority's Secondary Competition Objective. Bank of England Bulletin 2015 Q4.

Duca, J. V., Muellbauer, J., & Murphy, A. (2016). How mortgage finance reform could affect housing. American Economic Review, 106(5), 620-24.

Ellen, I. G., Lacoe, J., & Sharygin, C. A. (2013). Do foreclosures cause crime?. Journal of Urban Economics, 74, 59-70.

Ergungor, O. E. (2010). Bank Branch Presence and Access to Credit in Low-to Moderate-Income Neighborhoods. Journal of Money, Credit and Banking, 42(7), 1321-1349.

Favara, G., & Imbs, J. (2015). Credit supply and the price of housing. American Economic Review, 105(3), 958-92.

Fisher, L. M., Lambie-Hanson, L., & Willen, P. (2015). The role of proximity in foreclosure externalities: Evidence from condominiums. American Economic Journal: Economic Policy, 7(1), 119-40.

Furlong, F. T., & Keeley, M. C. (1989). Capital regulation and bank risk-taking: A note. Journal of banking & finance, 13(6), 883-891.

Gabriel, S. A., & Rosenthal, S. S. (1991). Credit rationing, race, and the mortgage market. Journal of Urban Economics, 29(3), 371-379.

Gande, A., Puri, M., Saunders, A. (1999). Bank entry, competition, and the market for corporate securities underwriting. Journal of Financial Economics, 54(2), 165-195.

Gibbons, S., & Machin, S. (2005). Valuing rail access using transport innovations. Journal of urban Economics, 57(1), 148-169.

Gilje, E. P., Loutskina, E., & Strahan, P. E. (2016). Exporting liquidity: Branch banking and financial integration. The Journal of Finance, 71(3), 1159-1184.

Girouard, N., Kennedy, M., Van Den Noord, P., & André, C. (2006). "Recent House Price Developments: The Role of Fundamentals". OECD Working Papers, No. 475, OECD Publishing.

Glaeser, E. L., & Gyourko, J. (2007). Arbitrage in housing markets (No. w13704). National Bureau of Economic Research.

Glaeser, E. L., & Nathanson, C. G. (2017). An extrapolative model of house price dynamics. Journal of Financial Economics, 126(1), 147-170.

Gormley, T. A. (2010). The impact of foreign bank entry in emerging markets: Evidence from India. Journal of Financial Intermediation, 19(1), 26-51.

Gorton, G. (2009). Information, liquidity, and the (ongoing) panic of 2007. American Economic Review, 99(2), 567-72.

Han, L., & Strange, W. C. (2015). The microstructure of housing markets: Search, bargaining, and brokerage. In Handbook of regional and urban economics (Vol. 5, pp. 813-886). Elsevier.

Heckman, J. J., Ichimura, H., & Todd, P. E. (1997). Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme. The review of economic studies, 64(4), 605.

Hellmann, T. F., Murdock, K. C., & Stiglitz, J. E. (2000). Liberalization, moral hazard in banking, and prudential regulation: Are capital requirements enough? American economic review, 90(1), 147.

Hilber, C. A., & Vermeulen, W. (2016). The impact of supply constraints on house prices in England. The Economic Journal, 126(591), 358-405.

Hill, R. J., & Syed, I. A. (2016). Hedonic price–rent ratios, user cost, and departures from equilibrium in the housing market. Regional Science and Urban Economics, 56, 60-72.

Himmelberg, C., Mayer, C., & Sinai, T. (2005). Assessing high house prices: Bubbles, fundamentals and misperceptions. Journal of Economic Perspectives, 19(4), 67-92.

Houston, J. F., Lin, C., Lin, P., & Ma, Y. (2010). Creditor rights, information sharing, and bank risk taking. Journal of financial Economics, 96(3), 485-512.

Huang, R. R. (2008). Evaluating the real effect of bank branching deregulation: Comparing contiguous counties across US state borders. Journal of Financial Economics, 87(3), 678-705.

Ioannidou, V. P., & Penas, M. F. (2010). Deposit insurance and bank risk-taking: Evidence from internal loan ratings. Journal of Financial Intermediation, 19(1), 95-115.

Jaffee, D., & Stiglitz, J. (1990). Credit rationing. Handbook of monetary economics, 2, 837-888.

Janssen, S. (2009). British and german banking strategies. Palgrave Macmillan.

Jiménez, G., Lopez, J. A., & Saurina, J. (2013). How does competition affect bank risk-taking? Journal of Financial stability, 9(2), 185-195.

