The real versus the financial economy: A global tale of stability versus volatility*

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Abstract

The question how the real and the financial side of a capitalist economy relate to each other has been a frequently recurring topic in the history of economic thought. Our paper addresses this question from the viewpoint that capital ultimately seeks returns from its perpetual reallocation and essentially faces two choices: it can either be "entrepreneurially" allocated to real economic activity, or it can be "financially" invested in legal claims against such activity. Adopting such a perspective, we study here how real and financial returns relate to each other over the past fifteen years, both within and across countries, by considering more than 30,000 publicly traded firms in more than forty countries that stand for 70% of the global population and about 90% of world income. We compare the average rates of return to both types of investment and their respective volatilities. While average returns, perhaps somewhat surprisingly, turn out to be roughly equal across the two domains, the volatility of financial returns exceeds 'real volatility' by an order of magnitude. From a systemic point of view, these finding raise the question why capital would seek out financial investments in the first place.

Keywords: Profit rates, growth rates of market value, excess volatility.
Journal of Economic Literature Classification: D21, G14, L10, F01.

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1 Introduction

The question how the real and the financial side of a capitalist economy relate to each other has been a frequently recurring topic in the history of economic thought, and the call for papers of this special issue in *E-conomics* explicitly mentions its importance in light of the recent turmoils in the global economy. Our paper addresses this question from the viewpoint that capital ultimately seeks returns from its perpetual reallocation and essentially faces two choices: it can either be "entrepreneurially" allocated to real economic activity (that is the production of goods and services), or it can be "financially" invested in legal claims against such activity. Adopting such a perspective, we study here how real and financial returns relate to each other over the past fifteen years, both within and across countries, by considering more than 30,000 publicly traded firms in more than forty countries that stand for 70% of the global population and about 90% of world income. We compare the average rates of return to both types of investment and their respective volatilities. While average returns turn out to be roughly equal across the two domains, the volatility of financial returns exceeds 'real volatility' by an order of magnitude. We also find that real returns are positively autocorrelated and exhibit remarkable stability over time, while financial returns have no memory and are characterized by pronounced fluctuations that are hard to reconcile with fluctuations in the real returns to economic activity. From a systemic point of view, these findings raise the question why capital would seek out financial investments in the first place.

Our perspective owes its intellectual debt to at least three influences. Firstly, we take the position that the destinies of the largest firms in an economy are of crucial quantitative importance for aggregate outcomes, a viewpoint that Gabaix (2011) calls the "granular origins of aggregate fluctuations". Secondly, we focus on the profit rate as a measure of the returns to real economic activity, an idea that has pervaded classical economic thinking since the times of Adam Smith (see, e.g., Foley, 2006). Last but not least, the latent notion of some form of excess volatility in financial returns dates back to the seminal contributions of Shiller (1981) and LeRoy and Porter (1981).

The pre-analytical vision of our study rests on the observation that positive long-run deviations of financial returns from the real rate of profit amount to a Ponzi scheme and are therefore unsustainable, simply because in the long run companies cannot afford to pay more to financial stakeholders than they earn from their real activities. On the other hand, negative long-run deviations coupled with arbitrage considerations would render financial investments relatively unattractive. Two important strands of literature have helped to shape this way of thinking, the first being the fundamental principle of valuation put forth by Miller and Modigliani (1961), the second being the efficient markets hypothesis of Fama (1970, 1991).

According to the first, deviations from a firm's fundamental share price, perceived as the discounted value of future income streams, should be eliminated through trading on perfect capital markets. More importantly, Modigliani and Miller argue that it is ultimately the left-hand side of a company's balance sheet that matters, i.e. its real activities, and not how the right-hand side of the balance sheet is composed, i.e. how exactly and in which proportions the different financial claims are stacked against these real activities. According to the second, price movements are directly tied to the arrival of new information about activities in the real economy, implying that financial returns should be coupled to returns in the real economy. We find it unfortunate, however, that both these strands as well as the excess volatility literature have apparently singled out corporate dividends to be the most important determinant of a company's income stream. The reason why we find this choice less than ideal is that (i) dividend policy varies widely across companies and that (ii) the pertinent literature still, after more than half a century, has not determined a robust effect of dividends on share prices (see, e.g., Al-Malkawi et al., 2010, for a recent review of the field).

In order to compare real and financial returns, we propose to consider a firm's (possibly negative) ratio of its operating income to its total assets as a meaningful measure of the profit rate, in line with the orthodox accounting and business economics literature where it is also known as the return on assets, or ROA. Our measure of financial returns will be the (possibly negative) growth rate of the corresponding firm's financial market value. Choosing these two proxies for real and financial returns of course still represents an imperfect and stylized approach, mainly because the ROA is influenced by empirical accounting issues (see, e.g., Burgstahler and Dichev, 1997) and because the growth rate of market value does not implicitly account for the peculiarities of a publicly traded company's dividend policy. Yet we would like to believe that both quantities are useful first-order approximations to the real and financial rates of return.

Interestingly, the profit rate has not been at the forefront of economic inquiry for many decades, which is probably due to the fact that orthodox theories have not been able to provide a coherent explanation for the profit rate (see, e.g., Naples and Aslanbeigui, 1996). Profit rates have nevertheless been studied in the context of the so-called persistence of profits literature that starts with Mueller (1977) (see, e.g., Cuaresma and Gschwandtner, 2006, for a more recent take on the subject), and more recently also in the context of a statistical equilibrium framework (Alfarano and Milaković, 2008; Alfarano et al., 2012; Erlingsson et al., 2013) that will guide our present investigation.[1]

[1] Foley (1994) and Garibaldi and Scalas (2010) provide useful background material for readers who might not be entirely familiar with the concept of statistical equilibrium. To the best of our knowledge, Farjoun and Machover (1983) provide the first probabilistic perspective on the rate of profit.

2 Data description and sample selection

The data used in this study come from Thomson Reuters Datastream and consist of annual observations on operating income, total assets and market value for 32,201 publicly traded domestic companies from 43 different countries listed in Table 1. The countries in our sample stand for approximately 70 percent of world population and represent the largest economies in terms of world income, accounting for more than 87 percent of global gross domestic product in 2011 according to the IMF's World Economic Outlook database. The dataset contains firms which have been present in the market for at least one year between 1997 and 2011. It is filtered according to two criteria: first, we exclude banks (entities with SIC codes 60 and 61 on a two-digit classification level) from the analysis because it is well known that their balance sheets and profit rates differ from those of non-banks by at least one order of magnitude. Second, to check to what extent our results are affected by the entry and exit of firms, we create two different samples. The first one considers entities that report data on all three variables (operating income, total assets, and market value) in at least one period, hence it includes firms with life spans varying between one and fifteen years. The second sample focusses on long-lived or "surviving" firms that we define as companies reporting data in the first and the final period of the time window. The time period has been chosen in such a way to maximize the number of observations across countries.[2]

Table 1 provides information about the number of firms in both the entire sample and the subset of firms that fulfill the longevity criterion, comprising 7,488 surviving firms. Datastream does not contain enough companies in Egypt and Russia that can be classified as long-lived companies according to our criterion, thus we only present results for firms with shorter life spans for these two countries. Averaging across all countries, around one quarter of the firms can be classified as long-lived. Notice, however, that these surviving firms on average account for approximately 60 percent of a country's total market capitalization according to World Bank data and, therefore, must be regarded as an important driver of economic activity. This argument is also supported by Gabaix (2011) who finds that about one third of variations in US GDP growth can be attributed to the idiosyncratic destinies of the largest one hundred US firms.

