



Price clustering and natural resistance points in the Dutch stock market: A natural experiment[☆]

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Abstract

This paper focuses on the tendency of stock prices to cluster at round numbers (like 10, 20, 30, etc. and to a lesser extent 5, 15, 25, etc.) and the related effect of round number price barriers (prices pass round numbers less frequently than other numbers). Two competing hypotheses are tested, using data from the Dutch stock market of the period 1990–2001. After 1 January 1999 stock prices were listed in euros, while guilders were still the currency of daily life until 2002. The *aspiration level* hypothesis predicts that round number effects in guilders will only slowly disappear. The *odd price* hypothesis predicts an abrupt change in round number effects after 1 January 1999. Generally, the results are consistent with the odd price hypothesis.

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1. Introduction

This paper focuses on the tendency of prices to cluster at round numbers (like 10, 20, 30, etc. and to a lesser extent 5, 15, 25, etc.) and the related effect of round number price barriers (prices pass round numbers less frequently than other numbers). These effects are

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small but very robust (documented in various markets, see Section 2) and contradicts any strict definition of the efficient market theory; there is no reason why the discounted value of future returns would relatively often be a round number. The effect is relatively stable because it is small in absolute terms, making it hard to arbitrage away profitably. This effect may therefore not be very interesting for an investor looking for profits, but it is from a scientific point of view of considerable interest because it offers insights in the way investors make their decisions.

There are several possible explanations for round number phenomena (discussed in Section 3). The two most plausible ones are the aspiration level hypothesis and odd pricing. According to the aspiration level hypothesis investors who buy an asset already have a target price in mind for which they are willing to sell in the future. Moreover, financial analysts also sometimes report target prices. These target prices are typically round numbers, probably because they are based upon rough estimates of the value of the firm or future dividends. Odd pricing is the tendency of consumers to consider an odd price like 19.95 as significantly lower than the round price of 20.00. This tendency is well documented and much used in the marketing of consumer goods. There is no a priori reason why investors would not be affected by this tendency, considering a 19.95 stock significantly cheaper than a 20 euro stock. Sellers would be happier to sell at 20 than at 19.95 and thus more limit sell orders will be placed at 20 while buyers will be more reluctant to buy the stock in the 20s than in the 10s.¹

It is difficult to test these hypotheses using regular market data. However, the introduction of the euro provides a unique opportunity to study the round number effect in a ‘natural experiment’. What a round number is depends on the currency used: how close a stock’s price (or a stock index) is to a ‘psychologically’ important number can change drastically when the transition from local currencies to euros is made. Fortunately, the implementation of the euro was done in two steps: after fixing the exchange rates (December 1998, 2.20371 guilders is 1 euro) all stock prices were listed in euros from January 1999 onwards. Three years later (January 2002) euro coins and banknotes were introduced in daily life. This means that during the 3 years 1999–2001 Dutch investors had to formulate their decisions to buy or sell stocks in euros while consumption was in guilders (and all salaries were paid in guilders).

This natural experiment enables us to evaluate the main hypotheses. According to the aspiration level hypothesis the round number effects in guilders will only vanish slowly after 1 January 1999. Stocks bought before this date, were paid in guilders, have an original target price in guilders and the investor selling the stock will receive guilders in her bank account (so there is no reason to change to new euro target prices). Only stocks purchased after 1 January 1999 are likely to have euro-target prices. In contrast, the odd-price hypotheses predicts that on 1 January 1999 round number effects in guilders will cease to exist and round number effects in euros will immediately arise.

Before discussing the design of the present study, a short overview of the relevant literature will be presented in Section 2. Section 3 discusses explanations for round number phenomena. Section 4 presents the data collection and the results. Section 5 concludes.

¹For an overview of other influences of investor psychology on asset prices, see Hirshleifer (2001).

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