Justiniano, A., Primiceri, G. E., Tambalotti, A. (2019). Credit supply and the housing boom. Journal of Political Economy, 127(3), 1317-1350.

Keeley, M. C. (1990). Deposit insurance, risk, and market power in banking. The American economic review, 1183-1200.

Konishi, M., & Yasuda, Y. (2004). Factors affecting bank risk taking: Evidence from Japan. Journal of Banking & Finance, 28(1), 215-232.

Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. Journal of financial economics, 93(2), 259-275.

Landvoigt, T. (2016). Financial intermediation, credit risk, and credit supply during the housing boom. Credit Risk, and Credit Supply During the Housing Boom (August 1, 2016).

Li, W., & Yao, R. (2007). The life-cycle effects of house price changes. Journal of Money, Credit and banking, 39(6), 1375-1409.

Liu, Lu. "Product Proliferation as Price Obfuscation? Evidence from the Mortgage Market." (2019).

Love, I., & Martínez Pería, M. S. (2014). How bank competition affects firms' access to finance. The World Bank Economic Review, 29(3), 413-448.

Marquez, R. (2002). Competition, adverse selection, and information dispersion in the banking industry. The Review of Financial Studies, 15(3), 901-926.

Martinez-Miera, D., & Repullo, R. (2010). Does competition reduce the risk of bank failure? The Review of Financial Studies, 23(10), 3638-3664.

Mian, A., & Sufi, A. (2009). The consequences of mortgage credit expansion: Evidence from the US mortgage default crisis. The Quarterly Journal of Economics, 124(4), 1449-1496.

Mian, A., & Sufi, A. (2010). The great recession: Lessons from microeconomic data. American Economic Review, 100(2), 51-56.

Mian, A., & Sufi, A. (2011). House prices, home equity-based borrowing, and the US household leverage crisis. American Economic Review, 101(5), 2132-56.

Mian, A., & Sufi, A. (2014). What explains the 2007–2009 drop in employment? Econometrica, 82(6), 2197-2223.

Miles, D. (2004). The UK mortgage market: Taking a longer-term view. Final Report and Recommendations.

Morrison, A. D. (2011). Systemic risks and the 'too-big-to-fail' problem. Oxford Review of Economic Policy, 27(3), 498-516.

Nguyen, H. L. Q. (2019). Are credit markets still local? evidence from bank branch closings. American Economic Journal: Applied Economics, 11(1), 1-32.

Ortalo-Magne, F., & Rady, S. (2006). Housing market dynamics: On the contribution of income shocks and credit constraints. The Review of Economic Studies, 73(2), 459-485.

Petersen, M. A., & Rajan, R. G. (1995). The effect of credit market competition on lending relationships. The Quarterly Journal of Economics, 110(2), 407-443.

Petersen, M. A., & Rajan, R. G. (2002). Does distance still matter? The information revolution in small business lending. The journal of Finance, 57(6), 2533-2570.

Rice, T., & Strahan, P. E. (2010). Does Credit Competition Affect Small-Firm Finance? The Journal of Finance, 65(3), 861-889.

Roback, J. (1982). Wages, rents, and the quality of life. Journal of political Economy, 90(6), 1257-1278.

Robles-Garcia, Claudia. Competition and incentives in mortgage markets: The role of brokers. Working paper, 2019.

Rosen, S. (1974). Hedonic prices and implicit markets: product differentiation in pure competition. Journal of political economy, 82(1), 34-55.

Ross, S. L., & Tootell, G. M. (2004). Redlining, the Community Reinvestment Act, and private mortgage insurance. Journal of Urban Economics, 55(2), 278-297.

Saunders, A., Strock, E., & Travlos, N. G. (1990). Ownership structure, deregulation, and bank risk taking. the Journal of Finance, 45(2), 643-654.

Schaeck, K., Cihak, M., & Wolfe, S. (2009). Are competitive banking systems more stable? Journal of Money, Credit and banking, 41(4), 711-734.

Scharfstein, David, and Adi Sunderam. "Market power in mortgage lending and the transmission of monetary policy." Unpublished working paper. Harvard University (2016).

Shiller, R. J. (2007). Understanding recent trends in house prices and home ownership (No. w13553). National Bureau of Economic Research.

Smirlock, M. (1985). Evidence on the (non) relationship between concentration and profitability in banking. Journal of money, credit and Banking, 17(1), 69-83.

