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Effects of the advice requirement and intermediation in the UK mortgage market

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Contents

1 Executive summary 3

2 Introduction 5
- The UK residential mortgage market 5
- Choosing a mortgage 7
- Advice 8
- Intermediation 9
- Consumer surveys on advice and intermediation 9
- The Mortgage Market Review (MMR) 10

3 Data 13
- Dataset 13
- Outcome variables 16
- Matching 19

4 Results 20
- Question 1: Impact of advice requirement 20
- Question 2: Impact of intermediation 26

5 Conclusion 31
- Advice 31
- Intermediation 32
- Limitations 32
- Lessons and reflections 32

Appendix 1: Methodology 36
- Impact of advice 36
- Impact of intermediation 44

Appendix 2: Population-sample comparisons 51

Appendix 3: Robustness checks 55

Appendix 4: Sub-group analysis 62

Appendix 5: Common trends 67

1 Executive summary

UK consumers searching and applying for a mortgage face a complicated choice. They often have more than a hundred products to choose from, involving multiple eligibility criteria, features and price elements. The stakes are high too: mortgages are most households' largest financial liability. Finding a well-priced product with the right features can therefore make a big difference to household finances.

To help navigate this complex landscape, consumers have access to (regulated) mortgage advice and the services of intermediaries who compare products from different lenders. The 2014 FCA Mortgage Market Review (MMR) introduced a new *advice requirement*: regulated mortgage advice should be provided with every "interactive" mortgage sale, whether conducted by a lender directly or an intermediary.[1] Following this policy change, the proportion of advised mortgage transactions increased from around 75% before to over 98% in the post-MMR market. Consumers also increasingly turned to intermediaries instead of approaching a lender directly (with the share of intermediated transactions rising from 50% to 67%).

This paper uses the introduction of the MMR to investigate two questions. First, we estimate the impact of the new advice requirement on the outcomes of those directly affected: consumers who chose not to receive advice before the MMR. Second, we estimate the post-MMR effect of using an intermediary rather than going directly to a lender and receiving advice there.[2] Using a combination of regulatory and commercial datasets, we construct our estimates from transaction-level data for the population of residential first-time buyers and home movers. We measure outcomes in terms of product features and in terms of borrowing cost – the 'price' aspect of the mortgage.

Key findings

We find the following average impact of the advice requirement on consumers that did not receive advice before the MMR:

- substantially increased likelihood of using an intermediary
- increased popularity of short-term (2-year) fixed rate products
- small and ambiguous effects on borrowing costs

We also estimate the following effects of intermediation (compared to a direct sale by the lender) on consumers receiving advice after the MMR:

- increased popularity of short-term (2-year) fixed rate products
- increase in mortgage term to maturity (20 months longer)
- lower near-term borrowing costs (£48 reduction in monthly payment during deal period, 1-19 basis points reduction on a 5-year APR basis).

[1] The definition of interactive sales effectively only exempts sales conducted entirely by post or on-line. The MMR rules also allow high-net worth individuals and mortgage professionals to opt out of advice. For full details on the MMR reforms, which were mainly motivated by affordability concerns, see FCA Policy Statement 12/16.

[2] We use a statistical approach called matching for intermediation and difference-in-differences matching for the advice requirement. Section 4 and Appendix 1 describe our methodology in detail and explain how it allows us to identify causal effects of these services even if e.g. consumers' circumstances might affect both their risk/borrowing cost and whether they choose to use an intermediary.

Effects on sub-populations and broader outcomes

Broadly speaking, we find that neither the advice requirement nor intermediary services have substantively different effects on first-time buyers and home movers. When we extend our analysis to sub-populations of consumers by age, income and credit score, we do not find substantial differences either. This finding is particularly relevant for the advice requirement, as it suggests that the effects of advice are not concentrated in a particular segment of the affected consumer population. We also note that the consumer population being brought into advice by the MMR had – on average – higher incomes, lower LTV/LTI (Loan to value/Loan to Income) ratios and more experience with financial products than the typical consumer.

Although we observe most product features and the full schedule of fees and charges in our data, we do not measure every aspect of a mortgage sale. For example, to address the question of how advice and intermediation affect suitability, more detailed data on consumer circumstances would be needed. We also do not observe details of the service provided (notably quality and speed) and what happens to consumers after taking out the mortgage. Finally, we do not look at the role of advice for those would have sought mortgage advice regardless of the advice requirement. We refer the reader to the FCA Advice and Distribution review (TR15/09), the Responsible Lending Review (TR16/4) and the relevant chapters of the Mortgage Market Study (3, 4, and 5 and Annex 2) for a broader perspective on the MMR's impact on consumers.

Policy implications

This research paper makes two policy contributions. First, it presents a detailed ex-post evaluation of the MMR's advice requirement, which effectively led to mandatory mortgage advice for new sales. Although we recognise that we cannot measure every aspect of choice relevant to consumers, we obtain robust estimates for key product features and price. Particularly with respect to price, we find no evidence that the consumer population having been brought into advice by the MMR makes choices that meaningfully differ from what they would have chosen without advice.

Second, we provide insight into the role of intermediary services for helping consumers search and compare products across the market. Our estimates show that, for advised consumers, there is some incremental value in searching with an intermediary's help rather than without. The detailed effects on price and product features can help regulators learn about how effectively intermediaries help their customers with product choice. From a broader macroeconomic perspective, the concentration of borrowers in 2-year fixed contracts and longer mortgage terms may also be of interest to policymakers.

2 Introduction

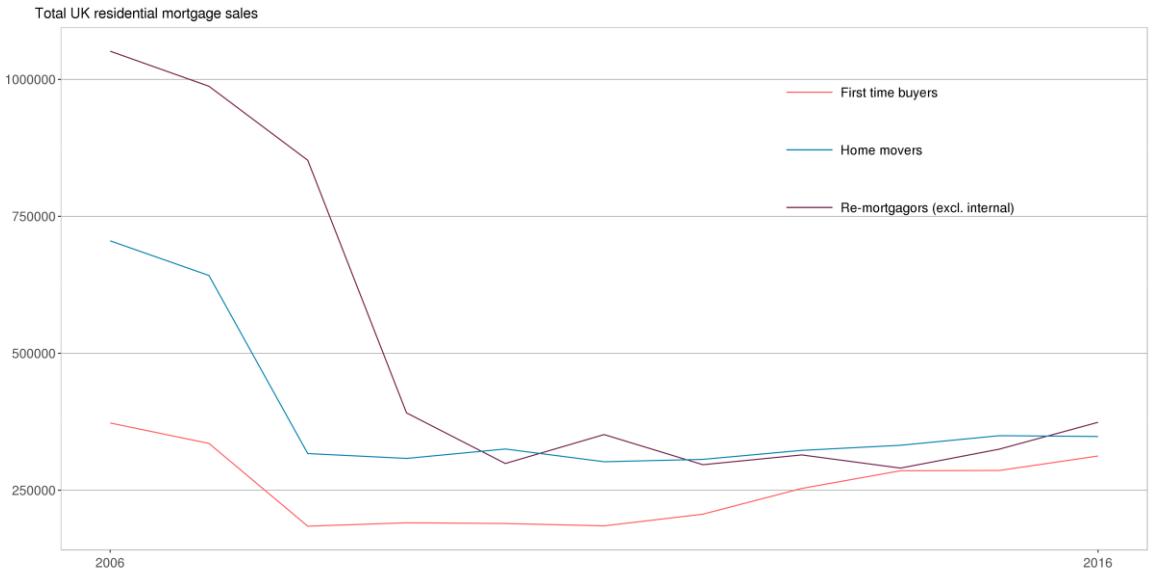
This paper studies a recent policy change in the UK residential mortgage market, which altered the role of regulated mortgage advice. The new policy, which formed part of the FCA's Mortgage Market Review (MMR) in 2014, introduced an advice requirement for all 'interactive' mortgage sales. As a result, the proportion of advised sales in the market increased from around 75% to over 98%; effectively mandating regulated advice for all but a few borrowers.

We estimate two effects of this policy. First, we estimate the effect of mandating advice on the population of borrowers who previously obtained mortgages without advice. Second, for the entire advised post-MMR consumer population, we estimate the difference in outcomes obtained by the average consumer when using an intermediary instead obtaining a mortgage directly from the lender. We measure various consumer outcomes of policy interest, focussing on key product features and the cost of borrowing.

We start by introducing the main features of the market, before and after the MMR, before describing our data and methodology. A detailed description of our statistical methodology is provided in Appendix 1 (Methodology).

The UK residential mortgage market

Figure 1: Annual mortgage sales by type of borrower (2006-2016)



Source: FCA Mortgage Product Sales Data

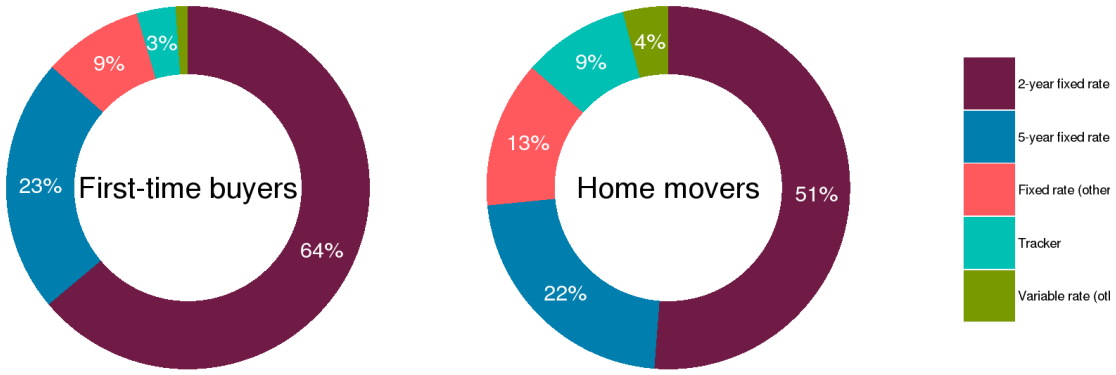
After a slump in activity from 2007 to 2010, the number of sales in the UK residential mortgage market has been increasing steadily. Figure 1 shows total annual number of sales for different borrower types from 2006 and 2016. A striking feature of the data is

that remortgaging accounts for so much activity in the market (especially given that internal remortgaging and product transfers are excluded from these statistics).

In fact, a substantial part of remortgaging activity is driven by a distinctive feature of the UK mortgage market: the absence of interest rates fixed until maturity.[3] The predominant mortgage types in the UK involve interest rates that are fixed for a relatively short period by other countries' standards (2-5 years) and then reset to Standard Variable Rate (SVR or *reversion rate*). The reversion rate can be varied by the lender at their discretion, but in practice tends to move broadly in line with the Bank of England base rate. Two-year fixed rate contracts are by far the most common mortgage type and accounted for almost two-thirds of all new mortgage lending in 2016, with five-year fixed contracts accounting for about 20%. Figure 2 shows the proportion of different mortgage product types sold to first-time buyers and home movers in 2016.

A smaller part of the market (around 10% in 2016) is made up of fully variable rate mortgages that typically track Bank of England base rate for the contractual term. But many of these mortgages, too, often offer more attractive terms in the early years of the contract (typically in the form of a lower spread over the underlying rate). In this paper we refer to the initial years of the mortgage during which the borrower benefits from special terms, such as a fixed rate or a discount on the variable rate, as the *deal period*.

Figure 2: Mortgage product type proportions in 2016, by borrower type



Source: FCA Mortgage Product Sales Data

Once their deal period expires, consumers do not appear to display systematic inertia in responding to remortgaging incentives. In fact, a significant majority of borrowers - around 80% - tend to remortgage within a year of their deal period ending. Borrowers are often approached by their own lender (and/or the intermediary who sold them their current mortgage) with offers to take out a new deal around that time to prompt action. The exit costs after the deal period expiry are typically low, just covering administrative charges of closing an account. Remortgaging before the deal period expires involves early redemption charges - of around 1-4% of the outstanding loan amount. Hence, remortgaging before deal period expiry is uncommon in the UK, unless prompted by a sudden house move or other unexpected circumstances.

[3] With the exception of lifetime mortgages (which are excluded from this analysis).

Choosing a mortgage

Choosing the right mortgage in this market is complicated. In the FCA's most recent Financial Lives survey (2017), between a quarter and a third of respondents state they have problems understanding and comparing mortgage products.[4] We highlight several features of the market that contribute to this:

1. the relatively short term of fixed (or incentivised) rates
2. the proliferation of products on the market and
3. the price structure of a typical mortgage

We outline each of those factors below, with a more detailed discussion available in Iscenko (2018) and the FCA mortgage market study interim report (2018).

Short term for fixed rates

While the typical maturity of a mortgage is 25 years or more, the vast majority of consumers remortgage to a new product after a few years. As explained earlier, the key contributing factor is product design: mortgages typically come with a 2-5 year deal period, after which the loan reverts to a higher, variable interest rate. Consumers will therefore benefit from switching to a different product at the end of the deal period. The optimal point in time to remortgage will often be shortly after the deal period ends – this being mostly driven by the early redemption charge that most loans carry for remortgaging within the deal period. Consumers typically remortgage at this point or shortly afterwards.[5]

The design of products means that, as part of considering their mortgage choice, consumers need to assess how much they value fixing or reducing their interest rates and for what period they want to do so. To add an extra dimension of complexity, calculating future costs of a mortgage product requires consumers to take a view on when they are likely to remortgage, how long they might stay on the higher reversion rate and how likely they are to need to incur early redemption charges due to, for example, a sudden need to relocate.

Range of options

At any given point in time, UK lenders post large 'menus' of products they have on offer. Contrary to mortgage markets in other countries, there is thus no negotiation between borrower and lender on product features. Each product is characterised by a combination of its features (e.g. length of fixed rate and options to overpay), price structure (e.g. fees, interest rates) and eligibility criteria potential borrowers need to satisfy to be considered (e.g. minimum loan-to-value ratio (LTV) or being a first-time buyer). The different combinations of all these options result in large number of products – the average prime mortgage borrower in 2015 was eligible on average for more than 400 products.[6]

[4] In the FCA Financial Lives survey (2017), 34% of the interviewed mortgage holders agreed with the statement "I felt there was too much information to deal with [when I last applied for a (re-)mortgage]", whilst 45% disagreed. Additionally, 31% disagreed with the statement "I feel mortgage products are simple to understand", 29% disagreed with "It is easy to understand total mortgage costs" and 26% disagreed with "It is easy to compare mortgages from different lenders".

[5] Mortgage Market Study statistics on initial rate periods expiring in 2015 shows that 75% of those on a 2-year deal will have remortgaged within one quarter of the expiry date; 91% of those on a 5-year deal will have remortgaged within one quarter of the expiry date.

[6] Iscenko (2018).

A prospective mortgage borrower therefore needs to choose which product features fit their preferences and circumstances, identify products of that type for which they are eligible (including on criteria that are less comparable across lenders, such as past credit impairments or unusual property types) and then compare costs of the suitable remaining options.

Price structure

The final complexity factor worth discussing is the price structure of a typical mortgage. In addition to the time-varying interest rates discussed above, products normally include at least one (and often more) fixed fee payable at mortgage origination, charges for early redemption and (usually smaller) fees the borrower pays to close their mortgage account even if the early redemption charge does not apply. Identifying all these costs and comparing them across products is far from trivial.

Interest rate changes and many of these fees can be included in a single cost metric – Annual Percentage Rate (APR) – to make the task simpler for consumers. This may not, however, solve the problem fully since APR requires choosing a specific time horizon and may not be very meaningful if that horizon does not align with consumers plans. For example, lenders often quote APRs for the contractual maturity of the mortgage, which, as discussed above, may be considerably longer than the consumer's actual time on the product. In this case, an APR would underestimate the effect of up-front fees on consumer costs.

Advice

Regulated advice[7] serves the purpose of helping consumers choose a mortgage product to apply for. Historically, the majority of borrowers opted to receive advice: around 80% of first-time buyers and 70% of movers in the years leading up to the MMR. This popularity is likely to be related to the complexity of mortgage products, the size of the financial commitment and some consumers' uncertainty on the likelihood of a successful application.

What distinguishes regulated advice from other types of information is that it contains a personal recommendation of one or more specific mortgage product(s). Regulated advice may only be provided by an FCA-regulated individual or firm and needs to meet the advice standard defined in the FCA Handbook.[8] Typically, advice will be provided by a mortgage adviser employed by a retail bank or a mortgage intermediary.

The advice standard specifies that, before recommending a product, the adviser must have ensured that the product is appropriate to the consumer's needs and circumstances (hence the 'personal' nature of the recommendation). The rules state that the adviser must consider, among other things:

- the appropriateness of the mortgage term;
- whether it is appropriate for the consumer to make early repayments;
- whether fees are paid up front or over the life of the loan;

[7] Regulated advice first appeared in the UK residential mortgage market in 2004, when mortgages became subject to statutory regulation.

[8] See FCA Handbook PERG 4.6 and MCOB 4.7A. Advisers must also hold a relevant qualification, as set out in FCA Handbook TC Appendices 1.1 and 4.1.

- whether the consumer needs stability of repayment;
- the consumer's self-reported credit history and the mortgage lender's eligibility criteria.[9]

Note that the advice process in itself should not serve to screen the consumer for creditworthiness or assess affordability – these checks are part of any sales process, advised or not (and are the lender's responsibility). However, it is likely that advisers will want to avoid recommending mortgages for which a consumer is unlikely to meet creditworthiness or affordability thresholds. An adviser will also provide services that do not strictly fall into the advice process, such as information on product features and supplementary products and support in filling out the application forms.

Intermediation

The advice that consumers receive from a lender will be limited to the menu of options provided by the lender itself. To receive advice on a comparison of products from multiple lenders, the consumer will have to use the services of an *intermediary* (or 'broker'). These intermediaries may specialise in mortgage products, may offer mortgage intermediation alongside other financial services (such as investment advice) or may be part of a residential real-estate business (the in-house broker).[10]

An intermediary typically provides regulated advice, as defined above, when serving consumers.[11] It is likely that many consumers who use an intermediary will partly do so because they want to receive advice. Consumers value advice from intermediaries in particular because intermediaries will also help the borrower search the market for mortgage deals. Note, however, that some products are only available directly from lenders and there is no regulatory requirement that the intermediary's search should cover the whole market. The intermediary does have to ensure that its menu of products is representative of the market and that the absence of certain products from the menu "does not materially disadvantage any customer [with respect to features and costs]".[12]

Some consumers' rationale for using an intermediary is not to find the best deal on price, but instead to help navigate an unfamiliar application process, speed up the process and increase the likelihood of application success. Consumers with worse credit histories, for example, may rely on intermediaries' knowledge of the likelihood of acceptance with different lenders. Consumers in more competitive housing markets may use intermediaries to avoid missing out on a property due to application delays, relying on the intermediary's knowledge of processing times.

Consumer surveys on advice and intermediation

Consumers' perceptions of advice and intermediation may differ from the definitions given above. For example, the consumer may not see such a clear-cut distinction

[9] Consumers may simultaneously have a need for stability (in monthly payments) and a degree of flexibility – chiefly flexibility in repayment and the cost of early redemption, although other features may also be valued (portability, approval for short-term lets, etc.). Of course, the wide availability of short-term contracts (which allow the consumer to refinance to other products without early redemption charges after one or two years) already offers borrowers considerable flexibility on product features.

