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## **Conspicuous Consumption and Household Indebtedness**

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### **Abstract**

*Using a novel, large dataset of consumer transactions in Singapore, we study how conspicuous consumption affects household indebtedness. The coexistence of private housing (condominiums) and subsidized public housing (HDB) allows us to identify conspicuous consumers. Conditional on the same income and other socioeconomic characteristics, those who choose to reside in condominiums—considered a status good—are likely to be more conspicuous than their counterparts living in HDB units. We consistently find that condominium residents spend considerably more (by up to 44%) on conspicuous goods but not differently on inconspicuous goods. Compared with their matched HDB counterparts, more conspicuous consumers have 13% more credit card debt and 151% more delinquent credit card debt. Furthermore, the association between conspicuous consumption and credit card debt is concentrated among younger, male, single individuals. These results suggest that status-seeking-induced conspicuous consumption is an important determinant of household indebtedness.*

Keywords: conspicuous consumption, consumer indebtedness, credit card delinquency, residential circle

JEL codes: D12, D14, E21, R20

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# Conspicuous Consumption and Household Indebtedness<sup>1</sup>

## 1. Introduction

A significant increase in household debt has been reported in many developed countries despite these countries' economic strength. For example, the ratio of individual household debt to disposable income has grown from 20% in 1945 to 134% in 2009 in the United States, and 2014 statistics show that the ratio remained high in many OECD countries (e.g., 113% in the United States, 164% in South Korea, 205% in Australia, and 274% in Netherlands). Along with the increase in real estate mortgage debt, one of the main drivers of the substantial growth of household debt was the increase in revolving debt, mainly credit card loans. In the United States, the share of revolving debt in total non-real estate consumer debt was as high as 41% in 1999 and remains at approximately 30% (Federal Reserve). As of 2009, credit card debt outstanding was US\$870 billion and the delinquency rate on such debt reached 6.8% (Federal Reserve). In particular, household indebtedness remains high after the recent financial crisis and has been the focus of various macro policies (e.g., Di Maggio et al., 2016).

Although traditional approaches focus on liquidity constraints to explain household indebtedness, an increasing number of studies highlight the role of social influence. For example, income ranking (within a social network) serves as a proxy for social status and plays an important role in influencing a household's debt decisions (Vissing-Jorgensen, 2012; Georgarakos, Haliassos and Pasini, 2014; Bricker, Ramcharan, and Krimmel, 2014). Under

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status-seeking incentives, households are more likely to accumulate excess debt by overspending.

One popular mechanism to explain the association between status seeking and household debt is a household's propensity to engage in conspicuous consumption. Conspicuous consumption refers to expenditures not made for consumers' own comfort or use but for the purpose of flaunting their wealth and income and, in turn, achieving greater social status (Veblen 1899). Charles et al. (2009) document that Blacks and Hispanics in the United States devote larger shares of their expenditure bundles to conspicuous goods than do Whites with similar permanent incomes, and that their conspicuous behavior is driven by reference group income and not by race.

Although intuitively appealing, the link between conspicuous consumption and household debt remains ambiguous: status-seeking incentives create distortions in the intratemporal consumption decision by tilting disproportionately more consumption toward visible or conspicuous goods (Agarwal, Qian, and Zou, 2016; De Giorgi, Frederiksen, and Pistaferri, 2016). Such intratemporal substitution may not necessarily correspond to a spending level that leads to (excess) debt accumulation, rendering an empirical question. Another empirical challenge lies in the difficulty of identifying conspicuous consumption motives and accurately measuring (conspicuous) consumption.

In this study, we investigate the role of conspicuous consumption to understand household indebtedness. Specifically, we measure status-seeking incentives by exploiting the unique

housing market setting in Singapore. The residential property market in Singapore consists of the two main types of housing—public and private—with the former sector (a.k.a. HDB<sup>2</sup>) providing homes to 80% of the resident population. The private housing market, primarily comprised of condominiums (condos), is viewed as an important status good in Singapore and, hence, aspired more by those with stronger conspicuous desire.<sup>3</sup> No geographical concentration of the public housing sector is distinct from that of the private housing market. Therefore, the HDB versus condo residence decision of individuals with similar income and demographics reveals their status-seeking incentives. The larger presence of conspicuous (middle-class) individuals in condos leads to the hypothesis that perceived peer income is much higher and peer effects on conspicuous motivation are much stronger in such private housing than in HDBs.

We employ a unique dataset of a large representative sample of consumers that includes credit card and debit card transactions between April 2010 and March 2012 from a leading bank in Singapore with a more than 80% market share. Similar to the United States, debit and credit cards account for approximately 30% of aggregate personal consumption (Agarwal and Qian, 2014).<sup>4</sup> Therefore, our data provide a fairly complete and accurate measure of individual-level consumption at high frequency. More importantly, we observe merchants and spending categories at the transaction level, allowing us to obtain a finer measure of conspicuous consumption. Relative to the existing literature that studies a specific spending item or that relies

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<sup>2</sup> HDB stands for Housing and Development Board, the statutory board of the Ministry of National Development that is responsible for public housing in Singapore.

<sup>3</sup> Singapore has an interesting term known as the 5Cs, which refers to condominium, car, country club membership, cash, and credit card. Some Singaporeans aspire to the 5Cs in their pursuit of material wealth and visible status ([https://en.wikipedia.org/wiki/Five\\_Cs\\_of\\_Singapore](https://en.wikipedia.org/wiki/Five_Cs_of_Singapore)).

<sup>4</sup> The remaining 70% of consumption occurs through checks, direct transfers, and cash. Consumers with recurring payments, including mortgage, rent, and auto loan payments, typically use instruments such as checks and direct deposit.

on a coarse classification scheme, we use the granularity contained in the transaction data by considering the luxurious feature of a spending item or merchant and the frequency and amount of an individual's consumption. Given the comprehensive nature of our consumption data, we are also able to examine whether conspicuous consumption crowds out inconspicuous consumption and analyze the direct link between consumption behavior and household indebtedness at the individual level.

We begin our analysis by identifying conspicuous consumption motives based on individuals' residential choice between HDB and condo. We analyze whether their conspicuous motivation influences conspicuous consumption behavior and indebtedness measured by credit card debt and delinquency. We then examine the direct relationship between conspicuous consumption and credit card debt behavior and whether this relationship is contingent on individuals' conspicuous motivation. Taking advantage of the rich information at the individual level, we also investigate whether the relationship between conspicuous consumption and household indebtedness is heterogeneous among people with different demographic characteristics.

Through an analysis of the matched sample based on income, demographic characteristics, and regional housing price levels, we find that people residing in condos spend more on conspicuous goods but less on other wellbeing goods compared with their matched counterparts in HDBs. Residing in condos increases conspicuous consumption by up to 44% relative to that of matched individuals in HDBs. In contrast, condo residents' spending on invisible or inconspicuous goods is not statistically significantly different from that of matched HDB residents. This finding supports both our identification strategy and our conspicuous consumption measures by

confirming that condo residents are indeed more conspicuous and their consumption of expensive luxury goods is driven by conspicuous motivation.

Next, we document that individuals with stronger conspicuous motivation have more credit card debt and experience delinquency more often than their matched counterparts with weaker conspicuous motivation. Compared with their matched HDB counterparts, condo residents have 13% more credit card debt and 151% more delinquent credit card debt. This effect is significant both statistically and economically. Furthermore, higher conspicuous consumption results in more credit card debt only for more conspicuous consumers but not for less conspicuous individuals. Among conspicuous individuals, younger, male, single individuals spend more on conspicuous goods, resulting in more credit card debt. Finally, our results remain intact for alternative matching algorithms and additional robustness analyses.

This paper directly contributes to the literature on the role of social influence as a determinant of household indebtedness. Most previous studies use relative income to capture the notion that conspicuous consumption is motivated by comparisons of socioeconomic standing or race among peers (Grinblatt et al., 2008; Charles et al., 2009; Vissing-Jorgensen, 2012; Georgarakos et al., 2014; Bricker et al., 2014; Carr and Jayadev, 2015). Our study measures status-seeking incentives by exploiting the revealed residential choice between locations that provide similar housing consumption services but differ in perceived status. Furthermore, we use administrative data on consumption and debt to provide direct evidence of the association between conspicuous consumption and household debt.

Our paper is also broadly related to the recent literature on the role of social networks in understanding household decisions. Guiso, Sapienza, and Zingales (2013) provide evidence of social influence on households' decisions to strategically default on their mortgages. Bailey et al. (2016) document the importance of accounting for social networks to understand the home purchase decision. Agarwal, Qian, and Zou (2016) and De Giorgi, Frederiksen, and Pistaferri (2016) find evidence consistent with a "keep-up-with-the-Joneses" effect on household consumption. This paper contributes to the literature by highlighting the role of status-seeking incentives in explaining household indebtedness through the mechanism of conspicuous consumption.