Smith, J. A., & Todd, P. E. (2005). Does matching overcome LaLonde's critique of nonexperimental estimators?. Journal of econometrics, 125(1-2), 305-353.

Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. The American economic review, 71(3), 393-410.

Szumilo, N. (2018). Prices of Peers: Identifying Endogenous Price Effects in the Housing Market. Available at SSRN 3098073.

Taylor, K. (2019). Indicators of loan performance: a comparison of the Bank of England's published collections of arrears, possessions, provisions and write-offs. Bank of England Statistics article available at:https://www.bankofengland.co.uk/-/media/boe/files/statistics/bankstats-articles/2019/indicators-of-loan-performance.pdf?la=en&hash=44CEA62C5ABCA9826E69556B6BAD95E154EABDE0

TSB (2014) Price range prospectus. Available at: http://www.lloydsbankinggroup.com/globalassets/documents/investors/2014/2014jun9_lbg_tsb_ipo_prospectus.pdf

Werner, R. (2013). Crises, the spatial distribution of economic activity, and the geography of banking-a commentary. Environment and Planning A, 45(12), 2789-2796.

9 Appendix.

9.1 Regression results for Figure 2

The estimating equation is based on creating two price indices: for TSB locations and for the rest of postcode sectors. The equation also controls for sector-fixed effects and postcode area trends in house prices. The base of the index is Q1 2010. Formally the equation is:

$$\text{HP}_{it} = a + \beta_1 SECTOR_i + \beta_2 TIME_t + \beta_3 AREA_i \times YEAR_t + \beta_4 TSB_i \times QUARTER_t + \epsilon_{it}$$

The results show the magnitude and statistical significance of both trends. The trend in TSB locations is presented as a difference to the overall time-trend. Critically, the difference between the two trends does not become significant until after the new bank is created which suggests that the trends were parallel before this event but not after.

Table 9: Regression results used for Figure 2: The average house price index in England and Wales and its difference to sectors that receive a TSB. [note that the table reports results of a single regression]

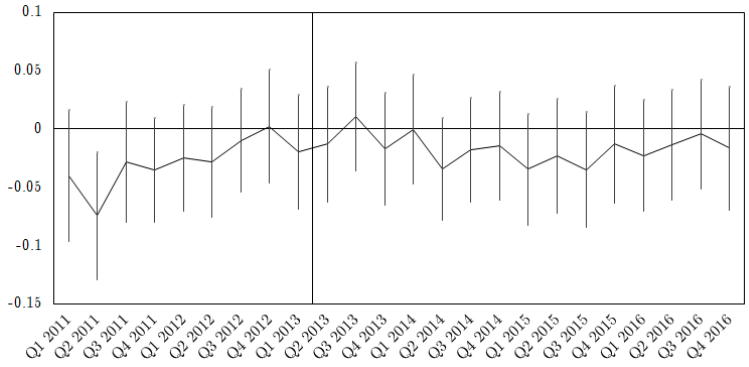
Time period	TSB	Time FE	Time period	TSB	Time FE	Time period	TSB	Time FE
Q2 2010	-0.0245	-0.0292	Q4 2012	-0.0317	-0.00367	Q1 2015	0.0681***	0.0677***
	[0.0195]	[0.0193]		[0.0195]	[0.0193]		[0.0193]	[0.0192]
Q3 2010	0.00593	-0.0155	Q1 2013	-0.0312	-0.0189	Q2 2015	0.0467**	0.0985***
	[0.0195]	[0.0193]		[0.0194]	[0.0193]		[0.0193]	[0.0192]
Q4 2010	0.00474	0.0115	Q2 2013	-0.0297	-0.0648***	Q3 2015	0.0925***	0.140***
	[0.0194]	[0.0193]		[0.0194]	[0.00441]		[0.0193]	[0.0192]
Q1 2011	-0.0119	-0.0139	Q3 2013	-0.00887	-0.0445***	Q4 2015	0.0393**	0.143***
	[0.0194]	[0.0193]		[0.0194]	[0.00441]		[0.0193]	[0.0192]
Q2 2011	-0.00828	-0.0194	Q4 2013	0.0678***	0.0372***	Q1 2016	0.0602***	0.0983***
	[0.0195]	[0.0193]		[0.0193]	[0.00439]		[0.0193]	[0.0192]
Q3 2011	-0.0217	-0.0161	Q1 2014	0.0348*	0.000204	Q2 2016	0.124***	0.142***
	[0.0195]	[0.0193]		[0.0194]	[0.0193]		[0.0193]	[0.0192]
Q4 2011	-0.0163	0.00821	Q2 2014	0.0645***	0.0333*	Q3 2016	0.0715***	0.179***
	[0.0195]	[0.0193]		[0.0194]	[0.0193]		[0.0193]	[0.0192]
Q1 2012	-0.0218	-0.0128	Q3 2014	0.0550***	0.0680***	Q4 2016	0.152***	0.220***
	[0.0194]	[0.0193]		[0.0194]	[0.0193]		[0.0193]	[0.0192]
Q2 2012	-0.0231	-0.0563***	Q4 2014	0.0515***	0.0715***	Q1 2017	0.106***	0.181***
	[0.0195]	[0.0193]		[0.0193]	[0.0193]		[0.0193]	[0.0299]
Q3 2012	-0.0197	-0.0228						
	[0.0195]	[0.0193]						
Observations	231,557	Sectors	8,296	R-squared	0.187			
Time periods	29	Sector FE	Yes	Period FE	Yes			

