

Buy Now, Pay Later (BNPL) ...On Your Credit Card*

Benedict Guttman-Kenney[†]

Chris Firth[‡]

John Gathergood[§]

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Abstract

We show consumers taking out buy now, pay later (BNPL) - an interest-free FinTech product enabling consumers to defer payments into instalments - commonly charge instalments to their credit card (a higher interest rate product). We find 19.5% of credit cardholders in our UK transactions data charged at least one BNPL instalment to their credit card in 2021: a practice 24% more prevalent in the most deprived geographies and among younger consumers. Our analysis provides an example of how consumer financial protection regulators can use real-time transactions data to monitor markets and evaluate potential risks - especially (largely) unregulated, financial innovations such as BNPL.

JEL Codes: D04, D18, G28, G51, M38.

Keywords: BNPL, buy now pay later, consumer credit, consumer financial protection, FinTech, household finance, regulation.

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[†]Corresponding author. University of Chicago, Booth School of Business. benedict@chicagobooth.edu

[‡]University of Warwick, Warwick Business School and University of Nottingham, Department of Economics. christopher.firth@wbs.ac.uk

[§]University of Nottingham, Department of Economics. john.gathergood@nottingham.ac.uk

1 Introduction

Determining the risks of products outside the regulatory perimeter - the scope of regulated products - to decide whether, when, or how to regulate them is a key challenge for policymakers.¹ New product innovations can emerge (e.g. cryptocurrency) that do not neatly fit into the legal framework used when regulations were formulated. In addition, products that are purposefully excluded from historical regulation (e.g. 0% interest finance for retail goods) may grow in prevalence or experience changes in their features, such that it changes their risks to consumers and the net economic benefits of consumer protection regulation.

A prominent, current, global example of this regulatory challenge is the ‘buy now, pay later’ (BNPL) market: a FinTech credit option offered by retailers, typically via a third-party, at the point-of-sale enabling shoppers to pay for goods or services in instalments at a zero percent interest rate and without fees (subject to making payments on time).² BNPL is largely exempt from most consumer credit regulations in the UK and US and, as a result of its rapid growth 2019 - 2021 (Berg et al., 2021; Financial Conduct Authority, 2021), the UK government, UK and US consumer financial regulators are considering whether and how to regulate such products (Consumer Financial Protection Bureau, 2021; Financial Conduct Authority, 2021; HM Treasury, 2021), while the Australian financial regulator recently conducted a review and brought BNPL within its regulatory perimeter.³ With an estimated £2.7bn in UK BNPL lending during 2020 (Financial Conduct Authority, 2021), the BNPL market now is larger than the UK payday loan sector at its 2013 peak (Gathergood et al., 2019) - a market that became heavily regulated from 2014 and more than halved by 2016.⁴ Globally BNPL accounted for an estimated 2.1% of transactions in 2020 and this share is expected to double by 2024.⁵

Extremely little is known about the economic effects of BNPL to inform regulatory discussions. At the time of writing there are no empirical research papers in economics or finance studying the UK or US BNPL markets. Searches for ‘Buy Now, Pay Later’ and ‘BNPL’ on ArXiv returned no

¹Barr et al. (2009); Campbell et al. (2011a); Campbell (2016); Sarin (2019) discuss broader challenges for consumer financial protection regulation.

²Non-payment may incur penalty fees or interest, and may see the debt passed to a debt collection agency.

³Australian Securities & Investments Commission (ASIC) consultation CP325 (2019) became regulation RG274 (2021) with reviews Rep 600 (2018) and REP672 (2021) and a market update in Fisher et al. (2021).

⁴<https://www.fca.org.uk/publications/feedback-statements/fs17-2-high-cost-credit>

⁵Worldpay from FIS 2021 Global Payments Report <https://worldpay.globalpaymentsreport.com/en/>

results; on SSRN returned a single law working paper on the Singapore BNPL market (Sng and Tan, 2021); there were no relevant results on NBER Working Papers beyond Berg et al. (2021)’s broader review of FinTech lending, and on google scholar the only related work is from the Australian market with limited empirical evidence on the prevalence and usage of BNPL (Xing et al., 2019; Fook et al., 2020; Gerrans et al., 2021; Johnson et al., 2021). In terms of other sources of evidence there are a few UK and US consumer surveys and blog discussions.⁶

In this paper we provide, to our knowledge, the first quantitative academic research using administrative data to study the UK BNPL market: showing it is common for consumers to charge their interest-free BNPL instalments to their credit card and such practices are more common among those in more deprived geographies and younger consumers.

In addition to shedding new light on this emerging sector in the consumer credit market, this research is designed as a proof of concept for how real-time data can be used by financial services regulators to monitor the growth of firms both inside and outside the regulatory perimeter. Prioritization of issues is essential for regulators (Campbell et al., 2011b; Hunt, 2017) especially given capacity constraints: for example, the UK financial services regulator the Financial Conduct Authority (FCA) regulates 60,000 firms with staff of 4,000. Real-time data can be viewed as a leading indicator of which firms or product markets inside or outside the regulatory perimeter to investigate in more detail (e.g. detailed data collection, causal & cost benefit analysis) and evaluate the potential net benefits of regulation – such exercises are costly for both firms and regulators. Real-time tracking of firms is also useful for governments to understand the growth and decline of individual retailers given their importance to national and sub-national consumption and labor markets. And, as has been seen in the covid pandemic, real-time private sector data have been an invaluable resource to inform public policymaking a crisis (e.g. Chetty et al., 2020; Journal of Public Economics, 2020; Vavra, 2021).

Economic theory provides mixed perspectives on the consumer benefits of deferred payments.

⁶Citizens Advice UK survey results available at: <https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/debt-and-money-policy-research/buy-now-pay-later/> and <https://www.citizensadvice.org.uk/about-us/our-work/policy/policy-research-topics/debt-and-money-policy-research/buy-now-pay-later-what-happens-if-you-cant-pay-later/> with Battermann (2021) providing a qualitative review of the UK market. Credit Karma US consumer survey: <https://www.creditkarma.com/about/commentary/buy-now-pay-later-surges-throughout-pandemic-consumers-credit-takes-a-hit> For examples of US blogs on BNPL see Alcazar and Bradford (2021a,b); Akeredolu et al. (2021); Lott (2021) and Equifax’s insight report <https://insight.equifax.com/what-to-know-about-buy-now-pay-later/>.

