A Tale of Two Vintages: Credit Limit Management Before and After the CARD Act and Great Recession

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Summary: *This paper uses tradeline-level credit card data to examine initial credit limits and early credit limit increases before and after the Great Recession and implementation of the Credit Card Accountability, Responsibility, and Disclosure Act of 2009 (the CARD Act). I compare two vintages of credit card accounts, those opened in 2005 and 2011; I also follow each vintage for more than two years after the account opening. In general, I find that significantly less credit was extended to approved credit card applicants in 2011 than in 2005. Accounts in the 2011 vintage started out with lower initial credit limits, received fewer limit increases, and received a smaller increase amount in dollar terms. These changes were most pronounced among the riskiest 25 percent of accounts opened in 2011. For this segment of the market, the median initial credit limit fell 66.7 percent to $500, and the median limit increase amount fell by at least 25 percent at each observation point. At the same time, limit increases occurred more often and sooner for this group, perhaps in recognition of the very low starting limits.*

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I. Introduction

From 2008 to 2010, there was a sea change in the American credit card market. A new law, the Credit Card Accountability, Responsibility, and Disclosure Act of 2009 (the CARD Act), prohibited a number of common practices while imposing new underwriting and disclosure requirements.[1] At about the same time, the U.S. entered a financial crisis followed by the most severe recession since the Great Depression. During this period, the supply of available credit in the card market contracted sharply. Average credit limits fell by 14 percent on open accounts and by more than 32 percent on new accounts.[2] Even in 2015, the credit card market looks very different today than it did in 2007.

Since the CARD Act provisions took effect, researchers have begun to investigate how the confluence of these two events — the CARD Act and the Great Recession — has affected the market for credit cards. Scholars and government agencies have examined aggregate measures, including the number of accounts, total balances, and total credit lines, as well as changes in the distribution of credit risk. Researchers have also studied changes in interest rates, fees, and repayment rates, and the implications of these changes for consumers' access to and use of credit cards.[3]

This paper examines anonymized credit bureau records for nearly 1 million revolving credit card accounts to identify changes in the amount of initial credit lines and the amount, timing, and

[1] Pub. L. No. 111-24, 123 Stat. 1734-1766 (2009)

[2] This is the change in average credit limits from December 2007 to December 2010. This calculation is based on the data described in Section IV.

[3] See, for example, Agarwal et al. (2014) and Consumer Financial Protection Bureau (2013b).

rate of subsequent line increases.[4] To do so, I select two vintages of credit card accounts: those opened in 2005 or in 2011. I observe their behavior during the first 30 months of account life.[5]

While this paper ideally seeks to identify market changes attributable solely to the implementation of the CARD Act, both the timing of the recession and the limitations of the available data create significant analytical challenges. Determining cause-and-effect relationships are especially difficult during this period because most of the changes in market characteristics might plausibly be driven by regulation or by changes in underlying credit risk and appetites for debt due to the recessionary cycle, or by both.[6] In addition, the data do not allow me to compare credit limit behavior in a market segment unaffected by the CARD Act, such as small business credit cards.

For these reasons, this study reports stylized facts drawn from the data and, at times, considers possible motivations behind changes in these data, but it cannot attribute these changes to a specific cause. While the paper may refer to the time periods "before and after the CARD Act," it does so as a shorthand reference to the periods before and after *both* the CARD Act and the recession.

This paper investigates the following questions:

1. Are initial credit limits larger or smaller on accounts opened in 2011 than for accounts opened in 2005?
2. In general, do credit limit increases occur more or less often for accounts opened in 2011 than for accounts opened in 2005?

[4] Charge cards and other nonrevolving cards which have balances that must be paid in full each billing cycle, are excluded from the analysis contained in this paper.

[5] A credit card account's age is often quoted as the number of months "on the books" of the issuer. This terminology is used throughout the paper.

[6] In other words, for the most part, the implications of these different drivers are observationally equivalent. The analysis in this paper does not completely escape this criticism.

3. By comparing accounts opened in 2005 and 2011, does the first credit limit increase occur sooner or later?
4. To what extent are credit limit increase amounts different for accounts opened in 2011 than for accounts opened in 2005?

I also examine whether any of the above differences depend on the creditworthiness of account holders in each vintage. In some instances, the results are also disaggregated by utilization group, based on the percentage of credit limit used as of the prior observation point.

I find a very different credit limit profile for accounts opened in 2005, before the CARD Act and recession, compared with those opened in 2011. The median initial credit limit ($5,000 in 2005) fell by 60 percent to $2,000 in 2011. Credit limit increase rates were generally lower in 2011, with the exception of the riskiest 25 percent of accounts, which had a 5.9 percent higher limit increase rate between months seven and 12.[7] *First* limit increases also occurred sooner for the 2011 vintage, driven by accounts with below-median credit risk scores. Lastly, the median credit limit increase amount fell to $600 in 2011, compared with $1,100 in 2005.

I find that these effects were especially pronounced among the riskiest 25 percent of accounts opened in 2011. The median initial credit limit fell 66.7 percent to $500, and the median limit increase amount fell by at least 25 percent at each observation point. At the same time, limit increases occurred more frequently and sooner for this group, perhaps in recognition of the very low starting limits.

Another important contribution of this paper is the finding that the relationship between risk score and the time until the first limit increase became inverted after the recession and the CARD Act. In the 2011 vintage, first credit-limit increases occurred sooner for the riskiest 25 percent of accounts than for the least risky 25 percent of accounts. Moreover, first credit-limit increases occurred sooner for the lowest risk score quartile in 2011 than for any of the 2005 quartiles.

[7] The credit limit increase rate is the percentage of accounts that experienced credit limit increases during a specified period.

These results are surprising, given the expectations for weaker risk appetites among lenders in the postrecession and CARD Act world. I discuss possible explanations for this behavior in Section VII.

The welfare implications of these findings depend on assumptions about the appropriate leverage of consumers as well as their outside options. Lower initial credit limits may be welcome if they discourage would-be borrowers from quickly running up unaffordably high revolving balances. On the other hand, if credit-constrained borrowers resort to opening additional cards or using higher-cost alternative products, the consumer could be worse off in the long run.

The paper is organized as follows. Section II provides some background by highlighting key aspects of the CARD Act as well as the regulatory and economic environment from 2007 to 2009. Section III reviews the related literature. Section IV introduces the data, while Section V discusses the methodology. The results are presented in Section VI, and I conclude in Section VII with a summary of my findings and some thoughts about the future.

II. Regulatory and Economic Considerations

In this section, I discuss the provisions of the CARD Act that are likely to have influenced how issuers determine initial credit limits and limit increases. I then review the timeline of events leading up to the CARD Act's passage, beginning with the Federal Reserve Board's 2007 decision to amend Regulation Z (which implements the Truth in Lending Act).[8] I overlay key dates and events from the 2007 financial crisis and subsequent recession.

A. Ability to Pay

The CARD Act's ability-to-pay rules address lawmakers' concern that some consumers find that they are unable to repay their credit card debt as it accumulates. Sections 109 and 301 of the

[8] Board of Governors of the Federal Reserve System (2007)

CARD Act prohibit credit card issuers from providing or increasing a credit limit without considering the applicant or cardholder's ability to make the required payments on the proposed limit.[9] The details of exactly how issuers should comply with the ability to pay are covered in a series of final rules implementing the CARD Act. The Board of Governors of the Federal Reserve System (Board) issued a final rule effective February 22, 2010 that (a) established a safe harbor for the calculation of minimum payments that assumes the account's credit limit is fully utilized; (b) required issuers to determine the consumer's ability to pay based on their income or assets and current obligations; (c) required the calculation of a debt-to-income or debt-to-assets ratio, or residual income; and (d) permitted issuers to estimate income or assets based on "empirically derived, demonstrably and statistically sound models."[10] The rule also contains requirements for underage consumers, one of which is that the consumer demonstrates an independent ability to pay. While the Board's final rule dated March 18, 2011 extended the independent ability-to-pay condition to consumers of all ages, a May 2013 final rule issued by the Consumer Financial Protection Bureau (CFPB) reversed the 'independence' requirement for consumers ages 21 and older.[11]

One of the more complex components of the CARD Act, ability to pay has many practical implications for credit card issuers. Any policies and procedures enacted by issuers seeking to comply with ability to pay must address both initial credit limits and all subsequent limit increases for different consumer types (under or over 21) with different kinds of credit applications (individual versus joint). Their underwriting and automated decisioning systems must be flexible enough to accept and synthesize income, asset, and liability data from multiple

[9] CARD Act Title I Section 109 ("Consideration of ability to repay") amends Chapter 3 of the Truth in Lending Act (15 U.S.C. 1666 et seq.). According to the requirement, issuers must consider "the ability of the consumer to make the required payments under the terms of [their] account." See also CARD Act Title III Section 301 ("Extensions of credit to underage consumers").

[10] See 75 Fed. Reg. 7658 (February 22, 2010)

[11] See 78 Fed. Reg. 25818 (May 3, 2013). For additional information regarding the transfer of authority from the Board to the CFPB, refer to page 11.

sources at potentially different frequencies (monthly versus annual) and must be capable of using the data to make several different calculations. In addition, for the majority of issuers, credit limit increase decisions are based on a set of automated decisioning rules that depend on account behavior and credit risk. While flexible, these rules-based systems operate under the assumption that all necessary data will be at the issuers' disposal each month as the portfolio is evaluated for limit increases. Requiring current or recent income or asset and debt data may constitute a substantial change in day-to-day operations for many issuers. (For further details about the CARD Act's ability-to-pay rule as it relates to credit limit increases, refer to the box titled "Ability to Pay — Challenges Remain.")

Ability to Pay — Challenges Remain

The Credit Card Accountability, Responsibility, and Disclosure Act of 2009 (the CARD Act)'s ability-to-pay requirement prohibits credit card issuers from opening a new account or increasing the limit on an existing account without first considering the consumer's ability to make his or her required minimum payments. But this requires that the issuer have information about the consumer's income (or assets). While the data are typically solicited on the credit card application and thus available for use at the account opening, the same cannot be said for credit limit increases occurring over the account's lifetime.

Neither the Federal Reserve Board nor the Consumer Financial Protection Bureau (CFPB)'s final rules and staff commentary address the shelf life of income data collected at the point of application or at any other point. Anecdotal evidence suggests that while issuers are comfortable executing limit increases using application data within the first year of account life, they shy away from using it beyond that point. According to Blix (2013), "Many card issuers are wary of presenting regulators with information older than 12 months." Indeed, this has caused confusion among issuers, as also noted in the Morrison and Foerster (2013) letter to the CFPB.

While it makes sense to think that income data become less valid over time, there is some evidence that questions the notion of a 12-month shelf life. Blix (2013) examines annualized consumer income over a 36-month period and finds that overall income levels tend to be stable over time and that income migration is much more likely to be upward rather than downward. Thus, application data may continue to accurately represent current income for much longer than is commonly thought.

An alternative approach permitted in the Board's final rule is that issuers can estimate income based on an empirically derived, demonstrably, and statistically sound model. However, FICO (2013b) notes that issuers have had trouble building income-estimator models that meet regulatory scrutiny. FICO (2013a) cites two possible trouble areas, including a lack of available model development data (leading to poor predictions) and the inherent fuzziness of the interval estimates common to income models. Resolving the regulatory uncertainty regarding income-estimating models would enable issuers to rely upon another source in credit limit increase decisions.

For now, issuers have adopted several alternative approaches, such as building internal databases that capture income data from across the banking relationship, inviting cardholders to apply for a limit increase by updating their income and purchasing verified income data from third-party vendors. It remains to be seen whether one or more of these approaches will be sufficient to raise credit limit increase activity to preregulatory levels without the benefit of additional regulatory guidance.

