# WINNERS AND LOSERS OF MARKETPLACE LENDING

## Research Challenge Technical Report

Sudheer Chava
Nikhil Paradkar

THINK FORWARD INITIATIVE

# WINNERS AND LOSERS OF MARKETPLACE LENDING: EVIDENCE FROM BORROWER CREDIT DYNAMICS [*]

**TECHNICAL REPORT**

Sudheer Chava and Nikhil Paradkar[†]
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**Abstract**

Does marketplace lending (MPL) benefit all its borrowers? Using comprehensive credit bureau data, we analyze the evolution of the credit profile of borrowers on a major marketplace lending platform, both prior to, and following the loan origination. Consistent with the stated purpose for the loan, borrowers consolidate expensive credit card debt, leading to lower credit utilization ratios and higher credit scores in the two quarters after loan origination. But, during the same time period, they also receive additional credit from their existing bank relationships. Subsequently, MPL borrowers consume more credit, leaving them as indebted in credit card debt three quarters post-MPL loan origination as they were prior to borrowing on the MPL platform. Further, they experience a significant increase in credit card default probabilities and rates in the months following MPL loan origination, even when compared to similar non-MPL borrowers residing in the same ZIP code, but who were declined traditional bank credit. Our cross-sectional analysis reveals that MPL borrowers who were subprime prior to MPL loan origination (accounting for nearly 23% of the sample) are most susceptible to ex post credit card defaults. Our findings suggest that the 'information cascading' between MPL platforms and traditional banks could lead to some borrowers being worse off.

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[†] Chava: Scheller College of Business at Georgia Tech, email: sudheer.chava@scheller.gatech.edu. Paradkar: Scheller College of Business at Georgia Tech, email: nikhil.paradkar@scheller.gatech.edu.

# 1. Introduction

In today's fast evolving financial landscape, individuals looking to fund their consumption through credit are no longer confined to credit cards or personal loans disbursed by traditional banking institutions.

The mid-2000s witnessed the advent of peer-to-peer lending (P2P lending) or marketplace lending (MPL) as an alternative investment, with the goal of revolutionizing the centuries old traditional banking model. Marketplace lenders promote themselves as cutting out the middle man – intermediary banking institutions – and directly connecting individual borrowers and lenders. MPL platforms allow individual borrowers to post loan requests online, and allow prospective investors to screen applications (by providing them credit bureau-generated borrower reports and other borrower information), thus facilitating lending decisions that are in line with the risk appetite of the investor-lenders. Moreover, certain MPL platforms engage in alternative interest rate pricing schemes, which can potentially improve the risk pricing of applicants.

An important point regarding MPL-generated, peer-financed loans is that they are used primarily for debt consolidation. In fact, over 70% of loan applicants on MPL platforms in the United States list expensive debt consolidation as the primary reason for requesting funds – i.e., these applicants wish to replace their expensive debt (usually credit cards) with relatively less-expensive peer-financed debt. However, MPL funds are unsecured, and platforms have no mechanism in place to ensure that borrowed funds are used in a manner consistent with the reasons stated on applications. As a result, investors face the entire risk of falsification on loan applications as well as borrower defaults. Thus, the prevalence of strategic misreporting on MPL loan applications is an important unsolved question. Moreover, the long-term benefits or costs of engaging in MPL activity are also unclear.

Our findings suggest that MPL funds are overwhelming used to pay down expensive credit card debt. On average, the credit card debts of MPL borrowers decline by over 47% in the quarter of MPL loan origination relative to pre-origination levels. This consolidation activity is reflected in both lower credit utilization ratios, which decline by 12%, and in higher credit scores, which rise by approximately 3%, in the quarter of MPL loan origination. Thus, strategic misreporting on MPL loan applications does not appear to be a significant concern. Moreover, MPL funds appear to relax financial constraints on borrowers in the immediate term.

In the long run, our findings suggest that MPL borrowers revert to consuming on credit cards following a brief period of consolidation. Our findings indicate that MPL borrowers reach their former level of credit card indebtedness within three quarters of taking out the loan. Faced with the prospect of paying down both the MPL loan and newly accrued credit card debt, we find that MPL borrowers default at higher rates on credit cards in the post-loan origination period. It's

important to note that defaults on the MPL loan itself appear to be negligible. Cross-sectional tests reveal that MPL borrowers who are subprime prior to the origination of the MPL loan are most susceptible to the negative consumption behavior and outcomes in the post-origination period. Non- subprime borrowers, who account for 77% of our sample, are better off in the longer horizon. In effect, we document that while MPL loans can assist in relaxing financial constraints, they do not appear to change the fundamental consumption behavior of a certain segment of their clientele.

Our research on marketplace lending comes at an important time. Although currently in a nascent stage, these platforms are experiencing a rapid growth in lending volumes. Using publicly available loan data from Prosper and Lending Club (two of the largest MPL platforms in the consumer credit space in the United States), we estimate that between 2007:Q3 and 2017:Q3, these two platforms have disbursed approximately USD $35 billion in online-generated, peer-financed loans. Forecasts regarding the future of the MPL market have been bullish, and the industry is expected to grow to originate at least $150 billion per year by 2025 (PwC, 2015). According to a February 2015 report, Goldman Sachs estimates that more than 31% of the USD $843 billion unsecured personal lending market is prone to disruption by MPL.

# 2. Related Literature

Our study relates to several strands of literature. First, it adds to the extant MPL literature in consumer credit, which has focused primarily on two areas. The first broad area deals with lending decisions within online lending platforms. Freedman and Jin (2011) and Lin, Prabhala, and Viswanathan (2013) show that online lenders utilize social networks and verifiable community relationships in order to overcome adverse selection. Moreover, Iyer, Khwaja, Luttmer, and Shue (2015) document that peer lenders are more accurate at predicting the borrowers' likelihood of defaulting on loans than credit scores.

A second strand focuses on borrower-specific determinants of probability of funding success and interest rates charged on peer financed loans in the consumer credit space, such as beauty (Ravina, 2012), age and race (Pope and Sydnor, 2011), appearance of trustworthiness (Duarte, Siegel, and Young, 2012), non-verifiable reasons on online MPL loan applications (Michels, 2012), and stereotypes (Hasan, He, and Lu, 2018).[3] In contrast, our paper focuses on the utilization of peer-financed funds, and the net benefits or costs generated for MPL borrowers.