Through the lens of the canonical life-cycle model of consumption smoothing, opportunities to smooth consumption at zero interest cost are weakly welfare improving (Ando and Modigliani, 1963). Yet in the presence of forecast errors, over-optimism or over-confidence, the option to defer payments may result in welfare losses through consumers triggering contingent interest rates, fees and charges (Grubb, 2009). As with the case of alternative mortgage products, BNPL allows consumption smoothing, but presents the possibility for financially unsophisticated or present focused consumers to over-consume in the near term, due to limited commitment (O’Donoghue and Rabin, 1999; Mian and Sufi, 2009; Campbell et al., 2011a; Cocco, 2013; Gathergood and Weber, 2017).⁷ BNPL may be profitable because it drives increased, potentially impulsive, merchant sales producing high merchant fees in commission to BNPL lenders to such an extent that lenders’ have limited incentives to consider the consumers’ creditworthiness or the broader effects of borrowing on their welfare. It is therefore important to examine available data to understand how consumers use such products in practice to inform regulation (for example, as in the early analysis of the payday lending market by Agarwal et al., 2009).

We analyze the UK BNPL market using credit card transactions data. Our insights may also be relevant to understanding the US market as the same BNPL lenders operate in both markets (e.g. Klarna operates in both countries, the firm known as Clearpay in the UK is Afterpay in the US) with the products offered on the same global retailers’ websites operating in both countries and the BNPL product structures offered being analogous.

We find it is common for UK credit cardholders to charge a BNPL instalment to their credit card: 19.5% of active credit cardholders in December 2021 have at least one BNPL transaction on their credit card during 2021. This itself is a potential warning flag for regulators as it indicates cardholders’ may be paying off debt with debt: with a 0% interest BNPL debt potentially leading to a debt spiral incurring 20% credit card interest rates.⁸ Moreover, the amount of BNPL spending is a non-trivial amount for many cardholders. The median value of BNPL spending over a year on cards using BNPL is £157 in 2021: reflecting both a single BNPL purchase often having multiple transactions and cardholders making repeat BNPL purchases. Indeed the median BNPL transaction in 2021 is just under £20.

⁷Present bias is a special case of present focus preferences.

⁸Representative credit card interest rates are approximately 20% in recent years (Bank of England) and have exceeded 21% (26% for purchases rates based on MoneyFacts) in 2021 despite base rates being 0.1-0.25%.

We use these data to document how the use of BNPL has grown extremely rapidly and understand the consumer base. The value of BNPL transactions in our data in December 2021 is more than twenty times its January 2019 level and growth rates in 2020 align to official estimates. The market has accelerated further in 2021: more than doubling in size on top of its rapid prior growth.

How heterogeneous is BNPL usage across consumers? Growth in BNPL usage has occurred across all parts of the UK, urban and rural regions, and age groups. BNPL is especially prevalent among younger consumers in their twenties. This is important as younger consumers may be less financially sophisticated as inexperienced users of financial products and potentially need protection.

We find BNPL usage is significantly higher in more deprived areas of England and regions of the UK that are historically poorer. On average, BNPL use on credit cards is 24-57% higher (based on two measures of shares of cards and of spending) by moving from the least to the most deprived local government area in England (Local Authority District). We interpret these findings as BNPL as being potentially higher risk. We do so as regulators' risk assessments consider the vulnerability of consumers using financial products (e.g. giving higher welfare weights to more deprived consumers).⁹

Our short paper proceeds as follows. Section 2 explains what Buy Now, Pay Later (BNPL) is, section 3 describes the data we use, section 4 presents results and section 5 concludes.

2 What is Buy Now, Pay Later (BNPL)?

Buy Now, Pay Later (BNPL) is a FinTech product provided at the point of sale providing consumers the option to pay for their purchase at a later date in one or more interest-free instalments. BNPL lenders typically are a third party separate to the retailer. Consumers are (typically) charged no interest or fees *unless* they miss BNPL payments. They may experience costs if their BNPL payment has knock-on adverse effects on their other finances (e.g. triggering overdraft fees, accumulating credit card interest, missing payments on other household bills) - such increased broader financial distress from taking on credit was previously found in the UK payday lending market (Gathergood

⁹For examples, see FCA's CP21/13 Consultation paper on a new consumer duty, December 2021; FG21/1 Guidance for firms on the fair treatment of vulnerable customers, December 2021; and FCA Occasional Paper 13, March 2016.

et al., 2019).

Repayment structures vary across and within UK BNPL lenders: for example, Klarna provides an option to repay in the next thirty days as well as an option to repay in three instalments thirty days apart whereas Clearpay has four payments that are two weeks apart.

Late fees are an important driver of revenue in other credit markets (e.g. Agarwal et al., 2015) but in the BNPL market not all firms charge late fees (e.g. PayPal does not). When BNPL firms do charge late fees they are smaller than those on other products such as credit cards where the UK industry standard fee is £12 plus additional interest costs. Among BNPL lenders, Klarna has no late fees in the UK but does have in the US: charging up to \$7 (capped at 25% of amount due) if ten days late and up to \$25 if an attempted payment is returned due to insufficient funds. Whereas Clearpay (known as Afterpay in the US) charges £6 if late and an additional £6 if no payment within seven days but caps total late fees at 25% of the purchase price. BNPL lenders may pass unpaid debt to debt collectors and missed payments may get reported in credit files, however, the prevalence and effects of such practices are unknown. US survey evidence estimates a third of BNPL users have missed payments and those consumers report their credit scores having since declined, however, this does not provide causal evidence of BNPL's effects on credit scores.¹⁰

BNPL is primarily offered by online retailers, however, innovations mean it is also increasingly available for in-store purchases. Retailers offer BNPL in exchange for merchant fees that can be 3-6% – market reports indicate these fees appear to be the main driver of revenue for the large BNPL lenders – and gaining insights about their customers from BNPL lenders to assist with targeted marketing. It is estimated the gross profit margins of BNPL lenders is thirty basis points.¹¹ By revealed preference, BNPL is generating more net revenue in additional retail sales for these retailers than the fees they are giving up: by one estimate these increase conversion rates 20-30% and average transaction size 30-50%.¹² One potential way in which BNPL can increase sales is enhancing the shopping experience by enabling liquidity-constrained consumers to purchase excess amounts of clothing online – more than their cash balances allow – to try on and then return the ones they do not want: with BNPL they will typically not be charged for these returns, unlike

¹⁰<https://www.creditkarma.com/about/commentary/buy-now-pay-later-surges-throughout-pandemic-consumers-credit-takes-a-hit>

¹¹Redburn estimate, 2021. <https://www.ft.com/content/ddb2e207-2450-4ca8-bad0-871290d80ea7>

¹²RBC Capital Markets estimate, 2021. <https://www.cnbc.com/2021/09/25/why-retailers-are-embracing-buy-now-pay-later-financing-services.html>

with traditional instant payments.

