

The Evolution of Market Efficiency Over the Past Century

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Abstract

I combine a hand-collected sample of earnings announcements from the *Wall Street Journal* over the years, 1934-1971, with more recent data from Compustat, and document a striking U-shaped pattern in the evolution of market efficiency over the extended period, 1934-2018. In terms of investors' response to both firm-specific and market-wide news, markets are more efficient during the early and late years in this extended sample, while they become less efficient in the middle decades. I argue that this U-shaped pattern in the degree of market efficiency over time has been driven by two distinct economic dynamics. While the recent evolution in information-processing technology has led to more efficient markets in the later periods, the surprisingly high degree of market efficiency in the 1930s and 1940s reflects the greater relative importance of earnings announcements as a critical source of information that commanded investor attention, at a time when there was less overall information to process and fewer alternative information venues to consider. Overall, these results highlight that the evolution of market efficiency has not followed a linear path, but rather, divergent economic forces have caused the U-shaped pattern in market efficiency over time.

Introduction

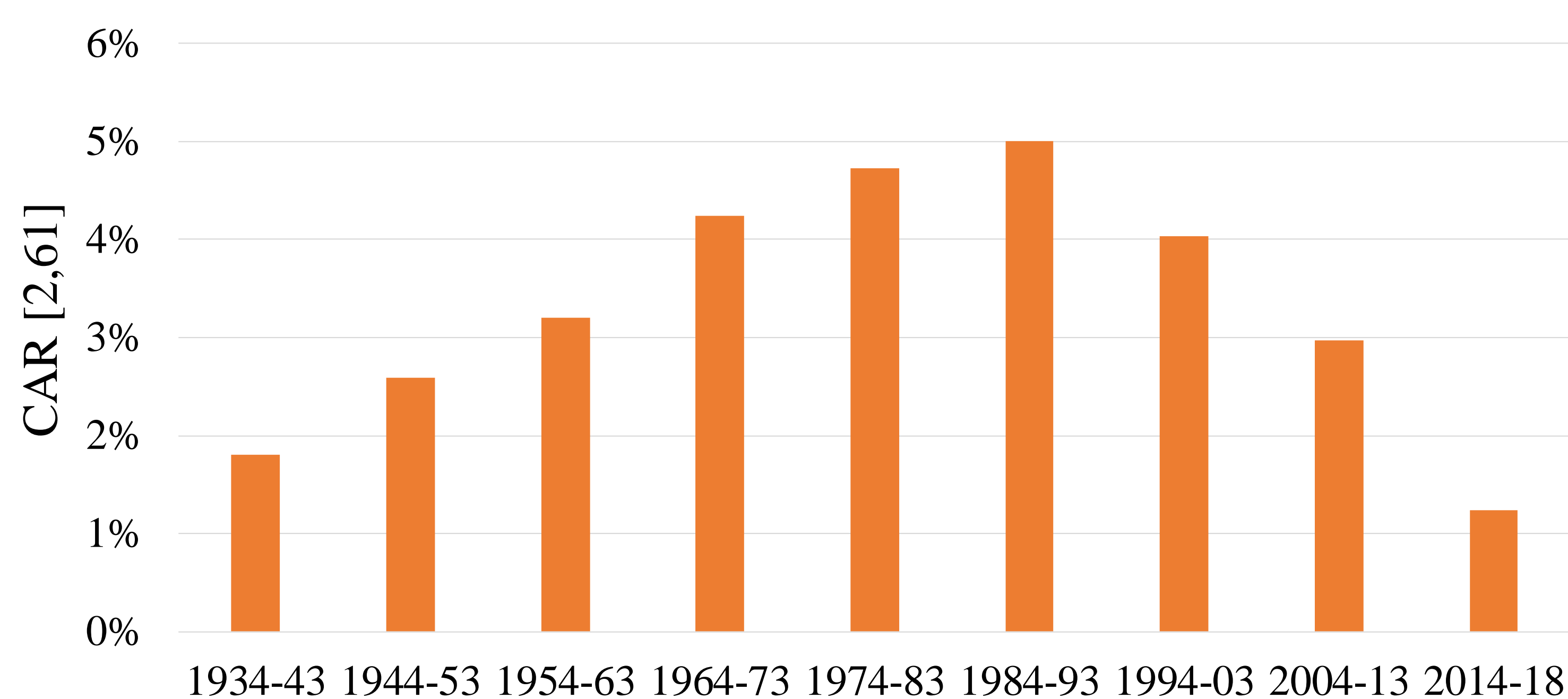


Figure 1. The Evolution of Delay in Response to Firm Specific News

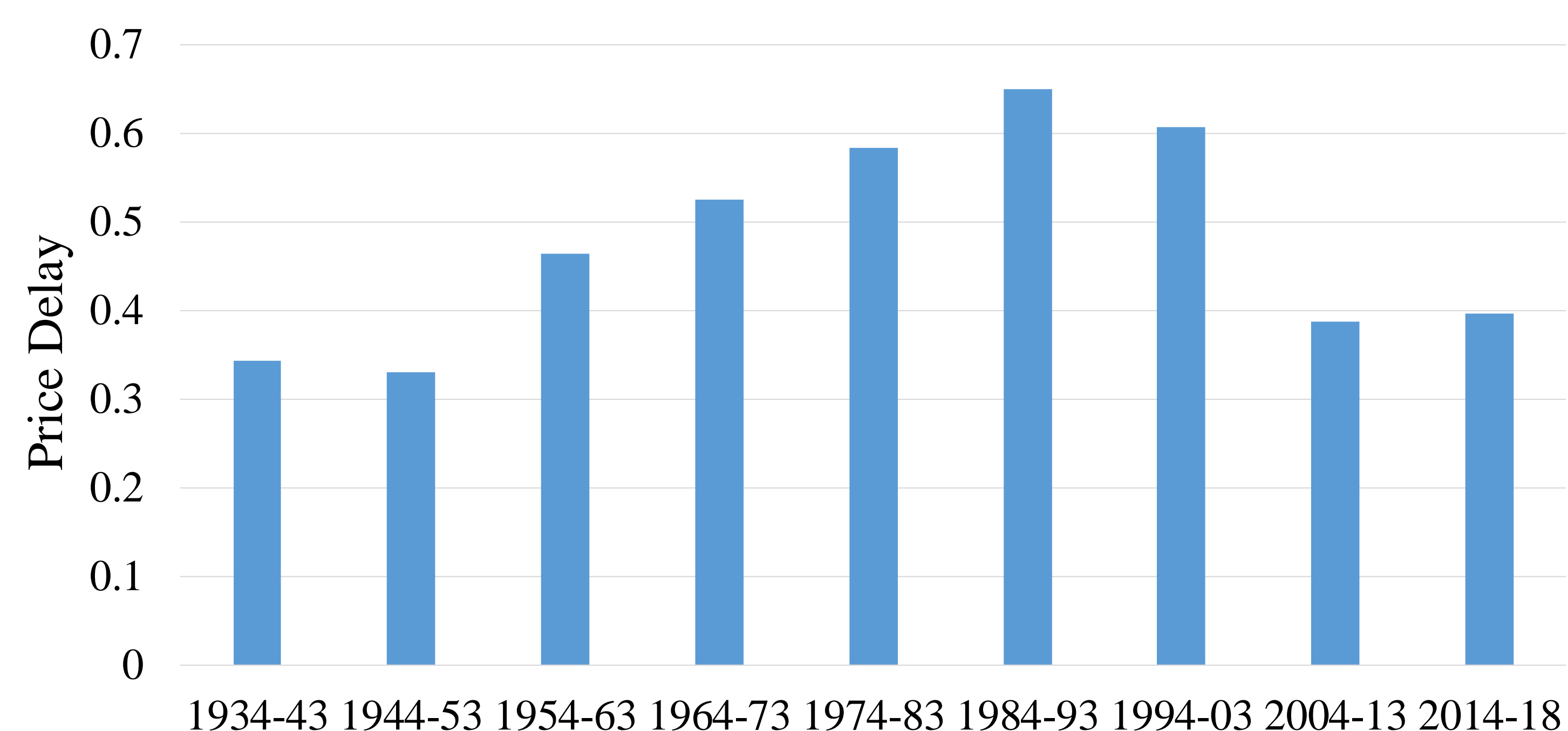


Figure 2. The Evolution of Delay in Response to Market Wide News

Data and Methods

