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Margin regulation and volatility

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ABSTRACT

An infinite-horizon asset-pricing model with heterogeneous agents and collateral constraints can explain why adjustments in stock market margins under US Regulation T had an economically insignificant impact on market volatility. In the model, raising the margin requirement for one asset class may barely affect its volatility if investors have access to another, unregulated class of collateralizable assets. Through spillovers, however, the volatility of the other asset class may substantially decrease. A very strong dampening effect on all assets' return volatilities can be achieved by a countercyclical regulation of all markets.

1. Introduction

Under the mandate of the US Securities Exchange Act of 1934, the Federal Reserve Board (FRB) established Regulation T to set initial margin requirements for partially loan-financed transactions of stocks. From 1947 until 1974, the FRB frequently changed these margin requirements. Motivated by the "Great Crash" of 1929, a major objective of Regulation T was to reduce the volatility of stock markets. The frequent adjustment of margin requirements provided a natural experiment for testing whether Regulation T achieved this goal. The vast majority of a sizeable empirical literature, however, does not find substantial evidence that regulating margin requirements in stock markets had an economically significant impact on market volatility (see Fortune, 2001 for a review).

This paper provides a model-based explanation of the inconclusive findings of the empirical literature on Regulation T. In order to do so, it analyzes the effects of margin regulation on asset return volatility within a calibrated, infinite-horizon asset-pricing model with heterogeneous agents and two classes of collateralizable assets. In this model, changes in the regulation of one class of collateralizable assets may have only small effects on these assets' return volatility if investors have access to another unregulated class of assets to enter leveraged positions. A detailed general equilibrium analysis uncovers the economic mechanisms driving asset market volatility.

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In the economic model, financial securities are only traded if the promised payments associated with selling these securities are backed by collateral. Margin requirements dictate how much agents can borrow using risky assets as collateral: if the margin requirement for an asset is m, then agents can borrow a fraction $1-m$ of the value of this asset when using it as collateral. There are two different margin rules that may apply to different asset classes. In the first rule the margin requirements are determined in equilibrium by market forces: they are set to the lowest possible value that still ensures no default in the subsequent period. In addition to market-determined margin requirements, a (not further modeled) regulating agency has the power to set minimum margin requirements.

To generate collateralized borrowing in equilibrium we assume that there are two types of agents who differ in risk aversion. They have Epstein–Zin utility with identical elasticity of substitution (IES) parameters and identical time discount factors. The agent with the low risk aversion parameter (agent 1) is the natural buyer of risky assets and takes up leverage to finance these investments. The agent with the high risk aversion (agent 2) has a strong desire to insure against bad shocks and is thus a natural buyer of risk-free bonds. Growth rates in the economy reflect the possibility of disaster shocks as in Barro and Jin (2011). When the economy is hit by a bad shock, the leveraged agent 1 loses financial wealth. As a result, the collateral constraint forces her[1] to reduce consumption and to sell risky assets to the risk-averse agent. These actions trigger an additional decrease in asset prices, which further reduces the wealth of agent 1. In sum, the presence of margin requirements leads to endogenous changes in the wealth distribution which—in turn—strongly affect asset return volatility in the economic model. Therefore, changing margins has the potential to substantially affect asset market volatility.

The model-based general equilibrium analysis of Regulation T is based on an economy with two long-lived assets, where margin requirements are exogenously regulated for one long-lived asset (representing stocks) while the margin requirement for the second asset (representing housing and corporate bonds) is determined by market forces. There are two forms of margin regulation: constant margin requirements and countercyclical margin requirements. For constant margins, the same minimum margin requirement applies over the whole business cycle. For countercyclical margin regulation, minimum margin requirements are 50 percent and the regulator imposes additional margins (sometimes referred to as “macroprudential add-ons”) in good times.

For constant margin requirements on stocks, higher margins do not imply significantly different stock return volatilities. The reason for this result is that an increase in the margin requirement has two opposing effects: First, the regulated asset becomes less attractive as collateral. Thus it is sold more frequently after bad shocks when agent 1 must de-leverage. This effect represents a “flight from high margins”. As a result the price of the regulated asset must fall to induce agent 2 to buy it. Second, higher stock margins decrease the agents' ability to leverage. Therefore the amount of leverage decreases in equilibrium, leading to less de-leveraging after bad shocks. While the first effect increases the regulated asset's volatility, the second effect reduces it. In equilibrium, these two effects approximately offset each other and thus the return volatility of the regulated asset barely changes. In contrast, the two effects work in the same direction for the unregulated asset and therefore reduce its volatility.

Countercyclical margin regulation of the stock market has a slightly stronger impact on asset price volatility than does constant regulation. In good times, the former type of regulation dampens the buildup of leverage in the same way as it does so with time-constant margins. However, the withdrawal of the macroprudential add-ons in bad times decreases the de-leveraging pressure induced by binding collateral constraints. For this reason, volatility can be reduced through countercyclical margin regulation, yet the quantitative impact can hardly be interpreted as economically significant. To sum up, changes in the regulation of one class of collateralizable assets may have only small effects on these assets' return volatility if investors have access to another (unregulated) class of collateralizable assets to leverage their positions.

In light of these observations, it is natural to explore a setting in which all asset markets are subject to margin regulation. And indeed, the effects of countercyclical margin regulation can significantly reduce stock market volatility if this kind of regulation is applied to all collateralizable assets in the economy. Such a regulatory policy prohibits agents from excessively leveraging (in unregulated markets), which lowers aggregate asset price volatility. That is to say, setting countercyclical margins in all markets is a powerful tool for considerably reducing stock market volatility as well as aggregate volatility.

While the focus of the analysis in this paper is on the volatility effects of margin regulation, we also explore the welfare implications of changing margin requirements on stock markets. In general, tightening margins benefits the more risk-averse agent, agent 2, yet results in a utility loss for agent 1. However, replacing constant margins with countercyclical ones benefits both agents if one agent compensates the other financially. In some cases this regulatory change leads to a Pareto improvement even without compensation. The normative analysis therefore confirms that countercyclical regulation is preferable to constant regulation.

There is a growing literature on the effects of collateralized borrowing on asset market volatility; see, among many other papers, Geanakoplos (1997), Aiyagari and Gertler (1999), Coen-Pirani (2005), Fostel and Geanakoplos (2008), Brunnermeier and Pedersen (2009), Garleanu and Pedersen (2011), and Fostel and Geanakoplos (2013). Unlike the present study, these papers do not consider calibrated models and do not investigate the quantitative implications of margin regulation. More like the present study, Rytchkov (2014) and Chabakauri (2013) analyze the volatility implications of collateral constraints in models with heterogeneous agents and two assets; in continuous time however. Unlike the present study, but similar to

[1] For simplicity, agent 1 is female and agent 2 is male throughout the paper.