From a regulatory perspective, it is difficult to define precisely what constitutes a BNPL arrangement. The challenge here is that deferred payment of retail goods and services at 0% interest rates has existed for decades in the UK, often in small scale arrangements with local stores. The recent upsurge of FinTech driven, scalable, data-driven BNPL models – offering 0% interest finance for retail goods and services via a third party lender – marks a significant change in the operation of the BNPL product while not fundamentally changing its core attributes HM Treasury (2021).

Although leading BNPL firms operate an instalment model, FinTech product innovation means the distinction between instalments and revolving credit (e.g. credit cards and retail store cards) is not clear cut. New BNPL products are emerging (e.g. Instalment by Barclays for Amazon UK, the Affirm Card is a debit card with BNPL) which feature a credit limit and so have some similarities to historical retail (store) cards. Some credit card providers offer the option for cardholders to pay particular transactions in BNPL-esque instalments (e.g. American Express’s ‘Pay It Plan It’ and Barclaycard’s Instalment Plan) as do some bank (current / checking) account providers on their debit cards (e.g. Monzo Flex).

In the UK and US, most BNPL is unregulated (Consumer Financial Protection Bureau, 2021; Financial Conduct Authority, 2021; HM Treasury, 2021). In the context of the UK market this means, unlike regulated credit, BNPL lenders are not required to provide pre-contractual information disclosures and also do not have a regulatory requirement to conduct an assessment of whether the applicant can afford such credit.¹³ BNPL providers are not required to perform credit checks or share data with credit bureaus – though some do – this limits the ability of regulators to use credit files to monitor such emerging markets.¹⁴ When the UK payday lending market grew in 2010s, lenders also typically did not report to credit files (Gathergood et al., 2019).

¹³See Guttman-Kenney and Hunt (2017) for analysis of considering affordability in U.K. consumer credit market and DeFusco et al. (2020) for research evaluating the effects of affordability (‘ability-to-pay’) assessments in the US mortgage market.

¹⁴Most mainstream UK and US lenders are also not required to report to credit bureaus but in practice most do so as it is in their incentives for assessing credit risk.

3 Data

We use credit card financial transactions data.¹⁵ Data are anonymized, sourced from multiple banks and credit card issuers and stratified to best represent the population. These data are disaggregated recording individual transactions on consumer and SME card spending across European countries from 2016 onwards. In this paper we examine credit cards held by UK consumers and the (pounds) transactions dated to 31 December 2021 and reported by 5 January 2022. When new cards are opened they are added to these data. Cards drop out of these data for a variety of reasons, such as if the card is closed, lost, or the card number changed for other reasons. For this paper we use a subset of these data: a stable repeated cross-section of UK consumer credit card data with approximately one million cards. For real-time analysis such a repeated cross-sectional approach is preferable to a balanced panel as the former ensures that each month we are capturing new cards which may have different spending behaviors to older cards. For parts of the analysis (sections 4.1 and 4.5) we incorporate additional months of data where cards are open but move out of the stable panel: this enables us to comprehensively aggregate spending on individual cards over time.

Each transaction includes a variety of details including the amount of spending, textual information on where the spending occurred, whether the transaction was online or offline, merchant category code, and a derived categorisation of the spend. Each transaction has an anonymized account identifier to enable tracking of accounts over time. For each account we observe the post-code sector of the cardholder’s address. In the UK, postcode sectors are very granular geographies: There are over 11,000 postcode sectors in the UK with each sector containing approximately 3,000 addresses. We use Office for National Statistics (ONS) data to merge these postcode sectors to higher levels of geographies (Local Authority District and NUTS1). We also observe the age range of the cardholder.

With these data we cannot precisely estimate the market levels of BNPL usage but can understand the relative differences across time, lenders, & geographies in real-time as a proxy to inform regulation. In these data we observe BNPL and non-BNPL transactions charged to a credit card account. BNPL transactions are tagged by us in the data via a field that records a transaction’s payment processor and, in cases where this is unknown, also based on the textual string. There

¹⁵See Baker and Kueng (2021) for a review of household financial transaction data. See Chetty et al. (2020) and Vavra (2021) for evaluations of real-time private sector administrative data for analyzing the covid-19 pandemic.

is no authoritative list of all BNPL processors on the UK and, given the market is unregulated, UK government agencies are unable to provide a list of relevant firms. Following a desktop search of BNPL processors in the UK, we categorize the following firms as BNPL providers: Affirm, Afterpay, AppToPay, Clearpay, Divido, Dividebuy, Klarna, LayBuy, Openpay, PayL8r, Quadpay, Sezzle, Splitit, Zilch. A limitation of this approach is that if a BNPL transaction appears under the retailer’s name without being also tagged with a BNPL lender’s name then we cannot distinguish a BNPL purchase from a non-BNPL one. However, we understand that this is a rare occurrence in the UK market. We do not categorize Paypal as a BNPL lender in our analysis as we cannot distinguish BNPL from its large, established non-BNPL business of processing payments. Amazon UK launched a BNPL product (‘Instalments by Barclays’) in December 2021 but the payments for this are not yet due to be observed in our data. Therefore if there is bias in our approach we expect to underestimate the prevalence of BNPL.

There are a variety of caveats to this exercise. Our timing is based on the timing a transaction is charged to the account which, in the case of BNPL, is typically later than the time of origination (& purchase). This means when we examine a period of time, for example 2021, we are capturing BNPL payments in 2021 as opposed to BNPL amounts lent in 2021. We do not observe the BNPL origination value or payment schedule and so cannot tell whether the BNPL product is an arrears or whether late fees have been charged. It is possible that for some BNPL purchases we only observe a subset of payments if the cardholder makes other payments with a debit or credit card not in our data. We cannot observe and link multiple cards in our data held by the same person in these data, however, for geographical analysis these will be grouped in the same area. We do not observe credit card interest, late payment fees, or credit card repayments so cannot evaluate the costs to the consumer of BNPL being put on their credit card.

