SHARE REPURCHASES

AND

DIVIDEND POLICY IN EUROPE

DURING

THE FINANCIAL CRISIS

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Abstract

In this research paper, we studied the payout of blue-chip European firms (S&P 350) during the financial crisis and we put it into perspective with the payout of US firms (S&P 500) over the same period. The fact that US companies had significant share buybacks programs during the financial crisis inspired this paper. We showed that European firms massively reduced their share buybacks programs during the turmoil and maintained their dividend payout at high levels. Indeed, the financial crisis marked a halt to the growing popularity of share buybacks in Europe as well as in the US, despite low stock valuations. Share buybacks were at historical lows in Europe as well as in the US in 2009, when share prices were at historical lows too. This should invite to more skepticism about the virtues of share repurchases as a tool to signal undervaluation. In the meantime, European as well as American firms maintained significant dividend payments, which confirms the strong signaling power of dividends.

Nevertheless, American share buybacks were at much higher levels than European share buybacks during the financial crisis; American firms have different payout policies from European firms. Before the crisis, repurchases were the main tool to redistribute cash in the US while European firms paid more dividends. Surprisingly, relating to payout policies, we showed that UK companies behaved as their continental peers. We studied the relationships between dividends, repurchases and firms' characteristics thanks to regressions and panel regressions to reveal correlations at macro and micro levels. Our results showed that the payment of dividend is not correlated with cash flow generation, which is in conformity with the dividend smoothing theory. Conversely, repurchases are linked with cash flow generation. Overall, our results suggest that European firms relied on dividends during the financial crisis and reduced massively their repurchasing activity.

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I. Introduction

The financial crisis represents a good opportunity to get a better understanding of the use of share buybacks in comparison with dividends. It is also a good opportunity to check if shares buybacks were of good help to preserve shareholders' value during the financial crisis. Given the fact that the Great Recession brought some share prices to unprecedented lows, we could expect repurchases to remain at substantial levels during these troubled years. In addition, as repurchases represent a distribution of cash to shareholders, we could expect that given the poor visibility of future investment opportunities, companies would have redistributed a lot of cash, and repurchases would have been more appropriate than dividends to do so as they do not represent a commitment.

However, in Europe, the financial crisis marked a halt to the success of repurchases. Over the past decades, share buybacks have gained momentum in the US as well as in Europe. Since the SEC has adopted Rule 10b-18 in 1982 (which has provided a "safe harbor" for repurchasing), share buybacks have been widely used by US firms to the point of exceeding dividends in 1999/2000 (Grullon and Michaely, 2002). In Europe, share buybacks have represented a significant portion of cash returned to shareholders over the past years, but they have not outpaced dividends yet as the pre-crisis trend could suggest. Besides, we observed a significant decline in repurchasing activity during the financial crisis. Has the financial crisis changed the way European companies use share buybacks? Has it changed their payout policy?

The decline of share buybacks during the financial crisis is, to some extent, paradoxical. Indeed, it has been often claimed that share buybacks have some virtues, as for instance, they could be a mean to signal undervaluation. Hence, share buybacks could be used to increase shareholder value (Dittmar 2000, Peyer & Vermaelen 2009) and this claim has been corroborated by the repetitive observations of excess returns after the announcement of share buybacks programs. Nevertheless, their use decreased during the Great Recession and dividends still represent a significant part of excess cash returned to shareholders, even in the US. What was the payout policy of European firms over the past decade? Could the financial crisis help us to understand the role played by repurchases?

We would like to advantage of the recent financial turmoil to get a better understanding of the role played by repurchases through the study of the payout policy of European firms during the financial crisis and thereafter.

Before looking at the payout policy of European and American companies during the financial crisis, we will first make a quick theoretical review to get a good insight of repurchases roles, particularly in comparison with dividends. Then, we will look at the general evolution of the payout policy of blue-chip companies in Europe during the financial crisis. We will put this evolution into perspective with the payout policies of their American peers. Then, we will look at company levels how share buybacks are linked to other parameters.

II. Why do firms repurchase their own stock?

"The greatest thing in the world is to know how to belong to oneself."
— Michel de Montaigne, The Complete Essays

The fact that firms can repurchase their own stocks is not an obvious or natural mechanism and can confuse the average person. Then, it is not surprising that share buybacks can be perceived as odd and it may explain why this practice had been forbidden for years and have just been allowed recently.

