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Essays on Asset-Backed Securitization The case of Industrial Firms

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To my little son,

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Chapter 1

Introduction

Since the first transaction in 1970, asset-backed securitization (ABS) has become one of the most important financing vehicles in the United States, with the market growing dramatically from the 1980s onwards (Agarwal et al., 2010). The period 1996-2008 saw an increase of 560% in the amount of ABS securities, with an outstanding balance reaching \$2,671.8 billion at the end of 2008 (Agarwal et al., 2010). As the market grew in size, it spread from securities backed by bank loan and mortgage assets to instruments linked to a wide range of collaterals including credit card receivables, equipment leases, and trade receivables. Thus, ABS developed first to finance housing market, has also become a business funding tool for many industrial companies. According to Lemmon et al. (2011), about 3% of US non-financial firms have conducted ABS transactions during the period 1996-2009, with the amount of ABS financing peaked at more than \$170 billion in 2006 before falling to less than \$80 billion in 2009 after the crisis.

Besides its quantitative significance, ABS has also furthered the development of disintermediation. Recent evidence suggests that by enabling the issue of off-balance sheet financing that is much less risky than on-balance sheet debt, ABS provides firms with access to high-rated debt markets, which allows them to take advantage of market segmentation (Lemmon et al., 2011). The same study reports that ABS helps firms to keep access to investment grade credit markets even when they face rating downgrade of their on-balance sheet debt. Furthermore, instead of funding their working capital mainly through the banking system, many corporations also have recourse to capital markets by issuing instruments including asset-backed commercial papers (Kothari, 2006). These findings support the claim that securitization may help non-financial firms to improve their liquidity and mitigate underinvestment in some situations when valuable investment opportunities would be foregone due to high cost of traditional capital sources.

This dissertation empirically tests a number of issues linked to the economic motivations of securitization by non-financial firms. More specifically, Chapter 2 analyzes the impact of ABS usage on corporate investment and performance, providing empirical evidence on the role of this tool of financing in mitigating underinvestment problems within industrial firms. Chapter 3 raises the question how top managers make use of this means of financing in order to achieve their performance targets, which allows them to maximize their own compensation. Chapter 4 focuses on a specific aspect of securitization, namely pledging collateral whose value exceeds the amount of capital raised through ABS transaction (i.e., overcollateralization). Starting from the fact that some ABS transactions are highly over-collateralized while others are not, it then investigates its determinants and impact on working capital management policy.

The three essays of this dissertation are built on central motivations governing securitization transactions done by industrial firms. To explain the corporate ABS process, let us take a simple example of trade receivables ABS (Figure 1), which make up the largest share of ABS transactions issued by non-financial firms. Trade receivables are short-term corporate receivables resulting from the sale of goods and services to customers. Typically, these trade receivables are securitized on an ongoing basis within ABS programs. The latter are initiated with the originating firm creating a wholly owned special purpose vehicle (SPV) whose the sole purpose is to sell interests in receivables acquired from its parent company (whose is also the originator). The originator transfers the receivables to the SPV which then sells them to a trust that issues asset-backed securities in the market. The proceeds received from ABS investors are used to fund the purchase of the receivables from the originator. As the latter is subject to the bankruptcy code, most ABS transactions are structured as *true sale* transfers that ensure the separation of securitized assets from the risk of the originator. Thus, both the SPV and the trust are bankruptcy remote, meaning that the securitized assets will be considered legally separated from the bankruptcy estate of the originating firm if the latter goes bankrupt. This specific structure, combined with the use of different credit enhancements, allows achieving higher credit rating for the asset-backed securities compared to the rating of the originating company.

Credit enhancement can take different forms. The most predominant one is *overcollateralization* which consists, as mentioned earlier, in the transfer to the SPV of

assets whose value is in excess of the face value of securities issued to investors. This leads to the originator holding a residual interest in the SPV that is subordinated to interests held by outside investors. In the case of trade receivables ABS, overcollateralization is used to cover both transaction yield and credit enhancement as trade receivables are noninterest-bearing assets (Moody's, 2002). Another form of credit enhancement is the inclusion in the ABS agreement of direct *recourse* provision to the seller who contractually commits to cover losses in securitized assets to some predetermined extent. Note that the use of recourse provision as credit enhancement may impair true sale qualification of the ABS transaction since retaining the default risk of securitized assets makes ABS transaction equivalent to secured borrowing, in which case the bankruptcy remoteness of the SPV will not be achieved (Hill, 1996). As Klee and Butler (2002) explain: "*The presence of recourse is the most important aspect of risk allocation because it suggests that the parties intended a loan and not a sale. If the parties had intended a sale, then the buyer would have retained the risk of default, not the seller.*" (p. 52). Some academics argue that the economic rationale of the nonrecourse feature of ABS financing is to avoid cost associated with monitoring effort of on-balance sheet assets while securitized assets are typically effort-insensitive assets (such as receivables) (see Fulghieri, 1993 and Iacobucci and Winter, 2005). Credit enhancement may also be provided through *cash reserve* funded either directly by the originator, by retention of a part of funds collected from investors, or by building it up from excess profits throughout the transaction period (Kothari, 2006). When securitized assets bear interest (such as credit card receivables, auto loans, and equipment leases), ABS transaction may also be enhanced through *excess spread* which represents excess of interest rate born by securitized assets over the transaction yield. The latter comprises interest rate offered to investors as well as different costs and fees pertaining to the ABS transaction (i.e. transaction costs and servicing fees) (Kothari, 2006). Besides these forms of enhancement provided by the originator, ABS transaction may also be enhanced either externally through *financial insurance* provided by insurance companies or structurally through *subordination* or *tranching*. Structural enhancement consists in the issuance of several classes of securities with different priorities, so that the most junior class provides protection for the senior classes (Agarwal et al., 2010).

Compared to other financing tools, securitization shares some similarities with

secured debt, factoring, and leasing although each of these alternatives involves distinguishing design and implications. All are asset-based financing, meaning that the funds obtained are secured by specific assets, which gives rise to senior claims. However, the key distinguishing aspect of securitization from traditional secured debt is the fact that ABS transactions involve the transfer of assets' ownership to a bankruptcy remote SPV, which places securitized assets beyond the reach of the originator's creditors. It follows from this legal feature that in the case of the originator's bankruptcy, securitized assets will not be subject to an automatic stay as those backing secured debt, but instead continue to be used for ABS investors' payments (Ayotte and Gaon, 2011). Furthermore, while secured creditors rely on the firm's ability to honor its debt commitment, payment to ABS investors depends entirely on cash flows generated from securitized assets (Lemmon et al., 2010). Assets sale is also the device used for factoring where, similar to securitization, receivables are sold to a separate entity for cash. However, factoring transactions typically involve the sale of receivables at a discount to a preexisting financial institution (called factor), which takes responsibility for billing and collecting the receivables from the originator's costumers. This contrasts with ABS transactions where receivables are transferred to a newly created SPV which finances assets purchase by issuing securities on the capital market while the originator retains collection service of the securitized assets. Finally, leasing also represents a financing alternative whereby a firm (lessee) acquires the right of using an asset for a period of time in exchange of fixed payments to a lessor. Similar to secured debt, leasing contracts depends on the firm's ability to make the associated fixed payments. However, leased assets are accorded the same treatment as securitized assets for bankruptcy purposes in the sense that both are not considered as a part of bankruptcy estate of the borrowing firm. On the other hand, assets involved in ABS transactions issued by industrial firms are mainly current assets (receivables) whereas those financed through leasing are fixed assets, which gives rise to agency costs related to the separation of ownership and control of leased assets (Eisfeldt and Rampini, 2009).

Given the different aspects of securitization, the device looks complex and costly. Besides fixed costs of setting up the SPV and the associated lawyers' fees to achieve true sale qualification, credit enhancements can also involve substantial costs. Thus, if ABS represents a rational financing decision compared to other available means of fund

raising, its costs should be more than compensated by its benefits. Existing literature argues that the essence of securitization is to package cash flows from some specific firm's assets into high quality securities, evidenced by high rating (see among others Hill, 1996). It seems therefore that the main benefit from securitization is to provide firms with access to less expensive capital. Gorton and Souleles (2005) argue that the use of bankruptcy remote SPVs allows avoiding bankruptcy costs pertaining to potential default of the originating firm. As the originator's bankruptcy does not adversely affect investors' payments, the latter can limit their inquiries to the quality of securitized assets instead of that of the borrowing firm (see among others Schwarcz, 2011). In addition, credit enhancements and rating process precisely aim at influencing investors' information regarding the assets sold to the SPV¹. Given their specialized skills, rating agencies and insurers are in principle able to assess adequately the quality of the assets sold within ABS transactions (Hill, 1996). Furthermore, originators can signal the quality of securitized assets through overcollateralization and representations included in the ABS agreement (Hill, 1996). Note that some specific features make ABS financing information-insensitive. As mentioned above, securitization creates a low-risk debt as a result of its specific design including pooling and tranching. While the originator may have superior information regarding the quality of its securitized assets, pooling these assets into a single portfolio allows risk diversification, which makes asset-backed securities less sensitive to the originator's private information regarding each individual asset (DeMarzo, 2005). Furthermore, originators are commonly observed tranching securities backed by the pooled portfolio into a senior class sold to uninformed investors while retaining the junior class (which represents the residual claim of the SPV). DeMarzo (2005) argues that combining tranching and pooling allows maximizing the advantage of risk diversification by creating a highly liquid security with a low risk profile. Finally, SPVs used as ABS issuers are entities with no publicly traded equity, which provides no incentive to produce information about their residual claims that could impact asset-backed securities (Gorton and Metrick, 2011). In addition, since assets located in the SPV are "passive cash flows" and the originator is the residual claimant, the latter shares with the SPV's senior claimants (who are ABS

¹ Firms can also achieve sale qualification for receivables sold in factoring transactions. However, unlike ABS investors, factors are responsible for the assessment of the receivables quality and their collection (Hill, 1996), which explains why interest rates required by factors are higher than those charged by ABS investors.

investors) the same interest of maintaining the value of the SPV's assets (Schwarcz, 2003 and Gorton and Metrick, 2011).

Other issues that could have a major impact on ABS cost are tax implications for both the originator and SPV. The first key tax issue is whether the transfer of assets will be considered as a sale or secured debt for tax purposes. If the tax authorities qualify the transaction as a sale, gain (loss) recognized by the originator on the transfer of assets will be subject to income tax (deducted) (Kothari, 2006). However, if the transaction is characterized as a secured loan, no gain or loss will be recognized for tax purposes (Kothari, 2006). Whether the originator will prefer to be granted sale or financing treatment depends on its tax basis in the securitized assets (Schneider, 2004). Thus, in the case of securitization of receivables, sale treatment will allow the originator to claim a tax loss since income from sales is already included in taxed revenues while associated receivables are securitized at a discount from their face value (Schneider, 2004). In contrast, financing treatment will be preferred when for example securitized assets are interests in future cash flows. This follows from the fact that ABS transaction will result in an acceleration of income from these future cash flows, which will be taxed if the transaction is accorded sale treatment (Kothari, 2006). Note that despite the transaction being legally considered as true sale for bankruptcy purposes, it may be “*recharacterized*” as financing transaction by tax authorities (Kothari, 2006)². The second key tax issue pertains to the SPV used to achieve bankruptcy remoteness of transferred assets. Taxation of the SPV depends mainly on its legal form and securities issued to ABS investors. Thus, tax income will be minimized at the SPV level if issued securities are debt securities, pass-through certificates, or if the SPV is a corporate entity wholly-owned by a corporate originator, non-corporate entity, or a grantor trust³, unless the equity interests in these forms of SPV are not publicly traded (Schneider, 2004). Finally, it is worthwhile noting that given the US tax regime for securitization, firms carefully structure their ABS transactions in order to achieve *tax neutrality*,

² A non-exhaustive list of situations in which financing treatment is applicable for tax purposes includes transactions qualified as secured debt for bankruptcy purposes, true sale ABS limiting transfer of risks and benefits of securitized assets from the originator to the buyer, and true sale ABS accorded “substantive financing” treatment as a result of inconsistencies in the form of the transaction (Kothari, 2006).

³ A grantor trust is a trust whose activity is restricted to acquiring the assets subject to securitization, issuing asset-backed certificates, and passing-through payments received on the assets to ABS holders (Schneider, 2004).

meaning that securitization will not result in any incremental nor accelerated tax liability compared to a plain financial transaction (Kothari, 2006).

As securitization allows achieving lower cost of capital raised, previous studies argue that the device may help mitigating underinvestment in firms facing limited or no access to investment credit market (Mian, 1984, 1986 and Sopranzetti, 1999). Indeed, similar to secured borrowing and factoring, securitization of high quality assets allows some firms to raise cheaper capital compared to unsecured debt (Sopranzetti, 1999). This helps reducing the wealth transfer from shareholders to existing creditors, which may reduce the severity of underinvestment (Mian, 1984, 1986 and Sopranzetti, 1999). In contrast, other studies argue that unlike traditional borrowing, ABS financing involves no active monitoring from ABS investors as a result of the separation of the risk of securitized assets from the risk of the originator, which may represent opportunities for management to engage in overinvestment of ABS proceeds (Yamazaki, 2005). Chapter 2 of this dissertation empirically tests these claims by arguing that if securitization is associated with overinvestment behavior, one should observe increasing investment and decreasing performance of ABS firms. Alternatively, if ABS financing helps mitigating underinvestment, ABS cash flows should be associated with increasing investment and improving firm's performance. Moreover, in contrast to the existing literature (Lemmon et al., 2011), Chapter 2 emphasizes the fact that ABS effect on investment behavior should depend on the financial status and investment opportunities of the originating firm as these corporate dimensions largely affect managerial investment decisions. The analysis shows that securitization represents a valuable source of investment funding for those firms with great investment opportunities or high financial distress probability. In addition, the results also show that ABS proceeds are used by low growth firms to finance investment, acquisitions, and stock repurchases. As these firms experience an improvement of their market performance, these findings suggest that ABS plays a signaling role by funding stock repurchases besides its role in mitigating underinvestment.

Implicit in these findings is the fact that securitization may ultimately have an impact on managerial compensation within ABS firms. Chapter 3 empirically explores the possible channels through which such an effect may occur, building on two hypotheses. The first one suggests that as source of additional liquidity, ABS may help

managers of financially constrained firms to achieve their targets in terms of firm's performance by enabling them to finance NPV projects that would otherwise be foregone. This may lead to the manager more efficiently maximizing his own compensation, especially performance-based components. The second hypothesis views ABS as a means to mitigate moral hazard regarding managerial actions. By securitizing those assets whose performance is insensitive to managerial effort, only the remaining assets in the balance sheet would affect firm's performance that becomes a less noisy measure of the quality of managerial actions (Iacobucci and Winter, 2005; Fan et al., 2006; Franke and Krahnen, 2008). This may allow for more efficiency of monitoring and managerial performance-based pay, which may increase incentives for greater use of such compensation (Iacobucci and Winter, 2005; Fan et al., 2006; Franke and Krahnen, 2008). The main findings in Chapter 3 provide strong support to the liquidity hypothesis and no support to the moral hazard hypothesis. ABS financing is significantly linked to managerial performance-based compensation essentially in financially constrained firms prior to securitization. Interestingly, the results also indicate that ABS effect is more persistent for short-term performance-based component (i.e., bonus) than long-term one (i.e., equity-based component).

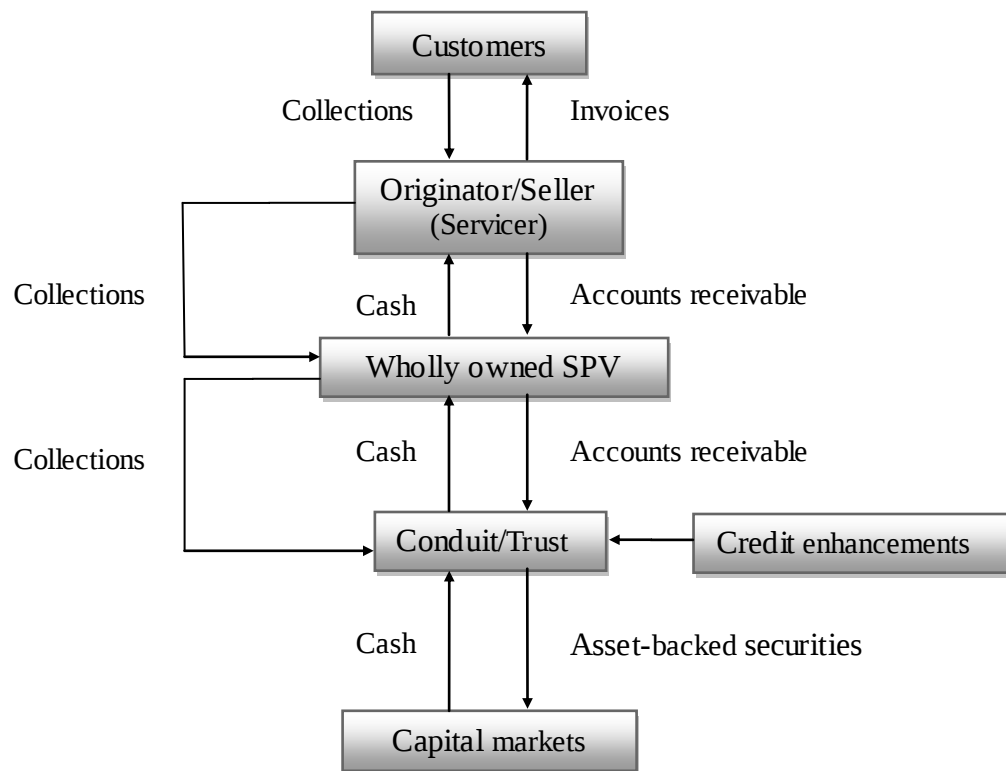
Finally, as mentioned earlier, Chapter 4 of this dissertation focuses on the use of overcollateralization as credit enhancement in ABS transactions issued by industrial firms. Limiting the analysis scope to securitization of short-term receivables, Chapter 4 explores the determinants of the usage and extent of overcollateralization and its consequences on working capital management policy within the originating firm. Although the empirical literature has already investigated the determinants of collateral usage in connection with debt financing by firms themselves (Boot et al., 1991; Jiménez et al., 2006), overcollateralization in ABS transactions has so far been ignored despite its empirical relevance. The latter mainly stems from the fact that assets transferred to SPVs in true sale securitizations offer the opportunity to capture the effective collateralization since the remaining assets in the originator's balance sheet contractually remain beyond the reach of ABS investors. This contrasts with collateralization in traditional borrowing where the remaining assets also provide guarantee to lenders as a result of the seniority of their claims over the shareholders' claims. The first part of the empirical analysis in Chapter 4 explores different factors

potentially determining the extent of overcollateralization. Credit risk of the originator and some macroeconomic factors (GDP growth and real interest rate) help predicting overcollateralization level. Moreover, some characteristics of ABS transaction are also important determinants. ABS transactions are on average more over-collateralized when the assets transfer achieves true sale qualification, implies the issuance of short-term securities, or involves covenants regarding the quality of securitized assets and the originating firm. The second part of the analysis investigates potential consequences of ABS and overcollateralization usage on working capital and operating performance, given that assets transferred are substantial amounts of trade receivables. The key results show that while ABS and overcollateralization both lead to an improvement of working capital ratios (especially receivables days and cash conversion cycle), the main impact of ABS activity on operating performance comes from an increased efficiency in the management of the originator's balance sheet. ABS firms using higher level of overcollateralization manage to reduce the total value of their balance sheet by using ABS proceeds to decrease their debt outstanding, which ultimately leads to an improvement of their operating performance. Overall, the results in Chapter 4 evidence the role of using high overcollateralization in mitigating credit risk of some ABS firms for which securitization represents an opportunity to deleverage in order to improve their financial status.

The three empirical analyses in this dissertation are based on a hand collected sample of ABS transactions issued by US industrial firms. Our initial sample comes from Standard & Poor's ExecuComp database and includes all 18,753 observations reported on US firms from 1992 to 2006, excluding regulated utilities (SIC Codes 4900-4999) and financial institutions (SIC Codes 6000-6999). We chose to consider the sample period until the year 2006, so that our ABS data are not contaminated by the financial crisis of 2007-2008. The initial sample has been matched with data in 10-K filings from Securities and Exchange Commission's EDGAR database. As done by Lemmon *et al.* (2010), we identified 658 firms as ABS candidates using a search algorithm based on the following key words: "securitization", "securitisation", "securitized" and "securitised". For all the identified ABS candidates, we manually examined each annual 10-K filing to check whether the firm had used ABS financing during the corresponding fiscal year and collect ABS data. To be included in our

sample, the firm should provide sufficient indication regarding the total amount of new securitizations issued during the corresponding fiscal year. Our initial ABS sample comprises 828 firm-year observations spanning from 1992 to 2006. Note that the final sample used for each of the three empirical analyses is determined based on the hypotheses to be tested and availability of data on control variables. Thus, investigation of securitization effect on firm's investment and performance in Chapter 2 is based on an ABS sample including 466 firm-year-observations ranging from 1993 to 2006. Our hypotheses here are built on the low cost of ABS financing mainly associated with the use of bankruptcy remoteness of the SPV (Gorton and Souleles, 2005). Thus, the sample used includes only true sale transactions with available data on all control variables from Standard & Poor's Compustat database and the Center for Research in Security Prices (CRSP) database. Furthermore, ABS proceeds from true sale transactions are accounted for as either operating or investing cash flows. Distinguishing between the two accounting treatments is important in our analysis since it determines whether non-ABS cash flow (which is a control variable) should be corrected. Thus, firm-year observations including ABS transactions with different accounting treatments have been excluded from our sample. As discussed above, Chapter 3 investigates the effect of ABS financing on executive compensation based on our initial ABS sample (828 firm-year observations). Again, unavailability of data on some control variables, especially those related to corporate governance from WRDS Blockholders database, has reduced our sample to 448 observations ranging from 1996 to 2006. Finally, as Chapter 4 focuses on the use of overcollateralization in ABS transactions and its impact on working capital management, we restricted our sample to securitizations of current assets with available data on overcollateralization and accounting variables from Compustat database. Accordingly, our final sample in the third essay includes 599 firm-year observations ranging from 1993 to 2006. Note that in all analyses in this dissertation, we used a control sample involving more than 7000 firm-year observations on US firms that have never used ABS financing during the period 1992-2006. This control firms have been drawn from ExcuComp database (excluding regulated utilities and financial institutions) and identified as non-ABS users after examining their annual reports (10-K filings) from Edgar database during the sample period.

Figure 1: Securitization of Accounts Receivable



References

- Agarwal, S., J., Barrett, C., Cun, and M., De Nardi, (2010). The Asset-Backed Securities Markets, the Crisis, and TALE, *Economic Perspectives* 4Q.
- Ayotte, K. and S., Gaon, (2011). Asset Backed Securities: Costs and Benefits of Bankruptcy Remoteness, *Review of Financial Studies* 24, 1299-1336.
- Boot, A.W.A., A.V., Thakor, and G.F., Udell, (1991). Secured Lending and Default Risk: Equilibrium Analysis, Policy Implications and Empirical Results, *Economic Journal* 101, 458–472.
- DeMarzo, P., (2005). The Pooling and Tranching of Securities: A Model of Informed Intermediation, *Review of Financial Studies* 18 (1), 1-35.
- Eisfeldt, A. L. and A. A., Rampini, (2009). Leasing, Ability to Repossess, and Debt Capacity, *Review of Financial Studies* 22 (4), 1621-1657.
- Fan, G.-Z., S. E. Ong and T. F. Sing, (2006). Moral Hazard, Effort Sensitivity and Compensation in Asset-Backed Securitization, *Journal of Real Estate Finance and Economics* 32, 229-251.
- Franke, G. and J. P. Krahnen, (2005). Default Risk Sharing Between Banks and Markets: The Contribution of Collateralized Debt Obligations, *CFS Working Paper No. 2005/06*.
- Fulghieri, P., (1993). Loan Sales and Balance Sheet Assets, in *Financial Markets*, V. Conti and R. Hamau Edition.
- Gorton, G. and A. Metrick, (2011). Securitization, *Working paper*.
- Gorton, G. and N., Souleles, (2005). Special Purpose Vehicles and Securitization, *FRB Philadelphia working paper series*.
- Hill, C. A., (1996). Securitization: A Low-Cost Sweetener for Lemons, *Washington University Law Review* 74 (4), 1061-1126.
- Iacobucci, E. M. and R. A. Winter, (2005). Asset Securitization and Asymmetric Information, *Journal of Legal Studies* 34, 161-206.
- Jimenez, G., V., Salas, and J., Saurina, (2006). Determinants of Collateral, *Journal of Financial Economics* 81, 255–281.
- Klee, K. and B., Butler (2002). Asset-Backed Securitization, Special Purpose Vehicles and Other Securitization Issues, *Uniform Commercial Code Law Journal* 35, 23-67.

- Kothari, V., (2006). *Securitization – The Financial Instrument of the Future*, John Wiley & Sons Edition.
- Lemmon, M., L. X., Liu, and M. Q., Mao, and G., Nini, (2011). *Securitization and Capital Structure in Nonfinancial Firms: An Empirical Investigation*, *Working Paper*.
- Mian, S. L., (1984). *Captive Finance Companies and Alternate Policies for Financing Accounts Receivable*, *Unpublished Working Paper*, University of Rochester.
- Mian, S. L., (1986). *Captive Finance Companies and Alternate Policies for Financing Accounts Receivable: A Collection of Related Essays*, *Unpublished Ph.D. Dissertation*, University of Rochester.
- Moody's Investors Service, (2002). *Moody's Approach to Rating Trade Receivables Backed Transactions*, *International Structured Finance Rating Methodology*, July.
- Schneider, W. H., (2004). *US Tax-Specific Points for Issuers and SPVs*, in *Global Securitisation and Structured Finance 2004*, Globe White Page Ltd.
- Schwarcz, S. L., (2003). *Commercial Trusts as Business Organizations: Unraveling the Mystery*, *The Business Lawyer* 58, 559-585.
- Schwarcz, S. L., (2011). *Securitization and Structured Finance*, *Encyclopedia of Financial Globalization*, Elsevier Edition.
- Sopranzetti, B. J., (1999). *Selling Accounts Receivable and the Underinvestment Problem*, *The Quarterly Review of Economics and Finance* 39, 291–301.
- Yamazaki, K., (2005). *What Makes Asset Securitization "Inefficient"?*, *bepress Legal Series, Working Paper*603.

Chapter 2

Investment, Firm Performance and Securitization: Evidence from Industrial Companies*

Abstract:

Given its specific structure, asset-backed securitization (ABS) can generate substantial cash flows to the firm when other sources of financing become very costly. These cash inflows could be used by management to mitigate underinvestment or exacerbate overinvestment. Using a hand collected sample of ABS transactions done in the US, we estimate the sensitivity to ABS proceeds of both investment and firm's performance, arguing that if both investment and firm's performance are increasing in ABS cash flow, this will be consistent with the underinvestment mitigation hypothesis. Alternatively, if ABS activity leads to increasing investment and decreasing firm's performance, this will provide support to the overinvestment hypothesis. We find that ABS proceeds are associated with higher investment and better market performance in firms with high financial distress probability. Furthermore, after exploring other uses of ABS proceeds, we show that high growth firms mainly use ABS to finance their acquisitions while low growth firms spend ABS proceeds to increase both investment and stock repurchases, which allows them to reduce underinvestment as well as signal to the market the improvement of their growth prospects.

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2.1 Introduction

Since the mid-1980s, industrial firms have increasingly made use of asset-backed securitization (ABS) as a financing instrument. The process consists of selling assets such as trade accounts receivable to a newly created special purpose vehicle (SPV), which in turn uses the assets as collateral for securities issued to investors. The first non-mortgage ABS was issued in March 1985 by Sperry Corporation which sold \$192.5 million of securities backed by computer lease receivables (Kothari, 2006). Since then, the aggregate volume of ABS proceeds raised by US non-financial firms has grown substantially, reaching the peak of \$170 billion in 2006 (Lemmon et al., 2011). According to Demica (2006), 17% of top 500 US non-financial companies had used trade receivables securitization during the period 1995-2005. Moreover, for many firms, the proceeds from ABS have increased to become one of the largest items of the cash flow statement⁴. However, despite the substantial amount of these cash flows, their impact on firm's investment policy and performance has received little attention in the academic empirical research⁵.

Building on the extensive literature regarding agency problems and their effect on managerial investment behavior, we provide evidence on the role of ABS financing in mitigating underinvestment in states of the world when other traditional external sources become very costly. This is closely related to the specific design of this means of funding. While securitization, as traditional secured debt, implies the use of assets as collateral for the capital obtained, the key distinguishing feature of ABS is the transfer of assets' ownership to a legally separate entity (the SPV) from the originating firm (Ayotte and Gaon, 2011). This structure allows establishing the bankruptcy remoteness

⁴ For example, in the fiscal year 1998, Manpower, Inc. received \$175 million of cash proceeds from the sale of trade accounts receivable under its securitization agreement. In the same year, the level of cash flow provided by operating activities excluding ABS proceeds was \$90.169 million and cash flow used by financing activities was \$-56.879 million. Manpower, Inc. invested \$140.753 million in capital expenditures, \$43.936 million in stock repurchases, and \$31.731 million in acquisitions. In addition, it paid \$15.168 million as dividend. In order to finance its investing activities and without the ABS proceeds, the firm would have had to issue additional debt or equity or substantially reduce its cash balance which instead increased from \$142.246 million to \$180.456 million during the given fiscal year.

⁵ One exception is the study of Lemmon et al. (2011) which finds that ABS activity does not affect investment activity in ABS firms. In this paper, we argue that investment sensitivity to ABS proceeds should vary among firms according to their financial distress status or growth opportunities. Thus, unlike Lemmon et al. (2011), we control for financial distress probability and investment opportunities of the firm and find evidence on the link between investment and ABS cash flow.

of the SPV, which insulates transferred assets from the bankruptcy risk of the originating company. Thus, if the latter files for bankruptcy securitized assets are not subject to an “automatic stay” as those backing traditional secured debt, but instead continue to be used by the SPV to repay ABS investors (Ayotte and Gaon, 2011). It follows from this specific structure that the pricing of asset-backed securities does not include the bankruptcy costs pertaining to the originator (Gorton and Souleles, 2005), which affords some firms access to a cheaper capital that could help them to mitigate underinvestment (Sopranzetti, 1999).

On the other hand, it has been argued that securitization, unlike traditional borrowing, provides management with cash proceeds that are not subject to direct monitoring from ABS investors since the device allows separating the risk of securitized assets from that of the originating firm (Yamazaki, 2005). Indeed, in the case of traditional borrowing, the management makes the commitment to repay the debt outstanding and the firm’s solvability depends on managerial ability to generate sufficient cash flows to meet debt service obligations. In contrast, in ABS financing, repayments to ABS investors contractually depend on the quality of securitized assets and related cash flows. This could represent opportunities for management to engage in overinvestment of ABS proceeds (Yamazaki, 2005), which makes ABS exacerbating the agency cost of free cash flow.

Although the above potential effects of ABS have been pointed out in previous studies (see Sopranzetti, 1999, and Yamazaki, 2005), to our best knowledge no empirical evidence has yet been provided. Thus, the purpose of this paper is to fill this gap by examining the impact of this form of funding on investment policy using a hand collected sample of 466 ABS transactions done in the US over the period 1993-2006. Following Aggarwal and Samwick (2006), we estimate the sensitivity to ABS proceeds of both investment and firm’s performance, arguing that if investment is increasing in ABS cash flow, this could indicate either a reduction of underinvestment or an overinvestment. An examination of ABS impact on both investment and firm’s performance allows identifying whether the observed effect is one related to over- or underinvestment. Thus, if both investment and firm’s performance are increasing in ABS cash flow, this will be consistent with the underinvestment hypothesis. Alternatively, if ABS activity leads to increasing investment and decreasing firm’s

performance, this will provide support to the overinvestment hypothesis. We predict that these two effects are more likely to be present in firms with high financial distressed probability since these firms can face a high conflict of interest between shareholders and debtholders. In addition, we expect that firms with low growth opportunities are more likely to engage in overinvestment of ABS proceeds while those with high growth options could use this source of funding to mitigate underinvestment problem.

Finally, by controlling for executive incentives, we aim at understanding how these two mechanisms interact in our ABS firms sample. With this respect, compensation literature provides conflicting point of views regarding the effect of pay-for-performance on managerial investment behavior. While for example Begley and Feltham (1999a,b) and John and John (1993) argue that higher equity-based compensation and pay-performance sensitivity could induce either underinvestment or overinvestment, Aggarwal and Samwick (2006) and Broussard et al. (2004) show that executive incentives allows reducing these two investment distortions. With these previous findings in mind, one should expect that the two devices can be used in concert to achieve the optimal effect on investment and firm's performance.

Our empirical analysis provides the following results. Despite important variations in the use of securitization, the device represents a substantial source of financing for our firms sample. Annual proceeds realized from securitization average 260% of beginning-of-period capital stock with 50% of our firms generating ABS cash flows exceeding 16% of capital stock. The mean and median values of investment are 25% and 19% of capital stock respectively. Thus, based on the median values, ABS proceeds are sufficient to finance 64% of investment spending in our firms sample. Furthermore, the data show that the subsample of firms generating ABS cash flows higher than the sample median invest on average more than the firms subsample with ABS proceeds lower than the sample median.

When estimating the sensitivities of investment and firm's performance to ABS proceeds, we find that, as expected, ABS activity is associated with higher investment and better performance in firms with high financial distress probability, which provides support to the underinvestment hypothesis. Furthermore, when controlling for growth opportunities of the firm, we find that the impact of ABS proceeds is insignificant on investment spending and positive and significant on market performance in firms with

high growth options, which does not provide evidence on the role of ABS in mitigating underinvestment in these firms. On the other hand, surprisingly, our results regarding low growth firms suggest that greater ABS proceeds are associated with increased investment and improved firm's performance, which makes it hard to support the overinvestment hypothesis in these firms.

To provide consistent explanations to these puzzling results, we further explore how our firms sample use the proceeds from securitization by examining the relationship between ABS cash flows and stock repurchases and acquisitions. Our results show that stock repurchases are positively and significantly affected by ABS activity regardless the financial distress status of the firm. In addition, when controlling for the firm's growth options, we find that ABS proceeds are associated with increasing acquisitions and decreasing stock repurchases in firms with high growth opportunities while low growth firms experience a significant increase in their stock repurchases subsequent to their ABS activity. These findings combined with those on investment and firm's performance imply that low growth firms use ABS proceeds to finance both investment and stock repurchases, which allows them to mitigate the underinvestment problem as well as signal to the market the improvement of their growth prospects. On the other hand, high growth firms mainly use ABS cash flows to finance their growth through acquisition, which impacts positively their market performance.

Finally, the results regarding the interaction between ABS and pay-performance sensitivity are inconclusive. While the significant effect of ABS on investment documented in financially distressed firms seems coming from firms granting high incentives to their CEOs, these firms exhibit a weak improvement of their market performance, which does not provide strong support to underinvestment mitigation hypothesis. In addition, considering the firm's growth options, the results suggest that asset securitization in low growth firms granting low pay-performance sensitivities leads to increasing investment and stock repurchases and improving firm's performance.

The paper is organized as follows. Section 2 briefly describes the securitization mechanism and provides a short literature review. Section 3 presents our empirical predictions. Section 4 describes the data. Section 5 presents empirical results and Section 6 provides some robustness checks. Section 7 concludes.

2.2 Asset securitization mechanism and related literature

Asset securitization is the financing tool whereby illiquid assets (e.g., accounts receivable or mortgages) are pooled and pledged as collateral for securities issued to investors. While the large part of the ABS market is dominated by financial institutions, industrial corporations also use this source of funding. These non-financial companies are from different industries and typically securitize current assets (such as trade accounts receivable, credit card receivables...) as well as fixed assets (e.g., equipment leases).

Compared to other forms of financing, securitization is closely similar to secured debt in the sense that both entail the use of existing assets as collateral for the funds. However, unlike secured debt, securitization involves the transfer of assets' ownership to a legally separate entity (SPV; special purpose vehicle), which then issues securities backed by these assets (Ayotte and Gaon, 2011). The transfer of assets implies a “true sale” when the bankruptcy remoteness of the SPV is established, in which case the assets transferred to the SPV cannot be seized if the borrowing firm is in default. Great effort is often made to ensure that the ABS transaction will indeed be legally considered as true sale (Ayotte and Gaon, 2011). With this respect, many firms opt for example for “two-step securitization” in which the ownership of assets is transferred to a first SPV (often a wholly owned subsidiary of the borrowing company) which in turn sells the assets to a second SPV (often a conduit). The latter thus issues asset-backed securities to investors. These securities are typically structured in multiple tranches of different credit risk with the more senior tranches are sold to outside investors and the residual tranche (called the “equity” tranche or retained interests) is held by the borrowing firm. The tranching is often added to other devices including excess spread, overcollateralization, and guaranties in order to improve the credit rating of the ABS transaction.

When designed as true sales, the ABS transactions are accounted for as off-balance sheet financing which requires that the assets securitized are removed from the balance sheet and the proceeds received are included in the operating or investing cash flows. Sometimes however, the ABS transactions do not meet the legal requirements of

the true sale treatment⁶. In such cases the ABS financing is considered as secured debt which implies that the assets securitized remain included in the balance sheet and the ABS proceeds are accounted for as part of financing cash flows.

The literature identifies several motivations behind the use of securitization. Leland (2007) provides a rationale for ABS transactions based on financial synergies. Using a trade-off model, he shows that managing less risky firm's assets (such as receivables) in a separate entity allows increasing the optimal leverage and reducing the credit spread on the debt outstanding in that separate entity. Gorton and Souleles (2005) argue that this reduced cost of capital in ABS transactions mainly comes from avoiding bankruptcy costs as a result of using bankruptcy remote SPVs. Furthermore, they show that while the bankruptcy remoteness of the SPV is an important feature in ABS transactions, the pricing of these contracts also reflects investors' expectations about the default risk of the borrowing firm. This follows from the fact that borrowing companies are commonly observed providing implicit guarantees (beyond the residual equity tranche and formal credit enhancement devices) to maintain the assets sold to the SPVs (Gorton and Souleles, 2005). In the same vein, Ayotte and Gaon (2011) find that securitizing “replaceable assets” such as accounts receivable allows for more efficient decisions in bankruptcy compared to those when “necessary assets” (e.g., fixed assets, inventory) are securitized. The use of ABS financing has also been linked to its specific accounting treatment. For example, Dechow et al. (2005) argue that reporting gains from securitization at their fair value can result in an improvement of firm's reported earnings. Furthermore, Mills and Newberry (2005) document that the off-balance sheet treatment of ABS transactions allows firms to enhance their credit rating by reducing their on-balance sheet leverage.

Some existing papers discuss potential effects of securitization on the conflict of interests between shareholders and bondholders, suggesting that securitization, as compared to traditional secured debt, can be used to achieve similar goals. Mian (1984, 1986) and Sopranzetti (1999) show theoretically that given the low cost of capital that could be raised through the sale of high quality assets (similar to ABS and factoring), this source of funding allows reducing the wealth transfer from shareholders to existing

⁶ This typically happens when the originator maintains effective control over the transferred assets for example through commitment to repurchase the assets (SFAS 125/140).

creditors. As a result, the severity of underinvestment could be mitigated, which helps increasing the shareholders' value since rational creditors will integrate this reduced underinvestment risk in their required bond spreads. In contrast, some arguments have been raised that securitization could be a way to transfer wealth from existing debtholders to shareholders. As pointed out earlier, assets that have been securitized through a bankruptcy remote SPV are not included in the bankruptcy estate of the borrowing company. This could reduce the claim's value of the existing creditors in bankruptcy, especially if the value of securitized assets is higher than that of the remaining assets in the balance sheet. However, previous studies examining the market reaction to ABS announcements have provided little evidence on such effect of securitization⁷ (Gaon, 2007; Mason *et al.*, 2009; Korgaonkar and Nini, 2010). In the same vein, it has been argued that the use of securitization can induce the overinvestment problem since the device allows exchanging financial assets for cash proceeds that may be used by management to undertake negative present value projects (Yamazaki, 2005). Yamazaki (2005) points out that financially distressed firms are more likely to engage in overinvestment or risk-shifting behavior in the case of securitization compared to traditional secured debt. This follows from the fact that unlike secured creditors, ABS investors provide no control on the use of ABS proceeds and investment activities of the borrowing company (Yamazaki, 2005).

In this paper, we abstract away from all other potential motivations of securitization and focus on the investment-linked motivations to provide an empirical evidence on the effect of this form of financing on the two major investment distortions, namely under- and overinvestment. Finally, our analysis is also related to the literature on capital structure and executive compensation design. Previous studies have provided conflicting arguments with respect to the link between incentives and managerial investment behavior. The first strand of this literature shows that the optimal executive pay should reflect not only the agency cost between shareholders and management but also the mitigation of interest conflicts between shareholders and debtholders regarding investment policy (see, among others, John and John, 1993). Thus, in highly levered firms executive compensation structure that aligns managers and shareholders' interests may provide incentives to underinvest if undertaking positive net present value projects

⁷ The negative market reaction found has been related to the announcement of first-time securitizations by banks (Mason *et al.*, 2009).

will result in wealth transfer from shareholders to debtholders (Bizjak et al., 1993, and Begley and Feltham, 1999a, b). Such executive compensation may also provide incentives to overinvest by taking high-risk projects if these new investments could increase the equity value at the expense of debt value (see for example John and John, 1993). In the contrast, the second strand of compensation literature argues that high managerial incentives can be used to mitigate either underinvestment (see Aggarwal and Samwick, 2006) or overinvestment (Broussard et al., 2004). Therefore, the impact of both executive incentive and its interaction with ABS financing on these investment distortions is still an empirical question.

