Measuring mortgage costs

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Background

- Housing costs are an important input into research and policy on household living standards, inequality, and poverty (Moretti, 2013; Dustmann et al., 2022; Cribb et al., 2023)
- In the UK, mortgage costs represent a significant part of housing costs for owner-occupiers
- Typically defined as **interest payments on mortgages**, and measured using survey data (e.g., Understanding Society and FRS)
  - Used in UK official income and poverty statistics

Background

- But interest payment is not directly observed, it is derived from reported mortgage variables, e.g., outstanding balance
- And survey variables can suffer from measurement error
- It is important to understand the accuracy of the components underlying interest payment
- A large body of literature evaluates different survey-reported aspects of household finance using linked survey-administrative data, e.g., earnings (Jenkins and Rios-Avila, 2023; Bollinger et al., 2026) and benefits (Meyer and Mittag, 2019; Celhay et al., 2024)
- Studies validating housing costs are rarer

This paper

- We use a new linked survey-administrative dataset to study housing costs for mortgage holders in a major general-purpose household survey
- We compare the **Understanding Society** (UKHLS) survey reports to the **Financial Conduct Authority** (FCA) administrative records of mortgage variables for the same individual in the same time period
- We evaluate three variables: **outstanding balance**, **monthly payment**, and **remaining life**
- We examine:
  - Differences in aggregate distributions between the two sources
  - Differences in within individual reports

Why balance, payment, and remaining life?

- Two methods to calculate the interest payment
- **Method 1**: when the outstanding balance is collected
  - Interest payment = outstanding balance $\times$ interest rate
- **Method 2:** when the outstanding balance is not collected (e.g., UKHLS waves 2-5)
  - For repayment mortgages: derive the interest payment from the mortgage amortisation formula using monthly payment, remaining life, and interest rate
  - For interest-only mortgages: the monthly payment

Data

- We use **UKHLS** survey data linked with **FCA** data (Financial Conduct Authority et al., 2024)
- **UKHLS**
  - General purpose household panel survey
  - Runs from 2009-10 (wave 1) to 2023-24 (wave 15, latest release)
  - Both individual and household interviews
  - *Household interviews cover housing and mortgages*
- **FCA**
  - Data collected by Credit Reference Agencies (CRA) on credit items held by individuals and disclosed to the FCA
  - Information on current accounts, credit cards, loans, and *mortgages*
  - A monthly dataset from 2009 to 2021 was linked to individuals in UKHLS who consented to the linkage
- 56% of individuals consented to linkage, 98% of consenters were successfully linked to their FCA records (Institute for Social and Economic Research, 2024)

Definitional differences between UKHLS and FCA mortgage variables

	UKHLS	**FCA**
Unit of observation	Household level totals	Individual/mortgage level
Outstanding balance	Total amount secured against primary residence	Balance on each mortgage for each individual
Mortgage payment	Last monthly payment	Standard monthly payment
Remaining life	- Number of years remaining on the mortgage - Reported once at the beginning of the tenure or by new entrants	- Derived remaining months using opening date and term - Updated whenever the term changes

Sample

- We use the observations corresponding to the UKHLS household interview month
- We keep households who reported owning their house with a mortgage, and in which all the adult members are linked to their FCA records
- Restrict to the observations from 2010 to 2020
- For each variable, we use the non-missing observations on both sources