Finally, our results contribute to the literature on conspicuous consumption. Hopkins and Kornienko (2004) propose a theoretical model to suggest that, in a symmetric Nash equilibrium, people spend inefficiently high amounts on status goods and this tendency is amplified in a wealthier society. Similarly, Eaton and Eswaran (2009) demonstrate that well-being is inversely related to productivity because conspicuous goods crowd out the consumption of wellbeing-inconspicuous goods as productivity increases. Charles et al. (2009) empirically prove this phenomenon by reporting that Blacks and Hispanics in the United States devote larger shares of their expenditure bundles to conspicuous goods than do Whites with similar permanent incomes; moreover, their conspicuous behavior is driven by reference group income and not by race. Drechsel-Grau et al. (2013) also find that, in the U.S. context, envy motives measured as reactions to changes in the consumption of households perceived as wealthier are a more substantial driver of consumption behavior than habits. We add to the literature by documenting the debt consequences of conspicuous consumption.

## 2. Data and Methods

### 2.1 Data

We use a unique proprietary dataset that contains consumer financial transactions between April 2010 and March 2012 of approximately 180,000 customers from the leading bank in Singapore.<sup>5</sup> For individuals in our sample, we have monthly statement information on each of their credit cards and debit cards with the bank, including balance, spending, credit card limit, credit card payment, and debt. Close to 30% of all personal consumption in the country is done using credit and debit cards.<sup>6</sup> The dataset, which covers all transactions done with credit cards and debit cards that individuals hold with the bank, contains transaction-level information, including transaction amount, transaction date, merchant name, and merchant category. It is reported that Singapore cardholders own, on average, 3.3 credit cards per individual,<sup>7</sup> and individuals in our analysis sample each own an average of 2.9 credit cards. Thus, our analyses are based on most—if not all—credit card and debit card transactions being done by each individual in our sample, although it is possible that these individuals still own credit cards with other banks. Their consumption using these credit cards is missing in our dataset. The dataset also contains a rich set of demographic information on each individual, including age, gender, income, type of residence, residential postal code,<sup>8</sup> nationality, ethnicity, and occupation.

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<sup>5</sup> The bank has more than four million customers, or 80% of the entire population of Singapore. Our sample is a random representative sample of the bank's customers. The same dataset was used in Agarwal and Qian (2014).

<sup>6</sup> We expect that a much larger proportion of conspicuous consumption, which is the main focus on our study, is done by credit cards.

<sup>7</sup> Singapore top in Asia in credit cards owned per person: survey. (April 13, 2012). Retrieved from <https://sg.finance.yahoo.com/news/singapore-top-asia-credit-cards-105414790.html>.

<sup>8</sup> Unlike in the United States, where a zip code is assigned to a wide area with a large population, a postal code in Singapore is assigned to a building representing a single-family house or a building with multiple apartment units.



Following Agarwal and Qian (2014), credit card spending is computed by adding the monthly spending for all credit card accounts for each individual. Debit card spending is computed by adding the monthly spending for all debit card accounts for each individual. All of our consumption measures are based on total credit card and debit card spending. We compute the credit card debt balance as the difference between the current month's credit card payment and the previous month's credit card balance and delinquent credit card debt (30–210 days). To account for the importance of demographic characteristics on consumption desire and behavior, we limit our sample to individuals with the proper information on characteristics such as age, income, type of residence, nationality, ethnicity, marital status, and residential postal code. To identify conspicuous consumers using two residential circles in Singapore—public (HDB) or private (condo)—we exclude individuals whose residence type is a foreign address, an office, a post office box, or unknown. After eliminating individuals with missing demographic information and who reside in neither a HDB nor a condo, our final sample consists of 123,139 individuals. We aggregate the data at the individual-quarter level.

One limitation to our credit card data is that they do not reflect information on the value of a residence, which may be associated with individuals' consumption and indebtedness. Therefore, we obtain data from the Housing and Development Board in Singapore and the REALIS (Real Estate Information System) database managed by the Urban Redevelopment Authority on, respectively, transaction prices of HDB flats and condos in Singapore from 2010 to 2012 (consistent with the period of the credit card data) aggregated at the postal code level. We calculate the mean transaction price for 2010 through 2012 for each postal code and match this information with individuals in the credit card database using postal code. Thus, the home value

used for the following analyses was proxied at the six-digit postal code level, which refers to each building of HDB flats or condos.

## 2.2 Measures

Because the purpose of conspicuous consumption is to flaunt wealth to others, people want to consume more at stores in which others also spend more. Therefore, for the main measure of conspicuous consumption, we first identify luxury stores at which people spend the most for conspicuous goods that are visible to others by ranking all of the stores in apparel and durable categories<sup>9</sup> in the credit card and debit card transaction data on the basis of per-transaction amount; the top 20% stores are then identified as conspicuous stores.<sup>10</sup> We then measure the average per-transaction amount spent at conspicuous stores for each individual and divide this value by the grand mean across all individuals in our initial unmatched sample. We compute this relative ratio of conspicuous consumption for each individual and for each quarter. We also calculate the average monthly number of transactions that each individual made in conspicuous stores for each quarter and divide this figure by the grand mean of all individuals in our sample. We believe that our measures more precisely capture real conspicuous desire reflected in non-housing consumption than measures used in previous research (e.g., Charles et al., 2009; Vissing-Jorgensen, 2012).

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<sup>9</sup> More specifically, these categories include stores in *Apparel, Automotive Related, Building Construction, Department Stores, Electronic and Computer, Home/Office Furnishing & Appliances, Repair, Specialty Retail, and Watches and Jewelry*.

<sup>10</sup> Appendix A-1 provides summary statistics on transactions made in these conspicuous stores, and Appendices A-2 and A-3 show examples of conspicuous stores. As shown in Appendix A-1, conspicuous stores are stores in which people spent an average of \$1,774 in one transaction to purchase apparel or durable goods. Appendix A-2 and A-3 show that these stores include luxury brand stores, such as ROLEX (rank: 4), HERMES (rank: 14), PATEK PHILIPPE (rank: 15), IWC (rank: 26), ARMANI (rank: 34), and COACH (rank: 18,392). Even at other conspicuous stores with lower ranks (Appendix A-3), people spent more than \$350 per transaction.

In addition to the relative likelihoods of purchasing higher-priced items and shopping more frequently at the top 20% conspicuous stores, we prepare several alternative measures of conspicuous consumption. First, we measure the average per-transaction amount and the average monthly number of transactions at the top 10% conspicuous stores (n=9,203)—instead of the top 20% stores previously used—using the per-transaction amount among apparel and durable goods stores and divide them by the grand mean of all individuals in our sample. At these top 10% conspicuous stores, people spent an average of \$3,060 per transaction. Next, it is possible that some stores selling conspicuous goods are not listed as conspicuous because many people happened to purchase inexpensive inconspicuous goods at these stores. Therefore, we calculate for each individual the total monthly transactions that are higher than \$500 and made in any apparel and durable goods store, and then divide this total by the grand mean of all individuals in our sample. We also calculate the same ratio for the total amount transacted in apparel and durable goods stores using the threshold of \$1,000.

Another important measure of our study is consumer indebtedness. We account for both the credit card debt balance and the credit card debt under delinquency. For the credit card debt balance, we use a quarterly mean computed from monthly statement information. We compute the credit card delinquency measure by taking the quarterly mean of the monthly credit card debt balances that are delinquent for 30–210 days (i.e., 30, 60, 90, 150, 180, and 210 days<sup>11</sup>).

### *2.3 Initial sample*

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<sup>11</sup> Our data do not contain information on debt that is delinquent for periods longer than 210 days. By nature, this delinquency measure has many zero values. Therefore, it represents both the likelihood of experiencing delinquency and the amount of delinquent debt.

Summary statistics based on the initial sample of 123,139 individuals are reported in Table 1. Table 1 compares conspicuous consumption behavior, indebtedness, and socioeconomic attributes between people living in condominiums (condo residents) and those living in HDB flats (HDB residents). Compared with HDB residents, condo residents spent a much larger per-transaction amount on apparel and durable (visible) goods at conspicuous stores (at both the top 20% and top 10% stores), shopped more often at these conspicuous stores, and spent more on visible goods that cost more than \$500 and \$1,000. Although condo residents also have larger credit card debt (\$551) than HDB residents (\$492), the opposite is observed for delinquent debt.

Although these results may imply a difference in conspicuous consumption and indebtedness between condo and HDB residents, it is clear that condo residents are not directly comparable with HDB residents in several key dimensions. For example, because condo residents have considerably higher monthly incomes (\$9,692) than HDB residents (\$4,304), condo residents may simply have greater economic capacity to buy more luxury goods than do HDB residents. It is also notable that condo residents live in more expensive residences and are older than HDB residents. More foreigners, more married people, fewer ethnic Malay, and more people with bachelor degrees live in condos. If individuals' income and demographic attributes are associated with their economic capacity for consumption and consumption desire, these attributes and not conspicuous motivation may drive more conspicuous consumption and higher indebtedness among condo residents. To avoid these confounding issues, we require a better identification strategy.