Based on these data we compute two quantities for each firm: the profit rate or return on assets, and the growth rate of market value. The profit rate of company i in year t is computed as the ratio of operating income (I) to total assets (A)

$$p_i(t) = \frac{I_i(t)}{A_i(t)}, \tag{1}$$

[2] Datastream provides the most extensive coverage for US firms, going back to 1980. For most countries in our sample, however, coverage only begins in 1997.

Table 1: Countries under consideration. The numbers in the second and third column refer to non-bank companies. Firms for which Datastream does not provide data on all three variables have been removed. The survival rate in the fourth column is computed as the ratio of the number of long-lived firms to the number of all firms in that country.

Country	Number of firms	Number of long-lived firms	Survival rate (in %)
Argentina	74	26	35.1
Australia	1700	128	7.5
Austria	81	35	43.2
Belgium	138	44	31.9
Brazil	442	78	17.6
Canada	187	104	55.6
Chile	191	62	32.5
China	2053	153	7.5
Czech Republic	15	4	26.7
Denmark	155	76	49.0
Egypt	107	0	0.0
Finland	128	57	44.5
France	727	228	31.4
Germany	952	233	24.5
Greece	268	81	30.2
Hong Kong	1199	298	24.9
India	2249	222	9.9
Indonesia	358	120	33.5
Ireland	35	16	45.7
Israel	420	21	5.0
Italy	260	83	31.9
Japan	3378	1589	47.0
Malaysia	851	227	26.7
Mexico	128	50	39.1
Netherlands	107	67	62.6
New Zealand	135	32	23.7
Norway	178	39	21.9
Pakistan	162	48	29.6
Poland	381	13	3.4
Portugal	55	20	36.4
Russia	361	1	0.3
Singapore	694	123	17.7
South Africa	321	69	21.5
South Korea	1614	235	14.6
Spain	130	53	40.8
Sweden	421	91	21.6
Switzerland	217	111	51.2
Taiwan	1459	168	11.5
Thailand	768	220	28.6
Turkey	309	65	21.0
United Kingdom	1353	424	31.3
United States	7411	1770	23.9
Venezuela	29	4	13.8
Total	**32201**	**7488**	**23.3**

while the growth rates are computed as logarithmic time differences in market value (MV)

$$g_i(t) = \log(MV_i(t+1)) - \log(MV_i(t)), \tag{2}$$

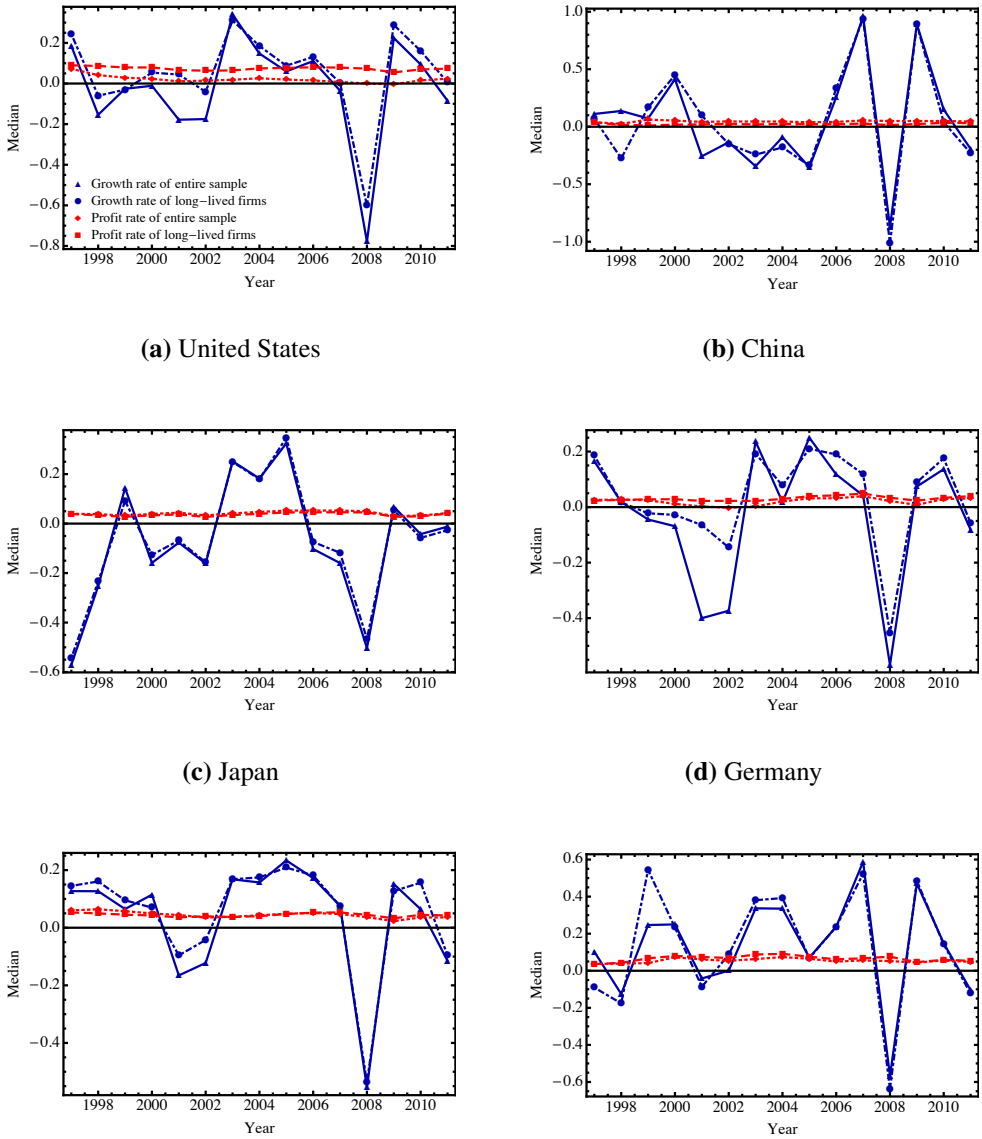
which should approximate the annual percentage change in market value. Notice that the comparison of both quantities is dimensionally sound in the sense that both quantities measure the annualized reurn per invested capital.

3 Empirical results

Since our goal is to obtain a global perspective of real and financial rates of return, we will focus on the time series properties of cross-sectionally averaged real and financial rates of return. Hence, our focus shifts from the return of a single stock or company to the central locations of the profit rate and growth in firm market value distributions in a given country. In the following analysis, we employ the median as location parameter since it is a more robust estimator against outliers.