B. Repricing and Fee Caps

Section 101 of the CARD Act governs changes to rates and fees applicable to existing card balances.[12] In essence, the revision prohibits issuers from increasing any annual percentage rate (APR), fee, or finance charge on an existing balance except under certain circumstances, including the end of a promotional period, a change in the variable APR due to a change in the

[12] I use the terms "existing" and "outstanding" interchangeably as they relate to balances that were incurred prior to a repricing event.

underlying index rate, the end of a workout or temporary hardship period or failure of the borrower to comply with the terms of a workout, or the borrower becoming delinquent for 60 days on his or her minimum payment.[13]

The CARD Act also restricts the repricing of new, or future, balances.[14] Section 172 of the Truth in Lending Act as amended by the CARD Act prohibits any repricing within the first year of an account's life, with the exception of the above conditions.[15] It also generally forbids repricing during the first six months of a promotional period. If an account is designated for repricing, the account holder must be given at least 45 days' notice. The CARD Act provisions applicable to the repricing of new and existing balances became effective February 22, 2010.

Effective August 22, 2010, the CARD Act required penalty fees, such as late and over-limit fees, to be "reasonable and proportional." A subsequent rule established a safe harbor of $25 for the first-time incident and $35 for subsequent violations within a six-month window.[16] In addition, late fees cannot be greater than the minimum payment. Over-limit fees cannot be assessed unless the cardholder has opted in to allow transactions to be processed when the account is over the limit. The fee is capped at the over-limit amount and can only be assessed once per billing cycle, no matter how many times the account exceeds the limit.

C. Event Timing

The coincident timing of the CARD Act with the 2008 financial crisis and Great Recession creates significant analytical challenges. Both the CARD Act and recession compressed profit

[13] Conditions may apply in each of the circumstances listed.

[14] I use the term "repricing" to narrowly refer to a change in interest rate, although the law does not confine the prohibitions to interest rates.

[15] To clarify, Section 172 applies to both new and existing balances, whereas Section 171 applies to existing balances only.

[16] See FRB implementing rule [12 CFR 1026.52(b)(1)(ii)(A)-(B)]; the fee amount is reviewed periodically to determine whether an increase is merited.

margins so that some of the same credit risk management tactics employed by issuers during the recession may have been carried through the recovery and into the post-CARD Act era.

As noted by Jambulapati and Stavins (2013), the history of the CARD Act begins much earlier than its signing on May 22, 2009. On May 23, 2007, the Federal Reserve Board issued a press release regarding its intent to amend Regulation Z (Truth in Lending) in order to enhance the clarity of credit card disclosures. A notice was published in the Federal Register on June 14, 2007.[17] In Federal Reserve Chairman Ben Bernanke's February 2008 prepared Congressional testimony, the last topic he addressed was the Federal Reserve Board's intent to review "potentially unfair and deceptive practices by issuers of credit cards" and to have proposed rules available by spring 2008.[18] In a May 2, 2008 press release, the Board announced the proposed rule changes, which would amend Regulations Z, AA (Unfair or Deceptive Acts or Practices), and DD (Truth in Savings). Among the five key protections noted is a prohibition on "increasing the rate on a pre-existing credit card balance (except under limited circumstances)." The final rules were approved on December 18, 2008, and were scheduled to go into effect July 1, 2010 (see below).[19]

On January 22, 2009, the Credit CARD Act was introduced in the U.S. House of Representatives.[20] President Barack Obama signed the act into law on May 22. The requirement that penalty fees be "reasonable and proportional" appears here and became effective August 22, 2010. Other parts of the law were phased in beforehand, including the ability to pay rules, which became effective February 22, 2010. The CARD Act superseded the Board's final rules since, as previously noted, they were not scheduled to go into effect until July 2010. In addition, Title X of the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act created the CFPB and

[17] See 72 Fed. Reg. 32948 (June 14, 2007)

[18] Bernanke (2008)

[19] Board of Governors of the Federal Reserve System (2008)

[20] The Credit Card Accountability, Responsibility, and Disclosure Act of 2009. (2009). Pub. L. No. 111-24, 123 Stat. 1734.

transferred many consumer financial protection functions from the Board to the CFPB, effective in July 2011.[21]

On April 29, 2013, the CFPB announced an amendment to Regulation Z that allowed issuers to consider shared income of stay-at-home spouses ages 21 and older when reviewing new credit applications or line increases on existing accounts.[22] Issuers had six months to comply with the amended rule.

Although events such as the banking failures, rescues, and federal interventions of 2008 were highly visible, the beginning of the financial crisis and recession actually appeared in early 2007. According to the Federal Reserve Bank of St. Louis, the financial crisis began in February 2007, when Federal Home Loan Mortgage Corporation (Freddie Mac) announced that it would stop buying the riskiest subprime mortgages and mortgage-related securities.[23] Then, in April 2007, subprime mortgage lender New Century Financial Corporation filed for Chapter 11 bankruptcy protection. In August 2007, the Federal Reserve Board began taking steps to provide additional liquidity to depository institutions. By September 2008, J.P. Morgan had acquired Bear Sterns, Bank of America announced plans to acquire Merrill Lynch & Co., and Lehman Brothers filed for Chapter 11 bankruptcy protection.

By late 2007, the U.S. economy had entered into a recession. The National Bureau of Economic Research (NBER) marks the recession period as beginning in December 2007 until June 2009.[24] Investor sentiment, as measured by the Dow Jones Industrial Average, peaked in October 2007 and dropped more than 50 percent by March 2009.[25]

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[21] Pub. L. No. 111-203, 123 Stat. 1376 (2010)

[22] Consumer Financial Protection Bureau (2013a)

[23] Federal Reserve Bank of St. Louis (2014)

[24] http://www.nber.org/cycles/cyclesmain.html

[25] Charts of Dow Jones Industrial Average (^DJI) are available at http://finance.yahoo.com/.

The macroeconomic shocks appear to have affected the credit card industry with a lag. Direct mail volume, falling slowly since 2005, began a more dramatic descent in September 2008.[26] The contraction in revolving credit balances began around March 2009.[27]

III. Literature Survey

Much of the economic literature on credit cards has focused on pricing, market structure, credit risk, and consumer rationality. Ausubel (1991) discusses the puzzles of high and downwardly sticky interest rates in a seemingly competitive market. Ausubel's (1991) explanations for these phenomena include search and switching costs, adverse selection, and consumer irrationality. Calem and Mester (1995), Ausubel (1999), Stango (2002), and Calem and Mester (2005) extend the discussion of switching costs and adverse selection. Brito and Hartley (1995) show that market-based observations and consumer choices are consistent with rational decision-making with constraints, while DellaVigna and Malmendier (2004) show that an environment with rational firms but partially naïve consumers with time-inconsistent preferences can explain several key features of credit card pricing, including low-rate introductory offers ("teaser rates") that automatically revert to higher rates in the future.

Comparatively little publicly available work exists on the determinants of initial credit limits and limit increases, as well as their effects on borrower behavior. Gross and Souleles (2002) focus on how consumers respond to changes to their credit limit, finding that credit limit increases generate an average of a 10—14 percent increase in debt. The effect is large for highly utilized consumers and small but statistically significant for low-utilized consumers. Dey and Mumy (2009) estimate a model of credit limit setting. They find that income, age, and interest rate on an existing card have a positive effect on credit limits, whereas prior delinquency and

[26] Mintel Comperemedia (2014a), "Credit Card Trend Report March 2014," Estimated Mail Volume by Month

[27] Federal Reserve Board G.19 Report, "Revolving Consumer credit owned and securitized, not seasonally adjusted"

bankruptcy have a negative effect. Interestingly, they find that being self-employed, typically an indicator of highly variable income, positively affects the limit. Musto and Souleles (2006) confirm the intuition that higher credit scores do indeed correspond to higher credit limits and vice versa. More generally, Sannikov (2007) looks at contracts under adverse selection and moral hazard. He shows that repeated interaction between borrower and lender reduces adverse selection, in which case an optimal contract has a credit limit that deterministically grows to some fixed amount over time.

While the effects of the CARD Act on interest rates and fees have garnered much attention, the effects on initial credit limits and credit limit increases have not been addressed as deeply. Jambulapati and Stavins (2013) examine the behavior of banks in the run up to the CARD Act's effective dates. While they find some evidence of account closure after the Federal Reserve Board's adoption of its rules in December 2008, they do not find evidence of additional closures or less desirable credit card terms between signing of the CARD Act into law in May 2009 and its effective dates, beginning in August 2009. Bar-Gill and Bubb (2012) evaluate the success of the CARD Act in addressing concerns about credit card pricing. They find that regulated fees declined substantially, while unregulated contract terms such as interest rate and annual fee did not change meaningfully. They also find that introductory teaser offers are equally prevalent before and after the CARD Act.

Ronen and Pinheiro (2014) use a multiperiod model to analyze the welfare effects of the CARD Act's repricing restrictions. They present a three-period model with symmetric information at period one, when a borrower contracts with any competitive lender, followed by asymmetric information and adverse selection at period two, when the borrower's type is revealed and he or she must make a decision to borrow under the existing contract or with another lender. In this environment, the authors find that regulation is generally welfare decreasing due to a

worsening of the adverse selection problem.[28] In their model, low credit-quality consumers become tempted to choose a credit card offer targeted to high credit-quality consumers. One of the results of this behavior is lower credit limits for high credit-quality consumers.

Tam (2011) also analyzes the welfare effects of repricing restrictions but from a different perspective. He uses a life-cycle model of optimal default with symmetric information. Households can save as well as borrow under a credit contract, which then ends at expiration or household default, whichever comes first. Households can only be under one contract at a time, but they may sign another contract once the existing one ends. Tam assumes that repricing restrictions effectively force lenders to lengthen the term of their initial offer. He concludes that these longer term contracts restrict borrowing by raising average interest rates. Welfare is reduced because of households' diminished ability to smooth consumption. Tam also examines the effect of imposing an interest rate ceiling, something considered during CARD Act deliberations that did not make it into the final piece of legislation. Under certain conditions, imposing the ceiling improves welfare for all consumers.

Agarwal et al. (2014) present a broad analysis of penalty fees, interest charges, and access to credit. Using a difference-in-differences approach with small business credit cards, which were unaffected by the CARD Act, they find significant over-limit and late-fee reductions for cardholders with a FICO score below 660 and smaller but meaningful differences for borrowers above 660.[29] They do not find evidence of higher interest charges on new accounts, nor do they find evidence of offsetting income from other fees or reduction in costs. With respect to credit volume, they find no effect on credit limits or new account originations. They do not present a separate analysis of initial credit limits.

[28] In their model there are circumstances in which a "pooling" equilibrium arise. In that case, regulation has no welfare impact.

[29] The approach taken by Agarwal et al. (2014) was first suggested in Canner (2010), who also recommends using a state-level binary variable to account for recession effects.

Consumer Financial Protection Bureau (2013b) also presents a broad and detailed empirical analysis. With respect to initial limits, the CFPB does not find a consistent pattern across risk segments. The smallest decline in average initial limit occurs in the superprime segment, where limits fell from second quarter 2008 to third quarter 2009 before beginning to rise again. Core and deep subprime limits fell from second quarter 2008 through third quarter 2010 before returning to an increasing trend. In contrast, initial limits in the prime segment have been falling slowly since first quarter 2009. Consumer Financial Protection Bureau (2013b) also reports that the incidence of credit limit increases fell after the financial crisis. The CFPB finds that the rate of limit increase was at its lowest level in second quarter 2010 and has remained flat, at about 35 percent of its second quarter 2008 level. The CFPB notes that ability to pay may play a role in this flattening and has marked this as an area for future research, saying it is "actively engaged in understanding the impact on consumers of the reduced incidence rate of CLI (credit limit increases)."