4 Results

4.1 BNPL Use On Credit Cards

Our first main finding is documenting the charging of BNPL instalments to credit cards. Such a pattern is a potential warning flag to regulators as it shows some consumers’ strategy for repaying their BNPL debt appears to be transferring it to credit cards. Credit cards can be a more costly

form of credit with an average interest rate of near 20% APRs unless the cardholder repays their balance in full. Credit cards also have decades long amortisation schedules meaning especially high interest costs if the cardholder only makes the minimum payment – a practice which is common in UK and US data (Keys and Wang, 2019; Guttman-Kenney et al., 2021). The potential rewards points benefit from a cardholder allocating a BNPL transaction to a credit card is lower in the UK than the US market due to price regulation of interchange fees (the form of income used to fund reward points). Furthermore by using BNPL the cardholder is discounting the value of any rewards points relative to if they charged it immediately in one instant (non-BNPL) payment.

Figure 1 shows BNPL transactions are commonly present on credit cards: 19.5% of UK credit cardholders active (i.e. with any transaction present) in December 2021 have charged a BNPL instalment in any month during 2021 to their credit card, while 15.3% and 12.1% have used in the last six and three months leading up to December 2021. As a robustness check we restrict the sample to credit cards that had transactions in both January and December 2021 and find economically similar results - they are very slightly lower (see footnote for details) which indicates BNPL is more likely to be used on newer cards.¹⁶

We interpret this as BNPL being a complement rather than a substitute to credit cards for some consumers. This complementarity is important for regulators because if the two products were substitutes regulators may want to ensure consistency in regulation between the products in the same market or even provide a market design to facilitate the lower cost credit option (BNPL) to grow in order to increase competition and drive down the costs borrowing in mainstream credit such as credit cards.

4.2 BNPL Use Over Time

We examine the time series using our real-time data – use the 28 day moving average and indexing the value of transactions in January 2019 to 1 – to examine how this market has evolved. Figure 2, Panel A shows rapid growth in the value of BNPL spending between January 2019 and December 2021: increasing 21.4 times. This rapid growth lines up with official estimates which size the value of UK BNPL lending during 2020 at £2.7bn having more than tripled in 2020 (HM Treasury, 2021;

¹⁶19.2% of UK credit cardholders active (i.e. with any transaction present) in both January and December 2021 have charged a BNPL instalment in any month during 2021 to their credit card, while 14.2% and 11.2% have used in the last six and three months leading up to December 2021

Financial Conduct Authority, 2021): in our data the 2020 value of BNPL transactions is 3.4 times its 2019 levels.

December 2021 is the peak in BNPL transactions value and the index is 5.9 times December 2019 and 2.0 times its December 2020 levels. There are local seasonal peaks in December & January aligning to the timing of payments coming due for ‘Black Friday’ and Christmas spending. Another feature to note from this time series is while UK and US aggregate consumption sharply fell in March-April 2020 during the first wave of COVID-19 due to fear of the virus and lockdowns (Chetty et al., 2020; Gathergood and Guttman-Kenney, 2021), the BNPL market actually grew - possibly a beneficiary of a broader consumer shift towards spending online (Gathergood et al., 2021a). This growth, as measured in credit card data, has persisted despite changes in the willingness of credit card providers to process BNPL transactions. Such repayment patterns may not only be a risk for consumers but a risk for credit card lenders. Capital One banned BNPL transactions on its global credit cards in December 2020.¹⁷

4.3 BNPL Lenders

A beneficial feature of these data is that we can conduct and publish research that identifies individual firms. Doing so using official datasets (e.g. FCA regulatory information requests, ONS business surveys) can be a challenge as these are typically only able to require firms to provide non-public information subject to confidential information about those firms not then becoming public.

Figure 2, Panel B disaggregates the aggregate time series by BNPL lenders: showing the share of BNPL spending on credit cards by each provider. Klarna is the BNPL lender with the highest value of transactions on credit cards throughout 2019 to 2021 in these data. Clearpay is second, with approximately a quarter of the BNPL transactions value – a third of Klarna’s – as of December 2021. The remaining other BNPL lenders appear small, however, as a reminder we caveat that our analysis does not include PayPal’s BNPL arm.

¹⁷<https://www.reuters.com/article/us-capital-one-fin-payments/capital-one-stops-risky-buy-now-pay-later-credit-card-transactions-idUSKBN28H0OR>

4.4 Demographics of BNPL Users

The share of spending by consumers on a product, or a brand of a specific firm, can be an informative metric for regulators to prioritise the economic importance of where to focus limited resources. It might also help shed some light on how consumers use products. For example, if BNPL products are used by high income, high liquidity consumers then a regulator might draw different conclusions regarding potential welfare consequences of the products than if the same products were using by low income, financially-constrained consumers. We therefore disaggregate the aggregate time series by the characteristics of cardholders in order to understand heterogeneity in use of these new credit products.

Figure 3, Panel A disaggregates by the cardholder’s age and shows a monotonic relationship between age and BNPL usage. The monotonic relationship is constant over time. Younger consumers spend a higher fraction on BNPL: especially those in their twenties. A regulator may be concerned younger consumers are less experienced and less financially sophisticated consumers of financial products and so are possibly in need of protections. Regulators may also evaluate these products role as gateway debt products. They may potentially be harmfully leading young consumers into a debt spiral of taking on increasingly expensive forms of debt. Or conversely, beneficially enabling young consumers to learn to prudently use low cost credit, improve their credit access and avoid relying on higher cost products.

Figure 3, Panels B and C examines these relationships by the cardholder’s location. These relationships were stable over time and therefore we aggregate 2021 data to ease presentation. In Panel B location is assigned based on postcode sector to the NUTS1 region: an official standardized unit of geography across European countries.¹⁸ For the UK, this contains Wales, Scotland, Northern Ireland and nine regions of England. Panel C disaggregates by the cardholder’s location based on official UK urban-rural area classifications ‘ONS supergroup’ (classifications previously used to understand the covid pandemic in Gathergood and Guttman-Kenney, 2021; Gathergood et al., 2021a,b).¹⁹

These show heterogeneity in BNPL usage across the UK. BNPL is more intensely used in the North East, North West and Scotland and much less so in the South East and South West. It

¹⁸Office for National Statistics (ONS) Nomenclature of Territorial Units for Statistics First Tier (NUTS1)

¹⁹<https://www.ons.gov.uk/methodology/geography/geographicalproducts/areaclassifications/2011areaclassifications>

is most used in ‘Urban Settlements’, ‘Town and Country Living’ (often towns across the UK), and ‘Countryside Living’ (rural areas across the UK). BNPL is least used in ‘Affluent England’ (primarily the commuter belt around London) and ‘Services and Industrial Legacy’ (often parts of Northern England, Wales and Scotland where mining and other industries declined) areas.

