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Short-term Asset Trading, long-term Price Swings, and the Stabilizing Potential of a Transactions Tax

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Abstract

The paper addresses the following puzzle. On the one hand, trading in asset markets has become progressively more short-term oriented, on the other hand, asset prices have continued to move in a sequence of "bull markets" and "bear markets", often lasting several years. The main results of the paper are as follows. First, "bull (bear) markets" are brought about by upward (downward) price runs lasting longer than counter-movements for an extended period of time. Second, this pattern is the result of "trading as usual", which employs so-called "technical analysis" to exploit asset price trends and, in doing so, reinforces the price trends. Third, the recent financial crisis spilled over to the real economy mainly through the coincidence of three "bear markets", i. e., through the simultaneous devaluation of stock, housing and commodity wealth. Fourth, a financial transactions tax (FTT) would specifically reduce the profitability of short-term derivatives trading. By doing so, a FTT would limit the magnitude of the "long swings" in asset prices. Fifth, an FTT need not to be introduced globally, there do exist options which would allow "forerunner countries" to introduce such a tax without doing much harm to their financial markets.

JEL: E30, F31, G12, G13, G14, H25

Keywords: Boom and bust of asset prices, speculation, technical trading, transaction tax.

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Short-term Asset Trading, long-term Price Swings, and the Stabilizing Potential of a Transactions Tax*)

1. Introduction

The transformation of a mortgage crisis in the US into a global crisis of the financial institutions as well as of the real economy was in large part a result of the sharp and simultaneous devaluation of stock, housing, and commodity wealth. The bust phases in these markets reduced consumption and investment spending directly, as well as indirectly through the devaluation of pension and college funds and credit collaterals and through the deterioration of the current accounts of commodity exporting countries.

The potential of stock, house and commodity markets to undergo protracted declines had "built up" during the boom phases in these markets between 2003 and 2007. The resulting vulnerability of the financial system to crisis, with its macroeconomic effects, was widely ignored prior to crisis. As *Blanchard – Dell'Ariccia – Mauro* (2010, p. 6) put it: "Financial regulation targeted the soundness of individual institutions and aimed at correcting market failures stemming from asymmetric information, limited liability, and other imperfections such as implicit or explicit government guaranties. In advanced economies, its systemic and macroeconomic implications were largely ignored."

The present paper provides an analysis of how the wide fluctuations of stock prices, exchange rates and commodity prices are brought about. It shows that the boom-and--bust phases in asset markets are the outcome of "trading as usual". Distilling the path of asset prices into distinct up and down movements reveals that "bull (bear) markets" result from short-term upward (downward) price runs (i.e., monotonic movements) lasting longer than counter-movements for an extended period of time. This pattern stems from the interaction between trend-exploiting and - at the same time - trend-reinforcing technical trading on the one hand, and the prevalence of an expectational bias ("bullishness/bearishness") on the other. This interaction of technical and fundamental trading and the increasing "speed" of transactions strengthened both the upward swings of asset prices until mid 2007 as well as their collapse thereafter. The paper argues that a general financial transactions tax would reduce the profits from short-term trend chasing, thereby limiting the tendency of stock prices, exchange rates and commodity prices to undergo wide price swings.

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2. The “fundamentalist hypothesis” and the “bull-bear-hypothesis” of asset price dynamics

According to mainstream economic theory, asset prices are determined by the respective equilibrium conditions, i. e., by the so-called market fundamentals. Hence, destabilizing speculation will influence prices at best over the very short run (if at all). The main assumptions of the "fundamentalist hypothesis" can be summarized as follows (see also figure 1):

- The theoretical benchmark model of the “fundamentalist hypothesis” is an ideal, frictionless market where all participants are equipped with perfect knowledge and where no transaction costs exist ("world 0").
- The model underlying the "fundamentalist hypothesis" relaxes the assumptions of perfect knowledge and of no transaction costs. Also in this "world I" actors are fully rational, but they do not know the expectations of other actors. Hence, prices can reach a new equilibrium only through a gradual price discovery process.
- The high transaction volumes in modern financial markets stem mainly from the activities of market makers. The latter provide just the liquidity necessary for facilitating and smoothing the movements of asset prices towards their fundamental equilibrium.
- Speculation is an indispensable component of both, the price discovery process as well as the distribution of risks. As part of the former, speculation is essentially stabilizing, i. e., it moves prices smoothly and quickly to their fundamental equilibrium (*Friedman*, 1953).
- An endogenous overshooting caused by excessive speculation does not exist. Any deviation of asset prices from their fundamental equilibrium is due to exogenous shocks and, hence, is only a temporary phenomenon.
- The emergence of news and shocks follows a random walk and so do asset prices. Therefore, speculation techniques based on past prices cannot be systematically profitable (otherwise the market would not even be "weakly efficient" – *Fama*, 1970).

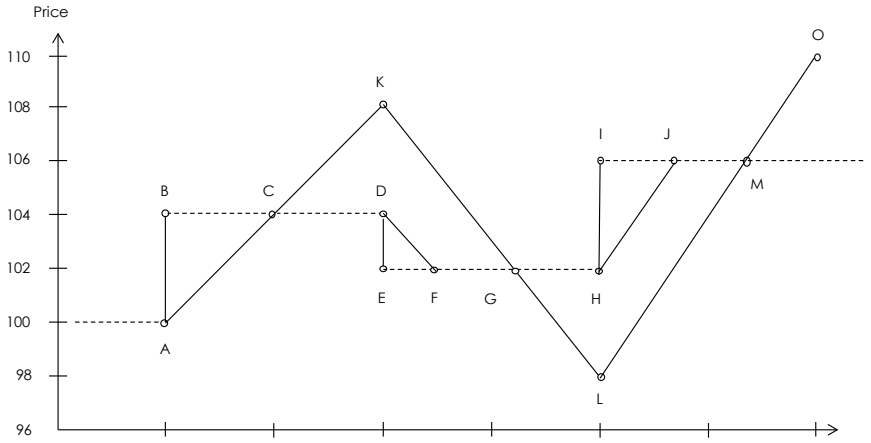
The "bull-bear-hypothesis" perceives trading behavior and price dynamics in asset markets as follows (“world II”):

- Imperfect knowledge is a general condition of social interaction. As a consequence, actors use different models and process different information sets.[1])
- Actors’ expectations and transactions are governed not only by rational calculations, but also by emotional und social factors.
- Not only are expectations heterogeneous but they are mostly formed only qualitatively, i. e., as regards the direction of an imminent price movement.

[1]) In a recent, pathbreaking book, *Frydman - Goldberg* (2007) demonstrate that recognizing the importance of imperfect knowledge is key to understanding outcomes in financial markets.

- Upward (downward) price movements – usually triggered by news - are lengthened by "cascades" of buy (sell) signals stemming from trend-following technical trading systems.
- The "trending" behavior of asset prices is fostered by the dominance of either a "bullish" or a "bearish" bias in expectations. News which are in line with the prevailing "market mood" gets higher reaction than news which contradict the "market mood".
- In the aggregate, this behavior of market participants causes price runs in line with the "market mood" to last longer than counter-movements. In such a way short-term runs accumulate to long-term trends, i. e., "bull markets" and "bear markets".
- The sequence of these trends then constitutes the pattern in long-term asset price dynamics: Prices develop in irregular cycles around the fundamental equilibrium without any tendency to converge towards this level.