2.3 Empirical Predictions

The following section describes our main hypotheses regarding how securitization and its interaction with executive compensation impact investment decisions.

2.3.1 Securitization and the financial distress status of the firm

As mentioned above, given the structure of ABS transactions and the use of bankruptcy remote SPVs, securitization could represent a cheaper source of capital when other traditional external sources become very costly. Furthermore, it has been argued that firms have recourse to ABS financing when they are shut out of traditional debt market (see Cantwell, 1996). As financially distressed firms are more likely to face high cost of capital and difficulties to access traditional market, we expect that the use of asset securitization is more likely to impact investment expense in those firms that are subject to high financial distress probability. This leads to our first hypothesis.

Hypothesis 1: Asset-securitization leads to an increase in investment expense in firms with high financial distress probability prior to securitization.

If ABS proceeds are used to increase investment, this could indicate either a reduction of underinvestment or an overinvestment since financially distressed firms can face the two investment distortions. To disentangle the two effects, one should also examine the impact of securitization on firm's performance. If ABS activity is associated with higher investment and better firm's performance, this could provide

support to the underinvestment mitigation hypothesis. On the other hand, if positive investment sensitivity to ABS cash flow leads to a decrease in firm's performance, this will indicate an induced overinvestment behavior.

2.3.2 Securitization, executive incentives, and underinvestment

Myers (1977) argues that firms with risky debt outstanding can voluntarily choose to underinvest if investing will result in wealth transfer from shareholders to debtholders. Financially distressed firms are more likely to engage in underinvestment behavior since exercising their investment options with additional risky debt issues could increase the creditor's claim value at the expense of equity value (Sopranzetti, 1999). In that case, given the low cost of capital that could be raised through ABS, the device can be a way for these firms to mitigate the underinvestment problem. Thus,

Hypothesis 2: Under the underinvestment hypothesis, asset securitization will induce an increase in investment expense that will be associated with higher firm's performance in financially distressed firms.

Furthermore, it has been well documented that levered firms with high growth opportunities are more likely to suffer from underinvestment (see among others Myers, 1977). Accordingly, we expect that these firms can use ABS proceeds to finance new positive NPV projects, which helps mitigating the underinvestment problem. Therefore,

Corollary 3: Under the underinvestment hypothesis, asset securitization will result in an increase in both investment expense and firm's performance in firms with high growth opportunities.

Regarding executive compensation, Aggarwal and Samwick (2006) show empirically that higher pay-performance sensitivity (PPS) allows reducing the underinvestment effect through a better alignment of managers and shareholders' interests. Accordingly, firms subject to high underinvestment probability should optimally grant more PPS to their executives. Thus, we expect that financially distressed firms as well as those with high investment opportunities will make use of more CEO incentives and ABS financing in order to mitigate underinvestment and improve their performance.

2.3.3 The overinvestment effect

As mentioned above, unlike traditional secured debt securitization provides borrowing companies with fresh cash proceeds free of direct monitoring from ABS investors (Yamazaki, 2005). This could give rise to overinvestment opportunities within ABS firms especially when the probability of financial distress is high. Thus,

Hypothesis 4: Under the overinvestment hypothesis, securitization will lead to an increase in investment expense by financially distressed firms that will be associated with worse firm's performance.

In addition, agency cost of free cash flow theory predicts that low growth firms could be subject to overinvestment in the presence of conflict of interest between shareholders and debtholders. Thus, we predict that securitization is more likely to induce overinvestment behavior in those firms that are facing low investment opportunities. This is summarized in the following Corollary:

Corollary 5: Under the overinvestment hypothesis, securitization will lead to an increase in investment expense and a decrease in firm's performance in firms with low growth opportunities.

With respect to executive pay structure, agency cost of debt theory predicts that firms with high conflict of interest between shareholders and debtholders should optimally design compensation contracts with a lower incentive alignment with their managers in order to reduce the overinvestment problem (see, among others, John and John, 1993). As ABS financing could induce overinvestment behavior, the later will be more pronounced in financially distressed firms granting high pay-performance sensitivities to their managers. Similarly, we expect that the overinvestment problem will be more present in low growth firms using high executive incentives.

2.4 Data and Summary Statistics

2.4.1 Sample

We begin with an initial sample of all US firms with available data on Standard &

Poor's ExecuComp database during fiscal years 1992 through 2006. The sample consists of 18,753 firm-year-observations excluding financial institutions (SIC code 6000-6999) and regulated utilities (SIC code 4900-4999). The data on ABS transactions come from 10-K statements on the Securities and Exchange Commission's EDGAR database. To identify ABS firms, we search in each firm's 10-K file for the words "securitization", "securitisation", "securitized", "securitised", and "sale of receivables". 658 firms have been identified as ABS candidates. We thus read each annual report for all these candidates to check whether the firm had issued ABS transactions or not during the corresponding fiscal year and to collect needed data. To be included in the sample, the firm is required to provide at least sufficient indications regarding the total amount of ABS transactions issued during the sample fiscal year. The initial ABS sample includes 828 firm-year observations. As mentioned above, accounting treatment of ABS cash flows depends on the true sale qualification of the transaction. Proceeds from true sale transactions are included in operating or investing cash flows while proceeds from on-balance sheet securitizations are accounted for as financing cash flows. This differentiation is important in this study since it determines how free cash flows and leverage, which are included as control variables in all regressions, should be corrected. Accordingly, we exclude 40 firm-year observations including ABS transactions with different accounting treatments. Furthermore, as mentioned above, the low cost of capital that could be raised through ABS has been mainly explained by the use of bankruptcy remote SPV in true sale transactions (Gorton and Souleles, 2005). Thus, it seems more relevant empirically to focus on this kind of securitization that is largely distinguishable from traditional secured debt. We therefore exclude from our ABS sample 40 firm-year observations relating to on-balance sheet transactions. Finally, the data on executive compensation and ABS transactions are merged with accounting data from Standard & Poor's Compustat database and stock prices from the Center for Research in Security Prices (CRSP) database. The final sample used in this paper consists of 466 firm-year observations spanning from 1993 to 2006.

2.4.2 Variable Definitions

To measure the ABS amount issued during the fiscal year, we consider the total net proceeds reported by the company which represents the total amount received from new securitizations during the fiscal year net of discounts, fees, and retained interests (i.e.,

equity tranche held by the borrowing company). Often, firms disclose the net proceeds received and/or the balance outstanding at the fiscal year end. We choose to rely on the amount of net proceeds rather than the balance outstanding since the latter represents the net cumulative securitized amount and hence could result from subsequent transactions issued in previous years rather than new transactions occurring in given fiscal year.

Our measure of CEO incentives is similar to that used by Aggarwal and Samwick (2006) and corresponds to total pay-performance sensitivity (PPS), which is based on the CEO ownership of stock and options. The use of the total PPS is motivated by the fact that most managerial incentives are provided through the grant of stock and stock options (Jensen and Murphy, 1998; Hall and Libman, 1998). ExecuComp contains detailed data on new options granted in the sample year and the total number and value of options and stock held by the manager in her own company. Following previous literature (see among others Aggarwal and Samwick, 2006), we measure the stock sensitivity as the share of the firm's stock held by the CEO multiplied by 1% change in the stock price. For option sensitivities, we multiply the proportion of securities underling the options by the deltas of the options. Option delta is the partial derivative of the Black-Scholes option value with respect to the stock price (see the Black-Scholes option pricing model (1973) and its adjustment for continuous dividends (Merton, 1973). For new option grants, the number of securities, the exercise price, and the exercise date are provided by ExecuComp. We follow the assumption of Standard and Poor's by considering that each option will be exercised 70% through its term. For previous grants, as done by Murphy (1999) and Aggarwal and Samwick (2006), we consider all previous options as a single grant with 5 year remaining maturity. The exercise price is an average price computed as the stock price minus the average realizable value of each previous option. The latter is obtained by dividing the realizable value of exercisable and unexercisable options excluding the realizable value of new options by the number of exercisable and unexercisable options excluding the number of new options. These options data are merged with data on volatility (the annualized standard deviation of monthly stock returns over the prior 60 months provided by ExecuComp), dividend yields (from ExecuComp), Stock prices (From ExecuComp), and the interest rates (from the website of the US Federal Reserve) in order to apply Black-Scholes model (1973).

As done by Aggarwal and Samwick (2006), we consider investment as the capital expenditure scaled by the year-beginning capital (which corresponds to property, plant, and equipment) while firm's performance is measured by Tobin's Q ratio (the market-to-book ratio assets where the market value of assets is equal to the book value of assets plus the market value of equity minus the book value of equity and deferred taxes) (Babenko and *al.* 2011). Needed variables are provided by Compustat Database.

All regressions include control variables that have been found to impact investment policy and firm's performance (Aggarwal and Samwick, 2006). These controls are free-cash flows (which is operating income before depreciation net of income taxes, interest expenses, and dividends) scaled by the year-beginning capital, book leverage, stock returns volatility (the annualized standard deviation of monthly stock returns over the prior 60 months provided by ExecuComp), firm's size (measured as the natural logarithm of sales), dividend yield (provided by Execucomp Database), capital over sales (property, plant, and equipment over sales), and R&D and advertising expenses⁸ both scaled by the year-beginning capital. It is worthwhile noting that as mentioned above, since in true sale securitization the ABS proceeds are considered as either operating or investing cash flows, we correct the free-cash flow variable by excluding the amount of ABS proceeds from operating cash flows for transactions with the former accounting treatment.

2.4.3 Summary Statistics

Summary statistics are presented in Table 1. The first two rows relate to our two dependent variables; investment and firm's performance measures. Capital expenditures (Investment/capital) have a mean value of 24.6% of capital stock and a median value of 18.6% of capital stock. Tobin's Q has a mean value of 1.64 and a median value of about 1.39. These figures are closed to mean and median Q of respectively 1.84 and 1.20 for all Compustat firms (Rauh, 2006).

--- TABLE 1 ABOUT HERE ---

The next two rows of Table 1 report statistics on the two independent variables of interest; the value of ABS proceeds normalized by year-beginning capital stock (ABS

⁸ As done by previous literature (see among others Aggarwal and Samwick 2006), I set missing values of R&D and advertising expenses equal to zero.

proceeds/capital) and the CEO pay-performance sensitivity (CEO PPS). The average ABS proceeds are 260% of capital while the median value is only of 16.7%. With respect to CEO pay, our sample includes ABS firms that use stock and options-based incentives and ABS firms that do not use these incentive mechanisms. The mean value of PPS is about 1.78 % of the firm while the median value is only of 0.31%. These figures show that executive pay-performance sensitivities within our ABS firms is relatively low compared to those in firms samples used in other studies (see for example Aggarwal and Samwick, 2006). This could be explained by the relatively high risk exposure that managers of our firms sample face through their PPS, as showed by summary statistics for stock returns volatility. Indeed, the mean and median values (1.42 and 1.26 respectively) of stock returns standard deviation are relatively high compared to those of other samples used in previous studies (see for example Lemmon et al. 2010).

The rest of Table 1 reports descriptive statistics regarding other independent variables that we control for in our empirical analysis. Non-ABS cash flow, which is cash flow net of ABS proceeds when the latter is accounted for as operating cash flow, has a negative mean value of -194.3% of capital stock and a median value of 5.5% of capital. These figures and other percentiles (not reported) show that the distribution of non-ABS cash flow is skewed to the left with at least 25% of the firms exhibiting negative non-ABS cash flow. Given the data on investment (see the first row of Table 1), the non-ABS cash flow distribution suggest that our average ABS firm does not generate enough non-ABS cash flow to fund all its investment expense. Summary statistics for firm's size (as measured by the natural logarithm of sales), leverage and R&D expense scaled by capital stock (R&D/capital) indicate that our firms are large, highly levered, and invest little in R&D, which confirms the findings of previous studies examining larger ABS samples (see Lemmon et al., 2010).

To further explore the use of ABS proceeds in our ABS firms, we examine the relationship between ABS cash flow and other uses of funds such as stock repurchases and acquisitions. The two last rows of Table 1 show that the mean values of repurchases and acquisitions are 40% and 17% of capital stock respectively. The data also show that the distributions of spending related to stock repurchases and acquisitions are skewed to the right with at least 50% of them showing no acquisition expenses during the sample

period.

Finally, it is worthwhile comparing some of summary statistics between firms generating ABS proceeds over capital stock exceeding the sample median and those with ABS cash flows over capital stock below the sample median. The last column of Table 1 reports the mean differences between these two subsamples. Firms raising higher ABS proceeds ratios allocate on average more funds to investment and stock repurchases than those with ABS cash flows ratios below the sample median. Furthermore, the firms group with lower ABS proceeds ratios exhibit on average higher amount of non-ABS cash flows over capital stock compared to firms group with higher ABS proceeds, which suggests that the latter group rely heavily on ABS financing as a result of low level of internal non-ABS cash flows. Finally, the mean differences between the two groups regarding leverage and dividend yield show that users of more ABS are on average highly levered and pay less dividend to their shareholders, which suggests that these firms are probably more constrained than those using less ABS financing.

2.5 Empirical Analysis

2.5.1 Regression Design

To test the effect of securitization and CEO incentives on investment and firm's performance, and as done by Aggarwal and Samwick (2006), we estimate the two following models:

$$\left(\frac{I}{K} \right)_{i,t+1} = \beta_0 + \beta_1 \left(\frac{ABS}{K} \right)_{i,t} + \beta_2 (PPS)_{i,t} + Controls + \varepsilon_{i,t}$$

$$Q_{i,t} = \beta_0 + \beta_1 \left(\frac{ABS}{K} \right)_{i,t} + \beta_2 (PPS)_{i,t} + Controls + \varepsilon_{i,t}$$

For firm i and year t , ABS/K is securitization proceeds scaled by the year-beginning capital stock (net property, plant, and equipment), PPS is the beginning of period total pay-performance sensitivity of the firm's CEO. Controls include CF/K (cash flow net of ABS proceeds when the latter is considered as operating cash flow), $CDF(\sigma^2)$ (the empirical cumulative distribution function of variance of dollar stock returns), D/A

(book leverage), $\ln(S)$ (the natural logarithm of sales used as proxy for firm's size), DVY (dividend yield), K/S (capital over sales), $R\&D/K$ ($R\&D$ expense scaled by the year-beginning capital stock), and ADV/K (advertising expense normalized by the year-beginning capital). Following Himmelberg et al. (1999) and Aggarwal and Samwick (2006), we include both linear and quadratic terms of the ratio of capital over sales. All specifications of the above two models include dummy variables for each sample year, industry (two digit SIC code), and missing data on $R\&D$ and advertising expenses⁹. The inclusion of year dummies allows controlling for unobserved macroeconomic trends while dummies of missing data address any systematic effects of these missing measurements on the relationship between investment, firm's performance, incentives, and securitization (Aggarwal and Samwick, 2006). Finally, the dummies of industries provide control for differences across industries.

To estimate the above two models, we first use OLS regressions with clustering at the firm level. To control for unobserved heterogeneity across firms which could affect both investment decision and firm's performance, fixed effect specification seems to be more appropriate. However, given the fact that our sample is highly unbalanced¹⁰, we cannot use the fixed effect model. Second, considering that firms could select themselves into the ABS group, we also apply Heckman two-stage model (1979) to correct for potential bias arising from correlation between unobservable factors in the investment/performance and participation equations. The model proceeds in two steps: the first one consists on the estimation of the probability of ABS choice (participation equation) based on covariates that have been shown to affect the decision to issue ABS financing (Lemmon et al., 2010). The sample used in the first stage includes our ABS firms as well as firms that have never issued ABS financing during the sample period. In the second step, the model estimates the effect of ABS proceeds on firm's investment and performance using OLS regressions and including the Inverse Mills Ratio estimated from the first stage as additional explanatory variable. Including Inverse Mills Ratio in the second stage equations allows controlling for the effect of self-selection. Finally, our analysis could suffer from simultaneity problem between investment policy and financing decisions as investment opportunities also determine financing decisions.

⁹ As done by Aggarwal and Samwick (2006), missing data on $R\&D$ expenses and advertising expenses have been set to zero in order to keep the sample as large as possible.

¹⁰ Indeed, our full ABS sample includes 466 firm-year observations spanning from 1993 to 2006 for 146 firms, with the number of observations ranging from 11 to 54 by year.

Therefore, we use in all our OLS and Heckman regressions lagged investment, stock repurchases, and acquisitions (of the year following the securitization year) in order to reduce simultaneity issue. Furthermore, as will be discussed in Section 6 (Robustness checks), we also reexamine the relationship between investment and ABS activity using Internet bubble as exogenous choc that allows disentangling between ABS financing effect and investment opportunities.

2.5.2 Regression Results

This section provides a detail description of our empirical results regarding ABS impact on investment decisions and firm's performance. According to our hypotheses, the results of main interest are those related to subsamples of firms sorted on proxies for financial distress status and investment opportunities of the firm. Nevertheless, the findings in the full sample (not reported), especially in Heckman specifications, show that ABS financing is associated with lower investment, higher firm's performance, and higher stock repurchases, which suggests that the observed improvement in firm's performance is more related to ABS signaling role of ABS through stock repurchases activity than mitigation of underinvestment.

2.5.2.1 Securitization and the financial distress status of the firm

According to either the underinvestment or overinvestment hypotheses, we predict that the sensitivities of investment and firm's performance to ABS proceeds should vary among firms as a function of their financial distress status. More specifically, firms with high financial distressed probability (as measured by Altman's Z-scores) should exhibit high investment sensitivities to ABS proceeds since these firms are more likely to face high cost of external financing and limited access to capital market, which makes securitization more valuable for these firms.

--- TABLE 2 ABOUT HERE ---

The results are presented in Panel A of Table 2. Standard errors are adjusted for clustering by firm in OLS regressions. In Heckman regressions, standard errors are corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty. As expected, the first column of Panel A shows positive and highly significant sensitivity of capital expenditures to ABS proceeds in financially

distressed firms while the third column shows negative and non-significant effect of ABS on investment in firms with low financial distress probability. When controlling for self-selection bias in the Heckman specification, investment sensitivity to ABS proceeds in firms with high financial distress probability is still positive and significant while that for firms with low financial distress probability becomes significantly negative. Note that the Inverse Mills Ratio is negatively signed, suggesting that unobserved factors that make ABS issuance more likely tend to be associated with lower corporate investment.

These results could indicate either a reduction of the underinvestment problem or an overinvestment behavior since financially distressed firms can be subject to both investment deficiencies. To disentangle the two effects, we examine the impact of ABS proceeds on firm's performance, arguing that if ABS proceeds are used to reduce the underinvestment problem, increased investment should be associated with an improvement of firm's performance. In contrast, if ABS proceeds are used to overinvest, this should lead to a decrease in firm's performance as measured by Tobin's Q ratio. The results of the OLS and Heckman regressions reported in Panel B of Table 2 provide support for the underinvestment hypothesis in firms with high financial distress probability (low Altman's Z-scores). More precisely, financially distressed firms allocate \$0.04 of each dollar of ABS proceeds to investment with an improvement of 0.08 in market-to-book ratio. The Heckman regression disentangles the measured effect into a self-selection induced effect and an ABS-induced effect. The estimated coefficients of ABS proceeds for financially distressed firms (second column of Panel A and Panel B) are still positive and statistically significant, suggesting that ABS financing itself, and not the self-selection, that results in more investment and better performance in firms with high financial distress probability. On the other hand, the results regarding firms with low financial distress probability show negative and significant sensitivity of investment and positive and significant sensitivity of firm's performance to ABS proceeds after controlling for self-selection, which indicates that the effect of ABS on performance takes place through other channels than investment in these firms.

With respect to control variables, we notice that PPS affects negatively and significantly investment expenses and positively and insignificantly performance in firms with high financial distress probability. On the other hand, investment is

positively related to PPS in firms with low financial distress probability. Other control variables also exhibit significant effects on investment expenses or Tobin's Q ratio. Non-ABS cash flows show positive effects on investment and firm's performance in the financially distressed subsample, suggesting that shocks to productivity affect positively both investment and market performance in these firms. On the other hand, Non-ABS cash affects negatively investment and positively performance in firms with low financial distressed probability. Yield and capital over sales show negative impact on investment and firm's performance, especially in financially distressed firms, with an increasing rate of the negative effect of capital over sales. Furthermore, R&D expenses enter positively investment regression for firms with high financial distress probability and positively Tobin's Q regressions in both firms with high and low financial distress probability. Finally, stock returns volatility seems to affect negatively Tobin's Q ratio regardless the financial distress status of the firm.

2.5.2.2 Securitization and growth options

Previous studies on investment-free cash flow sensitivity have sorted the examined firms according to their growth opportunities, arguing that observed positive sensitivity of investment to cash flow could indicate an induced overinvestment behavior in firms with low growth options or a reduced underinvestment in high growth firms (see among others Aivazian *et al.*, 2005). This follows from the fact that firms with high growth opportunities are more likely to face underinvestment risk while those with low growth options are more likely to suffer from overinvestment. Accordingly, we sort our ABS firms in high and low growth groups based on market-to-book ratio prior to securitization. Thus, firms with market-to-book ratios below the sample median are considered as low growth firms while those exhibiting higher ratios than the sample median are sorted in the high growth group. However, unlike these previous studies, and as done above, we rely on sensitivities of both investment and firm's performance to disentangle between the two effects, namely the under- and overinvestment.

--- TABLE 3 ABOUT HERE ---

Panel A of Table 3 presents the results of OLS and Heckman regressions of investment while Panel B reports the results regarding firm's performance, controlling for growth opportunities of the firm. Standard errors are adjusted for clustering by firm

in OLS regressions. In Heckman regressions, standard errors are corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty. Only firms with low investment opportunities exhibit positive and significant sensitivities of capital expenditures to ABS cash flow. On the other, investment shows a weak sensitivity to ABS proceeds in firms with high growth options. At first sight, the findings suggest that ABS financing exacerbates overinvestment behavior in firms with low growth opportunities. After examining the effect of securitization on Tobin's Q ratio, we find that firms with high growth options exhibit positive sensitivity of their performance to ABS activity that cannot be explained by mitigation of underinvestment problem. However surprisingly, the results regarding firms with low growth opportunities suggest that ABS activity leads to higher investment and better firm's performance, which makes it hard to support the overinvestment hypothesis in these firms. In fact, this puzzling finding suggests that ABS impact on firm's performance may take place through other additional channels. Thus, to explain the observed effect on performance, one should go beyond the analysis of the link between securitization and investment by looking at the impact of this form of funding on other corporate policies. The following section tries to shed light on some of these channels by examining the effect of ABS on other uses of funds such as stock repurchases and acquisitions.

Finally, the results pertaining to control variables show that non-ABS cash flows are positively and significantly related to investment and performance in firms with low growth opportunities, which contrasts with high growth firms where investment is negatively linked to ABS proceeds. Furthermore, leverage enters negatively investment regression regardless the growth options status of the firm while dividend yield affects negatively investment only in firms with low growth opportunities. Stock return volatility enters negatively almost all the regressions with significant impact on performance in low growth firms while CEO PPS is positively and significantly linked to investment and performance only in companies exhibiting high growth opportunities. Capital over sales shows negative impact on investment with an increasing rate in both firms groups with high and low growth opportunities. Furthermore, R&D expense over capital stock is positively and significantly related to firm's performance in low growth firms and positively and significantly linked to investment in both firms with high and

low growth options.

2.5.2.3 Asset-securitization and other uses of funds

In this section, we examine the impact of securitization on different uses of funds namely R&D, dividends, acquisitions, and stock repurchases while only results regarding acquisitions and stock repurchases are reported in Tables 4 and 5. Coefficients of main interest are again sensitivities to ABS proceeds controlling for the financial distress status (Table 4) and growth opportunities (Table 5) of the firm. Standard errors are adjusted for clustering by firm in OLS regressions. In Heckman regressions, standard errors are corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty.

--- TABLE 4 ABOUT HERE ---

--- TABLE 5 ABOUT HERE ---

Stock repurchases show positive and significant sensitivities to ABS proceeds in both firms with high and low financial distress probability while the amount spent on acquisitions seems unaffected by ABS activity in both groups of firms even after controlling for selection bias. The coefficient estimates reported in the first and third columns of Panel A of Table 4 indicate that for each dollar of ABS cash flow, stock repurchases are increased by \$0.20 and \$0.31 in firms with high and low financial distress probability respectively. Furthermore, when controlling for growth opportunities of the firm (Panel A of Table 5), stock repurchases still exhibit positive and significant sensitivities to ABS cash flow in low growth firms and negative and significant sensitivities in high growth firms. On the other hand, ABS seems to impact positively the amount allocated to acquisitions only in firms with high growth options (see Panel B of Table 5), so that every dollar of ABS cash flow is associated with an increase of more than \$0.17 in the amount spent on acquisitions. Finally, the results regarding R&D expense and dividends (not reported) show no significant sensitivities to ABS activity even after controlling for financial distress status and growth opportunities of the firm¹¹.

¹¹ The absence of ABS effect on R&D expense is quite expected since it has been well documented that firms using ABS financing are not R&D-intensive (Lemmon *et al.*, 2010).

The findings bring further insights into the use of ABS proceeds by industrial firms, which allows providing consistent explanations of the impact of securitization on both investment and firm's performance documented in the previous section. With respect to stock repurchases, an observed positive sensitivity to ABS cash flow could be consistent with either the information signaling or free cash flow hypotheses. The former one argues that firms repurchase shares to signal that their stock is undervalued or their growth prospects are improving while the second hypothesis argues that managers redistribute cash to shareholders through stock repurchases instead of undertaking negative NPV projects (see among others Nohel and Tarhan, 1998). As both hypotheses predict performance gains following stock repurchases especially in low growth firms (Nohel and Tarhan, 1998), an examination of both repurchases and investment expense allows disentangling between the two hypotheses. Thus, the fact that ABS-related repurchases are combined with investment increase in our ABS firms with low growth opportunities provides support for the information signaling hypothesis over the free cash flow hypothesis. ABS proceeds seem to be used by low growth companies to finance both investment expense and stock repurchases, which allows these firms to mitigate underinvestment as well as signal to the market the improvement of their growth options. On the other hand, the observed improvement of market performance in high growth firms seems to be related to increased acquisition rather than investment or stock repurchases activity.

With respect to financial distress status of the firm, previous literature on stock repurchases documents that repurchasing firms that are facing high financial constraints should exhibit greater financial distress risk as a result of the reduction of corporate liquidity that would otherwise be used to finance investment (see among others Almeida *et al.*, 2004). This could lead to a poorer firm's performance (see among others Almeida *et al.*, 2004). The results regarding our ABS firms sample with high financial distress probability suggest that these firms do not suffer a decrease in their market performance since they use ABS proceeds to finance both investment and stock repurchases. Moreover, with respect to firms with low financial distress probability, both stock repurchase and firm's performance exhibit positive and significant sensitivities to ABS proceeds. The findings suggest that these firms use ABS proceeds to repurchase their shares, signaling to the market that their stocks are undervalued.

2.5.2.4 The role of the interaction between securitization and managerial incentives

While existing studies on executive compensation widely agree that equity-based pay serves to align managers and shareholders' interests, they provide different and sometimes conflicting arguments regarding the effect of CEO compensation structure on the investment-cash flow sensitivity. For example, Bizjak et al. (1993) and Begley and Feltham (1999a,b) argue that higher equity-based compensation will exacerbate underinvestment while Aggarwal and Samwick (2006) provides empirical evidence on the role of PPS in reducing the underinvestment problem. On the other hand, Broussard et al. (2004) document a negative impact of PPS on investment-cash flow sensitivity, supporting the overinvestment mitigation effect of incentives while John & John (1993) claim that granting higher incentives to managers will induce overinvestment behavior especially in highly levered firms.

In this section, we examine the effect of PPS on investment sensitivity to ABS cash flow and aim at understanding how the use of ABS and PPS interact and affect both the underinvestment and overinvestment problems in our ABS firms. Under the underinvestment hypothesis, we predict that financially distressed firms as well as those with high growth options will use more executive incentives and ABS financing to mitigate underinvestment. Alternatively, under the overinvestment hypothesis, the use of ABS financing with high PPS is expected to exacerbate the overinvestment problem, which will give rise to jointly higher investment and worse firm's performance.

--- TABLE 6 ABOUT HERE ---

--- TABLE 7 ABOUT HERE ---

Tables 6 and 7 present the results regarding the effects of the interaction between ABS and PPS on investment (Panel A), firm's performance (Panel B), stock repurchases (Panel C), and acquisitions (Panel D), controlling for the financial distress probability and growth options of the firm. Standard errors are adjusted for clustering by firm in OLS regressions. In Heckman regressions, standard errors are corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty. The findings are inconclusive. As expected, only firms with high financial distress probability and granting high PPS exhibit positive and significant sensitivities of

investment and acquisitions to ABS proceeds. However, the interaction between ABS and PPS weakly affects firm's performance, which does not provide a strong support to underinvestment mitigation on these firms. After controlling for firm's growth opportunities, the results presented in Table 7 show that the positive sensitivities of investment expenses and stock repurchase to ABS proceeds documented earlier in low growth firms comes mainly from companies granting low incentives to their executives. In addition, the analysis of ABS effects on firm's performance suggests that subsequent to investment and stock repurchase, these firms experience an improvement of Tobin's Q ratio.

2.6 Robustness checks

So far, we argue that observed sensitivity of investment to ABS cash flows suggests that securitization helps relaxing financial constraints, which allows mitigating underinvestment problem. One concern is that investment-cash flow sensitivity might represent information about investment opportunities rather than financial constraints. Previous studies show that firms may exhibit higher investment-cash flow sensitivity simply because cash flow reflects information about their investment potential, even after controlling for Tobin's Q ratio in investment regression (see among others Altı, 2003). This follows from the fact that while cash flow is related to firm's productivity and thus better captures investment opportunities in the near future, Tobin's Q represents a noisy measure as it also reflects expectations about long-term growth options (Altı, 2003). Note that the same reasoning is valid for ABS proceeds since securitization results in acceleration of cash flow that would otherwise be internally generated, in particular from receivables collection. Thus, to check whether observed sensitivity of investment to ABS cash flows reflects financial constraints, we need a natural experiment that allows isolating the financing impact of ABS proceeds. As done by Hong et al. (2012), we consider the Internet bubble occurring in the period 1996-2000 as an exogenous experiment, arguing that if ABS impact on investment reflects mitigation of financial constraints, investment sensitivity to ABS proceeds should be higher before and after the bubble than during the bubble¹².

¹² This follows from the fact that during the Internet bubble, even non-technology firms were financially

Using the same specifications as before, we control for the effect of Internet bubble by adding an interactive term between ABS variable and a dummy for the ABS transaction being issued during the Internet bubble period. Again, investment, stock repurchases, and acquisitions variables are lagged one year to reduce the effect of simultaneity of investment and financing policies. Consistent with our previous results, we find that firms with high financial distress probability prior to securitization experience much higher sensitivities of investment and market performance (significant at 1% and 5% respectively) outside than during the Internet bubble. Investment and performance sensitivities during the bubble are positive and insignificant. Furthermore, differences test of the results between the two periods (during and outside the bubble period) are highly significant, providing a strong support to ABS role of mitigating underinvestment problem in firms with high financial distress probability. When controlling for the firm's investment opportunities, we find that low growth firms exhibit highly significant sensitivities of investment, performance, and stock repurchases to ABS cash flow only outside the bubble period, which confirms our previous results. Again, differences between outside and during the bubble are highly significant. Finally, our findings regarding high growth firms follow through after controlling for Internet bubble, suggesting that these firms mainly use ABS proceeds to finance their acquisitions rather than investment and stock repurchases.

2.7 Conclusion

This paper investigates how asset securitization and its interaction with managerial pay-performance sensitivity affect investment policy and firm's performance. Considering the two major suboptimal investment behaviors, under- and overinvestment, we provide empirical evidence on the existence of the underinvestment mitigation effect of securitization in a sample of US industrial firms during the period between 1993 and 2006.

The results suggest that given its specific structure and the use of bankruptcy remote SPVs, asset-backed securitization provides a substitute for costly external financing and helps mitigating the underinvestment problem in firms facing high financial distress

unconstrained as they could raise money by issuing equity (Hong et al., 2012).

probability. The estimates indicate that \$0.04 of each dollar received from ABS transactions is allocated to increasing investment expenses. When controlling for the growth options of the firm, we find that more ABS proceeds are associated with increasing investment and firm's performance in low growth firms while those with high growth opportunities experience an increase in acquisitions and performance. The results regarding high growth firms provide straightforward evidence on the role of ABS in reducing underinvestment in these firms by financing their acquisition transactions. With respect to low growth firms, we find that ABS proceeds also affect positively and significantly stock repurchases. These results combined with those pertaining to investment and firm's performance suggest that low growth firms use ABS proceeds to finance investment and stock repurchases, which allows them to mitigate underinvestment as well as signal to the market the improvement of their growth prospects.

References

- Alti, A., (2003). How Sensitive Is Investment to Cash Flow When Financing Is Frictionless?, *Journal of Finance* 58 (2), 707-722.
- Aggarwal, R. K., A. A., Samwick, (2006). Empire-Builders and Shirkers: Investment, Firm Performance, and Managerial Incentives, *Journal of Corporate Finance* 12, 489– 515.
- Aivazian, V. A., Y., Ge, and J., Qiu, (2005). Debt Maturity Structure and Firm Investment, *Financial Management* 34, 107-119.
- Almeida, H., M., Campello, and M., Weisbach, (2004). The Cash Flow Sensitivity of Cash, *The Journal of Finance* 59, 1777-1804.
- Ayotte, K. and S., Gaon, (2011). Asset Backed Securities: Costs and Benefits of Bankruptcy Remoteness, *Review of Financial Studies* 24, 1299-1336.
- Babenko, I., M., Lemmon, and Y., Tserlukevich, (2011). Employee Stock Options and Investment, *The Journal of Finance* 66, 981-1009.
- Begley, J., G., Feltham, (1999a). An Empirical Examination of the Relation Between Debt Contracts and Management Incentives. *Journal of Accounting and Economics* 27, 229– 259.
- Begley, J., G., Feltham, (1999b). Theoretical Analysis of the Impact of Debt Covenants and CEO Incentives on Investment Decisions. *Unpublished working paper*. University of British Columbia.
- Bizjak, J. M., J. A., Brickley, and J. L., Coles, (1993). Stock-Based Incentive Compensation and Investment Behavior, *Journal of Accounting and Economics* 16, 349–372.
- Black, F., and M., Scholes, (1973). The Pricing of Options and Corporate Liabilities, *Journal of Political Economy* 81, 637–654.
- Broussard, J. P., S. A., Buchenroth, and E. A., Pilotte, (2004). CEO Incentives, Cash Flow, and Investment, *Financial Management* 33, 51-70.
- Cantwell, D., (1996). How Public Corporations Use Securitization in Meeting Financial Needs: The Case of Chrysler Financial Corporation” in L. T. Kendall and M. J. Fishman (eds), *A Primer on securitization*, MIT press, Cambridge, MA.
- Dechow, P., L., Myers, and C., Shakespeare, (2005). Reporting a Rosy Future Today: the Role of Corporate Governance in the Reporting of Gains from Asset Securitizations, *working paper*.
- Demica, (2006). Trade Receivables Securitization – a Comparison Between Top US and

- European Companies. *Demica Report series*, Issue no.7.
- Gaon, S., (2007). Essays in Securitization, Columbia University, *PhD thesis*.
- Gorton, G. and N., Souleles,(2005). Special Purpose Vehicles and Securitization, *FRB Philadelphia working paper series*.
- Hall, B. J., J. B., Liebman, (1998). Are CEOs Really Paid Like Bureaucrats? *Quarterly Journal of Economics* 113, 653-691.
- Hill, C. A., (1996). Securitization: A Low-Cost Sweetener for Lemons. *Washington University Law Quarterly* 74, 1061-1126.
- Himmelberg, C. P., R.G., Hubbard, and D., Palia, (1999). Understanding the Determinants of Managerial Ownership and the Link Between Ownership and Performance, *Journal of Financial Economics* 53, 353- 384.
- Hong, H., J. D., Kubik, and J. A., Scheinkma, (2012). Financial Constraints on Corporate Goodness, *Working Paper*.
- Iacobucci, E. M. and R. A., Winter, (2005), Asset Securitization and Asymmetric Information, *Journal of Legal Studies* 34, 161-206.
- Jensen, M. C., K. J., Murphy, (1990). Performance Pay and Top Management Incentives. *Journal of Political Economy* 98, 225–264.
- John, T. and W., John (1993). Top-Management Compensation and Capital Structure, *The Journal of Finance* 48, 949-974.
- Korgaonkar, S. and G., Nini, (2010). Special Purpose Vehicles and Non-Financial Corporate Finance, *Wharton working paper*.
- Kothari, V., (2006). *Securitization – the financial instrument of the future*, John Wiley & Sons Edition.
- Leland, H., (2007). Financial Synergies and the Optimal Scope of the Firm: Implications for Mergers, Spinoffs, and Structured Finance, *The Journal of Finance* 62 (2), 765-807.
- Lemmon, M., L. X., Liu, and M. Q., Mao, (2010). Asset-Backed Securitization in Industrial Firms – An Empirical Investigation, *Working Paper*.
- Lemmon, M., L. X., Liu, and M. Q., Mao, and G., Nini, (2011). Securitization and Capital Structure in Nonfinancial Firms: An Empirical Investigation, *Working Paper*.
- Mason, J. R., E. J., Higgins, and A., Mordel, (2009). Asset Sales, Recourse, and Investor Reactions to Initial Securitizations: Evidence Why Off-Balance Sheet Accounting

- Treatment Does not Remove On-Balance Sheet Financial Risk, *Working paper*, University of Pennsylvania.
- Merton R. C., (1973). Theory of Rational Option Pricing, *Bell Journal of Economics and Management Science* 4, 141–183.
- Mian, S. L., (1984). Captive Finance Companies and Alternate Policies for Financing Accounts Receivable, *Unpublished Working Paper*, University of Rochester.
- Mian, S. L., (1986). Captive Finance Companies and Alternate Policies for Financing Accounts Receivable: A Collection of Related Essays, *Unpublished Ph.D. Dissertation*, University of Rochester.
- Mills L. and K., Newberry, (2005). Firms' Off-Balance Sheet and Hybrid Debt Financing: Evidence from their Book-Tax Reporting Differences, *Journal of Accounting Research* 43, 251-282.
- Murphy, K. J., (1999). Executive Compensation, Ashenfelter, O., Card, D. (Eds.), *Handbook of Labor Economics*, vol. 3. North Holland, Amsterdam, pp. 2485– 2563.
- Myers, S., (1977). Determinants of Corporate Borrowing. *Journal of Financial Economics* 5, 147– 175.
- Nohel, T. and V., Tarhan, (1998). Share Repurchases and Firm Performance: New Evidence on the Agency Costs of Free Cash Flow, *Journal of Financial Economics* 49, 187-222.
- Rauh, J. D., (2006). Investment and Financing Constraints: Evidence from the Funding of Corporate Pension Plans, *Journal of Finance* 61, 33–72.
- Sopranzetti, B. J., (1999). Selling Accounts Receivable and the Underinvestment Problem, *The Quarterly Review of Economics and Finance* 39, 291–301.
- Yamazaki, K.,(2005). What Makes Asset Securitization "Inefficient"?, *bepress Legal Series, Working Paper* 603.

Table 1: Descriptive statistics of variables

This table summarizes the descriptive statistics of all variables used in the empirical analysis. Our sample includes 466 firm-year observations for the period 1993 to 2006. Investment over capital is measured as lagged capital expenditure scaled by the year-beginning stock of capital, Tobin's Q is the market-to-book ratio assets where the market value of assets is equal to the book value of assets plus the market value of equity minus the book value of equity and deferred taxes. ABS proceeds/capital are annual proceeds from ABS scaled by the beginning-of-year capital stock. CEO PPS represents managerial incentives provided from direct stock holdings and stock options. Non-ABS cash flows are cash flows net of ABS proceeds when the latter is accounted for as operating cash flows. Leverage is book leverage measured as the sum of long-term debt and debt in current liabilities divided by the book value of total assets. Stock returns volatility is the annualized standard deviation of stock returns. R&D/capital and Advertising/capital are R&D and advertising expenses scaled by the beginning-of-year capital. Capital/sales is property, plant, and equipment over sales. Repurchase/capital and acquisition/capital are lagged stock repurchase and lagged acquisition scaled by the year-beginning stock of capital. (High ABS – Low ABS) is the mean differences between the two subsamples with ABS proceeds/capital above and below the sample median respectively. *, **, and *** indicate that the mean differences are statistically significant at 10%, 5%, and 1% levels respectively.