#### *2.4 Identification strategy*

Our goal is to provide a causal interpretation of the role of conspicuous consumption—consumption by conspicuous individuals to satisfy their conspicuous desire—on indebtedness. To do so, we identify conspicuous consumers using residential circles and employ the standard logic of a counterfactual causal inference design (e.g., Rosenbaum, 2002; Morgan and Winship, 2007).<sup>12</sup> Our treatment group is comprised of individuals residing in condominiums considered status goods in Singapore. The comparison group is comprised of those with similar income and demographic attributes but who reside in government subsidized housing units called HDBs. From the pool of 106,988 HDB residents (Table 1), we select the closest match for each household residing in condos using both manual and propensity score matching procedures. First, we manually match within the strata by income decile to ensure that there is no difference in income between treatment and comparison groups. Income level is particularly important because it is directly related to economic capacity for conspicuous consumption. Next, within each stratum, we match each treatment observation with a comparison observation based on the criteria that are potentially associated with (conspicuous) consumption behavior, including age, gender, and marital status. Condos usually provide better amenities than HDBs, such as swimming pools, and housing choice may be driven partly by demand for these amenities. Therefore, we also match the per square foot home values at the six-digit postal code level to control for the value of housing consumption flow.

We use one-to-one matching with no replacement closest in the propensity score within a 0.003 caliper width to improve covariate balance and reduce bias. During the matching process, we lost

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<sup>12</sup> Two conditions are necessary to obtain “strong ignorability” of any confounding or potential selection bias to treatment (Rosenbaum and Rubin, 1983). First, the treatment and comparison groups must have no significant difference in the means on all variables that could influence the treatment assignment. Second, the treatment and comparison groups must have common support in their distributions.

some individuals in our treatment groups who were left unmatched because no one in the comparison group pool was in the same income decile or had a propensity score within a 0.003 caliper width of these treated individuals' propensity scores.<sup>13</sup> Our final sample size after matching is 3,498 individuals for the treatment group and 3,498 for the comparison group.

Table 2 summarizes the quality of the matched sample. Our treatment group (condo residents) and the comparison group (HDB residents) are highly homogeneous with respect to income, value of residence per square foot, age, and marital status. The mean differences of these variables were reduced by more than 97% as a result of matching. In the matched sample, there are more females in the treatment group than in the comparison group. However, this fact does not deteriorate the quality of our matched sample because the direction of this difference is not in favor of our hypothesis (Table 1 from the unmatched sample shows that condo residents who spent more at conspicuous stores and carried more credit card debt were less likely to be female). Furthermore, all variables including the proportion of females satisfy Cochran's rule of thumb. This means that none of these variables differs by more than a quarter of a standard deviation of the respective variable between the treatment and comparison groups, suggesting that our matched sample is well balanced (Cochran, 1968; Ho et al., 2007).<sup>14</sup> Finally, Figure 1 demonstrates that the distributions of monthly income, value of residence per square foot, and age of condo residents and HDB residents are quite homogeneous after matching. Therefore, we have a panel of reasonably balanced treatment and comparison individuals, which allows us to

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<sup>13</sup> We lost many observations mainly given our strict matching criteria including exact matching for income deciles and a very small caliper size, which we believe are critical to identifying comparable treatment and comparison groups.

<sup>14</sup> A t-test of the mean difference with respect to each of these variables confirms that the differences are not statistically significant except for the proportion of females. However, we do not report the results of the t-tests, because balance is a characteristic of the observed sample and not a hypothetical population. Thus, *t* statistics below 2, for example, have no special relevance for assessing balance.

claim that any observed treatment effect on conspicuous consumption and indebtedness are not biased by differences between treatment and comparison groups in individual socioeconomic characteristics.

We argue that our identification strategy using residential circles is convincing not only because condominiums are considered important status goods in Singapore but also because the income position of condo residents is expected to be lower in their residential circles than their matched counterparts in HDBs given that the income level in condos is much higher than in HDBs, as shown in Table 1. To verify this statement, we compute the income deciles separately for two residential circles (i.e., condo or HDB) within the same postal sector<sup>15</sup> among all individuals in our initial sample. We then assign to each individual in the matched sample an income decile, where 1 represents the lowest decile and 10 represents the highest decile. We find that the mean deciles are 4.50 and 6.77 for condo residents and HDB residents in the matched sample, respectively (the difference is statistically significant at the 1% level). As demonstrated by previous research (Grinblatt et al., 2008; Charles et al., 2009; Georgarakos et al., 2014; Bricker et al., 2014), lower (perceived) own income compared with peers has a significant association with conspicuous consumption and debt. Building on this finding, we hypothesize that condo residents with a lower economic standing in their residential circle have stronger conspicuous motivation than matched HDB residents.

### **3. Results**

#### *3.1 Residential circles and conspicuous consumption*

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<sup>15</sup> The postal sector is represented by the first two digits of the postal code, and Singapore is divided into 82 sectors.

First, we attempt to prove our hypothesis that condo residents are more conspicuous than HDB residents using the matched sample based on individuals' income capacity and demographics. Table 3 reports the results of regressions (Panel-GLM with log link<sup>16</sup>) that examine the relationship between residential circles (condo vs. HDB) and conspicuous consumption. The main independent variable is a condo dummy variable that takes the value of 1 for individuals who are condo residents and 0 for HDB residents. In Model 1, the dependent variable is the ratio of the average per-transaction amount that each individual made at the top 20% (Panel A) and top 10% (Panel B) conspicuous stores relative to the grand means of all individuals in our sample. In Model 2, the dependent variable is the ratio of the average number of transactions that each individual made at the top 20% (Panel A) and top 10% (Panel B) conspicuous stores relative to the grand mean of all individuals in our sample. In Model 3, we used the ratio of the total amount transacted in apparel and durable goods stores higher than \$500 (Panel A) and \$1,000 (Panel B) relative to the grand mean of all individuals in our sample. Thus, the conspicuous consumption measures in Panel B are based on more expensive luxury goods than those used in Panel A. Regressions are run with the matched sample of 6,996 individuals (3,498 condo residents and 3,498 HDB residents). To account for any potential remaining heterogeneity across individuals even after matching, we include in the regressions potential confounding

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<sup>16</sup> We use a generalized linear model (GLM) with log link regression using the quasi-maximum likelihood method for all analyses (i.e., Poisson-type regression) because our dependent variables, such as conspicuous consumption and credit card debt, contain many zero values. The use of ordinary least squares (OLS) underestimates the effects in such a situation. The Poisson quasi-maximum-likelihood method has been reported to be more appropriate than log-linearized OLS, even when the dependent variable is a continuous variable (Gourieroux et al., 1984; Silva and Tenreiro, 2006). We run OLS regressions and find that our main analysis results are quite robust except for larger standard errors.



variables such as income, home value at the six-digit postal code level, and demographic characteristics.<sup>17</sup>

As shown in Table 3, we find a strongly significant positive effect of residing in condos on conspicuous consumption, and this effect is consistent across models. In other words, among individuals in the matched sample that had an income level that is not statistically different, lived in housing units with similar quality and value, and shared similar demographic characteristics, those who lived in condos bought higher-priced items, shopped more frequently at conspicuous stores, and spent more on conspicuous goods. Moreover, the comparison between Panel A and Panel B suggests that conspicuous consumption among condo residents is even more evident with more expensive luxury goods. For example, as shown in Panel B, residing in condos increases conspicuous consumption by 29% (Model 1), 27% (Model 2), and 44% (Model 3), which are larger increases than the results shown in Panel A.<sup>18</sup> Given the average per-transaction amount at the top 10% conspicuous stores among all individuals in the initial sample (\$1,243), the 29% increase in Model 1 translates into an increase in the per-transaction amount at these conspicuous stores by \$360, keeping other variables constant.

In addition to the direct relationship of residing in a conspicuous residential circle to conspicuous consumption, Table 4 presents the overall consumption patterns of condo residents compared with their counterparts in HDBs in the matched sample. First, all of the conspicuous

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<sup>17</sup> Even after matching, simply comparing the difference in the means between the treatment and comparison groups assumes that the treatment variable and covariates are unrelated. When this assumption is false, the results are subject to omitted variable bias. The control variables that we use include home value at the six-digit postal code level—a proxy for housing costs and wealth level—income, age, gender, and marital status.