Figure 1 illustrates the time evolution of the median profit rate as well as the median financial return for the six largest economies in the world: the US, China, Japan, Germany, France, and Brazil. The diagrams for the remaining countries are provided in the appendix. For all countries we observe pronounced differences between the real and the financial side of the economy regarding the intensity of market reactions. Although there are also moderate up- and downturns in the median profit rate (notice for instance the decline in firm profitability in the course of the recent financial and banking crisis in almost every considered market), the rate of profit exhibits a remarkable stability over time that is at odds with the high volatility in financial returns. This non-trivial stability of the profit rate has already been pointed out by Alfarano et al. (2012), who study the distributional details of profit rates for the US for a time span that dates back to 1980 and is thus about twice as long as the present one. One of their findings is that the average rate of profit (measured for instance by the mode or median of the profit rate distribution) exhibits the same stability that we find here. Hence we would like to believe that our present results are not an artefact of the chosen time period.

From an economic point of view, Alfarano et al. argue that the considerable stability of the profit rate should stem from the notion of classical competition that gives rise to a negative feedback mechanism, whereby capital seeks out sectors or industries where the profit rate is higher than the economy-wide average, typically attracting labor, raising output, and reducing prices and profit rates in the process. This in turn provides an incentive for capital to leave the sector again, leading to higher prices and profit rates for firms that remain in the industry.



(a) United States

(b) China

(c) Japan

(d) Germany

(e) France

(f) Brazil

Figure 1: Time evolution of the median profit rate and the median growth rate of market value for the United States, China, Japan, Germany, France, and Brazil. Results are shown for the entire sample and the long-lived firms. For visual clarity, linear interpolations between annual data points have been added.

On the other hand, the growth rates of market value appear to fluctuate around the rate of profit, but their volatility is far too large to be explained by changes in the return to real economic activity. Hence, instead of the negative feedback mechanism that characterizes the real sector, financial markets seem to be subject to some sort of positive feedback mechanism and strong cross-correlations that drive stock prices into the same direction for extended periods of time. In fact, the recent literature on heterogeneous agent-based financial market models agrees in all its different flavors (see, e.g., Lux et al., 2007, for a comprehensive and fairly recent review) that positive feedbacks, typically in the form of self-reinforcing social interactions, are crucial for the reproduction of the observed stylized facts regarding the statistical properties of financial returns.

Visual inspection of the median time series also suggests that returns in the real economy are more persistent than financial returns. To quantify this impression, we have calculated the first-lag autocorrelation coefficient for the median profit rate and growth in market value series, using the estimator

$$\gamma = \frac{1}{T}\sum_{t=1}^{T-1}(X_t - \bar{x}_T)(X_{t+1} - \bar{x}_T), \tag{3}$$

where

$$\bar{x}_T = \frac{1}{T}\sum_{t=1}^{T} X_t \tag{4}$$

is the mean of $T = 15$ observations from the time series. The results presented in Figure 2 support the view that annual returns earned in the real economy are positively autocorrelated, while there are no statistically significant autocorrelations in growth rates of market value, in line with the (weak-form) efficient market hypothesis.[3] This finding is very well established in the literature (see, e.g., Cont, 2001, for a review of the empirically established statistical properties of financial returns).[4] In light of the behavior of financial returns, the fact that autocorrelations in profit rates persist for one year (and most probably even longer) appears striking to us. We very much suspect that this finding traces back to real frictions and inertia introduced by, for instance, barriers of entry, the need to create and maintain corporate infrastructure, the administrative burden of founding a company, or the

[3] Note that the short length of the time series introduces a negative bias in the estimated autocorrelation coefficient (see, e.g., Fuller, 1996). Therefore, the autocorrelation in profit rates is even stronger than Figure 2 suggests. This bias probably explains the negative but statistically insignificant estimates for the autocorrelation coefficients of market value growth rates.

[4] If at all, significant autocorrelations in financial returns can merely be found on much smaller intraday time scales (so-called high frequency data) for which microstructure effects come into play.

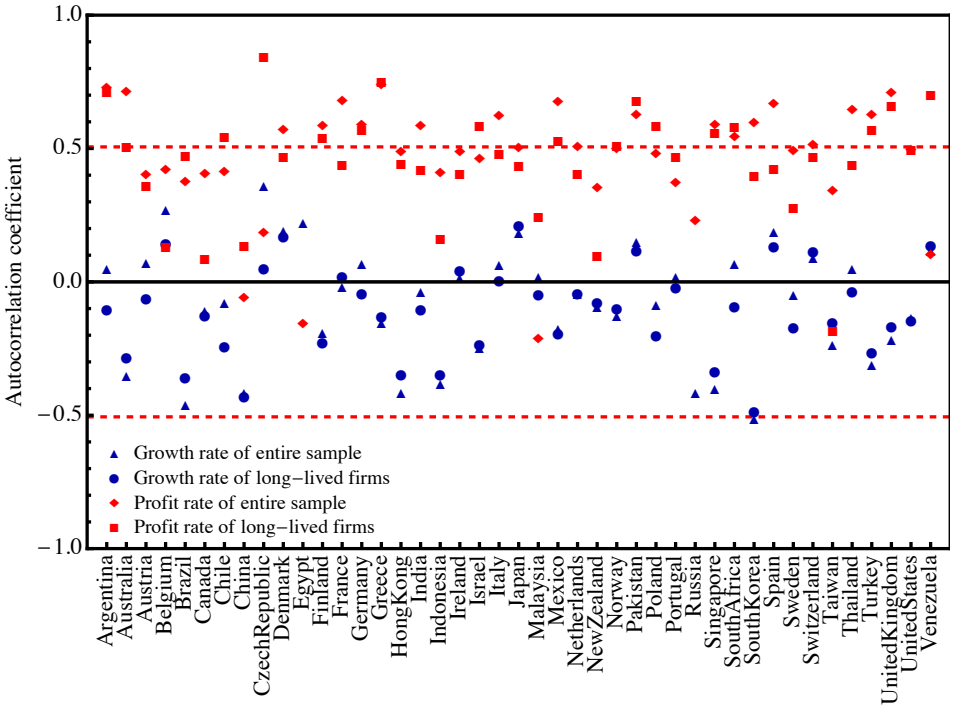


Figure 2: First-lag autocorrelation coefficients of both the median profit rate and growth in market value series for all countries in our sample. The red dashed lines show the 95% confidence interval under the null hypothesis of zero autocorrelations. The interval has been computed as $\pm 1.96/\sqrt{T}$, where $T = 15$ is the length of our time series.

efforts and costs involved in hiring and releasing employees, which are all absent from financial capital investment.

Moreover, our analysis indicates that there are differences in average firm profitability across countries. If we compute the median of the median profit rate series, the results for the long-lived companies vary between 1 percent in case of Portugal and approximately 10 percent for Pakistan. When the entire sample is considered, on one end Pakistan still has the highest average profit rate (approximately 9.7 percent), but now a high incidence of negative reported earnings in Australia at the other end of the spectrum results in an average return on assets of -6.1 percent (see Figure 11 in the appendix). This raises the question whether markets with a high profit rate are also more attractive to financial investors. Figure 3 presents a scatter plot showing combinations of the profit rate and the growth rate of market value (both averaged over the time series and across firms) for all countries in our long-lived sample. A weighted linear least squares regression of the financial return on the rate of profit that takes into account differences in