In the US, before the adoption of the Rule 10b-18 by the SEC in 1982, it was unclear whether a share buyback was a violation of the anti-manipulative provisions of the Security Exchange Act of 1934 and this rule clarified the legality of share buyback. Relating to repurchases, Continental Europe ("CE") has been more cautious and has allowed share buybacks later than the US. The 1976 Second Company Law Directive of the EEC gave flexibility to European Member States on the regulation of repurchases but it was only in 1998 that most European countries authorized repurchases. For instance, in France, open market stock repurchases have been authorized by the law of July 2, 1998 (up to 10% of capital and over a maximum time period of 18 months). In addition, the rules that govern share buybacks tend to be more stringent in Europe than in the US. For instance, even if the UK authorized repurchases in 1981, it has one of the strictest regulation (cf. Appendix 1). Surprisingly, when it relates to repurchases, the UK behaves more as its continental peers. In the US, there is no restriction on timing, volume and price. There is no need for any approval by shareholders and there is no specific disclosure required, which could be a reason why share buybacks volumes are more important in the US. In Europe, the EU Commission Rule 2273/2003 published on 22 December 2003 has restrained the range of objectives allowed for

a share buyback program. For instance, this rule has been applied in France since 2004 and only allows open market share buybacks aimed at redemption of repurchased shares, or at funding options or convertibles.

These legal constraints result from the fact that the very existence of repurchases seems to be in contradiction with what a share is. How a company could be its own shareholder? How is this done?

Repurchases can be conducted under two main different mechanisms: with a tender offer or through open market repurchases. Open market programs represent the vast majority of all shares repurchased (Oswald and Young, 2004). For the sake of simplicity, we will not distinguish these two mechanisms in our study[1]. It is worth noting that shares can be held on the balance sheet as "treasury shares" or they can be cancelled and simply destroyed. In the first case, they can be resold later or used to fund stock options or convertibles and in the latter case, they do no more exist.

Repurchasing its own stock is a way to redistribute cash to shareholders. However, is it the only reason why companies buy back their own shares or do they have other objectives? Before going forward, it is important that we get a better understanding of the different rationales that could drive repurchases. The two most common explanations include the agency cost theory applied to free cash flow and the signaling theory.

1) Distribution of cash and agency cost

When a company buys back its own shares, there is a cash stream from the balance sheet of the company to shareholders' pockets. That is why repurchases are commonly considered as a mean to redistribute excess cash to shareholders. However, it is more complex than a simple redistribution of cash. Indeed, depending on the sellers' identities, that redistribution is not equally distributed amongst shareholders. Consequently, it has impact on the ownership structure and so repurchases are not equivalent to dividends.

Since a share buyback represents a stream of cash from the company to shareholders' pockets, repurchases can be studied in the light of payout policy. Despite the fact that Modigliani and Miller (1961) declared the payout policy irrelevant in perfect markets, defining the right payout policy has been a huge debate amongst corporate finance academics.

[1] But there are key differences. The average announcement return on self tender offers is about 15% compared to only about 2% for repurchase programs. See, for example, Comment and Jarrell (1991)

The payout policy is, we think, a key factor in value creation as a trade-off between preventing the waste of cash and keeping the ability to seize future investment opportunities. Obviously, it depends on the maturity of the firm and its investment opportunities. Indeed, as long as a company has investment opportunities delivering higher returns than its weighted cost of capital, it makes sense to keep some cash on the balance sheet under certain circumstances. However, if it generates more cash than needed, it would not be pertinent to keep it on the balance sheet in terms of value creation; shareholders could have better investment opportunities than the investments chosen by the firm. Moreover, a payout policy has also to be tailored in function of the firm's ability to access cash easily. Indeed, the easier the access to financing, the greater could be the payout. In view of these considerations, we can presume that the management of free cash flow is more problematic in mature companies, that is to say companies with low prospects in term of growth and investment opportunities but with high cash flow generation.

We can note that some companies fund massive repurchase programs indebting themselves. For instance, Apple issued $17bn of bonds in 2013 and plan to raise another $17bn in 2014 through bonds issuance to fund its share buyback program. In that case, is it still a redistribution of excess cash? The analysis done by Jensen in 1986 could help us to understand the mechanism behind repurchases funded by debt: as he pointed out, debt reduces the agency cost of free cash flows because it reduces the cash flows available for spending at the discretion of managers. In addition, it is a real commitment over the long term, which would be extremely costly if not fulfilled. In that sense, when funded by debt, repurchases are as engaging as dividends, not to say more engaging. For many authors, repurchases and dividends are competing with each other. Which raise a natural question: are they interchangeable? The empirical evidence shows that European companies reduced massively their repurchases during the financial crisis. They also slightly reduced their dividends but not as much as their buybacks. We can infer that they are not interchangeable and our purpose is to get a better understanding of the different roles they play.

Comparison with dividends

Repurchases seem to be a more flexible way to redistribute cash to shareholders than dividends. Indeed, shareholders tend to expect dividends to be recurring and if the company decreases the amount of dividends, it generally sends a signal perceived as negative. Indeed, decreasing dividends reveal that managers do not believe in their firm's ability to generate sufficient future cash flows to maintain the payment of the current dividend. Denis and al.