Figure 1: Three stylized paths of asset prices



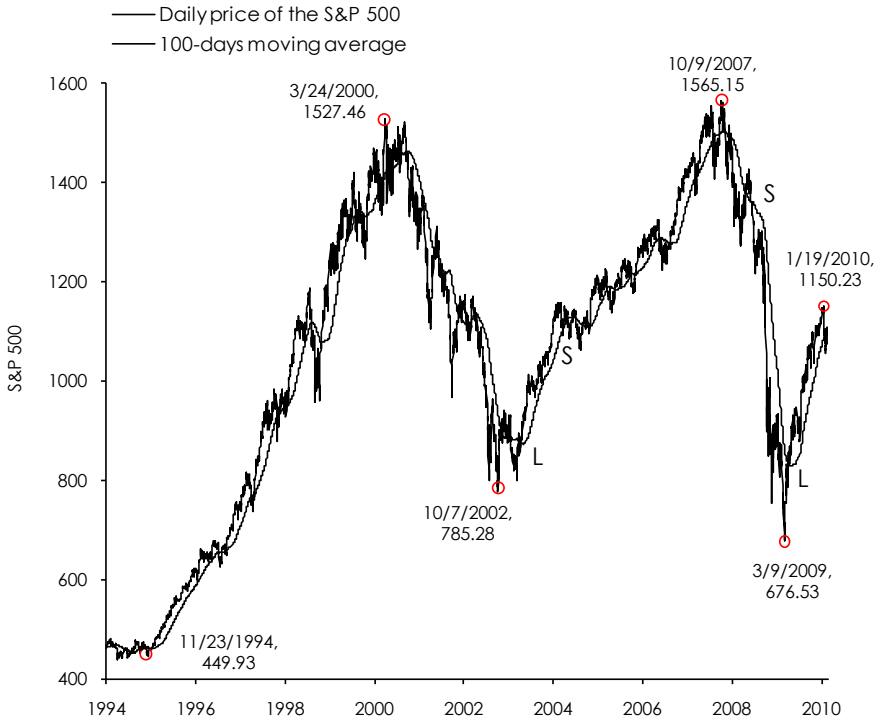
To clarify the differences between the "fundamentalist hypothesis" and the "bull-bear-hypothesis", it is useful to distinguish between three (stylized) paths of asset prices (figure 1):

- In "world 0", new information at t = 1 causes the asset price to jump instantaneously from the old equilibrium at P = 100 (point A) to the new equilibrium at P = 104 (B). In t = 3, news cause the price to jump to P = 102 (at E), and in t = 5 the price jumps to P = 106 (at I).
- In "world I", it takes a series of transactions to move the price from P = 100 to P = 104 (from A to C). Since traders are rational, the movement will stop at the new fundamental equilibrium level and stays there until t = 3, when a new adjustment process takes off.
- In "world II", there exist traders who form their expectations according to the most recent price movements, i. e., when prices move persistently up (down) they expect the respective short-term trend to continue. Hence, they buy (sell) when prices are rising (falling), causing the price to overshoot (from C to K, from G to L, and from M to O).

As a consequence of asset price "trending", rational investors (in the sense of profit-seeking) will try to systematically exploit this non-randomness in price dynamics. The conditions of

"world II" will therefore almost inevitably emanate from those of "world I": If prices move smoothly from one fundamental equilibrium to the next, and if this price discovery process takes some time, then profit-seeking actors will develop trend-following trading strategies. The most popular types are summarized under the heading "technical analysis". [2])

Figure 2: "Bulls" and "bears" in the US stock market and technical trading signals



3. Technical trading and the trending of asset prices

Technical analysis tries to exploit price trends ("the trend is your friend"). Hence, these trading techniques derive buy and sell signals from the most recent price movements which (purportedly) indicate the continuation of a trend or its reversal (trend-following or contrarian models).[3]) Since "technicians" believe that the pattern of asset price dynamics as a sequence of trends interrupted by "whipsaws" repeats itself across different time scales, they apply technical models to price data of almost any frequency.

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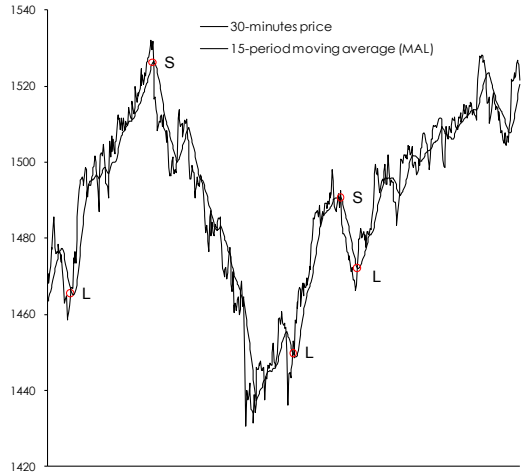
[2]) For theoretical models dealing with the interaction of heterogeneous actors see *DeLong et al.*, 1990A and 1990B; *Frankel – Froot*, 1990; *De Grauwe – Grimaldi*, 2006; *Hommes*, 2006; *Frydman – Goldberg*, 2007.

[3]) *Kaufman* (1987) provides an excellent treatment of the different methods of technical analysis. For a short description of the most important trading rules see *Schulmeister*, 2008A).

Figure 3: Technical trading signals for S&P 500 futures contract, July and August, 2000

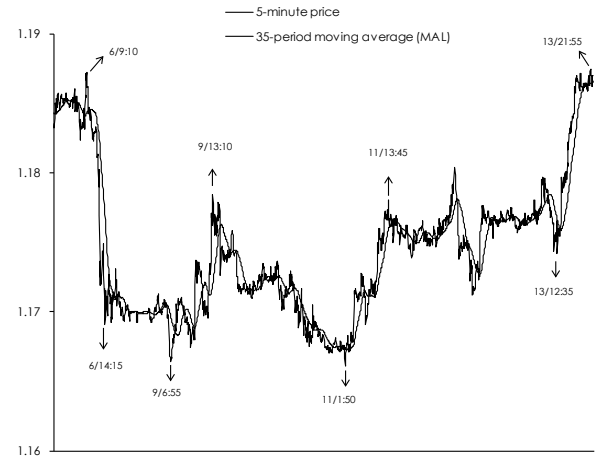


According to the timing of trading signals, one can distinguish between trend-following strategies and contrarian models. Trend-following systems produce buy (sell) signals in the early stage of an upward (downward) trend, whereas contrarian strategies produce sell (buy) signals at the end of an upward (downward) trend.

Figure 4: Dynamics of the dollar/euro exchange rate and technical trading signals

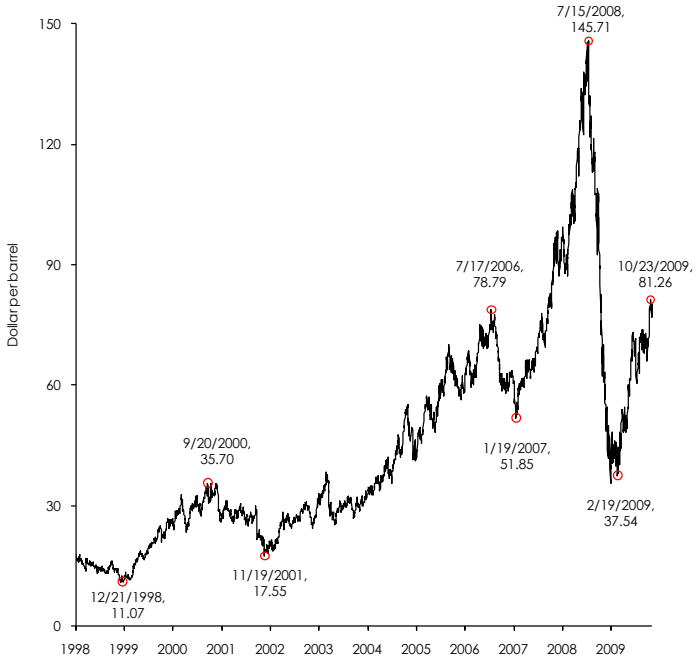
Technical analysis is omnipresent in financial markets. In the foreign exchange market, e. g., technical analysis is the most widely used trading technique (for recent survey studies see *Cheung – Chinn - Marsh*, 2004; *Gehrig - Menkhoff*, 2006; *Menkhoff - Taylor*, 2007). It seems highly plausible that technical analysis plays a similar role in stock (index futures) markets as well as in commodity futures markets (*Irwin-Holt*, 2004).