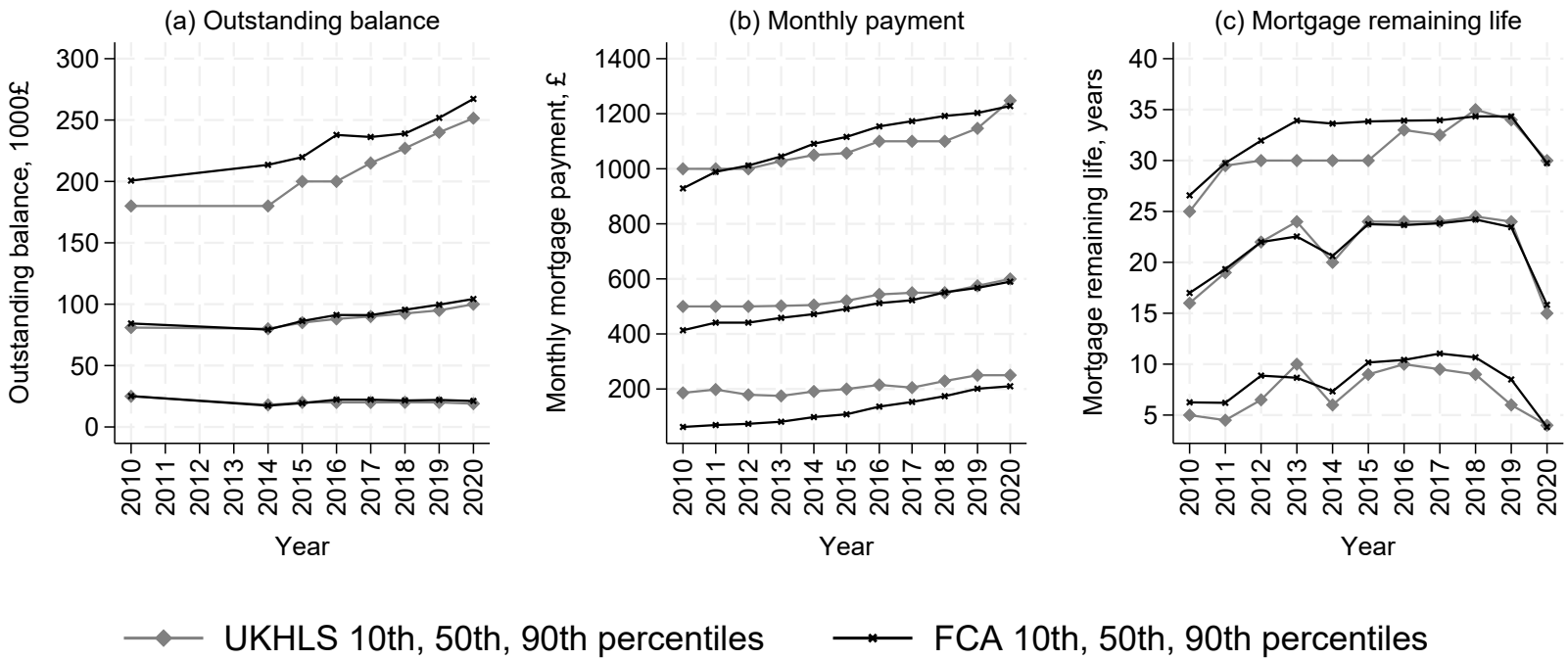
Variable construction and sample sizes

- **Outstanding balance and monthly payment**
  - FCA amounts are aggregated across individuals and mortgages within each household
- **Remaining life**
  - We use the observation at which the household responded to the remaining life question
  - In the case of multiple mortgages in the household, we take the one with the longest remaining life

- **Final samples**
  - Outstanding balance: 10,548 observations
  - Monthly payment: 17,738 observations
  - Remaining life: 3,115 observations