<sup>18</sup> These percentage changes are calculated using  $100 \times (e^{\beta} - 1)$ .

consumption measures are significantly higher for condo residents than for HDB residents, which is consistent with evidence from our regression results shown in Table 3. Second, we find that condo residents in the matched sample owned numerous credit cards and that a larger proportion of these residents, relative to HDB residents, owned the most prestigious type of credit card (Amex Elite) issued by the bank. This finding further supports the stronger conspicuous desire of condo residents. Finally, arguably and conditional on income level, condo residents generally consume more than HDB residents, and their consumption is not limited to conspicuous goods. To address this counterargument, we measure consumption in other categories, including inconspicuous, invisible consumption by condo and HDB residents. As shown in Table 4, condo residents spend on average a slightly larger amount (\$1,057) than HDB residents (\$974). However, this excess spending by condo residents is strongly evident in consumption categories that are visible and conspicuous, such as travel, durable, apparel, transportation, and dining. In contrast, condo residents do not spend significantly more at stores in the categories of service, supermarket, and entertainment, which tend to sell more invisible and/or inconspicuous wellbeing goods.

To summarize, the results in Tables 3 and 4 vividly show that people residing in condos indeed spent more on conspicuous goods and less on inconspicuous wellbeing goods compared with their matched counterparts in HDBs. This finding is consistent with the theoretical prediction of Eaton and Eswaran (2009). As previously explained, both relative economic standing and residential sorting (concentration of residents with stronger conspicuous desire) have likely driven conspicuous motivation among people living in condos. These results support our identification strategy that defines more (less) conspicuous consumers and uses quasi-experiment

matching based on their residential circles. They also confirm that our conspicuous consumption measures reflect conspicuous motivation and not just expenditures on higher-priced goods.

### *3.2 Conspicuous consumption and indebtedness*

Having established that people living in condominiums are indeed more conspicuous than their counterparts in HDBs, we move to examine whether more conspicuous individuals carry more household debt than less conspicuous individuals. Table 5 shows the results of regressions (Panel-GLM with log link) that examine the relationship between residential circles (condo vs. HDB) and household indebtedness, again using the same matched sample. The main independent variable is the condo dummy variable. Dependent variables are, in Model 1, credit card debt balance and, in Model 2, the credit card debt that is delinquent for more than 30 days. We find that condo residents carried more credit card debt and more delinquent debt than HDB residents by 13% and 151%, respectively, controlling for income, value of residence, and demographics. We argue that this increase is quite significant. Considering the average monthly credit card debt for all individuals in the initial sample (\$500), a 13% increase translates into \$65, keeping other variables constant.

Therefore, combined with the previous results shown in Tables 3 and 4, this finding suggests that people living in a conspicuous residential circle spent significantly more on expensive, visible goods. Moreover, this consumption may have sometimes gone beyond their financial capacity and resulted in debt and delinquencies.

Next, to examine the direct relationship between conspicuous consumption and indebtedness, we add a conspicuous consumption measure (the ratio of the average per-transaction amount of each individual at the top 10% conspicuous stores relative to the grand mean) and the interaction term between this measure and the condo dummy variable to the regression used for Model 1, Table 5.<sup>19</sup> Table 6 summarizes the results. First, consistent with this evidence, condo residents carried significantly higher credit card debt (11% more) than HDB residents. More importantly, among condo residents, those who spent more at conspicuous stores carried significantly more credit card debt, as shown through the strongly significant positive effect for the interaction term ( $B=0.001$ ;  $z=40.84$ ). In contrast, the relationship between conspicuous consumption and credit debt is negative among HDB residents, as is evident through the coefficient of conspicuous consumption ( $B=0.000$ ;  $z=-5.58$ ). Thus, HDB residents who spent more at conspicuous stores carried less credit card debt, potentially because such consumption by HDB residents may have been driven less by conspicuous motivation. They may also be better at substituting conspicuous desires between housing and non-housing goods than condo residents.<sup>20</sup>

The results in Tables 5 and 6 together suggest that only the consumption of visible luxury goods by consumers with stronger conspicuous motivation leads to higher indebtedness. In other words, conspicuous consumption and not consumption of higher-priced goods could have negative financial consequences to consumers. These results reinforce the importance of identifying consumers with conspicuous motivation to precisely investigate the role of conspicuous

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<sup>19</sup> Starting from this analysis, we focus only on credit card debt because the number of delinquent cases is very small for the matched sample and the maximum likelihood method did not converge to a solution for specifications that include additional interaction terms. Among 6,996 individuals in our matched sample, only 208 individuals ever had delinquent debt.

<sup>20</sup> A significant price difference exists between condos and HDBs (see Table 1). In a rational framework, individuals that chose condos should have responded to the higher housing costs by consuming less in other categories.

consumption on indebtedness. For example, because Vissing-Jorgensen (2012) did not identify more versus less conspicuous consumers, the positive relationship between luxury consumption and credit default shown in her study may have been underestimated.

### *3.3 Heterogeneity among conspicuous consumers*

Not all consumers with a stronger conspicuous motivation residing in condos spend more at conspicuous stores, thus leading to higher indebtedness. We examine the potential heterogeneity of conspicuous consumption and indebtedness among conspicuous consumers in terms of age, gender, marital status, and neighborhood context beyond residential circles. Table 7 summarizes the results of the regressions (Panel-GLM with log link) using the same matched sample (3,498 condo residents and 3,498 HDB residents). In Model 1, the dependent variable is conspicuous consumption measured by the ratio of the average per-transaction amount at the top 10% conspicuous stores relative to all individuals in the sample. In Model 2, the dependent variable is the credit card debt balance for each individual.

First, Panel A of Table 7 shows that, among conspicuous condo residents, younger people (see the result of  $\text{condo} \times \text{age}$ ) purchased more expensive goods at conspicuous stores (Model 1) and carried higher credit card debt (Model 2). We also observe a similar negative effect of age on conspicuous consumption among HDB residents (Model 1); however, these younger HDB residents do not appear to carry more credit card debt (Model 2), as shown for the result of age. Panel B shows that, among both condo and HDB residents, male individuals purchased higher-priced items at conspicuous stores and carried higher credit card debt. The heterogeneity in the results for marital status is more evident (Panel C). Among conspicuous condo residents, single

individuals spent much more on average for one transaction at conspicuous stores and carried much higher credit card debt (for both, approximately 20% more than married individuals) among condo residents. In contrast, both conspicuous consumption and credit card debt are higher for married individuals among HDB residents. Finally, Panel D shows that condo residents living in neighborhoods with higher home values purchased more expensive items at conspicuous stores and carried higher credit card debt. Among HDB residents, those who lived in conspicuously more expensive neighborhoods also spent more on conspicuous goods but also carried less credit card debt.

In summary, we found that even among conspicuous condo residents, younger, male, single individuals living in more expensive neighborhoods purchased more expensive items at conspicuous stores and carried higher credit card debt. For example, single male condo residents living in the most expensive neighborhoods spent \$1,841 per transaction at conspicuous stores and carried \$969 of credit card debt, significantly higher than the average amounts for all HDB residents and for married female condo residents not living in the most expensive neighborhoods in the matched sample.<sup>21</sup> We also find that conspicuous consumption and credit card debt are always in the same direction among condo residents (i.e., those with more (less) conspicuous consumption have more (less) credit card debt), although this relationship does not hold among HDB residents. In particular, HDB residents who were younger and lived in expensive neighborhoods bought expensive conspicuous goods; however, the probability that they experienced indebtedness was not higher than that of others. Consistent with the results shown in

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<sup>21</sup> We find that the average per-transaction amount at conspicuous stores was \$1,321 and credit card debt was \$514 for HDBs individuals. The average per-transaction amount at conspicuous stores was \$1,291 and credit card debt was \$544 among married female condo residents not living in the most expensive neighborhoods.

Table 6, these findings suggest that conspicuous motivation is critical to explaining the relationship between conspicuous consumption and indebtedness, possibly because those with stronger conspicuous motivation have lower capacity to substitute conspicuous desires across different items (e.g., housing vs. non-housing goods) and engage in better financial management.

### *3.4 Robustness checks*

First, we re-perform our analyses on the matched samples using a series of more rigorous methods.<sup>22</sup> Although we use a number of important socioeconomic variables as matching criteria and as controls for the regressions in our main analyses, we attempt to further remove the possibility that other variables systematically differ between treatment and comparison groups and are associated with dependent variables. For example, because non-Singaporeans are concentrated in condos, our results may be subject to selection bias if they have systematically different (conspicuous) consumption motivation from that of Singaporean citizens. We restrict the initial sample only to Singaporeans and redo the matching using the same treatment of residing in a condo. We find that the results using this matched sample (Appendix B, Panel A) are quite consistent with our main results for both conspicuous consumption (Model 1) and indebtedness (Model 2). It is also possible that neighborhoods in which condos and HDBs are located differ and the neighborhood environment beyond residential circles affects individual consumption behavior. To address this possibility, we create a new matched sample in which each matched pair is forced to be drawn from the same postal sector and from the same income

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<sup>22</sup> For all robustness checks, the value of residence (log), income (log), age, female, and married variables are included as control variables. For all matchings, we use the logit model to estimate the propensity score, for which the dependent variable is the condo dummy and the base independent variables are value of residence per square foot (a control for the quality of a residence), income decile, age, gender, and marital status. One-to-one matching is done with no replacement, where each matched pair is forced to be drawn from the same income decile. We add different criteria for different robustness checks.

decile. Using a smaller number of observations in the sample, we consistently find positive effects of residing in condos on both conspicuous consumption and credit card debt (Panel B).