Several industry reports look at average credit limits on new accounts. Experian's (2011) analysis of credit bureau data shows average limits declining starting in third quarter 2008, bottoming out in third quarter 2009, and showing signs of increasing in third quarter 2010. In Experian's chart, the trend appears to be generally consistent across risk segments and especially pronounced for lowest-risk borrowers; however, no data are publicly available to confirm this observation. A report by Heller (2011) indicates that average limits on new accounts were down across the risk spectrum in third quarter 2010 when compared with data from 2008.

This paper adds to the existing literature on the effects of the financial crisis and CARD Act in several ways. First, by focusing on a single issuer behavior (i.e., credit limit setting) within a roughly two-year performance window, I provide a deeper understanding of the mechanics of a complicated system. Second, an important but not well understood aspect of the CARD Act is the requirement that lenders evaluate the borrower's ability to repay, which may affect the initial

credit limit assignment as well as the timing and magnitude of subsequent increases.[30] Based on my own survey of news articles and trade publications, credit limit increases made after the CARD Act do not seem to have drawn much attention, despite the ability to pay becoming a contentious topic. Third, to my knowledge, no existing research has addressed these specific questions using credit card tradeline data that are linked with the other trade lines of the consumer. This has the advantage of presenting a complete card profile at the consumer level. In addition, the data have a long time series, which makes it possible to examine market conditions well before the emergence of the financial crisis and the uncertainty over new regulations for credit cards.

IV. Data

A. Data Description

This study relies upon account-level bankcard data that are drawn from an anonymized 5 percent random sample of consumers living in the U.S. who have a Social Security number and at least one account or public record (e.g., a bankruptcy filing) reported to the credit bureau.[31] The data are available beginning in 2000 and are updated semiannually. From these semiannual data updates ("snapshots"), I selected a 50 percent random sample of accounts, which equates to a 2.5 percent sample of all bankcard accounts reported to the bureau.

The data do not contain any means of identifying issuers and thus of ensuring a balanced panel of issuers across time. Given the changes in the banking industry during the observation

[30] Section 109, Title I, of the CARD Act prohibits issuers from providing or increasing a credit limit without considering the applicant's or cardholder's ability to make the required payments on the proposed limit.

[31] The underlying anonymized panel data set of consumer credit bureau variables is called the Federal Reserve Bank of New York Consumer Credit Panel/Equifax, hereafter referred to as the CCP. For additional information about the CCP, see Lee and van der Klaauw (2010). With a few exceptions, this paper does not rely on variables contained in the CCP itself, but rather, it relies on additional data on the individual credit card accounts of consumers in the CCP obtained by the Federal Reserve Bank of Philadelphia. Hereafter, I refer to these data as the Philadelphia CCP tradelines. Other researchers, including Banerjee and Canals-Cerdá (2012) have also used these data.

period, it is likely that some issuers stopped reporting due to acquisition, change of strategy, or closure.[32] While the results may be influenced by changes in issuer composition, this influence is likely to be small given the highly concentrated nature of the credit card industry.[33]

In order to ensure that credit cards with well-defined credit limits made it into the final data set, it was necessary to make certain product-level exclusions. For example, I exclude charge cards and accounts labeled as installment or flexible spending.[34] I also exclude secured credit cards, which have credit limits that are influenced by the consumer's deposit amount.[35]

The data contain information on up to 10 bankcard accounts per consumer, as well as the consumer's current Equifax Risk Score, a proprietary credit score similar to the FICO score.[36] For each bankcard, the highest amount that the consumer has ever charged, called high credit amount, is reported. Fortunately, in some instances, high credit corresponds to the actual credit limit on the account, although it may not be identified as such. In order to observe changes in actual credit limits, rather than changes in high credit, I derived a new credit limit variable, populated only when the high credit amount was either explicitly identified as the credit limit or when it had the appearance of being a credit limit (for example, a round number, nonnegative, divisible by $100, not equal to the current balance, etc.).[37] Accounts with credit limits that could not be identified at least once were excluded from consideration.

[32] While the vast majority of issuers reports to a credit bureau, there are some lenders that do not. It is likely that the behavior of nonreported accounts varies significantly from bureau-reported accounts.

[33] According to Table 1 in Fedaseyeu and Hunt (2014), the top eight firms held 83 percent of credit card balances in 2010.

[34] Charge cards typically do not have a credit limit.

[35] Additional exclusions were made for charged-off and collections accounts. While charged-off accounts may appear in the data for several months, the default event was counted only once. Collections accounts, which tend to first appear as a delinquent account without any prior nondelinquent history, were removed.

[36] If a consumer has more than 10 credit cards, the newest ones are kept and older ones are dropped.

[37] Open accounts with credit limits deemed to be extreme outliers (under $300 or greater than $50,000) were excluded. For accounts with a status that was identified as closed by the issuer, I allowed for the possibility that the credit limit might be equal to a delinquent balance and thus appear abnormal.

The resulting data set forms the basis for the analysis presented in this paper. Table 1 presents descriptive statistics for selected variables over the time period second quarter 2005 to fourth quarter 2013. In addition, Figures 1 and 2 plot average credit limits and average initial limits, respectively.

There are two aspects of the data that limit the precision of my measures of card issuers' credit supply behavior. First, having low frequency (semiannual) data create the possibility that an observed credit limit change may be the result of one or more actions. Many of the calculations contained herein, therefore, refer to change that has occurred since the last time an account was observed, rather than since the prior billing cycle. Second, the data do not distinguish supply-side changes to credit limits from demand-side changes. In other words, I cannot distinguish between issuer-initiated limit increases and those initiated at the request of the borrower.[38] This could potentially affect the measurement of limit increase timing and frequency, and, perhaps to a lesser extent, limit increase amounts. For example, if, as a result of credit tightening during and after the recession, demand for limit increases grew while the supply remained flat or fell, the data would underrepresent the degree to which issuers restricted their limit increase activity.[39] This issue is addressed further in the following subsection.

B. Demand-Effects on Credit

I attempted to indirectly measure the degree to which the share of borrower-initiated limit increases had changed over time. Since it is not directly observable, I relied upon various proxy measurements, beginning with credit limit increase rates over time for accounts grouped by credit limit utilization at prior snapshot (see Figure 1). Under the assumption that highly utilized

[38] A borrower might request a limit increase in order to transfer a balance or to pay for an expected expenditure that would compromise the limit, or out of a desire to shift more spending onto the card for convenience or rewards purposes.

[39] It is important to note that the CARD Act's ability-to-pay provision may have contributed to blurring the lines between issuer- and consumer-initiated limit increases. As mentioned in Section II, issuers such as American Express and U.S. Bank are prompting cardholders to request a limit increase on their own behalf. These "prompted" limit increases may be considered part of issuers' automated limit increase programs and are not distinguishable in the data from the other types.

cardholders are more likely to request limit increases than others, an upward shift in the relative limit increase rates of highly utilized groups might indicate increased consumer-driven demand.

I compared the limit increase rate in the highly utilized group (>75 to 100 percent) with both the moderate (>25 to 50 percent) and low (>0 to 25 percent) utilized groups. While the relative limit increase rate between high and moderate groups shows no signs of demand-driven upward pressure after the recession and CARD Act, the comparison of high versus low utilized groups suggests otherwise. Until June 2010, the limit increase rates in the high utilization group tended to fall within the same range as the low utilization group. However, from June 2010 to June 2012, the high utilization group experienced a 43 percent higher limit increase rate, 13.1 percent compared with 9.2 percent in the low utilized group. Taken together, the evidence derived from both comparisons is insufficient to make a strong conclusion.

If credit-constrained consumers also attempt to open new credit card accounts, looking at new account opening rates may help us to understand whether the share of borrower-initiated limit increases has grown since the recession and CARD Act.[40] Figures 2a and 2b chart the percentage of account holders who opened at least one new and distinct bankcard in the past six months. Figure 2a includes all accounts with an initial risk score below the 75th percentile, as these three quartiles displayed similar behavior. While the ordering of new account openings by utilization changes after the recession, consumers with a highly utilized (>75 to 100 percent) account tend to be the *least* likely to open a new account. In the lowest risk quartile (Figure 2b), consumers with highly utilized accounts had the highest rates of new account openings before the recession; however, after the recession, the rate is little different from what is observed in other utilization groups. Thus, it does not appear that new account openings have increased for consumers with highly utilized existing accounts.

[40] This, again, is an imperfect measure since new account openings will be affected by credit supply.

V. Methodology

The methodological approach taken in this paper is a vintage analysis. This type of analysis aligns one or more groups of new accounts at their earliest observation point and compares their attributes over time. I compare accounts booked in 2005, before the recession and CARD Act, with those booked in 2011. The 2005 vintage includes accounts that were new (aged six months or less since they were opened) at the June or December 2005 snapshots. The 2011 vintage comprises accounts opened after the recession and the February 2010 effective date for CARD Act repricing restrictions. These accounts were new at either the June 2011 or the December 2011 snapshots. Choosing this vintage requires me to restrict attention to the first 30 months on books, as data are only available to December 2013.[41]

Since the purpose of the vintage analysis is to understand changes in initial limits and credit limit increases over time, I further restrict the analysis to only those accounts observed five times consecutively. By excluding accounts that are closed or that are not reported with consistency, some of the percentages reported in the results may be overstated. Nonetheless, since the objective of this analysis is to understand differences across the two vintages as they mature, rather than to report aggregate trends, the benefits of this restriction outweigh the loss of generality.

Accounts in the vintage analysis are divided into risk score quartiles according to the account holder's Equifax Risk Score (a) the first time the account is observed or (b) as of the snapshot prior to observing account behavior.[42] When referring to the risk score in the former sense, I use the phrase "initial risk score," and, in the latter sense, I use the term "prior risk score." In either case, quartiles are decreasing in riskiness (increasing in score) so that quartile four contains

[41] To clarify account age and timing, accounts are first observed from one to six months. Accounts that persist to the next snapshot (six months) are between seven and 12 months old. They are 13–18 months old at the 12-month snapshot, 19–24 months old at the 18-month snapshot, and 25–30 months old at the 24-month snapshot.

[42] I use risk score at prior snapshot, rather than the contemporaneous risk score, in order to better align with what the issuer might have observed prior to making a credit limit decision.

accounts owned by the 25 percent of account holders with the highest risk scores, or lowest likelihood of credit default. In some instances, the results are examined by utilization groups, which are based on the percentage of credit limit used as of the prior snapshot.

VI. Results

In this section, I address each of the four research questions posed earlier. Namely, I compare the 2005 and 2011 credit card vintages to identify changes in initial credit limit amounts, credit limit increase rates, timing of first credit limit increases, and limit increase amounts. At times, I stratify the data by risk score quartiles and credit limit utilization groups in order to determine how these factors influence vintage-level results.

A. Initial Credit Limits

Table 2 presents median initial credit limits by initial risk score quartile for the 2005 and 2011 vintages. Overall, the median initial credit limit in the 2011 vintage was 60.0 percent lower than in 2005. Accounts in risk score quartile one, which includes account holders with the lowest 25 percent of Equifax Risk Scores, had the largest drop. The median initial limit in that quartile's 2005 vintage was $1,500 compared with $500 in 2011, a reduction of 66.7 percent.[43] In quartiles two through four, initial limits are lower by about 50 percent. Quartile four, which includes account holders with the highest 25 percent of Equifax Risk Scores, had a median initial credit limit of $5,000 in 2011, compared with $10,000 in 2005.