I hand collect earnings announcements from the digital archives of the WSI between 1934 and 1971 and combine these with the Compustat data from 1972 to 2018. I then construct an earnings surprise measure based on Foster, Olsen, and Shevlin (1984) and compute cumulative abnormal returns for each stock following the earnings announcement. I group stocks into quintile portfolios based on their earnings surprise and report returns to the long-short hedge portfolio based on the earnings surprise.

- Standardized Unexpected Earnings (SUE) = $(EPS_{i,q} - EPS_{i,q-4}) / \sigma_{q-8, q-1}$
- CAR [a, b]it = $\prod_{d=a}^{d=b} (1 + Ret(i, d)) - \prod_{d=a}^{d=b} (1 + MatchRet(m, d))$

Next, I follow Hou and Moskowitz (2005) to measure the delay with which stock prices respond to market-wide new information. I then estimate a pooled trend regression to document the nonlinear evolution of pricing efficiency over the period between 1934-2018.

Results

Variables	CAR [0, 1] (1)	CAR [2, 61] (2)
Adj_SUE	0.029*** (19.37)	-0.003 (-0.63)
Trend	0.123 (0.29)	10.037*** (6.85)
Adj_SUE x Trend	-0.094*** (-5.45)	0.590*** (11.71)
Trend ²	-0.003*** (-3.78)	-0.007*** (-2.87)
Adj_SUE x Trend ²	0.0005*** (11.01)	-0.002*** (-12.76)
Controls	Y	Y
Adjusted R-squared	0.033	0.009

Table 1. Delay in response to firm-specific news: Nonlinear Trend Over 1934-2018

Variables	(1)
Trend	3.748*** (8.73)
Trend ²	-0.010*** (-6.55)
Controls	Y
Adjusted R-squared	0.788

Table 2. Delay in response to market-wide news: Nonlinear Trend Over 1934-2018

Discussion and Conclusion

Figure I plots evolution in the market's average post-earnings announcement drift (PEAD) while Figure II plots analogous evolution in the market's overall inefficiency in responding to market-wide information. Both figures clearly show that markets are more efficient in the early and late