Aggregate comparison

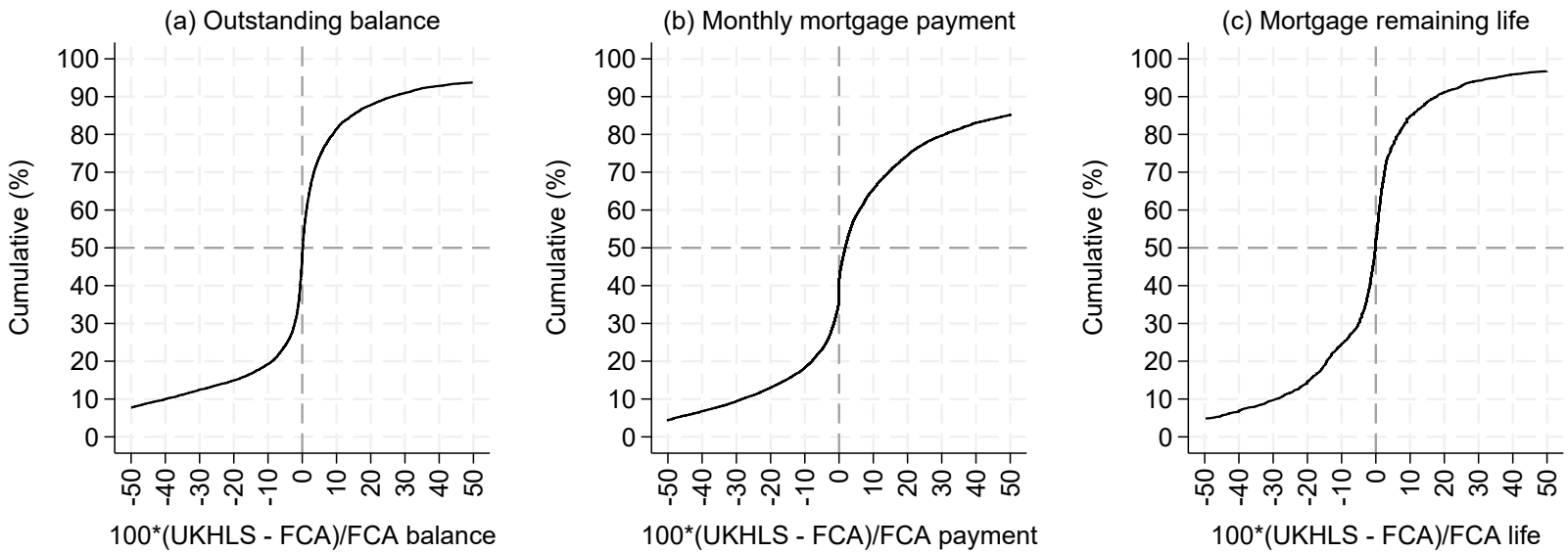
Distribution of mortgage variables over the years



Notes: Authors' calculations using Understanding Society linked to CRA. Sample is mortgagor households in which all adult members are linked to their FCA record and non-missing on both sources, 2010-2020. Sample sizes: (a) Outstanding balance: 10,548 (b) Monthly payment: 17,738 (c) Remaining life: 3,115.

Within individual differences

Dist



Notes: Authors' calculations using Understanding Society linked to CRA. Sample is mortgagor households in which all adult members are linked to their FCA record and non-missing on both sources, 2010-2020. Sample sizes: (a) Outstanding balance: 10,529 (b) Monthly payment: 17,427 (c) Remaining life: 3,115.

Determinants of the difference between the UKHLS and FCA

Table 1: OLS of the difference between the UKHLS and FCA amounts on household characteristics

Dep. variable: UKHLS amount - FCA amount	log outstanding balance	log mortgage payment	Remaining years
HH. income quartile (base = 1st)			
2nd	0.021	-0.055***	-0.125
	(0.033)	(0.016)	(0.230)
3rd	0.010	-0.025	0.059
	(0.036)	(0.019)	(0.269)
4th	0.000	0.006	0.015
	(0.037)	(0.020)	(0.286)
Age group (base = less than 30)			
30s	0.052*	0.034***	-0.014
	(0.027)	(0.012)	(0.239)
40s	0.067**	0.108***	0.092
	(0.028)	(0.013)	(0.239)
50s	0.031	0.175***	0.058
	(0.034)	(0.017)	(0.262)
60s	0.028	0.163***	0.201
	(0.045)	(0.025)	(0.394)
70 and above	-0.052	0.166***	0.557
	(0.137)	(0.055)	(0.815)
Number of adults (base = 1 adult)			
2	-0.031	0.021	-0.304
	(0.030)	(0.015)	(0.214)
More than 2	-0.040	0.089***	-0.219
	(0.042)	(0.026)	(0.494)
Number of FCA mortgages (base = 1 mortgage)			
2	-0.349***	-0.298***	-1.122***
	(0.030)	(0.017)	(0.227)
More than 2	-0.801***	-0.652***	-3.370***
	(0.057)	(0.032)	(0.474)
Observations	10529	17427	3115
Year fixed effects	X	X	X

Notes: Authors' calculations using Understanding Society linked to CRA. Sample is mortgagor households in which all adult members are linked to their FCA record and non-missing on both sources, 2010-2020. Robust standard errors in parenthesis. *p<0.1, **p<0.05, ***p<0.01.

Conclusion

- We evaluate the mortgage variables underlying housing costs for mortgagors in a household survey using administrative financial records
- On an aggregate level, the two sources provide a surprisingly similar picture on the outstanding balance, payment, and term
- However, we still see differences at the individual level
  - Related to definitional differences and/or reporting errors

Next steps

- We looked at balance, payment, and term. The other factor is the interest rate
- The implications of the differences between the two sources on housing costs estimate, and on AHC poverty and inequality
- Examine reporting quality and attrition following individual or household level financial shocks

Thank you!