Looking at the columns in Table 2, clearly both vintages exhibit an inverse relationship between risk and credit limit. Higher risk accounts, represented by lower Equifax Risk Scores, receive lower initial credit limits, and vice versa. This is consistent with issuers managing expected losses by controlling exposure to risky accounts.

[43] Because the initial credit limit data are not normally distributed, I use the Wilcoxon-Mann-Whitney Test in place of the t-test to determine whether the median initial credit limits of both vintages are from the same distribution.

Thus, the data suggest that initial credit limits were greatly affected by the events from 2008 to 2010, with the largest reductions in initial credit outlay falling on the riskiest 25 percent of new accounts.

B. Limit Increase Rates

Next, I examine the frequency of credit limit increases in the 2005 and 2011 vintages. Table 3 presents the credit limit increase rate, calculated as the percentage of accounts that received a limit increase between each six-month snapshot.[44] While accounts in the 2011 vintage were 2.1 percentage points more likely to receive a credit limit increase early on in life (between months seven and 12), they were less likely to receive one thereafter.

In order to further understand the limit increase rate between seven and 12 months, I separate the accounts in each vintage by their initial risk score quartile.[45] Table 4 shows that quartile one, which comprises the riskiest 25 percent of accounts, had a 20.9 percent credit limit increase rate in 2011, an increase of 5.9 percentage points over 2005. Accounts in quartiles two and three were slightly less likely (1.3 percentage points) to receive a limit increase in 2011, while accounts in quartile four were slightly more likely than in 2005. Thus, the higher limit increase rate between seven and 12 months is driven nearly completely by risk score quartile one.

In order to determine what role, if any, account utilization played in quartile one's higher limit increase rate, I further separate risk score quartile one into 25-percentage point utilization groups. As indicated in Table 5, accounts in the 2011 vintage were granted a higher percentage of limit increases than the 2005 vintage within all utilization groups. Of note, accounts with utilization greater than 75 percent were 7.5 percentage points more likely to receive a limit increase. In 2005, this group had just a 12.8 percent limit increase rate, the lowest of all

[44] The calculation is noncumulative. In other words, accounts receiving a limit increase in a previous snapshot are not included in the numerator of the limit increase rate calculation in subsequent snapshots.

[45] As noted in Section V, risk score quartile is calculated using the account holder's Equifax Risk Score as of the previous, rather than current, snapshot.

utilization groups. In contrast, in 2011, the group had a 20.3 percent limit increase rate. These results suggest that, while high utilization in a high-risk quartile could have been a sign of risk in 2005, low initial credit limits in the 2011 vintage may have degraded the information content of high utilization.

Continuing to focus on (prior) risk score quartile one, Table 6 presents credit limit increase rates by the months on books. While the 2011 vintage had a higher limit increase rate between seven and 12 months, Table 6 shows that this difference reverses in subsequent months. From 13 to 18 months and from 19 to 24 months, 2011 accounts had a lower limit increase rate of 7.1 and 7.4 percentage points, respectively. The gap between 2011 and 2005 is smallest between 25 and 30 months, although statistically significant. Thus, risk score quartile one does not appear to have directionally different behavior in later snapshots.

At the vintage level, Table 3 also indicates that the largest dropoff in credit limit increases occurs between months 19 and 24, in which the 2011 vintage had a 7.9 percentage point lower limit increase rate. This also represents the largest change in percent difference terms, at nearly 50 percent lower than the 15.9 percent limit increase rate in the 2005 vintage. When examined by risk quartile (not shown), no single quartile appeared to drive the result. In fact, lower limit increase rates were present across the board.

By analyzing credit limit increase rates, clearly the 2011 vintage was treated quite differently than the 2005 vintage. While accounts in the 2011 vintage were generally less likely to receive a limit increase, the 25 percent highest risk accounts, which also experienced the sharpest drop in median initial credit limits, had a higher limit increase rate early on in their account life cycles.

C. Timing of First Limit Increase

In the previous subsection, I examined the credit limit increase rate across vintages. In general, I found that the 2011 vintage was less likely to receive a limit increase, although accounts in risk score quartile one did have a higher limit increase rate than in 2005 between

months seven and 12. Presumably, limit increases occurring this early in a vintage's life cycle are first-time limit increases, although the results in subsection B included both first and subsequent limit increases. In this subsection, I approach the topic of first-time limit increases more directly by focusing solely on the timing of the first limit increase in the population that received one during the first 30 months on books. I investigate whether first credit limit increases occurred sooner or later for the 2011 vintage versus 2005.

Figure 3 presents the cumulative percentage of first limit increases by months on books for each of the vintages. Overall, it appears that first credit limit increases were more likely to occur early on for the 2011 vintage. In 2005, 35.2 percent of first limit increases occurred between months seven and 12, compared with 45.1 percent in 2011. The gap narrows somewhat between months 13 and 18, at which point 73.1 percent of the 2011 vintage's first limit increases had occurred, compared with 69.2 percent in 2005. By months 19–24, the 2005 vintage had caught up, with 87.8 percent of first limit increases having occurred, compared with 86.8 percent in the 2011 vintage. Thus, first limit increases in the 2011 vintage occurred sooner than in 2005, with 10.0 percent more occurring between months seven and 12.

As I noted in the previous subsection, credit risk plays a major role in explaining the differences between the two vintages. Figures 4a through 4d plot the cumulative percentage of first limit increases for each of the four initial risk score quartiles. These results suggest that first limit increases occurred much sooner for risk score quartiles one and two in 2011 than they would have in 2005. In risk score quartile one, 52.8 percent of first limit increases in the 2011 vintage occurred between months seven and 12, compared with 32 percent in the 2005 vintage, an increase of 21 percentage points (see Figure 4a). Similarly, for quartile two of the 2011 vintage, first limit increases were 12 percentage points more likely to occur between months seven and 12 than they had in 2005 (see Figure 4b). In contrast, the differences between vintages are much smaller for quartiles three and four (see Figures 4c and 4d). Thus, the accelerated timing of first limit increases in the 2011 vintage appears to be driven by the treatment of risk score quartiles

one and two, whereas risk score quartiles three and four do not appear to have changed much since 2005.

Comparing the treatment of risk score quartiles within each vintage yields another interesting result. As illustrated in Figure 5a, between 2005 and 2011, the relationship between risk and time until first limit increase became inverted. While the 2005 vintage clearly exhibits a direct relationship between risk score quartile and first limit increase timing, as the previous results suggest, the 2011 vintage exhibits more of an inverse relationship. Higher risk accounts that were opened in 2005 waited longer for their first limit increase than lower risk accounts. Of the accounts in quartile one to receive a limit increase, 32 percent received their increase between months seven and 12, compared with 35 percent, 36 percent, and 38 percent in quartiles two through four. The ordering also holds for 13 to 18 months as well as 19 to 24 months. In contrast, there appears to be more of an inverse relationship between risk score quartile and limit increase timing in the 2011 vintage. Figure 5b shows that more than half of the limit increase recipients in risk quartile one received their increase between months seven and 12, compared with 47 percent in quartile two and 40 percent in quartiles three and four. However, between 19 and 24 months, quartiles two through four have caught up with quartile one.

In the previous subsection, I found that the 2011 vintage was generally less likely to receive a limit increase, although risk score quartile one had a higher limit increase rate early on in its account life cycle. Here, not only do I find a differential treatment of risk score quartile one, but quartile two appears to behave similarly. Accounts in these quartiles of the 2011 vintage received their first credit limit increase much sooner than their 2005 counterparts.

D. Limit Increase Amounts

In this section, I compare the dollar amounts of credit limit increases for each vintage. Similar to the analysis in subsection B, I separately consider credit limit increases occurring between each six-month snapshot. Table 8 presents median limit-increase amounts for each snapshot period.

The greatest difference in limit increase amount occurs between seven and 12 months, in which the median limit increase amount fell by 54.5 percent from $1,100 in 2005 to $500 in 2011. Between 13 and 18 months, the 2011 vintage had just a 10 percent lower median limit amount ($900 compared with $1,000 in 2005). The gap between vintages subsequently increased between 19 and 24 months and between 25 and 29 months. Thus, median credit-limit increase amounts fell across all time buckets, with the steepest reduction occurring early on. There is also some indication that the vintages do not vary much between 13 and 18 months. In what follows, I investigate whether the variation between vintages is driven by changes within specific risk score quartiles.

In subsection B, I found that between seven and 12 months, (prior) risk score quartile one was the primary contributor to a higher overall limit increase rate for the 2011 vintage. In order to determine whether the same risk score quartile was also driving the lower median limit increase amounts during this observation period, I again separated each vintage by prior risk score quartile. Table 9 presents median credit-limit increase amounts received between seven and 12 months. Each of the 2011 risk score quartiles experienced significantly lower median limit-increase amounts, although amounts in quartiles one and two were reduced by more than 64 percent, compared with 33.3 percent and 37.5 percent reductions in quartiles three and four, respectively. Thus, the higher risk quartiles do appear to be driving down the lower limit increase amounts between seven and 12 months. Given that median initial credit limits in the 2011 vintage are less than half of the 2005 limits, it seems reasonable that median credit-limit increase amounts would also be lower across the risk spectrum.

As mentioned previously, while median credit-limit increase amounts vary considerably between the two vintages between seven and 12 months, I observe much less variation between 13 and 18 months, followed by increased variation from 19 to 29 months. Several things appear to be contributing to this result. Table 10 presents median credit-limit increase amounts for the three later snapshots. During each period, median limit amounts in the 2011 vintage vary only in

risk score quartile one, otherwise remaining at $1,000, $1,500, and $2,000 for quartiles two, three, and four, respectively. In other words, 2011 median credit-limit increase amounts plateau between 13 and 18 months and remain at the same levels until at least month 30. Even risk score quartile one varies by little more than $100, between $389 and $500.

On the other hand, median limit amounts in the 2005 vintage are weakly increasing through month 24.[46] The combination of fixed median credit-limit increase amounts in the 2011 vintage, which are most comparable with the 2005 medians between 13 and 18 months, and increasing median amounts in the 2005 vintage help explain the variation across time. Such a finding provides some indication that issuers' credit policies governing limit increase amounts did indeed change between 2005 and 2011.

I also examined whether the 2011 vintage's median credit-limit increase amounts, which appear very stable within risk score quartiles, varied at all by utilization.[47] Table 11 shows that, between 13 and 18 months and between19 and 24 months, median credit-limit increase amounts also do not vary much across utilization groups. The greatest amount of variation appears in quartiles three and four between 25 and 30 months. For example, at utilization levels above 75 percent, the median credit-limit increase amount in quartile four is $2,500, 25 percent higher than the overall median of $2,000.

Up to this point, my analysis of credit limit increase amounts has compared levels (actual dollars) in each vintage. The results indicate that the dollar amounts of 2011 limit increases are generally the same as or lower than the 2005 vintage. Given that initial credit limits in the 2011 vintage are also considerably lower than in 2005, it is possible that limit increase amounts as a percentage of existing credit limit were unchanged or perhaps higher than in 2005. In order to

[46] For the 2005 vintage, limit increase amounts appear to dip somewhat between months 24 and 29, suggesting a difference in composition of the accounts receiving limit increases compared with prior periods.

