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A General Financial Transactions Tax: Reasonable but no panacea

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Abstract

The idea of introducing a financial transaction tax (FTT) has recently attracted rising attention. There are three reasons for this interest. First, the economic crisis was deepened by the instability of stock prices, exchange rates and commodity prices. This instability might be dampened by such a tax. Second, as a consequence of the crisis, the need for fiscal consolidation has tremendously increased. A FTT would provide governments with substantial revenues. Third, the dampening effects of a FTT on the real economy would be much smaller as compared to other tax measures like increasing the VAT.

The paper summarizes at first the main arguments in favour and against a FTT. It provides then empirical evidence about the movements of the most important asset prices. These observations suggest that a small FTT (between 0.1% and 0.01%) would mitigate price volatility not only over the short run but also over the long run. At the same time, a FTT would yield substantial revenues. For Europe, revenues would amount to 1.8% of GDP at a tax rate of 0.05% (transaction volume is assumed to decline by roughly 65% at this rate).

JEL: F31, G12, G13, G14, H25

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

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1. Introduction: Concept of a general financial transactions tax

Over the past 30 years, financial innovations, in particular derivative instruments of all kinds, have contributed to a spectacular rise in turnover in all asset markets. At the same time, exchange rates, stock prices, and commodity prices have undergone wide swings.

The growing instability of financial markets and the related crises in the 1990s re-ignited the debate over the pros and cons of a currency transaction tax (*Haq – Kaul – Grunberg,* 1996; *Spahn*, 2002; *Jetin – Denys*, 2005).

The strong acceleration of trading activities in the 2000s and the related booms of stock and commodity prices between 2003 and 2008 (which laid the ground for the great asset devaluation leading into the great recession) motivated the Austrian Institute of Economic Research, to consider the pros and cons of a *general* and *uniform* financial transactions tax (*Schulmeister – Schratzenstaller – Picek*, 2008). Such a tax would be imposed on transactions of all kinds of financial assets, and, hence, would not be restricted to specific markets as proposed by *Keynes* (1936) for the stock market, *Tobin* (1978) for the foreign exchange market or securities taxes implemented in the past (e. g., stamp duties) [1]).

A general financial transactions tax (FTT) tracks two main targets: First, mitigating the fluctuations of the most important asset prices like stock prices, exchange rates, and commodity prices, and second, providing substantial revenues for governments.

The essential features of a general FTT are as follows:

- The FTT is levied on all transactions involving buying/selling of spot and derivative assets. These instruments are traded either on organized exchanges or over the counter (i.e., bilateral OTC transactions, exclusively carried out by professional market participants).
- The tax base is the value of the underlying asset; in the case of derivatives their notional value (e. g., the value of a futures contract at the current futures price, the notional principle of a swap, the spot value of the underlying asset in the case of options).

1 The WIFO study builds upon previous research on special transactions taxes as summarized there. After the outbreak of the financial crisis the debate over the usefulness of a general FTT intensified. A summary of this debate can be found in *Claessens – Keen – Pazarbasioglu* (2010*), European Commission* (2011), *Schulmeister* (2011).

- The tax rate should be low so that only very "fast" (= speculative) trading with high leverage ratios will become more costly due to the FTT (in the present study a rate of 0.05% is assumed).
- The FTT does not tax "real-world-transactions" like payments related to the goods and labour markets, to initial public offerings of stocks and bonds as well as foreign exchange transactions which stem from international trade or direct investment.
- The tax burden is divided between the buyer and the seller; hence, each side of a financial transaction would just pay 0.025% of the asset value (2.5 basis points).