Figure 5: Intraday dollar/euro exchange rates and technical trading signals, June, 6-13, 2003



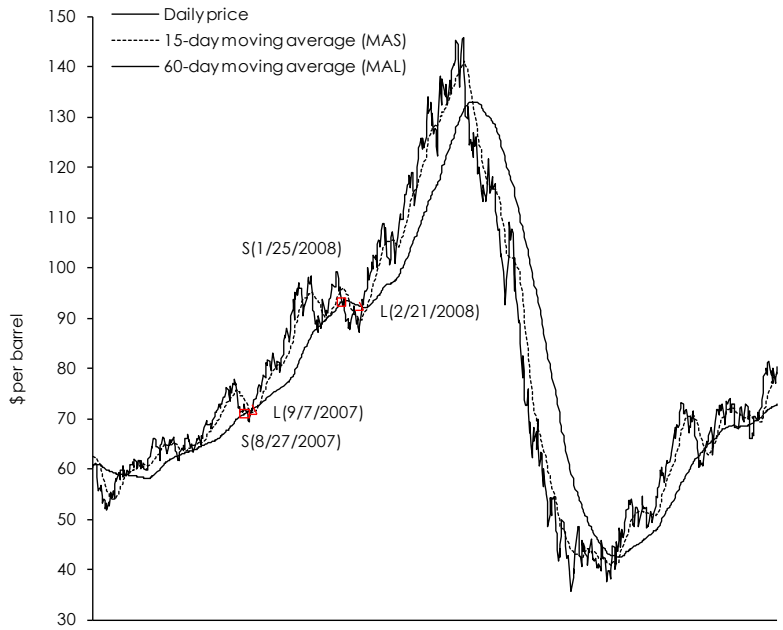
Many factors have contributed to the popularity of technical trading systems among practitioners. First, these systems can be "universally" used, i.e., they can be applied to any kind of price data frequency. Second, these price data have become easily available (at ever falling costs). Third, computer software has been continuously improved (and got cheaper at the same time). Fourth, the internet has enabled traders (professionals as well as amateurs) to trade in real time on all important market places in the world.

Figure 6: Dynamics of oil futures prices
Daily price of the most traded WTI crude oil futures contract (NYMEX)



Figures 2 to 7 show how simple moving average (MA) models based on different data frequencies operate in the dollar/euro market, the stock index futures market and the oil futures market. The trading rule is as follows: Buy (go long) when the current price crosses the MA from below and sell (go short) when the converse occurs (if a model uses two moving averages, then their crossing indicates a trading signal). The figures show that even these simple rules are able to exploit asset price trends, however, during "whipsaws" they produce a series of losses.

Figure 7: Technical trading signals for WTI crude oil futures contract, 2007 – 2009, November 5



There exists a general pattern in the profitability of technical trading systems (table 1):

- The number of profitable positions is always smaller than the number of unprofitable positions.
- The average return per day during profitable positions is lower than the average return (loss) during unprofitable positions.
- The average duration of profitable positions is several times greater than that of unprofitable positions.

This pattern characterizes technical trading in general (for a detailed analysis see *Schulmeister*, 2008A, 2008B, 2009A, 2009C, 2009D): Make profits from the exploitation of relatively few persistent price trends and limit the losses from many small price fluctuations ("cut losses short and let profits run").

Table 1: Components of the profitability of technical trading systems in various asset markets

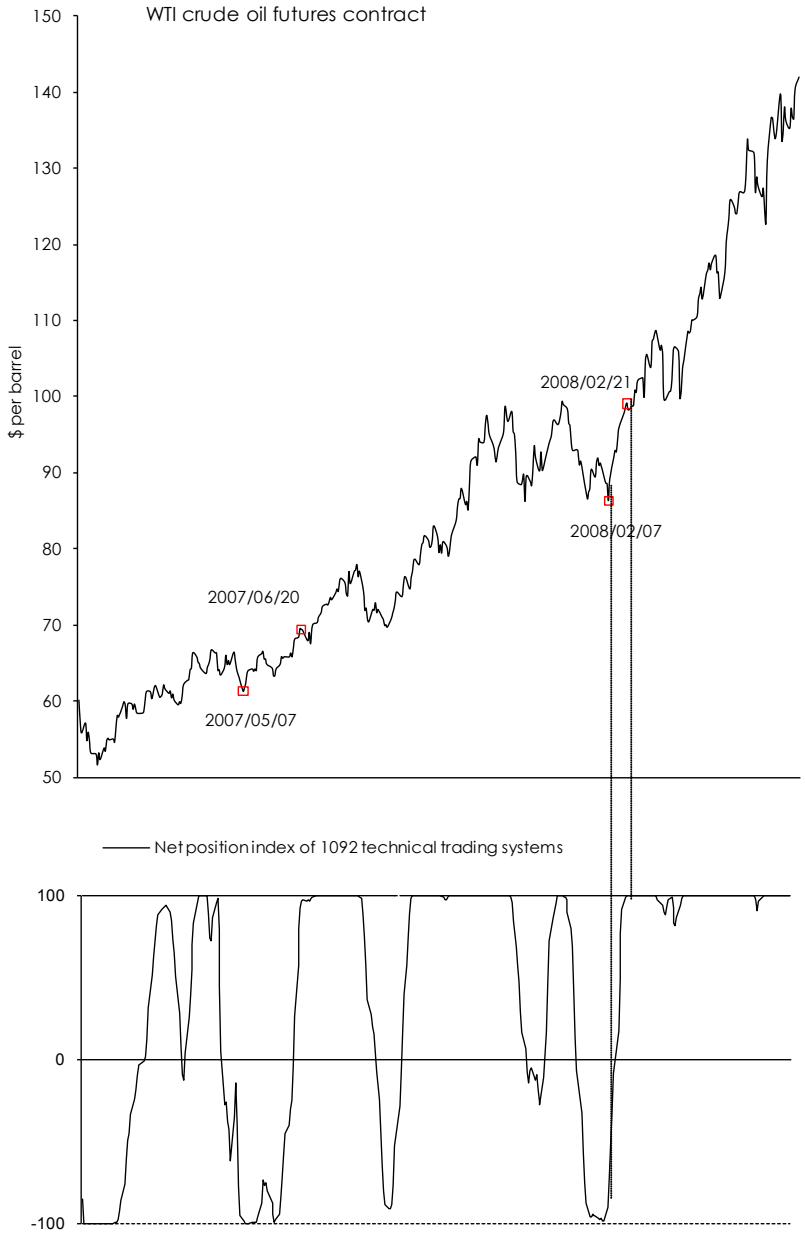
	Number of models	Gross rate of return per year	Mean of profitability components					
			Profitable positions			Unprofitable positions		
			Number per year	return per day	Duration in days	Number per year	return per day	Duration in days
Stock market, S&P 500 [1])								
1960 - 2007, Spot, daily data	2580	1.5	6.5	0.09	42.1	11.7	-0.15	13.1
1983 - 2007, Futures, Daily data	2580	-3.7	6.5	0.09	40.5	13.5	-0.16	13.3
1983 - 2007, Futures, 30-minutes data	2580	7.2	87.4	0.40	2.6	138.7	-0.59	1.0
Foreign exchange market								
1973 - 1999, DM/dollar rate, daily data [2])	1024	7.9	6.0	0.07	55.0	8.1	-0.09	16.9
1975 - 2007, Yen/dollar rate, daily data [3])	1024	6.9	6.1	0.07	50.7	9.0	-0.09	16.3
1999 - 2006, Dollar/euro rate, 30-minutes data [4])	2466	1.1	139.5	0.31	1.7	223.5	-0.45	0.8
Commodity futures markets, 1989 - 2008 (June) [5])								
WTI crude oil, daily data	1092	12.7	3.3	0.15	84.4	5.7	-0.23	23.0
Corn, daily data	1092	3.8	3.0	0.11	89.8	6.5	-0.17	23.3
Wheat, daily data	1092	2.4	2.9	0.11	87.0	6.7	-0.16	25.0
Rough rice, daily data	1092	12.6	3.1	0.12	94.3	5.7	-0.17	23.5

[1]) *Schulmeister* (2009C). - [2]) *Schulmeister* (2006). [3]) *Schulmeister* (2009B). [4]) *Schulmeister* (2009D). [5]) *Schulmeister* (2009A). - Note: For any single trading system the following relationship holds: GRR = NPP*DRP*DPP-NPL*DRL*DPL

There operates an interaction between the "trending" of asset prices and the use of technical models in practice. On the one hand, many different models are used by individual traders aiming at a profitable exploitation of asset price trends, on the other hand the aggregate behaviour of all models strengthen and lengthen price trends. Figure 8 documents this interaction, it compares the change in the aggregate position of 1092 technical models in the oil futures market (NYMEX) between January 2007 and June 2008 to the movements of the oil futures price (a value of +100 (-100) of the net position index means that 100% of the models hold a long (short) position).