[47] I also examined similar data on the 2005 vintage and found no consistent or discernable relationship between utilization and median limit increase amount within risk quartiles.

investigate this scenario, I examined median credit-limit increase amounts as a percentage of prior credit limit for 64 subgroups (four risk score quartiles × four utilization groups × four snapshots). Of the 64 groups, three were lower, another three were equal, and the remaining 58 were higher in 2011 than in 2005.[48] Thus, although the dollar values of limit increases are generally smaller in 2011 compared with 2005, in percentage terms they are mostly larger than in 2005, likely due to significantly lower initial credit limits.

VII. Conclusion

Beginning in 2007, the consumer credit card industry endured a host of macroeconomic and regulatory shocks, some of which appear to have had long-lasting effects. In this paper, I attempt to identify and document the effects of these environmental factors on credit limits and limit increases. Using credit card tradeline data, I compare the supply of credit at two different market equilibria: 2005 and 2011. The differences between the vintages are indicative of significant changes in credit card underwriting strategy. While I cannot completely rule out the effects of consumer demand on credit limit increases, the findings also suggest that issuers' credit limit management strategies have changed.

For example, credit card issuers reduced their acquisition exposure by cutting initial credit limits by 50 percent. At the median, a customer with a credit score in the highest quartile who would have been granted a $10,000 credit limit in 2005 would have received just a $5,000 initial limit in 2011. Account management programs, which typically kick in once an account has gone through the acquisition and onboarding process, appear to have reduced the frequency with which issuers grant credit limit increases. At the same time, these programs focused on accelerating the pace of credit limit increases for customers with a credit score in the lowest quartile who experienced a 66.7 percent reduction in initial limits (relative to 2005) at the median. Further,

[48] These results are meant to provide directional guidance and have not been tested for statistical significance.

while the dollar value of limit increase amounts was generally reduced, evidence suggests it may not have been done in direct proportion to reductions in initial credit limits. Rather, median credit-limit increase amounts as a percentage of initial credit limits are generally higher in 2011 than in 2005.

To what extent can these changes be attributed to either the CARD Act or the recession? As stated in Section I, determining cause-and-effect relationships during this period is very difficult because many issuer responses to both factors are observationally equivalent. During a recession, issuers generally tighten their underwriting standards, resulting in lower initial credit limits and fewer, possibly smaller, credit limit increases.[49] Issuers may have reacted to several provisions of the CARD Act in similar fashion.

As discussed earlier, the CARD Act's ability to pay provision requires issuers to consider the consumer's ability to make the required payments on any new card or limit increase. The intent of such a provision is to reduce the likelihood that a consumer becomes unable to make his or her minimum monthly payments on a highly utilized credit card. In some cases, issuers may lack sufficiently precise data to establish ability to pay for some consumers, which could result in declined applications and consumers receiving less credit or waiting longer for a credit limit increase than they might have otherwise.[50] These effects, while potentially affecting a small percentage of consumers, are similar to what might be observed as a result of a recessionary contraction.

In addition, both the CARD Act's limitations on issuers' ability to reprice risky accounts as well as its mandated lower penalty fees could have altered the economic viability of many issuer

[49] Although the recession officially ended in 2009, the recovery has been slow, continuing well past 2011 and into 2014. See "U.S. Economic Recovery Looks Distant as Growth Stalls" at http://www.nytimes.com/2014/06/12/business/economy/us-economic-recovery-looks-distant-as-growth-lingers.html?_r=0.

[50] There is evidence that ability to pay created operational complexities but did not significantly affect business decisions. Consumer Financial Protection Bureau (2013b) notes that issuers participating in its Consumer Credit Practices Inquiry reported that just 2–3 percent of applicants satisfied their credit criteria but were declined due to ability to pay.

strategies, whereby incremental acquisition risk could be offset by penalty fees and interest. Thus, issuers might have adjusted their approach and exposure to all accounts, and to risky accounts in particular, with similar effects on credit limits and limit increases.

An additional word of caution when reviewing the results presented in this paper: While the analysis herein may adequately capture differences between 2005 and 2011, it is unclear to what extent these differences will persist in future vintages. In other words, how representative is the 2011 vintage of 2012, 2013, and 2014? The evidence presented in this paper is mixed. While initial credit limits continue to trend downward, limit increase rates have (generally) increased since at least 2010, implying a steeper credit limit profile in future vintages.[51] Additional research will be able to determine whether the observed differences between the 2005 and 2011 vintages are transitory, merely the result of prolonged postrecession credit tightening and regulatory uncertainty combined with additional operational complexity.

Moreover, issuers' account management tactics continue to evolve in light of ability-to-pay requirements. A Mintel (2014b) report suggests that issuers' tactics have changed when it comes to granting limit increases. While some cardholders continue to receive automatic limit increases, others are being invited to request a limit increase. A letter from American Express prompts cardholders to request a $1,000 credit limit increase via online or by phone. Capital One's Credit Steps program offers a limit increase to any cardholder making a purchase and five on-time monthly payments. In addition, issuers such as U.S. Bank are offering bonus points for requesting an increase. These tactics represent a dramatic shift from business as usual, and their implications for success and profitability are not yet well understood at this time. Such tactics may be abandoned in later vintages because of either poorer-than-expected results or additional changes in the regulatory environment.

[51] See Table 1.

Indeed, as of the writing of this paper, a good deal of regulatory uncertainty remains. It is reasonable to think that some components of the CARD Act may still be making their way into card issuers' credit limit management strategies. The CFPB's latest changes to the ability to pay were effective as of November 2013, more than four years after the CARD Act became law. In addition, several issues raised by the CARD Act's ability to pay provision remain unsettled (refer to the box titled "Ability to Pay — Challenges Remain" on page 8). Should the CFPB provide clearer guidance regarding the acceptable use of modeled income and the shelf life of collected income data in a way that facilitates their use, credit limit increase activity may recover to pre-2009 levels. If, on the other hand, these issues are not addressed or are interpreted in a more restrictive manner, limit increase activity may stagnate or fall further.

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Table 1. Descriptive Statistics for Key Variables

	Jun 2005	Dec 2005	Jun 2006	Dec 2006	Jun 2007	Dec 2007	Jun 2008	Dec 2008	Jun 2009
Balance									
Average	1,636	1,666	1,646	1,809	1,796	1,852	1,836	1,977	1,909
Median	212	245	228	336	313	348	320	422	419
Std Dev	*3,352*	*3,384*	*3,389*	*3,529*	*3,567*	*3,665*	*3,702*	*3,820*	*3,693*
Credit Limit									
Average	7,437	7,532	7,496	7,545	7,597	7,568	7,617	7,718	7,069
Median	5,800	5,600	5,200	5,000	5,000	5,000	5,000	5,000	4,500
Std Dev	*6,547*	*6,743*	*6,904*	*7,182*	*7,376*	*7,524*	*7,642*	*7,792*	*7,325*
Utilization									
Average	25.8%	26.3%	25.8%	28.6%	28.4%	29.7%	29.4%	32.4%	32.5%
Median	4.9%	5.7%	5.0%	8.3%	7.6%	8.9%	7.9%	11.1%	11.8%
Std Dev	*36.4%*	*36.5%*	*36.0%*	*36.9%*	*37.0%*	*37.8%*	*37.9%*	*39.3%*	*38.8%*
Initial Credit Limit									
Average	6,055	4,902	4,840	4,698	4,894	4,770	4,880	5,110	4,348
Median	5,000	3,600	3,500	3,000	3,500	3,000	3,000	3,000	3,000
Std Dev	*4,960*	*4,595*	*4,680*	*4,822*	*5,077*	*5,117*	*5,339*	*5,650*	*4,401*
Limit Increase Amount									
Average	2,210	2,073	2,084	2,158	2,043	1,724	1,739	1,611	1,285
Median	1,700	1,500	1,500	1,500	1,500	1,200	1,100	1,000	900
Std Dev	*2,177*	*2,157*	*2,135*	*2,361*	*2,105*	*1,885*	*1,958*	*1,903*	*1,618*
Limit Increase %									
Average	42.5%	40.7%	42.7%	45.9%	53.0%	38.5%	39.1%	49.2%	47.7%
Median	20.7%	21.4%	24.0%	25.0%	23.1%	21.4%	20.8%	25.0%	25.0%
Std Dev	*532.6%*	*101.0%*	*112.4%*	*311.3%*	*208.3%*	*100.2%*	*531.9%*	*567.0%*	*101.7%*
Risk Score									
Average	729	729	729	724	724	722	723	722	726
Median	748	749	750	744	745	743	745	744	748
Std Dev	*80*	*81*	*82*	*85*	*86*	*89*	*89*	*91*	*90*
Risk Group									
Min-686	25.1	25.4	25.2	27.5	27.8	28.8	28.4	29.2	28.2
687-748	24.9	24.5	24.0	24.3	23.8	23.2	22.8	22.3	21.9
749-790	24.9	24.6	24.3	23.6	22.8	22.4	21.6	20.7	20.2
791-Max	24.7	25.4	26.1	24.3	25.3	25.3	26.8	27.5	29.5
Missing	0.4	0.1	0.4	0.3	0.3	0.3	0.3	0.3	0.3

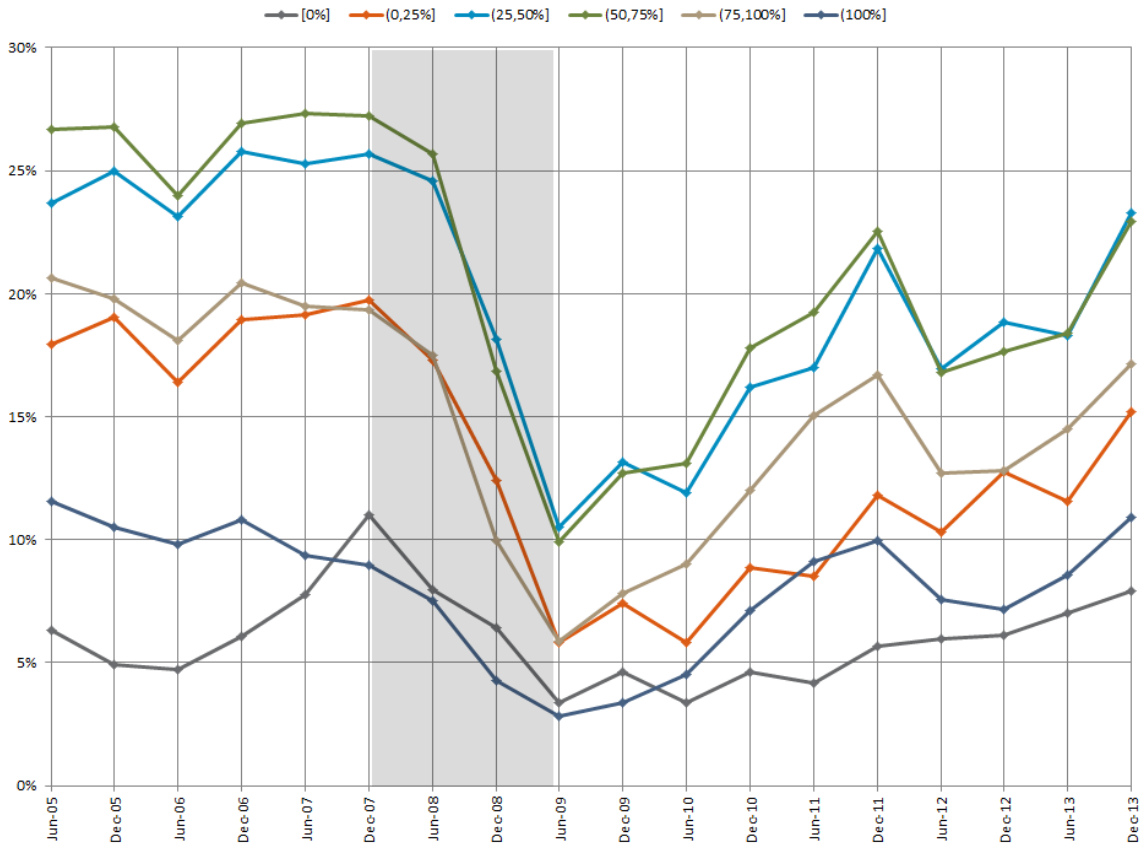
Source: Author's calculations using the Philadelphia Consumer Credit Panel (CCP) tradelines.