Our study also contributes to the growing literature on the interaction between banking intermediaries and FinTech lenders. In the consumer credit space, Jagtiani and Lemieux (2017) show that MPL platforms have penetrated areas that lose bank branches and areas that have highly concentrated banking markets, arguing in favour of credit expansion through financial technology to credit worthy borrowers not served by banks.

On the opposite side, Wolfe and Yoo (2017) document that small, rural commercial banks lose lending volumes to peer-to-peer lenders, which suggests non-trivial credit substitution. In the mortgage space, Buchak, Matvos, Piskorski, and Seru (2017) document that shadow banks gained a larger market share among less creditworthy borrowers, and filled the gap left behind by credit contraction by traditional banks in areas where traditional lenders face more capital and regulatory constraints. Within this subset of shadow banks, FinTech lenders account for approximately 25% of shadow bank originations, serving more creditworthy borrowers.

[3] In the mortgage setting, Bartlett, Morse, Stanton, and Wallace (2018) document that ethnicity plays a statistically and economically significant role in loan rejection rates. The authors note, however, that FinTech lenders are less likely to discriminate than traditional lenders.

# 3. Data and Method

## 3.1 Who Borrows on Marketplace Lending Platforms?

We make use of proprietary credit bureau data in order to identify individuals who have opened a peer-financed loans. All the data sources are used purely for academic purposes and contain completely anonymized information made available to us through a credit bureau. Following data filtering techniques, we are left with approximately 1 million individuals who opened a single peer-financed loan over the time 2013-2016. In our sample, 23% of borrowers are classified as 'subprime', 50% are classified as 'near-prime', and 27% are classified as 'prime'. The classifications are determined through borrower credit scores in the month immediately prior to MPL loan origination.

**Table 1. Profile Comparison**

| | MPL Platform Borrowers | National Average | Homeowners Average |
|---|---|---|---|
| | (I) | (II) | (III) |
| **Panel A**: Credit Characteristics | | | |
| # Open Trades | 10.49 | 4.68 | 7.58 |
| # Auto Trades | 1.02 | 0.66 | 0.84 |
| # Mortgage Trades | 0.86 | 0.79 | 1.07 |
| # Student Loan Trades | 2.23 | 1.66 | 1.49 |
| # Credit Card Trades | 3.84 | 1.97 | 2.74 |
| Credit Score | 656.44 | 675.47 | 733.84 |
| Total Balance | $232,463 | $208,195 | $310,142 |
| Auto Balance | $20,659 | $17,038 | $20,648 |
| Mortgage Balance | $189,597 | $186,237 | $274,244 |
| Student Loan Balance | $24,425 | $19,122 | $20,210 |
| Credit Card Balance | $9,821 | $4,197 | $5,994 |
| Credit Card Utilization | 69.42% | 30.89% | 28.55% |
| **Panel B**: Income Characteristics | | | |
| Monthly Income | $3,602 | $3,437 | $5,232 |
| Debt-to-Income | 41.03% | 27.82% | 45.39% |

Note: In this table, we present descriptive statistics comparing the credit and income characteristics of individuals who borrow funds from marketplace lending (MPL) platforms, relative to the average American population. The descriptive statistics for MPL borrowers are presented in column (I). In columns (II) and (III), we present univariate statistics for a 5% random sample of the U.S. population, and for a 33% random sample of U.S. homeowners. Panel A and Panel B contain statistics on credit characteristics and income characteristics, respectively.

A comparison of MPL borrowers to the average U.S. population (presented in Table 1) reveals that MPL borrowers have more open trades compared to the national average and the homeowners sample average. This difference is stark for open credit card trades, with MPL borrowers having more than twice as many open trades in this domain relative to both the national average and the homeowners average.

Moreover, MPL borrowers are over twice as indebted in credit card debt as compared to the national average, and have credit utilization ratios that are over twice the national average. Consistent with higher indebtedness being positively linked to higher probability of default, we find that MPL borrowers have significantly lower credit scores relative to the national average.

### 3.2 Empirical Approach

The empirical approach we employ for our analysis is derived from the event study approach used in Agarwal, Pan, and Qian (2016) and Agarwal, Qian, and Zou (2017). It relies on studying the evolution of the credit profile characteristics of MPL borrowers in the 25-month period centered on the month in which the MPL loan is originated. In this approach, credit profile characteristics in the post-MPL loan origination period are compared to the quarter immediately preceding the origination of the MPL loan. In our analysis, we demarcate time periods in relation to the origination of the MPL loan. $Quarter_0$ refers to the months [0,+3] in relation to the month in which the MPL loan is originated. $Quarter_{-1}$ ($Quarter_{+1}$) refers to months [-3,-1] (months [+4,+6]) in relation to month in which the MPL loan is originated, and all other quarters are defined in an analogous manner.

# 4. Results

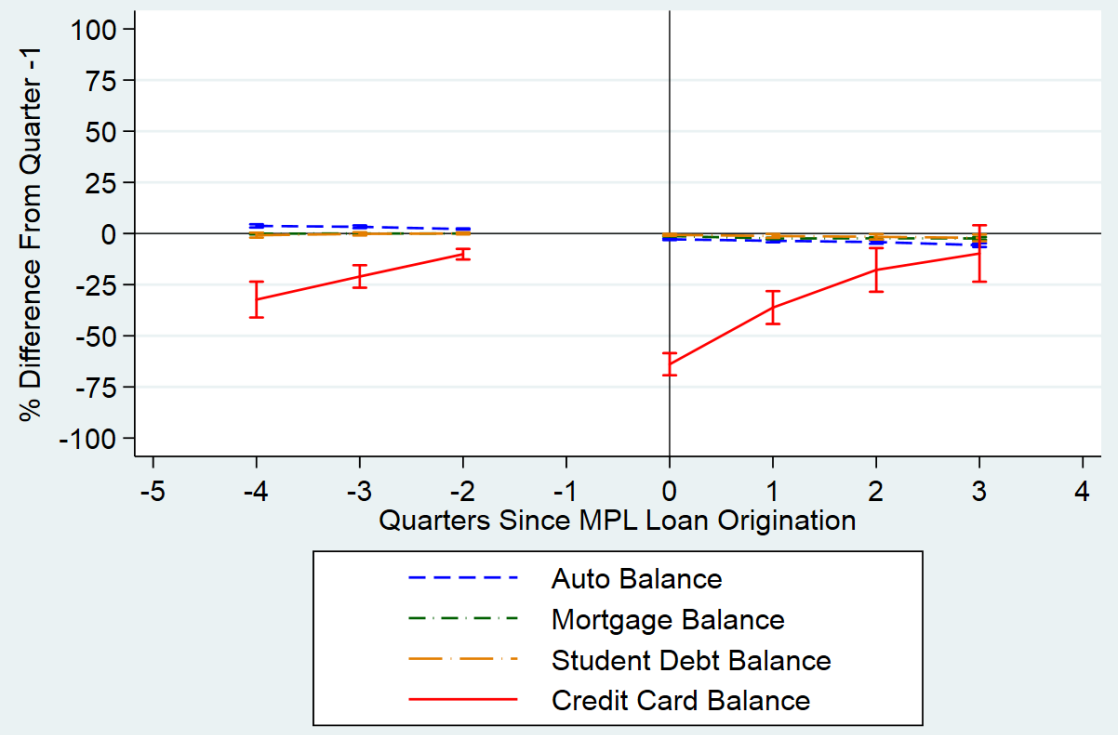
## 4.1 Short-Term and Long-Term Effects of Peer-Finances Loans