(1994) reported an average stock price decline of about 6% on the three days surrounding the announcement of a dividend cut.

The comparison between dividends and repurchases has been a recurring topic amongst academic searchers over the past decades. A key difference between repurchases and dividends relied in different tax treatments, which helped searchers to explain why share buybacks were becoming more and more popular. Indeed, for many years, dividends were tax-disadvantageous compared to share buybacks. Nevertheless, the tax treatments tend to get closer as taxation of capital gains and income gains have been aligned (in 2003 in the US) and this did not reduced the success of repurchases. Thus, the growing popularity of share buybacks is not only due to tax advantages. There are certainly other explanations. The question is then: do share buybacks offer something that dividends do not?

For some authors, (Williams 1985, Bernheim 1991, Allen, Bernardo, and Welch, 2000) repurchases and dividends are not interchangeable. According to them, firms will prefer dividends to signal their quality as it is more engaging than repurchases. It is as if there were a pecking order between repurchases and dividends: to redistribute cash, a company would first use dividends if it can afford it and then use share buybacks if its future cash flows would not be sufficient. Nevertheless, for authors like Modigliani 1961, Easterbrook 1984, Miller and Rock 1985, Grullon and Michaely 2002, repurchases and dividends are close substitutes. Allen and Michaely performed a survey on payout policy (2003) and they concluded *"we still do not have a firm understanding of what determines the choice between repurchases and dividends. (p. 420)"*

Some authors tried to model the difference between repurchases and dividends. Oded (2008), thanks to its model, predicts: *"mature firms have high payouts and tend to disburse cash using dividends rather than repurchases. Growth firms are less likely to pay out cash but if they do, they use repurchases rather than dividends."* Our view is that they are not close substitutes for many different reasons, including:

- Repurchases have no impact on stock-options value. This factor seems to be ignored by many research papers but we think it is of key importance. Redistributing cash through dividends decrease the value of managers' stock options while using repurchases has no impact at all. Therefore, *ceteris paribus,* a manager paid with stock options will prefer repurchases to dividends. Kahle investigated this subject in 2002 and she found that the popularity of repurchases in the 1990s was concomitant with the spread of stock options plans (cf. Appendix 2). *"Overall, my results provide*

evidence that firms repurchase shares to fund employee option exercises, but beyond that, firms are more likely to repurchase if managerial wealth would be negatively impacted by the payment of dividends"

- Repurchases are more flexible than dividends: an open-market program is less engaging than dividends for two main reasons i) "the market" expects dividends to be recurring and do not expect recurrence from repurchases ii) a company can announce an open-market program without executing it. The difference in terms of flexibility would explain why Jagannathan, Stephens, and Weisbach (2000) found that firms using dividends have more stable earnings than companies using repurchases. That is why we could make the following hypothesis: repurchases are used to the fill the gap between excess cash and dividends, so that the company can return cash without being committed. Nevertheless, we should not forget that companies can pay a special dividend.

- Repurchases reduce the amount of dividends to be spent: using repurchases has a double effect on future dividends. First, a company does not commit over the long term with a share buyback. Secondly, a company that has repurchased its own shares will have less dividends to pay in the future, as there is no need to pay dividends on treasury stocks. Said in another way, spending the same amount of cash, you can increase the DPS thanks to repurchases. Alternatively, a firm can keep its DPS constant using less cash if it has reduced the number of shares outstanding thanks to share buybacks.

- Share repurchases can be used for other purposes than just redistribution of cash. Considering dividends and repurchases as close substitutes could hide some key rationales behind repurchases. In addition, as tax rates on dividends and repurchases have narrowed over the past decade, the importance of other rationales should have gained momentum.

2) Signal undervaluation, the signaling theory

This is one of the most common reasons cited amongst specialists. The rationale behind it is that a company acquires its own share only if its managers think it is undervalued. It is said to represent then a signal, which may result in a positive adjustment of the share price. This

hypothesis, we think, has not been sufficiently challenged. Indeed, the credibility of the signal depends on the sellers identity. Under the hypothesis where all shareholders sell equally, it is hard to signal anything as there is no consequence if the share price declines later. It could by a reason why Warren Buffett criticized share buybacks during a Berkshire Hathaway's annual meeting in 2009 saying: *"Most of the repurchasing in recent years was foolish".* Besides, open market repurchases are not that much credible as a signal: if a company announces an open market repurchase program to signal undervaluation, then the stock price would go up, and the company would have no more interest in acquiring its own shares... That is why, to be a credible signal of undervaluation, a repurchase program needs to be executed through a tender offer.