Variable	Number of ob.	Mean	Standard dev.	Median	High ABS – Low ABS
Investment/capital	466	0.246	0.437	0.186	0.155***
Tobin's Q	366	1.636	0.886	1.392	0.211**
ABS proceeds/capital	466	2.602	13.966	0.167	4.890***
CEO PPS	460	1.786	7.146	0.312	1.758***
Non-ABS cash flows/capital	455	-1.943	12.203	0.055	-4.147***
Leverage	466	0.287	0.155	0.273	-0.046***
Ln(sales)	466	8.405	1.234	8.195	-0.345***
Stock returns volatility	449	1.416	0.694	1.261	0.214***
Dividend yield	465	1.263	1.788	0.837	-0.846***
R&D/capital	466	0.114	0.311	0.010	0.091***
Advertising/capital	466	0.073	0.240	0.000	0.104***
Capital/sales	466	0.337	0.436	0.224	-0.330***
Repurchase/capital	466	0.395	2.459	0.002	0.609***
Acquisition/capital	466	0.168	0.562	0.000	0.063

Table 2: OLS and Heckman regressions of investment and Tobin's Q on ABS proceeds, controlling for the firm's financial distress status

Investment is lagged capital expenditures normalized by the beginning-of-year capital stock which is property, plant, and equipment. Tobin's Q is the market-to-book ratio assets where the market value of assets is equal to the book value of assets plus the market value of equity minus the book value of equity and deferred taxes. ABS proceeds are annual proceeds from ABS transactions scaled by the beginning-of-year capital stock. PPS is managerial incentives provided from direct stock holdings and stock options. Missing volatility, missing R&D/K, and missing ADV/K are dummies for missing data on these variables. All other control variables are defined in Table 1. Low Z-score represents firms subsample whose Altman's Z-scores are below the sample median while high Z-score refers to firms subsample with Altman's Z-scores are above the sample median. All regressions include year and industry (two-digit SIC code) dummies. The first step for Heckman regressions is the probit model shown in the Appendix A. Standard errors are clustered at the firm level in OLS regressions and corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty in Heckman regressions. T statistics are in parentheses. T-tests of differences between the two subsamples are computed following the formula: $(b_1 - b_2) / (SE_1^2 + SE_2^2)^{1/2}$ where b_1 and b_2 are the coefficients of the two subsamples and SE_1 and SE_2 are the standard errors. The degree of freedom is $m+n-2$. *, **, and *** indicate that estimated coefficients are statistically significant at 10%, 5%, and 1% levels respectively.

Panel A

	Low Z-scores		High Z-scores	
	OLS Investment	Heckman Investment	OLS Investment	Heckman Investment
Inverse Mills Ratio		-0.065 (-1.45)		-0.030 (-0.22)
ABS Proceeds	0.043*** (5.97)	0.042*** (4.43)	-0.065 (-0.52)	-0.071** (-2.00)
Non-ABS Cash Flows	0.043*** (5.79)	0.043*** (4.31)	-0.067 (-0.52)	-0.073** (-1.97)
PPS	-0.006*** (-3.55)	-0.006** (-2.25)	0.026 (0.70)	0.028*** (2.80)
Leverage	0.054 (0.41)	0.007 (0.08)	-0.373 (-1.10)	-0.354 (-1.27)
CDF of Volatility	-0.060 (-0.74)	-0.107* (-1.93)	0.059 (0.65)	0.042 (0.22)
Ln(Sales)	-0.021 (-1.13)	-0.023* (-1.78)	0.038 (0.81)	0.037 (0.81)
Dividend Yield	-0.021** (-2.16)	-0.024** (-2.55)	0.011 (0.47)	0.008 (0.39)
Capital/Sales	-0.472*** (-3.84)	-0.395*** (-4.79)	-1.186** (-2.34)	-1.169* (-1.86)
(Capital/Sales)^2	0.139*** (3.48)	0.115*** (3.52)	0.417 (1.66)	0.401 (0.78)
R&D/Capital	0.104 (1.10)	0.122*** (3.78)	0.027 (0.07)	0.045 (0.14)
missing R&D/K	0.037 (0.85)	0.021 (0.66)	0.273 (1.57)	0.277*** (2.67)
Advertising/Capital	0.143 (1.62)	0.142* (1.84)	0.087 (1.35)	0.092 (0.54)
missing Adv/K	0.024 (0.56)	0.006 (0.19)	0.220 (1.61)	0.216** (2.02)
Constant	0.699*** (3.51)	0.817*** (3.44)	0.028 (0.07)	0.150 (0.15)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
T-test: Low Z-scores - High Z-scores (OLS)			0.86	
T-test: Low Z-scores - High Z-scores (Heckman)			3.08***	
R squared	0.61	0.48	0.25	0.25
Nbr. Obs.	262	8553	261	8545

(Continued)

Table 2—Continued

Panel B				
	Low Z-scores		High Z-scores	
	OLS Tobin's Q	Heckman Tobin's Q	OLS Tobin's Q	Heckman Tobin's Q
Inverse Mills Ratio		-0.421* (-1.69)		0.685*** (4.16)
ABS Proceeds	0.082** (2.44)	0.081** (2.14)	0.075 (1.54)	0.083** (2.18)
Non-ABS Cash Flows	0.085** (2.35)	0.084** (2.11)	0.075 (1.52)	0.083** (2.07)
PPS	0.012 (1.65)	0.011 (1.00)	0.013 (0.89)	0.012 (1.22)
Leverage	-0.670 (-0.83)	-0.989* (-1.93)	-0.801 (-0.83)	-0.654 (-1.64)
CDF of Volatility	-1.083** (-2.40)	-1.190*** (-4.07)	-1.079 (-1.65)	-0.943*** (-3.04)
Ln(Sales)	0.077 (0.70)	-0.010 (-0.12)	-0.134 (-1.01)	-0.059 (-0.73)
Dividend Yield	-0.209*** (-2.81)	-0.235*** (-5.36)	-0.0265 (-0.53)	-0.018 (-0.70)
Capital/Sales	-0.644 (-1.53)	-0.638 (-1.60)	0.201 (0.10)	0.487 (0.42)
(Capital/Sales)^2	-0.013 (-0.08)	-0.001 (-0.01)	0.127 (0.09)	0.0461 (0.04)
R&D/Capital	1.206*** (3.54)	1.148*** (6.37)	0.545 (0.76)	0.401 (0.70)
missing R&D/K	0.236 (1.22)	0.187 (1.10)	0.327 (1.65)	0.295* (1.88)
Advertising/Capital	-0.549 (-0.98)	-0.496 (-0.97)	-0.317 (-0.65)	-0.092 (-0.24)
missing Adv/K	-0.152 (-0.56)	-0.193 (-1.20)	0.170 (0.54)	0.386* (1.94)
Constant	3.374*** (2.96)	4.346*** (4.20)	3.864** (2.46)	2.851** (2.16)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
T-test: Low Z-scores - High Z-scores (OLS)			0.14	
T-test: Low Z-scores - High Z-scores (Heckman)			-0.02	
R squared	0.64	0.48	0.45	0.16
Nbr. Obs.	203	8491	194	8478

Table 3: OLS and Heckman regressions of investment and Tobin's Q on ABS proceeds, controlling for growth options of the firm

Dependent and independent variables are all defined in Tables 1 and 2. High growth represents firms subsample whose Tobin's Q ratios prior to securitization are above the sample median while low growth refers to firms subsample with Tobin's Q ratios are above the sample median. All regressions include year and industry (two-digit SIC code) dummies. The first step for Heckman regressions is the probit model shown in the Appendix A. Standard errors are clustered at the firm level in OLS regressions and corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty in Heckman regressions. t statistics are in parentheses. T-tests of differences between the two subsamples are computed following the formula: $(b_1 - b_2) / (SE_1^2 + SE_2^2)^{1/2}$ where b_1 and b_2 are the coefficients of the two subsamples and SE_1 and SE_2 are the standard errors. The degree of freedom is $m+n-2$. *, **, and *** indicate that estimated coefficients are statistically significant at 10%, 5%, and 1% levels respectively.

Panel A				
	High Growth		Low Growth	
	OLS Investment	Heckman Investment	OLS Investment	Heckman Investment
Inverse Mills Ratio		-0.232 (-1.28)		-0.059* (-1.94)
ABS Proceeds	-0.103 (-0.63)	-0.104* (-1.95)	0.165*** (3.75)	0.176*** (6.17)
Non-ABS Cash Flows	-0.096 (-0.62)	-0.099** (-2.12)	0.175*** (3.91)	0.187*** (6.26)
PPS	0.022 (0.72)	0.024** (2.36)	0.002 (0.22)	0.009 (1.17)
Leverage	-0.396 (-1.07)	-0.515** (-1.97)	-0.067 (-0.73)	-0.139** (-2.08)
CDF of Volatility	0.081 (0.76)	-0.099 (-0.50)	0.033 (0.72)	-0.017 (-0.43)
Ln(Sales)	-0.026 (-0.74)	-0.056 (-1.30)	-0.002 (-0.11)	-0.009 (-0.91)
Dividend Yield	0.014 (0.62)	0.010 (0.51)	-0.013** (-2.26)	-0.012** (-1.99)
Capital/Sales	-1.591* (-1.79)	-1.493*** (-2.86)	-0.149** (-2.29)	-0.129** (-2.02)
(Capital/Sales)^2	0.805 (1.65)	0.749** (2.09)	0.043* (1.96)	0.033 (1.30)
R&D/Capital	-0.220 (-0.85)	-0.198* (-1.92)	0.417 (1.59)	0.344*** (4.56)
missing R&D/K	0.330 (1.34)	0.347*** (3.42)	0.019 (0.80)	0.018 (0.88)
Advertising/Capital	0.116 (1.17)	0.135 (0.84)	0.051 (1.07)	0.030 (0.64)
missing Adv/K	0.205 (1.54)	0.188** (2.15)	0.026 (0.75)	0.021 (1.03)
Constant	0.597 (1.57)	0.861 (1.20)	0.221 (1.41)	0.306** (1.97)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
T-test: High Growth - Low Growth(OLS)			-1.59	
T-test: High Growth - Low Growth(Heckman)			-4.64***	
R squared	0.28	0.13	0.68	0.57
Nbr. Obs.	267	6619	269	4150

(Continued)

Table 3—Continued

Panel B				
	High Growth		Low Growth	
	OLS Tobin's Q	Heckman Tobin's Q	OLS Tobin's Q	Heckman Tobin's Q
Inverse Mills Ratio		-0.515 (-1.27)		-0.046 (-0.69)
ABS Proceeds	0.258 (1.60)	0.259*** (2.98)	0.254 (1.53)	0.288*** (3.19)
Non-ABS Cash Flows	0.220* (1.66)	0.218*** (2.84)	0.269 (1.52)	0.298*** (3.10)
PPS	0.034 (1.64)	0.035** (2.15)	0.006 (0.16)	0.029 (1.10)
Leverage	-0.624 (-0.79)	-0.681 (-1.31)	-0.140 (-0.56)	-0.136 (-0.79)
CDF of Volatility	-0.372 (-0.69)	-0.571 (-1.24)	-0.362** (-2.38)	-0.346*** (-3.13)
Ln(Sales)	-0.009 (-0.08)	-0.114 (-1.06)	-0.010 (-0.26)	0.007 (0.24)
Dividend Yield	-0.033 (-0.65)	-0.046 (-1.32)	-0.020 (-1.06)	-0.020 (-1.30)
Capital/Sales	1.079 (0.69)	1.350 (1.26)	0.020 (0.09)	0.142 (0.91)
(Capital/Sales)^2	-1.204 (-1.21)	-1.365* (-1.85)	-0.129 (-1.60)	-0.150** (-2.28)
R&D/Capital	0.900** (2.38)	0.867*** (3.98)	2.051** (2.58)	1.795*** (5.83)
missing R&D/K	0.144 (0.61)	0.123 (0.54)	0.230** (2.51)	0.189*** (3.36)
Advertising/Capital	-0.386 (-1.38)	-0.329 (-0.78)	0.057 (0.27)	0.029 (0.18)
missing Adv/K	0.006 (0.03)	0.032 (0.15)	0.049 (0.46)	0.044 (0.67)
Constant	3.336** (2.31)	4.279*** (2.84)	1.412*** (3.09)	1.164*** (3.01)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
T-test: High Growth - Low Growth(OLS)			0.02	
T-test: High Growth - Low Growth(Heckman)			-0.24	
R squared	0.48	0.31	0.68	0.66
Nbr. Obs.	176	6525	183	4061

Table 4: OLS and Heckman regressions of stock repurchases and acquisitions on ABS proceeds, controlling for the firm's financial distress status

Dependent variables are lagged stock repurchases and lagged acquisitions both scaled by the beginning-of-year capital stock. Low Z-score represents firms subsample whose Altman's Z-scores are below the sample median while high Z-score refers to firms subsample with Altman's Z-scores are above the sample median. Independent variables are the same as in Table 2 and Table 3. All regressions include year and industry (two-digit SIC code) dummies. The first step for Heckman regressions is the probit model shown in the Appendix A. Standard errors are clustered at the firm level in OLS regressions and corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty in Heckman regressions. t statistics are in parentheses. T-tests of differences between the two subsamples are computed following the formula: $(b_1 - b_2) / (SE_1^2 + SE_2^2)^{1/2}$ where b_1 and b_2 are the coefficients of the two subsamples and SE_1 and SE_2 are the standard errors. The degree of freedom is $m+n-2$. *, **, and *** indicate that estimated coefficients are statistically significant at 10%, 5%, and 1% levels respectively.

Panel A

	Low Z-scores		High Z-scores	
	OLS Stock Rep./Cap.	Heckman Stock Rep./Cap.	OLS Stock Rep./Cap.	Heckman Stock Rep./Cap.
Inverse Mills Ratio		0.476 (0.96)		0.204 (0.50)
ABS Proceeds	0.205*** (2.94)	0.201* (1.87)	0.312** (2.22)	0.260** (2.46)
Non-ABS Cash Flows	0.184*** (2.78)	0.180 (1.60)	0.297** (2.15)	0.242** (2.20)
PPS	0.201*** (14.43)	0.203*** (6.60)	0.169*** (4.21)	0.188*** (6.34)
Leverage	-0.786 (-1.06)	-0.522 (-0.51)	-0.998** (-2.01)	-0.742 (-0.90)
CDF of Volatility	0.219 (0.99)	0.293 (0.48)	0.446 (0.93)	0.471 (0.81)
Ln(Sales)	0.088** (2.20)	0.157 (1.12)	0.066 (1.03)	0.098 (0.75)
Dividend Yield	0.051 (1.59)	0.055 (0.53)	0.054* (1.93)	0.021 (0.35)
Capital/Sales	0.424 (1.10)	0.424 (0.46)	-0.206 (-0.25)	0.143 (0.08)
(Capital/Sales)^2	-0.160 (-1.13)	-0.139 (-0.38)	0.459 (0.61)	0.319 (0.21)
R&D/Capital	0.158 (1.00)	0.189 (0.54)	-0.564 (-0.88)	-0.537 (-0.56)
missing R&D/K	-0.102 (-1.14)	-0.127 (-0.37)	-0.223 (-1.12)	-0.210 (-0.68)
Advertising/Capital	-0.177 (-0.37)	-0.200 (-0.23)	-0.205 (-0.60)	-0.154 (-0.30)
missing Adv/K	-0.055 (-0.37)	0.029 (0.09)	0.012 (0.10)	0.046 (0.15)
Constant	-1.477*** (-2.65)	-3.724 (-1.42)	-1.011 (-1.56)	-1.196 (-0.55)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
T-test: Low Z-scores - High Z-scores (OLS)			-0.68	
T-test: Low Z-scores - High Z-scores (Heckman)			-0.39	
R squared	0.78	0.75	0.78	0.78
Nbr. Obs.	262	8553	261	8546

(Continued)

Table 4—Continued

Panel B				
	Low Z-scores		High Z-scores	
	OLS Acquisit./Cap.	Heckman Acquisit./Cap.	OLS Acquisit./Cap.	Heckman Acquisit./Cap.
Inverse Mills Ratio		0.056 (0.64)		0.066 (0.42)
ABS Proceeds	0.006 (0.28)	-0.000 (-0.01)	0.028 (1.03)	0.029 (0.72)
Non-ABS Cash Flows	0.010 (0.42)	0.003 (0.14)	0.031 (1.11)	0.033 (0.77)
PPS	-0.005 (-0.76)	-0.003 (-0.53)	-0.011* (-1.73)	-0.012 (-1.01)
Leverage	-0.367 (-1.33)	-0.062 (-0.35)	0.767 (1.47)	0.773** (2.42)
CDF of Volatility	-0.413*** (-2.66)	-0.247** (-2.31)	-0.406* (-1.70)	-0.378* (-1.69)
Ln(Sales)	-0.042 (-1.62)	-0.021 (-0.83)	-0.128 (-1.24)	-0.115** (-2.28)
Dividend Yield	-0.017 (-0.79)	-0.022 (-1.21)	0.002 (0.20)	0.002 (0.09)
Capital/Sales	-0.841*** (-3.16)	-0.810*** (-5.06)	-1.729** (-2.49)	-1.736** (-2.40)
(Capital/Sales)^2	0.236*** (2.83)	0.240*** (3.76)	0.644* (1.73)	0.641 (1.08)
R&D/Capital	0.058 (0.69)	0.092 (1.50)	-0.104 (-0.49)	-0.133 (-0.36)
missing R&D/K	0.239*** (2.88)	0.199*** (3.33)	0.051 (0.50)	0.050 (0.42)
Advertising/Capital	-1.066** (-2.51)	-1.239*** (-8.23)	-0.308 (-1.07)	-0.298 (-1.52)
missing Adv/K	-0.043 (-0.47)	-0.113** (-1.97)	0.054 (0.60)	0.070 (0.57)
Constant	1.353*** (3.17)	1.065** (2.31)	1.550 (1.40)	1.440* (1.72)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
T-test: Low Z-scores - High Z-scores (OLS)			-0.62	
T-test: Low Z-scores - High Z-scores (Heckman)			-0.66	
R squared	0.49	0.56	0.26	0.24
Nbr. Obs.	262	8553	261	8546

Table 5: OLS and Heckman regressions of stock repurchases and acquisitions on ABS proceeds, controlling for growth options of the firm

Dependent variables are lagged stock repurchases and lagged acquisitions both scaled by the beginning-of-year capital stock. High growth represents firms subsample whose Tobin's Q ratios prior to securitization are above the sample median while low growth refers to firms subsample with Tobin's Q ratios are above the sample median. Control variables are defined in Table 1 and Table 2. All regressions include year and industry (two-digit SIC code) dummies. The first step for Heckman regressions is the probit model shown in the Appendix A. Standard errors are clustered at the firm level in OLS regressions and corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty in Heckman regressions. t statistics are in parentheses. T-tests of differences between the two subsamples are computed following the formula: $(b_1 - b_2) / (SE_1^2 + SE_2^2)^{1/2}$ where b_1 and b_2 are the coefficients of the two subsamples and SE_1 and SE_2 are the standard errors. The degree of freedom is $m+n-2$. *, **, and *** indicate that estimated coefficients are statistically significant at 10%, 5%, and 1% levels respectively.

Panel A

	High Growth		Low Growth	
	OLS Stock Rep./Cap.	Heckman Stock Rep./Cap.	OLS Stock Rep./Cap.	Heckman Stock Rep./Cap.
Inverse Mills Ratio		0.437 (0.83)		-0.037 (-1.23)
ABS Proceeds	-0.529* (-1.87)	-0.534*** (-3.42)	0.135*** (2.87)	0.136*** (4.83)
Non-ABS Cash Flows	-0.358 (-1.42)	-0.368*** (-2.68)	0.140*** (3.00)	0.141*** (4.80)
PPS	0.069*** (2.78)	0.082*** (2.76)	-0.021* (-1.92)	-0.020*** (-2.69)
Leverage	-0.560 (-1.45)	-0.368 (-0.49)	-0.013 (-0.13)	-0.032 (-0.49)
CDF of Volatility	0.154 (0.63)	0.282 (0.50)	-0.041 (-0.63)	-0.058 (-1.45)
Ln(Sales)	0.047 (0.75)	0.100 (0.81)	0.009 (0.85)	0.006 (0.60)
Dividend Yield	0.005 (0.21)	-0.003 (-0.06)	0.006 (0.88)	0.006 (0.96)
Capital/Sales	-1.301** (-2.08)	-1.250 (-0.83)	0.037 (0.52)	0.042 (0.67)
(Capital/Sales)^2	0.833* (1.87)	0.831 (0.81)	-0.026 (-1.25)	-0.030 (-1.18)
R&D/Capital	0.098 (0.80)	0.113 (0.39)	-0.131 (-1.14)	-0.149** (-2.03)
missing R&D/K	-0.072 (-0.61)	-0.088 (-0.30)	0.018 (0.72)	0.018 (0.87)
Advertising/Capital	0.925** (2.56)	0.869* (1.90)	0.165*** (2.99)	0.166*** (3.69)
missing Adv/K	0.082 (0.62)	0.084 (0.33)	0.012 (0.48)	0.009 (0.44)
Constant	-0.233 (-0.37)	-0.850 (-0.41)	-0.232* (-1.67)	-0.188 (-1.23)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
T-test: High Growth - Low Growth(OLS)			-2.32**	
T-test: High Growth - Low Growth(Heckman)			-4.22***	
R squared	0.80	0.78	0.40	0.34
Nbr. Obs.	267	6619	269	4151

(Continued)

Table 5—Continued

Panel B				
	High Growth		Low Growth	
	OLS Acquisit./Cap.	Heckman Acquisit./Cap.	OLS Acquisit./Cap.	Heckman Acquisit./Cap.
Inverse Mills Ratio		-0.318 (-1.45)		0.038 (0.72)
ABS Proceeds	0.181 (1.39)	0.174*** (2.70)	0.031 (0.49)	0.051 (1.03)
Non-ABS Cash Flows	0.162 (1.42)	0.150*** (2.64)	0.041 (0.62)	0.057 (1.10)
PPS	-0.012 (-0.98)	-0.006 (-0.49)	-0.000 (-0.01)	-0.002 (-0.14)
Leverage	0.315 (0.66)	0.194 (0.60)	-0.167 (-1.49)	-0.166 (-1.44)
CDF of Volatility	-0.295 (-1.25)	-0.470* (-1.93)	-0.161* (-1.87)	-0.143** (-2.04)
Ln(Sales)	-0.151** (-2.02)	-0.175*** (-3.29)	-0.034** (-2.15)	-0.028* (-1.72)
Dividend Yield	-0.026 (-1.24)	-0.039 (-1.59)	-0.012 (-1.18)	-0.014 (-1.36)
Capital/Sales	-1.460** (-2.49)	-1.296** (-2.03)	-0.162 (-1.44)	-0.119 (-1.07)
(Capital/Sales)^2	0.833** (2.22)	0.762* (1.73)	0.019 (0.53)	0.011 (0.25)
R&D/Capital	-0.148 (-1.02)	-0.133 (-1.05)	-0.155 (-1.03)	-0.193 (-1.49)
missing R&D/K	0.035 (0.22)	0.038 (0.30)	0.074** (2.15)	0.069* (1.94)
Advertising/Capital	-0.282 (-1.41)	-0.297 (-1.50)	-0.143** (-2.04)	-0.147* (-1.86)
missing Adv/K	0.157 (1.46)	0.150 (1.40)	0.006 (0.18)	0.002 (0.05)
Constant	1.851*** (3.14)	2.047** (2.35)	0.459** (2.37)	0.352 (1.30)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
T-test: High Growth - Low Growth (OLS)			1.03	
T-test: High Growth - Low Growth (Heckman)			1.51	
R squared	0.31	0.19	0.32	0.28
Nbr. Obs.	267	6619	269	4151

Table 6: OLS and Heckman regressions of investment, Tobin's Q, stock repurchases, and acquisitions on ABS proceeds and its interaction with CEO PPS, controlling for the financial distress status of the firm

Dependent variables are Tobin's Q ratio, lagged capital expenditure, lagged stock repurchases, and lagged acquisitions, all three are scaled by the beginning-of-year capital. Low Z-score represents firms subsample whose Altman's Z-scores are below the sample median while high Z-score refers to firms subsample with Altman's Z-scores are above the sample median. To save space, only coefficients of three variables of interest are presented: ABS proceeds, PPS and their interaction term. All regressions include the same control variables as in previous tables as well as year and industry dummies. The first step for Heckman regressions is the probit model shown in the Appendix A. Standard errors are clustered at the firm level in OLS regressions and corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty in Heckman regressions. t statistics are in parentheses. Chi2 tests whether coefficients of ABS proceeds and ABS proceeds*High PPS are different. T-tests of differences between the two subsamples are computed following the formula: $(b_1 - b_2) / (SE_1^2 + SE_2^2)^{1/2}$ where b_1 and b_2 are the coefficients of the two subsamples and SE_1 and SE_2 are the standard errors. The degree of freedom is $m+n-2$. *, **, and *** indicate that estimated coefficients are statistically significant at 10%, 5%, and 1% levels respectively.

Panel A

	Low Z-scores		High Z-scores	
	OLS Investment	Heckman Investment	OLS Investment	Heckman Investment
Inverse Mills Ratio		-0.063 (-1.41)		-0.045 (-0.33)
ABS Proceeds	0.016 (1.04)	0.015 (0.89)	-0.086 (-0.61)	-0.092* (-1.92)
ABS Proceeds*high PPS	0.027** (2.15)	0.028* (1.93)	0.021 (0.91)	0.021 (0.67)
PPS	-0.006*** (-3.57)	-0.006** (-2.34)	0.026 (0.70)	0.028*** (2.78)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
Chi2	0.19	0.17	0.46	2.38
T-test: Low Z-scores - High Z-scores (OLS)			0.72	
T-test: Low Z-scores - High Z-scores (Heckman)			2.11**	
R squared	0.61	0.50	0.25	0.24
Nb. Obs.	262	8553	261	8545

Panel B

	Low Z-scores		High Z-scores	
	OLS Tobin's Q	Heckman Tobin's Q	OLS Tobin's Q	Heckman Tobin's Q
Inverse Mills Ratio		-0.348 (-1.39)		0.684*** (4.07)
ABS Proceeds	-0.056 (-0.67)	-0.040 (-0.43)	0.044 (0.59)	0.081 (1.50)
ABS Proceeds*high PPS	0.139* (1.93)	0.122 (1.44)	0.031 (0.68)	0.002 (0.05)
PPS	0.012 (1.62)	0.011 (0.99)	0.013 (0.87)	0.012 (1.21)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
Chi2	1.65	0.88	0.01	0.85
T-test: Low Z-scores - High Z-scores (OLS)			-0.89	
T-test: Low Z-scores - High Z-scores (Heckman)			-1.13	
R squared	0.65	0.52	0.45	0.16
Nb. Obs.	203	8491	194	8478

(Continued)

Table 6—Continued

Panel C				
	Low Z-scores		High Z-scores	
	OLS Stock Rep./Cap.	Heckman Stock Rep./Cap.	OLS Stock Rep./Cap.	Heckman Stock Rep./Cap.
Inverse Mills Ratio		0.476 (0.96)		0.180 (0.44)
ABS Proceeds	0.200 (1.66)	0.200 (1.06)	0.262 (1.24)	0.226 (1.58)
ABS Proceeds*high PPS	0.005 (0.07)	0.001 (0.01)	0.049 (0.61)	0.033 (0.35)
PPS	0.201*** (14.60)	0.203*** (6.59)	0.169*** (4.23)	0.188*** (6.32)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
Chi2	1.04	0.36	0.54	0.77
T-test: Low Z-scores - High Z-scores (OLS)			-0.25	
T-test: Low Z-scores - High Z-scores (Heckman)			-0.11	
R squared	0.78	0.75	0.78	0.78
Nb. Obs.	262	8553	261	8546
Panel D				
	Low Z-scores		High Z-scores	
	OLS Acquisit./Cap.	Heckman Acquisit./Cap.	OLS Acquisit./Cap.	Heckman Acquisit./Cap.
Inverse Mills Ratio		0.061 (0.71)		0.060 (0.38)
ABS Proceeds	-0.048 (-1.24)	-0.067** (-2.04)	0.017 (0.51)	0.020 (0.36)
ABS Proceeds*high PPS	0.055* (1.85)	0.068** (2.49)	0.011 (0.48)	0.009 (0.25)
PPS	-0.005 (-0.79)	-0.003 (-0.63)	-0.011* (-1.73)	-0.012 (-1.02)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
Chi2	2.51	5.51**	0.01	0.02
T-test: Low Z-scores - High Z-scores (OLS)			-1.27	
T-test: Low Z-scores - High Z-scores (Heckman)			-1.36	
R squared	0.49	0.55	0.26	0.25
Nb. Obs.	262	8553	261	8546

Table 7: OLS regressions of investment, Tobin's Q, stock repurchases, and acquisitions on ABS proceeds and its interaction with CEO PPS, controlling for the growth options of the firm

Dependent variables are Tobin's Q ratio, lagged capital expenditure, lagged stock repurchases, and lagged acquisitions, all three are scaled by the beginning-of-year capital. High growth represents firms subsample whose Tobin's Q ratios prior to securitization are above the sample median while low growth refers to firms subsample with Tobin's Q ratios are above the sample median. To save space, only coefficients of three variables of interest are presented: ABS proceeds, PPS and their interaction term. All regressions include the same control variables as in previous tables as well as year and industry dummies. The first step for Heckman regressions is the probit model shown in the Appendix A. Standard errors are clustered at the firm level in OLS regressions and corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty in Heckman regressions. t statistics are in parentheses. Chi2 tests whether coefficients of ABS proceeds and ABS proceeds*High PPS are different. T-tests of differences between the two subsamples are computed following the formula: $(b_1 - b_2) / (SE_1^2 + SE_2^2)^{1/2}$ where b_1 and b_2 are the coefficients of the two subsamples and SE_1 and SE_2 are the standard errors. The degree of freedom is $m+n-2$. *, **, and *** indicate that estimated coefficients are statistically significant at 10%, 5%, and 1% levels respectively.

Panel A				
	High Growth		Low Growth	
	OLS Investment	Heckman Investment	OLS Investment	Heckman Investment
Inverse Mills Ratio		-0.234 (-1.30)		-0.053* (-1.75)
ABS Proceeds	-0.164 (-0.88)	-0.160** (-2.24)	0.174*** (3.28)	0.190*** (6.19)
ABS Proceeds*high PPS	0.065 (1.52)	0.060 (1.17)	-0.007 (-0.54)	-0.010 (-1.23)
PPS	0.022 (0.73)	0.024** (2.40)	0.003 (0.32)	0.010 (1.34)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
Chi2	1.12	3.84**	8.45***	33.73***
T-test: High Growth - Low Growth (OLS)			-1.75*	
T-test: High Growth - Low Growth (Heckman)			-4.51***	
R squared	0.28	0.13	0.68	0.59
Nb. Obs.	267	6619	269	4150

Panel B				
	High Growth		Low Growth	
	OLS Tobin's Q	Heckman Tobin's Q	OLS Tobin's Q	Heckman Tobin's Q
Inverse Mills Ratio		-0.544 (-1.34)		-0.038 (-0.56)
ABS Proceeds	0.386 (1.50)	0.397* (1.79)	0.279 (1.56)	0.309*** (3.27)
ABS Proceeds*high PPS	-0.130 (-0.67)	-0.141 (-0.67)	-0.018 (-0.96)	-0.014 (-0.73)
PPS	0.034 (1.61)	0.035** (2.17)	0.009 (0.26)	0.032 (1.21)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
Chi2	1.46	1.61	2.48	10.04***
T-test: High Growth - Low Growth (OLS)			0.34	
T-test: High Growth - Low Growth (Heckman)			0.36	
R squared	0.48	0.30	0.68	0.66
Nb. Obs.	176	6525	183	4061

(Continued)

Table 7—Continued

Panel C				
	High Growth		Low Growth	
	OLS Stock Rep./Cap.	Heckman Stock Rep./Cap.	OLS Stock Rep./Cap.	Heckman Stock Rep./Cap.
Inverse Mills Ratio		0.438 (0.83)		-0.020 (-0.69)
ABS Proceeds	-0.521 (-1.50)	-0.514** (-2.45)	0.180*** (3.59)	0.177*** (6.00)
ABS Proceeds*high PPS	-0.009 (-0.10)	-0.022 (-0.15)	-0.033*** (-2.72)	-0.030*** (-3.82)
PPS	0.069*** (2.73)	0.081*** (2.76)	-0.016 (-1.51)	-0.016** (-2.13)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
Chi2	1.46	2.23	13.79***	38.84***
T-test: High Growth - Low Growth (OLS)			-1.99**	
T-test: High Growth - Low Growth (Heckman)			-3.25***	
R squared	0.80	0.78	0.44	0.41
Nb. Obs.	267	6619	269	4151
Panel D				
	High Growth		Low Growth	
	OLS Acquisit./Cap.	Heckman Acquisit./Cap.	OLS Acquisit./Cap.	Heckman Acquisit./Cap.
Inverse Mills Ratio		-0.322 (-1.47)		0.033 (0.63)
ABS Proceeds	0.090 (0.71)	0.088 (1.02)	0.024 (0.34)	0.039 (0.73)
ABS Proceeds*high PPS	0.097** (2.01)	0.091 (1.46)	0.006 (0.49)	0.009 (0.62)
PPS	-0.012 (-0.94)	-0.006 (-0.46)	-0.001 (-0.08)	-0.003 (-0.23)
Year Effects	Yes	Yes	Yes	Yes
Industry Effects	Yes	Yes	Yes	Yes
Chi2	0.00	0.00	0.06	0.25
T-test: High Growth - Low Growth (OLS)			0.46	
T-test: High Growth - Low Growth (Heckman)			0.49	
R squared	0.32	0.19	0.32	0.29
Nb. Obs.	267	6619	269	4151

Appendix A

This table presents the probit regression used in the first stage of Heckman regressions in table 2 to 7. The sample includes ABS firms as well as non-ABS firms (firms that have never issued ABS transaction during the sample period). The dependent variable is an indicator that equals 1 if the firm has issued an ABS transaction and zero otherwise. The model includes variables that have been shown to determine the probability of using ABS financing (Lemmon et al., 2010). $\ln(\text{total assets})$ is the natural logarithm of the book value of total assets (Compustat item TA). Receivables are accounts receivable (Compustat item RECT). Inventory is the Compustat item INVT. Total debt is the sum of long-term debt (Compustat item DLTT) and debt in current liabilities (Compustat item DLC). Earnings are calculated as income before extraordinary items (Compustat item IB) plus deferred income taxes (Compustat item TXDI) minus preferred dividends (Compustat DVP). R&D is R&D expenses (Compustat item XRD). No rating is a dummy variable that equals 1 if rating is missing and zero otherwise. Asset volatility is computed as stock return volatility times 1 minus total debt over total assets, where stock return volatility is the annualized standard deviation of stock returns provided by ExecuComp database. All the independent variables are measured at the beginning of the fiscal year. t statistics are in parentheses. *, **, and *** indicate that estimated coefficients are statistically significant at 10%, 5%, and 1% levels respectively. Receivables/total assets, inventory/total assets, no rating are instruments excluded from investment, performance, repurchase, and acquisition regressions.

	ABS firm
$\ln(\text{total assets})$	0.328*** (11.49)
Receivables/total assets	1.369*** (4.61)
Inventory/total assets	1.254*** (5.68)
Total debt/total assets	1.096*** (5.30)
Earnings/total assets	-0.179 (-1.16)
R&D/total assets	-3.612*** (-3.89)
No rating	-0.274*** (-2.93)
Assets volatility	0.261*** (5.99)
Constant	-5.150*** (-16.64)
Pseudo R	0.18
Nb. Obs.	8516

Chapter 3

Securitization of Corporate Assets and Executive Compensation*

Abstract:

We examine the effect of corporate asset-backed securitization on managerial compensation. We find that CEO compensation linked to performance increases subsequent to securitization of corporate assets. This is consistent with two distinct theoretical views: The first is that asset-backed securitization improves the efficiency of performance-based compensation as corporate performance becomes a better signal of managerial effort. The second is that securitization of corporate assets mitigates liquidity constraints so that firms can make more efficient investments. We find securitization primarily affects short-term accounting components (bonuses) and less equity-based components of the CEO's performance-based compensation. Further investigation reveals evidence for the second view of liquidity, but not for the first view of moral hazard. The effect of securitization is strongest for financially constrained firms, suggesting it alleviates liquidity problems that enable CEOs to achieve higher performance and thereby higher performance-based compensation. Results are robust to controlling for possible self-selection biases associated with the decision to rely on asset-backed securitization as a means of external financing as well as simultaneity between executive compensation and financial decisions (securitization and leverage).

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3.1 Introduction

Two important trends have been witnessed in the last 10-15 years in corporate strategy of large corporations. One is the securitization of corporate assets as a means to provide liquidity. Selling securities backed by valuable assets enables companies to obtain cash for investment or reduction of their working capital. Asset-backed securities (ABS) are backed by various types of assets, including accounts receivable, car loans, consumer debt and credit card claims. Since its creation in the 1970s, the ABS market has increased dramatically, also for corporations. According to the Securities Industry and Financial Markets Association (SIFMA), the total asset-backed securities market in the US had a volume of \$2,428.9 billion (including CDOs) outstanding in 2009, with \$150.9 billion issued in that same year.¹³ From a corporate finance perspective, securitization generates fresh liquidity, which may be especially valuable for financially constrained firms, possibly leading to a lower cost of capital (Lemmon et al., 2010). According to Katz and Blatt (2008), securitization of receivables yields lower costs of capital than factoring, where receivables are also sold.

A second important trend is the increasing use of performance-based compensation for CEOs such as executive stock option plans and annual bonuses (Murphy, 1999; Ofek and Yermack, 2000; Clementi and Cooley, 2009; Frydman and Jenter, 2010). Based on several measures, Clementi and Cooley (2009) evidence a strong sensitivity of executive pay to shareholder wealth. A key element in determining the proportion of executive compensation linked to performance is how well corporate performance correlates with managerial effort (Holmström, 1979; Holmström and Milgrom, 1991). If correlation is low,¹⁴ such a compensation scheme would not be very effective. This may lead management to bear risk that it cannot control. In such a case, incentive compensation should be low, especially if management is risk averse. However, the risk of shirking or misallocation of effort would be greater. If performance is a good measure of managerial effort, incentive compensation would become more effective and thus a larger proportion of the overall pay of corporate executives. Executive compensation constitutes an important part of corporate governance

¹³ Source: <http://www.sifma.org/research/statistics.aspx> (viewed on December 22, 2010)

¹⁴ This could be the case if other factors independent of management control, such as volatile market conditions and prices of inputs for production, strongly affect performance.

mechanisms that aligns managerial incentives with shareholder interest.

In this paper, we aim at understanding how these two important trends in corporate strategy interact. We empirically examine the impact of asset-backed securitization on the outcome of performance-based compensation of CEOs. One possible direct impact is through the easing of financial constraints of the firm (Ayotte and Gaon, 2010; Lemmon et al., 2010). Indeed, securitization generates additional liquidity that can be used by the firm (our liquidity hypothesis). This might be particularly valuable for firms that only have limited access to capital markets, for example, due to the presence of important asymmetric information on the quality of investments. This then impacts the capability of management to achieve performance targets for establishing performance-based compensation. Additionally, it has recently been argued that ABS can be used to improve the effectiveness of executive compensation by securitizing those assets whose performance correlates little with CEO effort (our moral hazard hypothesis). Then, corporate performance is only affected by the remaining assets, which facilitates incentive pay for CEOs. Along these lines, some theoretical studies have focused on the incentive effects on management, arguing that taking assets creating corporate performance noise out of the company's balance sheet improves monitoring of management and the efficiency of performance-based compensation (most recently, Iacobucci and Winter, 2005; Fan et al., 2006; Franke and Krahnen, 2008).¹⁵ This could eventually lead to increased use of performance-based compensation so that the *ex post* variable components of compensation become larger.

This paper investigates empirically the effect of corporate asset-backed securitization on the executive compensation of CEOs. We check the 10-K SEC filings from Edgar Database using a specific search algorithm to determine ABS candidates. We then manually examine the annual filings of these candidates to determine whether the firm has issued ABS transactions or not during the corresponding fiscal year and to collect needed variables. Our sample includes 448 corporate ABS transactions done in the US spanning the period 1996-2006. We explicitly aim at testing the liquidity and moral hazard hypotheses that both conjecture a positive impact of ABS on the variable

¹⁵ An interesting analogy can be made to the ongoing discussion on creating “bad banks” to take out assets (so-called “toxic assets”) from banks to ensure that the bank management focuses on the remaining assets, while not being adversely affected by those assets that have been taken off the balance sheet.

components of CEO compensation.

Our analysis provides the following key results. We find that CEO compensation that is performance-based increases subsequent to the securitization process of corporate assets. Interestingly, it affects more short-term components (i.e., bonuses) than long-term components (equity-based part) of the CEO's performance-based compensation. Overall, these findings suggest that the effect may have a short-term impact on performance.