Figure 8 shows the gradual adjustment of technical models price movements. On February 7, 2008, e. g., all models hold a short position due to a preceding decline in oil futures prices. The subsequent price rise causes the models to gradually switch their position from short to long, the "fast" models at first, the "slow" models at last. On February 21, all models hold a long position. During this transition period from short to long, technical models exert an excess demand on oil futures since any switch implies two buy transactions, one to close the (former) short position, and one to open the (new) long position.

Figure 8: Aggregate trading signals of 1092 technical models and the dynamics of oil futures prices, January 2007 to June 2008



Source: *Schulmeister* (2009A),

Studies on the aggregate trading behavior of the many different models, based on daily as well as on intraday data and operating in different markets reveals the following (*Schulmeister*, 2006, 2009A, 2009C, 2009D):

- Most of the time the great majority of the models is on the same side of the market.

- The process of changing open positions usually takes off 1 to 3 days after the local futures price minimum (maximum) has been reached.
- It takes between 10 and 20 trading days to gradually reverse the positions of (almost) all models if a persistent price trend develops.
- After all technical models have adjusted their open positions to the current trend, the trend often continues for some time.

One can therefore conclude that the widespread use of technical trading systems strengthens short-term asset price trends (runs). At the same time, the sequence of price runs accumulates to long-term trends when an expectational bias prevails in the market ("bullishness" or "bearishness"). I shall now present some empirical evidence on this phenomenon.

4. How "bull markets" and "bear markets" are brought about

In this section, I investigate the relationship between the following two phenomena:

- Stock prices, exchange rates and commodity prices move in a sequence of upward trends ("bull markets") and downward trends ("bear markets") which last for several years.
- Trading in asset markets has become progressively "faster", mainly due to the use of technical systems based on intraday data. As a consequence, transaction volume has expanded enormously (in OECD countries it is almost 100 times higher than nominal GDP).

The coincidence of both developments constitutes a puzzle. How can very short-term transactions generate asset price movements which accumulate to long-term "bull markets" and "bear markets"?

To find a first answer to this question, I look at the "Gestalt" of asset price movements (figures 2 to 7 and 9, 10):

- Over the short run, asset prices fluctuate almost always around "underlying" trends. If one smoothes the respective price series with simple moving averages, one can identify the "underlying" trends.
- The phenomenon of short-term trending repeats itself across different time scales. However, the volatility of fluctuations around the trend is higher the higher is the data frequency (see, e. g., figures 3 and 5).
- Over the long run, asset prices move in a sequence of upward and downward trends lasting several years in most cases ("bulls and bears"). These trends cause prices to deviate widely from fundamental benchmark levels (figures 9 and 10).

These observations suggest a "hierarchy" in asset price trending: Very short-term price trends (runs) based on high frequency data are embedded into comparatively longer-term trends based on data of lower frequency and so on. A "bull market" or "bear market" would then be the result of short-term upward (downward) trends lasting longer than counter-

movements over an extended period of time. This phenomenon could be related to optimistic (pessimistic) "market moods" which cause traders to invest more money into an open position which is in line with the prevailing mood than into a "contrarian position".

Table 2: Asset price runs during "bull markets" and "bear markets"
Based on daily prices

			Upward runs			Downward runs		
			Number	Average duration in days	Average slope [1])	Number	Average duration in days	Average slope [1])
S&P 500								
23/11/1994	24/03/2000	↑	319	2.35	7.28	318	1.87	-7.38
24/03/2000	07/10/2002	↓	167	1.73	12.92	168	2.05	-12.93
07/10/2002	09/10/2007	↑	341	2.04	7.08	341	1.65	-7.43
09/10/2007	09/03/2009	↓	103	1.69	15.93	103	1.74	-20.41
09/03/2009	19/01/2010	↑	57	2.25	10.28	57	1.56	-9.63
Dollar/euro exchange rate								
01/01/1999	26/10/2000	↓	113	1.79	0.47	113	2.38	-0.48
31/01/2002	30/12/2004	↑	209	1.96	0.56	209	1.66	-0.51
30/12/2004	14/11/2005	↓	57	1.74	0.53	58	2.16	-0.57
14/11/2005	22/04/2008	↑	168	2.03	0.49	167	1.65	-0.45
22/04/2008	27/10/2008	↓	31	1.74	0.71	32	2.31	-0.97
18/02/2009	03/12/2009	↑	57	1.81	0.88	57	1.68	-0.69
Oil futures prices (NYMEX) [2])								
21/12/1998	20/09/2000	↑	101	2.51	1.44	100	1.76	-1.43
20/09/2000	19/11/2001	↓	72	1.99	2.15	73	1.95	-2.68
19/11/2001	17/07/2006	↑	296	2.12	3.18	295	1.73	-3.43
17/07/2006	19/01/2007	↓	33	1.70	2.74	33	2.15	-4.01
19/01/2007	15/07/2008	↑	102	2.02	4.98	101	1.74	-4.07
15/07/2008	19/02/2009	↓	39	1.44	7.48	40	2.45	-8.43
19/02/2009	23/10/2009	↑	46	2.24	2.87	45	1.56	-3.12

Source: Own calculations; see also *Schulmeister*, 2009A, 2009D. - [1]) Average change in price level per day. - [2]) Most traded contract.

In order to examine this hypothesis, the following exercise is carried out. First, I identify the most pronounced "bull markets" and "bear markets" which occurred over the past 15 years in the stock market (S&P 500), in the foreign exchange market (dollar/euro rate) and in the oil futures market (NYMEX). Then I elaborate how the sequence of monotonic movements ("runs") of daily asset prices brings about long-term trends.

The tripling of stock prices between November 1994 and March 2000, their doubling between October 2002 and October 2007 as well as their recent rise by roughly 70% was mainly due to upward runs lasting on average by one third longer than downward runs, the average slope of upward and downward runs was roughly the same (figure 2, table 2). Also the "bull

markets" of the dollar/euro exchange rate and of oil futures prices are brought about by upward runs lasting longer than downward runs. Differences in the slope contribute little to the overall appreciation.

Table 3: Asset price runs during "bull markets" and "bear markets"
Based on 5-days moving averages of daily prices

			Upward runs			Downward runs		
			Number	Average duration in days	Average slope [1])	Number	Average duration in days	Average slope [1])
S&P 500								
23/11/1994	24/03/2000	↑	122	6.90	3.31	122	4.08	-3.52
24/03/2000	07/10/2002	↓	62	4.32	5.25	63	5.75	-5.79
07/10/2002	09/10/2007	↑	130	5.55	3.19	129	4.12	-2.93
09/10/2007	09/03/2009	↓	39	3.74	5.23	40	5.08	-8.01
09/03/2009	19/01/2010	↑	24	5.79	4.75	24	3.08	-3.27
Dollar/euro exchange rate								
01/01/1999	26/10/2000	↓	44	3.80	0.23	45	6.64	-0.24
31/01/2002	30/12/2004	↑	70	6.77	0.24	68	4.06	-0.24
30/12/2004	14/11/2005	↓	25	3.36	0.23	26	5.23	-0.27
14/11/2005	22/04/2008	↑	59	6.29	0.24	58	4.17	-0.19
22/04/2008	27/10/2008	↓	11	3.91	0.36	12	6.75	-0.54
18/02/2009	03/12/2009	↑	24	5.13	0.36	23	3.13	-0.28
Oil futures prices (NYMEX) [2])								
21/12/1998	20/09/2000	↑	36	7.64	0.70	35	4.29	-0.56
20/09/2000	19/11/2001	↓	30	4.40	0.89	28	5.14	-1.19
19/11/2001	17/07/2006	↑	98	6.81	1.42	98	4.73	-1.55
17/07/2006	19/01/2007	↓	11	3.27	1.14	12	7.25	-1.84
19/01/2007	15/07/2008	↑	40	5.95	2.18	39	3.59	-1.66
15/07/2008	19/02/2009	↓	12	2.83	3.08	13	8.92	-4.07
19/02/2009	23/10/2009	↑	17	6.41	1.37	16	3.75	-1.31

Source: Own calculations; see also *Schulmeister*, 2009A, 2009D. - [1]) Average change in price level per day. - [2]) Most traded contract.