[10] It is not uncommon for estate agents to recommend use of an in-house or 'friendly' intermediary to prospective borrowers.

[11] Some intermediaries do offer the option of 'Execution Only' (non-advised) sales, but this is a small part of the market (around 2% of all intermediated sales pre MMR, practically inexistent post MMR).

[12] See FCA handbook, MCOB 4.4A.5G.

between the parts of the conversation that constitute advice and the parts that do not. To better understand the role of advice and intermediation in decision-making more generally, it will be useful to look at evidence on consumers' experiences. We draw on two recent surveys of UK residential mortgage borrowers: research commissioned by the FCA as part of the Advice and Distribution Review in 2015 and the first wave of the FCA's Financial Lives (FL) consumer survey in 2017.

The FL findings provide some stylised facts on regulated advice, which is mostly provided face-to-face (69%), over the phone (49%) and/or online (17%). Where advice is obtained from a lender, the key reasons are easy access through a bank branch (49%), previous experience (37%) or recommendations from friends/family (10%). The decision to use a particular intermediary is most influenced by recommendations from friends/family (29%), previous experience (26%) or recommendations from estate agents (23%). There seems to be little shopping around for advice and intermediation: although 18% and 32% of recently active borrowers say they sought advice from a lender or intermediary, respectively, only 2% and 3% say they spoke to multiple lenders or intermediaries.

The Advice and Distribution Review survey finds that consumers:

i. are generally unclear on the role of mortgage advice provided by lenders
ii. find it difficult to distinguish advice from other aspects of the mortgage application process (in particular the lending decision) and
iii. often hold the mistaken view that advisers working for lenders cannot offer advice on their own products.[13]

Consumers view advisers at lenders as mostly providing information and assisting with the application process. Advice from intermediaries is looked upon more favourably, with many consumers convinced that the intermediary is more likely to be 'on their side'.[14] Interestingly, the FL data report similar satisfaction scores for lenders and intermediaries (8.1 and 8.0 out of 10, respectively), although respondents were more likely to agree that an intermediary got them "a better deal than [they] would have been able to get on [their] own" than an adviser working for a lender (74% versus 61%).[15]

The Mortgage Market Review (MMR)

The MMR was a substantial package of regulatory reforms implemented by the FCA in late April 2014. The MMR introduced a number of changes to the rules on mortgage sales to retail customers, including a strengthening of the responsible lending requirements, updated disclosure rules for key product information and – the focal point of this research paper – the requirement that consumers receive regulated advice with every 'interactive' mortgage sale. Interactivity is defined as "spoken or other interactive dialogue…

[13] ESRO report for the FCA, "Understanding consumer expectations of the mortgage sales process" (2015).

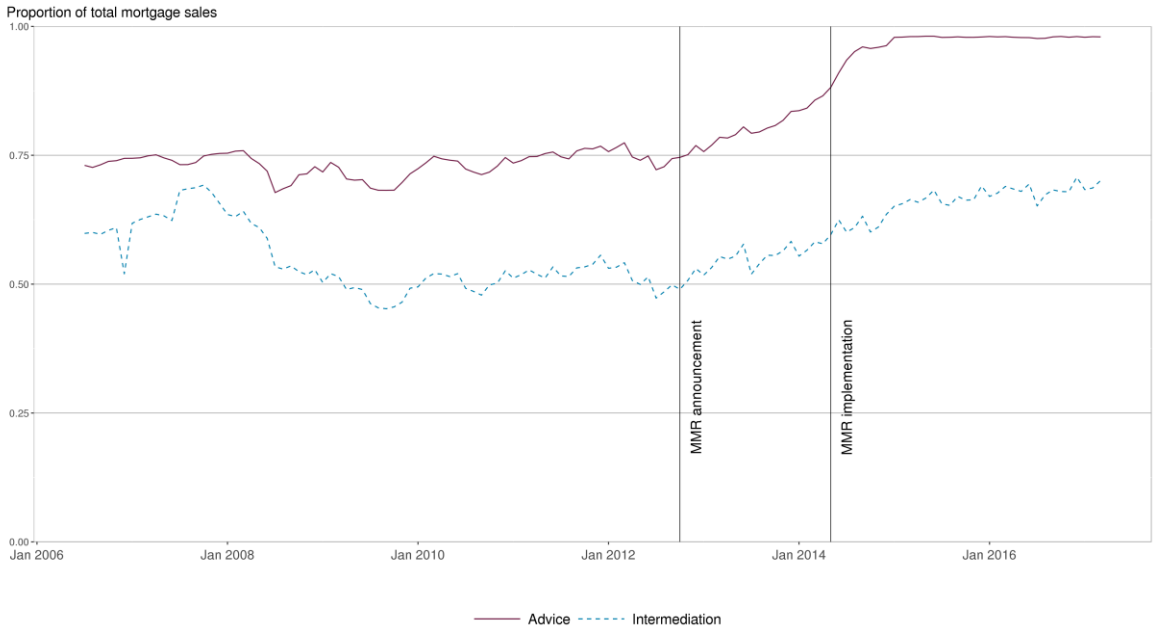
[14] Consumers are generally of the view that intermediaries are better placed to provide advice than lenders, consider the process as more customer centric and have higher levels of trust in the individuals with whom they are dealing.

[15] Although intermediaries do not have a duty to find the lowest-priced product that the consumer is eligible for, in practice this is what many consumers expect from an intermediary.

[including] SMS, mobile instant messaging, email and communication via social media" and thus seems to encompass the overwhelming majority of sales.[16]

Figure 3 shows the proportion of mortgage borrowers receiving regulated advice over time. Note that the Figure, in line with the rest of our analysis, only describes mortgage contracts taken out to purchase a property (first-time buyers and movers).[17] Before the MMR, when receiving advice was optional, the proportion of borrowers receiving advice was stable at around three quarters of sales. This proportion starts to increase gently in 2013, followed by a sharp increase before reaching a plateau around 98% in late 2014. The greatest increase in advice takes place just after the official MMR implementation date of 26 April 2014 (represented by a vertical line in the graph). The MMR's advice requirement thus appears to have affected around 1 in 4 mortgage borrowers – the proportion of consumers who previously (pre MMR) obtained mortgages without advice.

Figure 3: Advice and intermediation as a proportion of total mortgage sales to FTBs and movers (July 2006 – June 2016)



Source: FCA Mortgage Product Sales Data

Figure 3 also shows the proportion of intermediated sales, which have been increasing steadily since 2012. Evidence from lenders and intermediaries submissions to the FCA's Mortgage Market Study supports the notion that this increase is partly due to the MMR advice requirement.[18] This may be due to supply-side factors, such as lenders making a conscious decision to expand their lending through the intermediated channel, or demand-side factors, such as consumers deciding that – given advice is now mandatory for interactive sales – they would rather receive advice from an intermediary than a lender. Note that supply and demand-side factors can also operate through proxy

[16] The definition of interactive sales effectively only exempts mortgage sales conducted entirely by post or on-line (1.6% of the relevant market in 2016). In addition, the MMR rules allow high-net worth individuals and mortgage professionals to opt out of the advice requirement. See FCA Handbook, MCOB 4.8 for more details.

[17] For the remainder of this paper, all reported figures will refer to mortgage sales to first time buyers and home movers only.

[18] Mortgage Market Study interim report, chapter 5.

mechanisms, such as the time it takes to get an appointment with a mortgage adviser at a local bank branch. Of course, we cannot exclude the possibility that the increase in intermediation is a long-term time trend.

Measuring the effects of the MMR

It is plausible that the advice requirement has made intermediation a relatively more attractive distribution channel. Any differences we measure in the outcomes of consumers affected by the advice requirement should therefore not be interpreted as having been obtained *through the same distribution channel*. In fact, it seems a priori reasonable to assume that post-MMR outcomes are more likely to have been obtained through the intermediated channel. This is an important feature of the analysis: our estimates of average consumer outcomes take into account any shift in preferences over the two distribution channels (controlling for borrower characteristics).

Besides measuring the effect of the advice requirement introduced by the MMR, we also estimate the effect of intermediation. We do not, strictly speaking, estimate the impact of intermediation in relation to the MMR. Instead, we study the effect of intermediation on consumer outcomes in the post-MMR market, for the population of borrowers receiving advice. Note that, post MMR, nearly all consumers received advice. This allows us to estimate the difference in outcomes obtained by the average (advised) consumer when using an intermediary instead of obtaining a mortgage directly from the lender

To estimate these effects, we construct a unique dataset that combines regulatory and commercial data sources at the transaction level. In the following section, we describe our dataset in more detail. We also describe key characteristics of the different consumer populations studied in this paper.

3 Data

Dataset

Our data cover 4 years (July 1st 2012 to June 30th 2016) and are based on linking three main data sources at the transaction level:

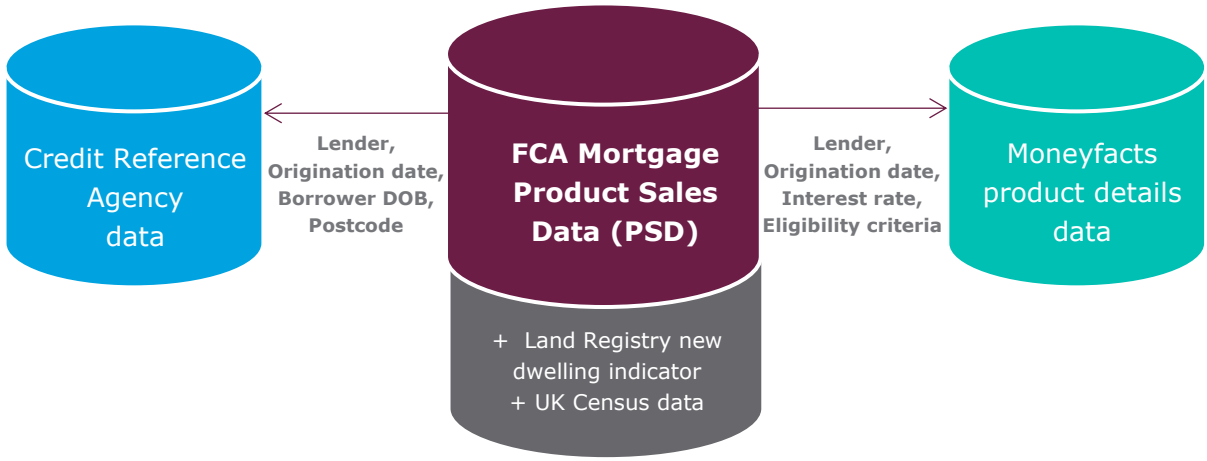
1. the population of regulated residential mortgage originations reported by UK lenders to the FCA as Mortgage Product Sales Data (PSD);
2. borrowers' credit files at mortgage application, including credit score, provided by a major Credit Reference Agency and
3. product data from Moneyfacts, a commercial supplier of detailed daily data on all available mortgage products in the UK market (including the complete price structure, extra features and lending standards).

We exclude mortgage originations due to remortgaging, as we do not have full visibility of remortgaging activity.[19] Our analysis therefore focusses on first-time buyers and home movers who obtain a mortgage to finance the purchase of a residential property.

Data linking

Our data linking process is shown in Figure 4. PSD is the main source of data, allowing us to select the population of residential repayment mortgages originated in the UK by first-time buyers and home movers.[20] We use lender name, property postcode, the mortgage origination date and borrowers' date(s) of birth to link a PSD observation to a credit file. We then use product features and borrower characteristics from both data sources to identify a mortgage product in Moneyfacts (ensuring that the identified product satisfies all stated eligibility criteria). Finally, we supplement the combined dataset with two extra variables from HM Land Registry Price Paid Data and the most recent (2011) UK Census.

Figure 4: Data sources



[19] PSD does not include data on remortgaging with the current lender ('internal remortgaging' and product transfers).

[20] Excluding bridging loans, buy-to-let, guarantor, shared ownership, lifetime and interest-only mortgages.

Table 1: List of variables in our dataset by source

Data source	Variable (group)
Mortgage Product Sales Data (PSD)[1]	• Lender and (if applicable) intermediary identifier • Regulated advice indicator • Intermediary indicator • Borrower type (first time buyer or mover) • Borrower(s) date of birth • Borrower(s) employment status and income • Loan details (origination date, loan value, interest rate, rate type, fees total, deal period length) • Property details (property value, dwelling type*, number of bedrooms*) • Affordability metrics*
Borrower(s) credit file at time of mortgage application, from Credit Reference Agency	• Credit score • Credit product holdings (including current accounts) for past 6 years • Date of birth • Property and application postcode • Behavioural variables (cash advances, minimum payment flags on credit cards)
Moneyfacts product details data	• Price components (interest rate, rate type, individual fees, discounts and cashback offers, early repayment charges) • Features (deal period length, repayment flexibility) • Eligibility criteria (e.g. LTV bands, borrower types, regional availability)
Other data sources	• Land Registry: Property new dwelling indicator • UK Census (2011): Postcode area statistics

Notes: Full PSD definition available at https://www.fca.org.uk/firms/product-sales-data. Variables with an asterisk (*) are only available for mortgage originations after 1 January 2015.

Linking observations in the PSD dataset to the 2 other main data sources is achieved by a combination of strict and fuzzy matching algorithms. The data from the Land Registry and Census are merged in at the 6-digit postcode level. The new dwelling indicator is based on property postcodes appearing for the first time in HM Land Registry Price Paid Data. Selected variables from the UK census are merged in on both application and property postcode as proxies for data not available at the individual level: average employment, educational attainment and sociodemographic status. Table 1 lists the information extracted from the different data sources.

For estimation, we first omit observations that do not contain all the required PSD and Land Registry data fields. This leaves us with a population of approximately 600,000 mortgage originations per year. We also omit observations for which we cannot identify credit file and Moneyfacts product matches, or for which we do not have all the required variables for propensity score estimation. From the population of observations available for linking, we obtain a final match rate of 67% for estimation of non-cost outcomes and 38% for estimation of cost outcomes. (The two match rates differ because the estimation of non-cost outcomes does not require Moneyfacts data.)

Summary statistics

Table 2: Borrower and loan sample characteristics

	Pre MMR (n=158,675)		*Post MMR (n=338,582)*	
Advice	Advised (82.6%)	Non-advised (17.4%)	Advised (97.3%)	Non-advised (2.7%)
First-time buyer %	44.7	35.4	42.9	43.5
Joint %	62.0	60.3	64.4	59.8
Age	36.2	37.2	36.5	35.2
Income (£k)	52.2	62.7	60.8	73.5
Loan value (£k)	158.5	173.3	188.6	210.1
Property value (£k)	231.4	279.0	278.3	324.1
Credit score	0.64	0.65	0.65	0.66
Previous products	2.50	2.55	2.68	2.67
Intermediated %	68.1	1.8	67.8	2.3
Channel	Direct (43.5%)	Intermediated (56.5%)	Direct (33.9%)	Intermediated (66.1%)
First-time buyer %	44.2	42.2	42.0	43.3
Joint %	59.2	63.5	61.9	65.5
Age	36.7	36.1	37.0	36.2
Income (£k)	55.1	53.4	60.5	61.4
Loan value (£k)	154.7	166.1	173.3	197.4
Property value (£k)	242.3	237.7	274.1	282.4
Credit score	0.65	0.64	0.65	0.64
Previous products	2.50	2.52	2.68	2.67
Advice %	60.6	99.5	92.2	99.9

Notes: All reported figures are means from the estimation sample (for population comparison, see Appendix 2, Table A5). Income is total gross income as reported by the borrower to the lender for verification. Credit score (normalised) and number of previous products are from borrower credit files.

Table 2 shows key demographics and loan characteristics for our fully matched sample. To illustrate changes over time, we aggregate data for two periods: a pre-MMR period (July 2012 to October 2013) and a post-MMR period (November 2014 to June 2016).

The top panel splits the data by advised and non-advised sales, whereas the bottom panel splits the data by sales channel. To provide context for our first research question, it is instructive to look at the non-advised consumer sample before the MMR (top-left quadrant of the table). Note that these consumers are less likely to be first-time buyers, are slightly older, have higher incomes, more experience with financial products, take out bigger loans for more expensive properties and are much less likely than advised consumers to use the services of an intermediary. Not shown in the table, but easily constructed from the reported figures, we find that non-advised consumers have lower LTI (Loan-To-Income) and LTV (Loan-To-Value) ratios than advised consumers.

The lower right quadrant of Table 2 shows the sample characteristics for consumers of relevance to our second research question. Intermediated consumers are more likely to be first-time buyers than those buying direct from lender, are slightly younger and take out bigger loans. With the exception of loan value, the differences between direct and intermediated consumers do not appear to be substantial.

To compare the sample underlying Table 2 with the population (the entire PSD dataset for the relevant periods), refer to Table A5 in Appendix 2. The characteristics of sample and population are similar on the majority of the reported dimensions. To ensure that our estimates are robust to differences, we also compute weighted measures.

Weighting

Because the loss of observations in our data linking procedure may bias our sample, we present weighted estimates counterparts to all our main estimates in Appendix 3 (Robustness checks). Our sample weights are based on key demographic and loan variables in the population of mortgage originations (PSD data only): main borrower age, total gross income, buyer type (first time buyer/mover), joint/sole application, interest rate type, deal period length and mortgage term. Table A5 and Table A6 in Appendix 2 present descriptive statistics on both the population and the weighted sample for different consumer groups of relevance to our estimation.

Outcome variables

We use a range of outcome variables in this research, constructed from PSD and Moneyfacts data. First, we measure chosen product characteristics, such as whether the mortgage had a fixed or variable rate, the length of the deal period and the total mortgage term. For our first research question, we also use the sales channel (direct or intermediated) as an outcome variable.

Second, we calculate various measures of the (relative) cost of borrowing. We apply the methodology from Iscenko (2018) to identify product choices that were *dominated* or *strongly dominated*. A mortgage choice is considered to be dominated when at the point of making the choice the borrower was also eligible for at least one product with had the same non-price features (e.g. fixed rate length) as the chosen mortgage but was strictly cheaper on cost: having all interest rates and fees that were no higher than the chosen product and at least one that was strictly lower. A 'strongly dominated choice' is when as

a result of choosing a dominated product (as described above), the consumer incurs excess costs of at least £250 per year and at least 5% of their annual mortgage cost compared to what they would pay on the cheaper but otherwise comparable available alternatives.

In addition, we construct absolute measures of borrowing cost: initial monthly payment (during the deal period), APR during the deal period and APR calculated on a 5-year basis.

All of our APR measures use Moneyfacts data on all relevant product fees (such as arrangement, booking, discharge fees and many others) to represent the full cost of borrowing, including remortgaging expenses. The 5-year APR has 2 variants:

- a 'no remortgaging' basis (consumers are assumed to be inert and revert to the applicable Standard Variable Rate at the end of their deal period) and
- an 'immediate remortgaging' basis (consumers are assumed to remortgage at the end of their deal period, to a product with the same terms as their current mortgage).