2. The debate over the usefulness of financial transactions taxes

The proponents of financial transaction taxes base their position on the various assertions about trading and price dynamics in asset markets and the effects of a transaction tax (*Keynes,* 1936; *Tobin*, 1978; *Stiglitz,* 1989; *Summers – Summers,* 1989; *Eichengreen – Tobin – Wyplosz,* 1995; *Arestis – Sawyer,* 1998; *Spahn,* 2002; *Pollin – Baker – Schaberg,* 2003; *Jetin – Denys*, 2005; *Baker,* 2008; for a more detailed summary of pro-FTT-arguments see *Schulmeister*, 2011). These "pro-FTT-propositions" (PP) can be summarized as follows:

- PP1: There is excessive trading activity (= liquidity) in modern asset markets due to the predominance of short-term speculation.
- PP2: The most pressing problem is not so much the volatility of asset prices over the short run but over the long run. This is so because short-term speculation produces long swings in asset prices and, hence, persistent deviations from their fundamental equilibria.
- PP3: The overshooting of exchange rates, but also of stock prices, interest rates and commodities prices fosters the "predominance of speculation over enterprise" (*Keynes*, 1936) and thereby dampens economic growth and employment.
- PP4: A uniform tax per transaction increases the costs of speculative trades the more, the shorter their time horizon is. Hence, a transaction tax would have a stabilizing effect on asset prices and would thereby improve the overall macroeconomic performance.
- PP5: A FTT would compensate the distortion effect caused by the exemption of financial services from the value-added-tax.
- PP6: A transaction tax would provide governments and/or supranational organizations with considerable revenues which could/should be used for fiscal consolidation and/or the achievement of policy goals, particularly on the supranational level.

The critics of an FTT base their position on a fundamentally different perception of trading and price dynamics in financial markets that is (e.g., *ECB,* 2004; *Habermeier – Kirilenko*, 2003; *Grahl – Lysandrou*, 2003; *IMF*, 2010; *EC,* 2010A and 2010B; a detailed summary and evaluation of the arguments against an FTT as put forward in the recent debate by the IMF and the EC are provided in *Schulmeister*, 2011). The counter-FTT-propositions (CP) can be summarized as follows:

- CP1: The high transaction volumes in modern financial markets reflect the liquidity necessary for the price discovery process and, hence, for facilitating and smoothing the movements of asset prices towards their fundamental equilibria.
- CP2: A great deal of short-term transactions is related to hedging and, hence, to the distribution of risk.
- CP3: 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 asset prices smoothly and quickly to their equilibria.
- CP4: Any increase in transaction costs, e.g. due to an FTT, will cause liquidity to decline which in turn will increase the short-term volatility of asset prices.
- CP5: An endogenous overshooting caused by excessive speculation does not exist. Any deviation of asset prices from their fundamental equilibrium is due to exogenous shocks.
- CP6: Transaction taxes are hard to implement, in particular taxes on international transactions. In addition, actors will find ways to circumvent the tax.

The pros and cons with respect to the usefulness of an FTT as summarized above are derived from two fundamentally different perceptions of the behaviour of market participants, price dynamics, and market efficiency.

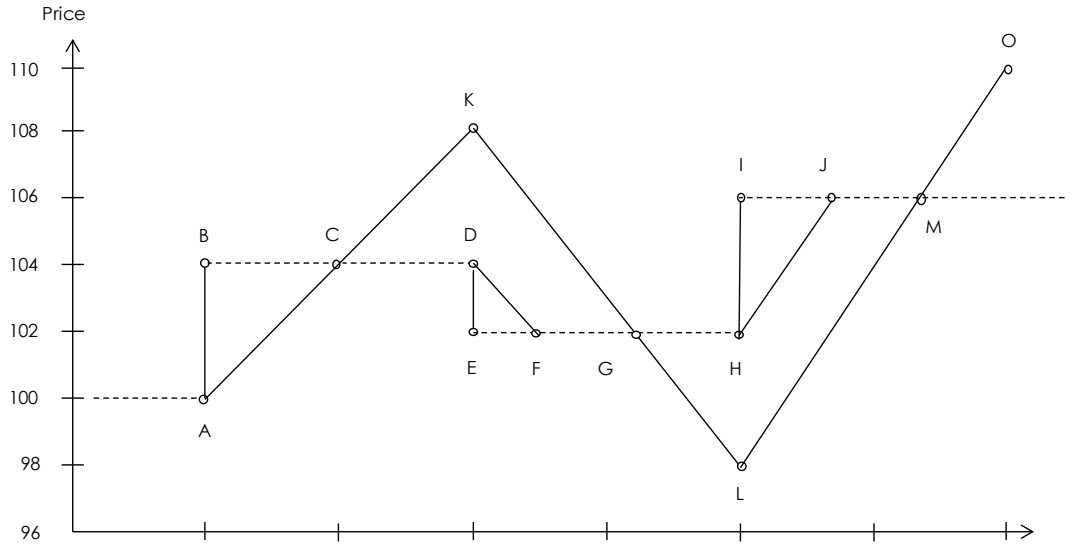
3. "Fundamentalist hypothesis" and "bull-bear-hypothesis"

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).