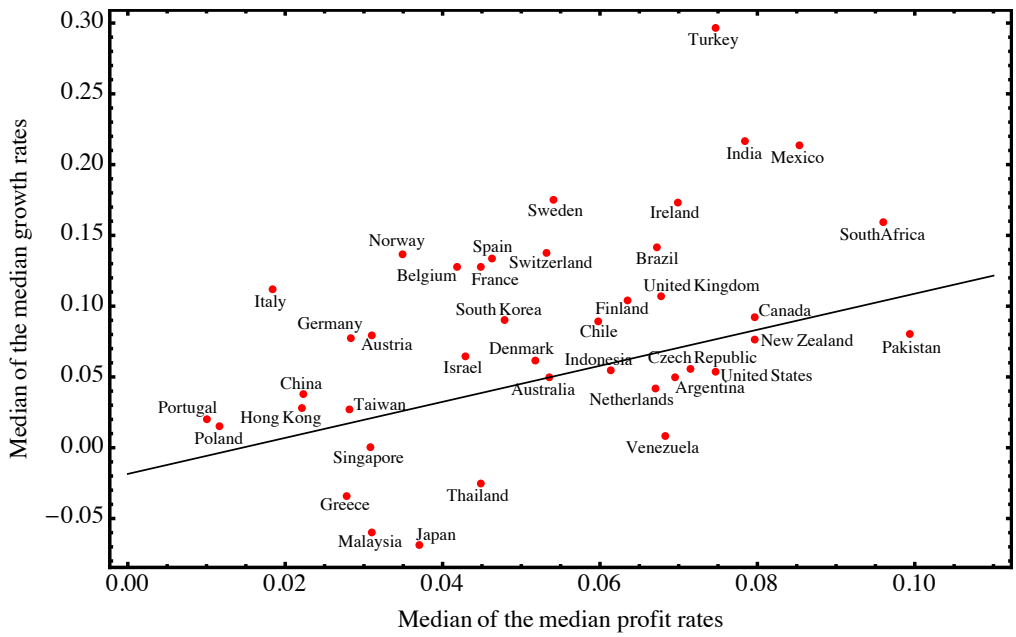


Figure 3: Scatter plot showing combinations of the average profit rate and the average growth rate of market value for long-lived firms in each country. The data points have been computed as the median of the median time series. Weighted least squares regression of the average financial return on the average profit rate yields an intercept of -0.02 ± 0.03 with a p-value of 0.57 and a slope parameter of 1.27 ± 0.52 with a p-value of 0.02. Thus we cannot reject the hypothesis that average real and financial returns are the same (that is, a slope parameter of unity) at the usual confidence levels. The weights have been calculated by starting from the sum of market values of all (long-lived) firms in a country relative to global market capitalization for a given year, and have then been averaged over the period 1997-2011.

market size or economic importance across countries is also shown.[5] We chose the weighting function to be the sum of market values of all (long-lived) firms in a country as a percentage of the market capitalization of the entire sample. To avoid distortions arising from booms and busts in single years, we calculate the weight for every year between 1997 and 2011 and then take the mean of these 15 values for each country. The weighted regression yields a slope coefficient of 1.27 ± 0.52 with a p-value of 0.02. Since the estimate for the slope coefficient cannot be statistically distinguished from unity at the usual confidence levels, we take this to imply that investments in the real and the financial sector yield the

[5] An (unweighted) ordinary least squares regression leads to similar results and supports our central findings.

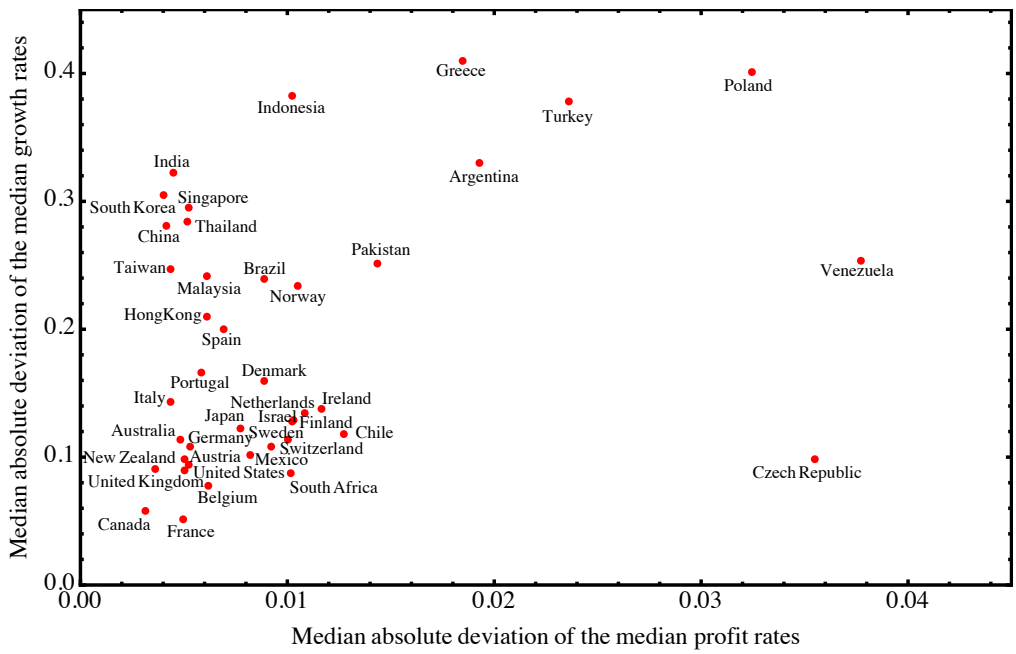


Figure 4: Scatter plot showing combinations of the profit rate volatility and the volatility of growth rates of market value for long-lived firms in each country. The data points have been computed as the median absolute deviation of the median time series. It is noteworthy that the volatilities differ by one order of magnitude, and that we cannot reject the hypothesis that the slope coefficient in a linear regression is equal to zero at the usual significance levels.

same return *on average*. Thus, we may conclude that at least on the aggregate level financial returns are tied to the rate of profit, supporting the hypothesis that the profit rate is an important benchmark for financial returns *on average*. Our results also carry over to the entire sample of firms, in which case we find an intercept of -0.02 ± 0.02 with a p-value of 0.38 and a slope of 1.42 ± 0.54 with a p-value of 0.01 (see Figure 11 in the appendix). Next we conduct a similar exercise for the volatility of the two quantities, measured as the median absolute deviation of the median time series. We chose this particular dispersion measure because it is more robust against outliers than the standard deviation.

Figure 4 presents the results for the long-lived companies. The scatter plot for the entire sample is provided in the appendix (Figure 12). We observe in both samples that the volatility of financial returns is about one order of magnitude higher than the volatility of profit rates, confirming the visual impression from the time series plots that financial returns are "excessively volatile" compared to

profit rates. To check whether the two volatilities are related, we have regressed the median absolute deviation of growth in market value on the volatility of profit rates, again weighting countries with their percentage share of total market capitalization. However, in contrast to our results for the median, we do not find any clear relationship between the two variables. A weighted least squares regression for the set of long-lived firms yields an intercept of 0.08 ± 0.03 with a p-value of 4×10^{-3}, but the slope parameter of 6.36 ± 4.01 only has a p-value of 0.12. Regressing the volatility of profit rates on the volatility of financial returns and weighting the data with total assets instead of market values, we obtain a constant of 0.01 ± 0.001 with a p-value of 4.8×10^{-7} and a slope of 0.01 ± 0.01 with a p-value of 0.12. Similar results are found for the entire sample, and we are happy to provide them upon request. Therefore, although there is a relation between the two rates of return in terms of the median, the fluctuations in financial returns seem to be disconnected from fluctuations in the return of real economic activity.

