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## A sectoral analysis of the financial instability hypothesis



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### ABSTRACT

Hyman Minsky's Financial Instability Hypothesis (FIH) is applied to various North American Industrial Classification System (NAICS) industry groups, and it is found that some sectors develop much more closely in accordance with the FIH than others. Minsky categorized firms based on the relationship between cash flow and debt service requirements: hedge finance units, whose operating revenues are adequate to service current interest and principal on their debt; speculative finance units, which can meet interest payments but cannot pay down principal; and Ponzi finance units, which cannot meet current interest payments. The FIH is related to, as well as supportive of, Austrian Business Cycle (ABC) theory, because interest rates are negatively correlated with the proportion and market value of speculative firms in several sectors.

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“He who refuses nothing, . . . will soon have nothing to refuse.”  
 Martial, *Epigrams* XII, 79

### 1. Introduction

Minsky (1975, 1982, 1986, 1992), classifies heterogeneous firms in three categories, according to the relationship between available cash flow and debt service needs—(1) hedge finance units generate sufficient cash flow to service both interest and principal, reflecting the discipline not to borrow more than their cash flow justifies; (2) speculative finance units borrow so much their cash flow covers interest payments but not repayment of principal; and (3) Ponzi finance units borrow so much they cannot even cover interest on their debt. In Minsky's Financial Instability Hypothesis (FIH), protracted periods of prosperity lead endogenously either to progressive acceptance of greater risk on the part of firms, or a mistaken under-evaluation of the market risk to which firms are exposed. As the expansion phase of the business cycle wears on, ever more-leveraged firms expose the financial sector to greater risk, thus actual risk-adjusted returns are lowered economy-wide as the economy becomes progressively more dominated by speculative and Ponzi finance units. Firms can increase their degree of overleveraging merely by failing to meet the sales or earnings expectations assumed to justify current borrowing levels, as well as by aggressively pursuing additional leverage.

Higher degrees of leverage are seen as normal as the expansion phase of the business cycle wears on and more prudent approaches to lending and borrowing are progressively abandoned. Once Ponzi finance units reach a level of indebtedness where they can no longer borrow in increasing amounts based on fixed collateral, they are suddenly forced to sell off assets to make interest payments, and once the economy reaches a critical threshold of Ponzi finance units, this creates an oversupply of assets offered for sale, and the resulting debt deflation causes a financial crisis and liquidity shortage.

Because the distribution of FIH categories is highly sensitive to earnings fluctuations, a crisis state can be brought about by a deceptively low critical mass of Ponzi and speculative finance units. Furthermore, since speculative bubbles are localized in particular industries, we would expect to see different degrees of overleverage develop in different sectors. A sufficient degree of speculative and Ponzi finance concentrate in a particular industry may be sufficient to drive a financial crisis affecting most or all other sectors.

This paper uses a large 2002–2009 quarterly data set of all publicly traded North American firms and foreign firms traded on North American exchanges, a total of 8707 companies. Eight industry groups are selected for examination, based on the two-digit NAICS prefix: Agriculture, Forestry, Fishing, and Hunting (11), Mining, Quarrying, and Oil and Gas Extraction (21), Utilities (22), Manufacturing (31–33), Transportation and Warehousing (48–49), Information (51), Real Estate, Rental, and Leasing (53), and Professional, Scientific, and Technical Services (54). Financial ratios are used to classify these firms in each quarter according to Minsky's FIH categories. Market value is used to weight the categories for

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firms in each NAICS sector. Results provide direct empirical support for the FIH on a sector-by-sector basis.

The FIH is then reinterpreted in terms of Austrian Business Cycle (ABC) theory, which depends on inflationary credit expansion to drive the unsustainable prosperity. According to Minsky's FIH, unsustainable prosperity emerges endogenously as long periods of economic expansion make borrowers and lenders alike more willing to engage in activities for which they systematically underestimate the actual risk. Protracted prosperity, stability, and growth naturally leads actors to progressively underestimate risk, driving a wedge between *ex ante* perceived risk-adjusted returns, which determine borrower and lender behavior, and actual *ex post* risk-adjusted returns. It becomes clear that this process is amplified and exacerbated by credit expansion. ABC theory posits as the cause of the business cycle. Minsky's FIH helps flesh out some of the missing dynamics of the malinvestment liquidation phase of ABC theory, and the two views turn out to be surprisingly complementary. Examining the dynamics of debt financing by sector introduces some of the firm heterogeneity on which both ABC theory and the FIH depend, and which is often disregarded in empirical macroeconomics.

The remainder of this paper is structured as follows: Section 2 recapitulates recent empirical findings based on the FIH; Section 3 presents the empirical results of this paper; Section 4 discusses the relationship between the FIH and ABC theory; Section 5 presents concluding comments.