Figure 1: Three stylized paths of asset prices



The "bull-bear-hypothesis" perceives trading behaviour 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.[2])
- 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.
- Upward (downward) price movements – usually triggered by news - are lengthened by "cascades" of buy (sell) signals stemming from trend-following technical trading systems.

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

- The "trending" behaviour 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 behaviour 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.

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". [3])

Any evaluation of the different arguments in favour of against an FTT has to answer the following question. Does the empirical evidence concerning transaction volumes and price dynamics in financial markets fit approximately better into the picture of the "fundamentalist hypothesis" or does the evidence rather support the "bull-bear-hypothesis"?

[3]) 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.

4. Pattern of asset price dynamics

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 and 3):

- 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.
- 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.
- 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".

Figure 2a: Asset price dynamics

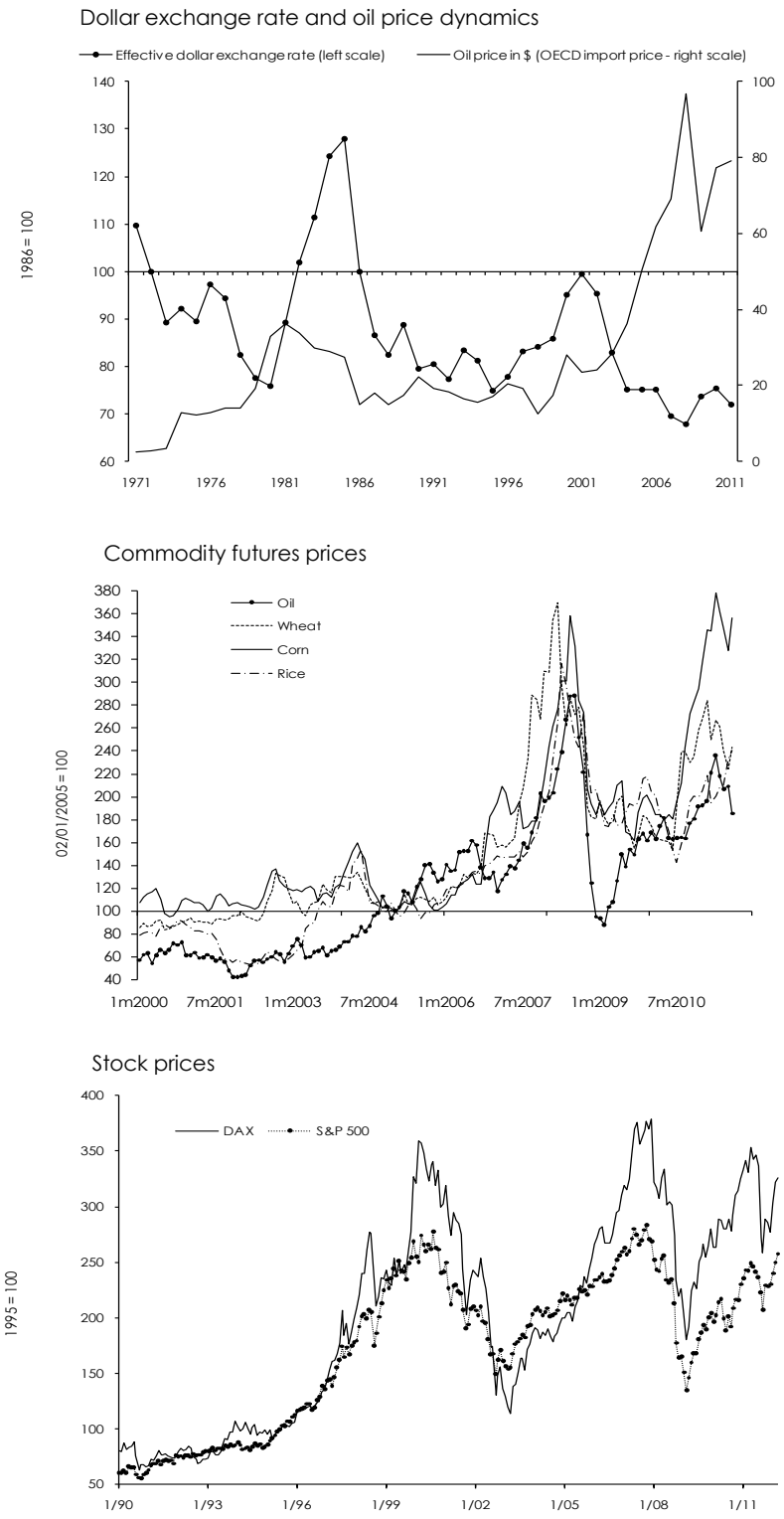
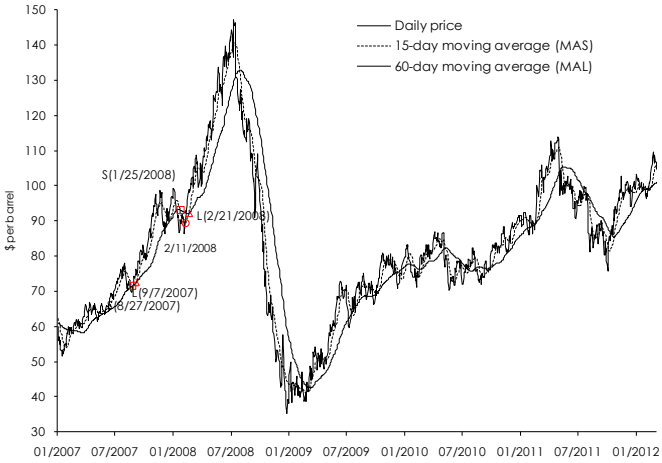