As we argued before, one popular explanation for the excess volatility in financial returns and the endogenous dynamics of the financial sector that seem to be "disconnected" from fundamental factors are speculative activities of traders and the presence of herding behavior in financial markets, but not in the real sector. Since in both volatility regressions the slope is not significantly different from zero, the estimator for the intercept can be interpreted as a (weighted) sample average of volatilities across countries. Thus the estimates confirm the impression that volatility in financial returns exceeds volatility in profit rates by about one order of magnitude.

4 Discussion and concluding remarks

While the length of the available time window in Datastream is certainly not ideal, the period 1997 to 2011 nevertheless strikes us as instructive for two reasons. It contains a period of considerable "financialization" or "securitization" of the global economy that starts in the 1990s, but it also contains a period of substantial financial distress through the global economic and banking crises that began in 2007. One might wonder whether the average equality of profit rates and financial returns would also hold without this realignment period? Reproducing the median regressions (Figures 3 and 11) for the period 1997-2006, we find a slope coefficient of 1.59 ± 0.53 for the long-lived corporations and 1.44 ± 0.66 for the entire sample (both parameters are statistically significant at the 5% level), thus our results for the years prior to the crisis are consistent with those reported in section 3 for the entire sample period, and we reject the hypothesis that the average equality of returns is merely due to the presence of the most recent crisis in our sample. Overall, our findings are compatible with some form of "investor rationality" since returns

appear to be the same *on average*, so that investors eventually realize that irrational exuberances or panics cannot last forever.

On the other hand, the source of deviations in volatility is most likely due to negative versus positive feedback mechanisms in the operation and allocation of real and financial capital. From our point of view, this leads to the question why capital would seek out financial market allocations in the first place. At this point, we find the observation by Shackle (1967) instructive, who claims that the foremost purpose of financial investment (or 'money' as he called it in the 1960s) "is the refuge from specialized commitment, the postponer of the need to take far-reaching decisions" because it provides much higher liquidity compared to the commitment of capital to real activity.

This view has intuitive appeal, but then one ultimately has to confront the question whether the possibility of postponing specialized commitments comes at a macroeconomic cost. Interest in this question dates back to the work of Kaldor (1956) and Pasinetti (1962), who have put forth what is often termed the *Cambridge growth equation*, a theory that in a more contemporary language boils down to statements about the relationship between the profit rate and the financial rate of return (see, e.g., Ciccarone, 2004, for a recent take on the subject), with far reaching implications for the functional distribution of income and macroeconomic stability at large. Orthodox interest in this subject has seemingly vanished altogether, which is probably due to the critique of the Cambridge growth equation by Samuelson and Modigliani (1966). In retrospect this strikes us as a rather unfortunate development, particularly since Kaldor, Pasinetti and Robinson have argued in their replies to Samuelson and Modigliani (that were published in the same issue) that the "Anti-Pasinetti" critique would require labor's propensity to save to become so high as to allow the accumulation of capital through labor at a rate that is greater than the speed at which capitalists accumulate capital. But then the total capital of the economy would eventually be entirely owned by workers, while the capitalists would become extinct. Casual observation of economic history suggests that such an outcome does not appear to be very likely.

Irrespective of these long-standing theoretical debates, we would like to conclude by pointing out once more that from a macro-perspective we find it most surprising that the profit rate appears as such an enormously stable and positively autocorrelated variable in each country, making it a very worthwhile candidate for further study in our opinion, despite the apparent orthodox disinterest in the subject.

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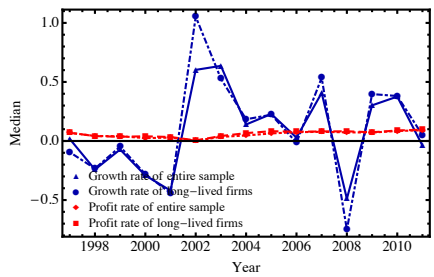
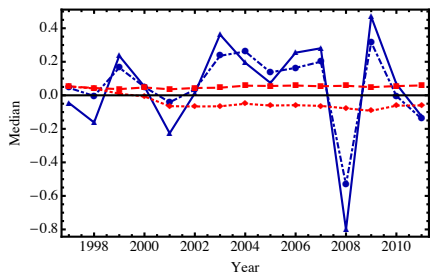
A Figures



(a) Argentina



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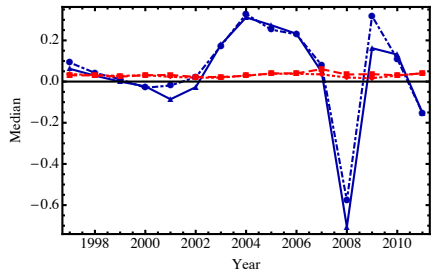
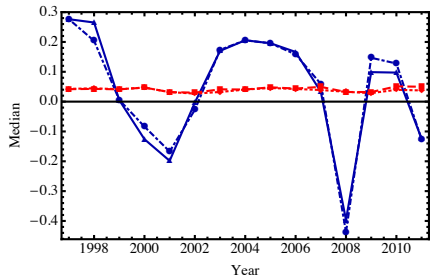
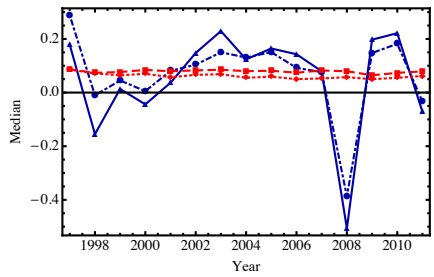