As a primary test, we examine the effect of originating MPL loans on the credit balances of borrowers along four broad trade lines - auto, mortgage, student debt, and credit cards. Next, we identify whether MPL loans affect other credit profile characteristics of MPL borrowers. The other characteristics we study include credit utilization, credit card limits, credit card default occurrences, and credit scores. Finally, we study the effect across three segments of MPL borrowers – subprime, near-prime, and prime – where the MPL borrower's credit status is determined by their credit score in the month immediately prior the month of MPL loan origination.

### 4.1.1 Credit Balances

We present our findings in the form of event study plots presented in Figure 1. Our analysis studies the evolution of debt balances along four broad lines of trade – auto, mortgage, student loans, and credit cards. The x-axis of the event study plots indicate quarters relative to the quarter of MPL loan origination, $Quarter_0$. Here, The y-axis displays percentage differences relative to average balance levels in $Quarter_{-1}$. The estimates of our event study analysis are connected through a line graph, and the associated 95% confidence intervals for each estimate are displayed in the form of bars surrounding the estimate.

**Figure 1: Evolution of Debt Balances**




Note: the x-axis of the event study plots indicate quarters relative to the quarter of MPL loan origination, $Quarter_0$. The y-axis represents percentage differences from average levels in $Quarter_{-1}$. The estimates are connected by colored line graphs, with associated 95% confidence intervals.

Our findings indicate that MPL borrowers do not use borrowed funds to consolidate auto debt. Indeed, our event study estimates for auto debt balances in Figure 1 show that average auto balance levels remain stable in the quarters preceding and following the origination of the MPL loan – i.e., the origination of the MPL loan has no effect on auto balance levels. Similarly, we find that the origination of MPL loans does not affect mortgage balances or student loan balances.

Rather, our findings indicate that MPL loans are used to consolidate credit card debt. In the quarter of MPL loan origination, we find that credit card balances are over 47% lower relative to the quarter prior to origination, consistent with the consolidation of credit card debt.4 However, we also note that this consolidation phase appears to be short-lived. In subsequent quarters, these borrowers begin re-accumulating additional credit card debt, such that 3 quarters post-origination, credit card balance levels are insignificantly different from pre-origination levels.

***Takeaways***

Our main takeaway here is that strategic reason reporting on MPL platforms is not a significant concern. MPL loans are overwhelmingly used to consolidate the most expensive form of debt facing MPL borrowers: credit cards.

However, we also find that these borrowers are as indebted 3 quarters post-origination as they were in the quarter prior to origination. This finding is rather problematic, since it is important to note that MPL-induced credit card debt consolidation does not reduce the aggregate debt exposure of the borrowing individual expensive credit card debt is simply replaced with relatively less-expensive MPL debt. Thus, these borrowers are already burdened with the monthly payments associated with amortized MPL loans when they begin consuming credit card debt again. This sort of double dipping activity leaves such borrowers significantly more indebted in the months following peer-financed loan origination.

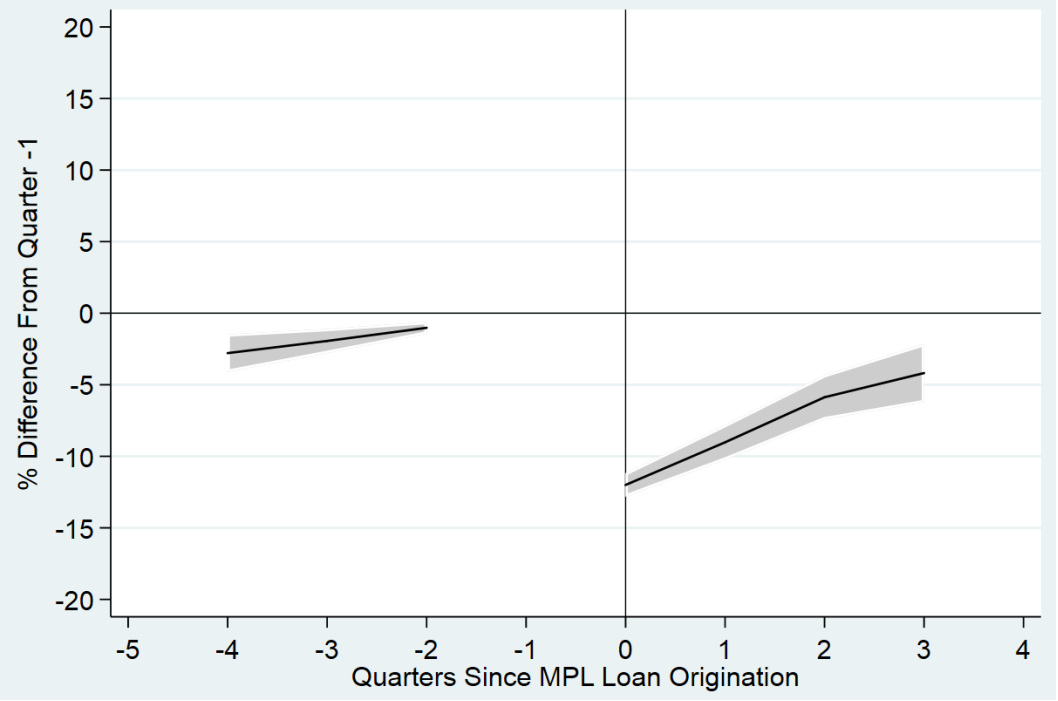
### 4.2 Other Credit Profile Characteristics

In all our analysis below, our approach and notation is similar to the one used in the above section. Thus, the x-axis of the event study plots indicate quarters relative to the quarter of MPL loan origination, $Quarter_0$. The y-axis represents percentage differences from average levels in $Quarter_{-1}$. The estimates are connected by a black line graph, with associated 95% confidence intervals displayed through the grey shaded area.