Nevertheless, it seems that it is perceived by the market as a signal since excess returns have been recurrently identified. However, it is not obvious that the reason why there is excess return is undervaluation. The share price increase could be due to the reduction of agency costs (Jensen, 1986). It could also relate to reasons we are not aware of, for instance the increase in the demand of the stock provoked by the share buyback.

In addition, is it still an undervaluation signal if managers or main shareholders sell their shares during a repurchase program? This could be interpreted as a signal of overvaluation.

Besides, the credibility of the signal depends also on the legislation of the country. For instance, in Germany, share buybacks require two announcements, one for AGM approval and a second approval for the actual repurchase. Hackethal and Zdantchouk (2005) observed that the average market reaction was stronger in Germany than in the US and concluded *"the stringent repurchase process prescribed by German law attributes a higher credibility to undervaluation signals than lax US regulations".*

The legislation explains also that, in the UK, it is much more difficult for managers to signal undervaluation: they do not have the right to repurchase two months before earnings publications as well as when they have sensitive information. Moreover, until 2003, UK companies had to cancel repurchased shares and so companies were unable to make any profit from the sell of its own shares.

Finally yet importantly, last studies have shown that excess returns after the announcement of a share buyback program tend to disappear. *"We confirm previous studies that, for the event up to 2002, long run abnormal returns are significantly positive following stock repurchases and significantly negative following SEOs. However, in sharp contrast for*

the events after 2002, we find neither outperformance following repurchases nor underperformance following SEOs." (Fu, Huang and Lin, 2012)

"In addition, the results indicate that the notion that stock buybacks are a signal of undervaluation could be overstated in recent years".

It could be argued that many companies still often cite "undervaluation" as a motivation for their repurchase program. We think that it could be some bluff and it does not cost anything to managers to mention undervaluation when they engage in a repurchase program. At worst, some people will perceive this as a signal and the share price will go up.

3) Wealth transfer

In the same manner than a dividend payment, a share repurchase is a transfer of wealth between bondholders and shareholders. Indeed, shareholders extract resources that bondholders can no more seize in case of bankruptcy. It reduces the safety margin of the bondholders and could reduce the value of their claim over the company. Some studies confirm that repurchases have strong impact on bonds' values. *"We find that bond ratings are twice as likely to be downgraded as upgraded after the announcement of the repurchase program."* (Maxwell and Stephens, 2003)

It is important to note that in many countries, you have to fund the reduction of share capital due to repurchases to keep it at the same level. This mechanism does exist to protect bondholders against this wealth transfer.

4) Adjustment of the shareholding structure

Share repurchases have an impact on the shareholding structure and it can be a discrete mean to reinforce some shareholders. Indeed, when a repurchasing program is conducted, shareholders who do not sell their shares mechanically have a larger stake at the end of the process. Said in another way, a share buyback is like an acquisition of existing shares by shareholders who keep their shares, even if shares are destroyed. It is worth mentioning that in the case of an open market repurchase program, shareholders are not aware that they are selling their shares to the company, i.e. that they are selling to other shareholders.

5) Management of stock price and liquidity

Repurchases are a tool to manage the liquidity of the stock and to some extent its price. Indeed, with a right to buy/sell their own shares all year round (open-market share buybacks), a firm can artificially sustain the demand for its stock. Surprisingly, it seems that authorities do accept such a practice.

6) Other possible reasons

- Repurchases is also **a tool against takeover**. Bagwell (1991) showed that repurchasing is a tool for managers to protect against takeover. The mechanism works as follows: when a repurchase program is implemented, sellers are shareholders who are not optimistic about the future share price; they do not believe that the share price will increase, as if they did, they would not sell their shares. As a result, the shareholder base has higher expectations after a repurchase program than before. Consequently, it increases the price in case of takeover. However, it also reduces the probability of a takeover, and then it could also have a negative impact on the share price!
- **Reach the right target of debt ratio**. Share buybacks increase the net debt and reduces the book equity, that is why it does increase the gearing.
- **Repurchases can help to fund some options.** Indeed, thanks to the accumulation of its own shares, a company will be able to re-issue them later to fund stock options or convertibles etc. However, in the UK, companies were, until the end of 2003, unable to use share buybacks for that purpose; they were required to cancel all repurchased shares immediately after their reacquisition. Nevertheless, the rationale behind that mechanism is unclear. It seems that it is to avoid the dilution of EPS as they can fund the stock-options plan without increasing the number of outstanding shares. Nevertheless, this is not value creation... but it is a well know fact that EPS and EPS target are key metrics, and being in line with expectations has an impact on the share price, even if there is no justification or logical rationale. Managers play the rule dictated by the market, even if the rule does not make sense. It seems that some analysts have a tendency to apply the P/E ratio on the EPS without more precautions.
- As developed in the previous point, **share buybacks can be used to adjust the number of outstanding shares** and so they are a (foolish) tool **to meet EPS target** by an

adjustment of the denominator. Companies can manipulate the DPS as well. It is 100% window dressing but, surprisingly, it seems extremely important for companies to meet EPS target, even virtually. Graham, Harvey and Rajgopal (2006) showed the importance of targeted EPS and revealed that managers often take value-destroying decision to hit EPS target. The EPS metric is broadly followed and a substantial part of these followers do not look further. It can also be used to manage the NAV for investment companies (Net Asset Value per share) and all sort of per-share metrics.