These findings are consistent with the liquidity hypothesis that ABS mitigates liquidity constraints. At first sight, this is also consistent with the moral hazard hypothesis that stipulates that ABS improves the effectiveness of performance-based compensation and thus leads to better compensation. Further investigation however enables us to disentangle the two hypotheses. When testing empirical predictions specific to each hypothesis, we only find supporting evidence for the liquidity theory. Indeed, while the moral hazard rationale further predicts that the effect is weaker when the securitized assets are highly complementary to the remaining assets, the liquidity rationale predicts that the effect is strongest for financially constrained firms. In our analysis, we proxy financial constraints by the KZ index, book leverage (prior to the securitization of considered assets) and cash balance (also prior to the ABS transaction).¹⁶ To identify firms with significant moral hazard problems, we rely on a broad range of measures reported in the literature, such as the ratio of operating income over sales prior to the securitization year, capital expense ratio, R&D expense ratio, as well as geographic and industry Herfindahl-Hirschman indices. Regarding asset type, we expect fixed assets to be more complementary than current assets given that fixed assets are more likely to be used by the company beyond the ABS transaction. In contrast, current assets are more likely to be unrelated, as these are generally accounts receivable of recent sales revenues. Based on these different measures, we document that the effect is strongest for financially constrained firms but not for firms with moral hazard problems. We also find no distinct effect for securitized assets with higher degree

¹⁶ To check the robustness of our results, we also use other proxies for financial constraints such as Cleary's Z (FC) scores (Cleary, 1999). Also, we do not use bond ratings as done by Whited (1992), Kashyap et al. (1994), and Hahn and Lee (2009), since companies opting for ABS are generally required by the underwriters to obtain a bond rating. Therefore, only very few of the companies included in our sample are not rated. More importantly, the fact that there is a requirement for having a bond rating makes this proxy unusable in our context.

of complementarity with the remaining assets. These results therefore provide support for the liquidity hypothesis but not the moral hazard hypothesis. Throughout the analysis, we check for possible self-selection biases, since firm adopting for asset-backed securitization may not be a random sample. We therefore perform Heckman two-step regressions, where the first step estimates the probability of a firm to rely on ABS. Controlling for possible self-selection issues makes our main results stronger.

We perform several other robustness checks. One is to control for the fact that executive compensation and financial policy are endogenously determined, using simultaneous equations model where compensation, securitization, and leverage are considered as jointly determined. Our main results become even stronger, providing further evidence in support of the liquidity hypothesis. Furthermore, we check the robustness of our results first by including additional variables pertaining to the quality of firm's board of directors and second by using convertible leverage instead of book and market leverage. The results are qualitatively similar.

Our research builds on a growing body of studies on securitization. One strand focuses on explaining why securitization is used. Much of this research however relates to securitization of loans of financial institutions, primarily banks (Greenbaum and Thakor, 1987; Pennacchi, 1988; Gorton and Pennacchi, 1995; Carey, 1998; Vermilyea *et al.*, 2008; Jiangli and Pritsker, 2008; Pagano and Volpin, 2008; Gerardi *et al.*, 2010). There is little research in this area for non-financial corporations. A few exceptions are Gorton and Souleles (2005) on the use of special purpose vehicles (SPVs) in the credit card securitization market, Skarabot (2001) who develops valuation models to determine optimal corporate and financial structure for the multi-asset firm with implications relative to the role of securitization, and finally Lemmon *et al.* (2010) on determinants and consequences of the use of securitization by industrial firms. The last study reveals that originating firms tend to be larger, more highly levered, have more securitizable assets and invest less in R&D. Our study investigates the relation between securitization of corporate assets and CEO compensation, a question not addressed in other studies.

While many studies relate the widespread use of ABS to external motivations, recent studies have focused on internally-generated mechanisms relying on agency theory (Iacobucci and Winter, 2005; Fan *et al.*, 2006). Recently, Ayotte and Gaon (2010)

derived costs and benefits of bankruptcy remoteness in SPVs. They show that ABS is most valuable if the transferred assets are non-essential in case of re-organization procedure of the originator. Finally, Pagano and Volpin (2008) develop a theoretical framework in which issuers can affect the liquidity of ABS by choosing the degree of transparency of the securities issued. Our paper intends to examine empirically aspects of the moral hazard theory proposed in this literature.

The remainder of this paper is structured as follows. The next section describes the mechanics of asset-backed securitization. Section 3 describes the research hypotheses that are then tested in this paper. In Section 4, we describe the data and methodology. Hypotheses are tested in Section 5. Section 6 offers robustness checks. Finally, Section 7 concludes.

3.2 Mechanism of Corporate Asset-backed Securitization

While banks have extensively issued ABS in connection with their outstanding loans and mortgages, non-financial corporations have also made use of this source of financing. The typical structure of such a transaction involves the corporation transferring assets currently on its balance sheet to a newly created entity, an SPV, which then owns the assets.

The transfer often implies a “true sale,” namely, the ownership of the assets is transferred to the SPV (Kothari, 2006). To finance the purchase of these assets, the SPV issues securities to investors—often limited to institutional investors—in exchange for the value and any future cash flows of the assets. The corporation then obtains liquidity from the sale of the assets to the SPV. An excellent definition is given by Lipson (2012): *“a purchase of primary payment rights by a special purpose entity that legally isolates such payment rights from a bankruptcy estate of the originator, and results in the issuance of securities whose value is determined by the payment rights so purchased”*.

When the ABS transaction is accounted for as a true sale, the outstanding principal of the assets sold to investors is removed from the originator’s balance sheet and the cash received is included in the statement of cash flows either as operating or investing activities. In many cases, a portion of the future cash flows of the securitized assets is

retained by the originator and the underlying assets remain included in its balance sheet. This is referred to as “retained interest” and is subordinated to the interest held by the SPV investors. According to the relevant legislation (Financial Accounting Standards Board [FASB] Statement N°125 and its replacement Statement of Financial Accounting Standards [SFAS] 140), the originator is required to determine the fair value of the ABS transaction and record any gain or loss realized, which represents the difference between the sum of cash received and the retained interest, and the face value of the securitized assets.

In a true sale, the SPV is bankruptcy-remote from the corporation, meaning that assets located in the SPV cannot be seized if the corporation is in default. In some cases however, the ABS transaction does not meet the legal requirements of a true sale, typically when the originator does not surrender control over the transferred assets (SFAS 125/140). In such a situation, the ABS is accounted for as secured borrowing and the underlying assets remain included in the originator’s balance sheet, implying that these assets are still owned by the corporation and creditors are also entitled to claims on any other assets held by this same corporation.

To improve the credit rating of the assets, and thus the securities issued to investors, the corporation may attach credit enhancement devices to the SPV, such as excess spread, asset tranching (so that some assets become more secure than others), over-collateralization of liabilities (i.e., retained interest) or a guarantee by an insurance company (Fabozzi and Kothari, 2007).

Figure 1 provides a real example from our sample. Voltis Information Sciences, Inc, acting here as originator and servicer, transferred trade account receivables worth \$168.2 million to an SPV called Volt Funding Corporation in exchange for \$60 million in cash and \$108.1 million in subordinated notes (the remaining \$0.1 million are fees related to setting up the ABS structure). Thus, net proceeds equal \$60 million only, the rest acting as credit enhancement in form of over-collateralization. The notes are booked on the balance sheet of Voltis Information Sciences as “retained interest”. To ensure bankruptcy-remoteness, the SPV then sold \$60 million of the account receivables to a conduit, Three River Funding Corporation that in turn sold commercial paper notes to investors. The \$60 million received from investors constitute the cash paid to the originator. The SPV remains a subsidiary of Voltis Information Sciences, Inc.

3.3 Research Hypotheses

In this section, we present our main research hypotheses that we test in Section 5.

3.3.1 Link between ABS and executive compensation

Asset-backed securitization is likely to affect incentive-based compensation of a CEO if there is an impact on performance. The first possibility stems from the increased liquidity that the firm may receive through ABS (Ayotte and Gaon, 2010). For firms that would otherwise be financially constrained, ABS allows management to pursue more positive net present value (NPV) projects that they may have. This may eventually lead to better performance and hence also increased performance-based compensation for the CEO.

An alternative channel would be the mitigation of moral hazard. Consider the following case: Suppose a firm has two types of asset, one related to managerial effort and the other not (Fan et al., 2006). If both types are risky, the second type of assets would generate noise since corporate performance is the result of both types. Therefore, incentive compensation would be less effective than if it were only related to the first type of assets. When the value of the assets transferred to the SPV is largely unrelated to managerial effort, securitizing these assets improves the effectiveness of performance-based compensation for the CEO. In both cases, namely, liquidity and moral hazard, we expect that the CEO achieves a higher compensation linked to performance through improved effectiveness. We summarize this in Hypothesis 1:

Hypothesis 1: Asset-backed securitization leads to an increase in CEO performance-based compensation.

To disentangle the two theoretical views of liquidity and moral hazard, we test further hypotheses specific to each theory, respectively.

For the liquidity theory, the positive effect on performance and thus performance-based compensation should only appear for firms that are financially constrained. Other firms can raise finance by other means so that any securitization transaction should not lead to additional value. Thus, one should expect the following hypothesis to hold:

Hypothesis 2: *Under the liquidity theory, there is only an effect of securitization on CEO performance compensation in firms that are financially constrained prior to securitization.*

In the empirical testing, we consider different proxies for financially constrained status that have been used in previous studies: the KZ index (Lamont et al., 2001), book leverage (prior to the securitization of considered assets) and cash balance (also prior to the ABS transaction)¹⁷.

Second, consistent with the moral hazard theory of Fan et al. (2006), the sensitivity of this link depends on the degree to which the assets that are being securitized are affected by managerial effort. If the value of these assets is unaffected by management effort, securitizing them will have a greater effect on the link between incentive pay and corporate performance. However, this assumes the firm is subject to significant moral hazard at the CEO level. Thus, we hypothesize:

Hypothesis 3: *The effect of securitization on CEO performance compensation only exists in firms exposed to moral hazard problems. The effect however decreases with the degree of complementarity between the assets securitized and the remaining assets.*

Measuring the sensitivity empirically is an arduous task that can only be done using rough proxies. We conjecture however that current assets are likely to be less sensitive than fixed assets since the latter are likely to be used by management in ongoing operations beyond the securitization process. In contrast, current assets such as accumulated accounts receivable are less likely to affect future corporate operations and thus overall performance after these assets have been sold to the SPV. To implement this test, we interact our measure of ABS with the type of assets securitized, namely, whether the assets being securitized are current or fixed assets. We then expect the relationship between asset securitization and incentive pay strongest when the securitized assets are current assets as opposed to fixed assets.

3.3.2 Control variables

We control for variables that have been found to affect our dependent variables. Indeed, previous empirical studies on executive compensation indicate that pay level and

¹⁷ We thank an anonymous referee for suggesting these proxies for financial constraints.

structure vary by industry, period of time, firm risk, corporate governance structure and firm capital structure.

According to Murphy (1999), compensation levels are significantly higher in financial services companies and lower in electric utility companies compared to other industries. Moreover, CEOs in large industrial companies earn higher pay than their counterparts in small industrial firms (Backer et al., 1988; Murphy, 1999). We therefore include industry dummies to control for possible industry-specific variations. These dummies are based on the two-digit SIC classification.

In addition, while analyzing the link between CEO compensation and different variables of firm risk, Gray and Cannella (1997) have shown that executive compensation is lower in higher-risk firms than in lower-risk firms. On the other hand, executives with higher risk compensations are generally more highly compensated than those who negotiate compensations with lower risk components (Gray and Cannella, 1997). To control for these different sources of risk, we include in our specifications the company's asset beta to capture systematic risk (our variable *Systematic Risk*) and sigma to capture company-specific risk (the variable *Stock Return Volatility*) as well as firm leverage (the variable *Market Leverage*).

Moreover, in line with other studies (Hartzell and Starks, 2003; Ozkan, 2010), we include *Tobin's Q* as a control variable. Tobin's Q is expected to positively affect CEO compensation since this ratio is frequently used to capture the expected performance of the firm as well as the presence of growth opportunities (Hartzell and Starks, 2003).

We further add several CEO characteristics, ownership structure, and the board of directors variables that measure the quality of corporate governance inside the firm. Consistent with other studies (see among others Core et al., 1999 and Chalmers et al., 2006), we include CEO age, tenure, ownership and a dummy variable capturing whether the CEO is also chairman of the board of directors. Yermack (1995) shows that more tenured and older CEOs are granted higher options awards. Furthermore, Core et al. (1999) find that CEO compensation decreases with CEO ownership stake while executives acting as chairman of the board receive higher compensation. In addition, the same study document that CEO compensation is positively linked to board size and negatively linked to the existence of higher representation of independent directors and

an external blockholder owning at least 5% of the firm's common stock.

Finally, in all our regressions we control for the nature of the securitized assets and timing by including dummy variables for the most important asset types and year dummies.

3.4 Data and Summary Statistics

3.4.1 Sample

To construct our ABS sample, we used the 10-K filings from the Securities and Exchange Commission's EDGAR database¹⁸. Since our objective is to test the link between CEO compensation and asset securitization in industrial firms, we began with an initial sample of 18,753 observations from Standard & Poor's ExecuComp database, which includes all US firm-year-observations from 1992 to 2006, but excludes financial institutions (SIC Codes 6000-6999) and regulated utilities (SIC Codes 4900-4999). Following the search strategy used by Lemmon et al. (2010), we identified ABS candidates by searching in each firm-year's 10-K filing for the words "securitization", "securitisation", "securitized" and "securitised". Our search algorithm identified 658 firms as ABS candidates. We manually examined each annual filing for all the ABS candidates to determine whether the firm had issued ABS transactions or not during the corresponding fiscal year and to collect the needed variables¹⁹. This separate step involves a significant amount of reading, but insures great accuracy of our data. Our initial ABS sample contained 828 firm-year observations. These securitization and compensation data were then combined with accounting variables from Standard & Poor's Compustat database, stock prices from the Center for Research in Security Prices (CRSP) database, blockholders data from WRDS database²⁰, and manually collected variables on the board structure from the Securities and Exchange Commission's

¹⁸ Alternatively, ABS transactions can be found in the SDC database from Thomson-Reuter. Unfortunately, most of the transactions reported pertain to financial institutions; only a very few transactions deal with non-financial corporations. However, all the corporate transactions reported in SDC are also included in our self-constructed sample.

¹⁹ To be included in our sample, the firm should provide sufficient indication regarding ABS for the corresponding fiscal year to allow us to compute the total amount of securitized assets. Unlike Lemon et al.'s (2010) sample, our sample includes all ABS transactions disclosed by the firm regardless of whether the transactions had been conducted through an ABS program or not.

²⁰ The WRDS Blockholders database reports data on the period spanning from 1996 to 2001. We manually collected missing data on the years 2002-2006 from Edgar database (DEF14filing).

EDGAR database (DEF14A filing). Our final sample includes 448 firm-year observations ranging from 1996 to 2006.

One of our variables of interest is the total amount of securitized assets during a given year. In many cases, firms disclose the net proceeds received and/or the balance outstanding at the fiscal year end rather than the total principal amount of assets securitized over the year. We chose to consider the net proceeds from new securitizations as our ABS measure, which represents the total amount securitized net of discounts, fees and retained interest. We consider that the amount of proceeds is the most accurate estimation of the total volume securitized compared to the balance outstanding at the yearend. One problem of using the balance outstanding is that it represents the net cumulative securitized amount and therefore could result from subsequent securitizations in previous years rather than new securitization occurring in the given fiscal year. In addition to the amount of securitized assets, we manually collected the following variables: the type of assets securitized, whether the securitized assets were current or fixed, whether the securitization transactions were accounted for as a sale or secured borrowing, whether the SPV was consolidated or not and the maturity of the ABS program when the transactions were issued through such a program.

For our measures of the different components of CEO compensation, we rely on previous studies. In particular, we adopt the definitions used by Webb (2008) to determine the amount of total compensation and equity-based compensation. Accordingly, we use *ex ante* total direct compensation which includes salary, bonuses, long-term incentive payouts, stock option grants using the Black-Scholes formula, restricted stock grants and other compensation. This measure corresponds to ExecuComp's TDC1 variable. Our equity-based compensation (EBC) is similar to that used by Webb (2008) and includes restricted stock granted, long-term incentive payouts, all other total and value of options exercised.

Although there is a lack in the literature of any guidance for a precise measure of performance-based versus non-performance-based executive compensation, most studies in this field use one or two measures of CEO compensation, often chosen according to the hypotheses to be tested. In our case, we use four specifications of CEO compensation, namely, total pay (TDC1), salary, bonuses and EBC. Our selection is

motivated by the fact that we hypothesize that asset securitization would affect CEO compensation as a result of an increase of performance-based compensation given moral hazard reduction and/or liquidity provision. Since CEO compensation packages often include more than one performance-based component, we considered it worthwhile to check which kind of variable compensation the CEO aims to maximize using asset securitization. Thus, we estimate the following model:

$$\ln \left(\frac{X}{TA} \right)_{i,t+1} = \beta_0 + \beta_1 \ln \left(\frac{ABS}{TA} \right)_{i,t} + Controls + \varepsilon_{i,t}$$

where $\ln(X/TA)$ is the natural logarithm of our measures of lagged CEO compensation (TDC1, EBC, bonus, or salary) (earned in the year following the securitization year) scaled by the year beginning total assets. $\ln(ABS/TA)$ is the natural logarithm of proceeds from new securitizations scaled by the year beginning total assets. Controls include all control variables described in the previous section. We use lagged instead of contemporaneous CEO compensation to reduce simultaneity problem pertaining to executive compensation and financing policy. In the robustness checks section, we further address simultaneity issue using simultaneous equations model.

When testing the effect of asset-backed securitization on CEO compensation, one concern is to tackle the multicollinearity of the securitization amount and firm size. On the one hand, it has been well documented that executive compensation is related to firm size, measured either as the natural logarithm of total assets or sales (Murphy, 1999; Bebchuk and Grinstein, 2005; Gabaix and Landier, 2008). On the other hand, the amount of assets securitized by industrial firms seems to correlate with firm size. Indeed, in our sample, the average volume securitized by the third largest firms in terms of lagged book value of total assets (lagged sales) is around USD 2176 million (USD 2173 million) compared to that of the third smallest firms, which is about USD 195 million (USD 163 million). Thus, to control for firm size, we scale both the dependent variables and the ABS amount by the book value of total assets instead of adding the latter as a control variable in our regressions. A similar approach is used by Lemmon *et al.* (2010).

To deal with the non-normality of our dependent and some independent

variables²¹, we use the natural logarithmic transformation. The logarithm specification has been used in many studies (including Murphy, 1986; Hallock et al., 2010) and documented by Murphy (1999). When measuring compensation in logarithms, the coefficients obtained represent elasticities instead of sensitivities when using the dollar amounts (Murphy, 1999), with the advantage that they are relatively insensitive to firm size (Gibbon and Murphy, 1992).

Finally, we also run Heckman regressions to account for possible self-selection biases generated by the fact that the choice of relying on ABS as form of external finance may not be random but a function of specific firm characteristics. For instance, firms with significant trade receivables are most likely to rely on this form of external financing, since ABS transactions mainly involve account receivables. Throughout the analysis, we therefore show results using Heckman regressions, next to the results based on OLS²². Results of the first-stage Heckman regressions are provided in Appendix A, including definition of excluded instruments. To identify the economic determinants of securitization decision, we rely on the study of Lemmon et al. (2010) where several firm's characteristics are examined²³. Note that the first stage in Heckman regressions is based on our ABS sample as well as a sample of 6831 firm-year observations drawn from ExecuComp database (excluding regulated utilities and financial institutions) and identified as firms that have never used ABS financing during the sample period²⁴.

Detailed definitions of all our variables are reported in Appendix A.

3.4.2 Summary statistics

Tables 1 and 2 provide summary statistics on our sample. The average ABS size is around USD 540.73 million. Although this large value itself is affected by a few very large transactions as the median size is significantly lower (USD 153.07 million), each transaction is nevertheless a substantial size, suggesting that such transactions are the

²¹ To test the normality of our variables, we run Shapiro-Wilk test, and Skewness/Kurtosis test. We reject the nul that our ABS and compensation variables are normally distributed. Example, Shapiro-Wilk test of ABS variable without logarithm transformation: $Z = 13.34$ significant at 1%. Shapiro-Wilk test of the transformation logarithm of ABS variable : $Z = 1.56$.

²² As our sample is too unbalanced, we cannot use fixed effect regression to control for for unobserved heterogeneity across firms that could affect CEO compensation. Indeed, our ABS sample includes 448 observations for 141 firms and spanning over 10 year period.

²³ For the economic rational underlying the choice of these determinants, see Lemmon et al. (2010).

²⁴ These firms have been identified as non-ABS users after examining their annual reports (10-K filings) from Edgar Database during the sample period.

reserve of very large firms. This is further confirmed by looking at the average firm size (in asset value), which is larger than the average Compustat firm (see, e.g., Cadman et al., 2009) and our Non-ABS firms sample (see the mean difference test in the last column of Panel B of Table 2). An important reason is the significant amount of fees involved in setting up an SPV, which makes it an unattractive means of financing for the smallest firms.

--- TABLE 1 ABOUT HERE ---

The average percentage of assets securitized in our sample is 11% (based on assets in the previous year), however again the median percentage is much lower (at almost 4%). The fact that the average proportion of assets securitized is nevertheless relatively high is due to the fact that many of the companies that do rely on ABS are very specific types, such as leasing companies and credit card companies.

In terms of asset type, it is perhaps not surprising that the largest corporate ABS transactions involve fixed assets. The average transaction size for fixed assets is USD 1106.61 million, while that for current assets is USD 371.91 million. Most of our sample deals with ABS transactions of current assets (370 observations out of 448). A small fraction of our sample involves the securitization of mixed asset types, namely, current as well as fixed assets (17 observations out of 448), which are particularly large with an average size of USD 2184.66 million.

--- TABLE 2 ABOUT HERE ---

Regarding compensation (Table 2), our sample is quite similar to those of other studies, including studies that use larger samples than ours (Hallock et al., 2010; Clementi and Cooley, 2009). The average total compensation (TDC1) is around USD 7.1 million. The largest part comes from performance-based compensation, the average EBC being around USD 4.6 million.

3.5 Analysis

Our results on the impact of asset-backed securitization on CEO compensation are shown in Tables 3 to 5. In Section 5.1, we test Hypothesis 1, which predicts a positive

link between ABS and executive compensation. In Section 5.2, we examine the moral hazard and financial constraint channels to see whether either or both of these can explain the effect documented in Section 5.1. In all these tables, we show estimation results using OLS as well as the second stage of Heckman regressions.

We consider total compensation (TDC1) as well as different components of compensation. In particular, we perform analysis also on salary only, on bonuses (short-term performance-based component) and total EBC (long-term performance-based compensation). Indeed, since bonuses are based on annual accounting performance, it essentially takes a short-term view of performance, while EBC includes stock grants and stock options that are based on market value and thus is sensitive to effects on long-term performance. These distinctions will shed light on which particular aspects of executive compensation is affected by securitization of corporate assets.

3.5.1 Effect on CEO compensation

In this subsection, we test Hypothesis 1 that conjectures a positive effect of ABS on CEO compensation. We test this relation on several components of compensation: total compensation ($\ln(TDC1/TA)$), EBC ($\ln(EBC/TA)$), bonuses ($\ln(Bonus/TA)$), and salary ($\ln(Salary/TA)$). Results are shown in Table 3; Panel A considers the first two variables (capturing total compensation and EBC), while Panel B the two last variables (bonuses and salary). Standard errors for OLS regressions are clustered at the company level, where we have 141 clusters. In Heckman regressions, standard errors are corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty. The number of observations included depends on information availability for CEO compensation, as sometimes individual components are only selectively reported.²⁵

--- TABLE 3 ABOUT HERE ---

First, we find a positive and insignificant relation between corporate asset securitization and total CEO compensation (Panel A) even after controlling for possible

²⁵ We avoided replacing empty cells by zeros, since this often leads to inconsistencies when adding the different components to total compensation. Therefore, a lack of information does not mean that the specific components are not used. In a few cases, we have information on selected components but not the total compensation. Thus, it turns out that we have 3 observation less in Table 3 for $\ln(TDC1/TA)$ than for the components.

self-selection, which does not provide support for Hypothesis 1. When examining individual components of CEO compensation (EBC in Panel A and bonus and salary in Panel B), we find that the effect is mostly due to bonus and salary after controlling for sample selection bias, so that both pay components have positive and statistically significant coefficients at 10% and 5% level respectively. The effect on EBC is negative and insignificant. This suggests that ABS has an impact on short-term compensation—that is, base salary and bonuses as short-term incentive-based compensation—but does not on long-term compensation. Note that the results regarding base salary are inconsistent with our hypothesis since only performance-based compensation is expected to be positively impacted by ABS activity. These findings could be explained by the fact that each year CEOs renegotiate their base salary (Dow and Raposo, 2005), which may be adjusted based on the firm's short-term performance. Two possible channels have been suggested: one through improved liquidity and another through the mitigation of moral hazard. Section 5.2 provides further insights into the channels through which ABS affects CEO compensation. Note that the two channels can co-exist, since both are in line with Hypothesis 1.

It is worthwhile discussing in detail several of the control variables. More generally, it should be noted that they impact CEO compensation in the expected way. The coefficients of Tobin's Q are all positive and statistically significant. This is consistent with the notion that CEO compensation is higher for firms with greater growth opportunity, especially for performance-based components such as bonuses (short-term component) and EBC (capturing long-term compensation as it is linked to stock options). As expected, leverage enters the equations negatively; however the coefficients are weakly significant for bonus but not for TDC1, EBC and salary. As pointed out earlier, increased leverage amplifies the firm's default probability, which in turn increases the risk premium required by debtholders. Thus, highly levered firms are more likely to face a higher borrowing cost, which represents a pressure for a reduction in executive compensation. Next, consistent with previous studies (e.g., Gray and Cannella, 1997), other risk measures such as *Stock Return Volatility* and *Systematic Risk* also affect compensation. As mentioned earlier, the direction of this effect however is ambiguous, as shown by our results that indicate the effect is mostly not significant. As expected, better market conditions (our variable Return on Assets) improve

compensation, especially base salary. Finally, some of the corporate governance variables affect CEO compensation. Most significantly, CEO tenure increases short-term compensation (bonuses and salary), which is consistent with the entrenchment hypothesis (see among others Bebchuk and Fried, 2004). In addition, boards with greater representation of independent directors set lower levels of executive compensation, especially base salary, which is in line with previous findings in the literature (Cyert et al., 1997; Core et al., 1999). However, our results regarding other governance variables are not consistent with the existing literature (Core et al., 1999). In particular, our findings suggest that short-term compensation granted to executives of ABS firms decreases when the board is larger and CEO is also the chairman of the board.

3.5.2 Financial constraints versus moral hazard

Next, we examine the effect separately for firms that are financially constrained (Table 4) and those that are subject to significant moral hazard (Table 5). This will shed light on whether either or both are involved.

Let us start with the liquidity view that predicts an effect only for financially constrained firms. We use several measures to identify such firms. First, we use the classification scheme based on the KZ index (Kaplan and Zingales, 1997), with the subsample of firm-observations with KZ index values above (below) the median being attributed to financially constrained (unconstrained) firms.²⁶ We then perform the multivariate analysis on each subsample separately and compare their results. As a second proxy for financially constrained status, we use the firm's book leverage prior to the securitization year, as defined in Appendix A. We then rank our firms in each year of the sample period according to this ratio and classify those firms being above (below) our sample median as financially constrained (financially unconstrained).²⁷ We use this measure in our analysis to capture borrowing capacity constraints as many of the firms in our sample exhibit high leverage and therefore using ABS as alternative mean of

²⁶ A further method is provided by Cleary's Z (FC) scores (Cleary, 1999), which relies on discriminant analysis. While applying this same methodology here, we found that it led to poor classification based on dividend changes. We therefore refrained from using it.

²⁷ As pointed out in Footnote 4, we do not use the existing of bond rating as a proxy for financial constraints, although it is commonly used in the literature. A requirement of most underwriters is that companies obtain a bond rating prior to the ABS. Without such a rating, ABS often does not even take place. Therefore, we cannot use this measure here.

securing external finance, in order to avoid excessively high cost of capital. Finally, we use *Cash Balance* as our third measure. Again, we compare the subsample of firms with cash balance below the sample median (which are the financially constrained ones) with those above the sample median (the financially unconstrained ones). Results are provided in Table 4.

--- TABLE 4 ABOUT HERE ---

With respect to total compensation, we find that the effect is essentially positive but not significant in financially constrained firms (namely, for firms with a high KZ index and firms with low cash balance). We find supporting evidence based on one of the compensation components considered. A strong effect is measured on the salary component based on KZ index, although the effect is not robust to using other proxies for financial constraints. However, a more consistent picture is found for bonus component, and the effect becomes even stronger after controlling for self-selection effects. On the other hand, there is no effect on equity-based compensation. Overall, these findings provide general support for the liquidity theory postulated in Hypothesis 2.

As for the moral hazard view (Hypothesis 3), we use several measures to separate firms subject to significant moral hazard problems from those that are not subject to significant moral hazard.²⁸ The first set of our moral hazard proxies is related to firm characteristics identified by Himmelberg et al. (1999) as representing monitoring difficulty and scope for discretionary spending. In particular, we use the ratio of operating income over sales prior to the securitization year as proxy for firm's free cash flow. Firms with high level of free cash flow are expected to be more subject to agency problems related to over-investment as suggested by findings of Richardson (2006). Furthermore, as proxies for discretionary spending and consistent with Himmelberg et al. (1999), we use capital expenses and R&D expenses²⁹, both scaled by

²⁸ To test Hypothesis 3, one could be tempted to simply perform the analysis on the full sample by including a dummy equal to one if the assets being securitized are current assets. However, this would be misleading, since we expect an effect only in firms subject to moral hazard problems. Therefore, it is critical to identify those firms in the first place.

²⁹ According to Himmelberg et al. (1999), non-reporting firms of R&D expenditure are in general those with negligible level of this expense. Thus, we control for this by setting missing values of R&D to zero instead of eliminating them in order to avoid the bias of a sample in favor of R&D-intensive firms.

property, plant, and equipment (PPE).³⁰ Firms with significant moral hazard problems are those exhibiting high values of operating income, capital expense and R&D expense ratios in the year prior to the ABS transaction. The second set of proxies for the scope of moral hazard problems is related to organizational complexity. According to Bushman *et al.* (2004) among others, firms operating in different industries and/or geographic areas are more likely to suffer from operational and informational complexity. This suggests that monitoring of managerial actions would be more difficult in firms with highly diversified business activities or geographical locations. To measure the degree of firm business and geographic concentrations, we compute Herfindahl-Hirschman indices based on segment sales provided by Compustat Segment Database. Consistent with the classification scheme used for financial constraints proxies, we consider firm-observations being below the sample median in terms of operating income, R&D expense and capital expense ratios, and business and geographic Herfindahl-Hirschman indices as suffering from severe moral hazard problems compared to those above the sample median.

--- TABLE 5 ABOUT HERE ---

Results are shown in Table 5 for both subsamples. Inconsistent with our moral hazard hypothesis, we find a significant effect only in firms with low capital expenses. When considering individual components of executive compensation, we find some negative effect for EBC. For bonuses and salary, we obtain no clear results. Since our results are very mixed, we conclude that the existence of moral hazard is unlikely to explain the relation between CEO compensation and securitization of corporate assets.

Hypothesis 3 further predicts that the relation should be strongest for assets with a low degree of complementarity with remaining assets. As argued earlier, this seems most plausible when current assets are securitized as opposed to fixed assets. We therefore add an interactive term in the regression between our ABS measure ($\ln(ABS/TA)$) and the dummy of the maturity of securitized assets (*current*). We also test whether the sum of the coefficients of $\ln(ABS/TA)$ and $\ln(ABS/TA)*current$ equals zero. Our primary goal however is to focus on the coefficient of $\ln(ABS/TA)*current$, which

³⁰ We do not use the ratio of net property, plant, and equipment over sales as in Himmelberg *et al.* (1999) since it is somewhat related to our ABS variable and the instrumental variable (ratio of current assets) used to check the endogeneity of our variable of interest (see Section 6).

measures the difference between fixed and current assets. Coefficients are statistically insignificant in almost all the regressions (not reported). Thus again, we find no support for this prediction.

Overall, our results indicate that the liquidity effect (Hypothesis 2) can explain the positive effect between securitization and executive compensation (in particular the bonus component), while no evidence is found for the moral hazard effect (Hypothesis 3). This supports our conclusion that firms engaging in ABS are motivated by overcoming liquidity problems. However, the impact on mitigating possible moral hazard is unclear, even in firms with significant moral hazard.

3.6 Robustness and Extensions

3.6.1 Simultaneous equations: compensation, securitization, and leverage

One concern is that the decision to securitize assets might itself be endogenous, especially if it eventually has an impact on compensation. In this case, results, from OLS regressions for example, will be biased if executive compensation and financial policy are jointly determined. For instance, Inderst and Pfeil (2010) derive a theoretical model where the compensation strategy may affect the level and quality of assets securitized. Although their model primarily focuses on financial institutions, the channel described could also be present in corporations. Furthermore, Coles et al. (2006), among others, consider jointly determined executive compensation and the firm's financial policy. So far, we try to reduce the effect of simultaneity issue using lagged compensation (compensation earned during the year following the year of securitization) in both OLS and Heckman specifications. To further address simultaneity problem, we use in this section simultaneous equations model where contemporaneous compensation, securitization, and leverage are considered as endogenously determined. The results are reported in Appendix C. In each specification, we estimate a system of three equations using three-stage least squares (3SLS) while only the results of compensation equations are reported. Independent variables for compensation and securitization equations are drawn from our specifications in the first (see Appendix B) and second stages (see Table 3) of Heckman regressions. For the leverage equations, we rely on specification used by Coles et al. (2006) which is based on the extensive

literature on the determinants of capital structure. Thus, we include the natural logarithm of firm's sales, Tobin's Q, return on assets, tangibility, R&D expenses ratio, CEO age and tenure and Altman Z-score (Altman, 1968). To account for the effect of taxes on capital structure, we also add the firm's marginal tax rate (obtained from John Graham's website) to the leverage equation. All these explanatory variables are defined in Appendix C. All specifications of the three equations (compensation, securitization, and leverage) include industry and year dummies.

As Panel A shows, the positive effect of securitization on total CEO compensation becomes significant at 1%, which is consistent with our first hypothesis. When analyzing individual components of executive compensation (EBC, bonus, and salary), we find that the effect is due to short-term compensation (namely bonus and salary); ABS activity has a negative and insignificant impact on long-term performance-based compensation (EBC), which confirms our previous results. Furthermore, our liquidity hypothesis predicts that the effect of ABS should be present only in financially constrained firms. To identify such firms, we use the same proxies and classification schemes as for OLS and Heckman regressions. The results are presented in Panel B (Appendix C). Consistent with our liquidity hypothesis, the result for bonus continues to hold; the effect of ABS on annual bonus is positive and significant at 1% in firms with high KZ index, high book leverage, and low cash balance prior to the securitization year. Note that the effect in firms with high cash balance is also positive and significant at 5%, however the coefficient is lower than that for firms with low cash balance. Considering the other components of executive compensation, we find that EBC increases subsequent to assets securitization, especially in financially constrained firms according to KZ index and cash balance proxies. The results regarding total compensation (TDC1) and salary are positive and significant in almost all the subsamples, although the coefficients for financially constrained firms are often higher than those obtained for financially unconstrained firms. Finally, to test our moral hazard hypothesis, we use the same proxies and classification as in the OLS and Heckman regressions. The results are reported in Panel C of Appendix C. Again, our results are very mixed, which suggests that mitigation of moral hazard problem is unlikely to explain the effect of ABS activity on executive compensation.

3.6.2 Other robustness checks

Additional explanatory variables pertaining to the quality of the board of directors have previously been found to affect the level of executive compensation. The first set of these controls are linked to the degree of the board independence (percentage of gray and interlocked outside directors) while the others are proxies for the ability of the directors to adequately monitor CEO actions (percentage of outside directors over age 69 and busy directors) (Core et al., 1999). We therefore include these variables to our regressions as done by Core et al. (1999). We find that all of the results follow through, except the finding on bonuses regarding ABS firms with low cash balance prior to securitization, which becomes statistically insignificant.

Ortiz-Molina (2007) shows that pay-performance sensitivity is negatively associated with executive stock ownership and specific risk of the firm, demonstrating that the stock option component in particular increases with convertible debt and decreases with straight debt. John and John (1993) also derive a negative relationship between pay-performance sensitivity and leverage when convertible debt is used. We therefore check the robustness of our results with respect to the inclusion of convertible debt in the measurement of capital structure. We find that correcting for convertible debt makes some of our results even more significant (in particular coefficients of bonuses in the global sample and subsample with low cash balance). Our results are therefore robust to this alternative specification of leverage.

3.7 Discussion and Concluding Remarks

We study possible channels through which securitization of corporate assets impacts on CEO compensation and thereby ultimately firm performance by investigating two mechanisms derived from theoretical considerations: one based on liquidity constraints and one based on moral hazard. We test our hypotheses on a sample of US transactions spanning the period 1996-2006.

We find that only short-term CEO compensation components increase subsequent to securitization of corporate assets. When testing hypotheses specific to each theory, we only find supporting evidence for the liquidity theory. Indeed, we

document that the effect is only present in financially constrained firms. However, the effect does not vary between firms with high and low degree of moral hazard, nor for assets with varying degrees of complementarity with the remaining assets.

These findings raise important questions, notably whether asset-backed securitization ultimately affects performance of companies. Our findings suggest that a material impact should only be found in those companies for which the purpose of the securitization is to alleviate financial constraints. Testing the effect on performance, in particular in connection with our observed CEO compensation effect, is out of the scope of this study, however an interesting avenue for future research.

Finally, the main empirical methodology in this paper relies on subsamples analysis where ABS effect on executive compensation is examined taking into account financial constraints and moral hazard status of the firm. Other models can be used to test the non-linear relationship between ABS financing and executive compensation. One alternative would be the use of piecewise linear regression. First, ABS effect is expected to vary according to financial constraints of the firm, we can legitimately expect that there is a certain level of ABS amount over which the effect will be more pronounced on executive compensation. Second, according to moral hazard hypothesis, ABS financing is expected to impact executive compensation through mitigation of moral hazard problem. Another possibility is that there is an intermediate range of ABS amount over which ABS proceeds will increase rather than reduce moral hazard problem as a result of exacerbating agency cost of free cash flow. Thus, piecewise linear regression with pre-determined number and position of turning points would allow testing for these hypotheses. Another alternative would be the use of curvilinear regression analysis where quadratic or higher order polynomial model is estimated, including interactive terms between ABS variable and our proxies for financial constraints and moral hazard. Such specification will allow the effect of ABS on compensation to be nonlinearly dependent on financial constraints and moral hazard variables.