(c) Austria



(d) Belgium



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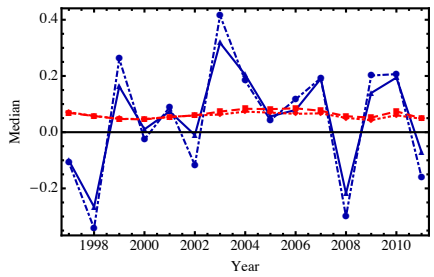
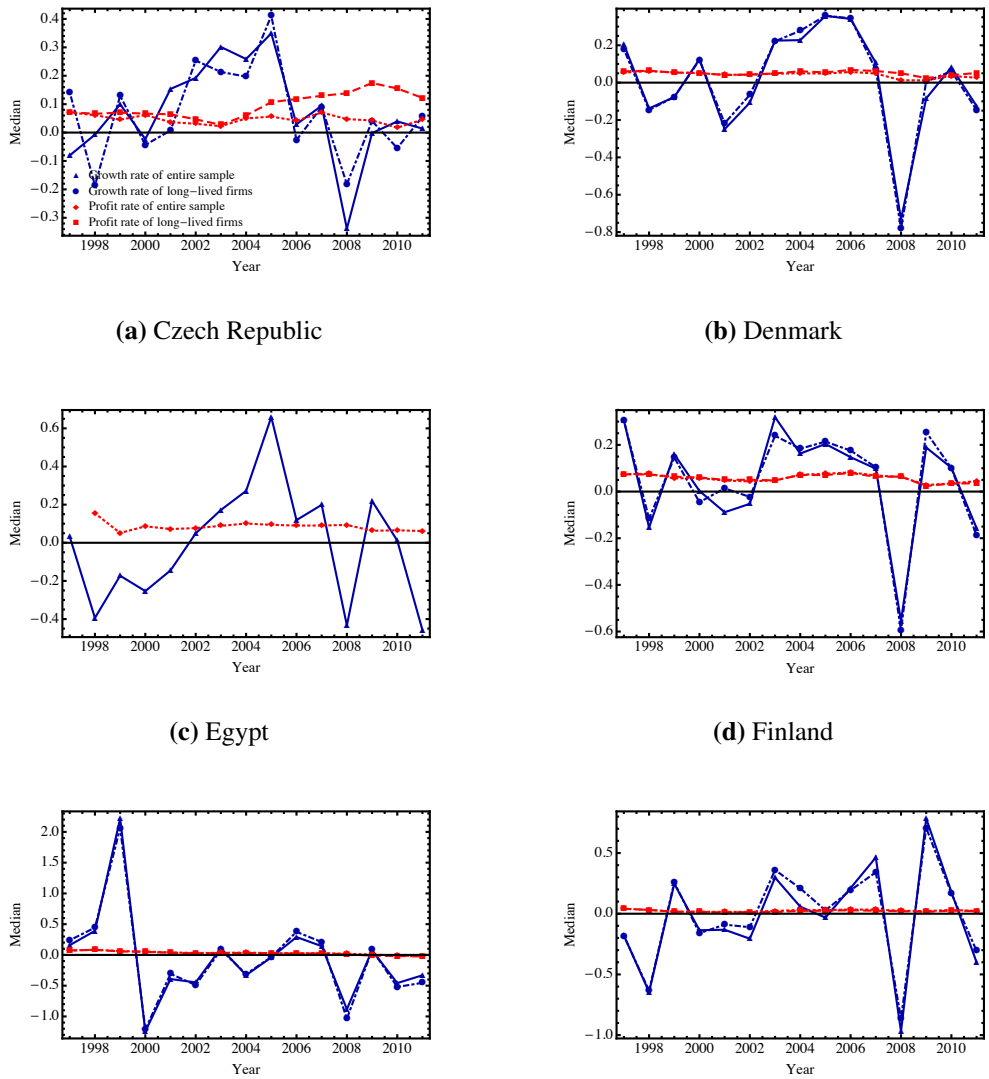


(f) Chile

Figure 5: Time evolution of the median profit rate and the median growth rate of market value for Argentina, Australia, Austria, Belgium, Canada, and Chile. Results are shown for the entire sample and the long-lived firms. For visual clarity, linear interpolations between annual data points have been added.



(a) Czech Republic

(b) Denmark

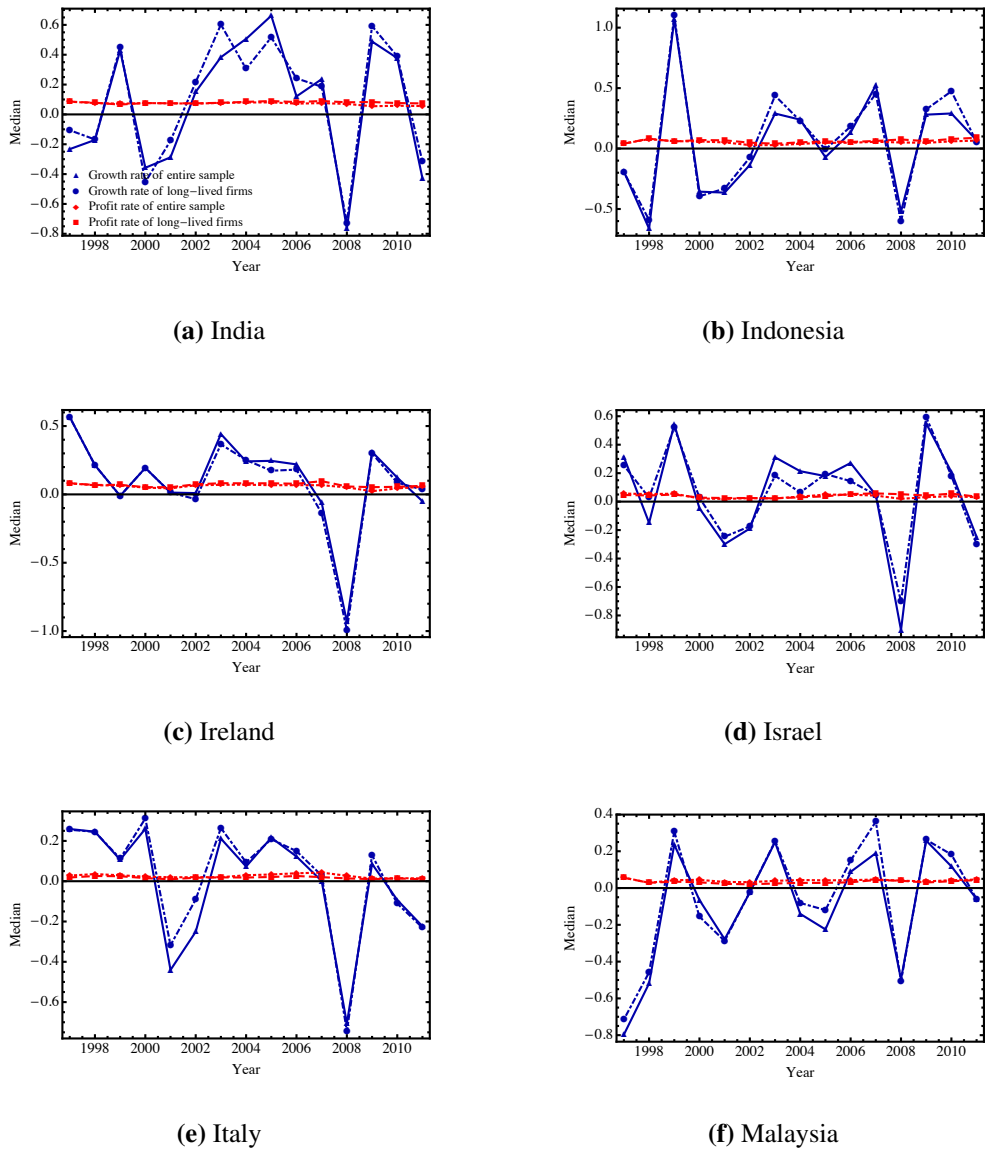
(c) Egypt

(d) Finland

(e) Greece

(f) Hong Kong

Figure 6: Time evolution of the median profit rate and the median growth rate of market value for Czech Republic, Denmark, Egypt, Finland, Greece, and Hong Kong. Results are shown for the entire sample and the long-lived firms. For visual clarity, linear interpolations between annual data points have been added.