- Share buybacks allow **responding to some shareholders' specific needs** in terms of taxation and type of returns. For instance, for some investment managers, receiving cash through dividends or through capital gains do not have the same fiscal consequences. In addition, it happens that institutional shareholders can prefer share repurchases as, for instance, they must return dividends to their prime investors while they could reinvest cash received from share buybacks.

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Eventually, the main use seems to relate to the payout policy. At this stage of our paper, it is important to remind that Miller and Modigliani showed in 1961 that, in perfect markets, the payout decision is irrelevant because it neither creates nor destroys value. Nevertheless, DeAngelo and DeAngelo (2006) criticized strongly these results; they pointed out the fact that Modigliani Miller postulate that the firm distributes 100% of free cash flow in every period, and so it is constrained to full distribution, without the option to retain profits. In reality, it is not the case: there is an optimal payout policy, which depends on the future investment opportunities, and the level of cash needed to seize them. Another parameter is the future ability to get financing to seize these opportunities.

Before Modigliani Miller, it was thought that dividends had intrinsic value per se as exemplified by the work of Gordon (1959) or Lintner (1956). Over the past years, it seems that we have observed the same phenomenon with share repurchases. Many people thought that share repurchases had intrinsic value. Has the crisis confirmed or contradicted the value per se of share buybacks? We could easily argue that repurchases are more suited for difficult economic conditions than periods of growth for many reasons: gloomy future rhymes with low need for investments as well as undervaluation of the share price etc. However, surprisingly, it seems that repurchases were at their lowest level during the financial crisis and it is now time to look at the payout policies of European firms over the last decade.

EU vs. US payout policies at aggregate level

1) Sample and data

Our sample is based on Compustat and Datastream data from 2003 to 2012. As the goal of our study is to compare US and European payout policies, we have selected the S&P 350 for Europe, from which we isolated UK companies to study them separately. For the US, we have selected the S&P 500. We removed financial companies (Compustat code: 5000) from all our samples as data relating to share repurchases for European financial companies were absent. From Compustat, we used the following items: cash dividends "DV", purchase of common and preferred stock as well as purchase of treasury stock "PRSTKC" & "PURTSHR", income before extra items ("IB").

- **Continental Europe [198 companies]**

This sample corresponds to Continental Europe ("CE"). Once UK companies have been removed from the S&P 350 as well as financial companies, there are 205 companies remaining. Unfortunately, for repurchases and dividends, Compustat data were not complete. 43% of repurchase data were missing and for dividends there were 681"@NA", i.e. 33% of dividend data were missing. The numbers of 0 and @NA were distributed as follows:

		S&P 350 excl. UK – 205 companies (Compustat)												
	Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Share buyback	Number of 0	112	105	111	125	112	43	32	11	10	4	1	0	0
	Number of @NA	42	39	39	39	40	82	79	73	74	141	131	104	119
Dividend	Number of 0	3	10	13	18	16	2	0	0	0	0	0	0	0
	Number of @NA	109	100	97	70	82	52	52	47	60	77	81	77	83

Then, we completed the sample with Datastream – Thomson Reuters data, especially thanks to item (i) cash dividends ("WC04551"), (ii) the variable share buybacks ("ECSLDP047") which is "Y" if repurchase value > 0 and "N" if repurchase value = 0 for a given year. This binary variable was particularly interesting to complete our data set as almost all 0 were missing in our original Compustat data. Then, we removed arbitrarily some companies for which too many data were still missing. At the end, our sample for CE is composed of 198 companies. Only 2% of data are missing for dividends and 6% for

repurchases. After completion with Datastream data, the number of 0 and @NA is then distributed as follows:

S&P 350 excl. UK – 198 companies (Compustat + Datastream)											
	Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Share buyback	Number of 0	143	134	103	90	68	64	130	110	94	103
	Number of @NA	15	10	13	13	10	13	9	15	5	10
Dividend	Number of 0	22	21	17	12	10	8	16	11	4	9
	Number of @NA	8	6	5	4	2	2	3	2	2	1

- **UK [78 companies]**

This sample corresponds to the UK. We isolated UK companies amongst the S&P 350 and we completed the data set with Datastream as well. In terms of data quality, we faced the same problem than for CE companies. Before the addition of Datastream data, it was as follows:

		UK – 83 companies (Compustat)												
	Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Share buyback	Number of 0	54	59	58	59	57	10	3	1	2	2	2	0	0
	Number of @NA	9	5	6	4	3	29	26	20	21	33	34	25	27
Dividend	Number of 0	3	6	6	8	5	1	0	0	0	0	0	0	0
	Number of @NA	15	11	9	7	7	11	13	10	11	22	15	13	14

Then, thanks to Datastream data and some manual research, we completed the sample. We arbitrarily removed Vodafone due to huge losses in 2000s that distorted our results. It resulted in a sample for which only 1% of share repurchases data are missing and 0% for dividends.