References

- Almeida, H. and M. Campello (2007). Financial Constraints, Asset Tangibility, and Corporate Investment, *Review of Financial Studies* 20, 1429-1460.
- Ayotte, K. and S. Gaon (2010). Asset-Backed Securities: Costs and Benefits of “Bankruptcy Remoteness, *Review of Financial Studies* (forthcoming).
- Backer, G., M. Jensen and K. J. Murphy (1988). Compensation and Incentives: Practice vs. Theory, *Journal of Finance* 43, 593-616.
- Bebchuk, L. A. and J. M. Fried (2004). Pay Without Performance: The Unfulfilled Promise of Executive Compensation, *Harvard University Press*, Cambridge, MA.
- Bebchuk, L. and Y. Grinstein (2005). The Growth of Executive Pay, *Oxford Review of Economic Policy* 21, 283–303.
- Berger, P. G., E. Ofek and D. Yermack (1997). Managerial Entrenchment and Capital Structure Decisions, *Journal of Finance* 52, 1411-38.
- Cadman, B.D., S. Klassa and S.R. Matsunaga (2009). Determinants of CEO Pay: A Comparison of Execucomp and Non-Execucomp Firms, *Accounting Review* 85, 1511-1543.
- Carey, M. (1998). Credit Risk in Private Debt Portfolios, *Journal of Finance* 58, 1363-1387.
- Chalmers, K., P. Koh, and G. Stapledon, (2006). The Determinants of CEO Compensation: Rent Extraction or Labour Demand?, *The British Accounting Review* 38, 259-275.
- Cleary, S. (1999). The Relationship Between Firm Investment and Financial Status, *Journal of Finance*, LIV, 673-692.
- Clementi, G. L. and T. F. Cooley (2009). Executive Compensation: Facts, *Working Paper*.
- Core, J. E., R.W. Holthausen, and D.F. Larcker, (1999). Corporate Governance, Chief Executive Officer Compensation and Firm Performance, *Journal of Financial Economics*, 51, 371-406.
- Cyert, R., S. Kang, P. Kumar, A. Shah, (1997). Corporate Governance and the Level of CEO Compensation, *Working Paper*.
- Dow, J. and C. C. Raposo (2005). CEO Compensation, Change, and Corporate Strategy, *Journal of Finance* 60 (6), 2701-2727.
- Durbin, J. (1954). Errors in Variables, *Review of the International Statistical Institute* 22, 23-32.
- Erickson, T. and T. Whited (2000). Measurement Error and the Relationship between

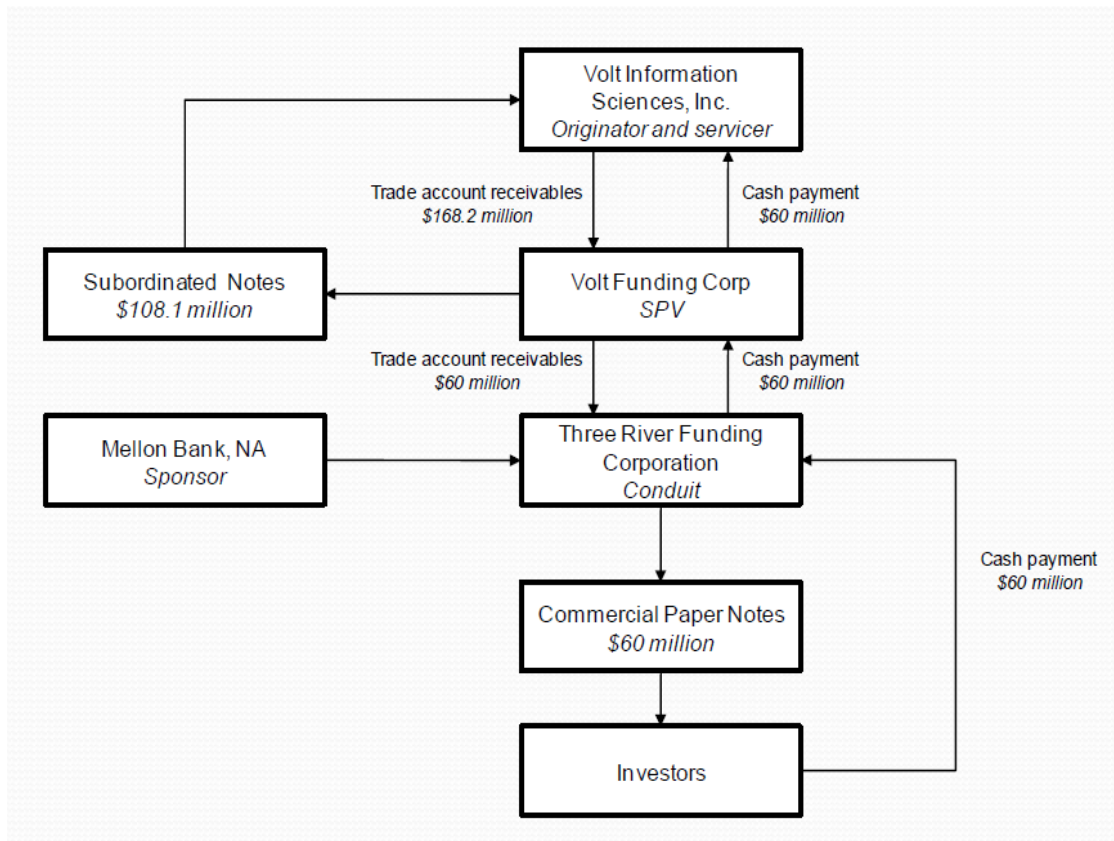
- Investment and Q, *Journal of Political Economy* 108, 1027-1057.
- Fabozzi, F.J. and V. Kothari (2007). Securitization: The Tool of Financial Transformation, *Yale ICF Working Paper*, No. 07-07.
- Fan, G.-Z., S.E. Ong and T.F. Sing (2006). Moral Hazard, Effort Sensitivity and Compensation in Asset-Backed Securitization, *Journal of Real Estate Finance and Economics* 32, 229-251.
- Fazzari, S., R. G. Hubbard and B. Petersen (1988). Financing Constraints and Corporate Investment, *Brooking Papers on Economic Activity* 1, 141-195.
- Franke, G. and J. P. Krahnen (2005). Default Risk Sharing Between Banks and Markets: The Contribution of Collateralized Debt Obligations, *CFS Working Paper* No. 2005/06.
- Franke, G. and J. P. Krahnen (2008). The Future of Securitization, *Working Paper*.
- Gabaix, X. and A. Landier (2008). Why Has CEO Pay Increased So Much?, *Quarterly Journal of Economics* 123, 49-100.
- Gerardi, K., H. S. Rosen and P. S. Willen (2010). The Impact of Deregulation and Financial Innovation on Consumers. The Case of the Mortgage Market, *Journal of Finance* 65, 333-360.
- Gertler, M. and S. Gilchrist (1994). Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms, *Quarterly Journal of Economics* 109, 309–340.
- Gibbons, R. and K. J. Murphy (1992). Optimal Incentive Contracts in the Presence of Career Concerns: Theory and Evidence, *Journal of Political Economy* 100, 468-505.
- Gibbons, R. and K. J. Murphy (1993). Does Executive Compensation Affect Investment?, *Journal of Applied Corporate Finance* 5 99–109.
- Katz, A. and J. Blatt (2008). Funding through the Use of Trade Receivable Securitizations, in (Ed. Frank Fabozzi): *The Handbook of Finance*, John Wiley & Sons.
- Gorton, G. B. and G. G. Pennacchi (1995). Banks and Loan Sales: Marketing Nonmarketable Assets, *Journal of Monetary Economics* 35, 389-411.
- Gorton, G. and N.S. Souleles (2005). Special Purpose Vehicles and Securitization, *Working Paper*, The Wharton School, University of Pennsylvania.
- Gray, S. R. and A. A. Cannella, Jr. (1997). The Role of Risk in Executive Compensation, *Journal of Management* 23, 517-540.

- Greenbaum, S.I. and A.V. Thakor (1987). Bank Funding Modes: Securitization versus Deposits, *Journal of Banking and Finance* 11, 379-401.
- Hahn, J. and H. Lee (2009). Financial Constraints, Debt Capacity and the Cross Section of Stock Returns, *Journal of Finance* 64, 891-921.
- Hallock, K., C. Clayton and R. Madalozzo (2010). CEO Pay for Performance Heterogeneity: Examples Using Quantile Regression, *Financial Review* 45, 1_19.
- Hartzell, J. C. and L. T. Starks (2003). Institutional Investors and Executive Compensation, *Journal of Finance* 58, 2351-2374.
- Hausman, J. (1978). Specification Tests in Econometrics, *Econometrica* 46, 1251-1271.
- Himmelberg, C.P., R.G. Hubbard, and D. Palia (1999). Understanding the Determinants of Managerial Ownership and the Link Between Ownership and Performance, *Journal of Financial Economics* 53, 353-384.
- Hirshleifer, D. (1993). Managerial Reputation and Corporate Investment Decisions, *Financial Management*, 22, 145–160.
- Holmström, B. (1979). Moral Hazard and Observability, *Bell Journal of Economics* 10, 74-91.
- Holmström, B., and P. Milgrom (1991). Multitask Principal-Agent Analysis: Incentive Contracts, Asset Ownership, and Job Creation, *Journal of Law, Economics and Organization* 7, 24-52.
- Iacobucci, E.M. and R.A. Winter (2005). Asset Securitization and Asymmetric Information, *Journal of Legal Studies* 34, 161-206.
- Inderst, R., and S. Pfeil (2010). Securitization and Compensation in Financial Institutions, *Working Paper*.
- Jiangli, W. and M. G. Pritsker (2008). The Impacts of Securitization on US Bank Holding Companies, *Working Paper*.
- John, T. A. and K. John (1993). Top-Management Compensation and Capital Structure, *Journal of Finance* 48, 949-974.
- Jung, P. (2005). Asset Securitization and its Application in Emerging Markets, *Working Paper*.
- Kaplan, S. N. and L. Zingales (1997). Do Financing Constraints Explain Why Investment Is Correlated With Cash Flow?, *Quarterly Journal of Economics* 112, 168–216.
- Kashyap, A. K., O. A. Lamont and J. C. Stein (1994). Credit Conditions and the Cyclical Behavior of Inventories, *Quarterly Journal of Economics* 109, 565–592.

- Kothari, V. (2006). *Securitization – The Financial Instrument of the Future*, John Wiley & Sons Edition.
- Lamont, O., C. Polk and J. Saa-Requejo (2001). Financial Constraints and Stock Returns, *Review of Financial Studies* 14, 529-554.
- Lemmon, M., L.X. Liu and M.Q. Mao (2010). Asset-Backed Securitization in Industrial Firms – An Empirical Investigation, *Working Paper*.
- Lewellen, W., C. Loderer and K. Martin (1987). Executive Compensation Contracts and Executive Incentive Problems: An Empirical Analysis, *Journal of Accounting and Economics* 10, 287–310.
- Lipson, J. C. (2012). Re: Defining Securitization, *Southern California Law Review* (forthcoming).
- Miller, G.S. and Cohen, J. (2006). Accounting for Asset-Backed Securitization, *Harvard Business School Publishing*.
- Murphy, K. J. (1986). Incentives, Learning, and Compensation: A Theoretical and Empirical Investigation of Managerial Labor Contracts, *Rand Journal of Economics* 17, 59-76.
- Murphy, K.J. (1999). Executive Compensation, in Ed. O. Ashenfelter and D. Card, *Handbook of Labor Economics*, Vol. III, Amsterdam: North-Holland, 2485-2563.
- Murray, M. P. (2006). Avoiding Invalid Instruments and Coping with Weak Instruments, *Journal of Economic Perspectives* 20 (4), 111-132.
- Ofek, E. and D. Yermack (2000). Taking Stock: Equity-Based Compensation and the Evolution of Managerial Ownership, *Journal of Finance* 55, 1367-1384.
- Ortiz-Molina, H. (2007). Executive Compensation and Capital Structure: The Effects of Convertible Debt and Straight Debt on CEO Pay, *Journal of Accounting and Economics* 43, 69-93.
- Ozkan, N. (2010). CEO Compensation and Firm Performance: An Empirical Investigation of UK Panel Data, *European Financial Management*, forthcoming.
- Pagano, M. and P. Volpin (2008). Securitization, Transparency and Liquidity, *Working Paper*.
- Pennacchi, G. G. (1988). Loan Sales and the Cost of Bank Capital, *Journal of Finance* 43, 375-396.
- Richardson, S. (2006). Over-Investment of Free Cash Flow, *Review of Accounting Studies* 11, 159-189.

- Riddiough, T.J. (1997). Optimal Design and Governance of Asset-Backed Securities, *Journal of Financial Intermediation* 6, 121-152.
- Ryan, H. and R. Wiggins (2001). The Influence of Firm and Manager-specific Characteristics on the Structure of Executive Compensation, *Journal of Corporate Finance* 7, 101–123.
- Schwarcz, S.L. (1994). The Alchemy of Asset Securitization, *Stanford Journal of Law, Business and Finance* 1, 133.
- Skarabot, J. (2001). Asset Securitization and Optimal Asset Structure of the Firm, *Working Paper*.
- Vermilyea, T. A., E. R. Webb and A. A. Kish (2008). Implicit Recourse and Credit Card Securitizations: What Do Fraud Losses Reveal?, *Journal of Banking and Finance* 32, 1198-1208.
- Webb, E. (2008).Regulatory Scrutiny and Bank CEO Incentives, *Journal of Financial Services Research* 33, 5-20.
- Whited, T. M. (1992). Debt, Liquidity Constraints, and Corporate Investment: Evidence from Panel Data, *Journal of Finance* 47, 1425–1460.
- Yermack, D. (1995). Do Corporations Award Stock Options Effectively?, *Journal of Finance* 39, 237-269.

Figure 1: Example of a corporate asset-backed securitization – the case of Volt Information Sciences, Inc.



Appendix A: Definition of Variables

Variable	Definition
T A	Book value of total assets (Compustat annually, item 6).
Ln(ABS/TA)	Natural logarithm of the ABS amount over the book value of total assets in the previous year. ABS is the proceeds (in US\$ millions) from new securitization transaction net of fees and discounts.
Book leverage	Book value of total debt / Book value of total assets. Book value of total debt = Long-term debt (Compustat annually, item 9) + Current liabilities (Compustat annually, item 34).
Market leverage	Book value of total debt / Market value of total assets. Market value of total assets = Book value of total assets – Book value of equity (Compustat annually, item 60) + Market value of equity. Market value of equity = Share price (Compustat annually, item 199) * Total number of shares outstanding (Compustat annually, item 54).
Convertible leverage	Convertible debt / Market value of total assets. Convertible debt = Debt-convertible (Compustat annually, item 79).
Tobin's Q	Market value of total assets / Book value of total assets.
Systematic risk	Systematic risk of the firm = (Covariance between daily stock returns and daily market returns) / Variance of daily market returns. The returns are computed based on closing prices provided on the CRSP database during the year in which the ABS transaction was issued. The S&P 500 index is used as a proxy for the market.
Stock return volatility	Specific risk of the firm = Standard deviation of stock returns during the year in which the ABS transaction was issued.
Return on assets	Earnings before interest and taxes over total assets = (EBIT)/TA.
Net income	Income before extraordinary items (Compustat annually, item 18) + Extraordinary items and discontinued operations (Compustat annually, item 48).
Cash balance	Cash and short-term investments (Compustat annually, item 1)/total assets in previous year.
KZ index	$KZ\ index = -1.001909 * (Cash\ flow / Net\ PPE) + 0.2826389 * (Market\ to\ book\ ratio) + 3.139193 * (Debt / Total\ capital) - 39.3678 * (Total\ dividend / Net\ PPE) - 1.314759 * (Cash\ holding / Net\ PPE).$ Cash flow = Income before extraordinary items (Compustat annually, item 18) in previous year + Depreciation and amortization (Compustat annually, item 14). Market to book ratio = (Book value of total assets in previous year + Market value of equity in previous year – Book value of equity in previous year – Deferred taxes (Compustat annually, item 74) in previous year) / Book value of total assets. Debt = Long-term debt in previous year + Debt due in one year in previous year (Compustat annually, item 44). Total capital = Long-term debt in previous year + Debt due in one year in previous year + Book value of equity in previous year. Total dividend = Common dividends in previous year + Preferred dividends (Compustat annually, item 19) in previous year. Cash holding = Cash and short-term investments (Compustat annually, item 1) in previous year.

	Net PPE = Net property, plant and equipment (Compustat annually, item 8).
Asset dummy	Dummy variable for the major asset types (mortgage loans, equipment leases, credit card receivables, auto loans, trade receivables, and assets mix).
Industry dummy	Dummy variable for the major industries based on the two-digit SIC codes.
Year dummy	Dummy variable for the years (from 1992 to 2006).
CEO tenure	The CEO tenure is the number of years as the CEO of the ABS firm.
CEO ownership	Percentage of outstanding shares owned by the CEO = ExecuComp item SHROWN_EXCL_OPTS/Compustat annually, item 54.
CEO chairman	Indicator that equals 1 if the CEO is the chairman of the board of directors and zero otherwise.
Board size	Total number of directors in the board.
Gray outside directors	Number of gray directors in the board divided by board size. Gray directors are outside directors who they or their employers received payments from the company.
Interlocked directors	Number of interlocked directors in the board divided by board size. This refers to the case when an inside officer of the company serves on the board of that outside director.
Busy directors	Number of busy directors in the board divided by board size. Busy directors are those who serve on three or more other boards.
Directors over age 69	Number of directors over age 69 in the board divided by board size.
Independent directors (%)	Number of independent directors in the board divided by board size. Independent directors are outside directors that are not gray, interlocked, affiliated or appointed by the CEO.
Outside blockholder dummy	Dummy variable equal to one if there is an outside blockholder owning at least 5% of the firm's equity.
$\ln(ABS/TA) * current$	Indicator of the interaction of $\ln(ABS/TA)$ with the type of assets securitized. = $\ln(ABS/TA) * \text{Dummy variable for asset type}$. Current is a dummy variable that equals 1 if assets securitized include current assets.
$\ln(TDC1/TA)$	Natural logarithm of total direct compensation (in US\$ thousands) for the fiscal year which is the ExecuComp variable TDC1 divided by the book value of total assets in the previous year. $TDC1 = \text{Salary} + \text{Bonuses} + \text{Other annual} + \text{Total value of restricted stock granted} + \text{Total value of stock options granted (using Black Scholes)} + \text{Long-term incentive payouts} + \text{All other total}$.
$\ln(\text{Bonus}/TA)$	Natural logarithm of the ExecuComp variable Bonus (in US\$ thousands) over the book value of total assets in the previous year. Bonus = The amount of bonuses received by the CEO during the fiscal year.
$\ln(\text{EBC}/TA)$	Natural logarithm of total equity-based compensation (EBC) (in US\$ thousands) for the fiscal year divided by the book value of total assets in the previous year. $EBC = \text{Total value of restricted stock granted} + \text{Long-term incentive payouts} + \text{All other Total} + \text{Value of options exercised}$.
$\ln(\text{Salary}/TA)$	Natural logarithm of the ExecuComp variable Salary (in US\$ thousands) divided by the book value of total assets in the previous year. Salary = The amount of the base salary earned by the CEO during the fiscal year.
Sales	Net sales prior to the securitization year (Compustat annually, item 12).
Operating income	Operating income after depreciation prior to the securitization year (Compustat annually, item 178).

Capital expenses	Capital expenditure prior to the securitization year (Compustat annually, item 128).
R&D expenses	Research and development expense prior to the securitization year (Compustat annually, item 46).
Geo HH Index	= sum of squares of the percentages of sales in each geographic segment of the firm prior to the securitization year. Sales are from Compustat Segment.
BUS HH Index	= sum of squares of the percentages of sales in each business segment of the firm prior to the securitization year. Sales are from Compustat Segment.

Table1: Descriptive statistics of ABS transactions and firm characteristics

This table summarizes the descriptive statistics of the ABS transactions and firm characteristics for our sample for the period 1996 to 2006. Panel A reports the summary statistics of the ABS transactions. Panel B reports the statistics on all firms included in our sample. Each variable is defined in detail in Appendix A. ABS, total assets (book and market value), market value of equity, net income, and common dividends are in millions of 2005 US\$ (US\$ mil).

Panel A: ABS characteristics				
Variable	N	mean	median	st.dev
Panel A: ABS transactions				
ABS (US\$mil)	448	540.730	153.069	1285.279
ABS/TA	448	0.107	0.038	0.201
By types of assets securitized				
Current assets				
ABS (US\$mil)	370	371.905	112.689	780.259
ABS/TA	370	0.076	0.035	0.129
Fixed assets				
ABS (US\$mil)	61	1106.606	977.949	940.604
ABS/TA	61	0.254	0.072	0.399
Current & fixed assets				
ABS (US\$mil)	17	2184.656	798.447	4903.212
ABS/TA	17	0.242	0.289	0.153

Panel B: Firm characteristics					
Variable	N	mean	median	st.dev	Mean diff ABS-NonABS
TA (book value) (US\$mil)	448	9063.561	3649.897	13756.820	6075.071***
TA (market value) (US\$mil)	448	14899.560	5902.110	23391.670	7048.810***
Equity (market value) (US\$mil)	448	8771.232	3051.779	16518.690	2650.155***
Book leverage	448	0.284	0.271	0.149	0.085***
Market leverage	448	0.207	0.188	0.135	0.085***
Tobin's Q	448	1.733	1.421	1.466	-0.793***

Table2: Descriptive statistics of CEO characteristics and compensation

This table presents CEO age, tenure, and compensation for our sample between 1992 and 2006. Each variable is described in detail in Appendix A. Compensation amounts are in thousands of 2005 US\$ (US\$'000).

Variable	N	mean	median	st.dev	Mean diff
					ABS-NonABS
CEO age	448	56.027	56.000	7.202	3.115***
CEO tenure	448	6.906	4.000	8.163	-0.006
TDC1 (US\$ '000)	445	7068.600	4756.134	9805.787	2784.747***
Salary (US\$ '000)	448	899.297	890.411	312.014	354.958***
Bonus (US\$ '000)	448	931.676	597.950	1275.693	377.263***
EBC (US\$ '000)	376	4559.074	733.229	12107.460	2173.386***
Other annual (US\$ '000)	376	78.146	0.000	191.795	27.249**
LTIP (US\$ '000)	376	382.755	0.000	1484,272	297.227***
TDC1/TA (x1000)	445	1.893	1.310	2.566	-5.644***
Salary/TA (x1000)	448	0.376	0.264	0.424	-0.875***
Bonus/TA (x1000)	448	0.310	0.133	0.578	-0.444***
EBC/TA (x1000)	376	1.461	0.204	6.884	-1.828***

Table 3: Asset-backed securitization and CEO compensation

This table reports the results of OLS and Heckman regressions on CEO compensation scaled by book value of total assets as the dependent variable and ABS amount scaled by book value of total assets as the independent variable. The first step for Heckman regressions is the probit model shown in the Appendix B. All variables are defined in detail in Appendix A. Natural logarithm transformation is used to deal with the non-normality of the distribution of the variables. All specifications include industry, asset and year dummies, coefficients of which are not reported. The first step for Heckman regressions is the probit model shown in the Appendix B. Standard deviations are adjusted for 161 clusters at company level in OLS regressions and corrected to control for heteroskedasticity and the fact that the Inverse Mills ratio is estimated with uncertainty in Heckman regressions. Figures in parentheses represent the t-statistic values. ***, ** and * indicate that estimated coefficients are statistically significant at 1%, 5% and 10% levels, respectively.

Panel A

	OLS Ln(TDC1/TA)	Heckman Ln(TDC1/TA)	OLS Ln(EBC/TA)	Heckman Ln(EBC/TA)
Inverse Mills Ratio		0.250*** (5.71)		0.406*** (2.65)
ln(ABS/TA)	0.037 (0.94)	0.033 (1.12)	-0.072 (-0.69)	-0.101 (-1.00)
Market leverage	-0.627 (-1.31)	-0.402 (-1.10)	-0.923 (-0.68)	0.004 (0.00)
Tobin's Q	0.117*** (5.54)	0.117*** (4.29)	0.236*** (4.60)	0.218** (2.50)
Stock return volatility	0.288* (1.87)	0.309*** (2.94)	-0.161 (-0.33)	-0.083 (-0.20)
Systematic risk	0.004 (0.03)	0.028 (0.29)	0.497 (1.32)	0.679* (1.83)
Return on assets	1.050 (1.24)	1.442* (1.93)	2.527 (0.98)	4.558* (1.83)
CEO age	-0.003 (-0.37)	-0.003 (-0.42)	-0.005 (-0.23)	0.001 (0.05)
Tenure	0.003 (0.45)	0.001 (0.14)	-0.009 (-0.45)	-0.014 (-0.76)
CEO ownership	-0.004 (-0.88)	-0.008 (-0.95)	-0.037** (-2.48)	-0.043 (-1.53)
CEO chairman	-0.123 (-0.95)	-0.063 (-0.65)	0.249 (0.66)	0.232 (0.68)
Board size	-0.087*** (-3.28)	-0.063*** (-3.50)	-0.027 (-0.39)	0.001 (0.02)
Independent directors (%)	-0.248 (-0.74)	-0.247 (-1.05)	-1.430 (-1.64)	-1.139 (-1.44)
Outside blockholder dummy	0.148 (1.13)	0.142 (1.38)	-0.232 (-0.62)	-0.397 (-1.14)
Industry dummy	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES
Asset dummy	YES	YES	YES	YES
R squared	0.51	0.46	0.54	0.29
Nbr. Obs.	445	424	370	348

(Continued)

Table 3—Continued

Panel B				
	OLS Ln(Bonus/TA)	Heckman Ln(Bonus/TA)	OLS Ln(Salary/TA)	Heckman Ln(Salary/TA)
Inverse Mills Ratio		0.238*** (4.02)		0.338*** (9.62)
ln(ABS/TA)	0.074 (1.39)	0.079* (1.92)	0.066* (1.69)	0.053** (2.16)
Book leverage	-0.937** (-2.00)	-0.563 (-1.31)	-0.479 (-1.16)	-0.047 (-0.19)
Tobin's Q	0.116*** (4.41)	0.107*** (3.43)	0.042 (1.15)	0.041* (1.86)
Stock return volatility	0.149 (0.71)	0.223 (1.39)	0.421*** (2.63)	0.429*** (4.93)
Systematic risk	-0.127 (-0.74)	-0.057 (-0.38)	-0.358*** (-2.77)	-0.281*** (-3.54)
Return on assets	-1.575* (-1.70)	-0.974 (-0.99)	1.606 (1.57)	2.369*** (3.92)
CEO age	-0.008 (-0.79)	-0.011 (-1.34)	-0.007 (-0.91)	-0.009* (-1.72)
Tenure	0.025*** (2.69)	0.028*** (3.57)	0.012* (1.84)	0.011** (2.54)
CEO ownership	-0.006 (-1.02)	-0.009 (-0.74)	-0.002 (-0.29)	0.000 (0.03)
CEO chairman	-0.147 (-0.99)	-0.096 (-0.72)	-0.374*** (-3.16)	-0.294*** (-3.65)
Board size	-0.148*** (-3.86)	-0.121*** (-5.15)	-0.120*** (-4.22)	-0.095*** (-6.38)
Independent directors (%)	-0.652 (-1.36)	-0.535* (-1.71)	-0.552 (-1.48)	-0.459** (-2.34)
Outside blockholder dummy	-0.115 (-0.77)	-0.141 (-1.01)	0.122 (1.00)	0.144* (1.68)
Industry dummy	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES
Asset dummy	YES	YES	YES	YES
R squared	0.86	0.64	0.90	0.67
Nbr. Obs.	331	313	448	426

Table 4: Effect of financial constraints

This table shows the results of OLS and Heckman regressions with CEO compensation scaled by book value of total assets as the dependent variable and ABS amount scaled by book value of total assets as the independent variable, controlling for the financial status of the originating companies. The first step for Heckman regressions is the probit model shown in the Appendix B. We only report the coefficients of $\ln(\text{ABS}/\text{TA})$ and Inverse Mile Ratio. Specifications are similar to those in Table 3. Standard deviations are adjusted for clusters at company level. A high (low) KZ index refers to firms exhibiting KZ index higher (lower) than the sample median and being considered as financially constrained (unconstrained). High book leverage (low book leverage), which are considered financially constrained (unconstrained) belong to the lowest (highest) 50% group in terms of book value of total assets prior to securitization. Low cash balance (high cash balance) indicates firms being in the lowest (highest) 50% group in terms of cash balance before the ABS year and considered financially constrained (unconstrained). All variables are defined in detail in Appendix A. Figures in parentheses represent the t-statistic values. T-tests of differences between subsamples are computed following the formula: $(b_1 - b_2) / (SE_1^2 + SE_2^2)^{1/2}$ where b_1 and b_2 are the coefficients of the two subsamples and SE_1 and SE_2 are the standard errors. The degree of freedom is $m+n-2$. ***, ** and * indicate that estimated coefficients are significant at 1%, 5% and 10% levels, respectively.

Panel A				
	OLS Ln (TDC1/TA)	Heckman Ln (TDC1/TA)	OLS Ln (EBC/TA)	Heckman Ln (EBC/TA)
High KZ index				
Inverse Mills Ratio		0.232*** (4.03)		0.416** (2.12)
ln (ABS/TA)	0.076* (1.71)	0.062 (1.55)	-0.098 (-0.60)	-0.106 (-0.78)
Low KZ index				
Inverse Mills Ratio		0.221*** (4.23)		0.461** (2.48)
ln (ABS/TA)	-0.011 (-0.20)	-0.014 (-0.36)	-0.063 (-0.40)	-0.113 (-0.81)
T-test: High - Low	1.21	1.37	-0.15	0.03
High book leverage				
Inverse Mills Ratio		0.274*** (3.85)		0.334 (1.22)
ln (ABS/TA)	0.030 (0.54)	-0.012 (-0.29)	-0.064 (-0.41)	-0.123 (-1.00)
Low book leverage				
Inverse Mills Ratio		0.161** (2.40)		-0.084 (-0.36)
ln (ABS/TA)	0.012 (0.21)	0.041 (0.83)	-0.218 (-0.89)	-0.187 (-1.03)
T-test: High - Low	0.23	-0.84	0.53	0.29
Low cash balance				
Inverse Mills Ratio		0.179** (2.45)		0.241 (0.84)
ln (ABS/TA)	0.059 (1.05)	0.058 (1.59)	0.032 (0.23)	0.030 (0.23)
High cash balance				
Inverse Mills Ratio		0.239*** (3.93)		0.567*** (2.67)
ln (ABS/TA)	-0.017 (-0.30)	0.000 (0.01)	-0.239 (-1.18)	-0.223 (-1.32)
T-test: Low - High	0.94	1.00	1.10	1.18

(Continued)

Table 4—Continued

Panel B				
	OLS Ln (Bonus/TA)	Heckman Ln (Bonus/TA)	OLS Ln (Salary/TA)	Heckman Ln (Salary/TA)
High KZ index				
Inverse Mills Ratio		0.202*** (2.65)		0.358*** (7.89)
ln(ABS/TA)	0.124** (2.03)	0.135*** (2.65)	0.129*** (2.70)	0.100*** (3.05)
Low KZ index				
Inverse Mills Ratio		0.254*** (3.58)		0.248*** (6.19)
ln(ABS/TA)	0.012 (0.15)	-0.006 (-0.11)	-0.002 (-0.04)	-0.007 (-0.25)
T-test: High - Low	1.14	1.84*	1.85*	2.41**
High book leverage				
Inverse Mills Ratio		0.279*** (3.34)		0.408*** (8.20)
ln(ABS/TA)	0.107** (2.08)	0.097** (2.14)	0.025 (0.58)	-0.012 (-0.42)
Low book leverage				
Inverse Mills Ratio		0.005 (0.05)		0.260*** (4.82)
ln(ABS/TA)	-0.047 (-0.41)	-0.024 (-0.29)	0.042 (0.70)	0.065 (1.62)
T-test: High - Low	1.23	1.27	-0.23	-1.56
Low cash balance				
Inverse Mills Ratio		0.083 (0.69)		0.322*** (6.54)
ln(ABS/TA)	0.084 (1.07)	0.102* (1.79)	0.048 (0.99)	0.030 (1.09)
High cash balance				
Inverse Mills Ratio		0.262*** (3.91)		0.284*** (6.31)
ln(ABS/TA)	0.019 (0.27)	0.035 (0.59)	0.056 (1.14)	0.072** (2.09)
T-test: Low - High	0.62	0.82	-0.12	-0.96

Table 5: Effect of moral hazard

This table reports the results of OLS and Heckman regressions with CEO compensation scaled by book value of total assets as the dependent variable and ABS amount scaled by book value of total assets as the independent variable, controlling for the importance of moral hazard prior to securitization. The first step for Heckman regressions is the probit model shown in the Appendix B. Panel A shows the coefficients of $\ln(\text{ABS}/\text{TA})$ for TDC1 and EBC while Panel B shows the coefficients of $\ln(\text{ABS}/\text{TA})$ for bonus and salary. Specifications are similar to those in Table 3. Standard deviations are adjusted for clusters at company level. High operating income, high capital expense, and high R&D expense are indicators of firms being in the highest 50% groups and considered as being subject to severe moral hazard, according to firm-year ranking based on these proxies. Low GEO HH Index and low BUS HH Index are indicators for firms being in the lowest 50% groups and considered as suffering from high moral hazard, according to firm ranking based on these two moral hazard proxies. All variables are defined in detail in Appendix A. To save space t-statistic values are not reported. T-tests of differences between subsamples are computed following the formula: $(b_1 - b_2) / (\text{SE}_1^2 + \text{SE}_2^2)^{1/2}$ where b_1 and b_2 are the coefficients of the two subsamples and SE_1 and SE_2 are the standard errors. The degree of freedom is $m+n-2$. ***, ** and * indicate that estimated coefficients are significant at 1%, 5% and 10% levels, respectively.

Panel A				
	OLS Ln (TDC1 /TA)	Heckman Ln (TDC1 /TA)	OLS Ln (EBC /TA)	Heckman Ln (EBC /TA)
High operating income				
Inverse Mills Ratio		0.283***		0.376
$\ln(\text{ABS}/\text{TA})$	0.050	0.052	0.159	0.159
Low operating income				
Inverse Mills Ratio		0.285***		0.596***
$\ln(\text{ABS}/\text{TA})$	0.022	0.004	-0.294	-0.403**
T-test: High - Low	0.36	0.84	2.17**	0.97
High capital expenses				
Inverse Mills Ratio		0.195***		0.616***
$\ln(\text{ABS}/\text{TA})$	0.003	-0.001	-0.001	-0.065
Low capital expenses				
Inverse Mills Ratio		0.231***		0.296
$\ln(\text{ABS}/\text{TA})$	0.095**	0.105***	0.0151	0.099
T-test: High - Low	-1.22	-1.79*	-0.05	-0.77

(Continued)

Table 5—Continued

	OLS Ln (TDC1/TA)	Heckman Ln (TDC1/TA)	OLS Ln (EBC/TA)	Heckman Ln (EBC/TA)
High R&D expenses				
Inverse Mills Ratio		0.280***		0.508**
ln(ABS/TA)	0.000	0.013	-0.238*	-0.232*
Low R&D expenses				
Inverse Mills Ratio		0.224***		0.022
ln(ABS/TA)	0.040	0.011	-0.092	-0.101
T-test: High - Low	-0.49	0.03	-0.64	-0.57
Low GEO HH Index				
Inverse Mills Ratio		0.205***		0.411**
ln(ABS/TA)	0.007	0.017	-0.213	-0.219*
High GEO HH Index				
Inverse Mills Ratio		0.196***		0.273
ln(ABS/TA)	-0.013	-0.024	-0.082	-0.113
T-test: Low - High	0.27	0.68	-0.63	-0.51
Low BUS HH Index				
Inverse Mills Ratio		0.142**		0.470**
ln(ABS/TA)	0.043	0.046	-0.080	-0.104
High BUS HH Index				
Inverse Mills Ratio		0.312***		0.314
ln(ABS/TA)	0.024	-0.004	-0.067	-0.106
T-test: Low - High	0.23	0.86	-0.05	0.01

(Continued)

Table 5—Continued

Panel B				
	OLS Ln(Bonus/TA)	Heckman Ln(Bonus/TA)	OLS Ln(Salary/TA)	Heckman Ln(Salary/TA)
High operating income				
Inverse Mills Ratio		0.030		0.294***
ln(ABS/TA)	0.092	0.153***	0.025	0.015
Low operating income				
Inverse Mills Ratio		0.321***		0.414***
ln(ABS/TA)	-0.036	-0.078	0.062	0.029
T-test: High - Low	0.97	2.97***	-0.49	-0.33
High capital expenses				
Inverse Mills Ratio		0.195**		0.280***
ln(ABS/TA)	0.034	0.045	0.070	0.053
Low capital expenses				
Inverse Mills Ratio		0.251***		0.407***
ln(ABS/TA)	0.093	0.131**	0.096**	0.095***
T-test: High - Low	-0.53	-0.95	-0.38	-0.91
High R&D expenses				
Inverse Mills Ratio		0.388***		0.333***
ln(ABS/TA)	0.041	0.055	0.010	0.006
Low R&D expenses				
Inverse Mills Ratio		-0.008		0.316***
ln(ABS/TA)	0.127	0.117*	0.068	0.058
T-test: High - Low	-0.71	-0.69	-0.80	-0.98

(Continued)

Table 5—Continued

	OLS Ln (Bonus/TA)	Heckman Ln (Bonus/TA)	OLS Ln (Salary/TA)	Heckman Ln (Salary/TA)
Low GEO HH Index				
Inverse Mills Ratio		0.231***		0.241***
ln (ABS/TA)	0.015	0.040	0.010	0.014
High GEO HH Index				
Inverse Mills Ratio		0.016		0.314***
ln (ABS/TA)	0.065	0.074	0.059	0.025
T-test: Low - High	-0.44	-0.42	-0.75	-0.21
Low BUS HH Index				
Inverse Mills Ratio		0.142*		0.187***
ln (ABS/TA)	0.023	0.044	0.025	0.013
High BUS HH Index				
Inverse Mills Ratio		0.272***		0.401***
ln (ABS/TA)	0.203**	0.187**	0.140**	0.120***
T-test: Low - High	-1.56	-1.64	-1.56	-2.23**

Appendix B

This table reports the first step of Heckman regressions presented in Table 3 to 5. The sample used includes ABS firms and non-ABS firms (firms that have never issued ABS transactions during the sample period). The dependent variable is an indicator that is equal to 1 if the firm has issued an ABS transaction during the fiscal year and zero otherwise. The model includes variables that have been shown to determine the probability of using ABS financing (Lemmon et al., 2010). $\ln(\text{total assets})$ is the natural logarithm of the book value of total assets (Compustat item 6). Receivables are accounts receivable (Compustat item 2). Inventory is the Compustat item 3. Market to book of equity is the market value of equity (Share price (Compustat annually, item 199) * Total number of shares outstanding (Compustat annually, item 54)) divided by Book value of equity (Compustat annually, item 60). Total debt is the sum of long-term debt (Compustat item 9) and debt in current liabilities (Compustat item 34). Earnings are calculated as income before extraordinary items (Compustat item 118) plus deferred income taxes (Compustat item 50) minus preferred dividends (Compustat 19). R&D is R&D expenses (Compustat item 46). No rating is a dummy variable that equals 1 if rating is missing and zero otherwise. Asset volatility is computed as stock return volatility times 1 minus total debt over total assets, where stock return volatility is the annualized standard deviation of stock returns provided by ExecuComp database. Post 2000 is an indicator that equals 1 if the fiscal year is post 2000 and zero otherwise. All the independent variables are measured at the beginning of the fiscal year. Figures in parentheses represent the t-statistic values. ***, ** and * indicate that estimated coefficients are significant at 1%, 5% and 10% levels, respectively.

	Heckman Ln (TDC1/TA)	Heckman Ln (EBC/TA)	Heckman Ln (Bonus/TA)	Heckman Ln (Salary/TA)
<i>Dependent variable: ABS firm indicator</i>				
Ln(total assets)	0.146*** (5.59)	0.138*** (4.95)	0.153*** (5.40)	0.148*** (5.63)
Receivables/ total assets	2.997*** (7.57)	2.999*** (7.07)	2.689*** (6.10)	2.987*** (7.55)
Inventory/ total assets	2.151*** (7.35)	2.162*** (6.96)	1.939*** (6.06)	2.165*** (7.42)
Market to book of equity	-0.000 (-0.06)	-0.000 (-0.04)	-0.000 (-0.09)	-0.000 (-0.07)
Total debt/ total assets	0.927*** (3.42)	1.042*** (3.66)	0.921*** (3.10)	0.910*** (3.33)
Earnings/ total assets	0.085 (0.21)	0.158 (0.36)	0.075 (0.17)	0.070 (0.18)
R&D/ total assets	-2.539* (-1.95)	-2.345* (-1.73)	-2.637* (-1.79)	-2.627** (-2.01)
No rating	-4.886*** (-19.83)	-4.960*** (-18.87)	-4.885*** (-18.26)	-4.902*** (-19.70)
Assets volatility	0.168*** (2.87)	0.214*** (3.77)	0.165*** (2.59)	0.175*** (3.03)
Post 2000	0.450*** (4.31)	0.372*** (3.34)	0.353*** (3.11)	0.455*** (4.36)
Nbr. obs.	7255	7179	7144	7257

Appendix C

This table presents the compensation equations in the simultaneous regressions where a system of three equations is estimated with contemporaneous compensation, securitization, and leverage treated as endogenously determined. Panel A reports the whole sample analysis while Panel B and Panel C present the subsamples analyses controlling for the firm's financial constraints and moral hazard respectively. Specifications in Panel B and Panel C include the same explanatory variables as in Panel A while only coefficients of $\ln(\text{ABS}/\text{TA})$ are reported in order to save space. Securitization equation includes the same independent variable as in the first stage of Heckman regressions (see Appendix A) and are drawn from the study of Lemmon *et al.* (2010). All these variables are defined in Appendix B. The leverage equation includes the natural logarithm of firm's sales, Tobin's Q (Market value of total assets / Book value of total assets), return on assets (Earnings before interest and taxes over total assets = $(\text{EBIT})/\text{TA}$), tangibility (property, plant & equipment over total assets), R&D expenses ratio (R&D over total assets), marginal tax rate (obtained from John Graham's website), CEO age and tenure and Altman Z-score computed as follows: $Z\text{-score} = (0.012 * \text{wcap}/\text{at}) + (0.014 * \text{re}/\text{at}) + (0.033 * \text{ebit}/\text{at}) + (0.006 * \text{MVequity}/\text{lt}) + (0.999 * \text{sale}/\text{at})$ where wcap/at is working capital over total assets, re/at is retained earnings over total assets, ebit/at is earnings before interests and taxes over total assets, $\text{MVequity}/\text{lt}$ is market value of equity over total liabilities, and sale/at are sales over total assets. Tangibility, marginal tax rate and Altman Z-score are instruments excluded from compensation and securitization equations. All these variables are measured at the beginning of the fiscal year. The sample used in the 3SLS regressions is smaller than that in the OLS and Heckman regressions since variables used to compute instruments in the leverage equation are not always available. Figures in parentheses represent the t-statistic values. T-tests of differences between subsamples are computed following the formula: $(b_1 - b_2) / (\text{SE}_1^2 + \text{SE}_2^2)^{1/2}$ where b_1 and b_2 are the coefficients of the two subsamples and SE_1 and SE_2 are the standard errors. The degree of freedom is $m+n-2$. ***, ** and * indicate that estimated coefficients are significant at 1%, 5% and 10% levels, respectively.