The picture is somewhat different for "bear markets". As the speed of price movements is generally greater during "bears" as compared to "bulls", the differences in the slope of upward and downward runs contribute to a greater extent to the overall price change during "bear markets" than during "bull markets". However, also the persistence of price movements matters: During "bear markets", downward runs last on average by one third longer than upward runs (the only exception concerns the decline of oil futures prices between September 2000 and November 2001, not a typical "bear market" – figure 6).

The accumulation of monotonic price movements to long-term trends is particularly pronounced on the basis of 5-days moving averages of the original price series (table 3). This

is not surprising: Since there prevails an "underlying" trend, smaller counter-movements are smoothed out even by a short moving average. E. g., during the "internet bull market" between November 1994 and March 2000, there occurred 617 runs based on the original S&P 500 data, but only 239 based on 5 days moving averages. Out of the latter, upward runs lasted on average 6.9 days, downward runs 4.1 days (table 3).

Table 4: Non-random components in duration and slope of exchange rate runs
Daily dollar/euro rates

	Run length	Upward runs Number observed		RW-Simulation	Downward runs Number observed		RW-Simulation	Upward runs Number observed		RW-Simulation	Downward runs Number observed		RW-Simulation
		"Bear market": 01/01/1999 - 10/26/2000						"Bull market": 01/31/2002 - 12/30/2004					
Original data	1-2	93		88.7	69	***	88.8	163	**	141.9	177	***	141.8
	3-6	20	**	27.7	42	***	27.5	43		44.3	32	***	44.3
	≥ 7	0	*	1.8	2		1.8	4		2.9	0	**	2.9
	All	113		118.2	113		118.2	210	***	189.0	209	***	189.1
5-days moving averages [1]	1-6	37		35.9	27	*	36.0	44	**	57.2	53		57.1
	7-14	5	**	10.4	11		10.4	18		16.6	15		16.8
	≥ 15	2		2.0	7	***	2.0	8	***	3.3	0	**	3.2
	All	44		48.4	45		48.4	70		77.1	68	*	77.1
20 days moving averages [1]	1-14	16		18.0	11	*	18.0	29		28.7	31		28.7
	15-34	3		4.1	5		4.1	4		6.5	6		6.6
	≥ 35	0	*	1.4	4	***	1.4	5	**	2.4	0	**	2.3
	All	19		23.5	20		23.5	38		37.5	37		37.5

Source: *Schulmeister*, 2009D, table 4. - [1]) Before being classified, the observed exchange rate series as well as the 1000 random walk series are smoothed by the respective moving average.
Notes: The table compares the observed numbers of exchange rate runs by duration to their expected means under the random-walk-hypothesis (RWH). These means are derived from a Monte-Carlo-simulation based on 1000 random walk series (without drift). The random walks were constructed with an expected zero mean of the first differences and with an expected standard deviation of the first differences as observed in the original exchange rate series over the respective period. * (**, ***) indicate the significance of the difference between the observed means and the expected means under the random-walk-hypothesis at the 10% (5%, 1%) level.

In order to clarify the (statistical) causes of the differences in the duration of runs, table 4 documents their distribution for a "bear market" and for a "bull market" of the dollar/euro exchange rate (period A and period B, respectively).

Over the "bear" phase A, short upward runs occurred more frequently than short downward runs (93 runs compared to 69 runs; short runs are defined as lasting up to 2 days). By contrast, within the set of medium runs (between 3 and 6 days) and long runs (longer than 6 days), downward runs occurred more frequently than upward runs (table 4). By the same token, medium and long runs were more often upward directed than downward directed during the "bull" phase B.

In order to test for the robustness of these results, I generate 1000 random series (without drift). I then compare the observed distribution of monotonic price movements to the expected distribution under the random walk hypothesis (RWH).

Based on the original data (MA = 1), there occurred significantly more short runs than under the RWH over the "bull" period B. At the same time there occurred significantly less medium and long downward runs. Over the "bear" period A, by contrast, there occurred significantly less short downward runs, but significantly more medium downward runs, and less medium and long upward runs than under the RWH (table 3).

Based on smoothed series, the most significant deviations of the observed number of runs from their expected values under the RWH concern the most persistent runs (lasting longer than 14 days in the case of a 5 days MA, and longer than 34 days in the case of a 20 days MA – table 4): Over the "bear" period A ("bull" period B) there occurred "abnormally" many long lasting monotonic downward (upward) movements.

These results suggest the following: First, upward (downward) asset price runs last on average longer during "bull (bear) markets" because there occur more (very) persistent upward (downward) runs than expected under the RWH. Second, that phenomenon which accounts for the realization of "bull markets" and "bear markets" provides the basis for the profitability of technical trading systems. Third, the widespread use of technical trading systems feeds back upon the pattern of asset price dynamics as a sequence of persistent runs, interrupted by "whipsaws".

This pattern conflicts with the most fundamental assumption of the "efficient market hypothesis". According to this concept any asset price reflects the fundamental equilibrium value of the respective asset. If new information arrives, actors will drive the price instantaneously to its new equilibrium. This (rational) behavior assures that asset prices follow a random which in turn implies "weak market efficiency". This concept means that one cannot systematically make trading profits from exploiting just the information contained in past prices.[4])

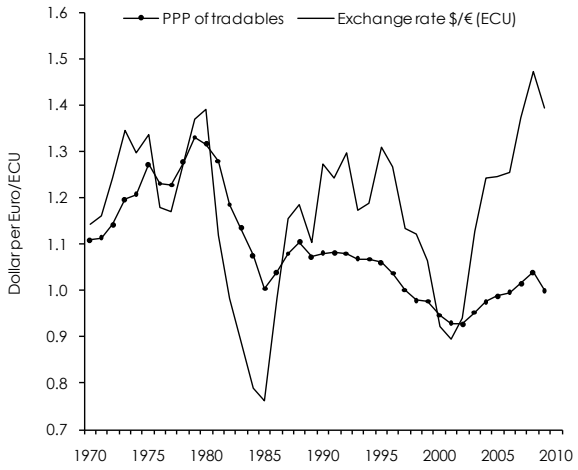
5. Overshooting of asset prices

In this section I sketch the sequence of "bulls" and "bears" in some of the most important asset markets.

Figure 9 shows the wide fluctuations of the US-dollar/Euro(ECU) exchange rate around its theoretical equilibrium level, i. e., the purchasing power parity (PPP) of internationally traded goods and services (for the calculation of PPP based on tradables see *Schulmeister*, 2005).

[4]) Recent contributions to the debate about the efficiency of asset markets are *Le Roy* (1989), *Shiller* (2003), *Lo* (2004).

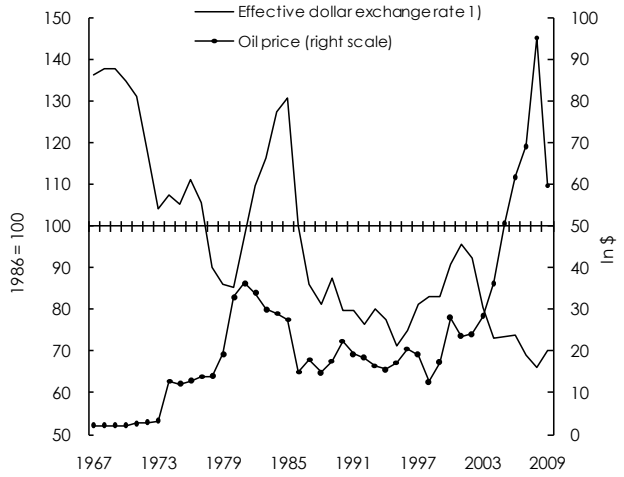
Figure 9: Dollar exchange rate and purchasing power parity



Source: OECD, WIFO, *Schulmeister* (2005).