decades while they are least efficient in the middle decades. To the best of my knowledge, this is the first study that examines the evolution of market efficiency over such a long historical period and reveals this U-shaped pattern in the degree of market efficiency over the past century.

Table I and II show this non-linear trend in the evolution of market efficiency in a trend regression spanning 1934-2018. The positive (negative) coefficient on the interaction term between Adj_SUE (hedge portfolio return) and the squared quarterly trend reveals this U-shaped (inverted U-shaped) pattern in the degree of immediate response (delayed response) to new firm-specific information. Table II shows the analogous nonlinearity in the evolution of investors' delayed response to market-wide new information.

Further analysis uncovers two potential dynamic mechanisms behind the U-shaped pattern of market efficiency over the past century. First, I document that investors had few information sources other than earnings announcements in the early years, which increased the attention and resources dedicated to processing the information and contributed to more efficient prices. Second, during the early years, the lack of other information venues increased the relative information content of earnings announcements at the time, which resulted in more timely adjustment of prices to earnings news.

References

- Foster, G., Olsen, C. and Shevlin, T. (1984). Earnings releases, anomalies, and the behavior of security returns. *The Accounting Review* 59 (No. 4), 574-603.
- Hou, K., and Moskowitz, T. J. (2005). "Market Frictions, Price Delay, and the Cross-Section of Expected Returns." *The Review of Financial Studies* 18.3 (2005): 981-1020. Web.