(a) India

(b) Indonesia

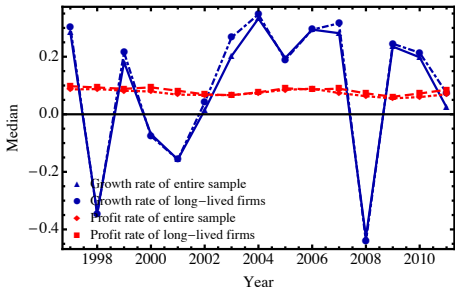
(c) Ireland

(d) Israel

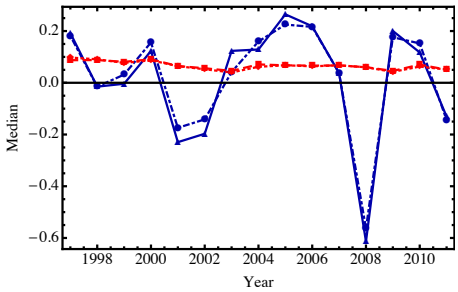
(e) Italy

(f) Malaysia

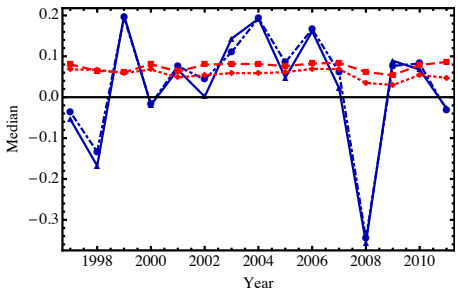
Figure 7: Time evolution of the median profit rate and the median growth rate of market value for India, Indonesia, Ireland, Israel, Italy, and Malaysia. Results are shown for the entire sample and the long-lived firms. For visual clarity, linear interpolations between annual data points have been added.



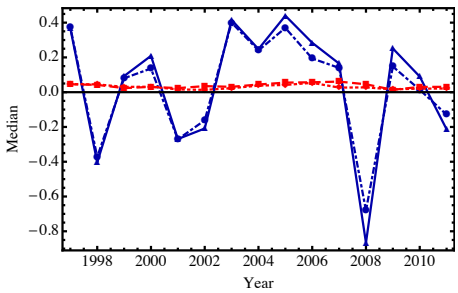
(a) Mexico



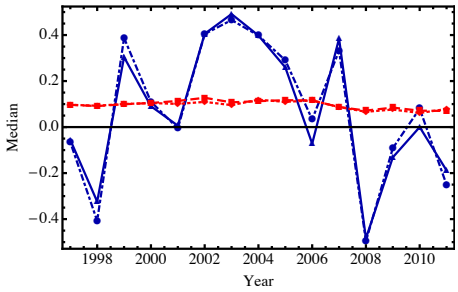
(b) Netherlands



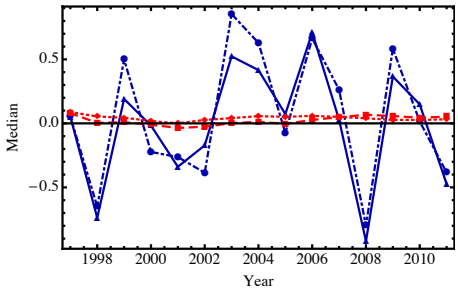
(c) New Zealand



(d) Norway

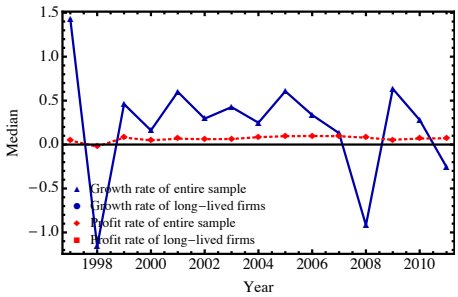


(e) Pakistan

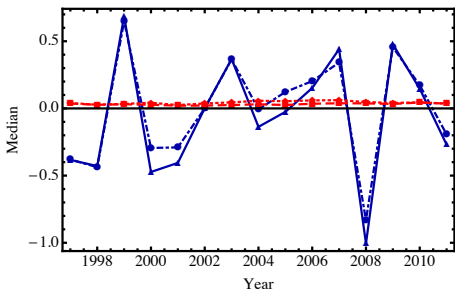


(f) Poland

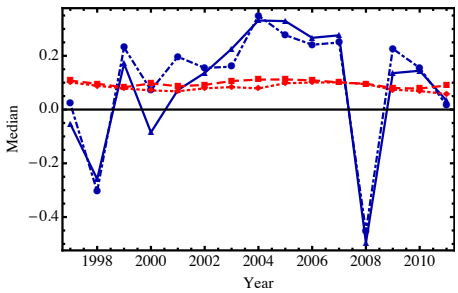
Figure 8: Time evolution of the median profit rate and the median growth rate of market value for Mexico, the Netherlands, New Zealand, Norway, Pakistan, and Poland. Results are shown for the entire sample and the long-lived firms. For visual clarity, linear interpolations between annual data points have been added.



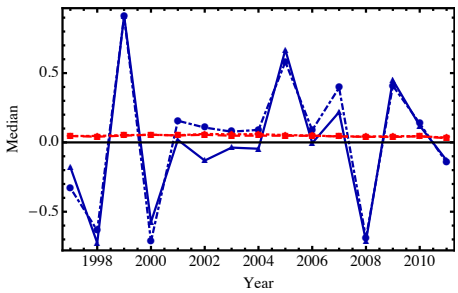
(a) Russia



(b) Singapore



(c) South Africa



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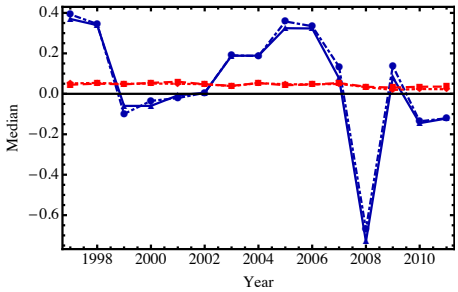
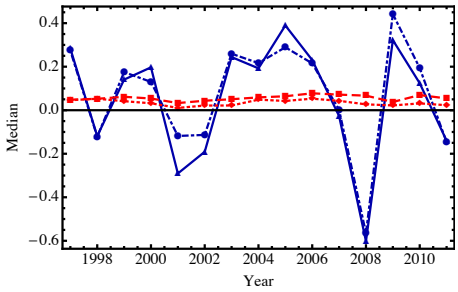
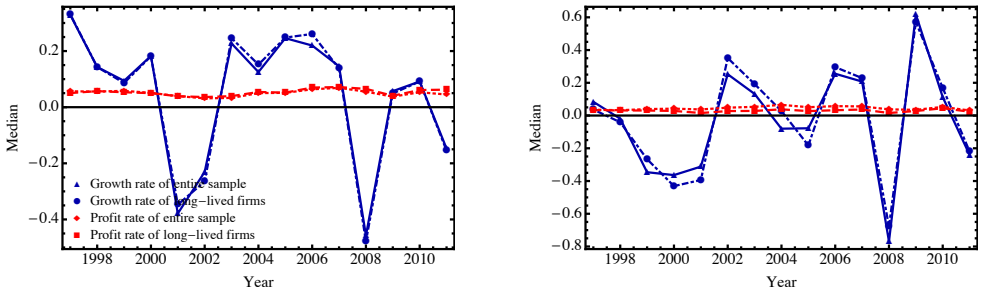


(e) Spain



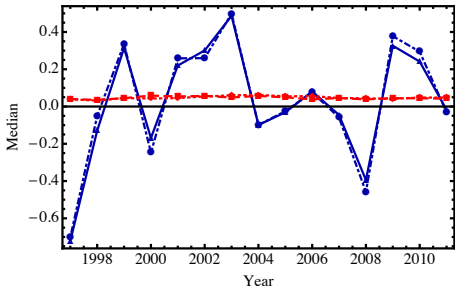
(f) Sweden

Figure 9: Time evolution of the median profit rate and the median growth rate of market value for Russia, Singapore, South Africa, South Korea, Spain, and Sweden. Results are shown for the entire sample and the long-lived firms. For visual clarity, linear interpolations between annual data points have been added.