## 2. Earlier empirical findings

A number of studies have refined or elaborated on the FIH (e.g., [Dos Santos, 2005](#); [Dos Santos & Zezza, 2008](#)), but empirical studies have been exceedingly rare. [Sethi \(1992\)](#) developed a model of firm behavior based on the FIH, in which information constraints, transactions costs associated with the acquisition and evaluation of relevant new information, and the dynamics of learning, all contribute to the progressive acceptance of over-leverage by both borrowers and lenders. His computer simulations were able to mimic business cycle behavior better than rational expectations models, when the rational expectations forecasts and agent expectations were not publicly observable, but had to be discovered through observation over time.

[Silipo \(2011\)](#) examines whether asset portfolios increasing include overvalued risky assets over the course of an expansion. As agents become more optimistic, they become less risk averse, or simply under-assess risk exposure, and assets used as collateral for loans thus become over-valued ([Minsky, 1982](#)). As capital asset price volatility falls over the course of an expansion, standard valuation techniques lead agents to conclude that assets are undervalued based on expected cash flows, which have been increasing and may be over-assessed, while cash flow volatility is increasingly likely to be under-assessed as the expansion progresses. If risk exposure is wrongly assessed at too low a level, risk-adjusted returns are misperceived as greater than their true underlying values. Asset valuations are thus systematically biased upward, and to borrowers and lenders caught up in the euphoria of an extended boom, these inflated asset values seemingly justify higher credit limits. And in the absence of realized losses, lenders and borrowers mistakenly conclude that cash flows justify increasingly higher debt levels.

As the boom period of steadily growing cash flows extends in duration, memory of past downturns and market volatility recedes, and capital asset prices rise in relation to current cash flows, acceptable debts increase in relation to income streams and collateral requirements ([Minsky, 1982, p. 144](#)), the quantity and quality

of collateral required by lenders falls, as investment spending and profits increase, all contributing to the transformation of the financial structure from an initial one of transparent and robust simplicity to one of increasing complexity, hidden dependency, concealed weakness, and fragility ([Minsky, 1982, p. 111](#); [Silipo, 2011, p. 443](#)).

Silipo examines 1991–2009 data, and among his conclusions are “that investor confidence and risk appetite shaped the business cycle more than monetary policy and the cost of borrowing” (2011, p. 447). Such measures as the Goldman Sachs Risk Aversion Index fall steadily over the expansion and rise abruptly at the onset of the 2001 and 2007–2008 crises. In addition, leading up to the financial crisis in late 2007, bank's asset holdings more than doubled, and the majority of this balance-sheet expansion occurred in increasingly risky assets ([Silipo, 2011, pp. 448–449](#)).

[Minsky \(1986\)](#) cites securitization as a vector of financial fragility, because it avoids the traditional regulatory constraints on growth of liquid assets, bypassing reserve requirements, central bank regulation, and monetary policy. As financial obligations become increasingly layered, the economy becomes more vulnerable to the inevitable liquidity crises which must occur eventually at some location. Highly layered obligations, made possible through extensive unregulated securitization, ensure that any liquidity shortage will spread from sector to sector, given the fragile and interdependent financial structure ([Minsky, 1982, p. 132](#)). Silipo observes that expansion-generated portfolio transformations also shrink the financial system's domain of stability, and thus make liquidity crises more likely. At some point, such a crisis becomes inevitable.

One feature of the last recession which does not strictly fit the FIH, is that the liquidity crisis occurred among those households and financial institutions which had run up the highest levels of indebtedness, rather than among the relatively *less* indebted corporate sector ([Silipo, 2011, p. 452](#)). This explains why the crisis occurred in the overextended financial sector.

Silipo also observes that interest rates rose along with amounts borrowed, although *ceteris paribus*, borrowing should fall as the cost of borrowing rises. Unless conventional supply and demand theory can be set aside, this could only happen due to an increase in loan demand (or a decrease in supply, which can clearly be ruled out), and one of the possible causes of such an increase in demand, is an increase in borrower confidence.

The flight to quality [Minsky \(1982, p. 131\)](#) predicts for the financial sector once the crisis and debt deflation hit, as a response to greater uncertainty by profit-maximizing, risk-averse banks, clearly occurred ([Silipo, 2011, p. 453](#)) as the monetary base was quadrupled, though monetary aggregates only increased by a comparatively moderate factor of about one-third (as of May 2012). Silipo's study is noteworthy as one of the few empirical examinations of the FIH.

Most applications of the FIH have employed computer simulations. [Keen \(2013\)](#) uses simulation studies based on his own FIH model ([Keen, 1995](#)) to reproduce the dynamics of the expansion and collapse. In addition to increasing risk and instability over the course of the expansion, Keen also shows that over the expansion phases of the cycles, the wage share of income fell, non-financial business incomes stabilized, and financial-sector income rose.

In presenting their model and simulation studies, [Chiarella and Di Guilmi \(2011\)](#) observe that in the stock market, heterogeneous agents form expectations which determine the market valuation of assets, taking advantage of the market's heterogeneous expectations to proxy firm and capital heterogeneity. In addition, to model the endogeneity of money, they model monetary aggregates as being linked to the total amount of financial assets, rather than a fixed multiple of the monetary base, an approach which

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