Notes: Descriptive statistics for semiannual snapshots of Philadelphia CCP tradelines data set. Excludes closed accounts. Utilization is calculated as balance divided by credit limit. Initial credit limit is the reported credit limit on accounts from one to six months old at the time of snapshot. Limit increase amount is calculated as current credit limit minus limit at previous snapshot. Limit percent increase is the percent difference from previous credit limit to current limit. Risk groups correspond to June 2005 quartiles.

Table 1. Descriptive Statistics for Key Variables (continued)

	Dec 2009	Jun 2010	Dec 2010	Jun 2011	Dec 2011	Jun 2012	Dec 2012	Jun 2013	Dec 2013
Balance									
Average	1,884	1,772	1,753	1,644	1,663	1,562	1,563	1,477	1,433
Median	460	413	452	396	443	381	406	345	338
Std Dev	*3,577*	*3,447*	*3,346*	*3,225*	*3,190*	*3,097*	*3,062*	*2,987*	*2,918*
Credit Limit									
Average	6,879	6,721	6,517	6,319	6,187	6,019	5,853	5,732	5,458
Median	4,300	4,000	4,000	3,800	3,600	3,500	3,300	3,000	3,000
Std Dev	*7,204*	*7,091*	*6,991*	*6,871*	*6,811*	*6,702*	*6,574*	*6,478*	*6,305*
Utilization									
Average	33.4%	32.0%	33.3%	32.0%	33.9%	32.3%	33.6%	31.8%	32.3%
Median	13.6%	12.3%	14.8%	12.9%	15.6%	13.0%	14.9%	12.2%	12.9%
Std Dev	*38.9%*	*81.5%*	*37.5%*	*37.1%*	*37.6%*	*37.6%*	*37.9%*	*37.3%*	*37.5%*
Initial Credit Limit									
Average	3,742	3,835	3,238	3,352	3,344	3,350	3,092	3,213	2,827
Median	2,500	2,500	2,000	2,000	2,000	2,000	2,000	2,000	1,900
Std Dev	*3,958*	*4,265*	*3,566*	*3,808*	*3,916*	*3,801*	*3,415*	*3,672*	*3,241*
Limit Increase Amount									
Average	1,172	1,339	1,213	1,487	1,253	1,395	1,408	1,512	1,425
Median	600	900	800	1,000	900	1,000	1,000	1,000	1,000
Std Dev	*1,642*	*1,723*	*1,509*	*1,743*	*1,541*	*1,522*	*1,694*	*1,737*	*1,711*
Limit Increase %									
Average	42.6%	46.2%	46.4%	50.9%	48.9%	52.0%	60.9%	64.4%	62.9%
Median	24.5%	28.6%	28.3%	33.3%	30.0%	33.3%	33.3%	36.8%	36.8%
Std Dev	*94.6%*	*117.3%*	*74.4%*	*99.2%*	*90.8%*	*87.2%*	*103.2%*	*105.8%*	*104.4%*
Risk Score									
Average	727	731	729	730	726	727	724	725	723
Median	750	752	750	750	746	745	742	742	739
Std Dev	*89*	*86*	*86*	*85*	*87*	*86*	*87*	*85*	*86*
Risk Group									
Min-686	27.4	26.4	27.2	27.1	28.7	28.6	29.8	29.6	30.7
687-748	21.9	21.9	22.1	22.2	22.4	22.5	22.6	23.0	22.9
749-790	20.5	20.5	20.6	20.3	20.0	19.8	19.6	19.5	18.7
791-Max	30.0	31.0	29.9	30.2	28.8	28.9	27.8	27.7	27.5
Missing	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2

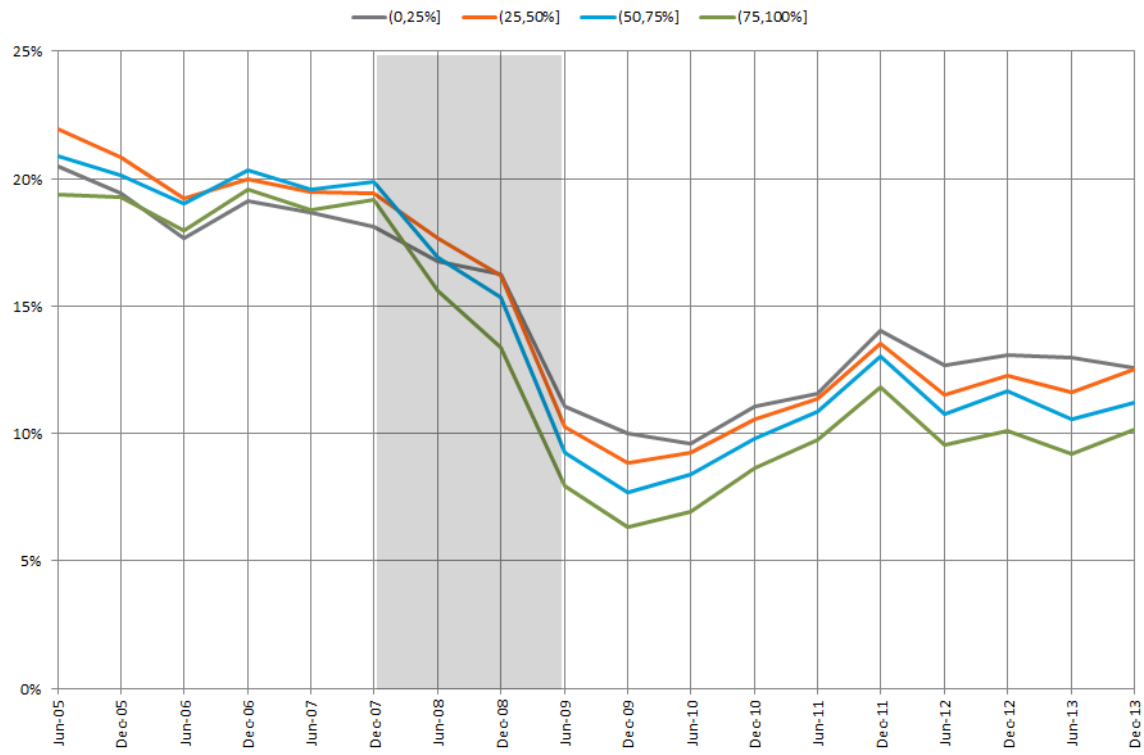
Figure 1. Credit Limit Increase Rate, by Utilization Group at Prior Snapshot



Source: Author's calculations using the Philadelphia CCP tradelines

Notes: Percentage of open and current accounts whose credit limit has increased from the previous snapshot. Utilization groups are calculated as of the snapshot prior to the observation snapshot; account composition varies at each snapshot. Recession shading notes first quarter 2008 to second quarter 2009.

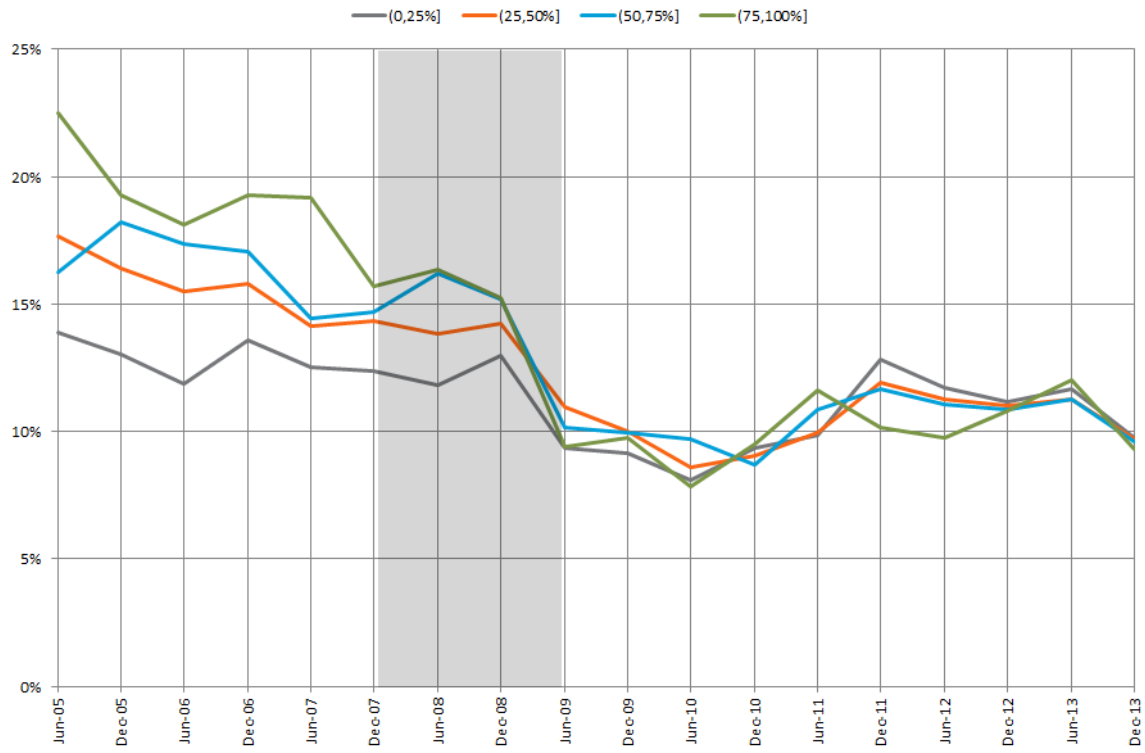
Figure 2a. New Bankcard Opening Rate, by Utilization Group at Prior Snapshot (Risk Score Quartiles One–Three)



Source: Author's calculations using the Federal Reserve Bank of New York's CCP

Notes: Percentage of cardholders who opened at least one new bankcard in the past six months. Utilization is calculated at the borrower level across all cards on file. Includes borrowers with a credit card between 12 and 17 months old. Risk score quartiles and utilization groups are calculated as of the snapshot prior to the observation snapshot. Excludes borrowers with missing Equifax Risk Score or utilization. Excludes 0 percent and >=100 percent utilization groups and accounts in risk score quartile four. Recession shading notes first quarter 2008 to second quarter 2009.

Figure 2b. New Bankcard Opening Rate, by Utilization Group at Prior Snapshot (Risk Score Quartile Four)



Source: Author's calculations using the Federal Reserve Bank of New York's CCP

Notes: Percentage of cardholders who opened at least one new bankcard in the past six months. Utilization is calculated at the borrower level across all cards on file. Includes borrowers with a credit card between 12 and 17 months old. Risk score quartiles and utilization groups are calculated as of the snapshot prior to the observation snapshot. Excludes borrowers with missing Equifax Risk Score or utilization. Excludes 0 percent and >=100 percent utilization groups and accounts in risk score quartiles one, two, and three. Recession shading notes first quarter 2008 to second quarter 2009.