Figure 2b: Asset price dynamics

Daily US dollar/euro exchange rate

Technical trading of oil futures 2007- 2012



Italy

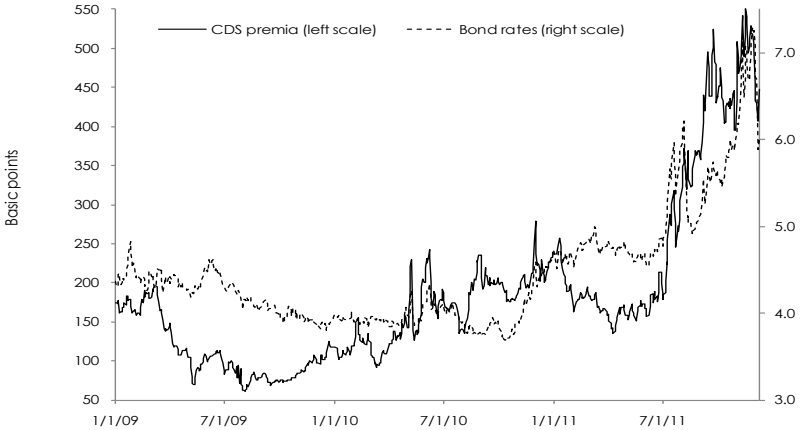
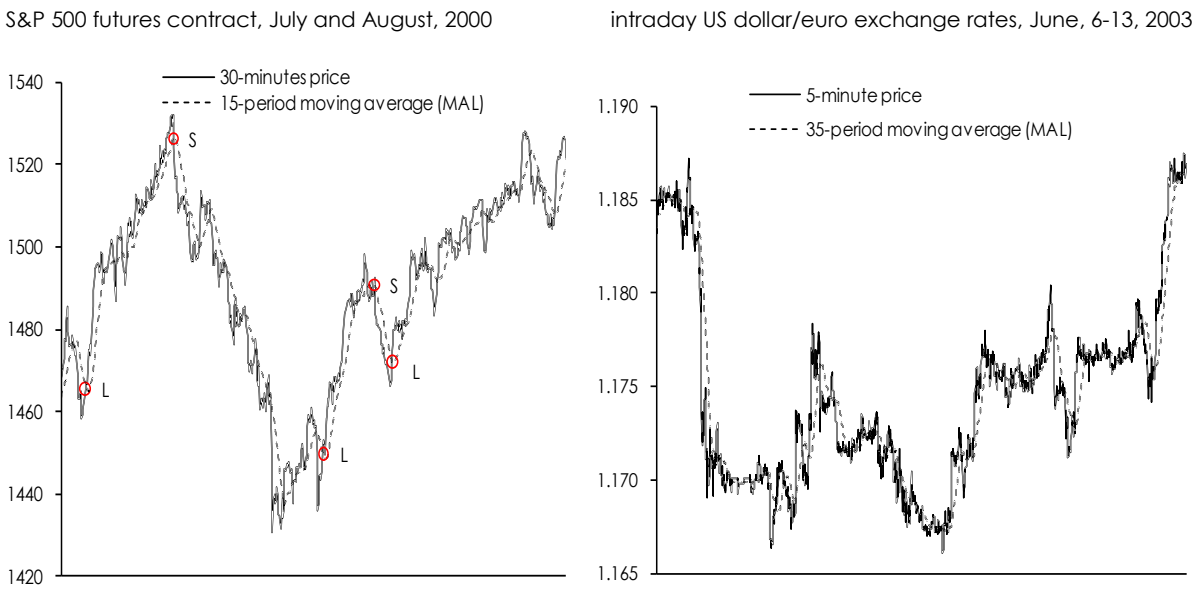


Figure 3: Intraday asset price dynamics



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 1). 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 1: 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.

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.

Table 2: 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 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 2). 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 637 runs based on the original S&P 500 data, but only 244 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).

In order to clarify the (statistical) causes of the differences in the duration of runs, table 3 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.

Table 3: 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 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) behaviour 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. 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).[5]) 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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[4]) Recent contributions to the debate about the efficiency of asset markets are *Le Roy* (1989), *Shiller* (2003), *Lo* (2004).

[5]) *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).

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.

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).

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.

Figures 2 and 3 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.

There exists a general pattern in the profitability of technical trading systems (table 4):

- 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").

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 4 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.

Table 4: Components of the profitability of technical trading systems in various asset markets