Another concern may be that condo residents spend slightly more in general, as shown in Table 4,<sup>23</sup> and our main findings are simply from the difference in this spending behavior. We doubt the validity of this concern because we find that this excessive spending is concentrated in stores that sell expensive conspicuous goods (Table 4). Still, we attempt to compare condo residents and HDB counterparts who have similar total credit, debit card spending, and other socioeconomic characteristics by adding a total card spending variable as a matching criteria. Regarding this newly created matched sample, we find that the results are robust to our main results (Panel C). Next, arguably, people with higher levels of education may have higher expectations about their future income, and condo residents tend to have higher education, as shown in Table 1. Therefore, expected future income and not conspicuous motivation leads condo residents to purchase more expensive luxury goods and carry higher debt. To at least partly address this concern, we create a matched sample only among individuals whose highest degree is a Bachelor's. The results using this matched sample (Panel D) show that the treatment effects of residing in condos on conspicuous consumption (Model 1) and credit card debt (Model 2) are positive and consistent with our main results. Lastly, we perform regressions using the initial sample of 123,139 without any matching algorithm to address concerns about the external validity of our results. The results shown in Panel E are consistent with our main results.

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<sup>23</sup> According to Table 4, condo residents have, on average, higher total credit and debit card spending (\$1,057) than HDB residents (\$974) in the matched sample.



Second, our analysis on the direct relationship between consumption and indebtedness shown in Table 6 focuses on conspicuous consumption and not total consumption. To further ensure that conspicuous and inconspicuous consumption have different effects on indebtedness, we rerun the regression of Table 6 using the ratio of total credit/debit card spending relative to all individuals in the sample and its interaction term with the condo dummy variable rather than the prior conspicuous consumption measures. We first find that, among those residing in HDBs, total spending has a positive effect on credit card debt ( $B=0.0002$ ,  $z=1100$ , and is significant at the 1% level), which makes sense. A more intriguing result is that, among individuals residing in condos, total spending has a negative effect on credit card debt, although the coefficient is quite small ( $B=-0.00005$ ,  $z=-170$ , significant at the 1% level). These results confirm that, among those with stronger conspicuous motivation, conspicuous consumption and not general consumption leads to higher indebtedness.<sup>24</sup>

Lastly, we test whether our analysis results using home value at the six-digit postal code level as a proxy for housing cost are robust to housing tenure status, for which our data do not provide information. Although we know that most HDB residents are homeowners, more condo residents in our sample are likely to be renters.<sup>25</sup> Therefore, housing costs significantly differ between owners and renters, and this difference may affect their non-housing conspicuous consumption and indebtedness. To address this issue, we estimate monthly housing costs for owners of HDBs, owners of condominiums, and renters of condominiums. For owners, we use the mean values of HDBs and condos (\$672,310 and \$941,018, respectively) from our matched sample and assume

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<sup>24</sup> Unreported robustness check results are available from the authors on request.

<sup>25</sup> Among Singaporean citizens and permanent residents, the homeownership rates for HDBs and condos are 92% and 84%, respectively, as of 2015. The rentership rate for foreigners who could only reside in condos is expected to be higher.

that owners take out an 80% loan with a 25-year maturity and a 2% interest rate. Monthly mortgage payments of condo and HDB owners are estimated at approximately \$3,200 and \$2,300, respectively. To measure the monthly rent for a condominium with a value of \$941,018, we identify several condominiums of similar values and collect rental data<sup>26</sup> for units sized 120 square meters—the mean size of condominium units in the matched sample. We find that the monthly rent of the typical condominium in the matched sample should be approximately \$3,400. This finding verifies that condo residents' housing costs must be similar regardless of their housing tenure status. In addition, condo renters' housing costs must be higher than HDB owners' housing costs. Thus, it is very unlikely that higher conspicuous consumption and higher debt among condo residents (both owners and renters) relative to among HDB owners is attributable to lower housing costs.

#### **4. Concluding Remarks**

We identify conspicuous consumers in the Singapore context on the basis of their residential circles, more conspicuous private condominiums, and less conspicuous public HDBs, and analyze their conspicuous consumption and indebtedness. A series of analyses using matched sample of individuals that reside in condos versus HDBs first confirms that condo residents were indeed more conspicuous than HBD residents. They spent more on conspicuous goods but not necessarily on other wellbeing goods and were more likely to own prestigious credit cards compared with their matched counterparts in HDBs. Our main finding is that condo residents who have greater conspicuous motivation have more credit card debt and experienced delinquency more often than their matched counterpart in HDBs. Moreover, only conspicuous

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<sup>26</sup> Rental data are from the Urban Redevelopment Authority in Singapore as of the end of 2012.

consumption by conspicuous condo residents and not by inconspicuous HDB residents led to higher credit card debt. Finally, even among conspicuous condo residents, younger, male, single individuals spent more on conspicuous goods and carried higher credit card debt.

Our findings provide an important insight into the discussion on recent increases in household indebtedness. Consumption of visible, luxury goods, especially driven by higher conspicuous motivation, makes a significant contribution to indebtedness. Hence, conspicuous motivation provides one possible explanation for why some people consume more than their available economic resources and carry debt. Furthermore, conspicuous consumers seem to have lower capacity to substitute conspicuous desires between different items. As shown in our results, individuals who already made a conspicuous residential choice further increase non-housing conspicuous consumption. In contrast, in a rational framework, they should respond to higher housing costs by consuming less in other categories. Even among conspicuous consumers, particular concern needs to be given to the group of people who are more vulnerable to higher indebtedness. Our results suggest that younger, male, single individuals may belong to this group.

In terms of conspicuous motivation, our results suggest the importance of individual residential choices. Even in non-Singapore contexts, it is highly plausible that persons with stronger conspicuous desire sort into single family housing units on prestigious streets or multifamily housing complexes with brand names. If they are surrounded by and interact with neighbors who are similarly conspicuous and/or have higher incomes, they are likely to perceive their economic standing as relatively low, motivating them to engage in more conspicuous consumption. In

contrast, certain areas may have significant variations in community and locational amenities, such as a swimming pool in a gated community and higher educational quality across different residential circles. Individuals who choose conspicuous residential circles for these amenities and not because of their own conspicuous desire may be exposed to peer effects from conspicuous neighbors. As our results suggest, choosing a conspicuous residential circle on the basis of either their own conspicuous motivation or other reasons could trigger a higher level of non-housing conspicuous consumption that eventually leads to higher debt and delinquency.

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**Table 1 Summary statistics***Condo residents vs. HDB residents (before matching)*

	<b>Condo</b>		<b>HDB</b>		<b>Diff (Condo - HDB)</b>	
	Mean	Std. Dev.	Mean	Std. Dev.	Diff	<i>t (z) Sig.</i>
<b><i>Credit and debit card spending</i></b>						
Monthly total spending						
Average per-transaction amount at conspicuous stores (Top20)	796.03	2,055.47	494.18	957.32	301.85	34.79 ***
Average per-transaction amount at conspicuous stores (Top10)	1,581.29	3,689.48	1,139.48	1,679.98	441.81	15.01 ***
Monthly number of transactions at conspicuous stores (Top20)	0.24	0.71	0.14	0.51	0.10	81.46 ***
Monthly number of transactions at conspicuous stores (Top10)	0.06	0.31	0.03	0.19	0.03	61.20 ***
Monthly total spending over \$500 per-transaction amount at apparel and durable stores	171.14	1,372.03	64.31	517.19	106.83	47.39 ***
Monthly total spending over \$1,000 per-transaction amount at apparel and durable stores	129.78	1,333.42	44.14	486.54	85.64	39.12 ***
<b><i>Credit card debt and delinquency</i></b>						
Monthly credit card debt amount	550.93	2,049.03	492.10	1,579.36	58.83	9.59 ***
Monthly delinquent credit card debt amount	24.58	780.18	36.70	823.28	-12.12	-5.02 ***
<b><i>Average house characteristics in neighborhood (6 digit postal code)</i></b>						
Size (sqm)	138.67	241.17	104.23	36.79	34.45	49.67 ***
Price	1,442,276.00	3,846,479.00	456,614.90	415,555.60	985,661.10	89.19 ***
Price per sqm	9,758.75	3,440.45	4,421.40	934.09	5,337.36	540.00 ***
<b><i>Demographics</i></b>						
Monthly income	9,692.17	12,346.44	4,304.40	3,446.84	5,387.77	150.00 ***
Age	43.78	9.79	39.35	10.20	4.43	150.00 ***
% foreigner	28.58%		18.97%		0.10	77.85 ***
% female	40.58%		41.36%		-0.01	-5.10 ***
% married	61.50%		39.55%		0.22	140.00 ***
% chinese	79.23%		80.19%		-0.01	-7.75 ***
% malay	1.11%		6.50%		-0.05	-74.97 ***
% indian	6.85%		7.12%		0.00	-3.46 ***
% with bachelor degree	35.03%		27.95%		0.07	18.51 ***
<b><i>Number of individuals</i></b>	16,151		106,988			

*Notes:* Table 1 reports summary statistics of the treatment (Condo residents) and comparison (HDB residents) samples, before propensity score matching, on the basis of the final sample of 123,139 individuals after deleting those with incomplete demographic

information. Credit card and debit card spending is computed by adding monthly spending over all card accounts for each individual. Conspicuous stores are defined by ranking all of the stores in the apparel and durable categories in the credit card and debit card transaction data on the basis of per-transaction amount. Statistics based on both top 20% and top 10% conspicuous stores are summarized. Credit card debt is computed as the difference between the current month's credit card payment and the previous month's credit card balance. House characteristics are based on information at the postal code level, which refers to each HDB flat or condo building. All dollar amounts are in local currency (SG\$), and SG\$1 = US\$0.78 as of February 2011. Variables are winsorized at the 1% and 99% levels. \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.