This approach means that our APR calculations exclude contingent fees, such as late payment fees and early termination charges, by design.

Table 3: Outcome variables in sample

	Pre MMR (n=158,675)		*Post MMR (n=338,582)*	
Advice	Advised (82.6%)	Non-advised (17.4%)	Advised (97.3%)	Non-advised (2.7%)
Fixed %	88.4	74.1	94.2	84.8
Fixed 2-year %	48.4	29.3	56.9	41.1
Fixed 5-year %	27.5	33.3	28.6	27.9
Dominated %	18.4	11.4	31.1	7.76
Dominated str. %	10.4	6.7	18.0	3.6
Monthly paymt. (£)	831.5	927.1	892.4	974.5
APR deal	3.89	3.82	2.87	2.65
APR 5-y reversion	4.06	3.94	3.44	3.19
APR 5-y remortg.	3.91	3.86	2.90	2.67
Channel	Direct (43.5%)	Intermediated (56.5%)	Direct (33.9%)	Intermediated (66.1%)
Fixed %	79.6	90.7	90.9	95.5
Fixed 2-year %	34.0	53.6	44.1	62.7
Fixed 5-year %	33.0	25.1	34.7	25.4
Dominated %	11.9	21.3	28.0	31.8
Dominated str. %	6.1	12.3	16.8	18.0
Monthly paymt. (£)	849.7	852.4	876.1	903.5
APR deal	3.92	3.86	2.89	2.85
APR 5-y reversion	3.94	4.08	3.33	3.49
APR 5-y remortg.	3.89	3.89	2.92	2.87

Notes: All reported figures are means from the estimation sample. *Fixed*, *Fix-2y* and *Fix-5y* indicate proportions of borrowers choosing a mortgage with a fixed rate deal period (of the indicated duration); *Dominated* = proportion of borrowers choosing a dominated product; *Monthly paymt.* = Monthly mortgage repayment for deal period in pound sterling (£); *APR deal* = APR calculated over deal period; *APR 5-y reversion* = APR on 5-year basis calculated on a 'no remortgaging' (reversion rate) basis; *APR 5-y remortg.* = APR on 5-year basis calculated on a remortgaging basis.

Table 3 shows the average outcome variables in the estimation sample, over time, for the consumer groups relevant to the estimation. Although the data presented simply present averages, some patterns are worth highlighting. First of all, fixed rate mortgages have grown in popularity over the years. Second, the cost of borrowing has gone down, although this does not translate into lower monthly repayments – most likely due to the increase in house prices over the same period (see Table 2 above). There are also a few differences between the non-advised population and the advised population, such as: the former being less likely to choose a fixed rate product (especially two-year fixed rate products) and less likely to choose a dominated product. Note that the non-advised population post MMR represents only a small part of the market.

Matching

Straight comparisons between different groups of consumers are likely to be affected by self-selection into these groups. We recognise that consumers who choose to use a mortgage adviser and/or intermediary are likely to be different from those who do not. We also recognise that the characteristics and needs of these different groups may affect their choices and outcomes. To overcome the selection problems posed by these differences, we use a statistical method called matching to identify similar individuals in both groups of consumers. Matching is an established technique for identifying causal effects that is particularly suited to our data and research questions.[21] This is because we have extensive data that cover the factors that are likely to affect the choice to use an adviser or intermediary and could also affect consumer outcomes. However, the relationships between those factors the channel used by the consumer, and consumer outcomes, are complex and inter-related. Matching is a flexible method that allows us to reflect this complexity.

Our matching algorithm makes use of a range of variables on borrower, property and mortgage characteristics to ensure we make a like-for-like comparison on all characteristics we can observe. This allows us to rule out, for example, that estimated effects are due to distributional differences between groups in observable characteristics such as credit score, income, or property value. Matching is therefore often described as a technique that treats the estimation problem as one of selection on observables.

We match observations on the propensity score – an individual's estimated propensity to take advice (for our first research question) or to use an intermediary (for our second research question). We discuss our approach in more detail – including a discussion of the underlying assumptions and data requirements – in Appendix 1 (Methodology).

Meeting the data requirements of the matching method is greatly helped by the fact that we observe all mortgage sales for newly purchased residential properties in the UK. Since we can only observe remortgaging in our data when it results in a contract with a new lender, we exclude outcomes from remortgaging.[22] Our findings are therefore specific to first-time buyers and home movers.

[21] See, for example. Blundell and Costa Dias (2009) for an overview of alternative evaluation approaches.

[22] Given the absence of data on remortgaging with the same lender, we cannot produce a credible matching estimate for re-mortgagors.See also Mortgage Market Study, chapter 6.

4 Results

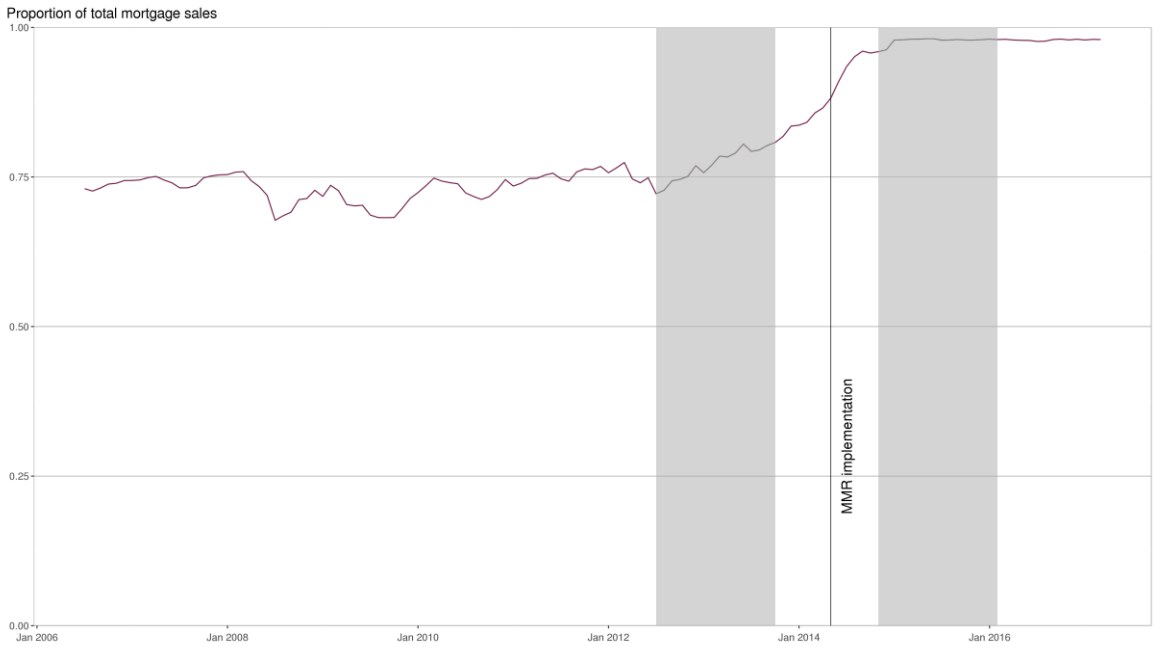
In this section, we present our estimates of the impact of the MMR advice requirement and the impact of intermediation in the post-MMR market. For detailed information on our implementation of matching, weighted-sample estimates and further robustness checks, please refer to Appendix 1 (Methodology).

Question 1: Impact of advice requirement

Our first research question is of immediate policy interest. It concerns the effect of a regulatory intervention that required advice to be provided in almost all interactive mortgage sales.[23] For a substantial proportion of mortgage borrowers, who without the intervention would have obtained a mortgage without receiving advice, this meant that they would now have to receive advice. Based on our pre-MMR data, the population of affected consumers represented approximately 20% of first-time buyers and 30% of home movers.

We are interested in estimating the net effect of the policy on the affected group of consumers, including any effect this policy may have had on the relative accessibility and desirability of the intermediated sales channel. The effect of the MMR advice requirement on consumer choices and outcomes may therefore be due, in part, to a shift of some consumers from the direct to the intermediated sales channel.

Figure 5: Advice as a proportion of total mortgage sales over time (July 2006 – June 2016), shaded areas indicate pre and post MMR observation windows



[23] See FCA handbook, MCOB 4.8A.7R(3).

Observation window

Our estimate is computed by comparing outcomes in pre and post MMR groups of consumers. As shown in Figure 5, we define the 6 months either side of the official MMR implementation date (April 26, 2014) as the implementation period. This is the period in which most of the growth in advised sales took place. Our pre- and post-MMR observation windows consist of 16 months of data before and after the implementation period.[24] This gives us a pre-MMR period between July 2012 and October 2013 and a post-MMR period between November 2014 and February 2016, illustrated by the shaded areas in Figure 5.

DID matching

Note that we are not comparing the same consumers pre- and post-MMR. This would restrict our sample to consumers that we can reliably observe at 2 points in time, plus it would introduce the complication that the same consumer is unlikely to have similar requirements and circumstances at both points in time. Rather, we compare similar individuals in similar situations at two points in time by matching on repeated cross-sectional data. We account for changes in incomes and property prices over time by using quartiles for these variables.

To estimate the treatment effect, we compare the outcomes of pre-MMR consumers who did not receive advice to similar post-MMR consumers (who did receive advice). We refer to these groups of consumers as our pre-MMR and post-MMR treatment groups, respectively.[25]

There are factors besides receiving advice that could explain changes in outcomes in our treatment group, such as macroeconomic conditions and market trends.[26] To account for other changes during the MMR implementation period, we correct our comparison of outcomes in the treatment group by the changes over time we observe in our *control group*: consumers who obtained advice both before and after MMR came into force. This approach is called difference-in-differences (DID) and it relies on the assumption that changes due to factors other than the advice requirement followed a common trend over time between comparable individuals in the treatment group and the control group.[27] We can thus 'difference out' such time trends from the changes in outcomes in our treatment group, to identify the effect of advice on consumers in our treatment group. All reported estimates are obtained using Gaussian kernel matching on propensity scores across time (pre and post MMR) and for the cross-section of differences. (See Appendix 1 for a more detailed explanation of this method.)

Our DID approach also differences out changes to the advice process itself over the implementation period. Whether our results also provide useful predictions for the impact

[24] The 16 month pre- and post-MMR observation windows were chosen to strike a balance between availability of reliable credit bureau data (favouring more recent mortgage originations) and limiting the time difference between pre- and post-MMR observations, whilst ensuring a large enough sample of pre-MMR observations. Our methodology section reports alternative specifications to verify the robustness of our results to different observation windows.

[25] For clarity, please note that we diverge slightly from the standard terminology in repeated cross-section difference-in-differences matching, where only the pre-MMR non-advised population would be the treatment group. Technically speaking, our post-MMR 'treatment group' is a control group used to construct a (synthetic) counterfactual.

[26] Examples of market trends are changes in lenders' approach to borrower or property risk, the introduction or re-interpretation of regulatory requirements, a greater demand for certain product features and changes to the application process.

[27] The specific assumption is that, conditional on covariates used by our matching algorithm, had advice not been required for consumers in the treatment group, outcomes in the treatment and control groups would have followed similar trends over time (although the levels of outcome variables may differ between groups).

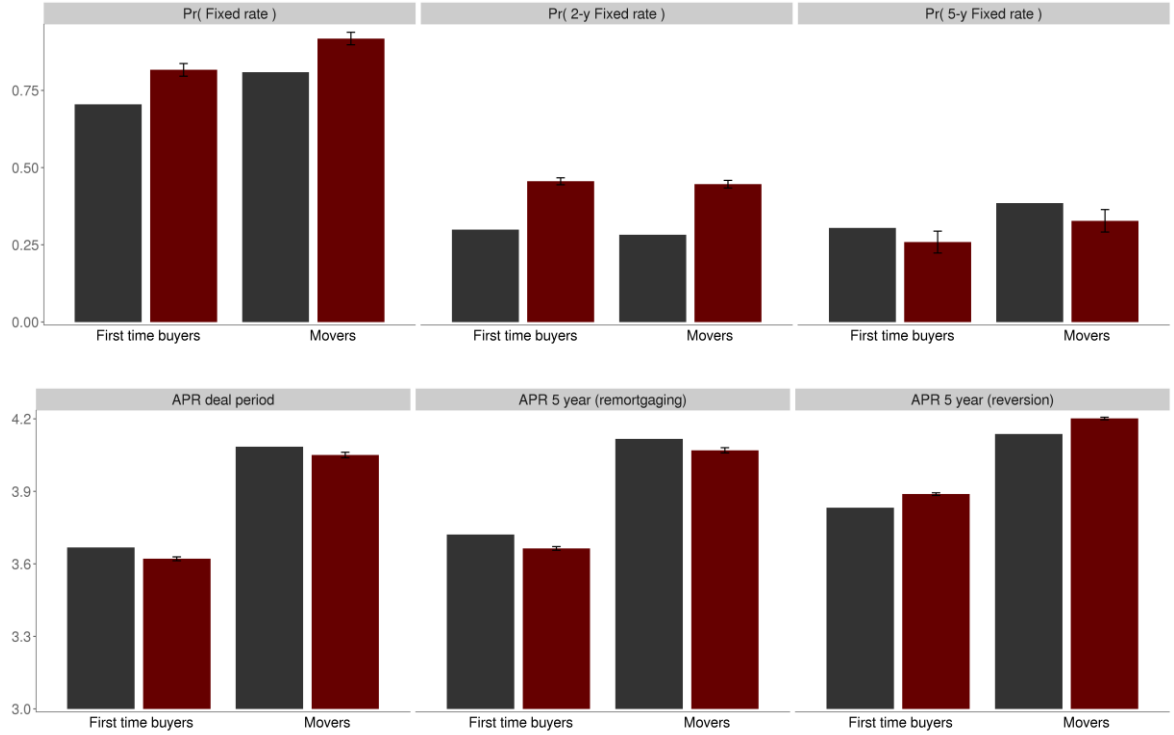
of *post*-MMR advice therefore depends on whether the current advice process leads to different recommendations than pre-MMR. Submissions by firms to the FCA state that MMR changes to the advice standard are unlikely to have led to systematically different recommendations.[28] Whereas one or two of the intermediaries surveyed for the MMS suggest that their advice process has improved post MMR, most respondents (intermediaries and lenders) report their approach to advice has remained unchanged.[29]

An alternative approach to assessing the assumptions behind our DID approach is to look at the time trends in outcome variables in the pre-MMR period. This allows us to see whether the trends in the advised and non-advised consumer groups are likely to follow similar trajectories during the implementation period. As discussed in Appendix 1 (Methodology), this seems to be the case for most of our outcome variables.

Impact estimates

Figure 6 shows our estimates for the impact of advice on key outcome variables: the type of product chosen and three APR measures of the near-term cost of borrowing. Each estimate (Average Treatment effect on the Treated, or ATT) is presented alongside the mean in the treatment group before the MMR, which serves as a baseline. Table 4 at the end of this section provides more detailed estimates, including further outcome variables of interest. In the remainder of this section, unless mentioned otherwise, the estimates discussed are aggregate effects (averaged across first time buyers and movers).

Figure 6: Impact of advice on previously non-advised consumers, mortgage product types and APR cost metrics by borrower type



Notes: First bar in each pair shows baseline (mean) in treatment group, second bar treatment effect (ATT).

[28] In addition to the requirement for almost all interactive sales to be advised, the MMR also: introduced a standard of advice requiring advisers to recommend a suitable product, rather than the previous most suitable standard; required every seller to hold a relevant mortgage qualification; required firms to act in customer's best interests; and removed the requirement on intermediaries to assess affordability.

[29] FCA Mortgage Market Study interim report (2018).

As Figure 6 shows, the main effect of advice is that consumers in the treatment group are more likely to choose fixed-rate mortgages (+11 percentage points), particularly 2-year fixed-rate products (+16 percentage points). Some of the increase in 2-year fixed products was at the expense of 5-year fixed products. The results in Table 4 indicate that the advice requirement has led an average increase of mortgage terms of 7 months (+0.6 years) and, in line with expectations, substantial growth of intermediation to about two-thirds of sales.

The bottom panel of Figure 6 shows the impact of advice on near-term cost of borrowing, expressed as APR measures over either the deal period or on a 5-year basis. The effects appear small. For the deal period, or under the assumption of timely remortgaging, we estimate a reduction of 4-5 basis points of APR. Under the relatively pessimistic assumption that borrowers stay on the reversion rate, our estimate of the impact of advice is an increase of 6 basis points in APR on a 5-year basis. To illustrate: a 5 basis-point change in APR on a £152,000 loan (the median loan amount in our 2016 data) corresponds to a £6.33 difference in monthly payments. Table 4 shows a slightly larger estimate for the difference to monthly payments in the deal period (-£15), although unlike the APR metrics this figure does not take into account up-front fees. To sum up, we find no evidence that receiving advice affects the cost of borrowing for the treatment group.

Table 4 also shows that advice makes consumers in the treatment group more likely to choose a dominated product (+5 percentage points). This may seem surprising given that the treatment group chose relatively few dominated products before the MMR (11% of sales, compared to 18% for advised consumers).

Why the potentially counter-intuitive increase in dominated choices as a result of the advice requirements? The change in the mix of products borrowers take out is an important factor. Almost 16% more borrowers in the treatment group take out 2-year fixed loans, which offer considerably lower introductory rates than fixing rates over the long term. Yet there were no material decreases in their deal period borrowing costs measured by APR. These findings combined suggest that some consumers induced to take advice as a result of the MMR, who were previously choosing relatively good products (on cost), get advice to move to a generally cheaper product class of 2-year fixed rate loans. But these consumers are not necessarily recommended a cost-effective product *in that class*. These cost effects roughly offset each other. The rate of dominated choices, however, reflects the fact that there were better 2-year fixed rate products the borrower could have chosen. The finding that advice by itself affects the characteristics of the chosen product but would not necessarily lead to a cheap deal with those characteristics is in line with the discussion earlier in the paper (recall that lenders can provide advice on just their own product range).

Finally, we also note that the slight increase in mortgage term and decrease in monthly payments may be related. This may be driven by suitability concerns. A longer mortgage term mechanically reduces monthly payments, which may be deemed more suitable for the consumer. Although we do not estimate the cost of borrowing over the term of the mortgage (this would require implausibly strong assumptions on repayment patterns and the availability of mortgage products in future), it is likely that a lower rate of repayment will increase the total cost of credit.

Robustness checks

Sample weighting. Appendix 3, Table A6 shows estimates from a model that weights each observation in the sample to the population. Comparing these estimates with those reported in Table 4, we note that the differences between the original sample and weighted sample results are relatively small. For the non-cost outcomes (product features and sales channel), the estimated effects are so similar across models that it appears unlikely that sampling bias affects our original estimates. For estimates of the cost of borrowing, the weighted estimates are greater than the original estimates. This suggests that the net effect of the advice requirement may, in fact, have been a slight increase in costs for borrowers in the treatment group.

Specification. To ensure that our estimates are robust to changes in specification, we estimated various alternative models that are reported in the Appendix. First, we check that our results are not sensitive to our choice of the MMR implementation window (November 2013- October 2014, 12 months in total). Tables A7 and A8 in Appendix 3 show the results of alternative specifications of the implementation window (6 months and 0 months). As a comparison with these estimates shows, our results do not materially vary with the choice of implementation period. As shown in Table A12, the results are also robust to alternative parametrisation of the Gaussian kernel matching algorithm (different choices of the bandwidth parameter).