Table 2. Median Initial Credit Limits, by Initial Risk Score Quartile

	2005	2011	% Diff
Quartile 1	$1,500 (122,667)	$500 (129,887)	-66.7
Quartile 2	4,000 (126,062)	2,000 (134,232)	-50.0
Quartile 3	7,000 (114,945)	3,600 (113,959)	-48.6
Quartile 4	10,000 (121,819)	5,000 (98,828)	-50.0
Total	$5,000 (485,493)	$2,000 (476,906)	-60.0

Source: Author's calculations using the Philadelphia CCP tradelines

Notes: Initial risk score quartiles are calculated using the Equifax Risk Score reported the first time an account is observed. Quartiles are decreasing in riskiness (increasing in score) and vary across vintages. Cell count is reported in parentheses. Percent difference is reported. All differences significant at 0.01 using Wilcoxon-Mann-Whitney test.

Table 3. Credit Limit Increase Rates, by Months on Books

	2005	2011	Diff
7–12 months	12.4% (484,986)	14.5% (475,124)	2.1%
13–18 months	16.6 (484,951)	11.7 (475,037)	-4.9
19–24 months	15.9 (484,506)	8.0 (474,949)	-7.9
25–30 months	14.6 (484,059)	9.1 (474,700)	-5.5

Source: Author's calculations using the Philadelphia CCP tradelines

Notes: Percentage of open and current accounts (at the time of first observation) whose credit limit has increased from the previous snapshot. Cells corresponding to months 13–18, 19–24, and 25–30 exclude accounts with missing Equifax Risk Score or balance at previous observation. Cell count (denominator) is reported in parentheses. Percentage point difference reported. All differences are statistically significant at 0.01.

Table 4. Credit Limit Increase Rates Between Seven and 12 Months on Books, by Initial Risk Score Quartile

	2005	2011	Diff
Quartile 1	15.0%	20.9%	5.9%
Quartile 2	15.9	14.6	-1.3
Quartile 3	10.0	8.7	-1.3
Quartile 4	5.6	5.8	0.2

Source: Author's calculations using the Philadelphia CCP tradelines

Notes: Percentage of open and current accounts (at the time of first observation) whose credit limit has increased from the first observation. Initial risk score quartiles are calculated using the Equifax Risk Score reported the first time an account is observed. Percentage point difference reported. All differences are statistically significant at 0.01, with the exception of quartile 4, which is significant at 0.1.

Table 5. Credit Limit Increase Rates Between Seven and 12 Months on Books for Risk Score Quartile One, by Utilization Group

	2005	2011	Diff
[0, 25%]	13.4%	17.8%	4.4%
(25, 50%]	21.2	24.9	3.7
(50,75%]	19.0	24.9	5.8
(75%+]	12.8	20.3	7.5

Source: Author's calculations using the Philadelphia CCP tradelines

Notes: Percentage of open and current accounts (at the time of first observation) in risk score quartile 1 whose credit limit increased from first observation. Risk score quartiles and utilization groups are calculated as of the snapshot prior to the observation snapshot. Percentage point difference reported. All differences are statistically significant at 0.01.

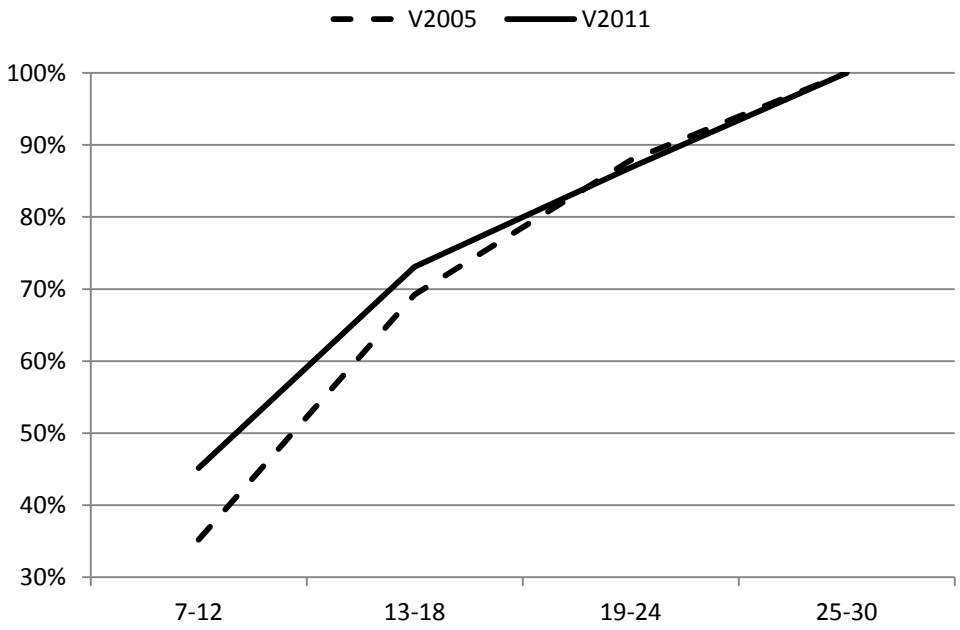
Table 6. Credit Limit Increase Rates for Risk Score Quartile 1, by Months on Books

	2005	2011	Diff
7–12 months	15.0%	20.9%	5.9%
13–18 months	19.4	12.2	-7.1
19–24 months	15.4	8.0	-7.4
25–30 months	14.5	11.8	-2.7

Source: Author's calculations using the Philadelphia CCP tradelines

Notes: Percentage of open and current accounts (at the time of first observation) in risk score quartile one whose credit limit increased from previous observation. Risk score quartiles are calculated as of the snapshot prior to the observation snapshot. Percentage point differences reported. All differences are statistically significant at 0.01.

Figure 3. Cumulative Percentage of First Limit Increases, by Months on Books

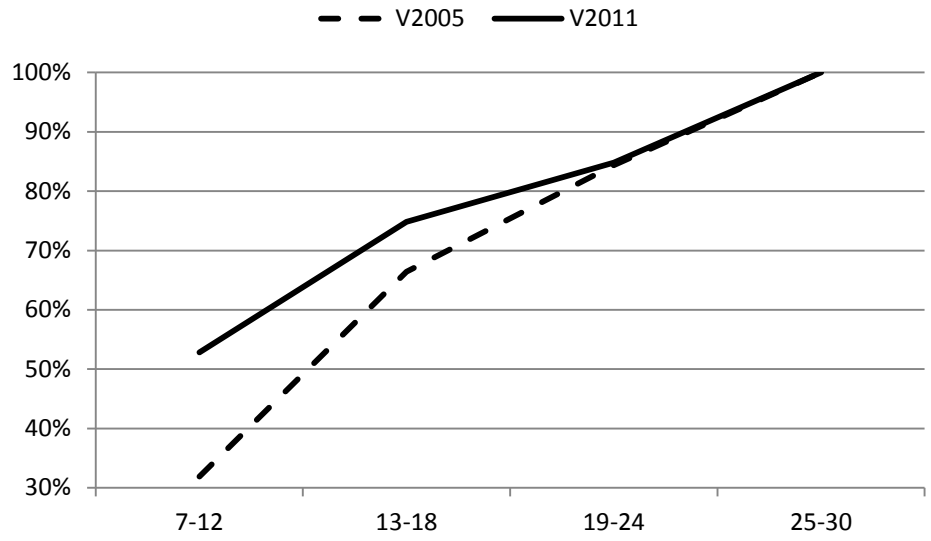


Source: Author's calculations using the Philadelphia CCP tradelines

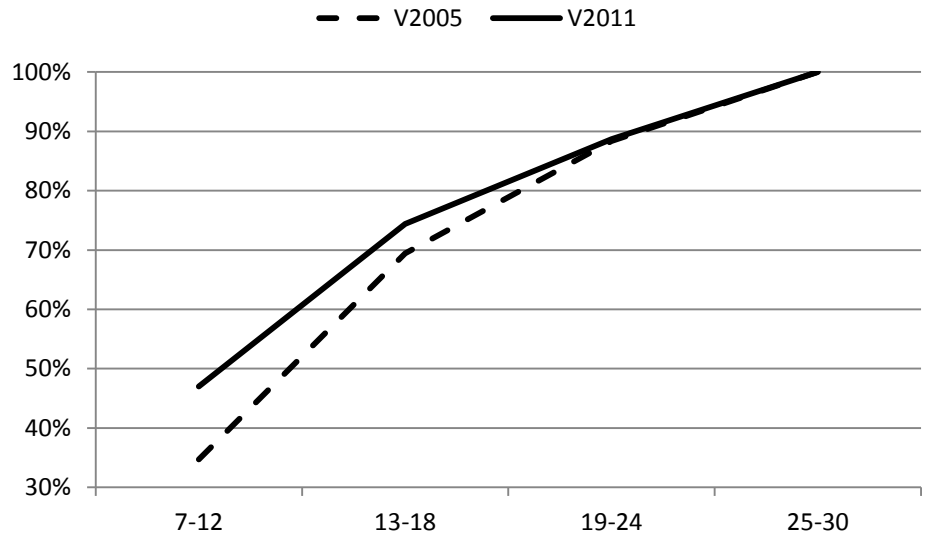
Notes: This figure pertains to open and nondelinquent accounts whose first credit limit increase occurred during the observation period. It graphs the percentage of limit increases occurring at each snapshot on a cumulative basis. I control for the age distribution of accounts at first observation by randomly selecting 1,200 accounts within each vintage, risk score quartile, and initial age.

Figures 4a–d. Cumulative Percentage of First Limit Increases Within Initial Risk Score Quartile, by Months on Books