**Table 2 Quality of propensity score matching sample**

		<i>Treatment: Comparison:</i>		<i>Difference</i>	<i>% reduction</i>	<i>Difference in means as proportion of standard deviation</i>	<i>Cochran's rule of thumb</i>
		<i>Condo</i>	<i>HDB</i>				
Monthly income	Unmatched	9,692.2	4,304.4	5387.77			
	Matched	6,430.0	6,383.2	46.80	99.10	0.008	y
Price per sqm (residence, 6 digit postal code)	Unmatched	9,758.8	4,421.4	5337.35			
	Matched	6,485.2	6,526.9	-41.70	99.20	0.018	y
Age	Unmatched	43.8	39.4	4.43			
	Matched	40.7	40.8	-0.11	97.60	0.011	y
% female	Unmatched	40.6%	41.4%	-0.01			
	Matched	44.7%	39.9%	0.05	-344.10	0.096	y
% married	Unmatched	61.5%	39.6%	0.22			
	Matched	48.7%	49.4%	-0.01	97.00	0.013	y

*Notes:* Table 2 summarizes the statistics of the sample created using propensity score matching. Statistics for both the before-matching sample of 123,139 individuals (unmatched) and the after-matching sample of 6,996 individuals (matched) are shown. The matched sample contains 3,498 condo residents and 3,498 HDB residents. We use the logit model, in which the dependent variable is the condo dummy (1 for condo residents and 0 for HDB residents) and the independent variables are value of residence per square foot (a control for residence quality), income decile, age, gender, and marital status to estimate the propensity score. One-to-one matching is done with no replacement, for which each matched pair is forced to be drawn from the same income decile. The column “% reduction” shows the percentage reduction in the mean difference between condo residents and HDB residents. “Cochran’s rule of thumb” reports whether the mean difference of a variable with the matched sample is less than a quarter of a standard deviation of the respective variable (“y” indicates that the mean difference is smaller than this threshold, suggesting that good balance is achieved after matching), following Cochran, 1968 and Ho et al., 2007.

**Table 3 Residential circles and conspicuous consumption****Panel A: Top20% conspicuous stores & over-\$500 spending**

	Model 1			Model 2			Model 3		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
<b>Condo</b>	0.17	22.57	***	0.16	19.58	***	0.33	44.80	***
Price of residence									
(log, 6 digit postal code)	0.10	11.92	***	0.04	4.11	***	0.07	8.73	***
Income (log)	0.25	53.19	***	0.26	52.56	***	0.39	79.58	***
Age	0.00	-3.69	***	-0.01	-21.50	***	-0.01	-19.86	***
Female	-0.35	-43.33	***	-0.34	-40.81	***	-0.35	-44.69	***
Married	0.23	28.96	***	0.22	26.34	***	0.19	24.41	***
Constant	-3.16	-27.91	***	-2.21	-18.24	***	-3.73	-33.77	***
Number of observations	53,392			53,392			53,392		
Number of individuals	6,996			6,996			6,996		

**Panel B: Top10% conspicuous stores & over-\$1,000 spending**

	Model 1			Model 2			Model 3		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
<b>Condo</b>	0.26	35.83	***	0.24	31.94	***	0.36	49.56	***
Price of residence									
(log, 6 digit postal code)	0.11	14.56	***	0.13	16.51	***	0.08	10.81	***
Income (log)	0.36	77.23	***	0.25	53.98	***	0.43	89.00	***
Age	-0.01	-24.24	***	-0.01	-25.44	***	-0.01	-23.03	***
Female	-0.40	-52.07	***	-0.38	-47.90	***	-0.39	-50.62	***
Married	0.26	34.77	***	0.23	29.12	***	0.20	26.32	***
Constant	-3.87	-36.63	***	-3.20	-29.09	***	-4.20	-39.14	***
Number of observations	53,392			53,392			53,392		
Number of individuals	6,996			6,996			6,996		

*Notes:* Table 3 summarizes the results of regressions (Panel-GLM with log link) that examine the relationship between residential environment (condo vs. HDB) and conspicuous consumption using the matched sample. In Panel A (Panel B), the dependent variable in Model 1 is the average per-transaction amount at the top 20% (top 10%) conspicuous stores, in Model 2 is the number of transactions at the top 20% (top 10%) conspicuous stores, and in Model 3 is the total amount of monthly transactions higher than \$500 (\$1,000) made in any apparel and durable goods stores, respectively. All of these measures are ratios larger than the grand mean from all 123,139 individuals in our before-matched sample. In all models shown in Panel A and Panel B, the main independent variable is the condo dummy variable that takes the value of 1 if individuals are condo residents (3,498) and 0 if they are HDB residents (3,498). \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

**Table 4 Overall consumption patterns of individuals in the matched sample**

	<i>Treatment:</i> <i>Condo</i>	<i>Comparison:</i> <i>HDB</i>	<i>Diff:</i> <i>Condo-HDB</i>
<b><i>Conspicuous consumption</i></b>			
Per-transaction amount at conspicuous stores: Top20%	667.03	598.12	68.91 ***
Per-transaction amount at conspicuous stores: Top10%	1,440.18	1,321.09	119.09 ***
Monthly number of transactions conspicuous stores: Top20%	0.21	0.18	0.03 ***
Monthly number of transactions conspicuous stores: Top10%	0.05	0.04	0.01 ***
Monthly total spending at conspicuous stores: Top20%	139.96	109.99	29.97 ***
Monthly total spending at conspicuous stores: Top10%	67.32	49.22	18.10 ***
Monthly total spending, over \$500 each transaction	129.39	94.57	34.82 ***
Monthly total spending, over \$1000 each transaction	96.08	68.31	27.77 ***
<b><i>Credit card accounts</i></b>			
Number of credit cards held	2.96	2.81	0.15 ***
% with Amex Elite	2.16%	0.96%	1.20% ***
<b><i>Monthly spending</i></b>			
Total	1,057.41	973.73	83.68 ***
Travel	157.51	132.12	25.39 ***
Durable	96.85	77.45	19.40 ***
Apparel	122.94	105.78	17.16 ***
Transportation	78.08	62.31	15.77 ***
Dining	82.16	71.69	10.47 ***
Service	275.85	271.52	4.33
Online	25.81	21.60	4.21 ***
Supermarket	70.27	70.54	-0.27
Entertainment	69.50	70.69	-1.19
<b><i>Number of individuals</i></b>			
	3,498	3,498	

*Notes:* Table 4 summarizes the characteristics of our condo and HDB sample after propensity score matching, which seem related to the conspicuousness of these individuals. Conspicuous consumption measures are shown as raw numbers instead of ratios. “Amex Elite” is the most prestigious type of credit card issued by the bank. All dollar amounts are in the local currency (SG\$), and SG\$1 = US\$0.78 as of February 2011. Variables are winsorized at the 1% and 99% levels. \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

**Table 5 Residential circles and credit card indebtedness**

	Model 1			Model 2		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
<b>Condo</b>	0.12	314.26	***	0.92	329.21	***
Price of residence (log, 6 digit postal code)	0.06	160.42	***	-0.65	-218.93	***
Income (log)	0.00	7.00	***	-0.08	-68.75	***
Age	0.01	636.33	***	-0.01	-43.42	***
Female	-0.38	-947.32	***	-0.97	-316.23	***
Married	0.03	85.06	***	-0.55	-191.54	***
Constant	4.97	885.66	***	12.05	295.49	***
Number of observations	53,392			53,392		
Number of individuals	6,996			6,996		

*Notes:* Table 5 summarizes the results of regressions (Panel-GLM with log link) that examine the relationship between residential environment (condo vs. HDB) and indebtedness using the matched sample. The dependent variable is credit card debt balance in Model 1 and credit card debt under delinquency (30, 60, 90, 150, 180, and 210 days) in Model 2. The main independent variable is the condo dummy variable that takes the value of 1 if individuals are condo residents (3,498 conspicuous individuals) and 0 if they are HDB residents (3,498 inconspicuous individuals). \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