Panel A: Global analysis

	3SLS Ln(TDC1/TA)	3SLS Ln(EBC/TA)	3SLS Ln(Bonus/TA)	3SLS Ln(Salary/TA)
ln(ABS/TA)	0.334*** (6.81)	-0.001 (-0.24)	0.144*** (5.64)	0.258*** (9.83)
Market leverage	0.115 (0.29)	-0.299*** (-9.69)		
Book leverage			0.874*** (6.01)	0.780*** (4.87)
Tobin's Q	0.033 (0.78)	-0.005 (-1.32)	0.053*** (2.83)	-0.017 (-1.09)
Stock return volatility	0.194** (2.35)	-0.029*** (-4.41)	0.041 (1.08)	0.139*** (3.42)
Systematic risk	-0.173*** (-2.97)	-0.002 (-0.33)	-0.094*** (-3.03)	-0.105*** (-3.51)
Return on assets	-1.741*** (-3.03)	0.225*** (4.12)	-0.782** (-2.56)	-0.364 (-1.42)
CEO age	-0.003 (-0.91)	-0.000 (-0.70)	-0.001 (-0.67)	-0.001 (-0.64)
Tenure	-0.008* (-1.91)	0.001 (1.40)	-0.004* (-1.88)	-0.000 (-0.28)
CEO ownership	-0.017** (-2.55)	-0.000 (-0.68)	0.002 (0.62)	0.006** (2.22)
CEO chairman	0.101* (1.66)	-0.001 (-0.27)	-0.001 (-0.02)	-0.047* (-1.94)
Board size	-0.028** (-2.56)	-0.001 (-1.19)	-0.019*** (-3.15)	-0.008* (-1.65)
Independent directors (%)	-0.030 (-0.21)	-0.003 (-0.23)	0.118 (1.55)	0.095 (1.39)
Outside blockholder	0.094 (1.61)	0.000 (0.02)	0.008 (0.26)	-0.000 (-0.02)
Industry dummy	YES	YES	YES	YES
Year dummy	YES	YES	YES	YES
Asset dummy	YES	YES	YES	YES
R squared	0.76	0.68	0.38	0.38
Nbr. Obs.	307	308	308	308

(Continued)

Appendix C—Continued

Panel B: Controlling for financial constraints

	3SLS Ln(TDC1/TA)	3SLS Ln(EBC/TA)	3SLS Ln(Bonus/TA)	3SLS Ln(Salary/TA)
High KZ index	0.320*** (4.70)	0.015** (2.30)	0.184*** (4.71)	0.332*** (7.64)
Low KZ index	0.093** (2.15)	-0.001 (-0.24)	0.027 (1.00)	0.092*** (6.22)
T-test: High - Low	2.81***	2.07**	3.33***	5.22***
High book leverage	0.299*** (5.22)	0.007 (1.60)	0.164*** (5.63)	0.299*** (10.61)
Low book leverage	-0.108* (-1.92)	-0.005 (-0.65)	-0.044 (-0.98)	0.064** (2.30)
T-test: High - Low	5.07***	1.37	3.86***	5.95***
Low cash balance	0.151*** (3.01)	0.016*** (3.05)	0.155*** (4.40)	0.174*** (6.31)
High cash balance	0.239*** (3.93)	0.000 (0.05)	0.087** (2.54)	0.094*** (4.55)
T-test: Low - High	-1.11	1.80*	1.38	2.34**

Panel C: Controlling for moral hazard

	3SLS Ln(TDC1/TA)	3SLS Ln(EBC/TA)	3SLS Ln(Bonus/TA)	3SLS Ln(Salary/TA)
High operating income	0.151*** (2.84)	0.010*** (2.69)	0.062*** (3.29)	0.067*** (4.74)
Low operating income	0.389*** (6.07)	-0.012* (-1.89)	0.209*** (5.13)	0.296*** (8.33)
T-test: High - Low	-2.87***	3.01***	-3.28***	5.98***
High capital expenses	0.164*** (2.81)	0.016*** (2.69)	0.062 (1.48)	0.213*** (7.50)
Low capital expenses	0.252*** (5.75)	-0.005 (-1.27)	-0.048** (-2.52)	0.140*** (7.56)
T-test: High - Low	-1.20	2.94***	2.39**	2.18**
High R&D expenses	0.219*** (4.57)	0.004 (0.66)	0.107*** (3.53)	0.169*** (8.36)
Low R&D expenses	0.120** (1.97)	0.019*** (3.95)	0.061** (2.10)	0.212*** (5.99)
T-test: High - Low	1.27	-2.16**	1.11	-1.07

Appendix C—Continued

	3SLS Ln (TDC1/TA)	3SLS Ln (EBC/TA)	3SLS Ln (Bonus/TA)	3SLS Ln (Salary/TA)
Low GEO HH Index	0.221*** (3.38)	-0.009 (-1.19)	0.023 (0.69)	0.124*** (4.99)
High GEO HH Index	0.133*** (2.89)	0.009** (2.01)	0.092*** (2.87)	0.142*** (5.50)
T-test: Low - High	1.10	-2.07**	-1.48	-0.49
Low BUS HH Index	0.219*** (4.22)	-0.007 (-1.22)	0.320*** (4.70)	0.096*** (6.63)
High BUS HH Index	0.238*** (5.43)	0.002 (0.59)	0.110*** (4.18)	0.138*** (6.15)
T-test: Low - High	-0.28	-1.34	0.22	-1.57

Chapter 4

Overcollateralization in Corporate Securitizations*

Abstract:

This paper examines the amount of assets sold (mostly current assets) to the special purpose vehicle (SPV) in the course of corporate asset-backed securitization and its impact of the originator's working capital management. Originators generally over-collateralize the vehicle as a way to enhance the rating of the securities issued. We find that credit risk of the originator as well as macroeconomic conditions significantly affect the level of overcollateralization. Furthermore, true sale treatment of ABS transaction, covenants included in the ABS agreement, and issuance of short-term securities are positively linked to overcollateralization. On the other hand, cash reserves pledged as credit enhancement decrease the need for high overcollateralization. As a result of transferring trade receivables to the SPV, the importance of account receivables on total assets is reduced for the originator. Using a differences-in-difference approach that enables comparison with a control group, we find that ABS firms experience a substantial decrease in accounts receivable days and cash conversion cycle. However, the results show a significant increase in operating performance only in firms that over-collateralize most, but no effect for firms that do not (or only little) over-collateralize their SPV. Combined with other results provided in the study, we conclude that firms that highly over-collateralize their SPV more actively manage their balance sheet by reducing the outstanding debt, in particular short-term borrowing. This allows them to improve some balance sheet ratios, which potentially makes easier compliance with debt covenants.

*This Chapter is a joint work with Armin Schwienbacher (Université Lille 2 & SKEMA Business School). It is submitted to the Financial Intermediation Research Society Conference (FIRS 2013).

4.1 Introduction

A growing body of research provides evidence on the determinants and consequences of asset-backed securitization (ABS) issued by corporations (Lemmon et al., 2010; Riachi and Schwienbacher, 2012)³¹, remaining silent about why ABS financing is that much overcollateralized. For instance, Lemmon et al. (2010) report that industrial firms pledge on average 40% as overcollateralization for their assets sold within ABS transactions. Overcollateralization refers to the securitizing firm (originator) transferring to the special purpose vehicle (SPV) assets whose value is in excess of the face value of securities issued to investors. The device serves as credit enhancement of the transaction by ensuring that the originator retains a residual claim into the vehicle and thereby bears first losses in case the assets are not offering the promised return. The amount of assets involved in ABS is substantial, representing on average 19.25% of total assets of the firm or 52.25% of the originator's on-balance sheet debt (Lemmon et al., 2010). Therefore, relying on higher level of overcollateralization as credit enhancement will depend on whether pledging such amounts of assets involves benefits or costs for the originator. Thus, this study addresses the following, yet unexplored research questions: what determines the extent of overcollateralization in asset-backed securitization? And is the use of overcollateralization costly or beneficial to originators? For the latter, we examine whether overcollateralization affects the originator's working capital management, since assets securitized are accounts receivable in at least 92% of the time (Lemmon et al., 2011). Shedding light into the economic channel of working capital management may help explain extra sources of economic value or costs derived from ABS.

Focusing on secured bank loans, existing literature explains collateral pledging as a means to mitigate either the ex ante asymmetric information or ex post incentive problems arising in lending contracts (Berger et al., 2011). The first theory suggests that asymmetric information about the quality of the borrower's projects may lead to adverse selection and

³¹ This study focuses on asset-backed securitization done by industrial firms. ABS has also been investigated in connection with banks, most recently the studies by Loutskina and Strahan (2009), Piskorskia, et al. (2010), and Maddaloni and Peydró (2011). ABS practices by banks are driven by other factors however. They are therefore excluded from our study.

credit rationing (Stiglitz and Weiss, 1981; Wette, 1983). Collateral then will help signaling the quality of the borrower so that firms with higher quality projects will choose to pledge collateral in exchange of lower risk premiums while those with lower quality projects will opt for unsecured but more expensive debt (see among others Berger et al., 2011). The second theory mainly relates collateral usage to moral hazard (Boot et al., 1991) and monitoring costs regarding the ex post borrower's actions (Manove and Padilla, 1999, 2001), which problems are leading to the lending bank to require collateral pledging from riskier borrowers. Both theories could apply to overcollateralization, although in ABS transactions investors' uncertainties, if any, would revolve more around the quality of securitized assets and the structure of the transaction than the quality of the originating firm. Consistent with the signaling hypothesis, Hill (1996) argues that originators can signal the quality of their securitized assets namely through overcollateralization. On the other hand, as a residual claim in the SPV, overcollateralization will likely depend on the perceived transaction risk, in which case overcollateralization will be governed by ex post motivations. Thus, the first analysis in this paper attempts to identify which signaling or moral hazard predictions helps explaining the observed level of overcollateralization in securitization of corporate assets.

While overcollateralization may have the same underlying motivations as collateral in traditional borrowing, this ABS contracting feature may raise specific implications at the originator's level. Most ABS transactions involve trade accounts receivable and are not one-shot transactions but rather structured as a program lasting several years with continuous transfer of new assets into the SPV. Therefore, the impact on working capital is likely to be substantial. Costs for the originator then depend on its capacity to transfer extra assets to the SPV over time to maintain the committed level of assets. Originators with significant extra assets on the balance sheet most likely will incur little costs; however, originators who would need to generate extra assets (e.g., by selling more goods and thus generating more accounts receivable) may find it more costly to rely on overcollateralization of the SPV. Thus, high overcollateralization potentially leads to significant commitment for the originator to generate and deliver account receivables in the future. By doing so, it may lead to an increase in bad debt, as the originator may boost its

sales by extending accounts receivables to even dubious customers. Alternatively, it may lead to originators bearing greater risk, since they also have substantial residual claims in the SPV. Originators then may instead behave more cautiously when extending accounts receivables to customers, in order to avoid keeping bad debt for themselves.

To investigate these issues empirically, we hand-collect data on corporate ABS transactions from 10-K reports disclosed in EDGAR database of the Securities and Exchange Commission for the period 1993-2006. In line with our research questions and related hypotheses, we limit our sample to asset-backed securitizations that only involve the transfer of current assets. Securitization programs that involve fixed assets are excluded, since they do not affect components of working capital. Our sample reflects the main features of securitization activity within industrial firms, which in the majority use overcollateralization as credit enhancement to support the SPV. Among 599 ABS transactions involving current assets, 40% pertain to originators retaining different proportions of beneficial interests in the assets transferred to the SPV, while 28% are transactions in which all securitized assets are sold to outside investors. Retained interests represent on average 3.4% of total book assets of the originating company and 26% of total value transferred to the SPV, with proportions exceeding 48% of total ABS value for 25% of our sample.

Our analysis first focuses on firm-specific characteristics that affect the usage and amount of overcollateralization. The originator's credit and assets risks clearly matter; the higher the credit and assets risks, the higher the probability to use overcollateralization. Furthermore, overcollateralization level increases with the originator's leverage. These findings highlight how overcollateralization becomes a useful credit enhancement when the firm faces a high cost of capital as a result of investors' uncertainties about its financial worthiness. This mainly follows from the revolving nature of ABS transactions as well as implicit guarantees commonly provided by ABS firms to support their SPVs should the securitized assets fail to generate expected cash flows. The importance of implicit support is further evidenced by the negative impact of cash holding on overcollateralization since high cash balance could be used by the originating firm to reimburse ABS investors for uncollected receivables sold to the SPV.

We next examine how some characteristics of ABS transaction and macroeconomic factors affect the usage and amount of overcollateralization. Covenants regarding the quality of assets sold and financial status of the borrowing firm help predicting the amount of overcollateralization. The basic intuition behind this result is that although these covenants aim at protecting investors, the latter may perceive ABS transactions with such covenants as being subject to high asymmetric information, which increases the required level of overcollateralization. In addition, other credit enhancements, in particular cash deposit, also impact overcollateralization usage, so that pledging guarantee in the form of cash reserve decreases the need for high overcollateralization. Moreover, the type of securities issued to investors also determines how much value should be transferred to the SPV. ABS transactions involving the issuance of short-term securities (such as commercial paper notes) are more over-collateralized than those including the sale of long-term securities as a result of higher exposure to liquidity risk associated with shorter maturities. Finally, the accounting treatment of ABS transaction is also an important determinant, so that the amount of overcollateralization is larger when ABS transaction is accounted for as true sale. This result is consistent with the fact that in true sale transactions, ABS investors have no contractual recourse to the remaining assets of the originator if securitized assets lose their value. This contrasts with situations when ABS transaction is accounted for as secured debt since ABS investors in this case are considered as collateralized debt holders, which provides them access to assets included in the originator's balance sheet. The effect of true sale treatment on overcollateralization usage is further captured by the impact of changes in ABS regulation occurring in September 2000, making true sale qualification more difficult to achieve. Besides ABS regulation, other macroeconomic factors (namely GDP growth, economic cycle, and real interest rate) also affect the use of overcollateralization in ABS transactions.

Finally, we investigate the effect of ABS and overcollateralization on working capital management at the originator level as most of ABS transactions issued by industrial firms imply the sale of current assets such as trade accounts receivable. Using a difference-in-difference approach with propensity score matching, we document a significant effect of ABS and overcollateralization usage on working capital ratios and components. Initiation

of an ABS program and the use of overcollateralization both lead to a substantial decrease in accounts receivable days and the length of the cash conversion cycle. Not surprisingly, this drop is largely a mechanical effect driven by the sale of accounts receivable in ABS transactions using low overcollateralization. However, quicker receivables cycle and cash conversion cycle following highly over-collateralized transactions seem also resulting from a substantial decrease in total value of the originator's balance sheet. Inconsistent with our hypotheses however, holding high overcollateralization in the SPV does not affect the firm's working capital management. Rather, ABS transactions are used by our high overcollateralization firms to achieve their targets in terms of balance sheet management by using ABS proceeds to reduce their debt outstanding, especially short-term borrowing. This ultimately leads to an improvement in their operating performance, as we document in our study. One explanation could be the fact that since riskier firms are more likely required transferring higher value to their SPVs, ABS transactions offer the opportunity for these firms to deleverage. By doing so, these firms manage to improve their financial credit status and some balance sheet ratios, potentially making easier compliance with debt covenants.

This study is related to several streams of research. First, it adds to the literature on corporate finance by alternative means such as asset sales and off-balance sheet financing. Klapper (2006) describes well how factoring of account receivables can be a useful source of financing, especially in better developed countries. Sharpe and Nguyen (1995) argue that leasing helps reducing the cost of financing when firms are facing high cost of external funds. Fabbri and Menichini (2010) show that trade credit can provide lower financing costs than bank debt for firms who have an informational advantage in the event of default of issuer. We extend existing studies by analyzing asset-backed securitization, where (in contrast to factoring) the originator retains an interest in the assets sold. Closer to our study, Lemmon et al. (2010) investigate debt levels of SPVs in connection with asset-backed securitization. They document that the debt level of SPV is related to the risk of assets transferred but unrelated to originator characteristics; this contrasts with findings of Gorton and Souleles (2005) who argue that the pricing of ABS contracts also includes investors' expectations about the default risk of the originator. The study by Lemmon et al. (2010) concludes that ABS is a substitute to debt financing for the originator. Moreover, they show

that prior to the ABS origination firms experienced increase in stock price volatility, leverage and decrease in bond rating. However, the study is silent about how working capital is managed by the originator to sustain its ABS program. This is critical given the choice of relying on ABS (by using current assets) if it is a substitute to debt finance; only firms with enough assets are likely to find ABS to be cheaper than debt finance.

Second, our analysis also offers new insights into the literature on working capital management. Deloof (2003) shows that reduction of accounts receivable and inventories improves profitability (measured by operating profits) of firms. The author offers an insightful discussion on the optimal level of working capital. Extending too easily accounts receivable to customers may lead to bad debt, while a too restrictive policy may deter customers to purchase these goods. This creates a direct channel between working capital management and operating profitability, which measures effects on sales (irrespective of changes in working capital). Our analysis shows that without changing their trade credit policy and the associated impact on sales, firms can improve their operating performance by efficiently managing their balance sheet using devices such as asset securitization.

Finally, the study contributes to the literature stressing the importance of collateral to secure lenders' interests (including Jimenez *et al.*, 2006, Berger and Udell, 1995, Harhoff and Korting, 1998, Berger *et al.*, 2011, and Berger *et al.*, 2011). These studies show that most of the loans are secured by collateral, which is crucial for obtaining debt (this is also why smaller firms are typically financially constrained). As will be discussed in Section 3, our view of collateral is different, since it considers all assets available rather than only those assets contractually related as guarantee to a specific loan.

The remainder of the paper is structured as follows. Section 1 describes different features of ABS programs issued by non-financial firms, including a real example from our sample. Section 2 discusses our motivations and hypotheses. Section 3 describes data and summary statistics while section 4 presents the results. Section 5 concludes.

4.2 The Process of Selling Assets in ABS Programs

To describe how a typical ABS program works in the case of non-financial firms, we provide in the Appendix B an example of ABS transaction from our sample disclosed in the 2003 Delphi Corp's 10-K report, which is a global supplier of electronic technologies.

The Delphi's example highlights the main common features in ABS transactions issued by industrial firms. An ABS program begins with the originating firm creating a special purpose subsidiary that is often capitalized as wholly owned and subject to the restriction from engaging in any business or activity unrelated to acquiring and selling interests in securitized assets. The SPV then enters with a multi-seller conduit (also an SPV) into an agreement under which undivided interests in pools of existing and newly generated assets by the originating firm are sold on an ongoing basis to the conduit. Transactions issued within the ABS program comprise two periods; revolving period during which only interests payments are made to asset-backed securities holders while most of cash collections from the underlying receivables are used by the SPV to purchase additional receivables from the originating firm. Following the revolving period, collections of receivables are used to amortize the outstanding balance of asset-backed securities sold to investors instead of being used to purchase new receivables. This last period is called amortization period. As in a revolving line of credit, the ABS agreement also specifies the maturity of the program, the maximum amount that could be financed, and conditions that could cause the termination of the program by the conduit³².

Most of ABS transactions issued by non-financial firms imply the sale of trade accounts receivable. The conduit finances the purchase of the receivables through the issuance of highly rated commercial paper notes to investors³³. Often, the originating company retains interests (i.e., overcollateralization) in a portion of the receivables transferred to its SPV, which are subordinated to securities held by outside investors. The ABS transaction could be accounted for either as true sale or secured debt. When the transaction is considered as true sale, the assets underlying securities sold to outside

³² These conditions are in general covenants related to default rate, collection rate, and credit rating.

³³ Asset-backed securities issued by non-financial firms include commercial paper notes, but also asset-backed notes, and asset-backed certificates (i.e. pass-through certificates). The latter are more frequent in ABS transactions implying the sale of credit card receivables issued by firms offering credit card service to their customers.

investors are removed from the originator's balance sheet while those underlying residual interests retained by the originator remain included at their fair value either as "retained interests in securitization" or "available-for-sale securities". Note that true sale treatment depends on compliance with the legal requirements for the SPVs to be qualified as bankruptcy remote. In contrast, when the ABS transaction is considered as secured borrowing, cash proceeds raised from the sale of asset-backed securities are included as collateralized debt without removing the underlying assets from the originator's balance sheet.

In the case of the Delphi Corp's transaction, \$3634 million of trade accounts receivable have been transferred to the SPV Delphi Receivables LLC (DR), which in turn sold the receivables to an asset-backed multi-seller conduit. The later issued A1/P1 commercial paper notes of \$2912 to outside investors and notes receivable of \$717 to Delphi Corp for the interests retained in the transferred receivables. The cost of the transaction has amounted to \$5 million. Moreover, the originating company also retains the servicing responsibilities of the receivables. Note that the ABS program provides Delphi Corp with access to higher rating for its ABS commercial paper notes (A1/P1) compared to its long-term debt and short-term debt ratings from Moody's (BBB- and A-3 respectively) during the two-year period of the ABS program. This arises from the guarantee provided by Delphi Corp in the form of overcollateralization as well as the bankruptcy remoteness established for the SPVs used, in particular the one of the multi-seller conduit. Indeed, the conduit is legally unrelated to Delphi Corp, which ensures the true sale qualification of the ABS transaction and thus the separation of the receivables sold from the bankruptcy estate of Delphi Corp. Additionally, the transfer of receivables is without recourse, meaning that Delphi Corp has no contractual obligation beyond the residual exposure to reimburse the conduit or the ABS holders for credit losses from the underlying receivables. With this respect, it is worthwhile noting that a key condition for the ABS transaction to be legally treated as true sale is that the originator should surrender his control over the assets securitized (Financial Accounting Standard No. 140). Since providing high contractual guarantees to cover credit risk pertaining to assets sold may preclude true sale qualification, ABS firms circumvent the issue by making relational or implicit arrangements with their

SPVs to secure the assets (Gorton and Souleles, 2005). This moral obligation to bear credit risk beyond the residual retained interests follows from the fact that default in ABS transaction may impair the firm's future access to the ABS market (FitchIBCA, 1999), especially given that default rate is commonly included in ABS agreement as covenant causing early amortization of ABS program.

4.3 Motivations and Hypotheses on Overcollateralization

4.3.1 Motivations

The literature on collateral focuses on assets explicitly used as guarantee for securing a loan. Using a sample of Spanish loans, Jimenez, et *al.* (2006) report that 51% of the long-term loans and 31% of the short-term loans in their sample involve some form of collateral. Out of the loans with collateral, 92.45% of the long-term loans and 86.65% of the short-term loans are fully collateralized, while the remaining ones are partially collateralized. Other studies provide similar evidence on the relative use of collateral, however in connection with lines of credits instead of term loans (Berger and Udell, 1995, for the US; Harhoff and Korting, 1998, for Germany), although the percentages are somewhat lower. Similarly, Berger et *al.* (2011) use a sample in which 82.5% of their loans are collateralized. The extent to which the loans are collateralized is however unknown. Berger et *al.* (2011) use a similar approach with Bolivian data, where only 24.4% of the loans involve either full or partial collateral.

Compared to collateral in traditional borrowing discussed above, assets transferred to SPVs in ABS transactions are used to achieve a similar purpose; providing guarantee to secure the funds collected from investors. However, ABS financing has important differences from collateralized loan, making its analysis especially interesting. Indeed, in the case of bank loans, assets used as collateral do not reflect the "effective" level of collateralization, since remaining assets also play the role of offering guarantee to lenders. The fact that lenders' claims are senior to shareholders' claims confers extra guarantees from the remaining assets. Thus, considering only those assets that are contractually

specified as collateral does not provide a good estimate of the “effective” collateralization. On the other hand, ABS transactions qualified as true sale offer the opportunity to capture the effective collateralization since ABS investors are legally entitled to assets transferred to the SPV and not the remaining assets in the originator’s balance sheet.

Furthermore, unlike collateralized loans, in ABS financing investors buy securities that have claims on a *pool of assets*, rather than in the traditional sense where specific assets are linked to individual debt claims and other assets allocated by seniority rules. Differences only occur based on seniority rules pertaining to distinct securities, but no specific assets are linked to individual classes of security. This is especially true for revolving ABS that involve trade receivables, since these assets still need to be transferred in the future as they are generated through future sales.

Finally, the level of overcollateralization in SPVs is given by the ratio of retained interests by the originator over total assets transferred to the SPV. Any claims retained by the originator are excess collateral (as long as they are all junior to securities issued to outside investors). In the case of over-collateralized ABS, this ratio must be larger than zero at time of issuance. Interestingly, this ratio is in part related to the SPV’s leverage (debt) ratio, since the originator (the firm) is the residual claimant for all the remaining securities not sold to outside investors and thus hold equity-type of claims. Therefore, factors that determine firm’s leverage could also explain to some extent the level of overcollateralization in the SPV. However, the perspective in terms of decision variable is different. In traditional capital structure considerations, the firm has an investment opportunity to finance. This implies that the amount of cash needed is fixed but the firm decides of the fraction of it raised by debt; the rest is financed with equity. In an SPV, the initiator’s cash need is mostly exogenous (thus the amount of securities issued to outside investors) but the originator endogenously chooses the amount of assets to sell to the SPV. This means that in SPV finance it is primarily the denominator of the leverage ratio that is affected, while in typical capital structure considerations it is the numerator (amount of debt).³⁴

³⁴ Here, we obviously abstract from agency problem and other inefficiency considerations that might affect

4.3.2 Hypotheses

Given the direct (although not exact) links between overcollateralization and SPV's capital structure, it seems reasonable to assume that factors impacting capital structure of any firm also affect the level of overcollateralization of the SPV. The main theories of capital structure are based on financial distress and taxation (trade-off theory, based on Modigliani and Miller's (1958) and (1963) work and subsequently refined), and information asymmetry (pecking-order theory, first developed in Myers, 1984). Also, theories on collateral argue that the level of collateral depends positively on borrower risk and negatively on monitoring needs of lenders.

In this spirit, the quality of the assets securitized should affect the need to overcollateralize, as it directly determines risk level. Nevertheless, assets sold in ABS transactions by non-financial firms should satisfy eligibility criteria that allow designing and maintaining a predetermined profile of the assets portfolio. Depending on the type of assets sold, these criteria aim at minimizing default risk of the portfolio by prohibiting for example the sale of delinquent or defaulted assets, receivables originated to obligors who present significant delinquencies on other receivables, receivables created before the delivery of goods and services to the originator's customer, ... (Moody's, 2002). Therefore, if assets sold to the SPV turn out not to have been eligible at the time of sale, the originator will be mandated to repurchase them according to covenants specified in the sale agreement. Note that these covenants include provisions linked to the quality of assets sold as well as credit risk of the originator. Thus, we control for the existence of such covenants since they will affect the extent to which overcollateralization is requested.

Similarly, the type of assets sold will impact the degree of overcollateralization, as some assets are more prone to volatility risk than others. In particular, we expect that transactions involving the sale of assets such as equipment loans and leases, auto loans, and credit card receivables will tend to include relatively higher level of overcollateralization than those pertaining to assets such as trade accounts receivable. When ABS transaction involves the sale of credit card receivables, overcollateralization is used to absorb monthly

fluctuations in the outstanding balances (Federal Reserve Board, 2010). Thus, overcollateralization level should also be determined by the originator's ability to generate new receivables as firms issuing credit card to their customers are especially exposed to high competition from financial institutions. With respect to auto loans, the value of the underlying vehicles is subject to depreciation risk (DBRS, 2010), which could impair loans payments by the originator's obligors. Moreover, many auto manufacturers extend loans to their obligors at lower rates than market interest rate. This commonly leads to the originator providing the so-called yield supplement account (YSA)³⁵ as interest generated from auto loans could be insufficient to cover the cost of ABS transaction (DBRS, 2010). Therefore, the required level of overcollateralization would be higher since YSA could be provided through pledging extra assets whose collections are devoted to cover interest shortage (DBRS, 2010)³⁶. Finally, regarding equipment loans and leases, the underlying contracts may include large or balloon payments at the end of the loan or lease, which increases the risk of non-payment by the obligor since these balloon payments are larger than the periodic payments (DBRS, 2010).

Other credit enhancement mechanisms put in place also affect the level of overcollateralization, so that ABS transactions including the use of cash reserve or financial insurance are expected to be less over-collateralized than those involving no other credit enhancements apart from overcollateralization³⁷. In addition, the type of securities issued to investors could also determine the level of overcollateralization. ABS transactions involving short-term securities such as commercial paper notes are expected to include higher amount of overcollateralization than those pertaining to long-term securities such as long-term certificates. This could result from the fact that investors in short-term securities are exposed to higher liquidity risk since their principal repayments are very sensitive to delays in receivables collection. Finally, the structure of the SPV itself should impact the extent of overcollateralization, since in some cases the transfer of assets still leads to the

³⁵ The value of the YSA is given by the difference between the discounted value of assets and their notional amount (DBRS, 2010).

³⁶ The YSA could also be provided in the form of cash account financed by the originator at the time of ABS issuance (DBRS, 2010).

³⁷ Note that these credit enhancements are obviously endogenous since they are simultaneously determined.

originator holding rights in these assets. As discussed in the previous section, when the transfer is a true sale, the assets transferred are legally isolated from the bankruptcy estate of the originator. This ensures that the underlying cash flows will be paid to ABS investors in accordance with the scheduled maturity even in the event of the originator's bankruptcy. Thus, one could expect that overcollateralization will be lower in true sale transactions. On the other hand, true sale qualification also implies that the originator should not cover credit losses of non-performing assets beyond the contractual credit enhancements, which makes ABS investors bearing most of the default risk linked to the assets sold. Therefore, one could also expect that true sale transfers will include higher level of overcollateralization.

Next to factors directly related to the structure of the SPV, characteristics of the originator may affect the use of overcollateralization. Financial status of the originator may impact the level of overcollateralization since investors may require more value to be transferred if they perceive that the originator may default and the value of the assets is in one way or another affected by the originator's default. One example could be accounts receivable that may lose value if the originator's default may make the collection of these accounts receivable more difficult.

More importantly, as discussed in the previous section, ABS transactions issued by industrial firms are typically conducted on a revolving basis, meaning that payments to ABS investors are made through collections from newly generated receivables rather than those sold to the SPV at the time of transaction initiation. Thus, financial condition of the originator could substantially affect the performance of securitized assets. Firms with established market and high sale growth rate would be able to provide less volatile assets portfolios for their ABS programs, which could result in lower overcollateralization level. We estimate the effect of the firm's market position by controlling for growth rate of sales and profitability. Similarly, credit risk may also have an impact on the performance of securitized assets as the originating firm should continue to exist in order to generate needed receivables to supply the revolving portfolio. In addition, firms facing financial difficulties may adopt less rigorous trade credit policy in order to boost their sales, which could result in higher rate of delinquent receivables (Moody's, 2002). Finally, as discussed earlier, even when ABS transaction is accounted for as true sale and involves no legal

recourse to the originator, the latter will be willing to provide non-contractual support to its SPV depending on its own financial worthiness. Thus, we expect that the amount of overcollateralization will be increasing in the level of the firm's debt, assets volatility, and decreasing in credit rating and cash balance.

Another factor possibly affecting the use of overcollateralization is the availability of excess assets by the originator. If these assets are not needed, the cost of selling them is small and thus the originator may find it worthwhile to transfer more assets to the SPV than needed compared to when overcollateralization involves costs. In the case of programs with trade receivables, this means that the originator expects to generate an amount of receivables by far larger than what is needed for the SPV.

Finally, as for collateral in traditional borrowing, macroeconomic conditions may also impact the use of overcollateralization. Previous studies show that the use of collateral is more likely during downturns while the amount of collateral increases with the real interest rate (Boot et al., 1991; Jiménez et al., 2006). This follows from the fact that reflecting high risk-free interest rate in higher required collateral instead of higher interest rate allows reducing agency cost of the loan (Jiménez et al., 2006). Accordingly, we control for the effect of macroeconomic conditions by including real interest rate and gross domestic product growth (GDP growth).

Our study is further motivated by the possible relationship between ABS and working capital management, given our sample of ABS transactions involving trade receivables. An unexplored research questions so far is whether originators adjust their working capital management in response to setting up an ABS program, and whether the relationship is affected by the extent of overcollateralization of the SPV. This is particularly intriguing for programs, as their originators contractually commit to supply trade receivables in the future. If these commitments are large compared to the usual level of trade receivables on the balance sheet, originators may be more generous in extending trade receivables. On the other hand, high level of overcollateralization may also push the originators to adopt a more restrictive working capital management policy in order to reduce bad debts frequency. This may result from the fact that pledging high level of

overcollateralization implies that the originator will cover a large part of default risk pertaining to the receivables sold to investors as a result of seniority rules in the SPV. One concern with our approach is that this relationship may partially or entirely be mechanical. A sale of accounts receivable directly impacts the level of working capital without necessarily affecting the way working capital is managed after the sale. To shed further light on the issue, we consider whether it affects operating performance, as it is closely determined by the level of sales. If operating performance improves due to an increase of sales, this will be consistent with the originators granting more liberal trade credit in order to achieve sufficient receivables volume to support their ABS programs. However, if operating performance decreases following a drop in sales, this will be consistent with the originators becoming more rigorous in granting trade credit as a result of higher exposure to default risk through higher overcollateralization.

4.4 Data and summary statistics

4.4.1 Sample construction and data

To construct our ABS sample, we matched 10-K statements provided by Securities and Exchange Commission's EDGAR database with an initial sample of 18,753 firm-year observations from ExecuComp Database, including all US observations between 1992 and 2006 and excluding financial institutions (SIC codes 6000-6999) and regulated utilities (Sic code 4900-4999). We then used a search algorithm searching for different key words related to securitization process³⁸ in the matched 10-K statements. Our algorithm identified 658 firms as ABS candidates, for which we read all annual reports related to the 1994-2006 period to end up with an ABS sample including 828 firm-year observations with all needed ABS variables. As we focus on the use of overcollateralization in ABS transactions and its impact on working capital management, we kept included in our sample only firm-year observations pertaining to securitization of current assets and having available data on Compustat database. Our final sample includes 599 ABS firm-year observations ranging

³⁸ The key words used are the following: securitize, securitise, securitization, and securitisation.

from 1993 to 2006, among which 240 firm-year observations have been identified as ABS transactions implying overcollateralization usage. This ABS sample has been supplemented by 6532 firm-year observations relating to firms that have never used ABS financing during the same period.

Regarding ABS firm's activity, we manually collected from 10-K reports different data including the annual total amount of proceeds received from new ABS transactions, the amount of interests retained by the originator, the types and maturity of assets securitized, the accounting treatment of ABS transactions (true sale or secured debt), whether the firm uses other credit enhancement, the types of asset-backed securities issued to investors, ...

To measure the firm's overcollateralization usage, we rely on the ratio of retained interests over total assets transferred to the SPV, which is the sum of retained interests and cash proceeds received from ABS investors. In addition, to identify the determinants of overcollateralization usage, we first consider different firm-specific characteristics. Among these characteristics, firm's risk could be potentially an important determinant. We therefore consider different measures of risk namely the book value of total debt over total assets, stock return volatility provided on ExecuComp database, and assets volatility.

Regarding working capital management, we analyze different ratios including current and total assets turnovers, accounts receivable days, accounts payable days, inventory days, and cash conversion cycle. Moreover, to explain the observed effects on these ratios, we additionally examine different components of working capital namely the ratio of accounts receivable and inventory over current assets, the ratio of current assets over total assets, and the ratio of current liabilities over total assets. Finally, as done by Deloof (2003), our measures of operating profitability are net and gross operating incomes scaled by total assets minus financial assets. Net operating income is computed as sales minus costs of goods sold including depreciation and amortization while gross operating income is obtained by adding depreciation and amortization to net operating income (see Deloof, 2003). Detailed description of all these and other variables used in our empirical analysis is provided in the Appendix B.

4.4.2 Summary statistics

Table 1 provides summary statistics on ABS amounts in our sample. Annual cash proceeds generated from ABS transactions averages 11% of firm's total book assets with a median value of about 3.6%. The data also show large variations in the use of ABS financing by firms in our sample, with 10% of them receiving hardly 0.6% of cash from their securitizations while 10% of firms generating more than 25% of ABS cash flow relative to their total book assets. Our ABS sample with available data on overcollateralization usage (407 firm-year observations among a total of 599) includes both firms that retain residual interests on their securitized assets and those that do not. Retained interests average 3.4% of total book assets and 26% of total value transferred to the SPV, with at least 25% of firms retaining no residual interests on their securitized assets. The last two rows of table 1 also show that the value of assets pledged as overcollateralization is substantial for 25% of our firms, exceeding 95% and 48% of ABS cash proceeds and total ABS assets respectively.

--- TABLE 1 ABOUT HERE ---

Table 2 shows summary statistics on firm-specific characteristics used to estimate the determinants of overcollateralization usage and value. All these variables are lagged one year. Panel A reports characteristics of our ABS sample while Panel B displays those related to only firms identified as overcollateralization users. In the two panels, we provide industry median values computed based on a sample including 6532 non-ABS firms that operate in the same industries as our ABS firms³⁹. The average ABS firm size based on book assets is \$9.7 billion and the median size is about \$2.7 billion, which is very large compared to the industry median (only \$0.7 billion). The first row of Panel B shows that these large figures mainly come from the sub-sample of overcollateralization users who exhibit mean and median firm size ranging from \$6.3 billion to \$9.7 billion and from \$2.4 billion and \$2.5 billion respectively. When examining some types of firm's assets, accounts receivable and inventories both represent proportions ranging from 16% to 20% of total

³⁹ For each ABS firm, we calculate the median value for all non-ABS firms operating in the same industry and the same year. These industry medians are then averaged to determine the mean value across the full sample or subsample.

book assets in ABS sample as well as overcollateralization users sub-sample, which is relatively high compared to the industry median values (between 12% and 16%). This suggests that ABS and overcollateralization candidates are companies generating large stock of liquid assets compared to other firms in the same industry. On the other hand, cash holding ratios of our ABS and overcollateralization samples are smaller than their industry medians (almost 4% to 6% of total assets compared to industry values ranging from 16% to almost 20%).

--- TABLE 2 ABOUT HERE ---

As mentioned above, we consider different proxies for firm's risk namely credit risk measured as the book value of total debt over assets, stock return volatility, and assets volatility. Book leverage is quite high (0.30) in our ABS and overcollateralization samples while assets and stock returns volatilities are relatively small (between 1.02 and 1.45) compared to the industry medians. Finally, the rest of Table 2 shows that our ABS firms pay on average relatively higher dividend yield but exhibit less profitability (see earnings ratio and operating income), marginal tax rate, and R&D expenses compared to other firms in the same industry.

Panel C also provides a comparison of firm characteristics between the two sub-samples according to the level of overcollateralization. Firms pledging higher overcollateralization ratios than the sample median are considered as high overcollateralization users while those exhibiting lower ratios than the sample median are sorted in the low overcollateralization group. The last column of Panel C displays t-test of the mean differences between the high and low overcollateralization groups. Firms pledging higher overcollateralization amounts than the sample median are larger than those using lower overcollateralization than the sample median. More interestingly, compared to the sub-sample using lower overcollateralization ratios, firms belonging to the higher overcollateralization group hold higher debt and lower cash ratios in their balance sheet. This gives indications on some potential determinants of overcollateralization amount. Furthermore, the lower overcollateralization group exhibits relatively similar levels of profitability and R&D expenses as the higher overcollateralization group, although both

groups are less profitable and R&D-intensive than other firms in the same industries.

--- TABLE 3 ABOUT HERE ---

Table 3 provides summary statistics on working capital components and ratios for our ABS firms (Panel A) and overcollateralization users (Panel B). All variables used are lagged one year. Both ABS and overcollateralization users display significantly lower current and quick ratios and higher inventory and trade receivables over current assets compared to other firms operating in the same industries. Panel A and Panel B also show that current assets represent 42% to 46% of total assets for our ABS and overcollateralization samples while their industry medians range from 54% to 57%. In addition, ABS and overcollateralization users' balance sheet exhibits relatively higher proportions of current liabilities over total assets (between 27% and 29%) compared to the industry median (21% to 23% of current liabilities over total assets). The rest of Panel A and Panel B of Table 3 highlight significant differences in the working capital ratios between our ABS samples and their respective industries. ABS users tend to have higher total assets and current assets turnovers, longer inventory and accounts payable cycles, and shorter accounts receivable cycle compared to their industry medians. Regarding cash conversion cycle, our ABS and high overcollateralization firms tend to have shorter cash conversion cycle, on average, than other firms in the same industries while low overcollateralization users display relatively similar cash conversion cycle as their industry medians.