Our findings suggest that in the quarter of origination, these borrowers have utilization ratios that are 12% lower relative to the baseline period. As these borrowers begin accumulating credit card debt again in the quarters following consolidation, we note a corresponding steady rise in utilization ratios. Finally, we note that 3 quarters post-origination, utilization ratios are, on average, 4.2% lower relative to pre-origination levels. The associated event study plot is presented in Figure 2.

[4] We conduct our event studies using logged balance levels as the dependent variables in our analysis. From the event study plot, our estimate for $Quarter_0$ is approximately -0.64. The equivalent percentage change amount is given by the following log-to-percentage formula: $100 \times [exp(-0.64) - 1] = -47\%$

**Figure 2: Evolution of Credit Card Utilization Ratios**




Note: the x-axis of the event study plots indicate quarters relative to the quarter of MPL loan origination, $Quarter_0$. The y-axis represents percentage differences from average levels in $Quarter_{-1}$. The estimates are connected by a black line graph, with associated 95% confidence intervals displayed through the grey shaded area.

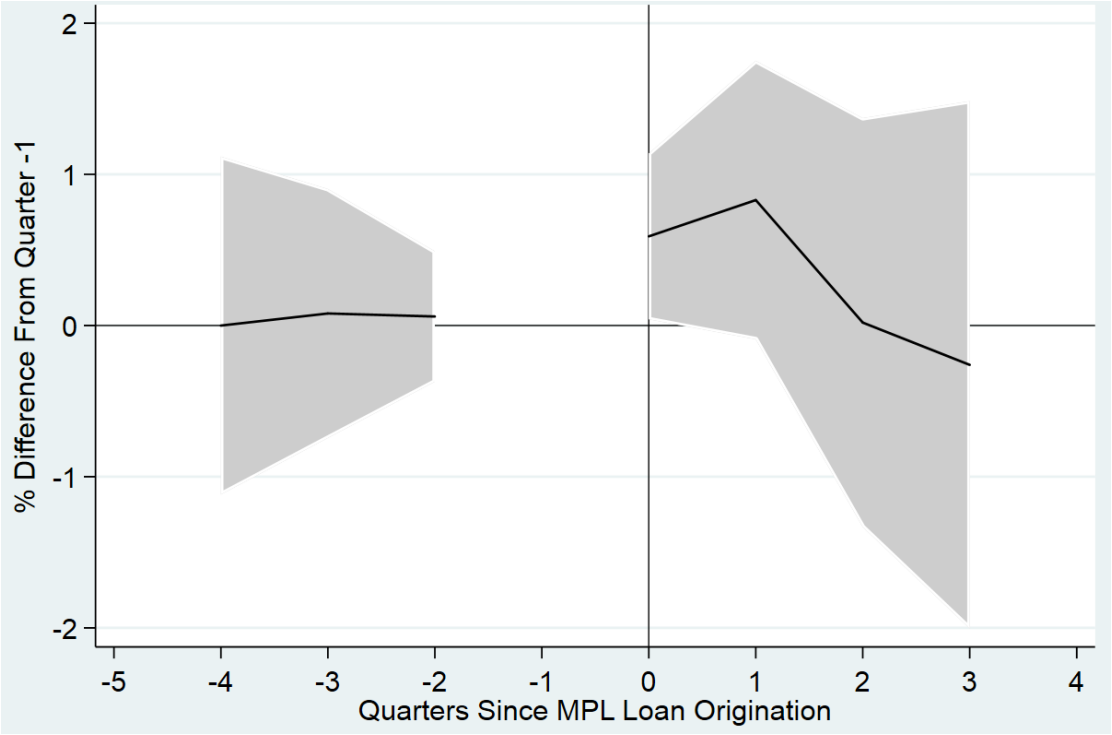
It is important to note that, on average, despite having similar credit card balances 3 quarters post-MPL loan origination, these borrowers have lower credit utilization ratios in the post-origination period. Holding credit card balances constant, as is the case 3 quarters post-MPL loan origination, the only way utilization ratios can decline is if credit card limits have been extended in the interim period.

Turning to credit limit growth (studied in Figure 3), findings suggest that in the quarters of and immediately following MPL loan origination, monthly limit growth on credit cards is 0.59% stronger and 0.83% stronger, respectively. This finding suggests that post-origination, the increase in credit card limits outpaces the increase in credit card balances. Moreover, it is important to note that credit limits increase along the intensive margin, i.e., from the MPL borrowers' existing creditors.

Our analysis of credit card default occurrences in Figure 4 suggests that 3 quarters post-MPL loan origination, credit card default rates are 1.47 percentage points higher relative to the baseline period, respectively. Given average credit card default occurrences of 0.12% in the baseline period, this finding indicates that the probability of defaulting on credit cards is 13 folds higher at the one-year mark post MPL loan origination.