**Table 6 Conspicuous consumption and credit card indebtedness: Matched sample**

	<i>B</i>	<i>z</i>	
<b>Conspicuous consumption</b>	0.000	-5.58	***
<b>Condo</b>	0.105	259.67	***
<b>Condo x Conspicuous consumption</b>	0.001	40.84	***
Price of residence			
(log, 6 digit postal code)	0.052	119.66	***
Income (log)	-0.006	-29.41	***
Age	0.011	548.38	***
Female	-0.380	-899.85	***
Married	0.025	59.560	***
Constant	5.292	881.700	***
Number of observations	45,870		
Number of individuals	6,944		

*Notes:* Table 6 summarizes the result of a regression (Panel-GLM with log link) that examines the relationship between conspicuous consumption and indebtedness interacted with the residential environment (condo vs. HDB) using the matched sample. The dependent variable is credit card debt balance. The conspicuous consumption measure is the average per-transaction amount at the top 10% conspicuous stores (ratio over the grand mean, one-quarter lagged). The condo dummy variable takes the value of 1 if individuals are condo residents (3,498 conspicuous individuals) and 0 if they are HDB residents (3,498 inconspicuous individuals). The main focus in this regression is the interaction term between the condo dummy and the conspicuous consumption variable. \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

**Table 7 Heterogeneity of conspicuous consumption and indebtedness**

*Panel A: Age*

	Model 1			Model 2		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
Age	-0.006	-9.75	***	0.013	476.23	***
Condo	0.596	18.61	***	0.147	93.17	***
<b>Condo x Age</b>	-0.008	-10.88	***	-0.001	-18.51	***
Constant & Controls	included			included		

*Panel C: Marital status*

	Model 1			Model 2		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
Married	0.383	34.82	***	0.160	288.87	***
Condo	0.384	35.08	***	0.245	450.12	***
<b>Condo x Married</b>	-0.222	-15.47	***	-0.242	-323.90	***
Constant & Controls	included			included		

*Panel B: Gender*

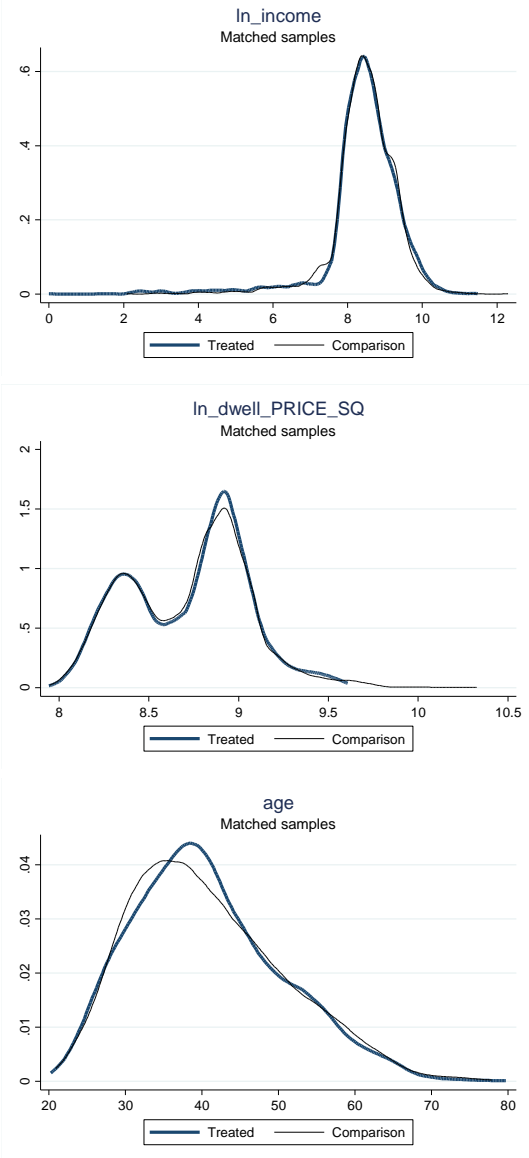
	Model 1			Model 2		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
Female	-0.339	-29.63	***	-0.351	-602.41	***
Condo	0.289	33.28	***	0.134	292.18	***
<b>Condo x Female</b>	-0.099	-6.55	***	-0.047	-58.84	***
Constant & Controls	included			included		

*Panel D: Neighborhood residential value*

	Model 1			Model 2		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
Neighborhood	0.001	0.57		-0.012	-121.61	***
Condo	0.158	8.82	***	0.018	19.56	***
<b>Condo x Neighborhood</b>	0.017	6.78	***	0.017	135.71	***
Constant & Controls	included			included		

*Notes:* Table 7 summarizes the results of regressions (Panel-GLM with log link) that examine the heterogeneity of the relationship between the residential environment and conspicuous consumption and indebtedness using the matched sample (6,996 individuals). In Model 1, the dependent variable is conspicuous consumption measured by the average per-transaction amount at the top 10% conspicuous stores (ratio over the grand mean). In Model 2, the dependent variable is credit card debt balance. The condo dummy variable takes the value of 1 if individuals are condo residents (3,498 conspicuous individuals) and 0 if they are HDB residents (3,498 inconspicuous individuals). The female variable in Panel B takes the value of 1 if individuals are female and 0 otherwise. The married variable in Panel C takes the value of 1 if individuals are married and 0 otherwise. In Panel D, the neighborhood variable represents the ranks of 82 postal sectors on the basis of the average price of houses (both condos and HDB flats) within each sector, where the rank of 1 represents the sectors with the lowest average residential values and the rank of 10 represents the sectors with the highest average residential values (i.e., as a proxy for the conspicuousness of neighborhood). All of the same control variables (except for variables used to test heterogeneous effects, e.g., age in Panel A) are included in the regressions. \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

**Figure 1 Quality of propensity score matching sample**



*Notes:* Figure 1 shows the treated group (condo residents) and the comparison group (HDB residents) comparison of distributions (QQ plots) of monthly income (log), value of residence per square foot (log), and age, after the propensity score matching.

### Appendix A-1: Summary statistics of “conspicuous stores” in apparel and durables

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Number of conspicuous stores	18,406
Total number of stores in apparel and durables	92,076
Per-transaction amount	
Mean	1,774.12
Std. Dev.	32,323.17
Min.	350.03
Max.	3,596,942.00

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*Notes:* This table summarizes the statistics on transactions at 18,406 “conspicuous stores,” which are the top 20% stores according to the rank of all stores in the apparel and durable categories in our dataset based on per-transaction amount. Statistics are based on the entire sample of 187,249 individuals for the complete sample period between April 2010 and March 2012.



## Appendix A-2: Examples of stores defined as “conspicuous stores”: Rank 1–50

Rank	Merchant name	Merchant category	Average per-transaction amount (Singapore Dollar)
1	SOTHEBY	Specialty Retail	3,596,942
2	CHRISTIE HONG KONG CENTRAL	Specialty Retail	1,914,216
3	SOTHEBY HONG KONG LI ADMIRALTY	Specialty Retail	1,526,522
4	ROLEX	Specialty Retail	381,552
5	MALAYAN MOTOR A DIV O	Automotive Related	155,241
6	KING FOOK JEW GROUP ADMIRALTY	Watches & Jewellery	100,289
7	RICHARD MILLE	Watches & Jewellery	96,000
8	ELIFSU TURIZM TIC.IMAL NEVSEHIR	Home/Office Furnishing & Appliances	82,211
9	RICHARD MILLE SINGAPORE	Watches & Jewellery	81,098
10	TESSAIDOU KIDOU	Specialty Retail	68,220
11	RODEODORAIBU SHINJIYUK TOKYO	Watches & Jewellery	61,570
12	SWISS WATCH GALLERY	Watches & Jewellery	60,404
13	HONDA AUTO HATFIELD	Automotive Related	57,267
14	HERMES MIDOSUJI TEN	Apparel	56,843
15	PATEK PHILIPPE MBS	Watches & Jewellery	50,950
16	ITAL AUTO SING	Automotive Related	50,660
17	HERMES JAPON MARUNOUCH *	Apparel	50,528
18	HERMES JAPON HILTON OSAKA	Apparel	50,050
19	WEMPE UK	Watches & Jewellery	46,233
20	JEWEL AFRICA MONTE CAS FOURWAY	Repair	45,096
21	ROCAS JEWELLERY HONG K CENTRAL	Watches & Jewellery	44,862
22	PATEK PHILIPPE SALON	Watches & Jewellery	44,311
23	F VINDIS & SON	Automotive Related	42,768
24	AUDIO VIDEO CITY AUDIO SANTA MONICA	Electronic and Computer	42,025
25	SUCCESS LIGHT INVESTME CAUSEWAY BAY	Watches & Jewellery	41,711
26	IWC 1881 HERITAGE	Department Stores	41,333
27	ART SEASON	Watches & Jewellery	40,000
28	GASSAN DIAMOND	Watches & Jewellery	38,861
29	BARLOWORLD HOLDEN & VO GLEN WAVERLEY 036	Automotive Related	37,068
30	JAWHARET ALORDON LLFUN AMMAN	Specialty Retail	33,428
31	THE HAVEN SDN BHD	Building Construction	33,155
32	RICHEMONT IBERIA SL	Watches & Jewellery	33,123
33	BJ ARTRIVIUM ART COMMU BEIJING	Department Stores	33,100
34	GIORGIO-ARMANI-NY NEW YORK	Apparel	31,989
35	JEWEL BY SARA	Watches & Jewellery	31,000
36	JOAILLERIE CARTIER MI	Watches & Jewellery	30,703
37	HABIB JEWEL-AMPANG PO AMPANG	Watches & Jewellery	30,648
38	AL ANWAR JEWELLERY	Watches & Jewellery	30,531
39	AHMED SEDDIQI & SON	Watches & Jewellery	30,475
40	DEGEM	Watches & Jewellery	29,000
41	PORSCHER-GLENMARIE	Automotive Related	28,354
42	PATRIZIA PEPE HONG KON CAUSEWAY ABY	Apparel	28,221
43	HERMES OF PARIS 0045	Specialty Retail	28,203
44	NEMICHAND BAMALWA &	Watches & Jewellery	27,255
45	HERMES SELLIER HERMES	Specialty Retail	26,610
46	SAMARA AUTOMAX PVT NEW DELHI	Automotive Related	26,071
47	BLUE NILE LLC	Watches & Jewellery	25,857
48	DAMAS JEWELLERY-FUJ	Watches & Jewellery	25,727
49	CARPETIUM /IKI E HALIC IZMIR	Home/Office Furnishing & Appliances	25,260
50	GEORG LANG SEL ERBEN	Specialty Retail	24,766