4.5 Distribution of BNPL Spending

Figure 4, Panel A shows the CDF of BNPL transaction amounts on credit cards in the last 12 months (January 2021 - December 2021). For this analysis we retain cards that were active (i.e. had any BNPL or non-BNPL transactions) in December 2021.²⁰ This shows that BNPL transactions are typically low value amounts: a median value of £19.65 and 96% are £100 or less. This reflects both that BNPL can be used for low value purchase amounts and that BNPL purchases are often spread across multiple payment transactions.

Some cardholders may have multiple BNPL transactions - due to both multiple BNPL purchases and BNPL purchases split into multiple instalments. Figure 4, Panel B aggregates the value of BNPL transactions on each credit card over the last 12 months. Contrasting this with Panel A, reveals that while each individual BNPL transaction is typically small, the total amount spent on BNPL per card during 2021 by credit cardholders using BNPL is often quite large: the median value is £157 and 17.6% have spent £500 or more.²¹ In these data we cannot distinguish between multiple instalments for the same purchase and multiple purchases.

4.6 BNPL Spending by Local Deprivation

In this section we seek to understand the potential vulnerability of consumers who use these products. From a consumer welfare standpoint, a regulator may be more worried about potential consumer detriment from a (ultimately) high-interest product sold to consumers in deprived areas than a zero-interest product sold to consumers in wealthy areas.

To evaluate this we aggregate data to the Local Authority District (LAD) – areas of local government – and merge in the 2019 English Indices of Multiple Deprivation (IMD) – an official

²⁰If we do not apply this restriction our results are unchanged - we apply it keep the sample consistent with Figure 4, Panel B.

²¹Numbers are similar if we restrict to cards active (i.e. had any BNPL or non-BNPL transactions) in both January and December 2021: the median value is £161 and 19.0% have spent £500 or more on BNPL during 2021.

government composite measure ranking how deprived a district is. Due to tiny populations in a couple of districts we merge (i) City of London (population under 10,000) with Westminster and (ii) Isles of Scilly (population under 3,000) with Cornwall. This leaves us with 315 districts which we rank 1 to 315 where rank 1 is the most deprived and 315 the least.

Both panels in Figure 5 rank each authority by its IMD on the x-axes where a ranking of 1 is most deprived. On the y-axis Figure 5, Panel A shows the percent of credit cards with any BNPL transaction in the last 12 months. On the y-axis Figure 5, Panel B shows the share of the total value of spending on credit cards that is BNPL in the last 12 months. The size of each dot is the district's ONS population.

In both of these charts we plot a linear regression (Equation 1) to describe the unconditional (non-causal) relationship between these two rankings. There is one observation (d) per district in England (315 in total) where Y_d are our measures of BNPL usage (0-100) and IMD_d is the ranking of IMD (1-315 where a higher value is less deprived). We weight each observation by its district's ONS population - our results are unchanged if unweighted. We use robust standard errors.

$$Y_d = \alpha + \beta IMD_d + \varepsilon_d \quad (1)$$

By both measures we find the most deprived areas have statistically significantly (p-values < 0.001) higher incidence in usage of BNPL on credit cards relative to less deprived areas. For panel A the β coefficient is -0.0076 (s.e. 0.0007) with an intercept (α) of 12.4754 and an $R^2 = 0.2881$. For panel B the β coefficient is -0.0016 (s.e. 0.0002) with an intercept (α) of 1.3877 with an $R^2 = 0.3442$. These coefficients can be interpreted as moving from the least to most deprived local authority is associated, on average, with 24% and 57% higher BNPL usage as measured by fraction of cards and fraction of spending respectively.²² Given this relationship it is unclear how much BNPL lenders are restricting credit supply - something visible in other markets (e.g. Agarwal et al. (2018) for US credit cards).

One might expect take-up of BNPL to be higher in more deprived areas as the potential economic benefits of smoothing purchases into multiple instalments are greatest for consumers in more deprived geographies where liquidity constraints are expected to bind more. If so, this market's

²²These are 2.39 and 0.5 percentage points changes.

growth may be welfare improving providing credit access for liquidity-constrained consumers (possibly especially those with volatile incomes or expenditures) with high MPCs to increase their consumption (and if BNPL repayments was incorporated into credit files there may also be longer-term benefits improving credit access) or use BNPL instead of higher cost credit (e.g. overdrafts, payday loans). An alternative view is that consumers in poorer areas are less financially sophisticated and may be making naïve mistakes that may warrant the introduction of consumer financial protections. For example, consumers may be taking out these products due to being overoptimistic in their ability to repay their BNPL debt or having self-control problems. The effects of such naïvete has previously been evaluated in credit cards (e.g. Heidhues and Kőszegi, 2010; Meier and Sprenger, 2010; Heidhues and Kőszegi, 2015; Kuchler and Pagel, 2021) and payday loans (e.g. Carvalho et al., 2020; Allcott et al., 2021). By increasing indebtedness it is possible BNPL may cause broader distress such as adverse mental health or missing other bills that may outweigh consumption benefits for some consumers. Evaluating these hypotheses using causal evidence is beyond the scope of this paper but is important for regulators to design proportionate interventions.

5 Conclusions

We have shown how real-time financial transactions data can be used by regulators to monitor the emergence and risks posed by firms in the regulatory perimeter. In this paper we used UK BNPL transactions on credit cards as a timely example, but similar analysis can be done for providers of other financial products. Using a current/checking accounts - ideally observing inflows as well as outflows - and data from other countries would augment such an approach.

We have documented new evidence on the growth and customer base of the UK BNPL market to inform discussions on potential UK and US regulation of these markets. This is important since, at the time of writing, there is very sparse research on the UK or US BNPL markets to inform such discussions. Based on our sample of data, it appears common for UK consumers to charge BNPL to their credit card – a warning flag for regulators. BNPL usage is greater in more deprived areas which indicates this product as being, potentially, higher risk.