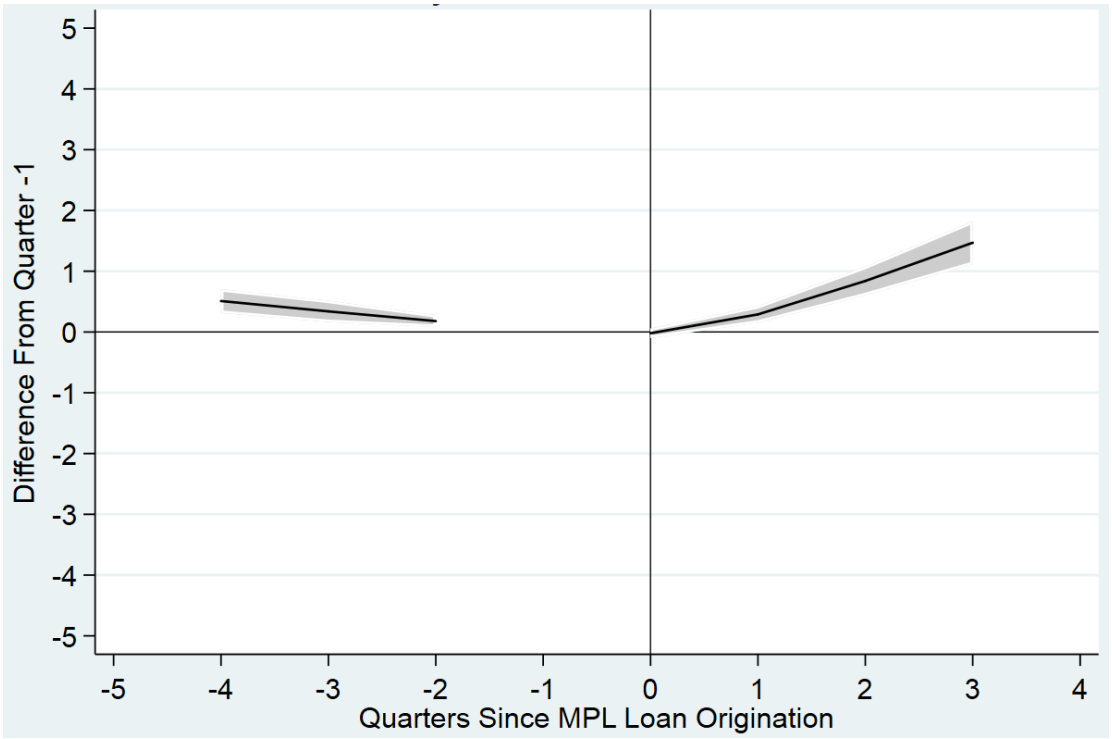
We also note that in the quarter of MPL loan origination, credit scores are 2.9% higher relative to the quarter preceding MPL loan origination. Following this peak, however, MPL borrowers' credit scores display a declining trend, such that 3 quarters post-origination, average credit scores are insignificantly different relative to the quarter prior to origination. The associated event study plot can be found in Figure 5.

**Figure 3: Credit Card Credit Limit Extension**



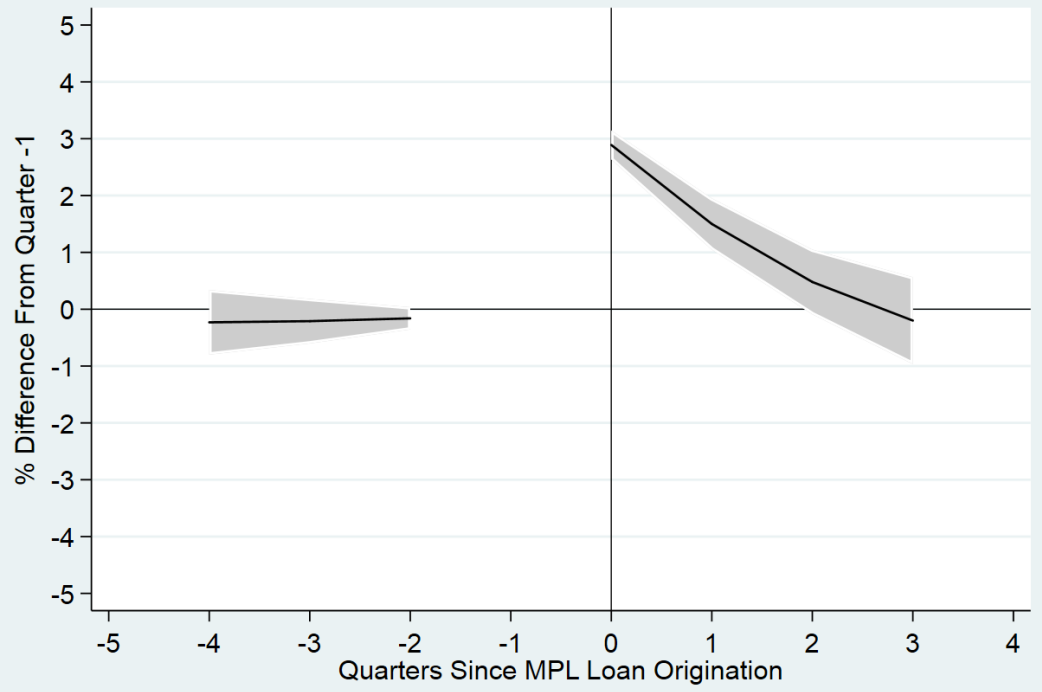

Note: the x-axis of the event study plots indicate quarters relative to the quarter of MPL loan origination, $Quarter_0$. The y-axis represents percentage differences from average levels in $Quarter_{-1}$. The estimates are connected by a black line graph, with associated 95% confidence intervals displayed through the grey shaded area.

**Figure 4: Probability of Default on Credit Card Debt**




Note: the x-axis of the event study plots indicate quarters relative to the quarter of MPL loan origination, $Quarter_0$. The y-axis represents percentage differences from average levels in $Quarter_{-1}$. The estimates are connected by a black line graph, with associated 95% confidence intervals displayed through the grey shaded area.

**Figure 5: Evolution of Credit Scores**




Note: the x-axis of the event study plots indicate quarters relative to the quarter of MPL loan origination, $Quarter_0$. The y-axis represents percentage differences from average levels in $Quarter_{-1}$. The estimates are connected by a black line graph, with associated 95% confidence intervals displayed through the grey shaded area.

***Takeaways***

These findings lead us to conclude that traditional banking intermediaries over-extrapolate the temporary downturn in credit card debt facilitated by MPL- induced debt consolidation.

Our findings from the previous sections suggest that credit card limit growth is strongest when credit card debt (and associated utilization ratios) are lowest. Thus, credit extension decisions are made prior to observing the subsequent upturn in credit accumulation. As a result, these borrowers, who are faced with paying down borrowed MPL funds and the additionally extended credit, start defaulting at greater rates in the quarters following MPL loan origination.