*Notes:* This table lists the top 50 stores (with ranks 1–50) among conspicuous stores, which are the top 20% stores according to the rank of all stores in the apparel and durable categories in our dataset based on per-transaction amount.

### Appendix A-3: Examples of stores defined as “conspicuous stores”: Rank 18357–18406

Rank	Merchant name	Merchant category	Average per-transaction amount (Singapore Dollar)
18357	CHEAR MOTORRAD SDN BHD PUCHONG	Automotive Related	351
18358	DSLR ACCESSORY	Specialty Retail	351
18359	NM LAST CALL 220	Specialty Retail	351
18360	DANG DAI SHANG CHENG BEIJING	Department Stores	351
18361	FOLLI FOLLIE GROUP-FOL MYKONOS	Apparel	351
18362	THE GOOD GUY TOOWOOMB TOOWOOMB	Home/Office Furnishing & Appliances	351
18363	SZ KADISICHOUYOUXIANG SUZHOU	Department Stores	351
18364	EE SOON TRADING	Automotive Related	351
18365	SUPER CITY	Automotive Related	351
18366	GIFTSIN24 AURORA	Specialty Retail	351
18367	DESIGNER.SG	Home/Office Furnishing & Appliances	351
18368	PRESTIGE TIME	Watches & Jewellery	351
18369	POLAR ELECTRO	Specialty Retail	351
18370	KYUSYU KS DENKI	Home/Office Furnishing & Appliances	351
18371	BABUBHAI JAGJIVAN DAS	Apparel	351
18372	MAPWORLD	Specialty Retail	351
18373	NIKI JODI	Specialty Retail	351
18374	LUZ DA LUA	Apparel	351
18375	SA BESSON	Apparel	351
18376	MARUZEN HAKATA	Specialty Retail	351
18377	B.ARMANI TAILOR	Apparel	351
18378	GALA BY LEISER	Apparel	351
18379	NELKE IIGUEZ ACCESIOR NUEVA ANDALUC ES	Watches & Jewellery	351
18380	06BEST DENKI-MARINE PARADE 12	Electronic and Computer	351
18381	BOUTIQUE ANNE FOTAINE	Apparel	351
18382	PROLINK-DATA SYSTEM	Electronic and Computer	351
18383	PARALLEL IMPORTED	Department Stores	351
18384	DIESEL OUTLET LAS ROZA SANTA MARIA,	Apparel	350
18385	PANDORA MBS	Apparel	350
18386	GREAT UNITED GOLDSMITH	Watches & Jewellery	350
18387	TORI RICHARD-ALA MOANA HONOLULU	Apparel	350
18388	LIU BOOTERY	Apparel	350
18389	KOGEITENYOBI	Department Stores	350
18390	VABIEN SUITE	Building Construction	350
18391	VOLKSWAGEN SER CENTRE	Automotive Related	350
18392	COACH 94 03101	Specialty Retail	350
18393	REITMAN REITMAN KINGSTON	Apparel	350
18394	ANA INFLIGHT SHOP	Department Stores	350
18395	BIC CAMERA	Electronic and Computer	350
18396	MOD CENTRAL	Electronic and Computer	350
18397	AUSTRALIAN OUTBACK CLU PORTSMITH	Apparel	350
18398	MR BIKES ENTERPRISE	Automotive Related	350
18399	HOME BEST FURNITURE	Home/Office Furnishing & Appliances	350
18400	01CRAWFORD ITALIA	Home/Office Furnishing & Appliances	350
18401	BLOOMINGDALES NEW YORK	Department Stores	350
18402	DAVE FINE JEWELLERY SI	Watches & Jewellery	350
18403	INDRANI DESIGNER SAREE MUMBAI	Apparel	350
18404	THEORY-WOODBURY CENTRAL VALLE 840	Apparel	350
18405	VELEKEM ZADAR	Department Stores	350
18406	KENZO -SUKHUMVIT CITY	Apparel	350

*Notes:* This table lists the bottom 50 stores (with ranks 18,357–18,406) among conspicuous stores, which are the top 20% stores according to the rank of all stores in the apparel and durable categories in our dataset based on per-transaction amount.

## Appendix B: Robustness checks with different matched samples

### Panel A: Only Singaporean

	Model 1			Model 2		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
Condo	0.394	45.29	***	0.121	268.76	***
Constant & Controls	included			included		
Number of observations	38,924					
Number of individuals in						
Treatment: Condo	2,518					
Comparison: HDB	2,518					

### Panel C: Similar total spending

	Model 1			Model 2		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
Condo	0.187	25.02	***	0.090	241.43	***
Constant & Controls	included			included		
Number of observations	53,522					
Number of individuals in						
Treatment: Condo	3,504					
Comparison: HDB	3,504					

### Panel E: No matching

	Model 1			Model 2		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
Condo	0.255	69.55	***	0.018	89.97	***
Constant & Controls	included			included		
Number of observations	942,622					
Number of individuals in						
Treatment: Condo	16,151					
Comparison: HDB	106,988					

### Panel B: Same neighborhood

	Model 1			Model 2		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
Condo	0.471	37.03	***	0.029	43.90	***
Constant & Controls	included			included		
Number of observations	16,555					
Number of individuals in						
Treatment: Condo	1,084					
Comparison: HDB	1,084					

### Panel D: Only individuals with Bachelor's degree

	Model 1			Model 2		
	<i>B</i>	<i>z</i>		<i>B</i>	<i>z</i>	
Condo	0.275	22.01	***	0.059	86.81	***
Constant & Controls	included			included		
Number of observations	18,185					
Number of individuals in						
Treatment: Condo	1,195					
Comparison: HDB	1,195					

*Notes:* This table summarizes the results of the regressions (Panel-GLM with log link) for robustness checks with different matched samples created using different criteria. In Model 1, the dependent variable is conspicuous consumption measured by the average per-transaction amount at the top 10% conspicuous stores (ratio over the grand mean). In Model 2, the dependent variable is credit card debt balance. The condo dummy variable takes the value of 1 if individuals are condo residents and 0 if they are HDB residents. In all regressions, the value of the residence (log), income (log), age, female, and married variables are included as control variables. For all matchings (except for Panel E), we use the logit model, where a dependent variable is condo dummy and the base independent variables are value of residence per square foot (a control for the quality of residence), income decile, age, gender, and marital status to estimate the propensity score. One-to-one matching is done with no replacement through which each matched pair is forced to be drawn from the same income decile. In Panel A, the matched sample is created and focuses only on Singaporeans. In Panel B, each matched pair is forced to be drawn from the same postal sector and from the same income decile. In Panel C, the total credit and debit card spending is added to the matching logit model. In Panel D, the matched sample is created and focuses only on individuals whose highest degree is a Bachelor's. We confirm that all relevant variables satisfy Cochran's rule of thumb. In Panel E, regressions are run with the unmatched initial sample of 123,139 individuals (16,151 condo residents and 106,988 HDB residents). \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.