Notes: Standard errors clustered at sector level in brackets,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors clustered by sector in brackets, All values are percentage changes to average house prices in Q1 2010.

9.2 Rents and TSB entry shock.

While figure 2 demonstrates an impact of TSB's entry on prices and lending, it is helpful to demonstrate that there is no corresponding impact on rents to reinforce the results reported in table 4. Figure 7 demonstrates that TSB had no effect on rents by plotting the difference of rents in TSB locations to the average rent index in England and Wales.

Figure 7: Difference between rent indices in TSB locations and in the rest of EW.



9.3 Sector level estimates.

The below table replicates the results of Tables 2 and 5 to show that estimating for postcode districts gives the same conclusions as for postcode sectors. Note that when a larger geographical area (district) is considered most areas will have a branch of both TSB and LBG which means that controlling for increased choice between banks no longer makes sense. For the same reason the variable Multiple is now a dummy variable that equals one if the postcode district includes any sectors with multiple branches of any major bank.

Table 10: Regression results: branch competition on house prices and lending at postcode district level.

	House Prices		New Lending	
	[1]	[2]	[3]	[4]
TSB	0.105***	0.0929***	0.00655***	0.00594***
	[0.00756]	[0.00746]	[0.000918]	[0.000871]
Multiple	0.00144***	0.00187***	-0.000297***	-0.000296***
	[0.000529]	[0.000523]	[0.000111]	[0.000107]
Observations	65,774	65,774	41,186	41,186
R-squared	0.196	0.267	0.08	0.057
Districts	2,306	2,306	2,778	2,778
District FE	Yes	Yes		
Period FE	Yes	Yes	Yes	Yes
Area Trend		Yes		Yes

Notes: Standard errors clustered at sector level in brackets,* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. TSB denotes an interaction term with AFT and reflects the treatment coefficient. Columns 1 and 2 use log of house prices as the dependent variable while 3 and 4 use log of the first difference in mortgage lending stock.

9.4 Local banking and house prices.

UK banks agree that for most services customers choose their banks based on geographical proximity to their residence (CMA 2015). For this reason, TSB chose to focus its client acquisition strategy on capturing customers living close to their branches in order to maximise cross-selling opportunities of different products (as stated in their IPO prospectus). This created an incentive for TSB to offer different

mortgage terms to customers who lived close to its branches and were more likely to buy other products offered by the bank (TSB 2014). In practice, this involved offering mortgages to customers who committed to using other services of the bank (for example by switching their current account). Local competition intensified as, in response, other banks introduced 'loyalty' mortgages with better terms for existing qualifying customers. Consequently, although banks did not vary their mortgage prices over space, in practice customers living close to a branch found it easier to borrow from the bank that operated it. In addition to this process, the literature also suggests other reasons for branch location to be significant in determining access to mortgage credit. For example, it is also possible that local branches have an advantage in lending to local customers as they are more familiar with the local housing market than other lenders and have an informational advantage (Ergungor, 2010). Indeed, empirical data from the US confirms that living close to a branch is a good indicator of the likelihood of using the services of the bank that operates it (Gilje et al 2016). The present study uses the fact that TSB has a branch in a particular postcode sector as an indicator of the probability that local credit markets are affected its presence[29]. To validate this assumption, I show that new lending by the biggest banks in the UK (including LBG) falls over twice as much in sectors where TSB is created compared to all other sectors[30].