The overshooting of the dollar exchange rate and of the oil price are inversely related to each other, at least during periods of marked "bull markets" and "bear markets" (figure 10). Since the dollar serves as global key currency, crude oil is priced in dollars. As a consequence, any dollar depreciation devalues real oil export earnings. This valuation effect in turn strengthens the incentive for oil-producing countries to increase the price of their most important export good. If their market power is strong, oil exporters are able to put through oil price increases which by far overcompensates them for the losses due to the preceding dollar depreciation. The oil price "shocks" 1973/74, 1979/80 and 2002/2007 are the most impressing examples for this inverse relationship (see also *Schulmeister*, 2000).

Figure 10: Dollar exchange rate and oil price fluctuations

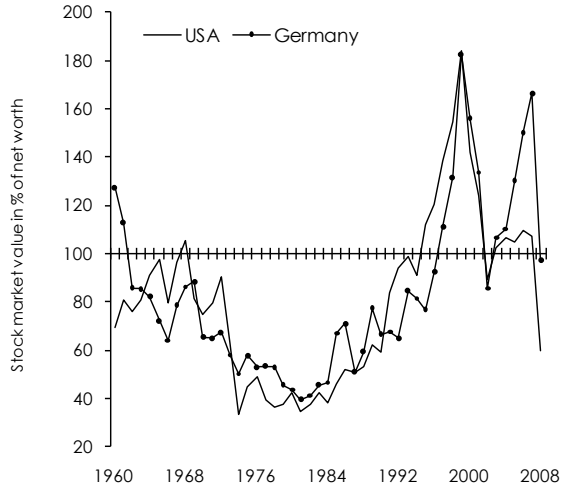


Source: OECD, IMF. - 1) Vis-a-vis DM, Franc, Pound, Yen.

Over the 1960s and 1970s that stock prices in the US and Germany became progressively undervalued (figure 11): The stock market value of non-financial corporations strongly declined relative to their net worth (real assets at goods market prices minus net financial liabilities[5]). During this period the striving for profits focused on the real side of the economy. As a consequence, real capital accumulation was booming und stock prices rose comparatively little (partly because corporate business financed investments through increasing the supply of stocks).

The stock market boom of the 1980s and 1990s and the slow-down in real investment dynamics caused stock prices to become progressively overvalued. By the end of the 1990s market capitalization of non-financial corporations was roughly by 80% higher than their net worth. This discrepancy contributed to the "tilt" from a "bull market" into a "bear market".

Figure 11: Stock market value and net worth of non-financial corporations



Source: Fed, Deutsche Bundesbank, *Schulmeister* (2003).

Between spring 2003 and summer 2007 stock prices were again booming, in Germany even stronger than in the US. At the same time real investment expanded in the US much stronger than in Germany. Hence, the discrepancy between the stock market value and net worth of non-financial corporate business rose much stronger in Germany than in the US (figure 11).

Equilibrium economics under rational expectations cannot account for wide fluctuations of asset prices around their fundamental equilibrium. This is so because conventional theory can only explain two types of equilibrium paths, either convergence towards the fundamental equilibrium or a bubble.

Empirical exchange rate studies, e. g., conceive the "purchasing power parity puzzle" primarily as the (unexplained) low speed at which an over- or undervalued exchange rate

[5]) The relation depicted in figure 11 is an estimate of Tobin's q. For the data series and the method to calculate this relation see *Schulmeister*, 2003.

returns to its fundamental equilibrium. The preceding process of "overshooting" is simply attributed to "shocks" and, remains unexplained (*Rogoff,* 1996; *Sarno – Taylor,* 2002; *Taylor – Taylor,* 2004).

Empirical stock market studies focus in most cases on specific "anomalies" like the "momentum effect" or the "reversal effect". However, these phenomena are not analyzed in the context of the irregular cyclicality of asset prices (e. g., see *Campbell*, 2000; *Cochrane* 1999; *Lo – MacKinlay,* 1999; *Shiller,* 1999). An reason for this "myopic" perception lies in the fact that also the relatively new school of "behavioral finance" uses equilibrium concepts as the benchmark (most important exception: the work of Robert J. Shiller).[6])

6. Development of the current crisis

The sequence of "bull markets" and "bear markets" of exchange rates, commodity prices and stock prices, affects the real sphere of the economy through many channels, e. g., by increasing uncertainty, by producing waves of positive and negative wealth effects, by inflating and deflating the balance sheets of financial institutions and by redistributing trade earnings between consumers and producers of commodities:

- The boom of stock prices in the 1990s and again between 2003 and 2007 as well as the boom of house prices between 1998 and 2005 stimulated the US economy through positive wealth effects (figure 12). At the same time, however, the "twin booms" led the ground for the subsequent "twin busts".
- After the outbreak of the sub-prime mortgage crisis the third "bull market", i. e., the commodity price boom, accelerated, mainly driven by speculation of financial investors in commodity derivatives markets (figure 6; see also *Schulmeister*, 2009A).
- Since mid 2008 the devaluation process of stock wealth, housing wealth and commodity wealth ass globally "synchronized". This process set free several contraction forces, not only through wealth effects and balance sheet compression but also via import reductions on behalf of commodity producers.

The fall of stock prices and commodity prices has been strengthened by trend-following technical trading via taking huge short positions in the respective derivatives markets. Due to the extraordinary strength of these "bear markets", hedge funds using these models reported higher returns than ever before (figure 13).

The transformation of financial markets and institutions from a sector servicing the "real economy" to a dominant sector to which the "real economy" has to adjust, can only be understood in the context of the latest "long cycle".

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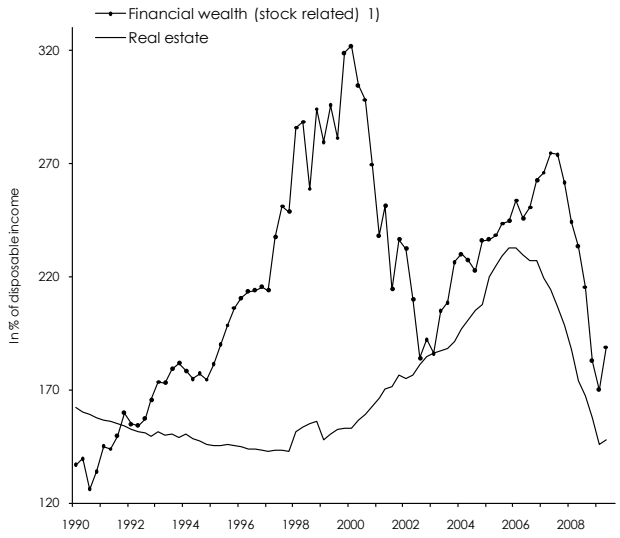
[6]) *Schulmeister* (1987) and *Frydman – Goldberg* (2007) offer models which explain asset price dynamics as a sequence of systematically overshooting upward and downward trends ("bulls" and "bears"). For the "long swings" of the dollar exchange rate see *Engel – Hamilton*, 1990.

