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# Psychological barriers in European stock markets: Where are they?☆

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ABSTRACT

We examine four European stock indices and the prices of eight major German stocks for indications of psychological barriers. The frequency, (expected) returns, intraday volatility and trading volume of these assets are studied contingent on whether the prices lie within a certain range around round numbers. Our results indicate that psychological barriers do not exist on a consistent basis. It seems that some barriers have disappeared after these anomalies have been published. This discovery is consistent with current literature findings about disappearing stock market anomalies.



## 1. Introduction

The answer to the question of whether there are psychological barriers in stock markets – prices' "exceptional" behavior whenever they are close to round numbers – depends heavily upon whom you ask. From market practitioners' and journalists' viewpoint, the existence of psychological barriers seems to be an obvious fact, as is daily noticeable in the markets. From an academic perspective the matter is much less obvious.

Why should market participants' attention – or even excitement – be more intense at certain price levels than elsewhere? Donaldson (1990) and De Grauwe and Decupere (1992) demonstrate that in stock and foreign exchange markets, price levels near round numbers are of special importance to market participants. Donaldson and Kim (1993) ascertain that multiples of 100, and especially of 1000, mark a certain hurdle for the further movement of the Dow Jones Industrial Average Index. They furthermore state

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that traders interpret the upward movement rebound at such a resistance level as a "market weakness", whereas breaking through the barrier is seen as a sign of a strong market (and vice versa in a downward movement).

Another effect observed when prices break through a barrier is the so-called *bandwagon effect*, i.e. the phenomenon of prices quickly moving away from the barrier after it has been breached. The bandwagon effect can be explained by the fact that the demand by some market participants increases because others are already purchasing the relevant asset. It is therefore a type of herding behavior.

Participants in financial markets try to reduce complexity with the help of simplifying heuristics in order to arrive at decisions even in very complicated situations. According to Mitchell (2001), one kind of simplification is the rounding of arbitrary rational numbers to integers, the so-called *clustering*.[1] Applied to stock markets, this means that a certain part of the asset pricing process is influenced by the number expressing the price itself. One consequence of clustering being made responsible for psychological barrier phenomena is the so-called *grouping* effect.[2] Grouping means separating numbers into different groups with the same leading figure. Due to this effect the difference between two numbers within the same group, e.g. 990 and 970, is perceived as smaller than the difference between two numbers of different groups, such as, e.g. 990 and 1010, although the difference is identical. In this view, psychological barriers – being multiples of powers of ten – lie exactly on the boundaries between the groups and are thus of special importance.

Behavioral factors are not the only reason why barriers could exist. Option exercise prices also are usually round numbers. Delta hedgers frequently are most active when the option is at the money, i.e. the price of the underlying is close to the exercise price. Thus, purely technical reasons also cause additional trading activity in the underlying asset.

From these considerations we can deduce that barriers may exist, but one cannot take their existence for granted a priori. Several studies from 1990 to date have empirically dealt with the question of psychological barriers in major stock indices (mainly the Dow Jones) and foreign exchange markets. However, these studies use daily close-to-close returns of FX rates or stock indices. None of these studies examine single stock prices. This is astonishing insofar as real stocks can be and are traded directly on stock exchanges, whereas stock indices are not immediately traded but rather by index futures and related instruments.

Clearly, the existence of psychological barriers in the above sense is connected to the belief in the predictability of stock prices and thus may lead to the possibility of earning abnormal risk-adjusted returns, which is not compatible with the theory of efficient markets.[3] Since thousands of articles and books have been written on the topic of efficient markets, we do not intend to review this discussion here.[4] We would, nevertheless, like to state that psychological barriers' existence is contradictive to both the market efficiency hypothesis and the assumption of rational investors. From this point of view studies which find evidence for the existence of psychological barriers contribute to the literature on market anomalies. Again, we make no attempt to present a complete survey of this literature here. It deserves particular mention that current studies have documented the disappearance of many anomalies found by empirical researchers: Marquering, Nisser and Valla (2006) show that the weekend effect, the holiday effect, the time-of-the-month effect and the January effect have disappeared after these anomalies have been published.

Our paper contributes new methodological aspects to the barrier literature as well as new empirical evidence from European stock markets, which have not been the main focus of earlier studies. Four European stock indices and the prices of major German stocks are examined with respect to the frequency with which they lie within a certain band around the barrier and also with respect to certain return characteristics and volume. Our concept is to use many different statistical approaches to find indications for psychological barriers in European Stock Markets. Some of our approaches are similar to the methods used in existing literature. Additionally, we pursue some new approaches in estimating the intraday variance and in using open, high, low and closing prices for our calculations. To the best of our knowledge, we also are the first to look for barrier effects in single stocks.

[1] Cf. Mitchell (2001) who assumes that clustering is caused by the decimal system.
[2] See also Mitchell (2001), p. 405.
[3] Cf. Ley and Varian (1994), p. 217.
[4] We refer the reader to Fama (1991) and to Shiller (2003) for an up-to-date discussion of the theory and empirical evidence of efficient markets.