References

Bollinger, C. R., Jenkins, S. P., Rios-Avila, F., and Tasseva, I. V. (2026). Errors in survey and administrative data on employment earnings: Austria and the united kingdom compared. *Economics Letters*, page 112901.

Celhay, P., Meyer, B. D., and Mittag, N. (2024). What leads to measurement errors? evidence from reports of program participation in three surveys. *Journal of Econometrics*, 238(2):105581.

Cribb, J., Wernham, T., and Xu, X. (2023). Housing costs and income inequality in the uk. *Institute for Fiscal Studies*, page 1.

Dustmann, C., Fitzenberger, B., and Zimmermann, M. (2022). Housing expenditure and income inequality. *The Economic Journal*, 132(645):1709–1736.

Financial Conduct Authority, University of Essex, and Institute for Social and Economic Research (2024). Understanding Society: Main Survey, Linked Credit Reference Agency (CRA) Dataset 2009-2021: Secure Access [data collection]. DOI: `http://doi.org/10.5255/UKDA-SN-9258-1`.

Institute for Social and Economic Research (2024). Understanding Society: Main Survey, Linked Credit Reference Agency (CRA) Dataset, 2009-2021, User Guide. Version 1, University of Essex, Colchester.

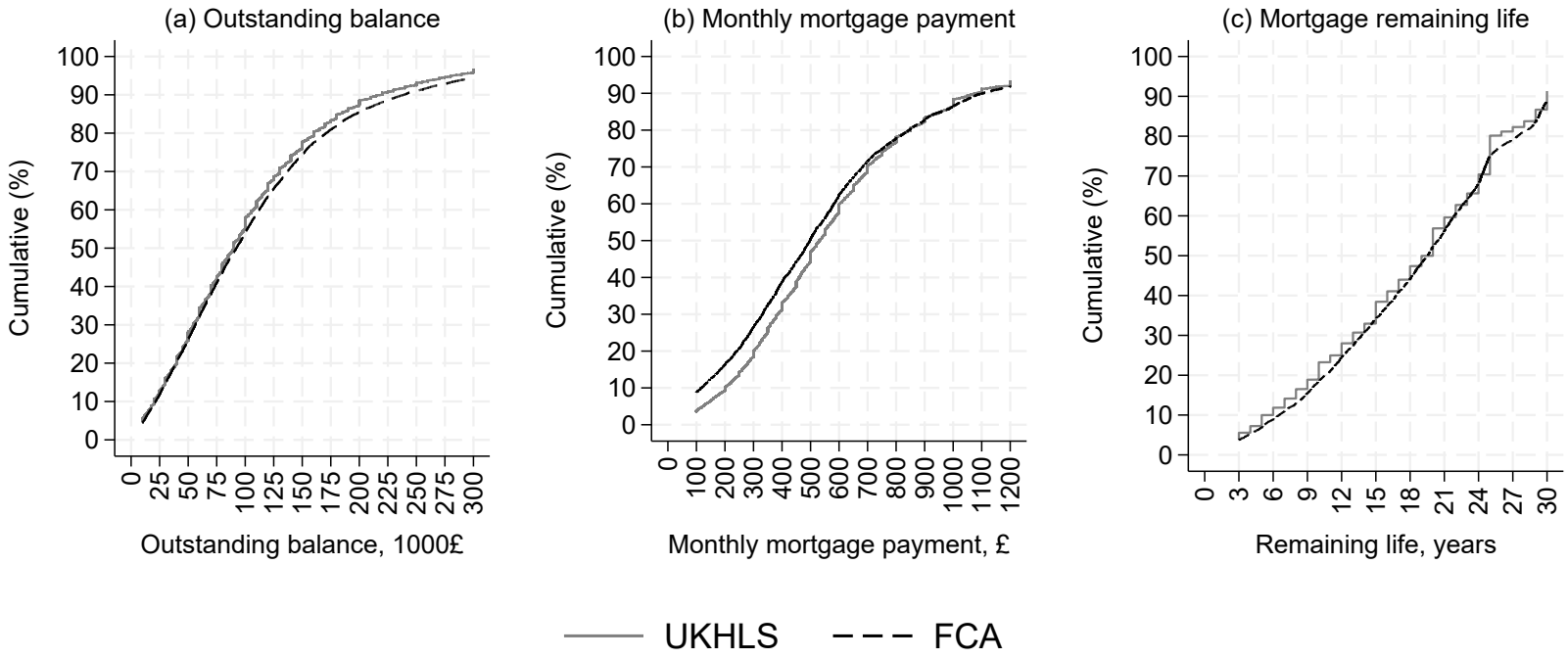
Jenkins, S. P. and Rios-Avila, F. (2023). Reconciling reports: modelling employment earnings and measurement errors using linked survey and administrative data. *Journal of the Royal Statistical Society Series A: Statistics in Society*, 186(1):110–136.