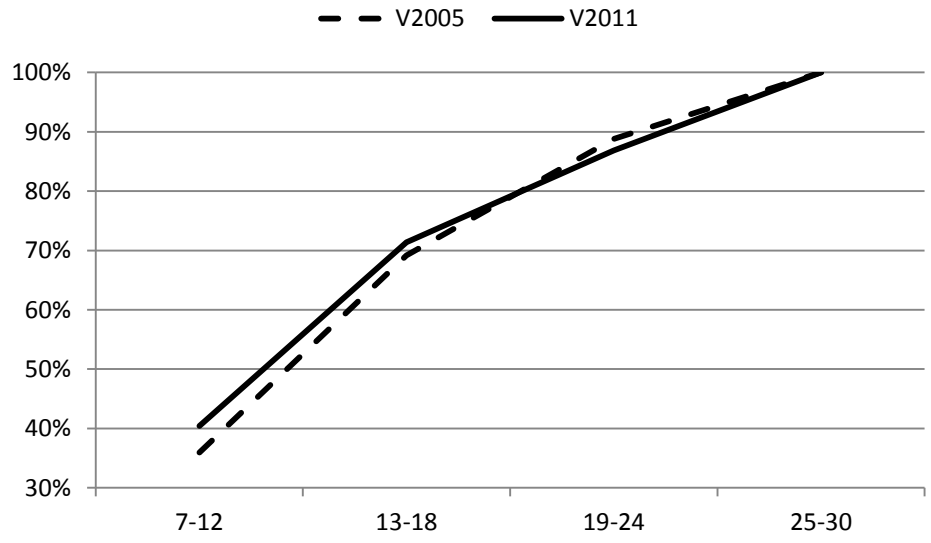
4a. Risk Score Quartile 1



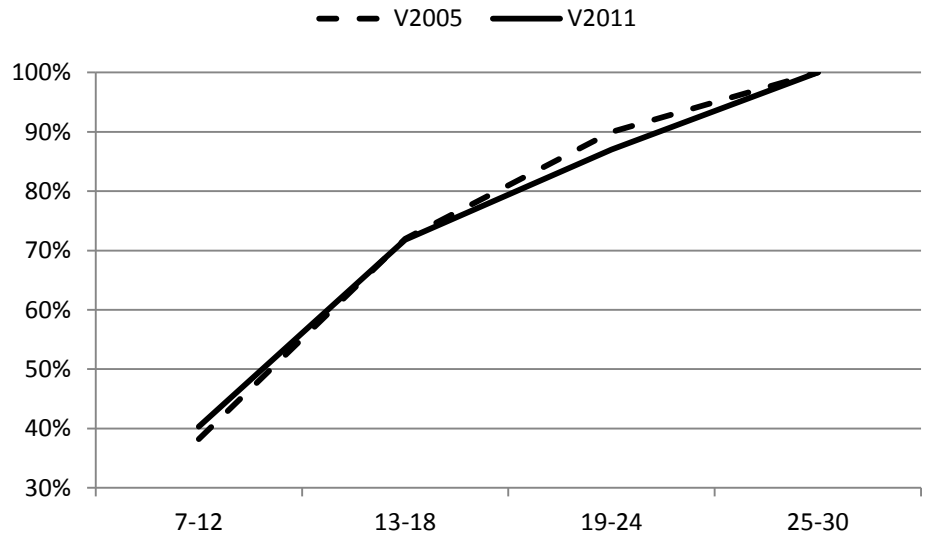
4b. Risk Score Quartile 2



4c. Risk Score Quartile 3



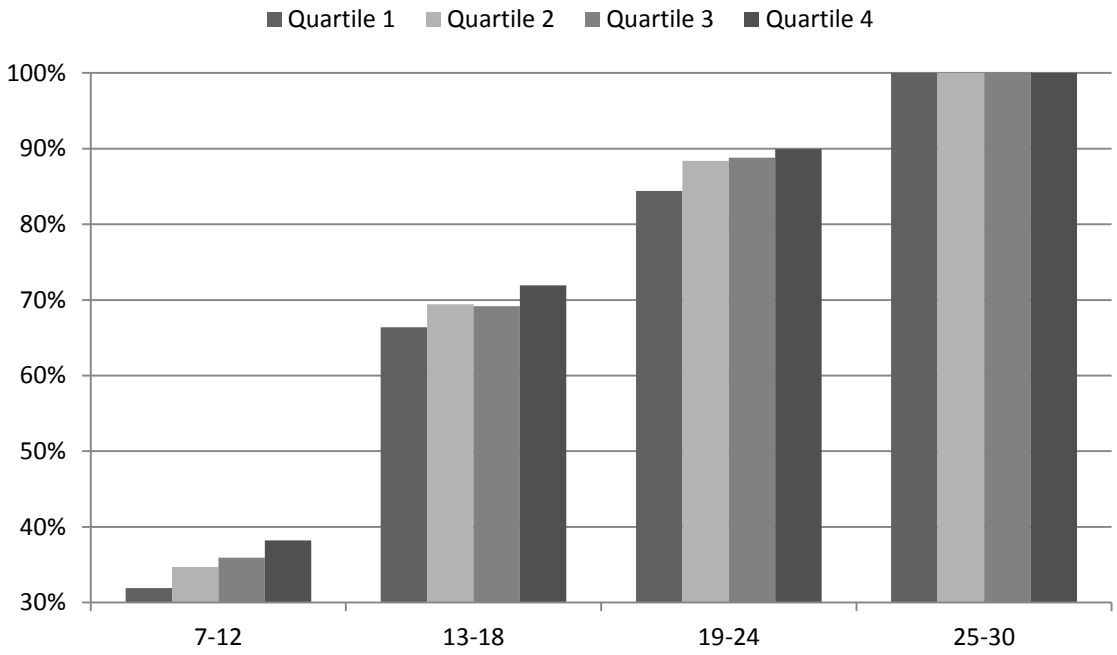
4d. Risk Score Quartile 4



Source: Author's calculations using the Philadelphia CCP tradelines

Notes: These figures pertain to open and nondelinquent accounts whose first credit limit increase occurred during the observation period. It graphs the percentage of limit increases occurring at each snapshot on a cumulative basis. Initial risk score quartiles are calculated using the Equifax Risk Score reported the first time an account is observed. Quartiles are decreasing in riskiness (increasing in score) and vary by snapshot. I control for the age distribution of accounts at first observation by randomly selecting 1,200 accounts within each vintage, risk score quartile, and initial age.

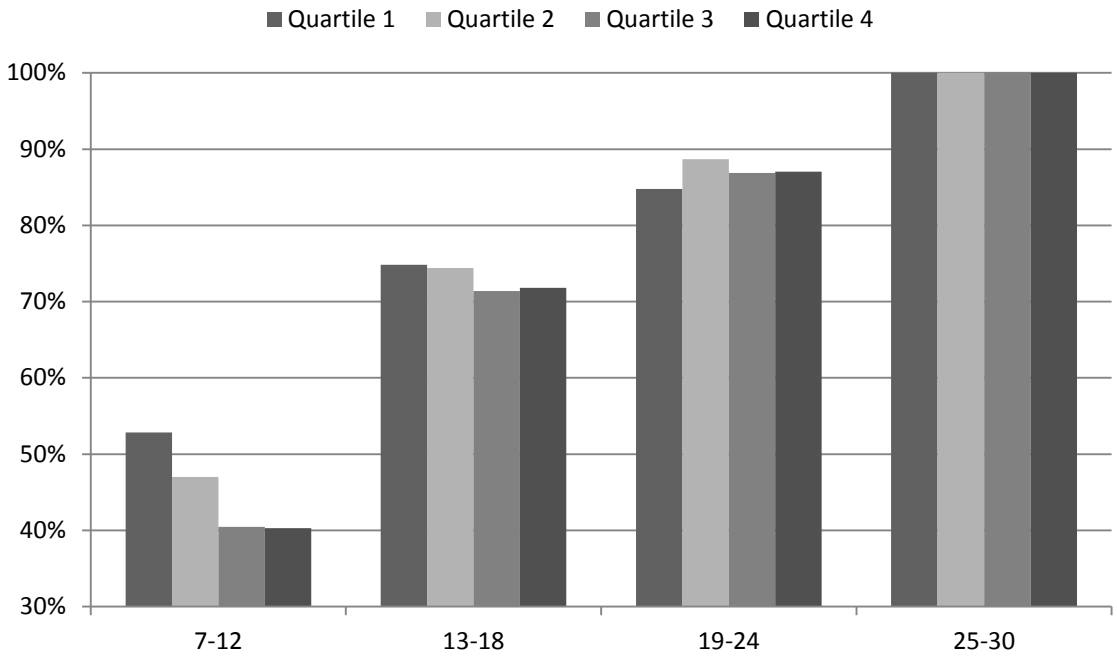
Figure 5a. Cumulative Percentage of First Limit Increases, 2005 Vintage, by Initial Risk Score Quartile



Source: Author's calculations using the Philadelphia CCP tradelines

Notes: This figure pertains to open and nondelinquent accounts whose first credit limit increase occurred during the observation period. It graphs the percentage of limit increases occurring at each snapshot, on a cumulative basis. Initial risk score quartiles are calculated using the Equifax Risk Score reported the first time an account is observed. I control for the age distribution of accounts at first observation by randomly selecting 1,200 accounts within each vintage, risk score quartile, and initial age.

Figure 5b. Cumulative Percentage of First Limit Increases, 2011 Vintage, by Initial Risk Score Quartile



Source: Author's calculations using the Philadelphia CCP tradelines

Notes: This figure pertains to open and nondelinquent accounts whose first credit limit increase occurred during the observation period. It graphs the percentage of limit increases occurring at each snapshot on a cumulative basis. Initial risk score quartiles are calculated using the Equifax Risk Score reported the first time an account is observed. I control for the age distribution of accounts at first observation by randomly selecting 1,200 accounts within each vintage, risk score quartile, and initial age.

Table 8. Median Limit Increase Amount, by Months on Books

	2005	2011	% Diff
7–12 months	$1,100 (59,978)	$500 (68,663)	-54.5
13–18 months	1,000 (80,717)	900 (55,603)	-10.0
19–24 months	1,300 (77,241)	1,000 (38,155)	-23.1
25–30 months	1,100 (70,676)	800 (43,154)	-27.3
Total	$1,100 (288,462)	$600 (205,508)	-45.4

Source: Author's calculations using the Philadelphia CCP tradelines

Notes: Median limit increase amount for accounts whose credit limit increased from prior snapshot. Each cell excludes accounts that were closed or delinquent at the time of first observation. Cells corresponding to months 13–18, 19–24, and 25–30 exclude accounts with missing Equifax Risk Score or current balance at previous observation. Cell count is reported in parentheses. Percent difference reported. All differences significant at 0.01 using Wilcoxon-Mann-Whitney test.

Table 9. Median Limit Increase Amount Between Seven and 12 Months on Books, by Risk Score Quartile

	2005	2011	% Diff
Quartile 1	$600	$200	-66.7
Quartile 2	1,400	500	-64.3
Quartile 3	1,500	1,000	-33.3
Quartile 4	1,600	1,000	-37.5

Source: Author's calculations using the Philadelphia CCP tradelines

Notes: Median limit increase amount for accounts whose credit limit increased from first observation. Risk score quartiles are calculated as of the snapshot prior to the observation snapshot. Each cell excludes accounts that were closed or delinquent at the time of first observation. Percent difference reported. All differences significant at 0.01 using Wilcoxon-Mann-Whitney test.

Table 10. Median Limit Increase Amount by Months on Books and Risk Score Quartile

	13–18 months			19–24 months			25–30 months		
	2005	2011	% Diff	2005	2011	% Diff	2005	2011	% Diff
Quartile 1	$700	$500	-28.6	$700	$400	-42.9	$531	$389	-26.7
Quartile 2	1,200	1,000	-16.7	1,500	1,000	-33.3	1,200	1,000	-16.7
Quartile 3	1,500	1,500	0.0	2,000	1,500	-25.0	1,700	1,500	-11.8
Quartile 4	2,000	2,000	0.0	2,000	2,000	0.0	2,000	2,000	0.0

Source: Author's calculations using the Philadelphia CCP tradelines

Notes: Median limit increase amount for accounts whose credit limit increased from prior snapshot. Risk score quartiles are calculated as of the snapshot prior to the observation snapshot. Each cell excludes accounts that were closed or delinquent at the time of first observation. Percent difference reported. All (nonzero) differences significant at 0.01 using Wilcoxon-Mann-Whitney test.

Table 11. Median Limit Increase Amounts for 2011 Vintage, by Utilization Group, Months on Books and Risk Score Quartile

Utilization Group	[0, 25%]	(25,50%]	(50,75%]	(75%+]
		13–18 months		
Quartile 1	$500	$500	$500	$400
Quartile 2	1,000	1,000	1,000	1,000
Quartile 3	1,500	1,500	1,500	1,600
Quartile 4	2,000	1,800	2,000	2,000
		19–24 months		
Quartile 1	$400	$400	$500	$400
Quartile 2	1,000	1,000	1,000	1,000
Quartile 3	1,500	1,500	1,600	1,950
Quartile 4	2,000	2,000	2,000	2,100
		25–30 months		
Quartile 1	$500	$500	$500	$300
Quartile 2	1,000	1,000	1,000	1,000
Quartile 3	1,500	1,500	1,800	1,700
Quartile 4	2,000	2,000	2,000	2,500

Source: Author's calculations using the Philadelphia CCP tradelines

Notes: Median limit increase amount for accounts whose credit limit increased from prior snapshot. Risk score quartiles and utilization groups are calculated as of the snapshot prior to the observation snapshot. Each cell excludes accounts that were closed or delinquent at the time of first observation.