Subpopulations of interest

Of course, the average treatment effect is just that: the average of a distribution of individual, positive and negative, treatment effect estimates. It may be the case that the advice requirement has much stronger effects on the decisions of subsets of the treatment group, particularly consumers who would be more likely to benefit from receiving advice. We also look at the effect of advice in certain sub-populations of interest, by splitting the sample by buyer type (first-time buyer/mover) and quartiles of main borrower age, income and credit score. For buyer type, the findings are reported here; results for the other subpopulations are reported in Appendix 4. Figures A3-5 in this Appendix show the (original, unweighted sample) treatment effects for the different sub-populations of interest.

Although there are notable differences between the pooled means of different subgroups, treatment effects do not appear to differ much between subgroups.

Table 4: Average Treatment effects on the Treated (ATT) of mortgage advice requirement on the non-advised population (sample)

	Full sample		*First time buyers*		*Movers*	
	Baseline	ATT	Baseline	ATT	Baseline	ATT
Product features						
Likelihood of choosing a fixed rate product	74.18%	+11.06 (0.39)	80.90%	+10.91 (2.02)	70.50%	+11.16 (2.05)
Likelihood of choosing a 2-year fixed rate product	29.32%	+15.92 (0.61)	28.29%	+16.35 (1.23)	29.88%	+15.69 (1.12)
Likelihood of choosing a 5-year fixed rate product	33.28%	-4.96 (0.22)	38.49%	-5.72 (0.51)	30.44%	-4.54 (0.35)
Mortgage term	23.78y	+0.60 (0.02)	26.72y	+0.64 (0.03)	22.18y	+0.58 (0.07)
Sales channel						
Likelihood of using an intermediary	2.10%	+63.10 (0.30)	1.80%	+63.82 (2.58)	2.26%	+62.71 (2.29)
Relative cost metrics						
Likelihood of choosing a dominated product	11.38%	+5.53 (0.07)	9.36%	+5.06 (0.30)	12.49%	+5.81 (0.27)
Likelihood of choosing a *strongly* dominated product	6.76%	+3.45 (0.10)	5.60%	+3.21 (0.07)	7.40%	+3.60 (0.01)
Cost (deal period)						
Monthly payment	£926.18	-15.44 (0.34)	£775.95	-20.33 (3.69)	£1008.5	-12.58 (3.04)
APR	3.82%	-0.04 (0.01)	4.08%	-0.03 (0.01)	3.67%	-0.05 (0.01)
Cost (5-year)						
APR on reversion rate basis	3.94%	+0.06 (0.00)	4.14%	+0.06 (0.01)	3.83%	+0.06 (0.01)
APR on remortgaging basis	3.86%	-0.05 (0.01)	4.12%	-0.04 (0.01)	3.72%	-0.06 (0.01)

Notes: Baseline is the mean in the treatment group pre-MMR. ATT for binary and percentage outcomes is reported in percentage points. Bootstrapped standard errors (clustered on year-quarter and postcode area) in parentheses.

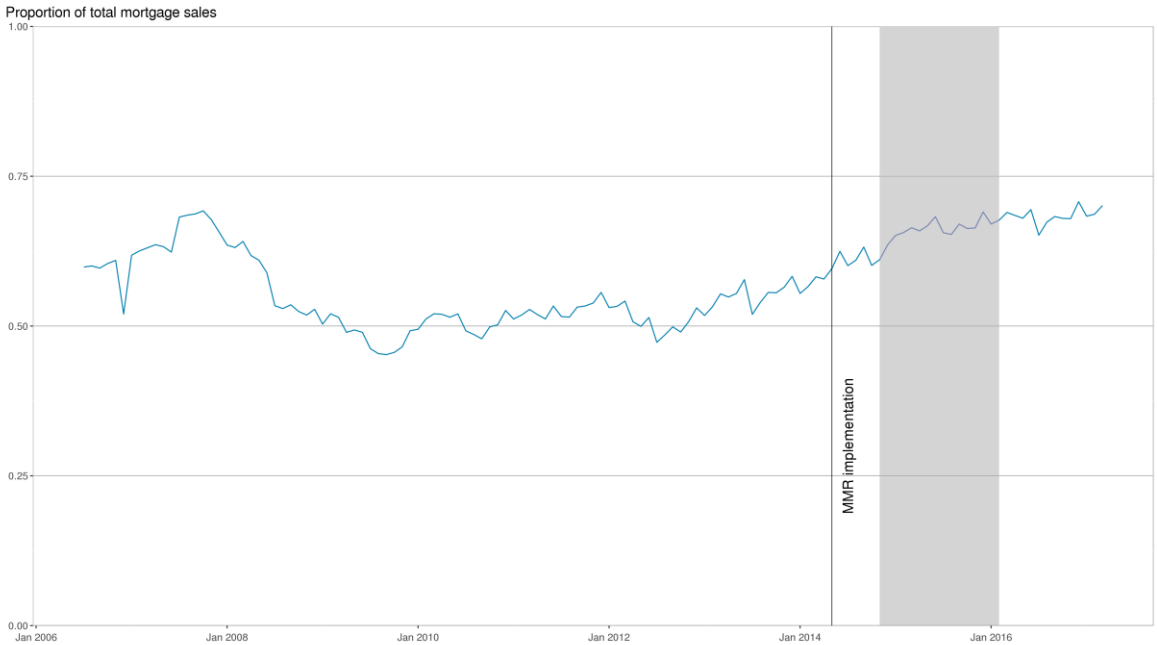
Question 2: Impact of intermediation

Our second research question focusses on the effect of intermediation, conditional on having received advice. Since around 98% of post-MMR mortgage sales are advised, we believe this approach has both methodological (in the sense that our estimates control for the role of advice) and practical merit. It does mean, however, that our estimates on the impact of intermediation do not extend to the non-advised segment of the post-MMR regulated residential mortgage market.[30]

Observation window

In line with our approach for our first research question, we define six months after the official MMR implementation date as the end of the MMR implementation period. Figure 7 shows our observation window, which is November 2014 to July 2016. In this period, around two thirds of mortgages on newly purchased properties were obtained through intermediaries, marking a substantial growth from pre-MMR intermediation levels. Note that our results on the impact of the MMR advice requirement suggest that most of the growth in intermediation is due to the consumers being brought into advice by the MMR.

Figure 7: Intermediation as a proportion of total mortgage sales over time (July 2006 – December 2016), shaded area indicates observation window



Cross-sectional matching

To measure the impact of intermediation, we use matching to compare the outcomes of similar post-MMR consumers in two groups: those who use intermediaries and those who go direct to a lender. Note that we estimate the impact of intermediation over the entire advised population – it is the Average Treatment Effect (ATE) of a consumer obtaining a

[30] It is unlikely that we would have been able to produce a credible estimate for intermediation in this population, given the small number of post-MMR non-advised sales and the fact that the overwhelming majority (93.7%) of these sales were direct.

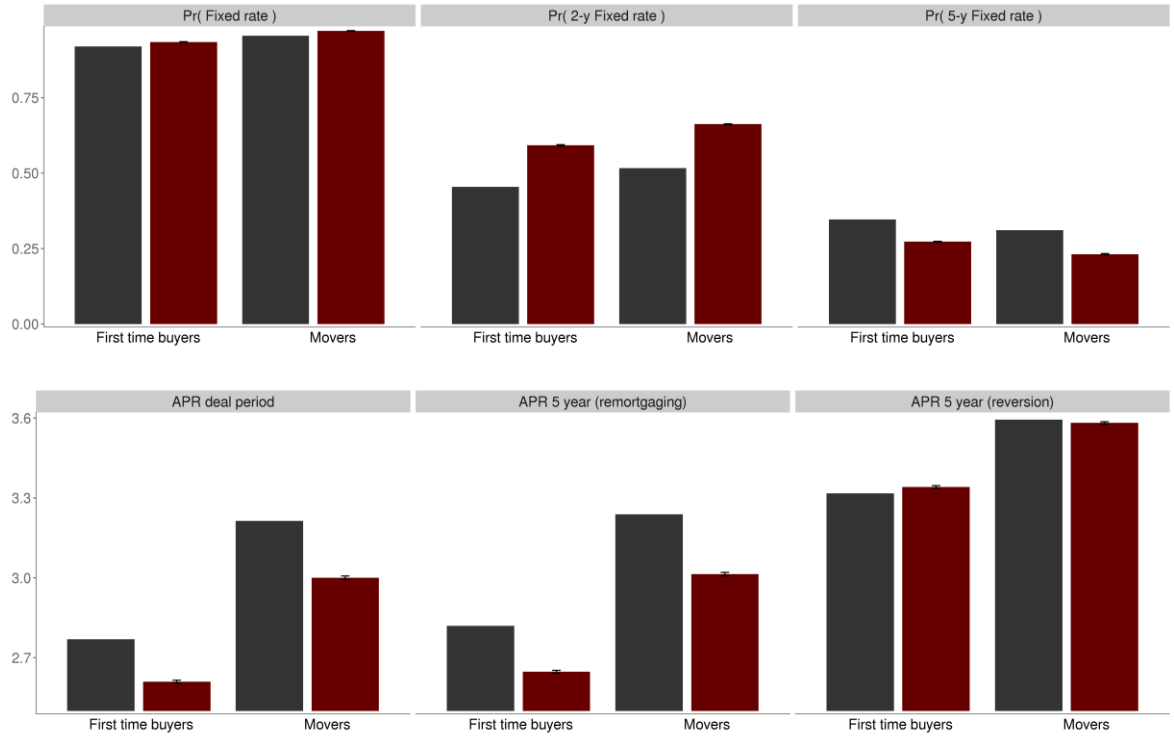
mortgage through an intermediary rather than directly from a lender, regardless of the channel actually used by the consumer.[31]

As with our first research question, our matching algorithm controls for a multitude of borrower, property and mortgage product characteristics. Our approach relies on the assumption that, once we have accounted for all the characteristics used by the matching algorithm, the potential outcomes a consumer would have obtained by going direct (or using an intermediary) are independent of the channel they actually chose. So if we take 2 people who very closely match on these characteristics, the value of intermediation would be the same for both, whether or not they both actually use an intermediary.

Impact estimates

Figure 8 shows our estimates for the impact of intermediation on key outcome variables: the type of product chosen and three APR measures of the near-term cost of borrowing. Each estimate is reported against a baseline of outcomes obtained by going direct to lender: this is an average of actual outcomes (for those who actually went direct to lender) and estimated counterfactual outcomes using matching (for those who went to an intermediary). Table 5 at the end of this section provides more detailed estimates, including further outcome variables of interest. Unless reported otherwise, the estimates discussed below are aggregate effects (averaged across first time buyers and movers).

Figure 8: Impact of intermediation on post-MMR advised consumers, key product features and cost metrics by borrower type



Notes: Top header shows outcome variable. First bar in each pair shows mean of observed outcomes (for the non-treated) and matching estimates of outcomes without treatment (for the treated), second bar shows treatment effect (ATE).

[31] Since we are interested in the average difference across the market (also called Average Treatment Effect or ATE), it will not be helpful to designate treatment and control groups for measuring the impact of intermediation.

Figure 8 shows that intermediation increases the likelihood of choosing a 2-year fixed rate mortgage (+14 percentage points) and decreases the likelihood of choosing a 5-year fixed rate mortgage (-8 percentage points). The net effect on the popularity of fixed rate mortgages is slightly positive. These effects could be explained by differences in the type of advice provided by intermediaries (for example, a greater focus on monthly repayments) or incentives for intermediaries to generate follow-up commissions by recommending shorter-term deals.

With reference to Table 5, intermediation is estimated to considerably increase the average mortgage term by 20 months (+1.65 years). Since longer mortgage contracts mean lower monthly payments, this effect may be driven by intermediaries' cautious interpretation of affordability requirements (which, itself, may itself be driven by the fact that intermediaries' remuneration is at least in part conditional on the success of the mortgage application).

Looking at the estimated effects of intermediation on the near-term cost of borrowing, our estimates suggest that the average consumer going to an intermediary does pay lower costs. This is reflected in a substantially lower (-£58) average monthly payment during the deal period, but also in lower APRs (which include all relevant fees, including remortgaging costs). Under the assumption of prompt remortgaging, the average 5-year APR is 20 basis points lower for consumers who use an intermediary. If we assume that the consumer does not remortgage at the end of the deal period, the differential impact of intermediation becomes effectively zero. Because the behaviour of the typical consumer will be between these extremes, the average effect of intermediation in the near term is likely to be a decrease in interest costs. It is worth bearing in mind, however, that the APR estimates do not take into account the effect of longer mortgage terms. Table 5 also shows that a consumer using an intermediary is slightly less likely to choose a dominated product (-1 percentage point).

Robustness checks

Sample weighting. Appendix 3, Table A9 shows estimates from a model that weights each observation in the sample to the population. Comparing these estimates with those reported in Table 5, the differences between the original sample and weighted sample results appear small. With the possible exception of the monthly payment ATE (-£58 in the original sample versus -£88 in the weighted sample), the estimated effects are so similar across models that it seems unlikely that sampling bias affects our original estimates.

Specification. To ensure that our estimates are robust to changes in specification, we estimated various alternative models that are reported in the Appendix. We check that our results are not sensitive to our choice of post-MMR observation window. Table A10 in Appendix 3 shows the results of a model that reduces the observation window to 12 months (July 2015 – June 2016). As a comparison with the above results shows, our results do not materially vary with the choice of observation window.

Subpopulations of interest

As with advice, it may be the case that intermediation has stronger effects on the decisions of subsets of the consumer population. We therefore look at the effect of intermediation in sub-populations of interest, by splitting the sample by buyer type (first-

time buyer or mover) and quartiles of main borrower age, income and credit score. For simplicity, we report estimates for the unweighted model only. For buyer type, the findings are reported here; results for the other subpopulations are reported in Appendix 4. Appendix 4 Figures A6-8 show the (original, unweighted sample) treatment effects for the different sub-populations of interest.

Although there are notable differences between the pooled means of different subgroups, treatment effects do not appear to differ much between subgroups.

Table 5: Average Treatment Effect (ATE) of intermediation on the post MMR advised population (sample).

	Full sample		*First time buyers*		*Movers*	
	Baseline	ATE	Baseline	ATE	Baseline	ATE
Product features						
Likelihood of choosing a fixed rate product	93.55%	+1.55 (0.14)	95.50%	+1.66 (0.09)	92.10%	+1.48 (0.06)
Likelihood of choosing a 2-year fixed rate product	48.15%	+14.10 (0.03)	51.70%	+14.54 (0.16)	45.52%	+13.78 (0.19)
Likelihood of choosing a 5-year fixed rate product	33.17%	-7.62 (0.03)	31.10%	-7.97% (0.39)	34.71%	-7.37 (0.54)
Mortgage term	24.44y	+1.65 (0.03)	26.95y	+1.64 (0.05)	22.59y	+1.67 (0.02)
Relative cost metrics						
Likelihood of choosing a dominated product	35.21%	-1.10 (0.39)	32.21%	-0.97 (0.06)	37.44%	-1.20 (0.36)
Likelihood of choosing a *strongly* dominated product	21.98%	-2.39 (0.26)	20.18%	-2.28 (0.33)	23.31%	-2.56 (0.13)
Cost (deal period)						
Monthly payment	£924.24	-58.06 (1.90)	£746.84	-33.54 (2.36)	£1055.9	-76.37 (4.18)
APR	2.96%	-0.18 (0.01)	3.21%	-0.21 (0.01)	2.77%	-0.16 (0.01)
Cost (5-year)						
APR on reversion rate basis	3.43%	0.01 (0.00)	3.60%	-0.01 (0.00)	3.31%	+0.02 (0.00)
APR on remortgaging basis	3.00%	-0.20 (0.01)	3.24%	-0.22 (0.01)	2.82%	-0.17 (0.01)

Notes: Baseline is the mean of observed outcomes (for the non-treated) and matching estimates of outcomes without treatment (for the treated). ATE for binary and percentage outcomes is reported in percentage points. Bootstrapped standard errors (clustered on year-quarter and postcode area) in parentheses.

5 Conclusion

In this paper, we compare consumer outcomes after, and as a result of, the FCA's Mortgage Market Review (MMR). We focus on the impact of two important aspects of the UK residential mortgage market: regulated advice and intermediation. To answer these questions, we construct a unique, detailed dataset on consumer outcomes for the entire population of first-time buyers and home movers in the UK who obtain regulated mortgage contracts.

Advice

We focus on the types of consumer who took advice post-MMR but (in all probability) would not have done so before the MMR. This is a substantial part of the population: some 20% of first-time buyers and 30% of home movers. We find that advice has a significant effect on the type of product bought by these consumers, showing a marked increase in the popularity of 2-year fixed mortgage sales, some of which comes at the expense of 5-year fixed mortgages. We also find that advice leads consumers to buy mortgages with longer terms. These effects on product features have a straightforward explanation as they are more likely to be suitable for a broad range of borrowers. For example, more fixed-rate mortgages and shorter fixing periods offer more flexibility, while longer mortgage terms offer lower monthly payments.

We estimate small and ambiguous effects of advice on the cost of borrowing in the population of previously non-advised consumers. Relative to the cheapest product in the chosen product class, costs slightly increase. This may be a function of the greater popularity of 2-year fixed rate products, of which there are many in the market and which therefore may be harder to compare. What's more, the effect of advice on absolute measures of cost is negligible as APR measures calculated under different assumptions show relatively small differences. Our original sample estimates range from -5 to +6 basis points on APR, whereas a population-weighted model suggests a slight increase in average costs due to the advice requirement.

In sum, we do not find strong evidence that the advice requirement made a meaningful difference to the cost of borrowing for the affected consumer population. One may argue that this was to be expected and, as we indicated in the introduction, we did not have strong priors either way. In the context of the increased reliance of intermediation in the treatment group, however, it is slightly surprising that the advice requirement had so little impact on cost. It is, after all, one of the functions of intermediation to help the consumer shop around for a good deal. In fact, our estimates of the impact of intermediation on the entire advised population suggest that intermediaries do help consumers select better-value deals. It may be the case that the population affected by the advice requirement contains mostly consumers already capable of finding a good deal on their own.

Intermediation

We measured the impact of intermediation on the population of advised borrowers (98% of the post-MMR market). We find that consumers using an intermediary are more likely to choose a 2-year fixed rate mortgage, and less likely to choose a 5-year fixed rate. We also find that consumers using an intermediary choose longer mortgage terms. We cannot attribute these differences to the regulatory advice standard, since the same standard applies to both intermediated and direct sales. It may, however, be the case that intermediaries have a more cautious interpretation of the advice standard, and/or the affordability and eligibility criteria used by lenders. An alternative explanation is that intermediaries have incentives to generate follow-up commissions by recommending shorter-term deal periods. Although these mechanisms may all operate to some extent, our data does not allow us to distinguish their relative contributions.