It is important to keep in mind that our analysis documents occurrences of default on credit cards issued by traditional banks in the months following MPL loan origination. In fact, we do not find statistically significant results indicating the occurrence of defaults on the MPL loan itself.

### 4.3 Effects of Borrowing Credit Status

In Figure 6, we re-conduct all the analysis conducted above separately for the subprime, near-prime, and prime segments of the MPL borrower base. As mentioned earlier, these account for 23%, 50%, and 27% of the sample, respectively.

Cross-sectional analysis of MPL borrowers reveals that borrowers who were subprime at the time of MPL loan origination consolidate the least amount of credit card debt. Our findings, presented in Panel A of Figure 6, show that these borrowers are also quickest to revert to consuming on credit cards. 6 months post-MPL loan origination, they are as indebted in credit card as they were in the quarter prior to loan origination.

In addition, we find that subprime MPL borrowers experience stronger growth in credit limits relative to non-subprime borrowers. We find that subprime borrowers experience a 1.33% and 1.44% stronger increase in monthly credit card limit growth in the quarter of, and the quarter immediately following, loan origination, respectively. The associated event study plot is displayed in Panel C of Figure 6.

Next, in Panel D, we note that the subprime segment has an approximately 5% higher default rate relative to the baseline period. The near-prime and prime segments experience economically and statistically insignificant changes in default rates, respectively.

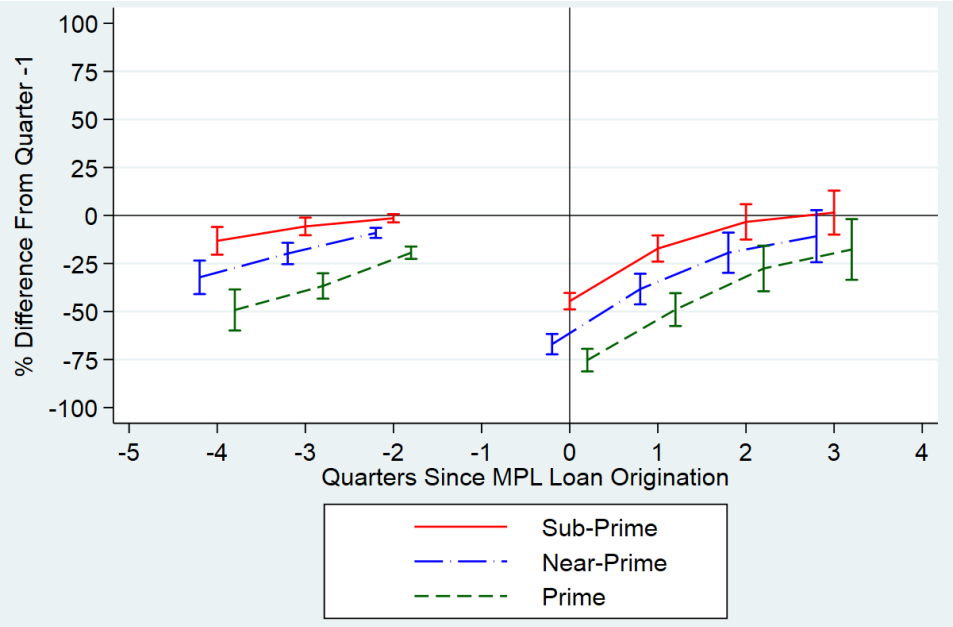
Finally, in Panel E, we show that subprime segment experience a near 3% increase in average credit scores in the quarter of MPL loan origination. This strong increase in credit scores coincides with the period of time when consolidation activity is the strongest for this group. The near-prime and prime segments also enjoy increased credit scores in the quarter of MPL loan origination, though the effect is less strong for these latter segments. Finally, we note that the increase in credit scores is temporary - 3 quarters post-origination, our findings indicate that MPL borrower credit scores are insignificantly different from pre-origination levels.

***Takeaways***

Taken together, our findings suggest that subprime borrowers consolidate a relatively smaller chunk of their credit card debt using peer-financed funds, but experience the strongest increase in monthly credit limit growth. Moreover, our estimates also suggest that the subprime segment is as indebted two quarters post-origination as they were prior to origination. This double dipping into both peer- financed and credit card funds ironically increases the aggregate indebtedness of the subprime segment, thus making them more susceptible to default.