S&P 350 excl. UK – 78 companies (Compustat + Datastream)											
	Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Share buyback	Number of 0	50	41	30	21	20	20	33	32	26	26
	Number of @NA	1	2	3	1	0	1	0	0	0	0
Dividend	Number of 0	10	7	4	2	1	2	7	4	1	1
	Number of @NA	0	0	0	0	0	0	0	0	0	0

- **US [401 companies]**

Compustat data are of good quality for the US. 421 companies are remaining after removing financial companies from the S&P 500. Then, we removed arbitrarily 20 companies for which data were of insufficient quality. We also removed General Motors as huge losses followed by huge profits thanks to its bailout distorted our results. At the end, our sample is composed of 401 companies. From 2003 to 2012, there are 118 "@NA", i.e. 3% of share buybacks data are missing. For dividends, there are 56 "@NA", i.e. 1.5% of the data are missing. Given the high quality of the data set, we have not used Datastream data for our US sample.

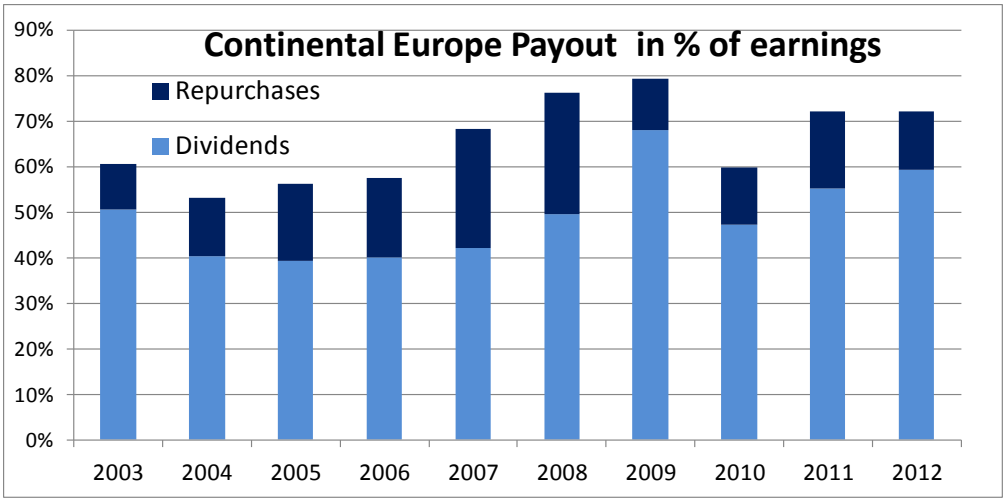
S&P 500 – 401 companies (Compustat)											
	Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Share buyback	Number of 0	146	133	105	93	81	85	162	116	82	85
	Number of @NA	37	27	18	8	6	5	4	3	4	6
Dividend	Number of 0	138	123	114	115	111	112	110	105	91	84
	Number of @NA	20	15	12	3	3	1	1	0	0	1

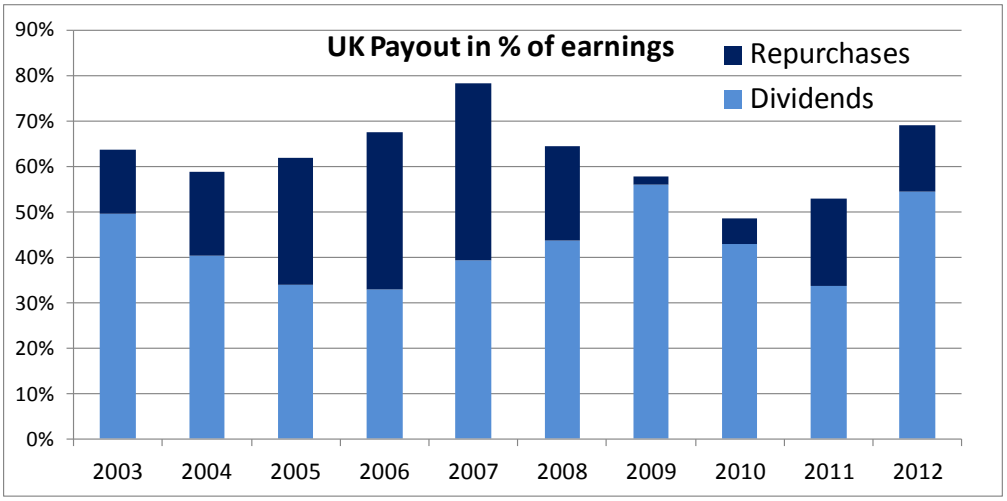
Note: Thereafter, we will refer to:

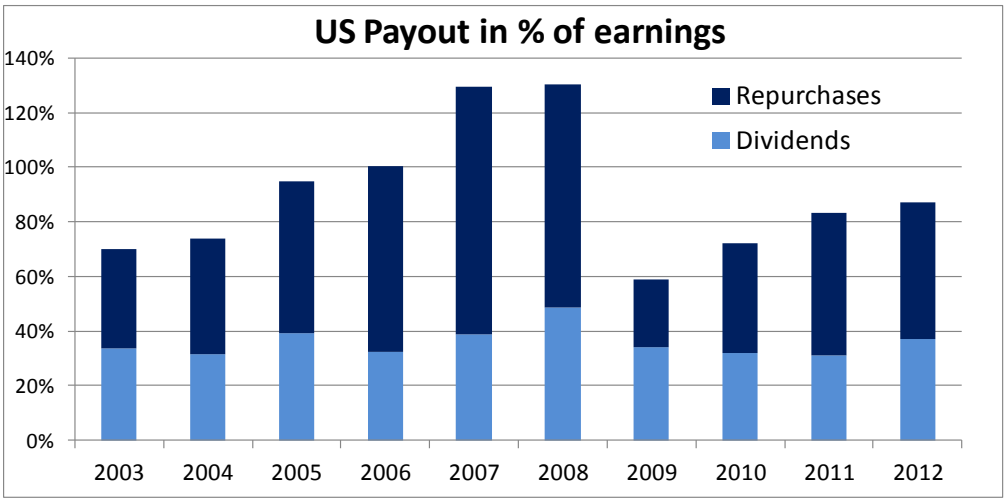
- CE = Continental Europe = our sample of 198 companies
- US = USA = our sample of 401 companies
- UK = United Kingdom = our sample of 78 companies
- And Europe = CE + UK = our UK and CE samples combined

2) Aggregate payout ratios evolution

Figure 1: Evolution of global payout ratios







First, we can observe that the financial crisis had a less visible impact on the total payout ratios in Europe than in the US. Between 2003 and 2006, the ratio evolved between 58% and 61% in CE and between 64% and 67% in the UK. In 2007, the payout ratio jumped to 68% in CE and 78% in the UK. This was not due to a decrease of the denominator, as aggregate earnings increased by 7% in the UK and 32% in CE; this was due to a massive increase in the aggregate payout, which increased by 28% in the UK and 57% in CE in 2007.

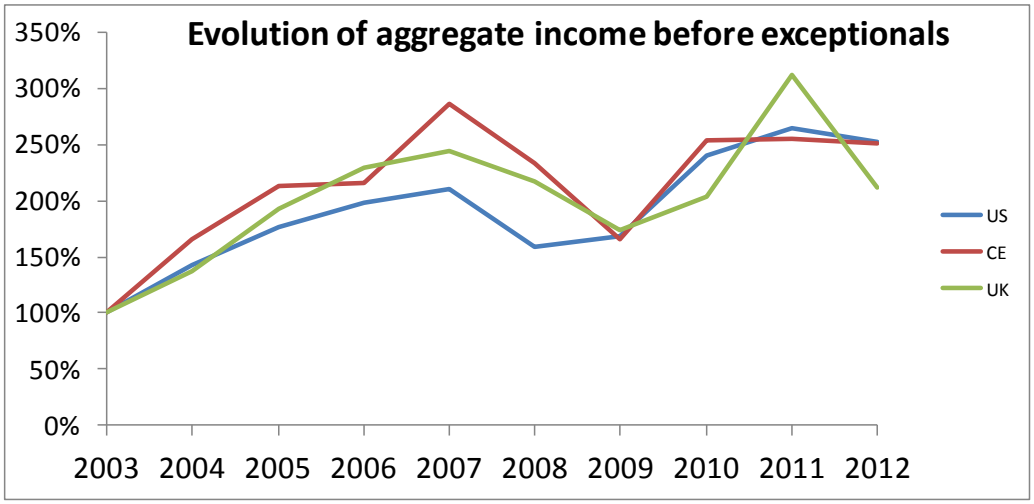
In 2008, the payout ratio evolved differently. In CE, it pursued its increase reaching 76% while it decreased to 64% in the UK. Indeed, UK aggregate absolute payout was reduced by 27% while aggregate earnings decreased by 11%, which overall resulted in a decrease in the global payout ratio. Conversely, CE earnings decreased at a higher pace than its aggregate absolute payout, which resulted in an increase in the payout ratio; CE reduced its aggregate payout by 9% while its earnings decreased by 19%.