We estimate that the use of an intermediary reduces the near-term average cost of borrowing. This is true for the cost of borrowing during both the deal period and a longer period including remortgaging. Only under the assumption that the borrower does not remortgage at the end of the deal period does the cost difference between an intermediated and direct mortgage sale disappear.

Limitations

As with all research, there are some limitations to our findings. First, our findings apply to first time buyers and home movers only. We do not know whether they would extend to the large contingent of remortgagors in the UK market. Second, we do not have data on unsuccessful mortgage applications, only originations. This means that we are restricted to looking at consumer outcomes, conditional on having successfully secured a mortgage. It also means that we cannot assess the impact of advice and/or intermediation on securing a mortgage, or incorporate consumers' application history in our propensity score model. Third, our research questions are limited to the measurement of consumer outcomes in the short run – longer term outcomes, such as repayment performance, remortgaging choices and wider financial well-being would be interesting topics for follow-up studies.

Finally, we acknowledge that there are aspects of consumer decision-making for which our combined dataset does not provide measures. We do not measure suitability. We do not have estimates of how consumers value their time (neither the time spent on advice nor the time spent waiting for a mortgage application). We have no subjective measures of how consumers value having recourse to the Financial Ombudsman's Service after receiving advice, or how they value customer service, speed of delivery or certain features of mortgage products. Although we believe these caveats do not materially affect the usefulness of our findings, we urge caution in interpreting them as the full story.

Lessons and reflections

We hope that our evaluation of the MMR advice requirement constitutes a good example of how regulators can use detailed regulatory returns, supplemented with the required

details on consumers and products, to estimate the effect of a policy on consumer outcomes. Ultimately, the best way to evaluate a policy is to measure its effect; our constructed dataset of detailed individual sales data provides an objective measure of the products chosen.

The amount of detail in the product data allows us to take into account eligibility and include all relevant fees and charges in our cost calculations. Because the question of long-term creditworthiness loom large in the mortgage market, it is also essential to control for borrowers' credit history and credit score at the time of application. Borrower credit files also include other information that is valuable for an analysis of the residential mortgage market, such as previous holdings of financial products – in general and with specific lenders.

We find no evidence, either in aggregate or for subgroups of consumers, that advice has had a material effect on mortgage costs for consumers who did not make use of advice before the MMR. This suggests that those consumers are capable of picking a well-priced mortgage product on their own; a relaxation of the requirement to receive advice may better meet their needs.

Although the trend towards shorter-term fixed rate products is already apparent from the aggregate data, our findings suggest that the advice requirement and increased intermediation are partly responsible for this trend. It is worth reflecting on whether advisors' increased inclination to recommend 2-year fixed rates is a feature of the current low-interest rate environment, or whether institutional factors are also at play here. Shorter term fixing periods mean that remortgaging risk in the UK is now largely a short-term question: an increase in interest rates would affect the majority of first-time buyers and home movers within 2 years. If rates were to rise, these consumers may have to adjust their consumption sooner than would have previously been the case.

The impact of intermediation on the length of mortgage terms is another salient finding. Economic theory predicts that longer mortgage terms are most beneficial to certain types of borrower – for example, younger borrowers, consumers with volatile incomes, consumers who expect their income to increase substantially, consumers who hold expensive unsecured debt. It is not immediately clear that intermediation would be more likely to bring out such preferences, although this may be the case. Given that intermediaries' remuneration is contingent on a successful mortgage application, they may have an incentive to recommend longer term mortgages to avoid falling foul of affordability requirements. An alternative explanation is that mortgage advisors working at lenders are better informed of affordability requirements.

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Appendix 1: Methodology

Impact of advice

The MMR advice requirement meant that nearly a quarter of prospective borrowers, specifically those that had previously been able to obtain a mortgage without receiving advice, would now receive advice. It seems a fair assumption that these consumers, given the choice, would have chosen not have received advice. The question of policy interest, therefore, is how the advice requirement has affected their choices. If these consumers were making informed choices without advice, then arguably advice should not affect their outcomes. We therefore estimate the effect of advice on these consumers.

To be precise, we estimate the Average Treatment effect on the Treated (ATT) using difference-in-difference matching on the propensity score.

We define outcomes as follows,

$Y^A(i,t)$ = outcome for individual i at time t after receiving advice;

$Y^N(i,t)$ = outcome for individual i at time t without advice.

And rely on the following notation,

$t = 0$ as the pre-MMR period;

$t = 1$ as the post-MMR period;

$D \in \{A, N\}$ to indicate treatment (advice) at $t = 0$.

It is not necessary to specify whether individuals receive advice at $t = 1$ (post MMR), since all individuals in the post-MMR population were treated with advice.

Identification strategy

Our identification problem centres on constructing the counterfactual for the treatment group (which we refer to as the *non-advised population*). We wish to compute an estimate of how the outcomes of individuals in the non-advised population change depending on whether they do or do not receive mortgage advice,

$$ATT_t = E[Y^N - Y^A | D = N] = E[Y^N(i,t|D = N)] - E[Y^A(i,t|D = N))].$$

The outcome $Y(i,t)$ may be a particular aspect of the chosen mortgage product, a metric that combines multiple aspects (such as APR) or a metric that compares the product to other relevant products (such as the dominance metric).

The ATT at $t = 1$ can be rewritten as

$$(E[Y^N(i,t = 0|D = N)] - E[Y^A(i,t = 1|D = N)]) -$$

$$(\, E[Y^N(i,t = 0|D = N)] - E[Y^N(i,t = 1|D = N)]\,)$$

We can now see the identification problem more clearly. Two hurdles need to be overcome to construct a valid counterfactual. First, we do not actually observe the same person at two different points in time – we have repeated cross-sectional data. Treating the selection problem as one on observables, we match consumers in the non-advised

population to those in control populations on the propensity score of taking up advice given their characteristics X. We represent this henceforth by conditioning on the predicted propensity score $p(X)$.

Second, we do not observe one of the expectation terms in the ATT equation and therefore cannot compute the estimate without making a further identifying assumption. We opt for the following *common trend* assumption:

$$E[Y^N(i,t=1 \mid p(X), D=N) - Y^N(i,t=0 \mid p(X), D=N)] =$$

$$E[Y^A(i,t=1 \mid p(X), D=A) - Y^A(i,t=0 \mid p(X), D=A)]$$

In words: controlling for propensity score, non-advised outcomes in the non-advised population and advised outcome in the advised population follow a common trend over our MMR implementation period. In Appendix 5 (Common trends), we plot the means of these two populations conditional on their propensity score. This allows us to investigate the plausibility of this assumption with data from our pre-treatment observation window. It appears that the common trends assumption is plausible, although for one variable (likelihood of an intermediated sale) the trend over time for the non-advised population is hard to assess.

Another, perhaps more intuitive, way of arriving at this assumption is to decompose it into the following two sufficient conditions (controlling for propensity score): i) advised outcomes in the non-advised and advised populations follow a common trend over the MMR implementation period and ii) the treatment effect of advice remains constant over the implementation period.[32]

Under the common trend assumption stated above, the ATT of mandated mortgage advice can be recovered by the following equation,

$$ATT_{t=1} = \ (E[Y^N(i,t=0|p(X), D=N)] - E[Y^A(i,t=1|p(X), D=N)]) -$$

$$(\ E[Y^A(i,t=0|p(X), D=A)] - E[Y^A(i,t=1|p(X), D=A)]\ )$$

Note that our approach additionally requires sufficient common support in the treatment and control populations, in the pre-MMR cross-section and over time. In other words, the pre-MMR advised population needs to contain a sufficiently large representation of the pre-MMR non-advised population (the treatment group) and the post-MMR control populations need to contain a sufficiently large representation of the corresponding pre-MMR population. In practice, this boils down to having a sufficient number of observations to match on propensity score across groups. We evaluate these data requirements in the *Common support* sub-section below.

ATT estimation

We estimate the ATT using Gaussian kernel matching, with Silverman (1986) rule-of-thumb bandwidth selection rule. The results of this paper are robust to a wide range of alternative bandwidths as shown in Table A12.

[32] The former condition seems plausible, given that it is ostensibly weaker than the common trend assumption we rely on, and by itself allows us to recover the ATT of advice at $t = 0$ (pre MMR). The second condition, which is supported by lenders' and intermediaries' responses to the Mortgage Market Study consultation (refs), allows us to extend our findings to post-MMR advice.

Propensity to take advice

We implement matching on the propensity score, which has the joint benefits of dimension reduction and controlling for the treatment decision by the (estimated) propensity to use an intermediary. To model this propensity, we must first ask what factors affect consumer choice on whether to use an advisor.

Self-selection into advice

As is common in the evaluation literature, the first step to answering this question is to set out a simple decision rule that determines whether consumer *i* chooses to take advice. Using the notation set out above this decision can be summarised as:

$$D_i = \begin{cases} A \text{ if } E_i[Y^A(i,t)|D_i = A] - E_i[Y^N(i,t)|D_i = N] \geq e_i^A + \epsilon_i \\ N \text{ otherwise} \end{cases}$$

This means that a consumer *i* will choose to get advice if its expected benefit exceeds the cost of receiving advice, modified by a random variation in preferences. For practical applications including our propensity score literature, we think of the selection decision as a linear index model which can be represented by:

$$D_i = A \text{ if and only if } M_i\varphi + v_i \geq 0$$

where M_i are observable mortgage borrower characteristics and other aspects of the sale that affect benefits or effort cost of advice or both (and their interactions), φ are coefficients, and v_i is the residual component in the decision to take advice that is driven by factors we do not observe. As suggested above, for difference-in-differences matching to be valid, we need: $\Delta Y_i^A, \Delta Y_i^N$ to be independent of D_i (and thus v_i), conditional on all M_i.

In our case of modelling the pre-MMR decision on whether to take advice, there are two additional important considerations. First, consumers who use intermediaries virtually always use advice, whereas those who go directly to a lender vary in their advice choices. This means that selection into intermediation (discussed more in the next section) is nested in in thinking about selection into advice as it appears very difficult to opt out of advice when using an intermediary. Second, recall that not receiving or following advice meant that to consumer would lose the right to seek redress from the Financial Ombudsman if their chosen mortgage proved unsuitable (but keep rights to redress for other reasons). This means that the benefits of advice might include not just information to help with product type choice but also the value of the additional regulatory protection.

Broadly speaking, expected benefits of the information and help provided by the advisor are likely to depend heavily on borrower's financial sophistication (how hard is it to make the choice on their own), complexity of borrower's circumstances (e.g. the implications of higher income volatility for self-employed for the appropriate mortgage type) and opportunity cost of time (including propensity to shop around in other cases). The value placed on additional protection might also depend on the stakes for the borrower if a less suitable choice is made (e.g. loan-to-income ratio, etc.), perceived risk of not making the right decision (financial sophistication) and risk aversion. Many of these factors could also affect outcomes (Y_i). We discuss how we control for these factors (and variables generally highlighted in the literature on demand for advice) in the next sub-section on the variables included in our propensity score model.

There are, however, additional factors that may affect whether the borrower takes advice without an obvious direct link to our outcomes of interest, let alone to their change over time. Many of these factors 'shift' the effort and time costs of obtaining advice. For instance, a consumer might not feel they need advice but prefers to clarify something about the terms of their chosen product in the branch before they apply for the mortgage. The ability of bank staff available at the time to answer these specific queries could make a difference between an advised and non-advised transaction. If advice is only weakly preferred, another example of a situational source of randomness is the availability of appointments with an advisor in the chosen branch and/or convenience of the wait time. Finally, the consumer's trust in the value of advice can be affected by exogenous shocks, e.g. reported experiences in their social network.

Conditional on the large number of observed demographic and situational characteristics we include in the model, factors such as bank branch staff expertise and availability of appointments provide an important source of random variation in the uptake of advice that makes satisfying the common support assumption that underlies our matching approach possible.

Propensity score variables

Table A1 describes the borrower, property and area characteristics we use to estimate the propensity score for getting advice. The choice of variables is informed by the conceptual selection model we set out above, as well as specific variables suggested in the relevant literature on demand for financial advice.[33]

First of all, the consumer's need for advice will depend on experience, knowledge of the market and financial capability more generally. We therefore include in our model demographics such as age, gender, education (measured directly for those with postgraduate titles and indirectly through two postcode-level proxy variables) and whether the mortgage is jointly held (i.e. marital and relationship status). We also include behavioural variables that proxy for the consumer's experience with financial products and sophistication in using these products (notably the expensive practice of taking out cash advances on one's credit card and whether the consumer has been making minimum payments on their credit card). Finally, the consumer may be overwhelmed by choice if eligible for many different products – we therefore include a metric that captures this complexity.[34]

Furthermore, the value of information on the products available to the consumer will depend on the credit commitment relative to income (LTI) and property value (LTV), plus concerns consumers may have about their eligibility. The variables representing these concerns in our model are income, employment status, credit score, an additional impaired credit flag, property value, LTI and LTV. Income and borrower type (first-time buyer or mover) also proxy for opportunity cost of time. Note also that property price is likely to be a good proxy for household wealth and credit score is also likely to reflect consumer ability to manage their finances (in addition to measuring their riskiness to the lender).

[33] Existing research on demand for advice and intermediation typically doesn't distinguish between these two services, which is helpful given that intermediation decision is linked to the choice to receive advice in our application. The literature also typically focuses on financial advice on investments rather than mortgages, but the relevant demographics are likely to be similar.

[34] Specifically, using Moneyfacts data on available products and eligibility criteria, we estimate the number of mortgage products (across the market, at the time of application) that the consumer will be eligible for based on LTI, LTV, credit score and property location.

Table A1: Covariates for Logit propensity score, Pr(Advice).

Variable group	Variable description
Borrower	First time buyer dummy
	Joint mortgage dummy
	Main borrower age
	Main borrower gender (derived from title)
	Main borrower employment status
	Main borrower postgraduate qualifications (derived from title)
	Combined gross income (percentile in overall distribution in year-quarter of transaction)
	Credit score at time of application*
	Impaired credit flag
Borrower financial capability	Combined number of financial product types held in past 6 years*
	Diversity of borrower's financial product holdings across providers (Herfindahl-Hirschman index for (i) all credit products and (ii) current accounts)*
	Main borrower number of credit card cash advances in last 12 months*
	Main borrower number of credit cards with minimum payment flag set*
Borrower financial capability area proxies (based on application postcode)	Postcode area % with university degree or higher**
	Postcode area % unskilled/partly skilled workers**
Loan	Loan-To-Income (LTI) ratio (percentile)
	Loan-To-Value (LTV) ratio (percentile)
Property	Property value (percentile)
	New build
	Problem property proxy
Property area	Postcode area % unskilled/partly skilled workers**
	Postcode area % with university degree or higher**
	Postcode area % unemployment**
	Postcode area % of houses with zero county court judgements**
	Postcode area average number of defaulted credit accounts**
	Property region fixed effects
Choice complexity	Number of mortgage products that borrower is eligible for***

Notes: Data is taken from PSD unless indicated otherwise: * indicates variable taken from credit file; ** = variable taken from UK Census; *** = variable taken from Moneyfacts product data.

Our model also accommodates an additional dimension of eligibility: lenders can be selective on the kind of property they will lend on. This includes newly built properties, properties in areas with low rates of home ownership and properties that have idiosyncratic features that make them less desirable. We control for these property features either directly – in the case of newly built properties – or by proxy: various postcode-level characteristics that correlate with the rate of home ownership, as well as a dummy variable (*problem property proxy*) that indicates whether the property has a significantly lower value than other housing of the same size and in the same postcode area).

Given that one of our matching dimensions is longitudinal, we convert numerical variables that may change over time to a percentile ranking metric (based on calendar quarter-year). We apply this conversion to measures of income, LTI, LTV and property value.

Existing research suggests that the likelihood of using a financial advisor can vary with financial knowledge, income, age, education, gender, marital status, employment status and stakes (e.g. amount invested).[35] Studies based on survey data also report an association, albeit small, between stated attitude to risk and demand for advice (e.g. Robb et al. 2012). We are able to control for all these factors directly, with the exception of risk aversion. However, risk aversion has been shown to correlate with demographic variables in our model – notably gender, income, marital status, self-employment and age (Halek and Eisenhauer, 2001). Moreover, our measures of the borrower's credit history and choice of leverage would also be affected by their risk appetite and proxy for its variation. It therefore appears implausible that even conditional on observed behaviour and relevant demographics there is significant residual variation in borrower risk aversion *and* that this residual variation is linked to change in outcomes over time in a way that would materially threaten DiD matching identification.

Propensity score econometric estimation and performance

Our propensity score model is fully interacted and allows for non-linearity in numerical variables by incorporating their squared terms. To represent our model specification, it will be convenient to split the explanatory variables into two sets based on variable type: X contains all numerical variables and D contains all categorical variables in binary form (i.e. variables with $c > 2$ categories have been transformed into a set of $c-1$ binary dummy terms). We can now write our model as follows,

$$\Pr(Advice) = \alpha + \sum_{x \in X} \beta_x x + \sum_{x \in X} \gamma_x x^2 + \sum_{d \in D} \delta_d d + \sum_{z_1 \in Z} \sum_{\substack{z_2 \in Z \\ z_2 \neq z_1}} \zeta_{z_1, z_2} (z_1 \times z_2)$$

where $Z = X \cup D$ represents the full set of interaction terms.

We estimate the propensity score model using LASSO (Least Absolute Shrinkage and Selection Operator) regression, our method for data-driven variable selection. We select the regularization parameter on the LASSO using the standard 10-fold cross-validation algorithm.[36]

Table A2 shows the predictive performance of our model, estimated on all available pre-MMR observations (mortgage sales between July 2012 and November 2013) in our

[35] See, for instance, Lee and Cho (2005), Robb et al. (2012), Hackethal et al. (2012) and Calcagno and Monticone (2015).

[36] See Tibshirani (1996) on the methodology and Friedman et al. (2005) on implementation.

estimation sample. It is not meaningful to test this after the MMR implementation, since $\Pr(Advice) = 1$ for this period.

First, we create bands based on deciles of the distribution of the predicted propensity scores and calculate the actual proportion of consumers getting advice in each decile. Because of the high proportion of advised transaction in the overall data, the share of advised transactions is above 50% in all deciles. Nonetheless, the model has considerable predictive power, with the share of advised consumers rising from 61% in the bottom decile of predicted propensity scores to 94% in the top decile.

As a second measure of predictive performance we show the proportion of all non-advised consumers who are allocated to each propensity score decile. Almost 40% of all these borrowers are in the bottom two propensity score deciles and a small minority are allocated into the top bands. This suggests that the model performs well in ranking borrowers' propensity to take advice. Note that a perfectly discriminating model is neither realistic nor desirable. As described above, there is a large circumstantial (random) component to borrowers' advice choice that is not related to outcomes we are interested in. Moreover, propensity scores from a nearly perfectly discriminating model would have little overlap between advised and non-advised consumers and would thus violate the common support assumption.

Table A2: Pr(Advice) propensity score model validation

Propensity score decile	P(Advice) in band	No. non-advised in band/ Total no. non-advised
1	0.612	0.222
2	0.727	0.156
3	0.782	0.125
4	0.816	0.105
5	0.838	0.093
6	0.856	0.082
7	0.873	0.070
8	0.894	0.061
9	0.913	0.050
10	0.943	0.033

Note: Estimates from the cost outcomes sub-sample. The predictive power of the model is nearly identical in the non-cost outcome sample and is not reported separately.