Finally, Panel C also compares summary statistics on working capital components and ratios between high and low overcollateralization groups. Compared to the lower overcollateralization group, firms pledging higher overcollateralization exhibit lower current assets and liabilities over total assets, and higher current assets turnover. Note that firms in the high overcollateralization group manage to have, on average, shorter receivables and cash conversion cycles (almost 50 and 64 days respectively) than other firms operating in the same industries (around 59 and 76 days respectively). Conversely, the low overcollateralization group exhibits relatively similar receivables and cash conversion cycles as their industry peers (about 50 and 66 days respectively).

4.5 Empirical Results

4.5.1 Empirical design

To examine the determinants of overcollateralization usage in ABS transactions, we first use probit regressions where the dependent variable is a dummy equal to one if the firm retains an interest in the transferred assets to the SPV. The ABS sample used includes only first-time securitizers, thus firm-year observations following the initiation of ABS program are dropped while all observations of non-ABS firms are included. Note that the control sample (for which the dependent variable equals zero) includes non-ABS firms as well as firms initiating ABS programs without using overcollateralization as credit enhancement. Specifically, we estimate the probability of pledging overcollateralization when issuing first-time securitization using the following probit regression specification:

$$\text{Pr}(\text{OVER})_{i,t} = \beta_1 X_{i,t-1} + \beta_2 Y_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where $\text{Pr}(\text{OVER})_{i,t}$ is the probability of using overcollateralization (our variable *overcollateralization dummy*), $X_{i,t-1}$ is a vector of firm's characteristics prior to the securitization year, and $Y_{i,t-1}$ is a vector of macro-economic conditions prior to the securitization year. In line with our hypotheses, firm's characteristics include variables estimating the level of the firm's risk as well as those used in the literature to estimate the determinants of ABS usage (see Lemmon et al., 2010). Thus, we include firm size measured as the natural logarithm of total assets, book leverage, market-to-book ratio of equity, dividend yield, growth rate of sales, marginal tax rate, the firm's assets risk, receivables, inventory, cash, earnings, R&D expenses, all scaled by total assets, and a dummy for firm's credit rating (No rating). Furthermore, since retained interests are used as an insurance against potential future losses in value of securitized assets, they can be viewed as extra collateral pledged to secure capital provided by ABS investors. Therefore, we additionally include determinants of collateral use that are relevant to our study, namely macroeconomic factors such as GDP growth, real interest rate, and economic cycle measured as the absolute difference between GDP growth and the average GDP growth

over the sample period (see Jiménez et al., 2006). Finally, as done by Lemmon et al. (2010), we also add a dummy equal to one if the initiation year of ABS program is post-2000 in order to capture the effect of changes in accounting rules regarding the treatment of SPVs and sale of assets. All specifications include industry dummies.

To investigate the determinants of the extent of overcollateralization, we use the following OLS regression:

$$OVER_{i,t} = \beta_1 X_{i,t-1} + \beta_2 Y_{i,t-1} + \beta_3 Z_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

where $OVER_{i,t}$ is the amount of retained interest over total ABS assets (i.e., the sum of retained interests and ABS cash proceeds) (our variable *overcollateralization*), $X_{i,t-1}$ and $Y_{i,t-1}$ are vectors of firm's characteristics and macro-economic factors respectively. These vectors include the same variables as for the probability of using overcollateralization. Again, all these variables are lagged one year. Additionally, we include $Z_{i,t-1}$ which represents a vector of characteristics of ABS transaction, namely the type of assets securitized, credit enhancements used to support the SPV, accounting treatment of the ABS transaction, the type of securities issued, and covenants included in the sale agreement. The sample used here comprises our ABS sample with non-missing data on overcollateralization usage. All specifications include industry dummies. Standard errors are clustered at the firm level.

Finally, to estimate the effect of ABS and overcollateralization usage on working capital management and operating performance, we use difference-in-difference approach with propensity score matching. The matching approach is commonly used to estimate the causal effects, especially in connection with policy impact analysis, but some previous studies in the finance literature have also applied this methodology (see among others Cheng, 2003, and Villalonga, 2004). To implement the matching method, we need to identify the treatment which is the decision of initiating an ABS program (when estimating the effect of ABS) or using overcollateralization (when estimating the impact of overcollateralization), the treated group (first-time securitizers or first-time overcollateralization users), and the untreated group (firms that have never used ABS or overcollateralization). Untreated group allows measuring what would have happened to the

working capital and operating performance of ABS firms had they not securitized or used overcollateralization. Thus, treated and untreated groups should have exactly the same pre-treatment characteristics, which could be achieved through matching between the two groups. However, a large set of conditioning covariates may make the matching difficult. Rosenbaum and Rubin (1983) suggest that dimensionality problem can be reduced using propensity scores, which represent the probability to receive the treatment (namely issuing a first-time securitization or overcollateralization) conditional on the observable pre-treatment covariates. These propensity scores are estimated from the following logit model:

$$P(\text{Treatment}_i) = E(\text{Treated}_i | X_{i,t-1}) = \Pr(\text{Treated}_i = 1 | X_{i,t-1}) \quad (3)$$

where $P(\text{Treatment})_i$ is the probability that firm i chooses to use an ABS program or overcollateralization for the first time conditional on observable firm characteristics $X_{i,t-1}$ measured in the year prior to the ABS program initiation⁴⁰. To match our ABS firms to non-ABS controls, we employ a Kernel algorithm that matches each ABS firm to a weighted sum of all control firms that are in the same industry and the same year, with highest weight being assigned to controls with propensity scores closest to the ABS firm's one.

Once the matching is achieved, we implement difference-in-difference analysis which measures the causal effect of securitization or overcollateralization on working capital management and operating performance. This causal effect can be presented as:

$$\alpha = E(\Delta Y_{i,t}^1 | \text{Treatment} = 1, X_{i,t-1}) - E(\Delta Y_{i,t}^0 | \text{Treatment} = 0, X_{i,t-1}) \quad (4)$$

where $E(\Delta Y_{i,t}^1 | \text{Treatment} = 1, X_{i,t-1})$ is the mean working capital and operating performance change of the first-time securitizers or overcollateralization users at time t , $E(\Delta Y_{i,t}^0 | \text{Treatment} = 0, X_{i,t-1})$ is the weighted mean working capital and operating performance change of the control group at the same time t , and $X_{i,t-1}$ is a vector of observed pre-treatment covariates. Note that the causal effect measured here represents the

⁴⁰ The covariates used in the logit model are firm's characteristics identified to determine the decision to issue ABS transactions when measuring the effect of ABS initiation (Lemmon et al., 2010) and the identified determinants of overcollateralization usage table 5 when measuring the effect of overcollateralization. Standard errors are robust and clustered at the firm level.

difference in working capital and operating performance before and after securitization (difference-in-difference), where the first difference removes the unobserved heterogeneity between ABS firms and their controls and the second difference measures the effect estimate (Smith and Todd, 2005).

4.5.2 Determinants of overcollateralization usage

We estimate equations explaining the probability of using overcollateralization as a function of firm characteristics as well as macro-economic conditions. The results are reported in Table 4. Coefficients represent marginal effects of the independent variables on the probability of a firm initiating an ABS program with retained interests.

--- TABLE 4 ABOUT HERE ---

The first row of Table 4 shows positive and significant effect of firm size, indicating that large firms are more likely to issue ABS transactions with overcollateralization. Moreover, there is a leverage effect; high leverage increases the probability of using overcollateralization as credit enhancement. The result provides support to the hypothesis according to which high credit risk of the originator increases perceived risk of the assets involved in ABS programs as the latter are conducted on a revolving basis. The revolving nature of these transactions makes the performance of securitized assets ultimately related to the quality of newly generated assets rather than those sold at the time of transaction initiation. Furthermore, the quality of receivables collection should also depend on the financial status of the firm as most of the time industrial firms using ABS financing retain servicing responsibility of securitized receivables. Originators facing financial difficulties could be tempted to keep collections from securitized receivables rather than transferring them to the SPVs. Finally, as discussed earlier, it has been argued that even in true sale transactions, ABS firms are commonly observed providing implicit (non-contractual) guarantees to support the SPV in states of the world when contractual credit enhancements turn out to be insufficient to cover losses in value of securitized assets (Gorton and Souleles, 2005). As a result, the price of asset-backed securities also includes investor's expectations about the default risk of the originating firm (Gorton and Souleles, 2005).

Thus, our results suggest that overcollateralization becomes more helpful in reducing the cost of ABS capital when firms are highly levered since high level of debt may increase credit risk, thus the probability of default, casting doubt on whether implicit guarantees would be honored.

Moreover, the variable sigma of firm's assets exhibits positive and significant effect on the probability of using overcollateralization, showing that pledging more assets through overcollateralization is more valuable when firm's assets are highly risky, which provides additional support to the above point of views. The evidence is further supported by the results regarding the ratio of cash over assets. Coefficient estimates are consistently negative and significant, suggesting that holding more cash somewhat substitutes to pledging overcollateralization given the precautionary role of cash holdings well documented in the literature (see Bates et *al.*, 2009). Note that cash ratio displays stronger marginal effects than those obtained for other firm-specific variables, which indicates that the firm's ability to support its SPV if securitized assets lose some of their value is very important in explaining overcollateralization usage in ABS transactions.

On the other hand, the coefficient on the dummy variable no rating in specification 2 is significantly negative. In addition, when controlling for the level of firm's rating, we find that companies with ratings BBB are more likely to use ABS transactions involving overcollateralization. This means that while overcollateralization could be used to reduce the cost of ABS financing, it seems however that a minimum level of credit quality is required to access ABS market even when extra assets are pledged as collateral for asset-backed securities. On the other hand, the coefficient estimates of sale growth and profitability (earnings over total assets) are insignificant, suggesting that overcollateralization usage is not impacted by the market position of the originator. Finally, the result regarding R&D expenses (specification 1), although not consistent, indicates that overcollateralization users in our sample are less R&D-intensive, which confirms previous findings on ABS firms in general (Lemmon et *al.*, 2010).

To explore whether availability of excess assets could explain the use of overcollateralization, we first control for the ratio of accounts receivable since most

transactions in our sample involve the sale of this type of assets. Specification 3 of Table 4 reports negative and insignificant coefficient on the ratio of accounts receivable over total assets. Second, we test the effect of excess receivables by using the difference between the firm's receivables ratio and its industry mean value. The coefficient estimate is still negative and insignificant (not reported), which is inconsistent with the hypothesis relating overcollateralization usage to availability of spare assets.

Macroeconomic conditions may also affect the decision of using overcollateralization in ABS transactions since previous literature on debt collateral has found significant effects of some macroeconomic factors (see Jiménez et al., 2006). To explore the issue, we control in the last three specifications of Table 4 for GDP growth, real interest rate, economic cycle, and time period. The coefficient on the dummy post-2000 is negative and highly significant, showing that changes in ABS regulation occurring around this period have affected firms' incentives to issue ABS transactions with overcollateralization. More specifically, the FASB issued in September 2000 Statement No. 140 as a replacement of Statement No.125, limiting true sale treatment to ABS transactions using QSPE "qualified special purpose entity" (Hartgraves and Benston, 2002). The latter is defined as a special purpose vehicle with at least 10% of the fair value of beneficial interests being held by outside parties excluding the originating firm, its affiliates, and agents (Hartgraves and Benston, 2002). Thus, as true sale qualification becomes more difficult to achieve, firms are less likely to issue ABS transactions involving the use of overcollateralization as credit enhancement. In the following section, we highlight why the use of overcollateralization in ABS transaction is positively related to its true sale treatment.

As for the use of collateral in traditional debt financing (see Jiménez et al., 2006), overcollateralization usage is negatively related to real interest rate, suggesting that ABS firms are less likely to pledge overcollateralization in periods of higher interest rates. Since riskier ABS firms are more likely to pledge overcollateralization, the observed effect of real interest rate could be explained by the fact that when interest rates are high, availability of credit and financing is limited on capital market (Jiménez et al., 2006). This makes ABS investors preferring asset-backed securities issued by safer firms. On the other hand,

overcollateralization is positively linked to GDP growth and the economic cycle, which is contrasting with previous findings on the use of collateral in bank lending (Jiménez *et al.*, 2006). One explanation of our results could be the fact that in periods of strong GDP growth capital flows are higher, which makes investors, on average, less risk-averse.

4.5.3 Determinants of the extent of overcollateralization

In this section, we investigate the determinants of the amount of retained interests over total ABS assets (i.e., the sum of retained interests and ABS cash proceeds). The model used is OLS regression with standard errors clustered at the firm level. The results are reported in Table 5. Panel A shows the effects of firm-specific and macroeconomic conditions while Panel B and Panel C report the results when we further control for ABS characteristics. Note that since our independent variable is censored at zero, we also report in the last column (Tobit) of Panel A the results of Tobit regression of the amount of retained interests over total ABS assets on the main potential determinants.

--- TABLE 5 ABOUT HERE ---

Consistent with the previous results on the probability of overcollateralization usage, Panel A shows significant and positive coefficients on firm's size and leverage while coefficient estimates on R&D ratio are significantly negative. The larger the size of the firm, the higher the value of assets transferred to the SPV as overcollateralization. Similarly, retained interests ratio increases with the originator's leverage. This confirms the idea that high credit risk results in large investors' uncertainties regarding the quality of ABS transaction. The revolving structure of ABS programs and the existence of implicit guarantees make ABS investors requiring higher value to be transferred to the SPV when they perceive high default risk of the originator. In addition, the findings on cash holding show that the firm's ability to support its SPV, by using its available cash to pay uncollected proceeds from securitized assets, is an important determinant of overcollateralization amount. Indeed, the coefficient estimates on cash ratio are consistently negative, which provides further support to the substitution effect between the originator's cash holding and overcollateralization. In the same vein, dividend payout displays negative and sometimes

significant effect (in Panel B and Panel C) on the overcollateralization amount, suggesting that ABS firms paying high dividend to their shareholders are not required to transfer high value to their SPVs in order to cover securitized assets risk. This follows from the fact that high dividend payout conveys good signal about the firm's financial health and its future profitability. The evidence is further supported by the positive coefficient estimates on the rating indicator and marginal tax rate in Panel A. Note that marginal tax rate captures the effect of leverage in the sense that firms with high marginal tax rate tend to contract more debt in order to maximize their tax shield. On the other hand, as for the probability of overcollateralization usage, we find no supporting evidence on the link between the existence of spare assets and the extra value transferred to the SPV since the coefficient estimates on receivables ratio are insignificant.

The last two specifications OLS regressions reported in Panel A show the results when we further investigate the impact of economic conditions. Real interest rate is positively and significantly affecting the amount of overcollateralization. This could be explained by the fact that firms prefer reflecting high risk-free interest rates in higher overcollateralization amount rather than higher interest rates (Jiménez *et al.*, 2006), which confirms the view that overcollateralization helps reducing the cost of ABS financing. In addition, GDP growth and economic cycle exhibit positive and significant effect on the level of overcollateralization. This suggests that in upturns (GDP growth is above the trend) ABS firms are required to retain higher proportions of interests in the assets securitized. Note that the use of Tobit regression instead of OLS model (see the last specification of Panel A) does not qualitatively affect our results.

In Panel B and Panel C, we test the effect of different characteristics of ABS transaction on the amount of overcollateralization. True sale indicator exhibits large positive and significant effect on the value of assets transferred to the SPV. The results suggest that the amount of extra assets needed to cover ABS risk is larger when the transaction is accounted for as true sale than secured debt. This follows from the fact that when ABS transaction meets the legal requirements for being qualified as true sale, investors in asset-backed securities have no contractual recourse to the originator's remaining assets if securitized assets lose a part or all of their value. Conversely, when ABS

transaction is accounted for as secured debt, ABS investors are considered as holders of collateralized debt, which guarantees them access to the firm's assets depending on the seniority level of their claims. To control for the interaction between the level of default risk and true sale qualification of ABS transaction, we also report in the last specification of Panel B the result when we add an interactive term between true sale dummy and Altman's Z-score as proxy for default risk probability. Note that the lower the Altman's Z-score, the higher the firm's default risk. The coefficient is positive and insignificant, suggesting that true sale transactions are on average highly over-collateralized regardless the level of the default risk of the originating company. With respect to the effect of other credit enhancements, as expected using guarantee in the form of cash deposit lowers the amount of overcollateralization needed to support the assets transferred to the SPV. On the other hand, financial insurance exhibits positive and insignificant effect on overcollateralization level. The result could be explained by the fact that while pledging financial insurance partially secures payments to ABS investors, the latter are still junior to interests and principal payments to insurance companies (DBRS, 2010). Furthermore, covenants show positive and significant effect on overcollateralization, suggesting that inclusion of such covenants in the sale agreement signals a high perceived risk associated with ABS transaction, which increases the level of required overcollateralization. However, the effect of the type of assets securitized is very weak. Only auto loans exhibit weak and positive effect on the amount of overcollateralization. Trade receivables are negatively and insignificantly related to the level of overcollateralization while equipment loans and leases, and credit card receivables are positively and insignificantly linked to overcollateralization. Finally, as expected, the results pertaining to the type of securities issued to investors show positive and significant effect of short-term securities and non-significant effect of long-term securities on overcollateralization level. As mentioned earlier, the basic intuition of our results is that in the case of short-term securities, investors are subject to liquidity risk as any delay on receivables collection could impair principal payments to investors, which increases the level of needed support provided through overcollateralization.

4.5.4 Effect of ABS initiation on working capital management

Given the fact that our sample involve the sale of accounts receivable, a natural question is whether ABS usage affects the way working capital is managed by the firm. Therefore, we explore the impact of ABS initiation on different working capital components and ratios using difference-in-difference approach with propensity score matching. The propensity scores represent the probability to initiate an ABS program and are estimated from a logit model including conditional variables measured in the year prior to ABS program initiation⁴¹. To match our ABS firms to non-ABS controls, we employ a Kernel algorithm that matches each ABS firm to a weighted sum of all control firms that are in the same industry and the same year, with highest weight being assigned to controls with propensity scores closest to the ABS firm's one.

--- TABLE 6 ABOUT HERE ---

The results are presented in Panel A of Table 6. The first and second columns report the mean values for the matched controls and ABS firms respectively in the year prior to ABS initiation while the fourth and fifth columns display the means for the controls and ABS firms at the year-end following ABS initiation. Additionally, we report the pre- and post-initiation differences between the ABS firms and their matched controls in the third and sixth columns, respectively. The pre-initiation mean difference reflects the pre-existing differences between our ABS firms and the matched controls while the post-initiation difference measures the effect of ABS initiation, ignoring the pre-existing differences between ABS and non-ABS firms. Finally, the last column reports the difference-in-difference, which measures the effect of ABS initiation, controlling for the pre-existing differences between ABS firms and their matched controls as well as the general time trend that could affect working capital regardless of whether the firm has initiated an ABS program or not.

Following ABS initiation, ABS firms experience significant decrease in the ratio of

⁴¹ The covariates used in the logit model are firm's characteristics identified by previous literature to determine the decision to issue ABS transactions (Lemmon et al., 2010). These variables are those used in table 5 Panel A, excluding cash over total assets. Standard errors are robust and clustered at the firm level.

current assets over total assets and significant increase in current assets turnover compared to their non-ABS controls. As expected, this change mainly comes from a substantial reduction of the proportion of trade receivables among current assets, which drops by more almost 13% compared to a small decline of 1.2% within matched control firms. As a result, ABS firms manage to shorten their accounts receivable and cash conversion cycles drastically, so that the number of days of accounts receivable and cash conversion cycle decreases by 16.2% and almost 18.8% respectively following ABS initiation.

Given these results, one could expect that the use of securitization as accounts receivable management policy could add value to the firm. This follows from the fact that selling its receivables in exchange of immediate cash allows the firm to extend payment terms to their customers and thus stimulate sales without locking up its financial resources in receivables investment. Furthermore, it has been argued that operating profitability could be improved through a better management of working capital by reducing the cash conversion cycle (see Shin and Soenen, 1998, and Deloof, 2003).⁴² We therefore investigate whether the observed effect on accounts receivable and cash conversion cycles ultimately leads to an improvement in the firm's operating profitability. As done by Deloof (2003), we consider two measures of operating profitability, namely net operating income – which corresponds to sales minus costs of goods sold – and gross operating income – which further includes depreciation and amortization. Both are scaled by total assets minus financial assets. Again, we employ a difference-in-difference approach with propensity score matching using our ABS sample and its matched non-ABS firms. The results are reported in Panel B of Table 6. As expected, ABS firms experience an increase in both net and gross operating income amounting 2.11% and 2.39% respectively. However, this improvement in operating income is still insignificant compared to the observed performance change in non-ABS controls.

⁴² We focus on operating performance as opposed to cash flow growth to avoid capturing purely mechanical effects that could arise when considering cash flows. Indeed, working capital changes are directly linked to cash flows by definition. For operating performance, any effect from changes in working capital must come from strategic effects that result into changes in sales.

4.5.5 Effect of overcollateralization usage on working capital management

After exploring the effect of ABS initiation on working capital management and operating performance, we now aim at identifying whether this effect is homogenous within our ABS firms regardless the level of overcollateralization used to support securitized assets. As above, we split our overcollateralization users sample into two groups according to their ratio of retained interests over total ABS assets. Thus, firms pledging more retained interests than the sample median are considered as high overcollateralization users while those exhibiting lower retained interests ratios are sorted in the low overcollateralization group. Again, we use the difference-in-difference approach with propensity score matching to measure the effect of overcollateralization on working capital management and operating profitability. The results are presented in Table 7 and Table 8. In both high and low overcollateralization subsamples, ABS initiation leads to a significant increase in current assets turnover and a substantial decrease in receivables and cash conversion cycles. However unlike high overcollateralization group, low overcollateralization group experiences a significant decrease in trade accounts receivable over current assets and current and quick ratios. All these results combined suggest that the observed drop in receivables days and cash conversion cycle in low overcollateralization group is a mechanical effect resulting from the sale of accounts receivable to the SPV. On the other hand, in high overcollateralization group, while current and total assets turnovers are both improving, the ratios of current assets, trade receivables, and current liabilities over total assets show a weak decrease following ABS initiation. This results from a substantial drop in total assets that is not fully explained by the mechanical effect of the sale of trade accounts receivable to the SPV. Further investigation of the examined firms shows that high overcollateralization group manages to decrease the value of total assets through two channels. The first one is straightforward: through the transfer of trade receivables to the SPV. The second is through the use of ABS proceeds to reduce significantly outstanding debt, in particular short-term borrowing (see Panel C of Table 7 compared to Panel C of Table 8), which allows these firms to decrease the total balance sheet value. As a result, the book value of total assets decreases substantially, leading to an increase of assets turnover and ultimately an improvement of operating profitability. Indeed, net and gross operating

incomes increase by almost 12.42% and 12.5% respectively in firms using high overcollateralization compared to 2% drop within their industry peers.

--- TABLE 7 ABOUT HERE ---

--- TABLE 8 ABOUT HERE ---

Overall, our results suggest that while selling receivables through ABS transactions leads to a mechanical improvement of working capital ratios, in particular quicker accounts receivable cycle and cash conversion cycle, it seems that the effect on operating profitability is mainly driven by the use of additional liquidity generated through ABS to repay debt outstanding. Furthermore, the positive impact on operating profitability is only observed in firms using high overcollateralization. One explanation is that as shown above, riskier firms are more likely required to pledge higher overcollateralization ratios to support their SPVs. Thus, a natural use of ABS proceeds by these firms is to repay existing debt, which helps them to improve their financial credit status.

4.6 Conclusion

Overcollateralization is a common credit enhancement mechanism used in ABS transactions. Non-financial firms retain on average 40% of the value transferred to their SPVs (Lemmon *et al.* 2010). While previous studies have focused on the use of collateral in traditional loans and credit lines, in this paper we examine the determinants and some consequences of overcollateralization usage, arguing that the device provides a unique opportunity to measure the effective collateralization given the specific structure of ABS transactions. Our results first show that the probability and amount of overcollateralization is closely linked to credit risk of the originator of the SPV. Riskier firms are required to retain higher value in assets sold to their SPVs as a result of the revolving structure of ABS transactions and the existence of implicit guarantees well documented by practitioners and academics.

In addition, macroeconomic conditions are factors determining overcollateralization

usage. GDP growth and economic cycle both affect positively overcollateralization. Furthermore, the amount of overcollateralization is increasing in real interest rate, confirming the idea that mitigation of the borrowing agency costs leads to higher risk-free interest rate to be translated in higher collateralization rather than higher interest rate.

Finally, some characteristics of ABS transaction also impact the use of overcollateralization, so that true sale treatment increases the value of retained interests in the assets securitized as a result of the absence of contractual recourse to the remaining assets of the originator. Moreover, inclusion in ABS agreement of covenants pertaining to the quality of assets sold and credit status of the firm leads to higher level of overcollateralization while pledging cash reserve as guarantee decreases the required amount of overcollateralization. In addition, ABS transactions involving the sale of short-term securities are on average highly over-collateralized given the higher associated liquidity risk.

When examining consequences on working capital management, we find that ABS initiation and the use of overcollateralization both result in an improvement of working capital ratios of originators, in particular receivables and cash conversion cycles. While an obvious and direct channel is through the reduction of accounts receivables by selling them to the SPV, our results also show how ABS could help achieving balance sheet management targets, especially in firms pledging higher amounts of overcollateralization. Indeed, as the latter are on average riskier firms, they use ABS proceeds to repay their debt outstanding, which allows them to reduce their balance sheet value (by reducing the amount of debt outstanding with use of the cash received from the ABS) and improve some accounting ratios including operating performance. This could be especially valuable for firms that are close to violating debt covenants.

In the first analysis of this paper, we focus on the determinants of overcollateralization, using a probit model without expressly considering the decision of using ABS financing at the first place, although all factors that have been found to determine the decision of issuing ABS have been carefully included in our specifications. Another interesting way to approach the question would be the use of a nested multinomial

logit model (MacFadden, 1981) where the probability of pledging overcollateralization will be conditional on the probability of using ABS financing. The decision process will be structured as a tree, so that at the upper level of the tree are two alternatives, using or not ABS financing, and at the lower level of the tree are two alternatives, using or not overcollateralization as credit enhancement of the ABS transaction. The nested multinomial model relaxes the irrelevance of independent alternatives property of the logit model and allows for correlations among error terms across different levels (MacFadden, 1981), which will be appropriate to the analysis of overcollateralization usage in connection with that of ABS.

References

- Bates T. W., K. M., Kahle, and R. M., Stulz, (2009). Why Do U.S. Firms Hold So Much More Cash than They Used To?, *Journal of Finance* 64, 1985–2021.
- Berger, A.N., and G.F., Udell, (1995). Relationship Lending and Lines of Credit in Small Firm Finance. *Journal of Business* 68, 351–382.
- Berger, A. N., M. A., Espinosa-Vega, W. S., Frame, and N. H., Miller, (2011). Why Do Borrowers Pledge Collateral? New Empirical Evidence on the Role of Asymmetric Information, *Journal of Financial Intermediation* 20, 55–70.
- Berger, A. N., W. S., Frame, and V., Ioannidou, (2011). Tests of Exante Versus Expost Theories of Collateral Using Private and Public Information, *Journal of Financial Economics* 100, 85–97.
- Boot, A.W.A., A.V., Thakor, and G.F., Udell, (1991). Secured Lending and Default Risk: Equilibrium Analysis, Policy Implications and Empirical Results. *Economic Journal* 101, 458–472.
- Board of Governors of the Federal Reserve System, (2010), *Report to the Congress on risk retention*, October.
- Cheng, Y. (2003). Propensity Score Matching and the New Issue Puzzle. *Working Paper*.
- DBRS, (2010). Rating U.S. Equipment Lease and Loan Securitizations, *Methodology*, January.
- DBRS, (2010). Rating U.S. Retail Auto Loan Securitizations, *Methodology*, January.
- Deloof, D, (2003). Does Working Capital Management Affect Profitability of Belgian Firms?, *Journal of Business Finance and Accounting* 30, 573–587.
- Fabbri, D. and A. M. C., Menichini, (2010). Trade Credit, Collateral Liquidation, and Borrowing Constraints, *Journal of Financial Economics* 96, 413–432.
- Fitch IBCA, (1999). Implications of Securitization for Finance Companies, *Financial Services Special Report*, November.
- Gorton, G. and N., Souleles, (2005). Special Purpose Vehicles and Securitization, *FRB Philadelphia working paper series*.
- Harhof, D., R., Körting, (1998). Lending Relationships in Germany—Empirical Evidence from Survey Data. *Journal of Banking and Finance* 22, 1317–1353.

- Hartgraves, L., and G. J., Benston, (2002). The Evolving Accounting Standards for Special Purpose Entities and Consolidations, *Accounting Horizons* 16 (3), 245–258.
- Hill, C. A., (1996). Securitization: A Low-Cost Sweetener for Lemons, *Washington University Law Review* 74 (4), 1061-1126.
- Jimenez, G., V., Salas, and J., Saurina, (2006). Determinants of Collateral, *Journal of Financial Economics* 81, 255–281.
- Klapper, L., (2006). The Role of Factoring for Financing Small and Medium Enterprises. *Journal of Banking & Finance* 30, 3111–3130.
- Lemmon, M., L. X., Liu, and M. Q., Mao, (2010). Asset-Backed Securitization in Industrial Firms – An Empirical Investigation, *Working Paper*.
- Lemmon, M., L. X. , Liu, and M. Q., Mao, and G., Nini, (2011). Securitization and Capital Structure in Nonfinancial Firms: An Empirical Investigation, *Working Paper*.
- Loutskina, E. and P., Strahan, (2009). Securitization and the Declining Impact of Bank Finance on Loan Supply: Evidence from Mortgage Originations, *Journal of Finance* 64, 861–889.
- Manove, M., A.J., Padilla, (1999). Banking (Conservatively) with Optimists. *RAND Journal of Economics* 30, 324–350.
- Manove, M., A.J., Padilla, (2001). Collateral versus Project Screening: a Model of Lazy Banks, *RAND Journal of Economics* 32, 726–744.
- McFadden, D., (1981). Econometric Models of Probabilistic Choice, in Charles Manski and Daniel McFadden, eds.: *Structural Analysis of Discrete Data with Econometric Applications* (MIT Press, Cambridge, MA).
- Modigliani, F., and M. H., MILLER, (1958). The Cost of Capital, Corporation Finance, and the Theory of Investment, *American Economic Review* 48 (3), 261–297.
- Maddaloni, A. and J., Peydró, (2011). Bank Risk-Taking, Securitization, Supervision, and Low Interest Rates: Evidence from the Euro-Area and the U.S. Lending Standards, *Review of Financial Studies* 24 (6), 2121-2165.
- Modigliani, F., and M. H., MILLER, (1963). Corporate Income Taxes and the Cost of Capital: A Correction, *American Economic Review* 53 (3), 433–443.
- Moody's Investors Service, (2002). Moody's Approach to Rating Trade Receivables Backed

- Transactions, *International Structured Finance Rating Methodology*, July.
- Myers, S. C., and N. S., Majluf, (1984). Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have, *Journal of Financial Economics* 13 (2), 187–221.
- Piskorskia, T., A., Seru, and V., Vig, (2010). Securitization and Distressed Loan Renegotiation: Evidence from the Subprime Mortgage Crisis, *Journal of Financial Economics* 97 (3), 369–397.
- Riachi I., and A., Schwienbacher, (2012). Securitization of Corporate Assets and Executive Compensation, *Working Paper*.
- Rosenbaum, P., and D., Rubin, (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika* 70 (1), 41-55.
- Sharpe, S. A., and H. H., Nguyen, (1995). Capital Market Imperfections and the Incentive to Lease, *Journal of Financial Economics* 39, 271–294.
- Shin, H. H., and L., Soenen, (1998). Efficiency of Working Capital and Corporate Profitability, *Financial Practice and Education* 8 (2), 37–45.
- Smith, J., and P., Todd, (2005). Does Matching Overcome LaLonde’s Critique of Nonexperimental Estimators?. *Journal of Econometrics* 125 (1-2), 305-353.
- Stiglitz, J.E., and A., Weiss, (1981). Credit Rationing in Markets with Imperfect Information, *American Economic Review* 71, 393–410.
- Villalonga, B., (2004). Does Diversification Cause the “Diversification Discount”?. *Financial Management*, 33 (2), 5-27.
- Wette, H.C., (1983). Collateral in Credit Rationing in Markets with Imperfect Information: note. *American Economic Review* 73, 442–445.

Appendix A

DELPHI CORP, CIK 0001072342: Excerpt from 10-K 2003-12-31, FILED AS OF DATE: 2004-01-28

“In the first quarter of 2003, we entered into a \$500 million revolving accounts receivable securitization program in the United States (U.S. Facility Program). Under this U.S. Facility Program, we sell a portion of our U.S. and Canadian trade receivables to Delphi Receivables LLC (DR), a wholly owned consolidated special purpose entity. DR may then sell, on a non-recourse basis (subject to certain limited exceptions), an undivided interest in the receivables to asset-backed, multi-seller commercial paper conduits. Neither the Conduits nor the associated banks are related to Delphi or DR. The Conduits typically finance the purchases through the issuance of A1/P1 rated commercial paper. In the event that the Conduits become unable to or otherwise elect not to issue commercial paper and make purchases, the associated banks are obligated to make the purchases. The sale of the undivided interest in the receivables from DR to the Conduits is accounted for as a sale under the provisions of SFAS No. 140, Accounting for the Transfers and Servicing of Financial Assets and Extinguishments of Liabilities (SFAS 140). When DR sells an undivided interest to the Conduits, DR retains the remaining undivided interest. The value of the undivided interest sold to the Conduits is excluded from our consolidated balance sheet thereby reducing our accounts receivable. The value of the retained interest in receivables held by DR, which may include eligible undivided interests that we elect not to sell, is shown separately on our consolidated balance sheet and therefore is not included in our accounts receivable. As of December 31, 2003, the retained interest in receivables was \$717 million. We assess the recoverability of the retained interest on a quarterly basis and adjust to the carrying value as necessary.

At the time DR sells the undivided interest to the Conduits the sale is recorded at fair value with the difference between the carrying amount and fair value of the assets sold included in operating income as a loss on sale. This difference between carrying value and fair value is principally the estimated discount inherent in the U.S. Facility Program, which reflects the borrowing costs as well as fees and expenses of the Conduits (approximately 1.4% to 1.6%), and the length of time the receivables are expected to be outstanding. The loss on sale was approximately \$5 million for the year ended December 31, 2003.

Additionally, we perform collections and administrative functions on the receivables sold similar to the procedures we use for collecting all of our receivables, including receivables that are not sold under the U.S. Facility Program. We can elect to keep the collections and sell additional receivables in exchange; or, we can transfer the cash collections to the Conduits thereby reducing the amount of sales of undivided interests to the Conduits. The nature of the collection and administrative activities and the terms of the U.S. Facility Program do not result in the recognition of a servicing asset or liability under the provisions of SFAS 140 because the benefits of servicing are just adequate to compensate us for our servicing responsibilities.

The U.S. Facility Program, which is among Delphi, DR, the Conduits, the sponsoring banks and their agents, expires on March 29, 2004 and can be extended for two additional 364-day periods based upon the mutual agreement of the parties. Additionally, the U.S. Facility Program contains single financial and other covenants similar to our revolving credit facilities that, if not met, could result in a termination of the program. At December 31, 2003, we were in compliance with all such covenants”.

Appendix B: Definition of variables

Variable	Definition
ABS proceeds/total assets	Total annual cash proceeds generated from new securitizations during the fiscal year scaled by the total book value of assets (Compustat item AT).
Retained interests/total assets	Interests retained by the originator over the book value of total assets.
Retained interests/proceeds	Interests retained by the originator over cash proceeds generated from new securitizations during the fiscal year.
Retained interests/total ABS	Interests retained by the originator over the sum of cash proceeds generated from new securitizations and retained interests.
Overcollateralization	Retained interests/total ABS
Overcollateralization dummy	Dummy variable taking value of 1 if overcollateralization is higher than 0 and 0 otherwise.
High overcollateralization	Overcollateralization above the sample median
Low overcollateralization	Overcollateralization below the sample median
Total assets (\$M)	Book value of total assets (Compustat item AT) prior to the securitization.
Market to book of equity	Market value of equity over book value of equity prior to the securitization. Market value of equity = Share price (Compustat item PRCC) * Total number of shares outstanding (Compustat item CSHPRI). Book value of equity (Compustat item CEQ)
Total debt/total assets	Book value of total debt over Book value of total assets prior to the securitization. Book value of total debt = Long-term debt (Compustat item DLTT) + Debt in current liabilities (Compustat item DLC).
Total dividend/equity	Total dividend over equity prior to the securitization. Preferred dividend (Compustat item DVP) + Common dividend (Compustat item DVC), scaled by market value of equity.
Earnings/total assets	Earnings over book value of total assets prior to the securitization. Earnings = Income before extraordinary items (Compustat item IB) + Deferred income taxes (Compustat item TXDI) – Preferred dividend (Compustat item DVP).
Sale growth	Sale growth prior to the securitization. Growth rate of sales (Compustat item SALE) = (Sales in ABS year – Sales in previous year) / Sales in previous year.
R&D/total assets	Research & development expense (Compustat item XRD) over book value of total assets prior to the securitization.
Marginal tax rate	Simulated marginal tax rate (before) obtained from John Graham.
Stock returns volatility	Annualized standard deviation of monthly stock returns over the prior 60 months provided by ExecuComp.
Assets volatility	(1-total debt/total assets)* Stock return volatility.
Receivables/total assets	Accounts receivable (Compustat item RECT) / total assets.
Inventory/total assets	Inventory (Compustat item INVT) / total assets.
Cash/total assets	Cash and Short-Term Investments (Compustat item CHE) / total assets.
Net operating income	Sales – Cost of goods sold (Compustat item COGS), scaled by book (value of total assets - Cash and Short-Term Investments).
Gross operating income	Sales – Cost of goods sold (Compustat item COGS) + Depreciation (Compustat item DP), scaled by book (value of total assets - Cash and Short-Term Investments).
Current ratio	Current assets (Compustat item ACT) / Current liabilities (Compustat

	item LCT).
Quick ratio	(Current assets (Compustat item ACT) – Inventory) / Current liabilities (Compustat item LCT).
Inventory/Current assets	Inventory/Current assets
Trade receivables/current assets	Trade receivables (Compustat item RECTR) / Current assets.
Current assets/total assets	Current assets / Total assets.
Current liabilities/total assets	Current liabilities / Total assets.
Assets turnover	Sales / Total assets.
Inventory days	Inventory*365 / Sales.
Accounts receivable days	Accounts receivable*365 / Sales.
Accounts payable days	Accounts payable (Compustat item AP)*365 / Sales.
Cash conversion cycle	Inventory days + Accounts receivable days - Accounts payable days.
Current assets turnover	Sales / Current assets.
Long-term debt/ adjusted total assets	Long-term debt (Compustat item DLTT)/total assets including securitized assets.
Short-term debt/ adjusted total assets	Debt in current liabilities (Compustat item DLC)/total assets including securitized assets.
True sale	Dummy variable taking value of 1 if ABS transaction is accounted for as true sale and 0 otherwise.
Cash deposit	Dummy variable taking value of 1 if ABS transaction involves cash reserve as credit enhancement and 0 otherwise.
Recourse provision	Dummy variable taking value of 1 if ABS transaction involves recourse provision as credit enhancement and 0 otherwise.
Insurance	Dummy variable taking value of 1 if ABS transaction involves financial insurance as credit enhancement and 0 otherwise.
Covenants	Dummy variable taking value of 1 if ABS agreement involves covenants regarding the quality of securitized assets and credit status of the originator and 0 otherwise.
Long-term securities	Dummy variable taking value of 1 if ABS agreement involves the sale of long-term securities and 0 otherwise.
Short-term securities	Dummy variable taking value of 1 if ABS agreement involves the sale of short-term securities and 0 otherwise.
Trade receivables	Dummy variable taking value of 1 if assets sold are trade receivables and 0 otherwise.
Equipment loans and leases	Dummy variable taking value of 1 if assets sold are equipment loans and leases and 0 otherwise.
Credit card receivables	Dummy variable taking value of 1 if assets sold are credit card receivables and 0 otherwise.
Auto loans	Dummy variable taking value of 1 if assets sold are auto loans and 0 otherwise.
GDP growth	GDP percent change in 2005 dollars obtained from Datastream prior to the securitization.
Economic cycle	Absolute value of (GDP growth – Average GDP growth over the sample period) prior to the securitization.
Real interest rate	3 month-UK interbank interest rate obtained from Datastream prior to the securitization.
Post 2000	Dummy variable taking value of 1 if the ABS year is post year 2000 and 0 otherwise.
Industry dummy	Dummy variable for the major industries based on the two-digit SIC codes.
Z-score	Altman's Z-score prior to the securitization, $Z\text{-score} = (0.012*wc/ap) + (0.014*re/at) + (0.033*ebit/at) + (0.006*M/Equity/Lt) + (0.999*sale/at)$. wc/ap is working capital

	over total assets, re/at is retained earnings over total assets, $ebit/at$ is earnings before interests and taxes over total assets, MV_{equity}/lt is market value of equity over total liabilities, and $sale/at$ are sales over total assets.
True sale*Z-score	Interactive term between true sale dummy and Z-score.