Beyond the scope of this paper there are a much broader range of open empirical research questions that are critical to understand the BNPL market to ensure any regulations (e.g. disclosures,

nudges, lending restrictions) are effective. Most importantly (i) estimating the welfare effects of BNPL on consumers considering their interactions with other forms of credit and (ii) testing potential interventions (e.g. disclosures, nudges, lending restrictions) – especially given prior evidence testing potential disclosures and nudges in the UK has found them to have little or no effect on real economic outcomes (e.g. Adams et al., 2021, 2022; Guttman-Kenney et al., 2021).

Future research understanding the BNPL market can also potentially help us more generally to understand consumer time preferences by testing the predictions of traditional and behavioral models (e.g. Prelec and Loewenstein, 1998) of consumption smoothing. The BNPL domain is attractive to study as it offers an excellent, almost lab-like, natural experiment of the dynamic choices of consumers under real financial stakes when presented with a menu of interest-free, payment structures across a broad range of expenditure categories with repeated interactions.

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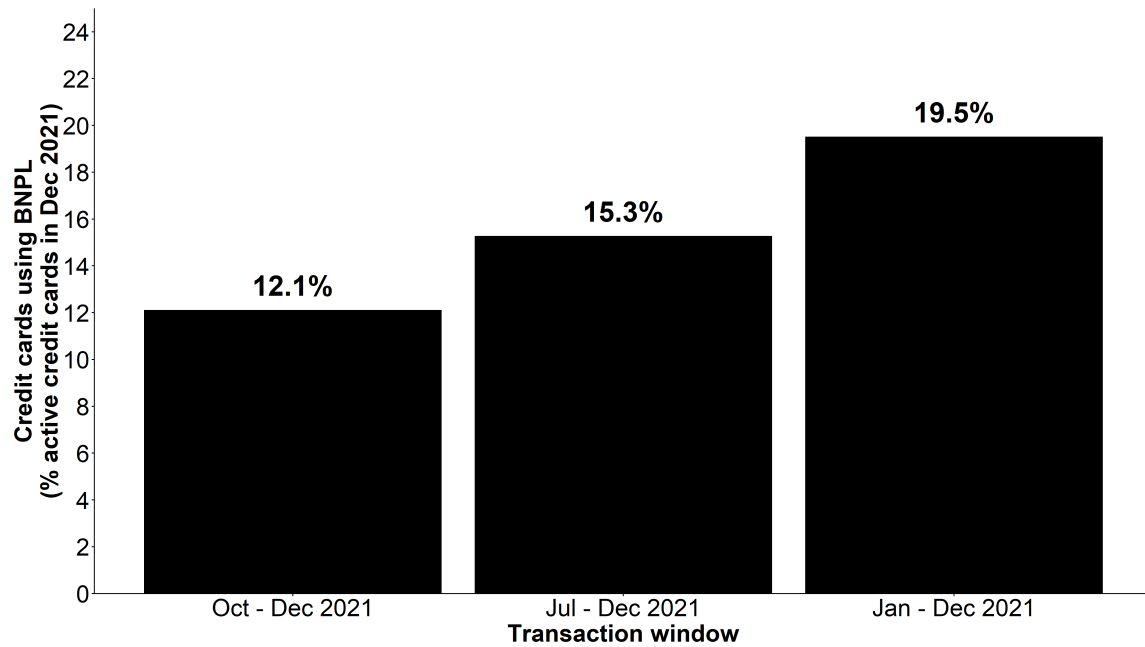
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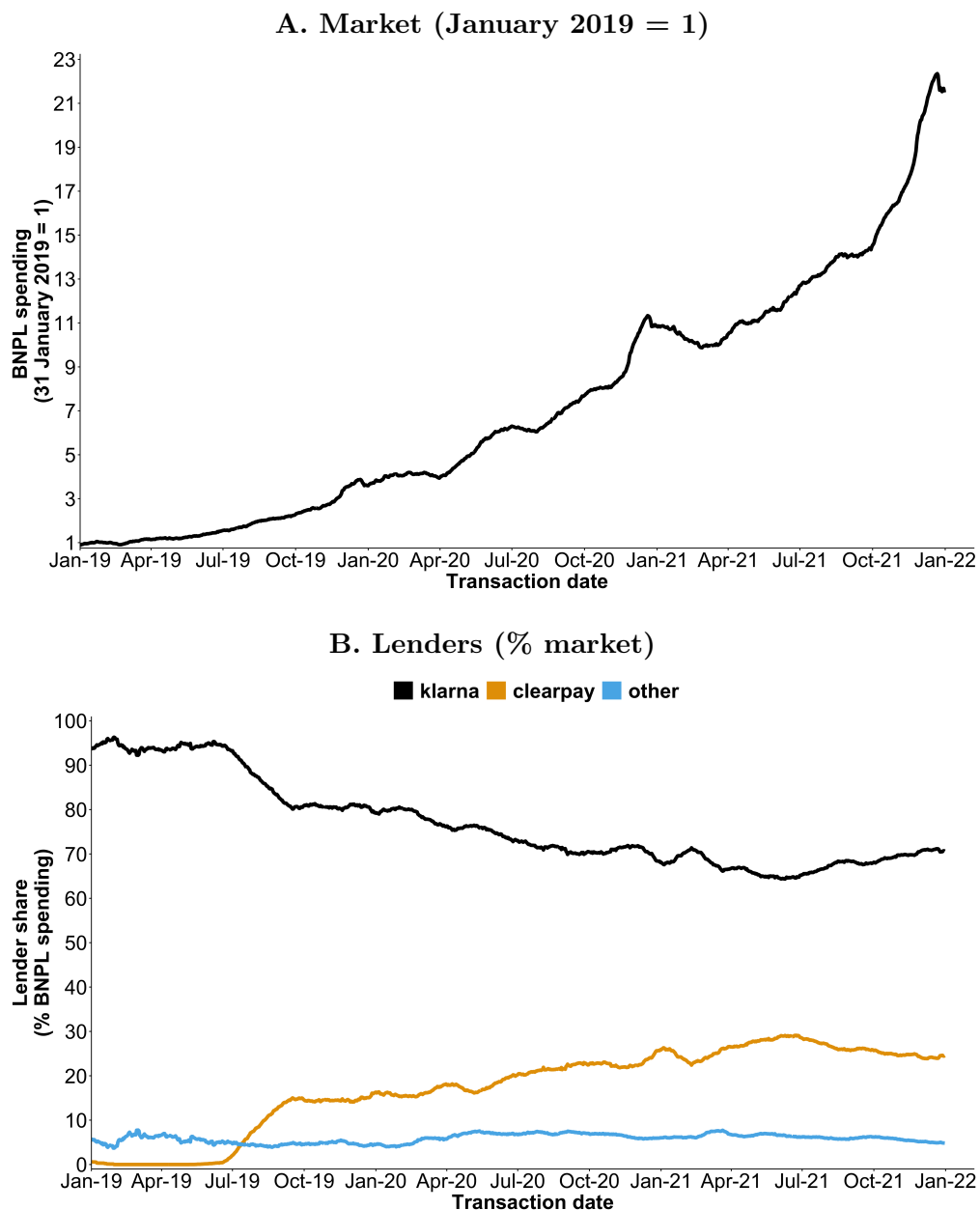
6 Figures