**Figure 6: Impact of Credit Quality of MPL Borrowers**

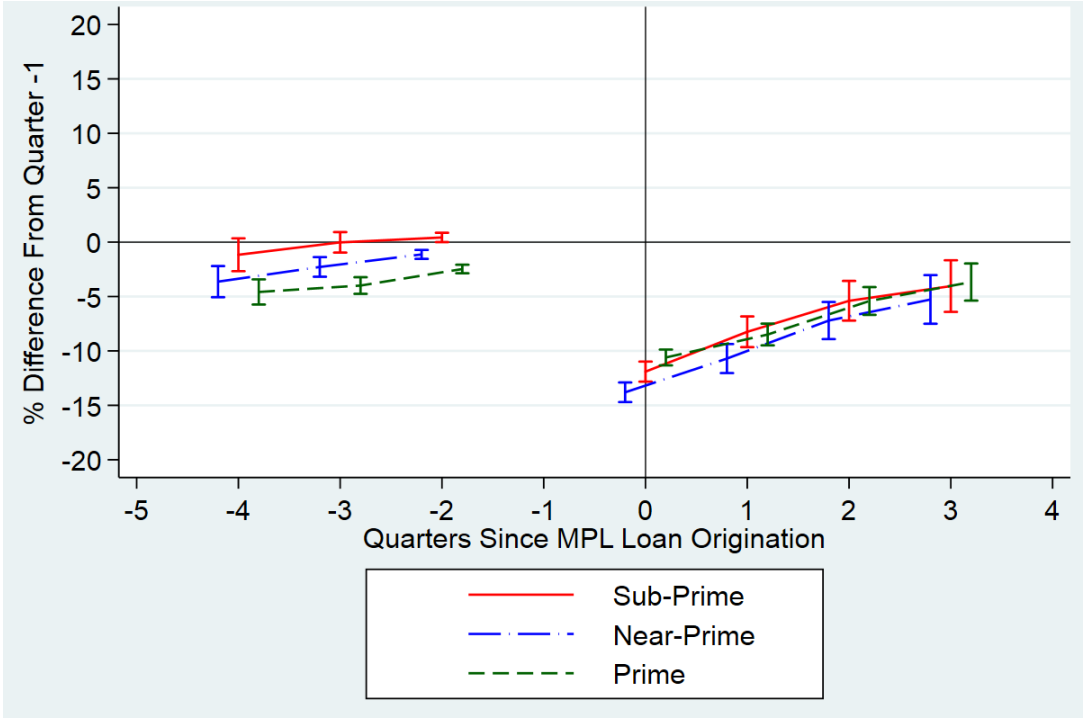
*Panel A. Raw Credit Card Balance*



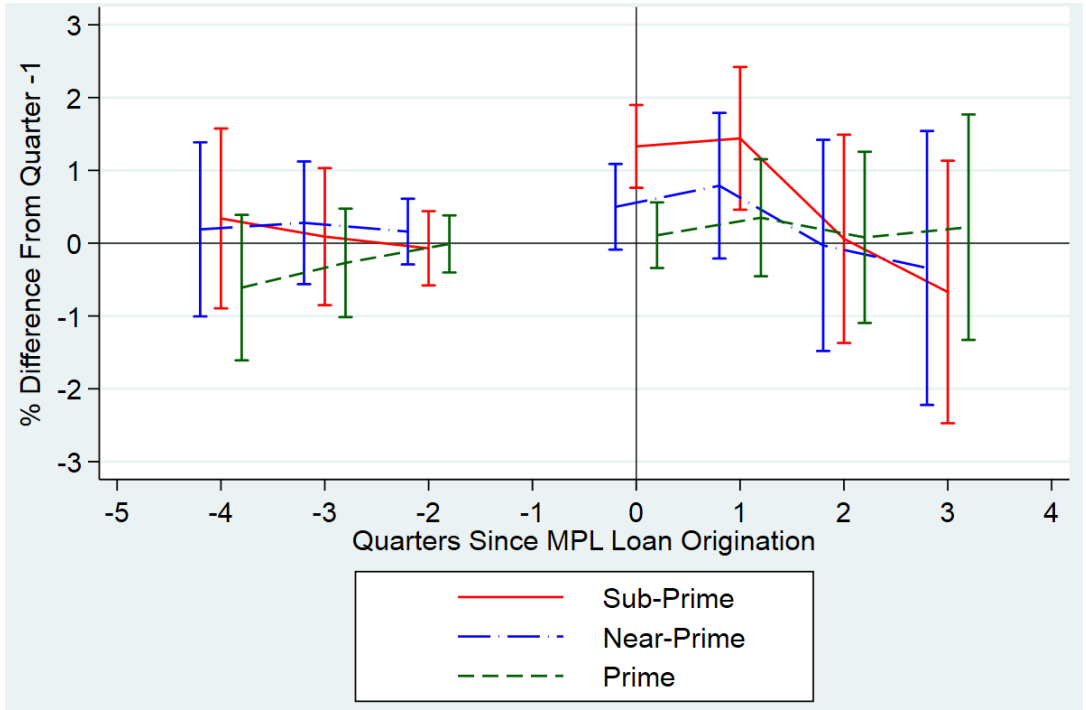

Note: the x-axis of the event study plots indicate quarters relative to the quarter of MPL loan origination, $Quarter_0$. The y-axis represents percentage differences from average levels in $Quarter_{-1}$. The estimates are connected by colored line graphs, with associated 95% confidence intervals.