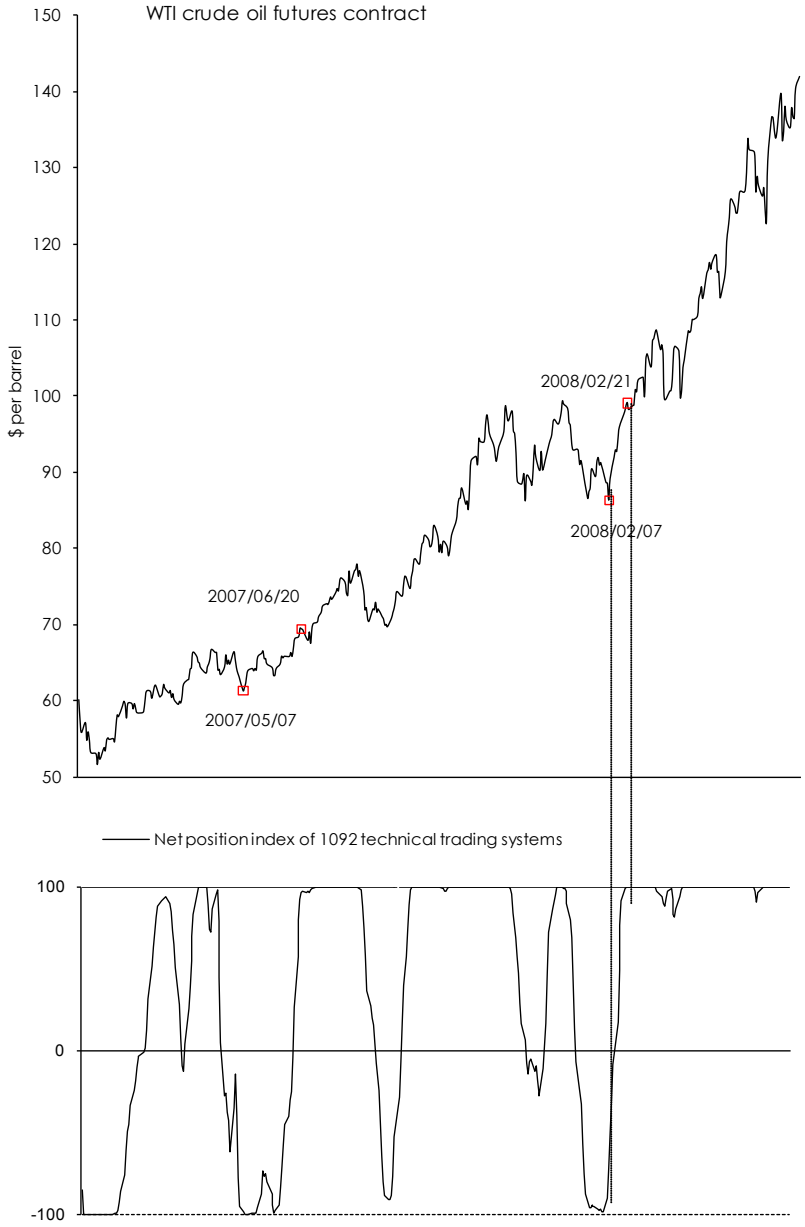
	Number of models	Gross rate of return per year	Mean of profitability components					
			Profitable positions			Unprofitable positions		
			Number per year	return per day	Duration in days	Number per year	return per day	Duration in days
Stock market, S&P 500 [1])								
1960 - 2007, Spot, daily data	2580	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

Studies on the aggregate trading behaviour 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, 2009B, 2009D):

- 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.

Figure 4: Aggregate trading signals of 1092 technical models and the dynamics of oil futures prices, January 2007 to June 2008



Source: *Schulmeister* (2009A),

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

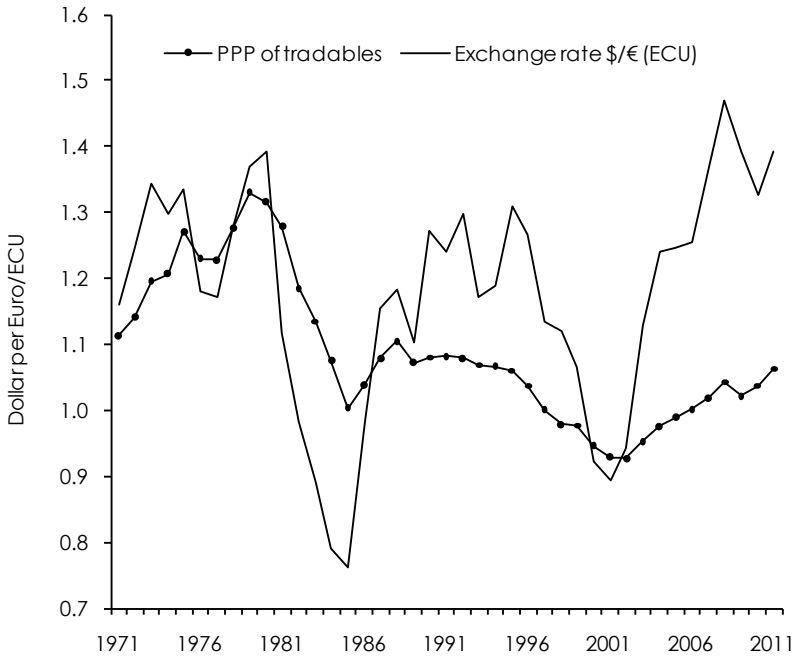
("bullishness" or "bearishness"). I shall now present some empirical evidence on this phenomenon.