Figure 1. Actively-used credit cards with any BNPL transactions in December 2021



Notes: UK credit card transactions data. BNPL is buy now, pay later. Denominator is credit cards with any BNPL or non-BNPL transactions in December 2021.

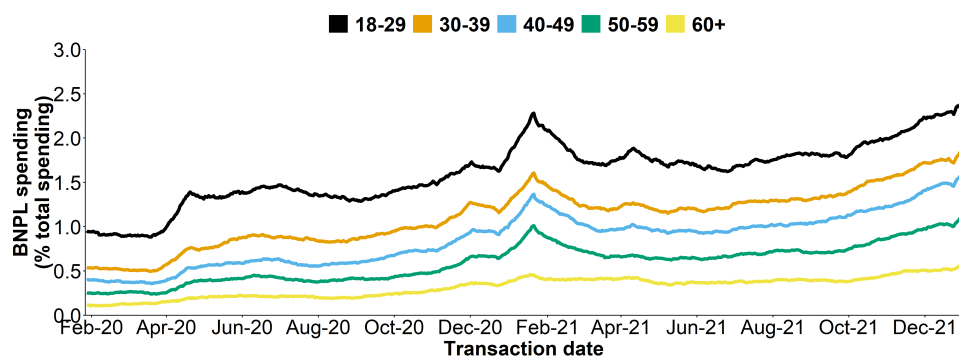
Figure 2. Value of BNPL transactions on credit cards, 2019 - 2021 for market (A) and disaggregated by BNPL lenders (B)



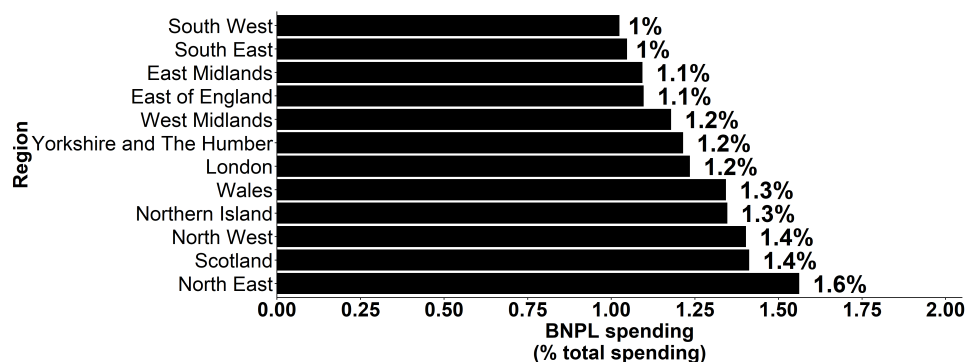
Notes: UK credit card transactions data. BNPL is buy now, pay later. 28 day moving averages.

Figure 3. BNPL spending as % of all spending, by age (A), region (B), and area (C)

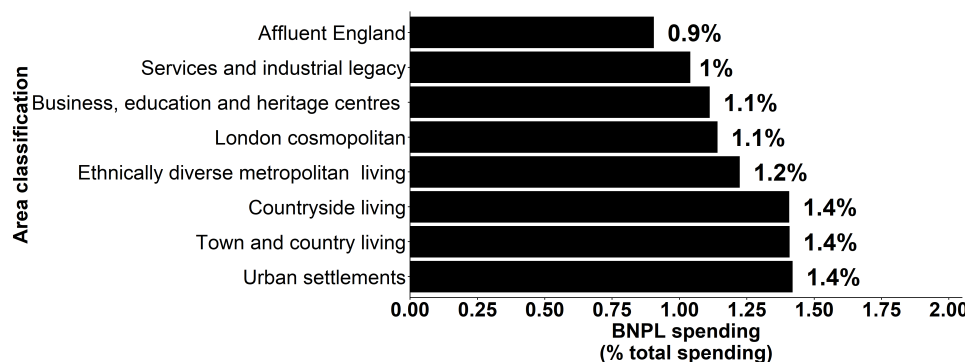
A. Age (2020 - 2021 spending, 28 day moving average)