9.5 Acquisitions and divestments by Lloyds Banking Group.

The below summary of the major mergers and acquisitions by Lloyds Banking Group since 1995 provides further information on what determined locations of branches of legacy brands divested in 2013. It briefly describes the most relevant features of each transaction and some key events in the relevant timeline. A more detailed summary is provided in Janssen (2009). The key message from the below summary is that the majority of branches divested in 2013 became redundant after an unexpected acquisition of HBOS in 2009. Prior to acquiring HBOS, LBG had no plans to close those branches. On the contrary, it invested into restructuring them. This supports the assumption that the location of branches divested in 2013 was not driven by the performance of their regional economies or housing markets.

In August 1995, Lloyds acquired Cheltenham & Gloucester Building Society. This was the first ever association between a bank and a building society. This was part of a plan to expand the bank into the

[29]Note that in 2013 when TSB was created internet banking and peer-to-peer platforms were significantly less popular than at the time of writing this article

[30]See figure 3a which shows that when TSB's loan balances are excluded from the figure reported by 7 biggest banks, the impact on the reported level of lending in TSB locations is much stronger.

UK mortgage market and of a broader strategy to focus the bank's operations on the domestic market after failed attempts to expand into foreign counties (Janssen 2009). In 1992, Lloyds decided to focus on increasing its market share and attempted to take over Midland Bank but was unsuccessful and the bank was purchased by HSBC instead. This put Lloyds in a difficult position and motivated the bank to make a first ever offer to purchase a building society CG to expand into the UK mortgage market. Since its foundation in 1850, Cheltenham & Gloucester had taken over more than 50 competitors. In 1995 it was one of the UK's largest and most successful mortgage providers (The Economist, 23 April 1994). The process required the building society to demutualize and proved cumbersome and time consuming. In October 1995, Lloyds announced another large deal as it was merging with TSB which had 2,850 branches throughout the UK.

In general, the C&G takeover was considered revenue-led while the TSB merger was motivated by cost savings (Linnell, The Banker, 1 Jan 2000). As part of the domestic expansion plan, in 1999, Lloyds also acquired the UK's sixth largest life assurer: Scottish Widows to increase the distribution capacity in the finical advisory market. At this point LBG was the largest retail bank in the UK and although the management clearly expressed a desire to grow through domestic acquisitions, they recognized that the regulators would not allow this (Janssen 2009).

In 1995 when TSB and Lloyds merged, TSB consisted of two sub brands: TSB England and Wales and TSB Scotland. The former was fully integrated into Lloyds TSB and the latter absorbed Lloyds's three Scottish brands and became Lloyds TSB Scotland.
Because the deal with C&G was a takeover while the deal with TSB was a merger, C&G remained a separate brand although it was fully integrated within LBG. In terms of its mortgage lending, the lender was formally Lloyds TSB Bank PLC while C&G was in charge of administering those loans. In 2007 C&G was restructured and 31 of its 195 branches were closed.

In January 2009 LBG merged with a HBOS and added over its 1,100 branches (320 in Scotland) to the portfolio of LBG which at the time had around 1,900 branches (of which 164 were C&G's). The deal was an unexpected opportunity for LBG to realise their ambition of increasing domestic market share. It

was only allowed by the regulator as it was likely that without the deal HBOS could collapse. Officially, the merger was motivated by "significant cost savings from combining branch networks and back offices including IT systems"[31].

On the 9th of June 2009 LBG announced that it would close all 164 of C&G's remaining branches and around 1660 jobs would be lost as they were redundant after the HBOS merger. However, the brand would be retained and savings and mortgage products would be offered under its name. At the same time LBG announced redundancies in other parts of its business as it was restructuring after the financial crisis. On the 19th of August 2009, LBG announced that it would review the decision to close C&G's branches after being put under pressure from labour unions. The future of C&G's branches remained unclear until it was formally included in LBG's divestment package in 2012. The initial divestment plan was to rebrand its branches (along with some all Lloyds TSB Scotland and other LBG's branches) to TSB and sell these branches to a competitor Co-operative Bank but it was unsuccessful mainly due to Co-operative Bank's poor governance structure (Treasury - Sixth Report Project Verde). In 2013, LBG created a new entity called TSB Bank and all C&G's branches were divested. In November 2019 TSB announced that it will close 82 of its branches across the UK with 17 in Scotland.

[31]Lloyds TSB Group plc shareholder statement available at: `https://www.lloydsbankinggroup.com/globalassets/documents/investors/2008/2008nov3d_ltsb_hbos_acquisition__publishing_shareholder_circular.pdf`