Table 1: Summary statistics of ABS and overcollateralization

The first two rows of this table report summary statistics of cash proceeds generated from ABS transactions and the amount of interests retained by the originator in the assets transferred to the SPV, both are scaled by the originator's book total assets. The last two rows show the ratio of retained interests over ABS cash proceeds and total value of assets transferred to the SPV respectively. The sample includes all our ABS transactions issued between 1993 and 2006 and involving the sale of current assets.

Variable	Number of ob.	Mean	Median	Standard dev.
ABS proceeds/total assets	599	0.110	0.036	0.252
Retained interests/total assets	407	0.034	0.010	0.076
Retained interests/proceeds	407	1.426	0.109	4.184
Retained interests/total ABS	407	0.262	0.098	0.308

Table 2: Summary statistics of Firm Characteristics

This table shows summary statistics for firm's characteristics used in the empirical analysis. All these variables are measured at the beginning of the fiscal year. Detailed definitions of these variables are provided in table 1. The sample includes all our ABS transactions implying the sale of current assets and ranging from 1993 to 2006. Panel A presents summary statistics for the full ABS sample while in Panel B, the sample is restricted to ABS firms using overcollateralization. The last column of Panel A and the fourth and seventh columns of Panel B show the industry median computed as follows: for each ABS firm, the industry median is calculated for all non-ABS firms in the same industry and the same year. These industry medians are then averaged. ***, ** and * indicate significant difference between the ABS firms and the industry median of non-ABS firms at 1%, 5% and 10% levels, respectively. Panel B reports summary statistics (mean, median, and industry median) for firm's characteristics in the two subsamples identified based on the level of overcollateralization. High overcollateralization group comprises ABS transactions including the use of overcollateralization exceeding the sample median while low overcollateralization group represents ABS transactions with overcollateralization being below the sample median. The last column of Panel C reports the mean difference between the high overcollateralization and low overcollateralization groups. ***, ** and * indicate significant difference between the two groups at 1%, 5% and 10% levels, respectively.

Panel A

Variable	Number of ob.	Mean	Median	Standard dev.	Industry median
Total assets	598	9730.320	2681.210	19034.020	691.152***
Market to book of equity	539	2.524	2.128	7.142	2.820
Total debt/total assets	598	0.300	0.291	0.146	0.134***
Total dividend/equity	535	0.015	0.009	0.038	0.004***
Earnings/total assets	587	0.029	0.041	0.090	0.056***
Sale growth	598	0.128	0.076	0.289	0.121
R&D/total assets	599	0.019	0.002	0.031	0.044***
Marginal tax rate	424	0.329	0.350	0.066	0.348***
Equity volatility	571	1.447	1.278	0.770	1.649***
Assets volatility	570	1.021	0.872	0.598	1.353***
Receivables/total assets	598	0.173	0.154	0.111	0.153***
Inventory/total assets	596	0.163	0.140	0.122	0.124***
Cash/total assets	598	0.057	0.024	0.085	0.165***
Net profitability	598	0.373	0.351	0.197	0.515***
Gross profitability	596	0.421	0.389	0.199	0.577***

(Continued)

Table 2—Continued

Panel B							
	High overcollateralization			Low overcollateralization			Mean difference
	Mean	Median	Industry median	Mean	Median	Industry median	High – Low
Total assets	9741.732	2404.038	672.503***	6271.506	2551.715	661.536***	3470.226**
Market to book of equity	2.270	2.033	2.901	1.664	1.918	2.636	0.605
Total debt/total assets	0.323	0.309	0.123***	0.279	0.282	0.103***	0.044**
Total dividend/equity	0.011	0.010	0.002***	0.011	0.005	0.004***	0.001
Earnings/total assets	0.028	0.038	0.049***	0.031	0.040	0.052***	-0.002
Sale growth	0.111	0.053	0.099	0.117	0.080	0.114	-0.006
R&D/total assets	0.012	0.000	0.048***	0.014	0.000	0.043***	-0.002
Marginal tax rate	0.334	0.350	0.349**	0.335	0.350	0.349**	-0.001
Equity volatility	1.508	1.323	1.856***	1.501	1.379	1.797***	0.007
Assets volatility	1.024	0.825	1.532***	1.094	1.008	1.530***	-0.070
Receivables/total assets	0.166	0.134	0.141*	0.164	0.171	0.138**	0.002
Inventory/total assets	0.169	0.140	0.118***	0.201	0.176	0.133***	-0.032*
Cash/total assets	0.036	0.019	0.193***	0.060	0.032	0.198***	-0.023***
Net profitability	0.369	0.359	0.509***	0.427	0.412	0.555***	-0.057**
Gross profitability	0.416	0.385	0.572***	0.471	0.445	0.622***	-0.055*

Table 3: Summary statistics of working capital ratios and components

This table shows summary statistics for working capital ratios and components. All these variables are measured at the beginning of the fiscal year. Detailed definitions of these variables are provided in table 1. The sample includes all our ABS transactions implying the sale of current assets and ranging from 1993 to 2006. Panel A presents summary statistics for the full ABS sample while in Panel B, the sample is restricted to ABS firms using overcollateralization. The last column of Panel A and the fourth and seventh columns of Panel B show the industry median computed based on a sample of 6532 non-ABS firms operating in the same industries as the ABS firms. ***, ** and * indicate significant differences between the ABS firms and the industry median of non-ABS firms at 1%, 5% and 10% levels, respectively. Panel B reports summary statistics (mean, median, and industry median) for working capital ratios and components in the two subsamples: high and low overcollateralization groups. The last column of Panel B reports the mean difference between the high overcollateralization and low overcollateralization groups. ***, ** and * indicate significant difference between the two groups at 1%, 5% and 10% levels, respectively.

Panel A

Variable	Number of ob.	Mean	Median	Standard dev.	Industry median
Current ratio	593	1.646	1.517	0.729	2.354***
Quick ratio	591	1.017	0.920	0.594	1.724***
Inventory/Current assets	591	0.365	0.361	0.196	0.240***
Trade receivables/current assets	576	0.386	0.380	0.167	0.316***
Current assets/total assets	593	0.433	0.424	0.193	0.544***
Current liabilities/total assets	593	0.273	0.263	0.109	0.219***
Assets turnover	598	1.362	1.148	0.841	1.012***
Inventory days	596	45.124	44.136	28.230	38.016***
Accounts receivable days	598	54.032	46.285	35.905	59.183***
Accounts payable days	598	31.881	29.497	14.499	24.696***
Cash conversion cycle	596	67.140	58.732	44.891	74.525***
Current assets turnover	593	3.505	3.134	1.813	2.096***

(Continued)

Table 3—Continued

Panel B							
	High overcollateralization			Low overcollateralization			Mean difference
	Mean	Median	Industry median	Mean	Median	Industry median	High - Low
Current ratio	1.573	1.484	2.475***	1.651	1.657	2.392***	-0.078
Quick ratio	0.907	0.842	1.851***	0.907	0.871	1.754***	0.000
Inventory/Current assets	0.395	0.395	0.231***	0.405	0.418	0.250***	-0.010
Trade receivables/current assets	0.366	0.344	0.276***	0.341	0.353	0.262***	0.025
Current assets/total assets	0.416	0.409	0.560***	0.463	0.468	0.568***	-0.047*
Current liabilities/total assets	0.263	0.253	0.213***	0.290	0.296	0.228***	-0.027**
Assets turnover	1.412	1.095	0.949***	1.484	1.382	1.096***	-0.072
Inventory days	45.872	43.446	39.385**	48.623	47.563	35.756***	-2.751
Accounts receivable days	50.044	40.902	58.898**	49.996	45.377	52.696	0.048
Accounts payable days	32.267	28.754	23.744***	32.198	30.564	23.640***	0.069
Cash conversion cycle	63.649	52.198	75.979***	65.659	53.152	66.882	-2.010
Current assets turnover	3.954	3.498	1.865***	3.422	3.121	2.103***	0.531**

Table 4: Determinants of overcollateralization usage in ABS transactions

This table presents marginal effects of firm's characteristics and macro-economic factors on the probability of pledging overcollateralization in ABS transactions issued by industrial firms. The dependent variable is the overcollateralization dummy taking the value of 1 if the level of overcollateralization is higher than zero and zero otherwise. The sample includes only first-time securitizations of ABS firms and all available observations of non-ABS firms ranging from 1993 to 2006. All independent variables are measured at the beginning of the fiscal year and defined in Table 1. All regressions include industry dummies, coefficients of which are not reported. T-statistics are in parentheses. ***, ** and * indicate that the estimated marginal coefficients are significant at 1%, 5% and 10% levels, respectively. The last two rows report the mean and maximum variance inflation factor (VIF) to control for multicollinearity.

	(1)	(2)	(3)	(4)	(5)	(6)
Ln(assets)	0.004*** (3.67)		0.004*** (3.44)			
Total debt/ total assets	0.025*** (3.72)	0.027*** (2.74)	0.019** (2.52)	0.014** (2.01)	0.009 (1.55)	0.002 (0.39)
MB(equity)	-0.000 (-0.86)	-0.000 (-0.04)	-0.000 (-0.77)	-0.000 (-0.75)	-0.000 (-0.15)	-0.000 (-1.27)
Total dividend/ equity	0.008 (0.27)	0.013 (0.32)	0.003 (0.09)	0.012 (0.39)	-0.018 (-0.38)	0.001 (0.11)
Sale growth	-0.001 (-0.36)	-0.001 (-0.11)	-0.000 (-0.00)	0.000 (0.07)	0.000 (0.11)	-0.001 (-0.22)
Earnings/ total assets	0.002 (0.17)	-0.009 (-0.71)	0.005 (0.45)	0.004 (0.39)	0.008 (0.90)	0.004 (0.40)
R&D/ total assets	-0.086** (-2.12)	-0.079 (-1.42)	0.011 (0.58)	0.001 (0.04)	0.009 (0.81)	0.006 (0.48)
Assets volatility	0.003** (2.00)	0.004** (1.98)	0.004*** (2.59)	0.003 (1.62)	0.001 (0.39)	
Marginal tax rate		0.043 (1.51)				
No rating	-0.001 (-0.23)	-0.007** (-1.97)				
BBB			0.007* (1.88)	0.012** (2.53)	0.007** (2.12)	0.003 (1.20)
BB			0.004 (0.93)	0.007 (1.35)	0.002 (0.61)	0.003 (0.88)
Receivables/ total assets			-0.001 (-0.04)			
Inventory/ Total assets			-0.004 (-0.29)			
Cash/ total assets			-0.120*** (-3.17)	-0.105*** (-2.97)	-0.095*** (-2.86)	-0.068*** (-2.78)
GDP growth				0.002** (2.23)		
Economic cycle				0.004* (1.69)		
Real interest rate					-0.008*** (-7.38)	
Post 2000						-0.591*** (-6.06)
Industry dummy	YES	YES	YES	YES	YES	YES
Pseudo R squared	0.24	0.19	0.32	0.29	0.61	0.50
Nb. Obs.	5899	3510	5564	5620	5620	6730
Mean VIF	1.86	2.01	2.13	1.90	1.90	1.69
Max VIF	8.22	6.91	9.71	6.63	9.22	8.50

Table 5: Determinants of the extent of overcollateralization in ABS transactions

This table presents estimated effects of firm's characteristics and macro-economic factors on the amount of overcollateralization in ABS transactions issued by industrial firms. The dependent variable is the level of overcollateralization defined in Table 1. The sample ranges from 1993 to 2006 and includes all ABS firms using or not overcollateralization. Panel A presents the results related to characteristics of the originating firm's and macro-economic conditions while Panel B and Panel C report the results when ABS transactions characteristics are further included. All independent variables are measured at the beginning of the fiscal year and defined in Appendix B. All standard errors are robust and clustered at the firm level. T-statistics are in parentheses. ***, ** and * indicate that the estimated coefficients are significant at 1%, 5% and 10% levels, respectively. The last two rows of Panel A, Panel B and Panel C report the mean and maximum variance inflation factor (VIF) to control for multicollinearity.

Panel A							
	(1)	(2)	(3)	(4)	(5)	(6)	Tobit
Ln(assets)	0.023** (2.40)						
Total debt/ total assets		0.407*** (2.69)		0.389** (2.35)	0.076 (0.45)	0.144 (0.98)	0.144 (1.01)
MB(equity)	-0.002 (-0.60)	0.001 (0.19)	-0.000 (-0.12)	0.001 (0.32)	-0.001 (-0.30)	-0.001 (-0.20)	-0.001 (-0.21)
Total dividend/ equity	-1.247 (-1.44)	-0.834 (-0.77)	-0.330 (-0.35)	-0.889 (-0.82)	-1.284 (-1.48)	-0.774 (-0.85)	-0.769 (-0.88)
Sale growth	-0.062 (-1.21)	-0.044 (-0.88)	-0.078 (-1.35)	-0.040 (-0.84)	-0.070 (-1.37)	-0.066 (-1.29)	-0.065 (-1.34)
Earnings/ total assets	-0.113 (-0.68)	0.087 (0.48)	-0.423 (-1.21)	0.095 (0.49)	-0.061 (-0.37)	0.026 (0.17)	0.026 (0.17)
R&D/ total assets	-2.313** (-2.24)	-1.454 (-1.39)	-2.979** (-2.57)	-0.771 (-0.63)	-1.324 (-1.10)	-1.058 (-0.90)	-1.059 (0.94)
Assets volatility	-0.011 (-0.27)	0.038 (1.27)	0.052* (1.84)	0.050 (1.32)	0.006 (0.17)	0.027 (0.82)	0.027 (0.85)
Marginal tax rate			0.559** (2.28)				
No rating	0.132* (1.93)	0.141** (2.04)	0.034 (0.44)	0.121 (1.64)	0.105 (1.46)	0.120* (1.70)	0.120* (1.77)
Receivables/ total assets				-0.044 (-0.15)			
Inventory/ total assets				0.222 (0.87)			
Cash/ total assets				-0.422 (-1.63)	-0.508* (-1.86)	-0.511** (-2.01)	-0.511** (-2.09)
GDP growth					0.041** (2.00)		
Economic cycle					0.080*** (2.66)		
Real interest rate						0.065** (2.54)	0.065*** (2.65)
Industry dummy	YES	YES	YES	YES	YES	YES	YES
R squared	0.51	0.50	0.55	0.51	0.53	0.53	
Log pseudo.							-49.46
Nb. Obs.	360	360	257	358	360	360	360
Mean VIF	1.70	1.56	1.87	2.00	2.18	1.88	1.88
Max VIF	7.57	4.51	8.63	5.09	8.72	6.20	6.20

(Continued)

Table 5—Continued

Panel B							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total debt/ total assets	0.090 (0.61)	0.064 (0.41)		-0.030 (-0.20)	0.104 (0.69)		
MB(equity)	-0.001 (-0.33)	-0.000 (-0.15)	-0.001 (-0.23)	-0.001 (-0.36)	-0.000 (-0.11)	-0.001 (-0.31)	-0.000 (-0.12)
Total dividend/ equity	-1.506 (-1.61)	-1.510 (-1.63)	-1.650** (-2.19)	-1.419 (-1.57)	-1.376 (-1.53)	-2.343*** (-3.24)	-2.363*** (-3.24)
Sale growth	-0.061 (-1.25)	-0.055 (-1.21)	-0.052 (-1.09)	-0.066 (-1.41)	-0.058 (-1.26)	-0.084* (-1.72)	-0.083* (-1.74)
Earnings/ total assets	-0.187 (-1.07)	-0.153 (-0.82)	-0.184 (-1.02)	-0.179 (-1.01)	-0.132 (-0.73)	-0.109 (-0.62)	-0.151 (-0.80)
R&D/ total assets	-2.297** (-2.17)	-1.621 (-1.38)	-1.635 (-1.45)	-1.558 (-1.37)	-1.458 (-1.26)		
Assets volatility	-0.028 (-0.79)	0.001 (0.01)	-0.013 (-0.32)	-0.010 (-0.28)	0.010 (0.28)	-0.008 (-0.22)	-0.022 (-0.52)
No rating	0.083 (1.33)	0.079 (1.27)	0.070 (1.13)	0.073 (1.15)	0.080 (1.27)	0.028 (0.56)	0.027 (0.50)
Receivables/ total assets		-0.006 (-0.02)					
Inventory/ total assets		-0.086 (-0.35)					
Cash/ total assets		-0.538** (-1.98)	-0.579** (-2.07)	-0.604** (-2.25)	-0.567** (-2.08)	-0.839*** (-2.69)	-0.863*** (-2.68)
True sale	0.258*** (4.19)	0.276*** (4.21)	0.251*** (4.03)	0.238*** (4.03)	0.269*** (4.41)	0.286*** (5.13)	0.242*** (3.21)
True sale*Z-score							0.053 (1.18)
Cash deposit						-0.325*** (-4.82)	-0.307*** (-4.08)
Recourse provision						0.067 (0.54)	0.084 (0.59)
Covenants						0.429** (2.54)	0.355** (2.21)
Insurance						0.216 (1.63)	0.261** (1.98)
Long-term securities						0.015 (0.16)	-0.001 (-0.01)
Short-term securities						0.112** (2.36)	0.119** (2.51)

(Continued)

Table 5—Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP growth			0.007 (0.40)				
Economic cycle			0.036 (1.36)				
Real interest rate				0.034 (1.38)			
Post 2000					-0.035 (-0.75)		
Industry dummy	YES	YES	YES	YES	YES	YES	YES
R squared	0.56	0.57	0.57	0.58	0.57	0.61	0.63
Nb. Obs.	360	358	360	360	360	360	353
Mean VIF	1.80	2.22	2.05	2.10	2.07	1.62	1.90
Max VIF	5.83	6.27	7.90	6.66	6.55	5.08	7.72

Panel C

	(1)	(2)	(3)	(4)
MB(equity)	-0.000 (-0.11)	-0.000 (-0.17)	-0.000 (-0.10)	-0.000 (-0.18)
Total dividend/ equity	-1.263 (-1.63)	-1.906** (-2.33)	-1.976** (-2.44)	-1.650* (-1.94)
Sale growth	-0.046 (-1.06)	-0.063 (-1.41)	-0.065 (-1.45)	-0.058 (-1.26)
Earnings/ total assets	-0.166 (-0.94)	-0.215 (-1.20)	-0.206 (-1.16)	-0.110 (-0.66)
R&D/ total assets	-1.614 (-1.43)	-1.648 (-1.49)	-1.542** (-2.06)	-0.947 (-1.21)
Assets volatility	0.006 (0.16)			
No rating	0.071 (1.15)	0.050 (0.83)	0.058 (0.94)	0.058 (0.87)
Cash/ total assets	-0.584** (-2.08)	-0.667*** (-2.63)	-0.614*** (-2.78)	-0.659*** (-2.64)
True sale	0.286*** (4.62)	0.248*** (4.24)	0.260*** (4.58)	0.245*** (4.21)
Trade receivables	-0.014 (-0.31)			
Equipment leases		0.053 (1.58)		
Credit card receivables			0.047 (1.34)	
Auto loans				0.056* (1.89)
Industry dummy	YES	YES	YES	YES

(Continued)

Table 5—Continued

	(1)	(2)	(3)	(4)
R squared	0.57	0.56	0.56	0.55
Nb. Obs.	360	375	375	375
Mean VIF	1.96	1.88	1.83	1.87
Max VIF	8.11	9.56	9.63	9.86

Table 6: Effect of ABS initiation on working capital and operating performance

This table reports the results of difference-in-difference analysis on working capital ratios and components, operating profitability, and debt ratios for 73 ABS firms that have matching controls. Pre and Post are the year prior to ABS initiation and the year of ABS initiation program respectively. Difference is the mean difference between ABS firms and their matched non-ABS firms. The matching has been implemented based on kernel algorithm and propensity scores estimated using logit model with the set of independent variables used in Panel A of table 4. Kernel algorithm matches each ABS firm to a weighted sum of all control firms in the same industry and the same year, with highest weight being assigned to controls with propensity scores closest to the ABS firm's one. Diff-in-Diff is the mean difference between the average differences between ABS firms and non-ABS firms before and after ABS initiation. Panel A presents the results regarding working capital ratios and components while Panel B and Panel C report findings related to operating performance and debt ratios respectively. All the variables are defined in Appendix B. All standard errors are robust and clustered at the firm level. T-statistics are in parentheses. ***, ** and * indicate that the estimated coefficients are significant at 1%, 5% and 10% levels, respectively.

Panel A

	Pre			Post			
	Non-ABS firms	ABS firms	Difference	Non-ABS firms	ABS firms	Difference	Diff-in-Diff
Working capital ratios							
Assets turnover	1.130 (37.16)	1.321 (3.02)	0.191* (1.81)	1.113 (0.56)	1.370 (1.96)	0.257** (0.82)	0.066* (1.77)
Inventory days	45.858 (27.65)	47.431 (46.29)	1.573 (0.39)	45.145 (45.43)	42.520 (45.21)	-2.625 (0.28)	-4.198*** (-2.16)
Accounts receivable days	62.621 (35.28)	61.755 (62.38)	-0.866 (-0.22)	61.638 (62.04)	51.754 (58.18)	-9.884** (-3.20)	-9.018*** (-4.01)
Accounts payable days	41.250 (4.28)	30.633 (34.64)	-10.617 (-1.09)	40.956 (41.22)	30.456 (30.41)	-10.501 (-10.61)	0.117 (0.11)
Cash conversion cycle	66.151 (6.66)	78.554 (68.59)	12.403 (1.11)	64.610 (66.00)	63.818 (74.03)	-0.792 (11.24)	-13.195*** (-4.41)
Current assets turnover	2.479 (40.96)	3.211 (6.58)	0.732*** (3.88)	2.461 (2.17)	3.596 (5.22)	1.136*** (2.67)	0.404*** (4.78)
Working capital components							
Current ratio	2.954 (28.47)	1.769 (-9.72)	-1.186*** (-8.49)	2.931 (2.73)	1.641 (0.70)	-1.291*** (-1.92)	-0.105* (-1.86)
Quick ratio	2.312 (22.73)	1.106 (-11.89)	-1.206*** (-9.10)	2.303 (2.22)	1.002 (-0.06)	-1.301*** (-1.94)	-0.095** (-2.01)
Inventory/current assets	0.259 (30.83)	0.364 (5.01)	0.105*** (4.44)	0.255 (-0.27)	0.373 (0.97)	0.118*** (0.68)	0.014 (1.51)
Trade receivables/current assets	0.334 (44.40)	0.449 (7.37)	0.115*** (6.39)	0.330 (-0.30)	0.392 (-2.57)	0.062*** (-2.65)	-0.052*** (-4.20)
Current assets/total assets	0.518 (66.14)	0.430 (-3.53)	-0.088*** (-3.81)	0.514 (0.00)	0.404 (-0.61)	-0.110*** (-1.06)	-0.022** (-2.56)
Current liabilities/total assets	0.235 (44.37)	0.256 (2.02)	0.021 (1.63)	0.238 (0.78)	0.267 (0.85)	0.029** (0.56)	0.008 (0.99)

(Continued)

(Continued)

Table 6—Continued

Panel B							
	Pre			Post			Diff-in-Diff
	Non-ABS firms	ABS firms	Difference	Non-ABS firms	ABS firms	Difference	
Net operating income	0.539 (26.30)	0.331 (-10.24)	-0.208*** (-7.39)	0.531 (0.18)	0.338 (1.12)	-0.193*** (0.31)	0.016 (1.30)
Gross operating income	0.603 (29.48)	0.376 (-10.93)	-0.227*** (-8.00)	0.595 (0.23)	0.385 (1.27)	-0.210*** (0.37)	0.018 (1.45)
Panel C							
	Pre			Post			Diff-in-Diff
	Non-ABS firms	ABS firms	Difference	Non-ABS firms	ABS firms	Difference	
Long-term debt/adjusted total assets	0.175 (27.57)	0.265 (6.62)	0.089*** (5.85)	0.172 (-0.29)	0.236 (-1.56)	0.064*** (-1.56)	-0.025** (-2.23)
Short-term debt/adjusted total assets	0.029 (13.80)	0.045 (2.98)	0.015*** (2.73)	0.033 (1.32)	0.041 (-1.22)	0.007 (-1.13)	-0.008 (-1.14)

Table 7: Effect of high overcollateralization usage on working capital and operating performance

This table reports the results of difference-in-difference analysis on working capital ratios and components, and operating profitability for 15 ABS firms belonging to high overcollateralization group that have matching controls. Pre and Post are the year prior to ABS initiation and the year of ABS initiation program respectively. Difference is the mean difference between ABS firms and their matched non-ABS firms. The matching has been implemented based on kernel algorithm and propensity scores estimated using logit model with the set of independent variables used in Panel B of table 4. Kernel algorithm matches each ABS firm to a weighted sum of all control firms in the same industry and the same year, with highest weight being assigned to controls with propensity scores closest to the ABS firm's one. Diff-in-Diff is the mean difference between the average differences between ABS firms and non-ABS firms before and after ABS initiation. Panel A presents the results regarding working capital ratios and components while Panel B and Panel C report findings related to operating performance and debt ratios respectively. All the variables are defined in Appendix B. All standard errors are robust and clustered at the firm level. T-statistics are in parentheses. ***, ** and * indicate that the estimated coefficients are significant at 1%, 5% and 10% levels, respectively.

Panel A

	Pre			Post			
	Non-ABS firms	ABS firms	Difference	Non-ABS firms	ABS firms	Difference	Diff-in-Diff
Working capital ratios							
Assets turnover	1.104 (32.72)	1.273 (2.01)	0.169 (0.89)	1.089 (0.63)	1.356 (1.83)	0.266 (0.73)	0.097* (1.70)
Inventory days	43.752 (27.75)	61.819 (45.67)	18.067* (1.89)	43.028 (43.29)	50.554 (58.66)	7.526 (15.78)	-10.541 (-1.40)
Accounts receivable days	61.714 (31.65)	56.913 (61.09)	-4.801 (-0.61)	60.738 (61.18)	44.157 (53.71)	-16.581*** (-6.91)	-11.780** (-2.03)
Accounts payable days	46.151 (3.18)	33.592 (41.38)	-12.559 (-0.85)	45.910 (46.14)	34.259 (33.65)	-11.651 (-12.50)	0.908 (0.31)
Cash conversion cycle	59.325 (4.03)	85.139 (61.16)	25.814 (1.27)	57.828 (59.23)	60.451 (80.60)	2.623 (24.44)	-23.191** (-2.34)
Current assets turnover	2.469 (37.29)	2.899 (4.00)	0.430 (1.49)	2.452 (2.21)	3.307 (4.42)	0.854*** (1.93)	0.424** (2.10)
Working capital components							
Current ratio	2.975 (25.13)	1.648 (-9.90)	-1.327*** (-8.45)	2.942 (2.68)	1.614 (1.61)	-1.328*** (-1.33)	-0.001 (-0.01)
Quick ratio	2.347 (20.24)	0.895 (-21.70)	-1.452*** (-11.11)	2.327 (2.15)	0.889 (1.04)	-1.438*** (-1.35)	0.015 (0.13)
Inventory/current assets	0.253 (28.60)	0.434 (4.49)	0.181*** (4.15)	0.249 (-0.18)	0.429 (0.40)	0.180*** (0.15)	-0.001 (-0.04)
Trade receivables/current assets	0.329 (40.85)	0.391 (2.28)	0.062* (1.89)	0.324 (-0.23)	0.335 (-1.21)	0.011 (-1.49)	-0.051 (-1.40)
Current assets/total assets	0.510 (61.96)	0.451 (-0.82)	-0.059 (-1.31)	0.507 (0.09)	0.422 (-0.11)	-0.085* (-0.60)	-0.026 (-1.07)
Current liabilities/total assets	0.233 (36.66)	0.274 (2.34)	0.041** (2.01)	0.235 (0.52)	0.267 (-0.19)	0.033* (-0.39)	-0.008 (-0.55)

(continued)

Table 7—Continued

Panel B							
	Pre			Post			Diff-in-Diff
	Non-ABS firms	ABS firms	Difference	Non-ABS firms	ABS firms	Difference	
Net operating income	0.530 (22.42)	0.306 (-6.44)	-0.224*** (-5.61)	0.519 (0.11)	0.344 (1.53)	-0.175*** (0.80)	0.049** (2.08)
Gross operating income	0.595 (25.47)	0.344 (-7.29)	-0.251*** (-6.36)	0.583 (0.13)	0.387 (1.78)	-0.196*** (0.94)	0.055** (2.25)
Panel C							
	Pre			Post			Diff-in-Diff
	Non-ABS firms	ABS firms	Difference	Non-ABS firms	ABS firms	Difference	
Long-term debt/ adjusted total assets	0.170 (25.16)	0.284 (3.67)	0.114*** (3.43)	0.169 (-0.02)	0.251 (-0.82)	0.082*** (-0.96)	-0.032 (-1.53)
Short-term debt/ adjusted total assets	0.029 (9.93)	0.054 (2.17)	0.025** (2.08)	0.031 (0.70)	0.032 (-2.94)	0.000 (-2.71)	-0.025** (-2.17)

Table 8: Effect of low overcollateralization usage on working capital and operating performance

This table reports the results of difference-in-difference analysis on working capital ratios and components, and operating profitability for 11 ABS firms belonging to low overcollateralization group that have matching controls. Pre and Post are the year prior to ABS initiation and the year of ABS initiation program respectively. Difference is the mean difference between ABS firms and their matched non-ABS firms. The matching has been implemented based on kernel algorithm and propensity scores estimated using logit model with the set of independent variables used in Panel B of table 4. Kernel algorithm matches each ABS firm to a weighted sum of all control firms in the same industry and the same year, with highest weight being assigned to controls with propensity scores closest to the ABS firm's one. Diff-in-Diff is the mean difference between the average differences between ABS firms and non-ABS firms before and after ABS initiation. Panel A presents the results regarding working capital ratios and components while Panel B and Panel C report findings related to operating performance and debt ratios respectively. All the variables are defined in Appendix B. All standard errors are robust and clustered at the firm level. T-statistics are in parentheses. ***, ** and * indicate that the estimated coefficients are significant at 1%, 5% and 10% levels, respectively.

Panel A

	Pre			Post			Diff-in-Diff
	Non-ABS firms	ABS firms	Difference	Non-ABS firms	ABS firms	Difference	
<i>Working capital ratios</i>							
Assets turnover	1.091 (31.87)	1.443 (2.58)	0.351 (1.47)	1.078 (0.68)	1.349 (0.95)	0.271 (-0.12)	-0.080 (-0.70)
Inventory days	43.307 (26.35)	54.152 (44.57)	10.844 (1.24)	42.631 (42.89)	49.344 (52.88)	6.712 (10.27)	-4.132 (-1.59)
Accounts receivable days	62.003 (30.94)	61.065 (61.91)	-0.938 (-0.10)	60.946 (61.44)	47.762 (58.45)	-13.184 (-2.45)	-12.246*** (-3.05)
Accounts payable days	46.995 (3.17)	29.943 (40.89)	-17.052 (-1.13)	46.901 (46.99)	29.154 (29.56)	-17.748 (-17.10)	-0.695 (-0.30)
Cash conversion cycle	58.325 (3.89)	85.274 (60.49)	26.948 (1.38)	56.646 (58.22)	67.952 (82.03)	11.306 (26.10)	-15.642*** (-4.12)
Current assets turnover	2.462 (36.29)	3.360 (4.17)	0.898* (1.69)	2.443 (2.18)	3.706 (4.06)	1.263** (1.61)	0.365*** (2.73)
<i>Working capital components</i>							
Current ratio	3.004 (23.73)	1.620 (-6.04)	-1.384*** (-6.97)	2.990 (2.89)	1.430 (0.30)	-1.560*** (-2.36)	-0.176* (-1.90)
Quick ratio	2.389 (19.17)	0.888 (-11.06)	-1.501*** (-8.97)	2.385 (2.35)	0.763 (-0.39)	-1.622*** (-2.30)	-0.121** (-2.25)
Inventory/current assets	0.248 (27.67)	0.424 (3.17)	0.176*** (2.89)	0.244 (-0.19)	0.447 (0.88)	0.202*** (0.63)	0.027 (1.25)
Trade receivables/current assets	0.327 (39.96)	0.453 (2.87)	0.126** (2.51)	0.322 (-0.28)	0.372 (-1.47)	0.050 (-1.75)	-0.076*** (-2.67)
Current assets/total assets	0.509 (60.44)	0.454 (-0.72)	-0.055 (-1.21)	0.506 (0.20)	0.394 (-0.93)	-0.112*** (-1.41)	-0.057*** (-3.44)
Current liabilities/total assets	0.232 (35.74)	0.286 (3.07)	0.055*** (2.69)	0.233 (0.43)	0.286 (0.24)	0.053* (0.00)	-0.001 (-0.08)
(continued)							

Table 8—Continued

Panel B							
	Pre			Post			Diff-in-Diff
	Non-ABS firms	ABS firms	Difference	Non-ABS firms	ABS firms	Difference	
Net operating income	0.529	0.373	-0.155***	0.517	0.355	-0.162***	-0.007
	(21.60)	(-3.68)	(-3.51)	(0.10)	(0.19)	(-0.29)	(-0.30)
Gross operating income	0.594	0.410	-0.184***	0.581	0.391	-0.190***	-0.006
	(24.60)	(-4.54)	(-4.26)	(0.10)	(0.25)	(-0.30)	(-0.24)
Panel C							
	Pre			Post			Diff-in-Diff
	Non-ABS firms	ABS firms	Difference	Non-ABS firms	ABS firms	Difference	
Long-term debt/ adjusted total assets	0.172	0.249	0.077**	0.169	0.231	0.062*	-0.015
	(24.77)	(2.40)	(2.18)	(-0.23)	(-0.18)	(-0.34)	(-0.86)
Short-term debt/ adjusted total assets	0.029	0.069	0.040***	0.031	0.073	0.042**	0.001
	(9.72)	(2.71)	(2.64)	(0.62)	(0.15)	(0.11)	(0.07)

Chapter 5

Conclusion

This dissertation focuses on different issues linked to the economic motivations of ABS activity within industrial firms and contributes to several streams of research. Recent evidence suggests that ABS cash flows are essentially used to reduce debt outstanding rather than financing investment in capital expenditures (Lemmon *et al.*, 2011). While the analysis in Chapter 4 confirms the previous finding on debt repayment, the results in Chapter 2 stand in contrast to the previous claim regarding investment expenses. Emphasizing the fact that the firm's financial status and investment opportunities are important determinants of managerial investment decisions, Chapter 2 provides evidence on the role of ABS in mitigating underinvestment problem within the originating firms. ABS activity is associated with increasing investment and improving market performance in those firms with high financial distress probability. In addition, our empirical analysis is the first that provides a complete picture of how industrial companies spend ABS proceeds by examining different uses of funds (Stock repurchases, acquisitions, dividends, and R&D). The findings show that ABS cash flows are also used to fund acquisitions and stock repurchases, depending on the financial distress status and investment opportunities of the originating firms. Thus, besides its role in mitigating underinvestment, the analysis suggests that ABS also plays a signaling role through stock repurchases, shedding light into an extra channel through which industrial firms derive additional economic value from their ABS activity.

Moreover, the present dissertation also contributes to the literature on capital structure and executive compensation design. Previous studies have investigated the link between some forms of fund raising and CEO compensation, building on the agency cost of debt theory (see among others Ortiz-Molina, 2007 on convertible debt and Brockman *et al.*,

2010 on short-term debt). Chapter 3 examines the effect of ABS financing on the level and structure of executive compensation, considering two possible channels; namely provision of additional liquidity for investment and other corporate purposes and/or reduction of moral hazard pertaining to managerial actions. The analysis shows that ABS leads to an increase in executive compensation, in particular current components, as a result of relaxing the firm's financial constraints. Furthermore, still in relation with the literature on capital structure, Chapter 4 contributes to the studies documenting the importance of collateral to secure the funds obtained (see Jimenez *et al.*, 2006; Harhoff and Korting, 1998, and Berger *et al.*, 2011, among others). Unlike these previous studies where only those assets contractually tied to a specific loan are considered as collateral, Chapter 4 emphasizes the fact that the remaining assets also provide guarantee for lenders since their claims are senior to the shareholders claims. It then explores the determinants of overcollateralization in ABS transactions, taking advantage of the unique opportunity afforded by true sale transactions to capture the effective collateralization. The results highlight the importance of credit risk of the borrowing company and some macroeconomic conditions in determining the level of overcollateralization. Moreover, the analysis also evidences the positive effect of some characteristics of ABS transactions on the extent of overcollateralization, in particular the existence of covenants in the ABS agreement, short-term maturity of the ABS securities, and true sale qualification of the ABS transaction. The latter result is especially interesting; since one might expect the opposite relation given that true sale ABS helps insulating ABS investors from the originator's default risk. We argue that in true sale transfers, ABS investors have no contractual recourse to the remaining assets of the originator, which makes them relying more on overcollateralization as a means to mitigate the default risk pertaining to the securitized assets.

Finally, Chapter 4 also contributes to the literature on working capital management. Existing literature suggests that each firm has an optimal working capital level that maximizes its operating profitability (Deloof, 2003). With respect to accounts receivable, this means that granting too generous trade credit to customers to boost sales may increase the incidence of bad debt and receivables delinquencies while too restrictive credit policy may deter customers to purchase the firm's goods and services (Deloof, 2003). The analysis

in Chapter 4 shows that selling accounts receivables in ABS transactions helps industrial companies to improve their working capital without changing their trade credit policy. In addition, the findings suggest that some ABS firms achieve an improvement of their operating performance by using ABS financing to efficiently manage their balance sheet.

The three essays of this dissertation suggest several avenues for further research. First, because factoring and leasing also represent alternative means of financing that may help relaxing financial constraints (Sharpe and Nguyen, 1995; Klapper, 2006), it would be interesting to investigate whether financially constrained firms with ABS programs raise fewer funding from factoring and leasing transactions in financing their investment and working capital than similar firms without such programs. Additionally, the analysis in Chapter 3 shows that securitization essentially affects managerial current compensation (salary and bonus) and less long-term compensation. It would be fruitful to examine which company's performance metrics these ABS firms rely on when it comes to shape short- and long-term compensation plans of their CEOs. This could be a crucial determinant of managerial financing decisions, especially given the evidence provided in Chapter 4 on the use of ABS as a means to achieve an improved efficiency in the originator's balance sheet management. Finally, an appealing study would be the analysis of the relationship between the usage of ABS financing and covenants linked to the existing debt outstanding within the originating firm. Previous studies show that firms use restrictive and event-driven covenants in bank loans and public debt issues to control for shareholders-bondholders conflict, with increasing incidence of such covenants with firm's leverage (Billett et al., 2007). Typically, restrictive covenants may include restrictions placed on payouts to shareholders (including dividends and stock repurchases), restrictions on financing activities, and restrictions on investment decisions (Smith and Warner, 1979). Event-driven covenants concern provisions regarding some firm's performance metrics including credit ratings, cross-default, and some balance sheet ratios (Billett et al., 2007). Chapter 2 of this dissertation shows that ABS proceeds are used by some firms to fund both investment and stock repurchases while Chapter 4 evidences that ABS is also used as a means to reduce debt outstanding and improve some balance sheet ratios. Since ABS firms are on average

highly levered, their existing debt indentures are likely to include some of the aforementioned covenants. Thus, it would be interesting to investigate whether ABS activity is also linked to the existence of such covenants and which types of debt covenants motivate each use of ABS proceeds.

References

- Berger, A. N., Udell, S., Frame, and V., Ioannidou, (2011). Tests of Exante Versus Expost Theories of Collateral Using Private and Public Information, *Journal of Financial Economics* 100, 85–97.
- Billett, M. T., T. D., King, and D. C., Mauer, (2007). Growth Opportunities and the Choice of Leverage, Debt Maturity, and Covenants, *Journal of Finance* 62 (2), 697-730.
- Brockman, P., X., MARTIN, and E., UNLU, (2010). Executive Compensation and the Maturity Structure of Corporate Debt, *Journal of Finance* 65 (3), 1123-1161.
- Deloof, D, (2003). Does Working Capital Management Affect Profitability of Belgian Firms?, *Journal of Business Finance and Accounting* 30, 573–587.
- Harhof, D., R., Körting, (1998). Lending Relationships in Germany—Empirical Evidence from Survey Data. *Journal of Banking and Finance* 22, 1317–1353.
- Jimenez, G., V., Salas, and J., Saurina, (2006). Determinants of Collateral, *Journal of Financial Economics* 81, 255–281.
- Klapper, L., (2006). The Role of Factoring for Financing Small and Medium Enterprises. *Journal of Banking & Finance* 30, 3111–3130.
- Lemmon, M., L. X. , Liu, and M. Q., Mao, and G., Nini, (2011). Securitization and Capital Structure in Nonfinancial Firms: An Empirical Investigation, *Working Paper*.
- Ortiz-Molina, H., (2007). Executive Compensation and Capital Structure: The Effects of Convertible Debt and Straight Debt on CEO Pay, *Journal of Accounting and Economics* 43(1).
- Sharpe, S. A., and H. H., Nguyen, (1995). Capital Market Imperfections and the Incentive to Lease, *Journal of Financial Economics* 39, 271–294.
- Smith, C. W. Jr., and J. B., Warner, (1979). On Financial Contracting: An Analysis of Bond Covenants, *Journal of Financial Economics* 7, 117–161.