B. Region (2021 spending)

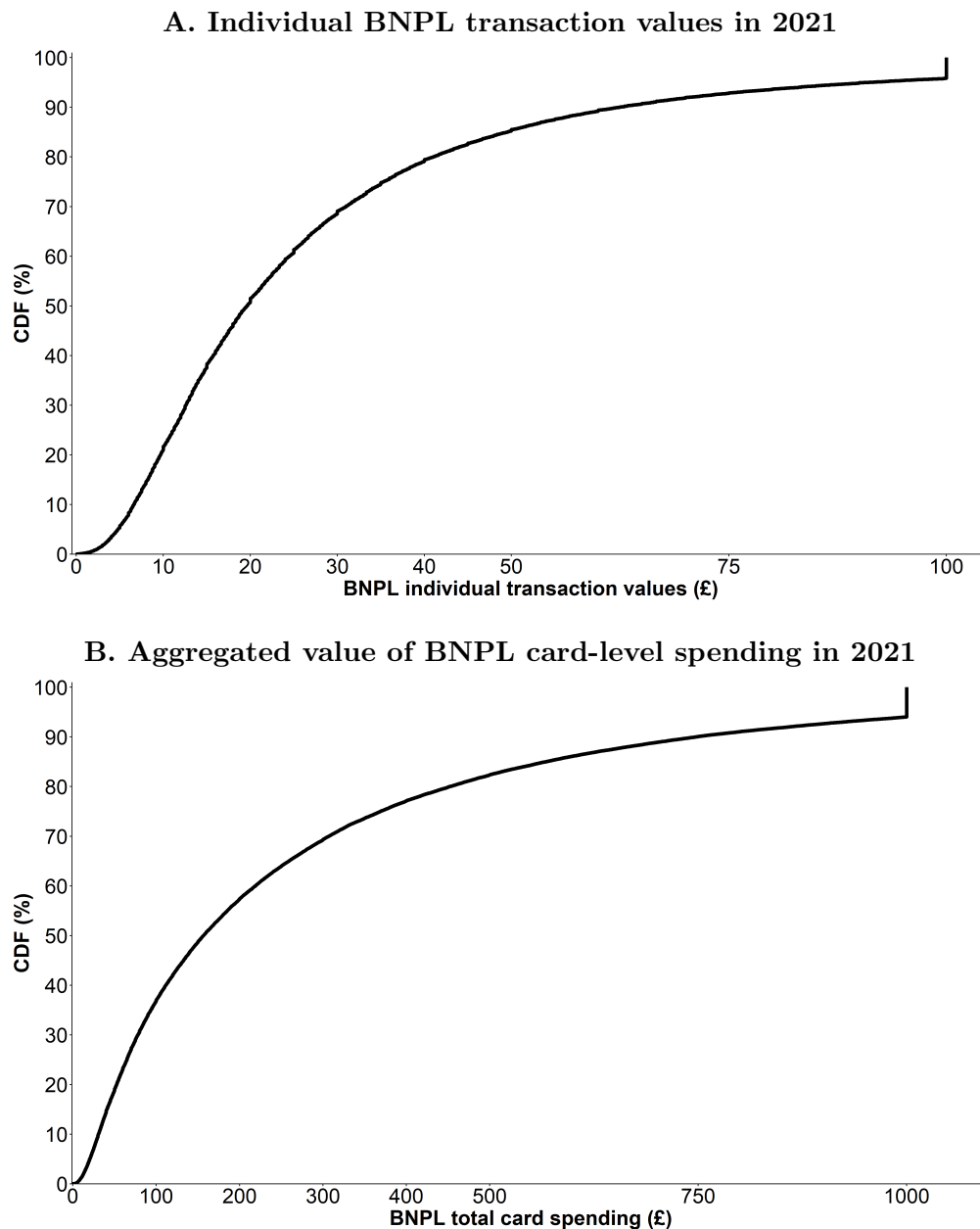


C. Urban-rural area classification (2021 spending)



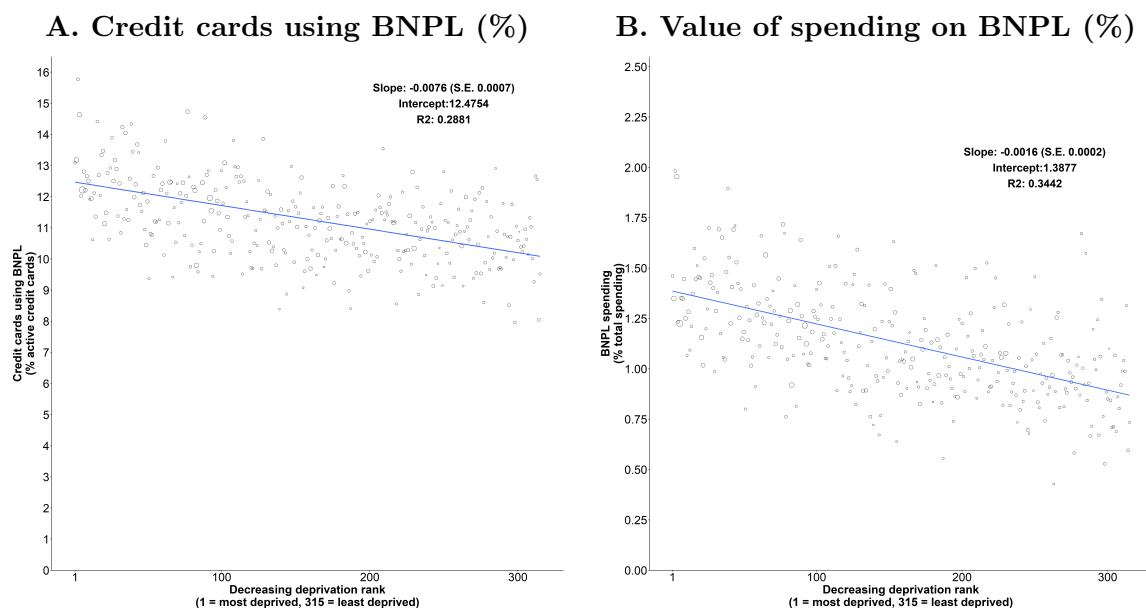
Notes: UK credit card transactions and Office for National Statistics (ONS) data. BNPL is buy now, pay later. Panels B and C allocate cards based on cardholder postcode sector to use ONS NUTS1 regions (Panel B) and ONS supergroup (2011) area classifications (Panel C). Maps and definitions of ONS area classifications: www.ons.gov.uk/methodology/geography/geographicalproducts/areaclassifications/2011areaclassifications

Figure 4. Distribution of BNPL spending for individual BNPL transactions (A) and aggregated across BNPL transactions on credit card (B), 2021



Notes: UK credit card transactions data. Panel A and Panel B top-coded at £100 and £1,000 respectively. BNPL is buy now, pay later. Panels A and B include all BNPL transactions on credit cards that were active throughout 2021: defined as any BNPL or non-BNPL transactions in December 2021.

Figure 5. BNPL usage and local area deprivation



Notes: Credit card transactions, Ministry of Housing, Communities & Local Government (MHCLG), Office for National Statistics (ONS) data. BNPL is buy now, pay later. Data aggregated to Local Authority District (LAD) level based on cardholder postcode sector. Cardholders in England across 315 LADs since there is no official standardized UK-wide index of multiple deprivation. Due to small populations, City of London is merged with Westminster and Isles of Scilly merged with Cornwall. Size of dot is share of ONS England population estimates and the linear regression is weighted by these shares. Panel A is percent of the number of active credit cards (i.e. those with any BNPL or non-BNPL spending) in a LAD which have any BNPL spending in 2021. Panel B is percent of the value of credit card spending in a LAD which is on BNPL spending in 2021. Deprivation ranks by English Indices of Multiple Deprivation (2019) - more details: www.gov.uk/government/statistics/english-indices-of-deprivation-2019