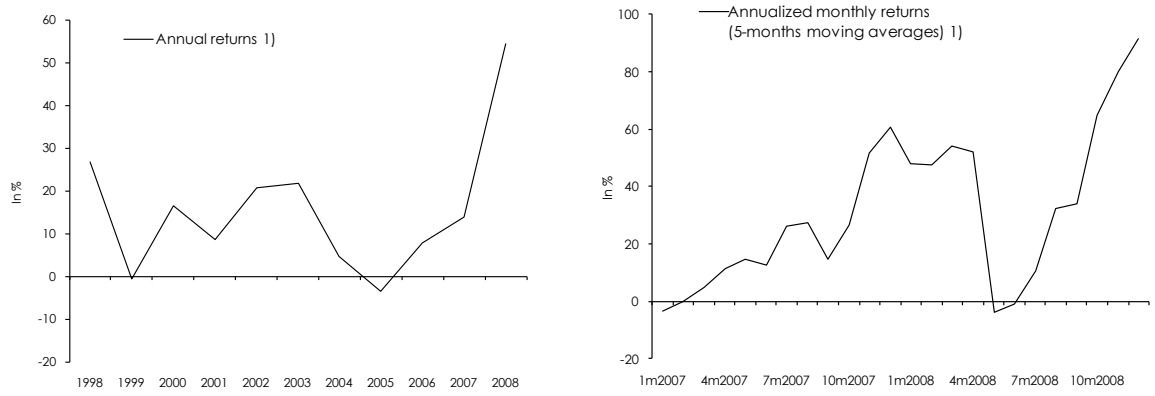
Figure 12: Wealth of private household in the US



Qu: Federal Reserve Board, OEF. - 1) Stocks, Investment funds, Pension funds.

The trough of this cycle was the Great Depression of the 1930s. The learning process enforced by this crisis resulted in a new macro-economic theory (Keynesianism), an active economic policy focusing on stable growth and full employment, a stable international monetary system ("Bretton Woods"), de-regulation of goods markets (e. g. though the GATT rounds), but strict regulation of financial markets. The essential characteristic of the system was the following: The driving force of capitalist development, the striving for profits, was systematically directed towards activities in the "real economy". Under these conditions the "Golden Age" of capitalism was realized over the 1950s and 1960s.

Figure 13: Profitability of "trend-following" hedge funds

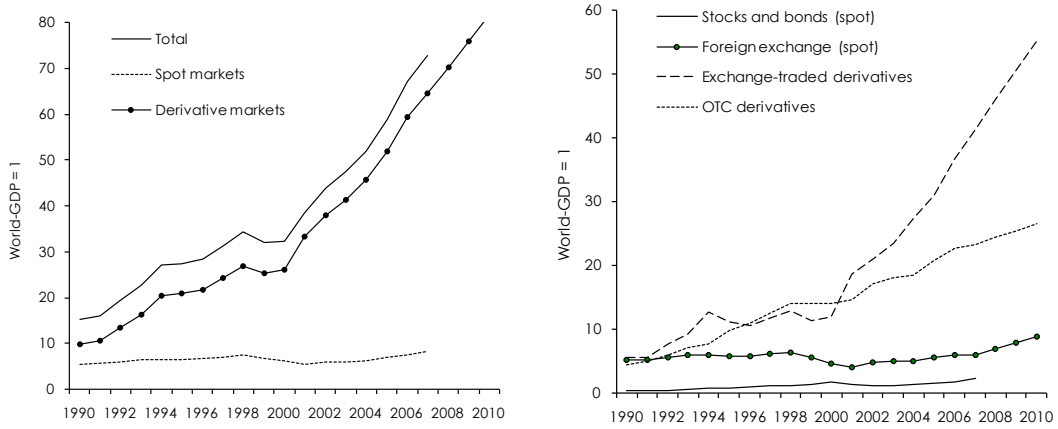


Source: www.turtletrader.com 1) Unweighted average of the returns net of fees and transaction costs of 17 hedge funds using trend-following technical trading systems.

The "monetarist counterrevolution" of the late 1960s got support from "big business" because permanent full employment had strengthened trade unions as well as the welfare state. The stepwise realization of the monetarist/neo-liberal demand for de-regulation of financial markets changed the "rule of the capitalistic game" fundamentally. Under the condition of widely fluctuating exchange rates and commodity prices, and of a high interest-growth-differential (until the late 1970s interest rates had been kept lower than the rate of economic growth), financial and non-financial business shifted activities from the "real economy" to financial investment and short-term speculation ("finance capitalism"). This shift was supported by the tremendous amount of financial innovations (i.e., derivatives of all kinds) which have been realized since the 1980s as well as by the rising instability of asset prices.

The expansion of financial transactions is therefore one of the most typical characteristics of the late phase in a "finance-capitalistic" development (together with the rising instability of those asset prices which are most important for the "real economy" like exchange rates, commodity prices and stock prices).

Figure 14: Financial transactions in the world economy



Source: BIS, WFE, OECD.

7. Dynamics of financial transactions

Trading activities in financial markets have exploded over the past 20 years (figure 14):[7])

- There is a rising discrepancy between the levels of financial transactions and the levels of transactions in the "real world". In 2007, the former was roughly 74 times higher than nominal world GDP.

[7]) A comprehensive estimate of financial transaction in the global economy, differentiated by types of instruments and regions, is provided by *Schulmeister – Schratzenstaller – Picek*, 2008. These data are based on the Triennial Bank Survey organised by the Bank of International Settlements (BIS). According to preliminary BIS estimates based on the 2010 survey, financial transactions have further increased by almost 30%. These estimates are included in figure 14.

- Trading in derivatives markets has expanded significantly stronger than trading in spot markets. In the world economy, derivatives trading volume is roughly 66 times higher than world GDP, whereas spot trading amounts to "only" 8 times world GDP.
- Trading of futures and options on organized exchanges has risen stronger than "over-the-counter"-transactions.
- Given the spectacular level of derivatives trading only a comparatively small share of transactions stem from hedging activities. The greatest part of transactions is related to speculative trades between actors with heterogeneous price expectations.

8. Stabilizing effects and revenue potential of a general financial transactions tax[8])

The following transactions could/should be subject to a general financial transaction tax (FTT):

- All spot and derivatives transactions on organized exchanges, e.g., trades of stocks and interest rate securities, as well as trades of futures and options related to stocks, interest rate securities, currencies and commodities.
- Those "over-the-counter" (OTC)-transactions which are directly related to asset prices, in particular to exchange rates and interest rates.

The first group of transactions is clearly defined. The second group covers all transactions reported by the "Triennial Central Bank Survey" plus OTC spot transactions of interest rate securities and stocks (see *BIS,* 2007.

A FTT would specifically dampen very short-term oriented trading in derivatives markets. There are two reasons for that. First, a FTT makes trading the more costly the shorter its time horizon is (e. g., technical trading based on intraday data). Second, a FTT will dampen specifically derivatives trading since the tax rate refers to contract value (e. g., the effective tax on the margin "invested" is by the leverage factor higher than the tax relative to the notional value).

Since long-term asset price trends ("bulls/bears") are brought about through the accumulation of (very) short-term runs, a FTT would also dampen the "long swings" of exchange rates, commodity prices and stock prices.

Hedging as well as "real-world-transactions" (this would only concern foreign exchange transactions stemming from international trade) would hardly be affected by a low FTT between 0.1% and 0.01%.

The revenue estimates are based on the assumption that transaction volumes will be reduced by the introduction of an FTT. The size of this reduction effect depends on the tax rate, the pre-tax transaction costs and the leverage in the case of derivatives instruments. For

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[8]) This section summarizes some key results of a comprehensive study on the possible effects of a general financial transactions tax (*Schulmeister – Schratzenstaller – Picek*, 2008). A shorter version is *Schulmeister* (2009E). See also *Baker et al.* (2009), *Baker* (2008), *Jetin – Denys* (2005), *Pollin – Baker – Schaberg* (2003), *Schmidt* (2008).

each tax rate and type of instrument, a low, medium and high "transactions-reduction-scenario" (TRS) is specified. In the case of the medium TRS it is assumed that transactions would decline by roughly 75% at a tax rate of 0.1%, at 65% at a rate of 0.05% and by roughly 25% at a tax rate of 0.01%.

Table 5 represents the estimated FTT revenues at a tax rate of 0.05% under the assumptions of the medium TRS (based on 2007 transactions data - based on 2010 data, revenue estimates will be by roughly 30% higher). Overall revenues would amount to 1.21% of world GDP or 661.1 bill. $. More than half of the revenues would stem from derivatives transactions on exchanges. Taxes on spot transactions would amount to only 0.11% of global GDP.