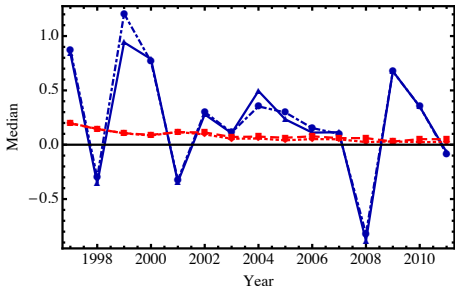


(a) Switzerland

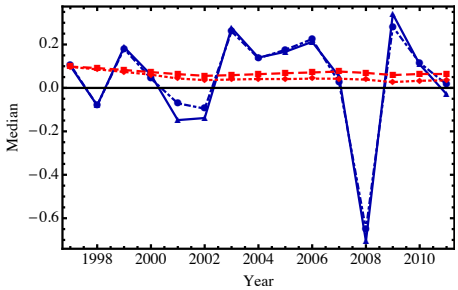
(b) Taiwan



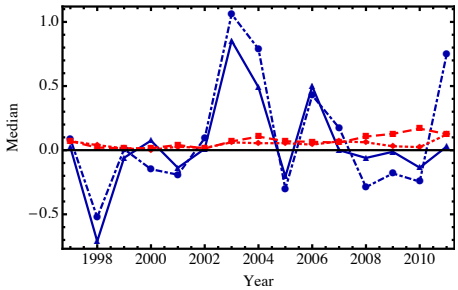
(c) Thailand



(d) Turkey



(e) United Kingdom



(f) Venezuela

Figure 10: Time evolution of the median profit rate and the median growth rate of market value for Switzerland, Taiwan, Thailand, Turkey, United Kingdom, and Venezuela. Results are shown for the entire sample and the long-lived firms. For visual clarity, linear interpolations between annual data points have been added.

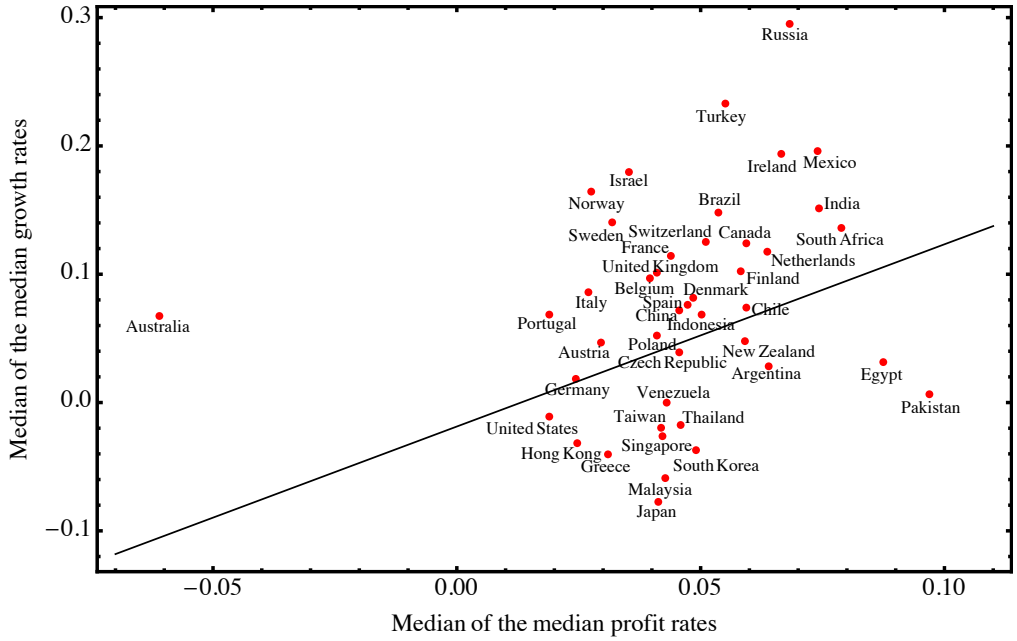


Figure 11: Scatter plot showing combinations of the average profit rate and the average growth rate of market value for the entire sample of firms. The data points have been computed as the median of the median time series. Weighted least squares regression of the average financial return on the average profit rate yields an intercept of -0.02 ± 0.02 with a p-value of 0.38 and a slope parameter of 1.42 ± 0.54 with a p-value of 0.01. Weights have been calculated as the sum of market values of all firms in a country as a percentage of the market capitalization of the entire sample for a given year and are averaged over the period 1997-2011.

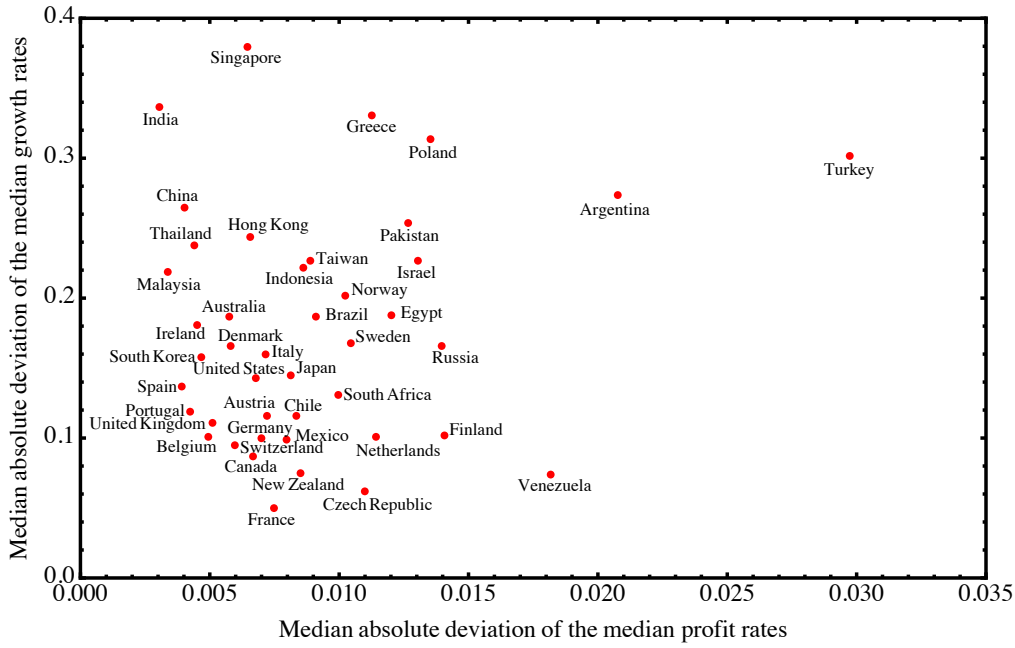


Figure 12: Scatter plot showing combinations of the profit rate volatility and the volatility of growth rates of market value for the entire sample of firms. The data points have been computed as the median absolute deviation of the median time series.