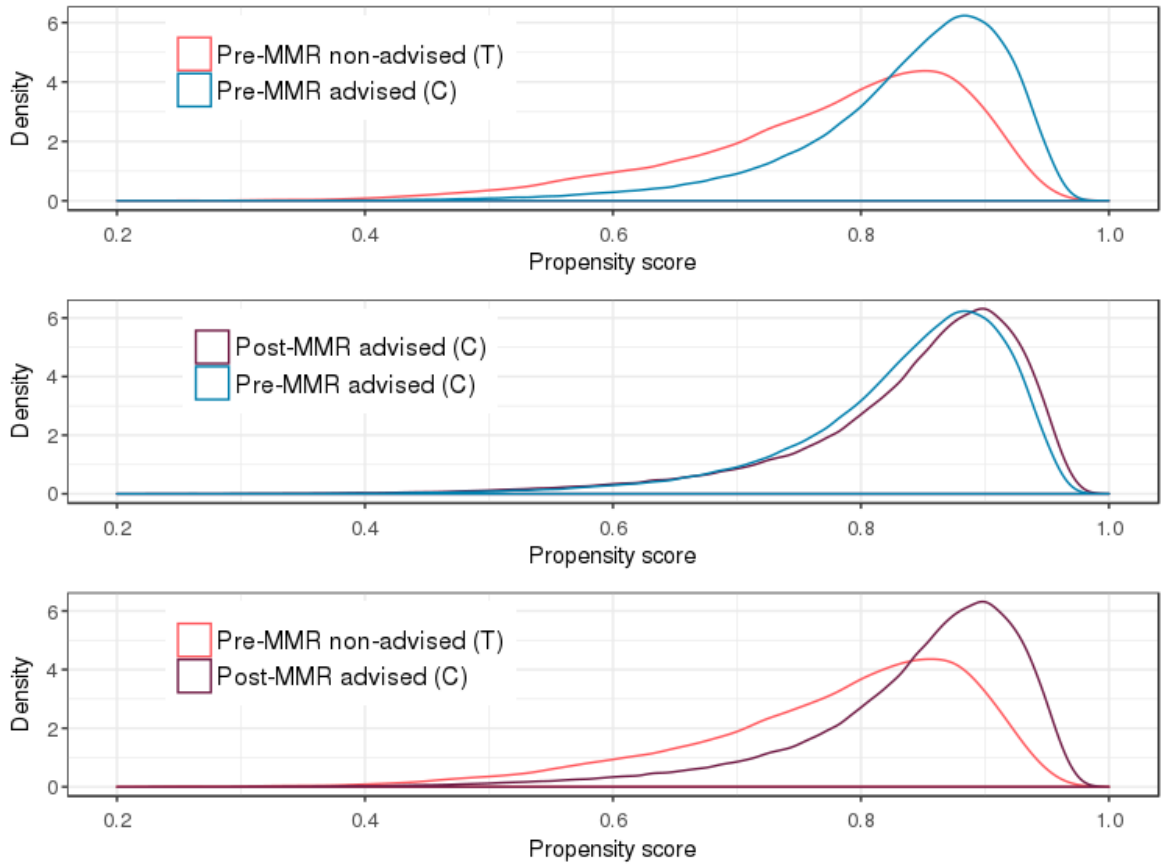
Common support

To construct a plausible counterfactual (and estimate unbiased treatment effects), matching requires that the distribution of observables in the treatment group has support in common with the control group(s). The three panels in Figure A1 show the extent to which this holds for predicted propensity scores between the treatment group and the relevant control groups. Panel A compares the pre-MMR treatment (non-advised consumers) and pre-MMR control group (advised consumers); panel B compares the

treatment group and the post-MMR control group; panel C compares the pre-MMR control group and the post-MMR control group.

As Figure A1 shows, the domain of the propensity score metric for the treatment group is covered well by the respective control groups; furthermore, each control group is larger in size than the corresponding treatment group. The common support assumption therefore seems warranted.

Figure A1: Distribution of p-scores (propensity to take advice).



Impact of intermediation

Our second question of interest concerns differences in outcomes between consumers who obtain a mortgage direct from a lender and those who use an intermediary – *conditional on receiving advice*. In contrast to the previous question, this research question does not constitute the evaluation of a policy. We are simply interested in whether consumers with similar (observable) characteristics obtain different outcomes in the intermediated channel.

Because intermediaries provide access to a wider range of mortgage products than a single lender, it is often claimed that consumers will save money by going to an intermediary. However, intermediaries have no obligation to provide the cheapest product and may instead claim their added value lies in superior customer service and faster processing. Since we cannot measure the latter dimensions, we focus instead on the consumer outcomes defined in the Data section and certain product characteristics (fixed or variable interest rate, fixed rate period, contract term) to see whether intermediaries have an effect on product type selection. Our question is best phrased as whether, besides supporting the mortgage application process, intermediaries offer additional value in terms of improved consumer choices.

We define outcomes as follows,

$Y^I(i)$ = outcome for individual i when using intermediary;

$Y^L(i)$ = outcome for individual i when going direct to lender.

Note there is no time subscript as we use cross-sectional data from a single period (post MMR).

Identification strategy

We want to measure the difference between the intermediated and direct channels over the entire advised population, obtaining an Average Treatment Effect (ATE),

$$ATE = E[Y^I(i) - Y^L(i)] = E[Y^I(i)] - E[Y^L(i)]$$

which presents us with the classic counterfactual problem. The identifying assumption is that, once observables have been controlled for (using the estimated propensity to choose an intermediary), outcomes are independent of the channel chosen,

$$E[Y^I(i) \mid p(X), D = L] = E[Y^I(i) \mid p(X), D = I] = E[Y^I(i) \mid p(X)]$$

$$E[Y^L(i) \mid p(X), D = L] = E[Y^L(i) \mid p(X), D = I] = E[Y^D(i) \mid p(X)]$$

where the treatment variable $D = I$ indicates those who go to an intermediary and $D = L$ those who go direct to a lender. This assumption allows for the ATE to be rewritten as,

$$ATE = E[Y^I(i) \mid p(X), D = I] - E[Y^L(i) \mid p(X), D = L]$$

which can be computed with the matching estimator over treatment and control groups in the cross-sectional data.

ATE estimation

We estimate the ATE using Gaussian kernel matching, with Silverman (1986) rule of thumb bandwidth selection rule. The results are not materially sensitive to other bandwidth choices as shown in Table A12.

Propensity to use an intermediary

As before, we start by describing a stylised decision rule for whether or not a consumer uses an intermediary.[37] We then describe the variables we use in our model for the consumer propensity to use an intermediary, how well those cover the main drivers of consumer choice, and whether other sources of random variation in our model pose endogeneity concerns.

Self-selection into intermediation

Using the notation above, the decision rule for consumer *i* using an intermediary is:

$$D_i = \begin{cases} I \text{ if } E_i[Y^I(i)|D_i = I] - E_i[Y^N(i,t)|D_i = N] \geq e_i^A + \epsilon_i \\ L \text{ otherwise} \end{cases}$$

which we can summarise as:

$$D_i = I \text{ if and only if } M_i\varphi + v_i \geq 0$$

M_i are observable variables (or their interactions) on mortgage borrower characteristics or other aspects of the sale that affect the expected benefits of intermediary help and/or the effort required to get this help, φ are coefficients, and v_i is the residual variation in the net attractiveness of intermediation for borrower *i* that is driven by factors we do not observe. Our identifying assumption for matching requires that Y_i^I, Y_i^L be independent of D_i (and thus v_i), conditional on all M_i.

So, what are the factors that affect benefits and costs of intermediation? Starting from first principles, we propose that the main functions of the intermediary (incremental to advice) are to economise on search costs of finding and comparing a large number of mortgage products (including accessing some intermediary-only products), support the consumer during the application process and pair a consumer with a lender that is likely to accept them, thus potentially increasing increase chances of a successful and speedy mortgage application. The extent to which consumers perceive a need for any of these functions will determine the strength of their preference for using an intermediary. In broad terms, demand for search and mortgage application assistance is therefore likely to depend on consumer financial sophistication (perhaps non-linearly), complexity of their circumstances and value of their time.

Those factors could also have an effect on the effort and time costs of using an intermediary (e.g. an unsophisticated borrower may not know what intermediaries have to offer them or how to find a good one). Financial knowledge, willingness to shop around, unusual borrower or property characteristics and available time are all factors that could affect our outcomes directly, so we make sure to control for them in the propensity score model.

Some idiosyncratic aspects of the housing transaction can affect the likelihood of using an intermediary without influencing cost outcomes or product preferences directly. Similar to the case for advice, waiting times for appointments at lenders (or intermediaries) may lead borrowers to switch channels. Borrowers can also be swayed by recommendation from other parties in the transaction. For instance, almost a third of respondents in the recent FCA Financial Lives Survey said they had used their

[37] Note that we assume that the consumer chooses a property to purchase first, then looks for a mortgage to secure the property.

intermediary because of a recommendation from a real estate agent or a solicitor.[38] Whether real estate agents refer customers to mortgage intermediaries varies depending on the company and is another plausible exogenous shock to borrower decision. Similarly, borrowers' demand may be affected by their own previous experiences with intermediaries or those of their social circle.

Finally, we control for some of variability in local supply in intermediary services by using granular regional fixed effects in the propensity score model. More generally, however, idiosyncratic factors that 'shift' the effort of using an intermediary are natural components for the v_i vector in the decision rule – providing random variation needed to satisfy the common support assumption for matching while being independent of outcomes (conditional on other controls we use).

Propensity score variables

Table A3 lists the variables we include in our propensity score model to capture the demographics relevant in the literature (see section on advice) as well as more general drivers of demand for intermediation linked to our outcomes of interest: potential complications in mortgage eligibility, financial capability and propensity to shop around, and the opportunity cost of borrower's time. Some of the variables fall in more than one category.

We would expect consumers with less experience, knowledge and general financial capability to be more likely to use an intermediary. We therefore include in our model demographics such as age, gender and education (measured directly for those with postgraduate titles and indirectly through two postcode-level proxy variables). Household income and property price (as a proxy for wealth) are also often correlated with financial capability. Finally, we include some variables that directly reflect how capably the borrower has been managing their finances and their experience with financial products. In addition to the overall credit score, we measure the number of different financial products types that the borrower had recently held and how concentrated their credit product holdings, and also current accounts, specifically, are with a single lender (reflecting tendency to shop around). We also include indicators for typically unsophisticated behaviours such as the expensive practice of taking out cash advances on one's credit card or making minimum payments on their credit card.

Given the complex eligibility standards often used by lenders for different products, there are many factors that may affect intermediary demand by making borrower circumstances and eligibility more complicated. Our propensity score model captures key personal eligibility factors, such as income, employment status, credit score, an additional impaired credit flag, property value, LTI and LTV. We also capture variables related to lenders' potential selectivity on the kind of property they will lend on. This includes newly built properties, properties in areas with low rates of home ownership and properties that have idiosyncratic features that make them less desirable. We control for these property features either directly (in the case of newly built properties) or by proxy (various postcode-level characteristics that correlate with the rate of home ownership, as well as a dummy variable (*problem property proxy*) that indicates whether the property has a significantly lower value than others in the same postcode).

[38] FCA (2017) Understanding the financial lives of UK adults.

Table A3: Covariates for the propensity score, Pr(Intermediation).

Variable group	Variable description
Borrower	First time buyer dummy
	Joint mortgage dummy
	Main borrower age
	Main borrower gender (derived from title)
	Main borrower employment status
	Main borrower postgraduate qualifications (derived from title)
	Number of dependents
	Combined gross income
	Credit score at time of application*
	Impaired credit flag
Borrower financial capability	Combined number of financial product types held in past 6 years*
	Measures of how concentrated the borrower's product holdings are with a small number of lenders (HHI all credit products, HHI current accounts)*, ****
	Main borrower number of credit card cash advances in last 12 months*
	Main borrower number of credit cards with minimum payment flag set*
Borrower financial capability area proxies (based on application postcode)	Postcode area % with university degree or higher**
	Postcode area % unskilled/partly skilled workers**
Loan	Loan-To-Income (LTI) ratio (percentile)
	Loan-To-Value (LTV) ratio
Property	Property value
	New build
	Number of rooms
	Problem property proxy
Property area	Postcode area % unskilled/partly skilled workers**
	Postcode area % with university degree or higher**
	Postcode area % unemployment**
	Postcode area % of houses with zero county court judgements**
	Postcode area average number of defaulted credit accounts**
	Property region fixed effects
Choice complexity	Number of mortgage products that borrower is eligible for***

Notes: Data is taken from PSD unless indicated otherwise: * indicates variable taken from credit file; ** = variable taken from UK Census; *** = variable taken from Moneyfacts product data, **** HHI stands for Herfindahl-Hirschman index, a common measure of concentration.

Borrowers may be particularly likely to seek intermediary help when their needs are less conventional. For example, loans to self-employed consumers are typically thought of as specialist products sold through intermediaries. Other more specialist mortgage products are loans to consumers with impaired credit histories and mortgages on newly built properties. In general, the consumer may be more likely to use an intermediary if eligible for fewer loans – we therefore include a metric that captures this possibility.[39]

We control for the opportunity cost of borrower's time by adding borrower type (moving house involves buying and selling and is typically a more complex transaction), whether the mortgage is jointly held (i.e. marital/relationship status), number of dependents and, of course, income, which is a standard if rough proxy for cost of time.

Propensity score econometric estimation and performance

Our propensity score model is fully interacted and allows for non-linearity in numerical variables by incorporating their squared terms. To represent our model specification, it will be convenient to split the explanatory variables into two sets based on variable type: X contains all numerical variables and D contains all categorical variables in binary form (i.e. variables with $c > 2$ categories have been transformed into a set of $c - 1$ binary dummy terms). We can now write our model as follows,

$$\Pr(Intermediary) = \alpha + \sum_{x \in X} \beta_x x + \sum_{x \in X} \gamma_x x^2 + \sum_{d \in D} \delta_d d + \sum_{z_1 \in Z} \sum_{\substack{z_2 \in Z \\ z_2 \neq z_1}} \zeta_{z_1, z_2} (z_1 \times z_2)$$

where $Z = X \cup D$ represents the full set of interaction terms.

As before, we estimate the propensity score model using a binomial LASSO (Least Absolute Shrinkage and Selection Operator) regression, tuned with 10-fold cross-validation.

Table A4: Pr(Intermediation) propensity score model validation

Propensity score decile	P(intermediated) in band	No. direct in band/ Total no. direct
1	0.442	0.191
2	0.572	0.147
3	0.631	0.126
4	0.677	0.111
5	0.714	0.098
6	0.746	0.087
7	0.780	0.076
8	0.804	0.067
9	0.836	0.056
10	0.879	0.042

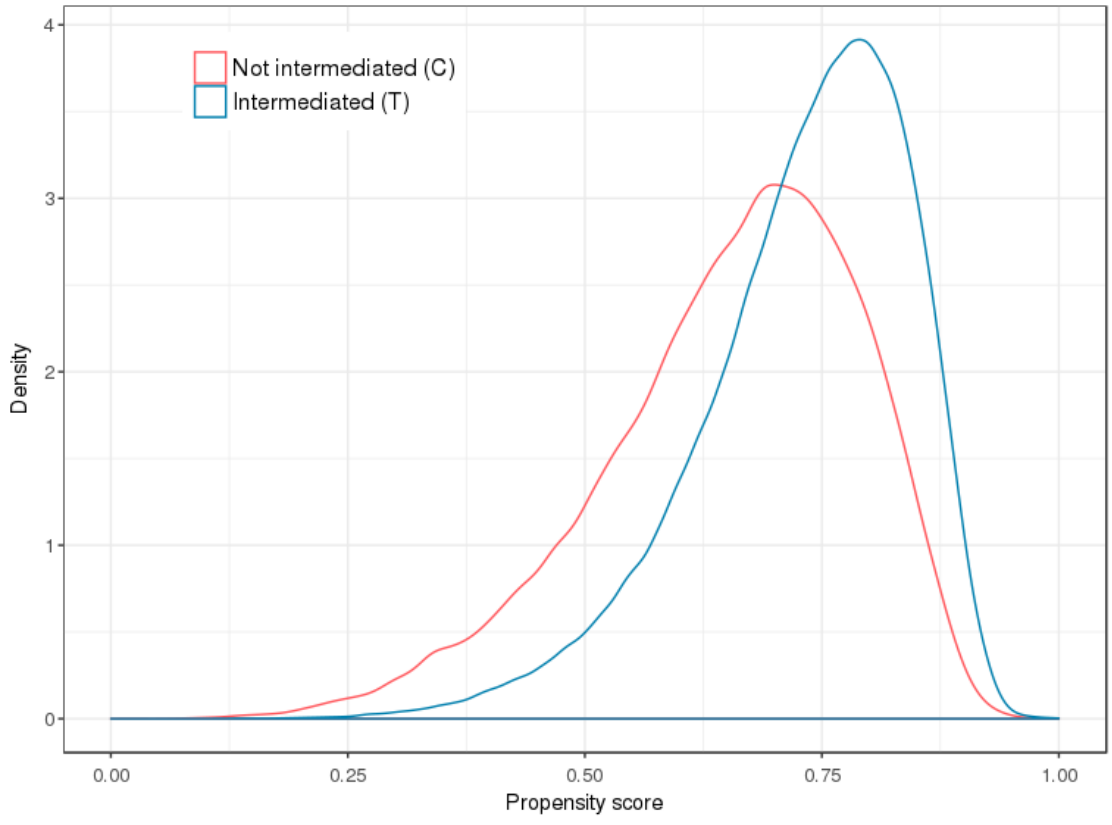
[39] Specifically, using Moneyfacts data on available products and eligibility criteria, we estimate the number of mortgage products (across the market, at the time of application) that the consumer will be eligible for based on LTI, LTV, credit score and property location.

Table A4 shows the predictive performance of our model, estimated on all available post-MMR observations (mortgage sales November 2014 and June 2016) in our estimation sample. As with advice, we divide the predicted propensity scores into deciles to determine how well the model is ranking consumers. First, we find that the proportion of the borrowers who used an intermediary is 44 percentage points higher in the top propensity score decile than in the bottom one. We also find that non-intermediated borrowers are allocated to low deciles at much higher rates than chance would predict. For instance, almost a half of all direct transactions are in the bottom three deciles by propensity score.

Common support

To construct a plausible counterfactual (and thus estimate an unbiased treatment effect), matching requires that the distribution of observables in the treatment group has support in common with the control group(s). Figure A2 shows that the distributions of propensity scores of intermediated and direct consumers both have non-zero density for all values of propensity score where at least one of them has observations. (Despite low density there are over 100 intermediated consumers with propensity scores below 0.25.)

Figure A2: Predicted propensity score.