Table 5: Hypothetical transaction tax receipts in the global economy 2007
Tax rate: 0.05%

	World		Europe		North America		Asia and Pacific	
	In % of GDP	In Bill. $	In % of GDP	In Bill. $	In % of GDP	In Bill. $	In % of GDP	In Bill. $
Spot transactions on exchanges	0.11	60.9	0.12	21.2	0.18	28.3	0.16	10.3
Derivatives transactions on exchanges	0.65	358.1	0.69	122.7	1.28	198.7	0.51	32.8
OTC Transactions	0.44	242.0	0.82	145.1	0.33	50.8	0.67	43.6
All transactions	1.21	661.1	1.63	289.0	1.79	277.8	1.34	86.7

Source: Schulmeister (2009E)

9. Implementation of a general FTT

There are two fundamentally different ways of how an FTT could be implemented.[9])

With the centralized approach, the tax is collected at point of settlement, either from the electronic settlement systems at exchanges, or from Central Counterparty Platforms (CCPs) or Central Securities Depositories" (CSDs) in the case of OTC transactions, respectively.

With the decentralized approach, the tax is deducted by the banks and brokerage firms which transmit an order to an exchange (on behalf of a customer or as part of proprietary trading) or which carry out an OTC-transaction with another financial institution or with a non-financial customer.

[9]) This section summarizes the key results of the forthcoming WIFO Study: Stephan Schulmeister, Implementation of a General Financial Transactions Tax.

9.1 Centralized FTT deduction: The optimal approach

The centralized tax deduction would be the optimal form of an FTT implementation. At the same time, however, this approach is difficult to realize in practice because it necessitates a broad consensus to introduce an FTT and to force all OTC-transactions to be settled via CCPs. Such a consensus has to be achieved at least among all important countries in a trading time zone. Otherwise substantial shifts in market shares of financial centres would occur.

In addition, there is the issue of how to distribute the FTT receipts. Due to the concentration of trading on the exchanges in London and Frankfurt, e. g., roughly three quarters of revenues would stem from transactions on the London market place and one quarter from transactions in Frankfurt. However, the tax will effectively be paid by all counterparties who make use of these exchanges (e. g., 85% of all trades made at Eurex in Frankfurt stem from non-German traders). For this reason it seems advisable that one part of the revenues should go to the countries from which the transactions on organized exchanges originate. Of course, for providing the EU as a whole with such efficient market places as London and Frankfurt, the UK and Germany should get some fixed share of tax revenues.

These considerations suggest that the FTT revenues from exchange transactions should be divided into three parts if all EU countries agree to implement a common FTT. One part should go to the host country of the exchange, one part should go to the countries from which the transactions on exchanges originate, and the third part should/could go to supranational institutions like the EU or to supranational projects like development aid.

As regards OTC transactions, a prerequisite for the centralized solution is the mandatory clearance of all OTC-transactions through Central Counterparty Platforms (CCPs) or Central Securities Depositories (CSDs). If such a consensus could be reached, then it would be easy to legally force all banks and other financial institutions to centrally clear their OTC transactions.

However, a central collection through currently wholly private settlement institutions requires a high degree of tax coordination and cooperation as well as the harmonization and further integration of the clearing and settlement processes.

Since the CCPs and CSDs represent just an electronic clearing system, their efficiency does not depend on network externalities of financial centres (as with organized exchanges). Hence, the FTT proceeds should be divided between the countries from which the transactions originate, and the EU institutions.

A centralized FTT implementation necessitates also the creation of a "Standard Classification of Financial Transactions" (SCFT). Such a classification (similar to the SITC as regards international trade) is also a prerequisite for an efficient supervision and regulation of financial markets (including restrictions to tax fraud as well as to terrorist activities).

The last years have seen a remarkable change in clearing and settlement structure towards centralisation and integration, a process which has been furthered in the course of the financial crisis and the efforts to mitigate systemic risk. However, as outlined above the

current infrastructure falls short of the requirements that have to be fulfilled to make a central FTT deduction feasible.

9.2 Decentralized FTT deduction: The pragmatic approach

The essential difference between the centralized and the decentralized approach to FTT implementation is as follows (taking transactions on exchanges as example). According to the centralized approach, any exchange situated in a country where an FTT applies ("FTT country") has to deduct the FTT for all transactions ("territorial principle"). According to the decentralized approach, any resident of an FTT country who orders a transaction to be carried out at home or abroad is legally the debtor of the FTT ("personal principle"). The tax is charged to the account of the tax debtor and transferred to the tax authorities by the bank or broker which places the respective order to the exchange ("taxing at the source").

A concrete example: If Germany would introduce a FTT, then only all German residents placing orders for transactions on exchanges - at home or abroad - are liable to pay the FTT, the tax debtor's accounts are debited which are held at the bank or broker dealers who then place the order with an exchange. As regards the derivatives exchange Eurex, e. g., only those 15% of all transactions which stem from German residents would be taxed. At the same time, also all transactions stemming from German residents for execution in a non-FTT country, e. g., on exchanges in London, would be taxed (at the bank or broker which places the order). In this way, German exchanges would not be discriminated relative to exchanges abroad as long as those who place the order would not move from an FTT country to a non-FTT country.

However, some hedge funds and investment banks might shift their (very) short-transactions (even more) from Frankfurt to London. The same might be true for some amateur "day traders" who would process their orders through brokers at London. Given the destabilizing effects of these activities and their negative incentive effects for activities in the "real world", such a move could/would be positive for the German economy as a whole.

To tone down migration, one could restrict the extent of this emigration of short-term trading by introducing a FTT-substitute-levy (FFTSL) in FTT countries. The FTTSL would be charged to any transfer of funds from a bank account in an FTT country to a brokerage firm or hedge fund in a non-FTT country. The size of the FTTST must be several times higher than the FTT. With an FTT of 0.05% the FTTSL could be 2% or even higher. If it were 2% it would be the equivalent of 40 "round-trip-transactions". The FTTST can be considered some kind of "security deposit" in case the FTT due to the transactions carried out abroad is not paid.

As regards OTC transactions, any bank, other financial institution or non-financial customers of a FTT country is the debtor of an FTT. If both parties of the transaction are residents of an FTT country, then their fiscal authorities receive an FTT payment at the full rate (0,05%), if one partner is resident of a non-FTT country, then the FTT country gets only half of it (0,025%).

In the OTC markets, either banks trade with each other, or a bank trades with other market participants or the latter trade among themselves (other market participants comprise "other financial institutions" like hedge funds and "non-financial customers" like corporations). In executing trading, a bank is always involved. For this reason, in this concept the bank has to charge the tax to debtors' account and transfer the FTT to the tax authorities. If the bank is the intermediary of two customers trading with each other, then the bank has to charge the accounts of the two counterparties with the tax. To sum up: The decentralised approach defines the banking system as the point of tax collection.

The decentralized approach takes into account the different political and institutional conditions among the advanced economies. In a pragmatic way, it would enable single countries or a group of countries to start with the implementation of a FTT. Based on the experiences of the "forerunner countries", the introduction of a general FTT could then be enlarged to other countries in a stepwise process.

10. Concluding remarks

The empirical evidence presented in this paper does not "prove" the efficacy of introducing a FTT. However, it does show the following:

- Long swings in asset prices in either direction result from the accumulation of persistent upward (downward) "mini" runs lasting longer than counter-movements over an extended period of time.
- The most popular trading practice, e. g., technical analysis, focuses on the exploitation of such price trends.
- The widespread use of technical trading systems reinforces the boom-and-bust pattern of asset price dynamics as a sequence of persistent price movements interrupted by "whipsaws."
- Technical models, including "automated trading systems", are used at ever increasing data frequencies. This development has strongly contributed to the tremendous rise in transaction volumes in asset markets, particularly in derivatives markets.

These observations provide "circumstantial evidence" for the view that the increasingly short-term oriented, non-fundamental speculation contributes strongly to the overshooting of asset prices. A small FTT would then dampen the volatility of asset prices over the short run as well as the magnitude of the swings over the longer run.

The implementation of a FTT would not constitute a great technical problem. Reaching a political consensus will be much more difficult because the idea of taxing transactions in the "freest" markets calls implicitly into question that "Weltanschauung" which has become mainstream in economics and politics over the past decades.

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