



Regulatory pressure and fire sales in the corporate bond market[☆]

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ABSTRACT

This paper investigates fire sales of downgraded corporate bonds induced by regulatory constraints imposed on insurance companies. As insurance companies hold over one-third of investment-grade corporate bonds, the *collective* need to divest downgraded issues may be limited by a scarcity of counterparties. Using insurance company transaction data, we find that insurance companies that are relatively *more constrained* by regulation are more likely to sell downgraded bonds. Bonds subject to a high probability of regulatory-induced selling exhibit price declines and subsequent reversals. These price effects appear larger during periods when the insurance industry is relatively distressed and other potential buyers' capital is scarce.

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1. Introduction

This paper investigates fire sales of downgraded corporate bonds induced by regulatory constraints imposed on insurance companies. Shleifer and Vishny (1992) show

that forced selling of industry-specific assets may yield transaction prices that are significantly below fundamental values. In these circumstances, other buyers in the same industry may also face financial constraints and therefore be unable to provide liquidity. The presence of

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potential buyers is a crucial factor in determining the price at which any transaction will take place. As Pulvino (1998) argues, the maximum price that potential buyers are willing and able to pay for the asset depends on their own valuation and funding. As an interesting parallel among financial assets, the trading activity of bonds downgraded to speculative-grade by regulatory-constrained insurance companies provides an ideal environment in which to study forced selling and any associated price effects. As a group, insurance companies hold over one-third of outstanding investment-grade bonds (see Schultz, 2001) and, at the same time, face regulations that either prohibit or impose large capital requirements on the holdings of speculative-grade bonds.¹

The empirical literature on asset fire sales provides several situations in which transaction prices may deviate from fundamental values.² Coval and Stafford (2007) study equity market transactions induced by open-end mutual fund redemptions. Mitchell, Pedersen, and Pulvino (2007) investigate the price reaction of convertible bonds around hedge fund redemptions. Pulvino (1998) studies commercial aircraft transactions initiated by (capital) constrained versus unconstrained airlines. Finally, Campbell, Giglio, and Pathak (2009) consider forced selling in the real estate market due to events such as foreclosures. In contrast, we examine a new channel that may induce fire sales: regulatory constraints. Specifically, regulations governing the investing behavior of insurance companies may effectively force the sale of certain assets (particularly those reclassified into a higher risk category) and simultaneously prevent other insurance companies from stepping in as buyers.³ As such, forced selling is most likely to occur in the downgraded bonds that are held by regulatory-constrained insurers such as those that have low risk-based capital ratios. Further, when coupled with a relative lack of liquidity, forced selling is likely to generate significant price pressure.

To empirically test the fire sale hypothesis in the corporate bond market as related to regulatory requirements, we construct a data set of 1,179 bonds that were downgraded to speculative-grade over the period 2001–2005. We combine information on these bonds with observations on individual insurance companies' holdings and transactions provided by the National Association of Insurance Commissioners (NAIC). In addition, we obtain data on the financial position and strength of each

insurance company from the Street.com. We employ an industry-standard risk-based measure to determine which individual insurance companies have the lowest risk capacity and are thus most likely (to have) to sell the downgraded corporate bond if the regulatory pressure hypothesis is valid. In studying the determinants of price patterns around corporate bond downgrades, we also use these constraint measures to make a distinction between trading volume arising from forced selling versus that which is discretionary. Finally, we use the overall distress in the insurance industry and the capital of potential buyers of speculative-grade bonds as time-conditioning variables to examine whether fire sales take place mostly in periods where sellers are under stress and buyers are hard to find.

Several key empirical results deserve attention. First, we find that relatively constrained insurance companies are more likely to immediately sell (at least part of) their holdings of a downgraded corporate bond. Observable selling pressure varies with measurable differences in the financial health of the insurance companies holding these bonds. This result obtains even after controlling for insurance company and bond characteristics (e.g., such as the bonds' general level of liquidity). Second, we find that forced selling of downgraded bonds held disproportionately by regulatory-constrained insurance companies causes prices of these bonds to fall below fundamental values for several weeks around the downgrade event. Downgraded bonds largely held by relatively unconstrained insurance companies do not exhibit these dramatic price effects. Indeed, the median cumulative abnormal return differential across the two groups of bonds separated by the relative constraints of the bond holders is around -6% to -7% . As we observe that the relatively constrained firms have a larger probability of selling downgraded bonds, the evidence again points to a market imbalance generated by regulatory pressure. Further, prices fully revert by week +35, suggesting the imbalance is temporary. These are the key results of the paper.

Why do these patterns exist and where are the potential buyers? Duffie, Garleanu, and Pedersen (2007) provide some recent theoretical guidance. They demonstrate that a market-wide liquidity shock that forces a large group of investors to sell a security, coupled with high search costs, can result in an extended period over which prices deviate from fundamental values. The speed with which transaction prices recover depends to a large extent on counterparty search costs and the associated level of market liquidity.⁴ In illiquid environments, a price recovery may take a significant period of time as market participants await sufficient counterparties. Since insurance companies face shared regulation, the resulting collective need to divest downgraded issues may be limited by a scarcity of counterparties and associated bargaining power. Fire sale prices will obtain, leading to

¹ Other institutions, such as pension funds, also face limitations in holding non-investment-grade bonds. This severely limits the set of potential buyers.

² Boyson, Helwege, and Jindra (2010) show that during crises, a majority of commercial banks, investment banks, and hedge funds use a variety of alternatives to avoid selling affected assets at fire sale prices.

³ Insurance companies are regulated at the state level. Many states adopted the guideline prescribed by the National Association of Insurance Commissioners (NAIC). Holdings of non-investment-grade bonds are generally limited by two types of regulations. First, the capital requirements are 4.6% and 10% for the holdings of BB-rated and B-rated bonds, respectively. The same requirement is only 1.3% for BBB-rated bonds and 0.4% for bonds rated A or above. Second, the NAIC prescribes a hard cap of 20% for all non-investment-grade bonds as a percent of the portfolio; however, this is generally not binding. Some states impose even more stringent guidelines.

⁴ Duffie, Garleanu, and Pedersen (2002), Green, Hollifield, and Schurhoff (2007), and others demonstrate empirically that search costs are important in describing trading in over-the-counter markets.

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