Appendix 2: Population-sample comparisons

This section contains the following tables:

- Table A5: Borrower and loan population characteristics
- Table A6: Borrower and loan weighted sample characteristics

Table A5: Borrower and loan population characteristics

	Pre MMR (n=616,185)		*Post MMR (n=777,800)*	
Advice	Advised (77.8%)	Non-advised (22.8%)	Advised (97.5%)	Non-advised (2.5%)
First-time buyer %	47.1	31.4	41.7	39.7
Joint %	57.7	60.6	61.4	59.1
Age	35.7	37.3	36.3	35.7
Income (£k)	51.5	62.3	60.8	76.8
Loan value (£k)	153.0	169.1	186.5	209.8
Property value (£k)	222.2	267.9	276.4	330.0
Intermediated %	67.6	2.0	66.8	3.8
Channel	Direct (46.9%)	Intermediated (53.1%)	Direct (34.8%)	Intermediated (65.2%)
First-time buyer %	39.5	47.3	37.1	44.1
Joint %	58.5	58.2	60.7	61.6
Age	36.9	35.4	37.1	35.8
Income (£k)	56.6	51.5	62.2	60.7
Loan value (£k)	155.3	157.8	174.1	194.0
Property value (£k)	242.5	223.4	277.4	278.0
Advice %	53.7	99.2	93.1	99.9

Notes: All reported figures are means from the population (PSD data only). Income is total gross income as reported by the borrower to the lender for verification.

Table A6: Borrower and loan weighted sample characteristics

	Pre MMR (n=616,185)		*Post MMR (n=777,800)*	
Advice	Advised (77.8%)	Non-advised (22.8%)	Advised (97.5%)	Non-advised (2.5%)
First-time buyer %	47.7	31.4	42.7	39.8
Joint %	57.7	60.0	61.1	59.2
Age	35.7	36.9	36.3	35.7
Income (£k)	50.9	62.3	60.0	76.8
Loan value (£k)	155.2	169.1	184.8	209.7
Property value (£k)	225.6	270.8	272.7	331.0
Intermediated %	67.9	1.8	67.8	3.8
Channel	Direct (46.9%)	Intermediated (53.1%)	Direct (34.8%)	Intermediated (65.2%)
First-time buyer %	46.4	42.2	42.3	42.8
Joint %	56.4	56.4	62.3	62.3
Age	36.3	35.7	36.8	35.9
Income (£k)	56.4	51.9	62.1	60.4
Loan value (£k)	154.9	162.5	173.1	194.0
Property value (£k)	235.5	231.9	275.4	276.7
Advice %	53.4	98.9	93.2	99.8

Notes: All reported figures are weighted means based on population weights. Income is total gross income as reported by the borrower to the lender for verification.

Appendix 3: Robustness checks

This section contains the following tables:

- Table A7: Average Treatment effects on the Treated (ATT) of mortgage advice requirement on the non-advised population: population-weighted sample.
- Table A8: Average Treatment effects on the Treated (ATT) of mortgage advice requirement on the non-advised population: 6-month MMR implementation period (02/2014 – 07/2014).
- Table A9: Average Treatment effects on the Treated (ATT) of mortgage advice requirement on the non-advised population: 0-month MMR implementation period (post MMR: 05/2014 – 06/2016).
- Table A10: Average Treatment Effect (ATE) of intermediation on the post MMR advised population: population-weighted sample.
- Table A11: Average Treatment Effect (ATE) of intermediation on the post MMR advised population: 12-month observation window (07/2015 – 06/2016).
- Table A12: Sensitivity of the treatment effect estimates to different bandwidth assumptions

Table A7: Average Treatment effects on the Treated (ATT) of mortgage advice requirement on the non-advised population: population-weighted sample.

	Full sample		*First time buyers*		*Movers*	
	Baseline	ATT	Baseline	ATT	Baseline	ATT
Product features						
Likelihood of choosing a fixed rate product	75.34%	+10.42 (0.58)	81.79%	+17.76 (0.44)	71.53%	+7.28 (0.49)
Likelihood of choosing a 2-year fixed rate product	30.52%	+15.60 (0.46)	29.44%	+19.58 (0.93)	31.15%	+13.25 (0.10)
Likelihood of choosing a 5-year fixed rate product	31.82%	-4.55 (0.13)	35.45%	-3.44 (0.10)	29.72%	-4.66 (0.12)
Mortgage term	23.91y	+0.59 (0.03)	26.94y	+3.50 (0.22)	22.16y	-0.06 (0.24)
Sales channel						
Likelihood of using an intermediary	1.80%	+62.70 (0.19)	1.91%	+62.18 (0.32)	1.70%	+63.23 (0.02)
Relative cost metrics						
Likelihood of choosing a dominated product	11.02%	+6.20 (0.15)	9.25%	+9.67 (0.54)	12.04%	+4.31 (0.35)
Likelihood of choosing a *strongly* dominated product	6.78%	+3.77 (0.05)	5.67%	+5.92 (0.55)	7.42%	+2.52 (0.01)
Cost (deal period)						
Monthly payment	£920.70	-10.92 (0.76)	£772.90	-26.6 (8.72)	£1005.9	-7.14 (0.50)
APR	3.79%	+0.02 (0.01)	4.04%	+0.06 (0.01)	3.65%	-0.01 (0.02)
Cost (5-year)						
APR on reversion rate basis	3.93%	+0.12 (0.00)	4.10%	+0.03 (0.00)	3.82%	+0.15 (0.01)
APR on remortgaging basis	3.84%	+0.01 (0.00)	4.07%	+0.05 (0.01)	3.70%	-0.02 (0.02)

Notes: Baseline is the mean in the treatment group pre-MMR. ATT for binary and percentage outcomes is reported in percentage points. Bootstrapped standard errors (clustered on year-quarter and postcode area) in parentheses.

Table A8: Average Treatment effects on the Treated (ATT) of mortgage advice requirement on the non-advised population: 6-month MMR implementation period (02/2014 – 07/2014).

	Full sample		*First time buyers*		*Movers*	
	Baseline	ATT	Baseline	ATT	Baseline	ATT
Product features						
Likelihood of choosing a fixed rate product	76.64%	+10.74 (0.33)	82.83%	+10.93 (0.67)	72.65%	+10.65 (0.11)
Likelihood of choosing a 2-year fixed rate product	30.13%	+15.68 (0.03)	29.90%	+15.42 (0.70)	30.09%	+14.09 (0.30)
Likelihood of choosing a 5-year fixed rate product	34.13%	-4.40 (0.16)	38.49%	-3.72 (0.70)	31.37%	-4.77 (0.21)
Mortgage term	24.02y	+0.63 (0.04)	26.68y	+0.66 (0.04)	22.15y	+0.59 (0.02)
Sales channel						
Likelihood of using an intermediary	1.73%	+62.81 (0.32)	1.93%	+63.34 (0.92)	1.61%	+62.54 (1.01)
Relative cost metrics						
Likelihood of choosing a dominated product	12.00%	+4.97 (0.14)	10.01%	+5.19 (0.42)	13.15%	+4.84 (0.23)
Likelihood of choosing a *strongly* dominated product	7.01%	+2.83 (0.11)	5.76%	+2.84 (0.26)	7.74%	+2.82 (0.03)
Cost (deal period)						
Monthly payment	£925.75	-18.08 (1.90)	£778.72	-32.53 (20.09)	£1017.5	-9.90 (8.25)
APR	3.73%	-0.06 (0.01)	3.99%	-0.02 (0.02)	3.58%	-0.08 (0.01)
Cost (5-year)						
APR on reversion rate basis	3.89%	+0.05 (0.01)	4.07%	+0.08 (0.02)	3.77%	+0.03 (0.00)
APR on remortgaging basis	3.78%	-0.07 (0.00)	4.02%	-0.03 (0.02)	3.63%	-0.09 (0.01)

Notes: Baseline is the mean in the treatment group pre-MMR. ATT for binary and percentage outcomes is reported in percentage points. Bootstrapped standard errors (clustered on year-quarter and postcode area) in parentheses.

Table A9: Average Treatment effects on the Treated (ATT) of mortgage advice requirement on the non-advised population: 0-month MMR implementation period (post MMR: 05/2014 – 06/2016).

	Full sample		*First time buyers*		*Movers*	
	Baseline	ATT	Baseline	ATT	Baseline	ATT
Product features						
Likelihood of choosing a fixed rate product	77.85%	+10.30 (0.47)	83.89%	+10.56 (0.11)	73.98%	+10.16 (0.38)
Likelihood of choosing a 2-year fixed rate product	31.02%	+15.29 (0.06)	31.31%	+15.64 (0.09)	30.69%	+15.11 (0.35)
Likelihood of choosing a 5-year fixed rate product	33.83%	-3.91 (0.04)	37.44%	-3.43 (0.06)	31.55%	-4.16 (0.24)
Mortgage term	24.01y	+0.64 (0.07)	26.62y	+0.66 (0.03)	22.17y	+0.63 (0.03)
Sales channel						
Likelihood of using an intermediary	1.78	+62.55 (0.10)	1.98%	+62.78 (0.44)	1.67%	+62.44 (0.40)
Relative cost metrics						
Likelihood of choosing a dominated product	12.66%	+4.55 (0.19)	10.73%	+4.29 (0.40)	13.80%	+4.69 (0.13)
Likelihood of choosing a *strongly* dominated product	7.34%	+2.48 (0.18)	6.30%	+2.29 (0.20)	7.96%	+2.60 (0.11)
Cost (deal period)						
Monthly payment	£931.65	-17.18 (1.15)	£785.43	-27.21 (11.88)	£1023.8	-11.53 (8.82)
APR	3.69%	-0.06 (0.00)	3.93%	-0.04 (0.01)	3.53%	-0.07 (0.00)
Cost (5-year)						
APR on reversion rate basis	3.85%	+0.05 (0.00)	4.02%	+0.05 (0.01)	3.75%	+0.03 (0.00)
APR on remortgaging basis	3.73%	-0.07 (0.01)	4.12%	-0.06 (0.01)	3.58%	-0.08 (0.02)

Notes: Baseline is the mean in the treatment group pre-MMR. ATT for binary and percentage outcomes is reported in percentage points. Bootstrapped standard errors (clustered on year-quarter and postcode area) in parentheses.

Table A10: Average Treatment Effect (ATE) of intermediation on the post MMR advised population: population-weighted sample.

	Full sample		*First time buyers*		*Movers*	
	Baseline	ATE	Baseline	ATE	Baseline	ATE
Product features						
Likelihood of choosing a fixed rate product	92.54%	+2.16 (0.14)	94.30%	+2.53 (0.21)	91.10%	+1.85 (0.15)
Likelihood of choosing a 2-year fixed rate product	47.21%	+14.71 (0.03)	47.60%	+18.99 (0.06)	46.92%	+10.10 (0.08)
Likelihood of choosing a 5-year fixed rate product	31.73%	-6.00 (0.03)	31.10%	-7.94% (0.46)	33.11%	-5.53 (0.22)
Mortgage term	24.30y	+2.01 (0.03)	26.50y	+2.19 (0.15)	23.92y	+1.44 (0.02)
Relative cost metrics						
Likelihood of choosing a dominated product	33.80%	-0.21 (0.39)	30.81%	+1.72 (0.12)	35.34%	-1.72 (0.15)
Likelihood of choosing a *strongly* dominated product	19.82%	-1.98 (0.26)	18.60%	+0.01 (0.03)	20.91%	-4.32 (0.10)
Cost (deal period)						
Monthly payment	£947.24	-88.23 (1.90)	£857.05	-102.33 (4.00)	£1051.6	-73.63 (2.10)
APR	2.93%	-0.15 (0.01)	3.11%	-0.16 (0.01)	2.78%	-0.15 (0.01)
Cost (5-year)						
APR on reversion rate basis	3.45%	0.01 (0.00)	3.47%	-0.02 (0.00)	3.39%	-0.01 (0.00)
APR on remortgaging basis	2.96%	-0.15 (0.01)	3.13%	-0.17 (0.01)	2.83%	-0.16 (0.01)

Notes: Baseline is the mean of observed outcomes (for the non-treated) and matching estimates of outcomes without treatment (for the treated). ATE for binary and percentage outcomes is reported in percentage points. Bootstrapped standard errors (clustered on year-quarter and postcode area) in parentheses.

Table A11: Average Treatment Effect (ATE) of intermediation on the post MMR advised population: 12-month observation window (07/2015 – 06/2016).

	Full sample		*First time buyers*		*Movers*	
	Baseline	ATE	Baseline	ATE	Baseline	ATE
Product features						
Likelihood of choosing a fixed rate product	93.80%	+1.54 (0.10)	96.02%	+1.05 (0.23)	92.30%	+1.16 (0.02)
Likelihood of choosing a 2-year fixed rate product	49.34%	+15.03 (0.58)	54.09%	+12.84 (0.25)	46.20%	+13.33 (0.67)
Likelihood of choosing a 5-year fixed rate product	33.88%	-8.55 (0.36)	31.24%	-8.18% (0.01)	35.81%	-8.10 (0.04)
Mortgage term	24.29y	+1.68 (0.03)	27.00y	+1.69 (0.01)	22.66y	+1.73 (0.01)
Relative cost metrics						
Likelihood of choosing a dominated product	35.50%	-2.22 (0.17)	31.64%	+1.84 (0.15)	38.23%	+1.96 (0.17)
Likelihood of choosing a *strongly* dominated product	22.12%	-2.80 (0.21)	19.68%	-0.07 (0.32)	23.51%	+0.01 (0.05)
Cost (deal period)						
Monthly payment	£922.94	-58.87 (3.23)	£772.98	-62.54 (2.35)	£1029.9	-37.91 (10.87)
APR	2.87%	-0.18 (0.00)	3.10%	-0.17 (0.00)	2.71%	-0.18 (0.07)
Cost (5-year)						
APR on reversion rate basis	3.38%	+0.02 (0.00)	3.52%	+0.01 (0.00)	3.28%	-0.01 (0.03)
APR on remortgaging basis	2.91%	-0.19 (0.00)	3.12%	-0.18 (0.00)	2.76%	-0.28 (0.01)

Notes: Baseline is the mean of observed outcomes (for the non-treated) and matching estimates of outcomes without treatment (for the treated). ATE for binary and percentage outcomes is reported in percentage points. Bootstrapped standard errors (clustered on year-quarter and postcode area) in parentheses.

Table A12: Sensitivity of the treatment effect estimates to different bandwidth assumptions

	(1) Baseline (h)	(2) 0.5*h	(3) 1.5*h	(4) 2*h	(5) Adaptive
Advice					
Likelihood of choosing a fixed rate product	+11.06	+11.06	+11.08	+11.10	+11.11
Likelihood of choosing a 2-year fixed rate product	+15.92	+15.94	+15.91	+15.88	+15.97
Likelihood of choosing a dominated product	+5.53	+5.55	+5.53	+5.51	+5.48
5-year APR on reversion rate basis	+0.059	+0.059	+0.059	+0.059	+0.060
Deal period APR	-0.042	-0.042	-0.042	-0.042	-0.041
Intermediation					
Likelihood of choosing a fixed rate product	+1.55	+1.56	+1.54	+1.52	+1.56
Likelihood of choosing a 2-year fixed rate product	+14.10	+14.05	+14.17	+14.27	+14.12
Likelihood of choosing a dominated product	-1.10	-1.08	-1.14	-1.20	-1.08
5-year APR on reversion rate basis	+0.008	+0.008	+0.010	+0.011	+0.009
Deal period APR	-0.183	-0.182	-0.183	-0.183	-0.183

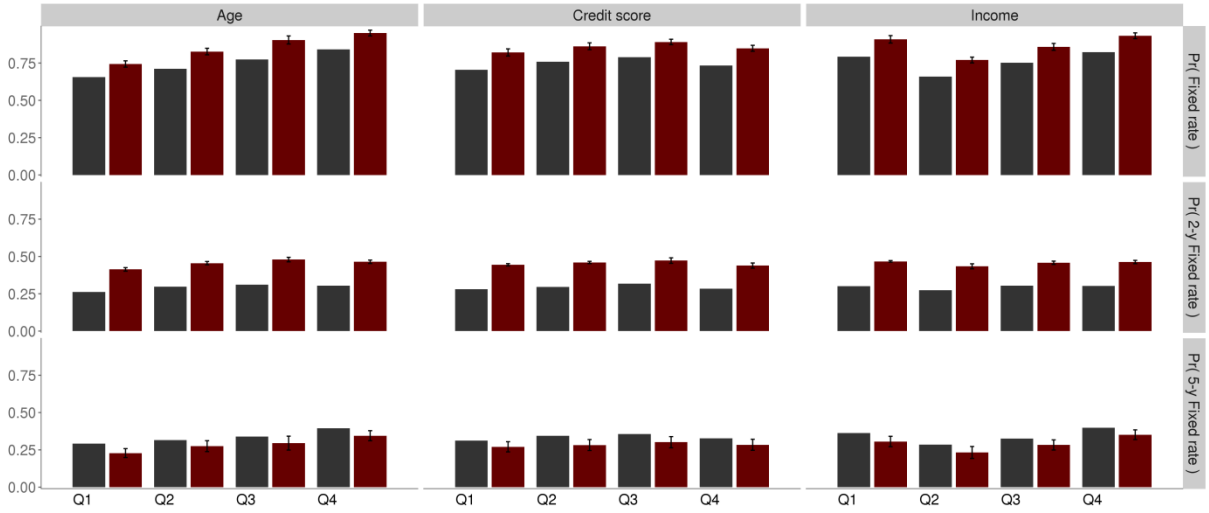
Notes: Baseline is the Silverman (1986) rule of thumb bandwidth used for the headline results of the paper. Columns (2) to (4) show estimates from matching estimation where the baseline bandwidths are scaled by a factor of 0.5, 1.5 and 2, respectively. Adaptive bandwidth uses an approach from Blundell and Duncan (1998), where the bandwidth is allowed to vary with the density of the propensity score at each point.

