

# Deconstructing the Nasdaq bubble: A look at contagion across international stock markets

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Received 24 April 2005; accepted 18 August 2005

Available online 12 September 2005

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## Abstract

Share prices for the technology, media, and telecommunication (TMT) sector experienced phenomenal growth and decline at the turn of this century in the U.S. and many other OECD economies. We investigate whether contagion occurred from the U.S. to other international stock markets after the Nasdaq bubble collapsed. Results document a significant structural break in comovements between the international TMT sectors, and suggest that the collapse of the stock market in more than a dozen countries is tied to close sectoral links (particularly in TMT), and cannot be attributed to widespread contagion. We also show the importance of modeling the intrinsic heteroskedasticity in the data using a GARCH framework for inferences on contagion.

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*JEL classification:* F30; G15

*Keywords:* Contagion; Stock bubble

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## 1. Introduction

When the dot-com bubble had finally run out of steam on 10 March 2000, the technology, media, and telecommunication (TMT) driven Nasdaq composite index lost over one-third of its value after having reached an all-time high of 5048 points. This remarkable rise and fall of share

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prices, particularly for stocks in the TMT sector was observed in the U.S. and many other OECD economies. The aim of this paper is to examine whether contagion occurred from the U.S. to other international stock markets after the bubble collapsed.

The unanticipated collapse of the Nasdaq bubble and the ensuing cross-border transmission is relevant from a theoretical and empirical perspective, especially in view of rising correlation between international financial markets in recent decades. A large shock in the U.S. market may induce simultaneous price movements in other financial markets and lead to contagion, which has significant consequences for asset allocation. The channel through which the shock is transmitted is equally important, such as through financial markets, trade linkages or market expectations.

A traditional approach to measuring the transmission of large shocks involves the examination of changes in correlation between international stock returns. Most research on international comovements in financial markets focus directly on correlations in cross-country returns. According to the [World Bank \(2004\)](#) definition, contagion occurs when a shock is transmitted across international markets with a significant increase in cross-country correlation during crisis times relative to tranquil times. [Corsetti et al. \(2002\)](#) define contagion as a structural break in the data generating process of the rates of return, while [Forbes and Rigobon \(2002\)](#) show that an increase in correlation may not necessarily point to contagion because of possible heteroskedasticity within the data. To investigate whether the technology bubble collapse in the U.S. Nasdaq resulted in a significant increase in correlation between the U.S. and other foreign stock markets, we examine the model proposed by [Forbes and Rigobon \(2002\)](#) (henceforth F&R) that adjusts for changes in volatility before and after the TMT bubble collapsed. While this procedure for adjusting correlation coefficients is an important contribution to the correction of biases caused by heteroskedasticity in times of crises, we demonstrate that assumptions of this methodology may be invalid and lead to incorrect inferences regarding the extent of comovements across economies.

To overcome these limitations, we apply the generalized autoregressive conditional heteroskedastic (GARCH) framework that models heteroskedasticity within the sample. We also show that the GARCH parameters are substantial, significant and stable across the sample periods when testing for contagion. Further, by explicitly modeling both the heteroskedasticity process throughout the entire sample and the long-run relationship between U.S. and international stock prices using an error correction term, we show that the GARCH framework yields lower standard errors compared to the F&R procedure.

The purpose of this paper is to deconstruct the effects of the Nasdaq bubble on international economies by measuring the comovements across international equity markets. Our contribution to the academic literature is two-fold: First, we test for a break in stock return comovements across both countries and sectors to determine the extent of volatility transmission after the bubble burst. Second, our approach highlights the importance of modeling intrinsic heteroskedasticity within the data before inferences concerning comovements are made.

On the whole, we find a significant increase in transmission of shocks in the TMT sectors from the U.S. to other global markets. We also observe substantial time-varying volatility across the entire sample (not just across the two before/after samples). After accommodating for heteroskedasticity, the relationship between U.S. stock returns and other economies differ significantly in the pre- and post-bubble time period. Our findings suggest that the collapse of the stock market in more than a dozen countries is tied to close sectoral links (particularly in TMT), and cannot be attributed to widespread contagion.

The structure of this paper is as follows: The next section will provide a brief survey of the various approaches for measuring market comovements. Section 3 discusses the data employed. In section 4, we discuss F&R's adjustment to vector autoregressive (VAR) estimates and the

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