Meyer, B. D. and Mittag, N. (2019). Using linked survey and administrative data to better measure income: Implications for poverty, program effectiveness, and holes in the safety net. *American Economic Journal: Applied Economics*, 11(2):176–204.

Moretti, E. (2013). Real wage inequality. *American Economic Journal: Applied Economics*, 5(1):65–103.

Additional results

Distribution of mortgage variables



Notes: Authors' calculations using Understanding Society linked to CRA. Sample is mortgagor households in which all adult members are linked to their FCA record and non-missing on both sources, 2010-2020. Sample sizes: (a) Outstanding balance: 10,548 (b) Monthly payment: 17,738 (c) Remaining life: 3,115. The right and left tails of the distributions are censored.

Measurement error model

- Consider a simple regression model: $outcome = \beta m + u$
  - Where m is the mortgage variable
  - Goal is to estimate β, e.g., the relationship between mortgage payment or debt, and labour supply or fertility
- *How much will the estimates differ depending on the data source used due to measurement differences?*
- We model the relationship between the UKHLS and FCA mortgage variables using a standard measurement error model
- Let m_s and m_r be the mortgage variable measured by UKHLS and FCA, respectively

$$m_s = \mu_r + \underbrace{k}_{\text{Over/under reporting}} + \underbrace{(1+\rho)(m_r - \mu_r)}_{\text{Mean reversion}} + \underbrace{\epsilon}_{\text{Random component}} \quad (1)$$

  - μ_r: FCA mean, k: UKHLS mean - FCA mean, ϵ: error term
  - ρ: relationship between the difference and FCA values (if $\rho < 0$, UKHLS measures revert to the FCA mean)

Ratio of the empirical estimates

- The ratio between the UKHLS and FCA estimates will be

$$\frac{\hat{\beta}_s}{\hat{\beta}_r} = \frac{(1+\rho)\sigma_r^2}{(1+\rho)^2\sigma_r^2 + \sigma_\epsilon^2} \tag{2}$$

  - σ_ϵ^2: variance of the error term
  - σ_r^2: FCA variance
- We estimate the model moments $\{\mu_r, k, \rho, \sigma_\epsilon^2, \sigma_r^2, \sigma_s^2\}$ using GMM

GMM estimates of the moments of differences

Table 2: GMM estimates of the moments of the differences between UKHLS reports and FCA records

	log outstanding balance	log mortgage payment	Remaining years
UKHLS mean - FCA mean	-0.109***	0.130***	-0.414***
	(0.010)	(0.006)	(0.077)
Mean reversion	-0.188***	-0.433***	-0.099***
	(0.015)	(0.010)	(0.010)
Var of the error term	0.996***	0.352***	17.535***
	(0.075)	(0.014)	(1.420)
FCA mean	11.269***	6.055***	19.045***
	(0.010)	(0.007)	(0.164)
FCA variance	1.152***	0.971***	84.263***
	(0.031)	(0.021)	(1.869)
UKHLS variance	1.756***	0.664***	85.981***
	(0.082)	(0.018)	(2.020)
Observations	10529	17427	3115
Ratio of OLS coefficients ($\frac{UKHLS}{FCA}$)	**0.533**	**0.829**	**0.883**

Notes: Authors' calculations using Understanding Society linked to CRA. Sample is mortgagor households in which all adult members are linked to their FCA record and non-missing on both sources, 2010-2020. Robust standard errors in parenthesis. *p<0.1, **p<0.05, ***p<0.01.