6. Long swings of asset prices

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

Figure 5 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).

Figure 5: Dollar exchange rate and purchasing power parity



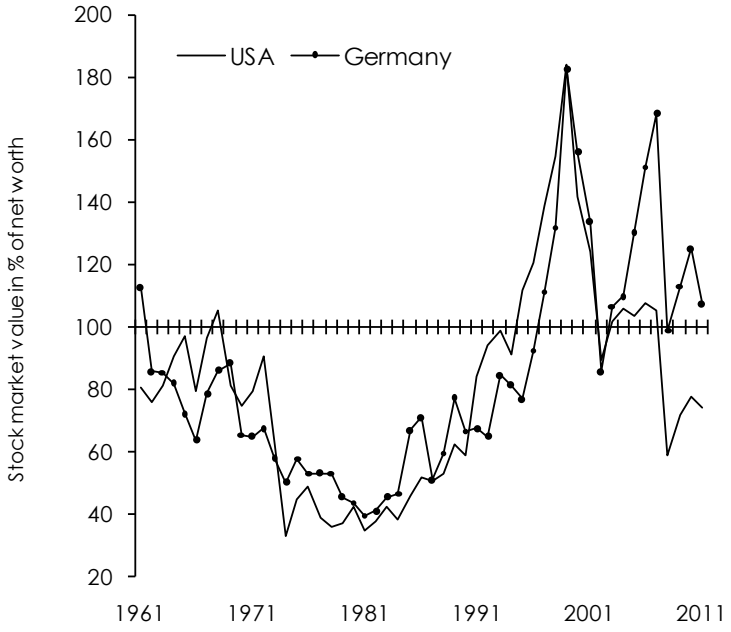
Source: OECD, WIFO, *Schulmeister* (2005).

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 2). 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 2007/2008 are the most impressing examples for this inverse relationship (see also *Schulmeister*, 2000).

Over the 1960s and 1970s that stock prices in the US and Germany became progressively undervalued (figure 6): 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[6]). 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 6: 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 6).

Equilibrium economics under rational expectations cannot account for wide fluctuations of asset prices around their fundamental equilibrium. This is so because conventional theory can

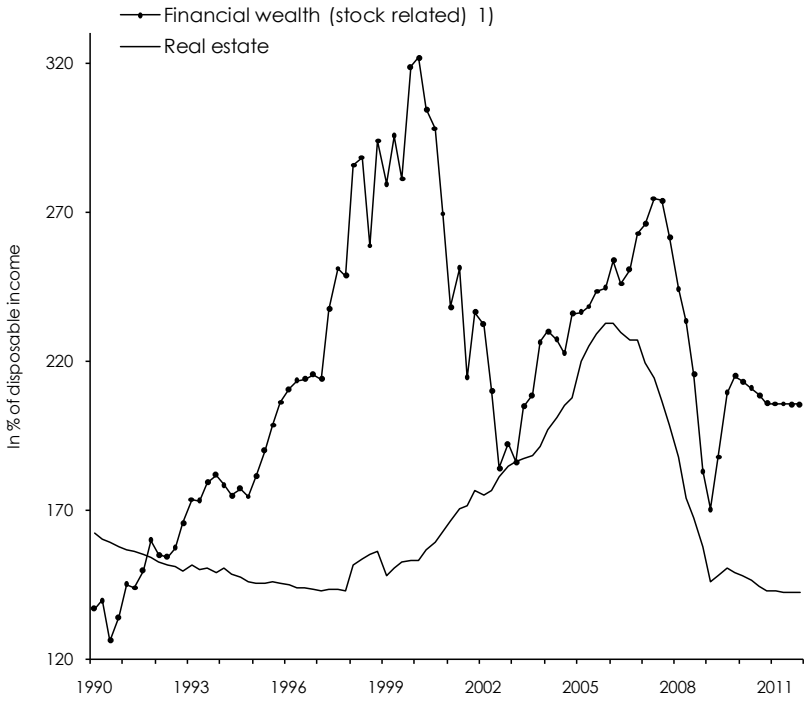
[6]) The relation depicted in figure 11 is an estimate of Tobin's q. For the data series and the method to calculate this relation see *Schulmeister*, 2003.