**.Figure 6: Impact of Credit Quality of MPL Borrowers (cont.)**

*Panel B. Credit Card Utilization*



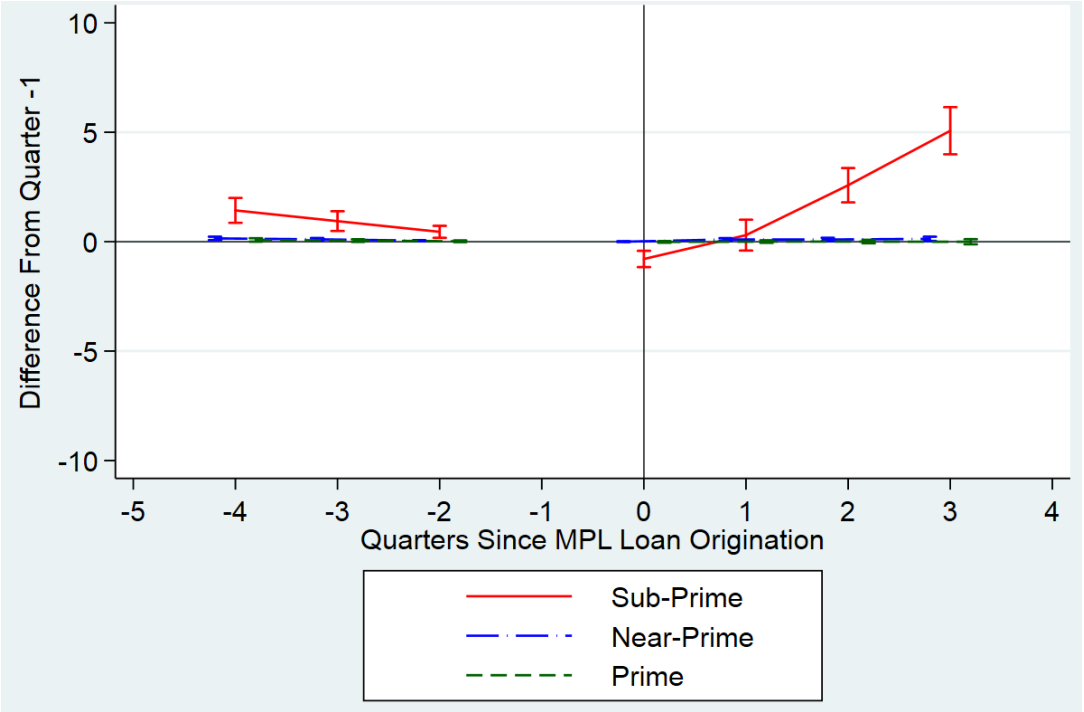

*Panel C. Credit Card Limit Growth*



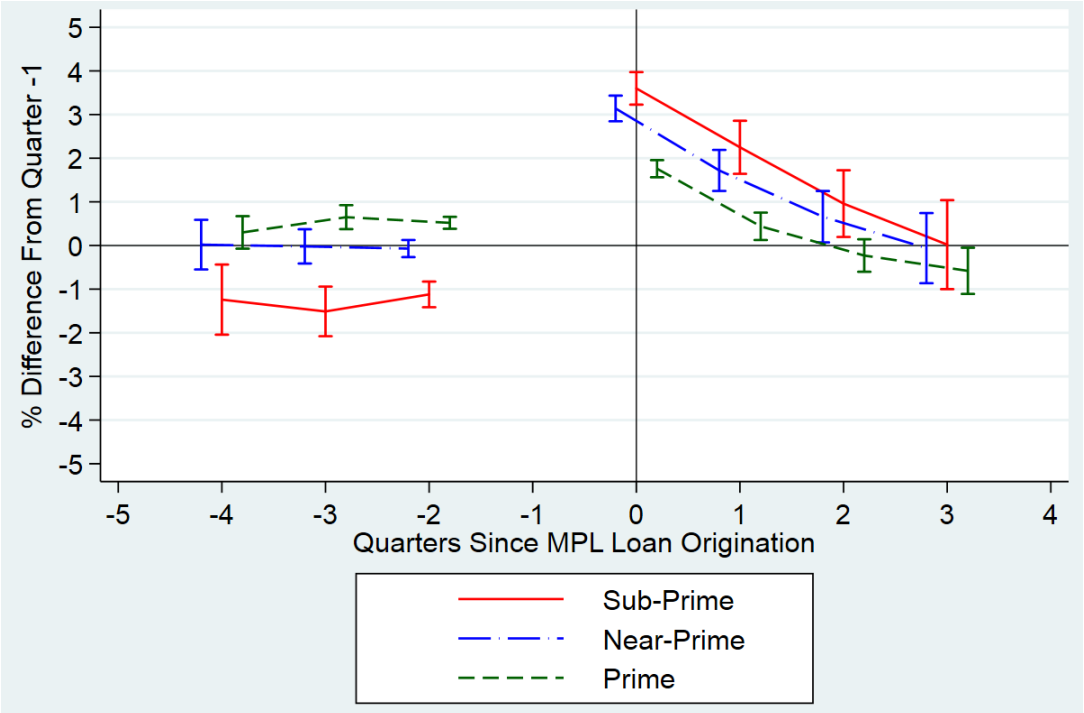

Note: the x-axis of the event study plots indicate quarters relative to the quarter of MPL loan origination, $Quarter_0$. The y-axis represents percentage differences from average levels in $Quarter_{-1}$. The estimates are connected by a black line graph, with associated 95% confidence intervals displayed through the grey shaded area.

**.Figure 6: Impact of Credit Quality of MPL Borrowers (cont.)**

*Panel D. Probability of Default on Credit Cards*




*Panel E. Credit Scores*




Note: the x-axis of the event study plots indicate quarters relative to the quarter of MPL loan origination, $Quarter_0$. The y-axis represents percentage differences from average levels in $Quarter_{-1}$. The estimates are connected by a black line graph, with associated 95% confidence intervals displayed through the grey shaded area.

# 5. Conclusions and Implications

In this report, we document both the benefits and drawbacks of the emergence of marketplace lending platforms for consumer loans. We find that despite having no mechanism in place to ensure loans made on such platforms are used in a manner consistent with the vast majority of stated reasons on loan applications (credit card debt consolidation), incidences of misreporting appear to be rare. However, it appears that these loans fail to change the fundamental behavior of the relatively financially constrained individuals that apply for MPL loans.

More importantly, the temporary financial relief bought on by such loans is incorrectly interpreted by some traditional lenders who extend new credit to these borrowers, who consume it and are thus more indebted on aggregate post-origination. The increased overall indebtedness results in MPL borrowers having higher probabilities of default in the months following MPL loan inception. Finally, cross-sectional analysis reveals that subprime borrowers, who account for nearly 1 in 4 people borrowing on such platforms, are most negatively affected.

### 5.1 Implications for individuals looking to borrow on marketplace lending platforms

The results of our analyses in this study suggest that marketplace lending platforms can be attractive sources of funding for deeply indebted people looking to alleviate financial constraints. Indeed, our results indicate that peer-financed funds help in reducing credit card debt by approximately 47% in the quarter of loan origination, on average. While the absolute level of debt payment is lower for the subprime segment, this group still enjoys higher credit scores as a result of this consolidation activity. In fact, despite their muted consolidation activity relative to the near-prime and prime segments, the subprime segment enjoys a credit score increase of approximately 3.5% relative to pre-origination levels. More importantly, all three segments enjoy lower utilization ratios in post-origination period. Thus, at least in the immediate term, MPL loans unequivocally improve the financial situations of borrowers, regardless of credit status.

In the longer horizon, the benefits of MPL loans depend exclusively on the actions of borrowers following consolidation. It is important to note that MPL loans are a form of cheaper debt. Thus, consolidation using MPL loans does not change the aggregated indebtedness of the individual; rather, it changes the composition of the individual's debt. Thus, consuming on credit cards when payments of the MPL loan remain to be made will strictly increase the indebtedness of the MPL borrower.

It is important, therefore, that MPL borrowers carefully consider their credit card consumption activities in the months following MPL loan origination. Of important consequence here is the fact that MPL loans can strictly improve the borrower's financial condition in the immediate term. How long these benefits last depends on the actions of the borrowing individual in the post-origination period.

### 5.2 Implications for banking intermediaries

A key channel documented in this article is that banks increase credit limits on credit cards issued to MPL borrowers. This limit increase occurs immediately following a short- lived debt consolidation phase at odds with the individual's past behavior. Moreover, this extension of additional credit is revealed to be inefficient ex post for the subprime segment of the population, who increase consumption and subsequently default at greater rates.

Thus, given the increasing market share of peer-financed loans in the unsecured consumer credit space, from the bank's perspective, it would be prudent to make credit limit increase decisions on a longer, sustained history of consumer activity.

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**The authors**

Dr. Sudheer Chava is Alton M. Costley Chair and Professor of Finance at Scheller College of Business at Georgia Tech, US.

E-mail: sudheer.chava@scheller.gatech.edu

Nikhil Paradkar is a PhD candidate in Finance at Scheller College of Business at Georgia Tech, US.

E-mail: nikhil.paradkar@scheller.gatech.edu