Appendix 4: Sub-group analysis

This section contains the following tables:

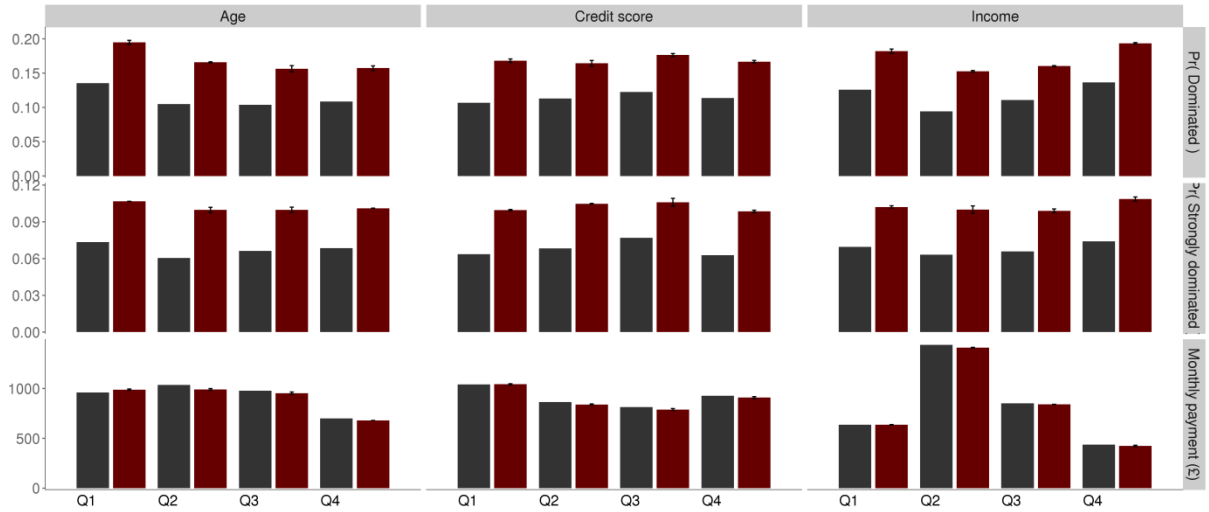
- Figure A3: Impact of advice on previously non-advised consumers, mortgage product types by age, credit score and income
- Figure A4: Impact of advice on previously non-advised consumers, dominated choices and monthly payment by age, credit score and income
- Figure A5: Impact of advice on previously non-advised consumers, APR cost metrics by age, credit score and income
- Figure A6: Impact of intermediation on post-MMR advised consumers, mortgag product types by age, credit score and income
- Figure A7: Impact of intermediation on post-MMR advised consumers, dominated choices and monthly payment by age, credit score and income
- Figure A8: Impact of intermediation on post-MMR advised consumers, APR cost metrics by age, credit score and income

Figure A3: Impact of advice on previously non-advised consumers, mortgage product types by age, credit score and income



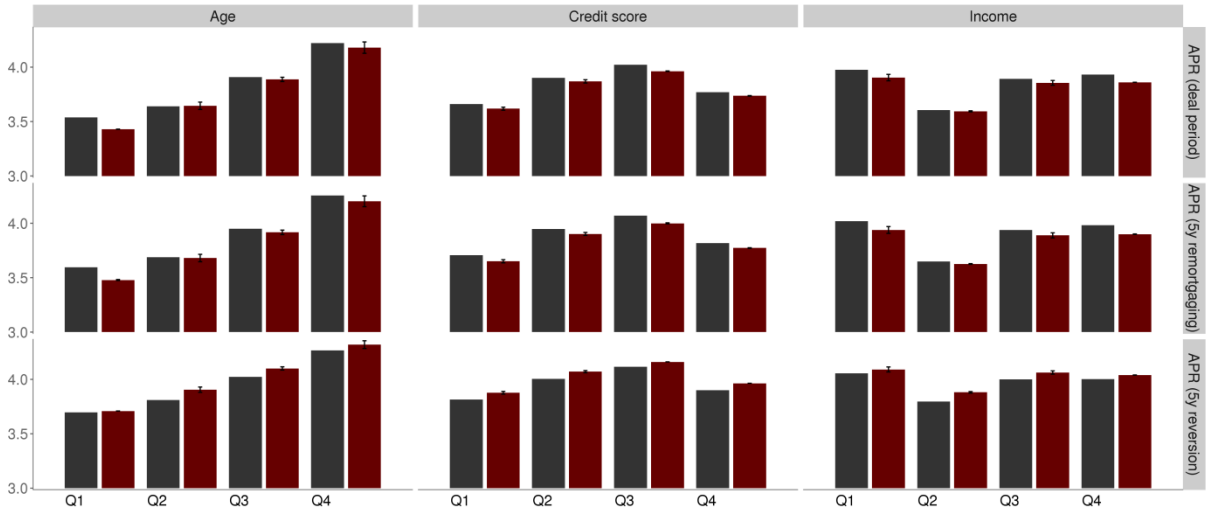
Notes: First bar in each pair shows baseline (mean) in treatment group, second bar treatment effect (ATT).

Figure A4: Impact of advice on previously non-advised consumers, dominated choices and monthly payment by age, credit score and income



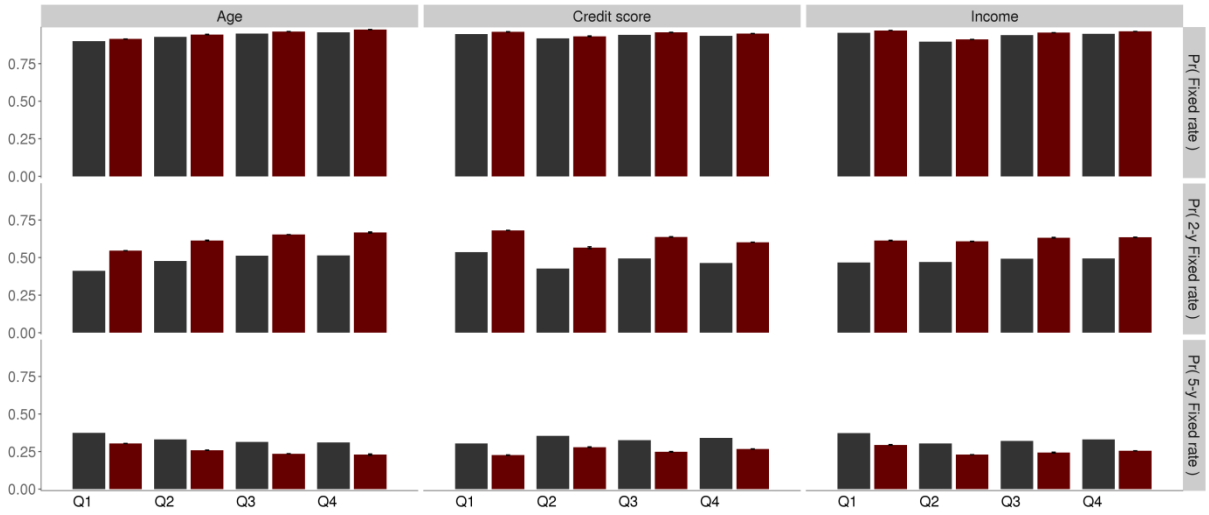
Notes: First bar in each pair shows baseline (mean) in treatment group, second bar treatment effect (ATT).

Figure A5: Impact of advice on previously non-advised consumers, APR cost metrics by age, credit score and income



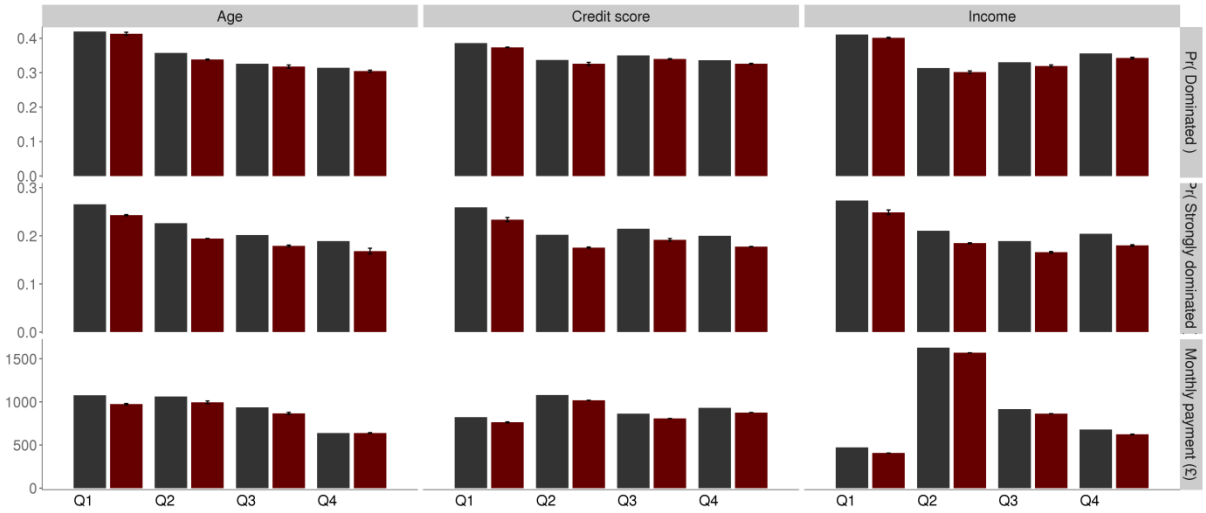
Notes: First bar in each pair shows baseline (mean) in treatment group, second bar treatment effect (ATT).

Figure A6: Impact of intermediation on post-MMR advised consumers, mortgag product types by age, credit score and income



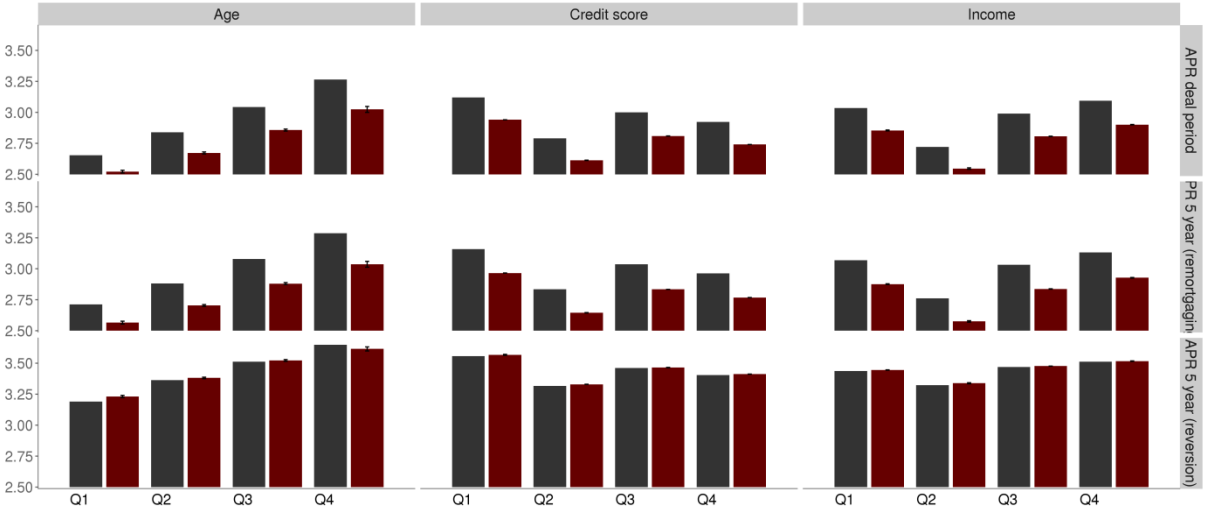
Notes: First bar in each pair shows baseline (mean) in treatment group, second bar treatment effect (ATT).

Figure A7: Impact of intermediation on post-MMR advised consumers, dominated choices and monthly payment by age, credit score and income



Notes: First bar in each pair shows baseline (mean) in treatment group, second bar treatment effect (ATT).

Figure A8: Impact of intermediation on post-MMR advised consumers, APR cost metrics by age, credit score and income



Notes: First bar in each pair shows baseline (mean) in treatment group, second bar treatment effect (ATT).

Appendix 5: Common trends

Although we cannot test the common trend assumption over the period we expect it to hold for, we can look at trends in the outcome variables Y in our pre-treatment period. This gives us an indication of whether it is reasonable to expect time-varying factors other than the advice requirement to affect our treatment and control group populations in similar ways. Note that our pre and post MMR observations are at least 12 months apart; we are therefore more concerned with longer-term trends in outcomes instead of close tracking on a month-by-month basis.

Although a pre-treatment 'sense check' of trends is commonly used prior to DID estimation, we deviate slightly from the standard approach. Instead of plotting moving averages for the treatment and control groups as a whole, we condition the trends on propensity score quartiles: this to reflect that observations in the treatment group will be matched with observations in control groups with similar propensity scores.

The panels in Figure A9 show 3-month moving averages, separate for advised (pre-MMR control group) and non-advised consumers (pre-MMR treatment group), for all outcome variables reported in this paper. The overall picture is that trends over time in the two groups are consistent, although the trends for intermediation are hard to evaluate for the non-advised sample.

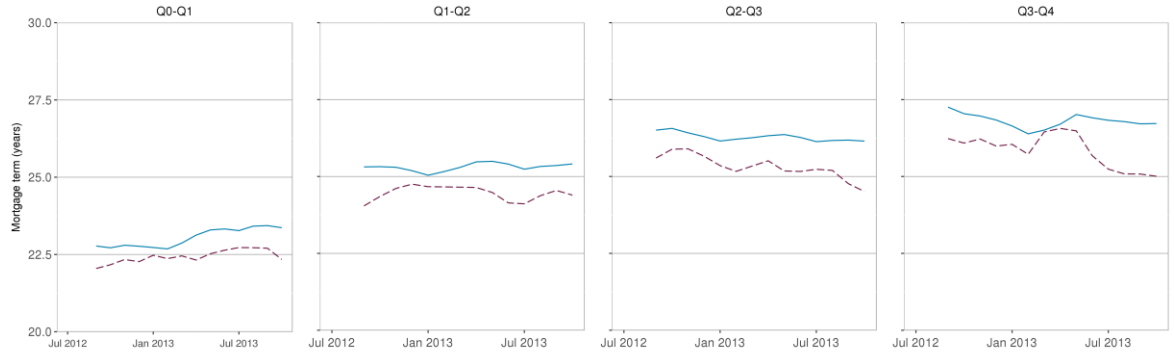
Figure A9: Three-month moving averages of outcome variables within propensity score quartiles, separately for advised (solid line) and non-advised sales (dashed line): September 2012-October 2013

Outcome variable: Fixed interest rate contracts (%)

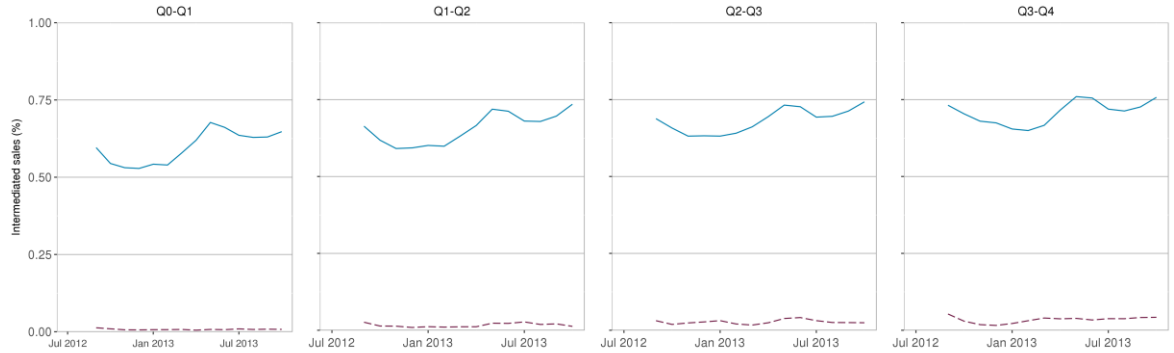
Outcome variable: 2-year fixed interest rate contracts (%)

Outcome variable: 5-year fixed interest rate contracts (%)

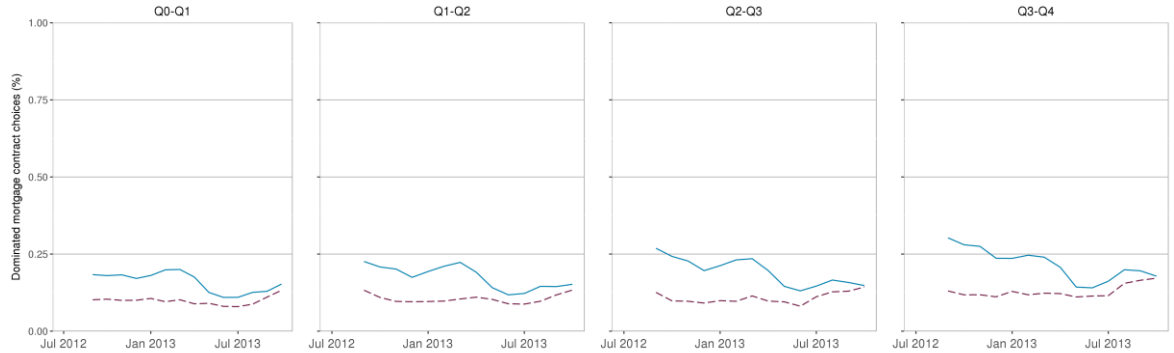
Outcome variable: Mortgage contract term to maturity (years)



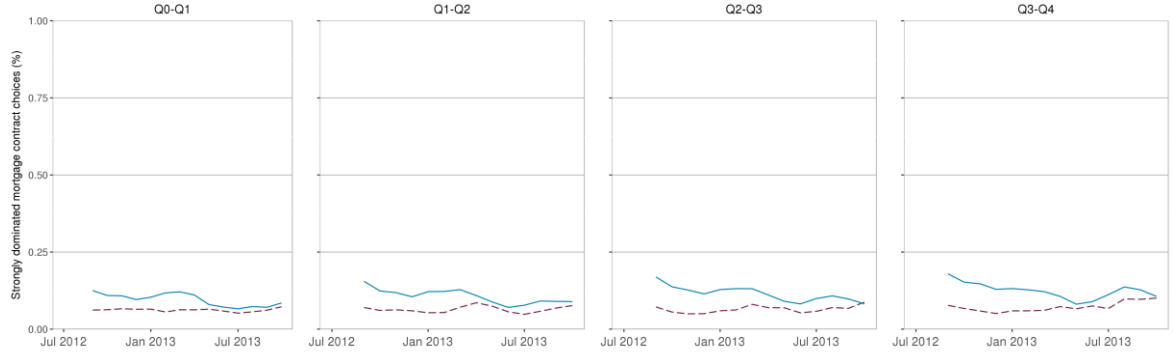
Outcome variable: Intermediated sales (%)



Outcome variable: Likelihood of choosing a dominated product (%)

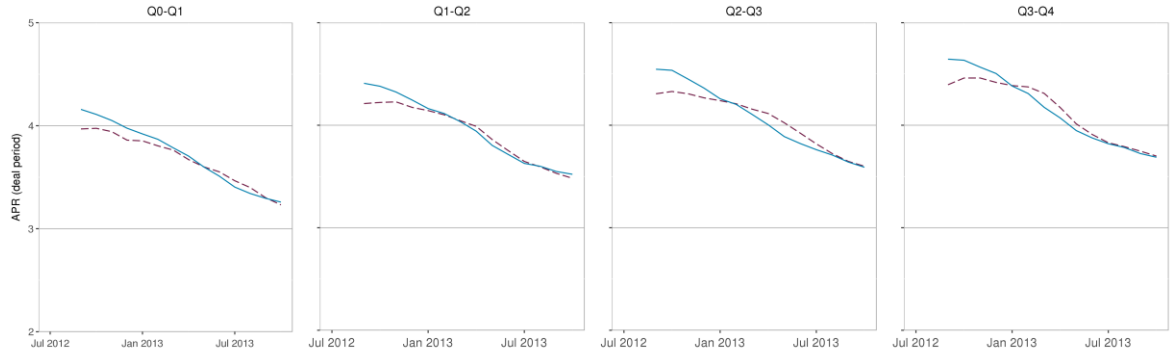


Outcome variable: Likelihood of choosing a strongly dominated product (%)



Outcome variable: Monthly payment (deal period).

Outcome variable: APR (deal period).



Outcome variable: APR (5-year, reversion rate basis)

Outcome variable: APR (5-year, remortgaging basis)

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