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 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 "behavioural finance" uses equilibrium concepts as the benchmark (most important exception: the work of Robert J. Shiller).[7])

Figure 7: Wealth of private households in the US



1) Stocks, Investment funds, pension funds.

Source: Federal Reserve Board

[7]) *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.

7. Asset price fluctuations and 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 7). 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 2; 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 (figure 7) 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 in the second half of 2008.

8. Dynamics of financial transactions

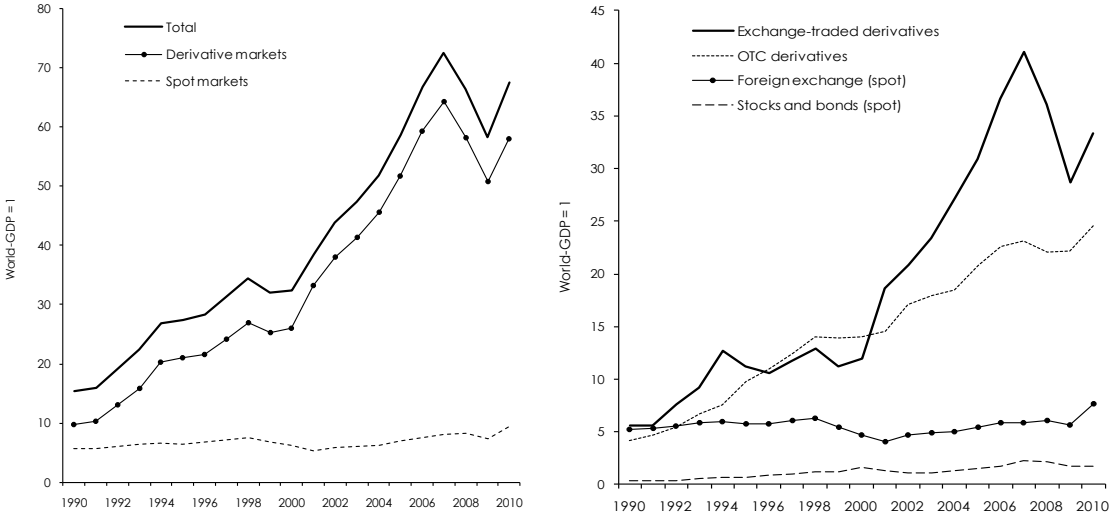
Trading activities in financial markets have exploded over the past 20 years (figure 8):[8])

- 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.
- 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.

[8]) 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*, 2010).

- 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.

Figure 8: Financial transactions in the world economy



9. Stabilizing effects and revenue potential of a general financial transactions tax[9)]

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

[9)] This section summarizes some key results of a comprehensive study on the possible effects of a general financial transactions tax (*Schulmeister – Schratzenstaller – Picek*, 2008). See also *Baker et al.* (2009), *Baker* (2008), *Jetin – Denys* (2005), *Pollin – Baker – Schaberg* (2003), *Schmidt* (2008). The issues concerning the implementation of an FTT is discussed in *Schulmeister* (2011).

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 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 some European countries 2010
Tax rate: 0.05%

	Europe		Germany		France		Netherlands		Denmark		United Kingdom	
	In % of GDP	In Bill. €	In % of GDP	In Bill. €	In % of GDP	In Bill. €	In % of GDP	In Bill. €	In % of GDP	In Bill. €	In % of GDP	In Bill. €
Spot transactions on exchanges	0.09	11.7	0.04	0.9	0.02	0.4	0.05	0.3	1.10	2.6	0.18	3.1
Derivatives transactions on exchanges	0.71	92.2	0.63	15.7	0.00	0.0	0.00	0.0	0.00	0.0	3.28	55.8
OTC transactions	1.00	130.4	0.18	4.4	0.50	9.7	0.38	2.2	1.65	3.9	5.13	87.3
All transactions	1.80	234.3	0.84	21.0	0.52	10.2	0.43	2.5	2.76	6.5	8.59	146.2

Source: WIFO.

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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