In 2009, we observe the same phenomenon, UK earnings decreased by 19% while UK reduced its aggregate absolute payout by 28%, which resulted again in a drop in the payout ratio, which reached 58%. In Europe, as in 2008, earnings deceased more quickly than aggregate payout (29% vs. 26%) which resulted in a slight increase in the global payout ratio, which reached 79%.

If we look at the payout split between share buybacks and dividends, UK and CE diverge on their use of dividends and repurchases. The UK constantly decreased its dividend payout ratio from 2003 to 2006 while CE decreased its dividend payout ratio from 2003 to 2004 but then it remained almost flat at 40%. We will study the payout mix later in more details.

Then, it is only in 2010 that CE payout ratio decreased. CE decreased its payout from 57% to 66% while the UK reduced its payout from 79% to 60%. This is due to the fact that CE had a greater increase in its earnings than in its absolute payout: CE aggregate earnings increased by 52% between 2009 and 2010 while aggregate absolute payout increased by 15%. In the UK, the aggregate payout was reduced by 2% while earnings increased by 17%, which resulted in a decrease in the payout ratio for the third consecutive year.

Figure 2: Earnings evolution (rebased)



In 2011, CE and UK both increased their payout ratio. It reached 72% in CE and 53% in the UK, and then UK companies caught up CE's in 2012 increasing again its payout ratio to 69% while CE maintained its payout at 72%. In 2011, UK increased its aggregate absolute payout by 67% while aggregate earnings increased by 53%. In Europe, aggregate income was flat between 2010 and 2011 but aggregate payout increased by 22%. Then, in 2012, UK payout ratio surged thanks to a drop in earnings, which decreased by 32% while aggregate payout decreased only by 12%. In CE, earnings were almost flat as well as aggregate payout; this is why the payout ratio remained the same.

*

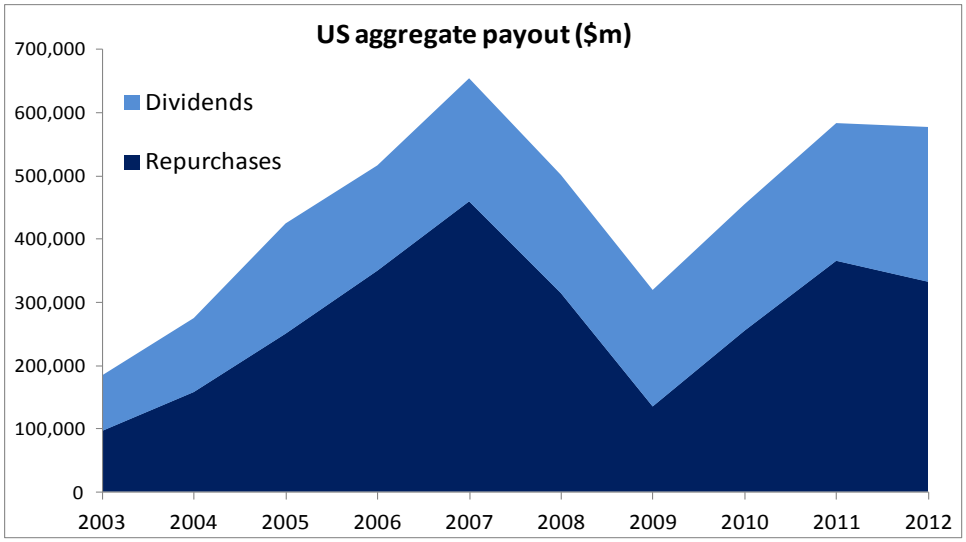
If we compare with the US, we can observe that European and American companies have significantly different payout policies. The US payout ratio fluctuates much more and is, on average, much higher. From 2003 to 2008, the US payout ratio increased year after year from 70% to 130%. Then it dropped to 73% in 2009, and then increased regularly from 2010 to 2012: 73% in 2010, 85% in 2011 and 87% in 2012. Earnings increased by 41%, 24%, 13% in 2004, 2005, 2006 and decreased by 2% in 2007. Over the same period, aggregate payout increased by 49%, 54%, 22%, and 27%. This explains why we observe a massive increase of the global payout ratio over this period. The growth in cash returned to shareholders was higher than the growth in earnings. Then, earnings decreased by 24% in 2008 while aggregate payout decreased only by 23%, which explains why the payout ratio stayed almost flat reaching a record-high 121% in 2008 despite a massive hit in earnings. At the beginning of the crisis, US companies decreased the absolute payout, but at the same pace than the

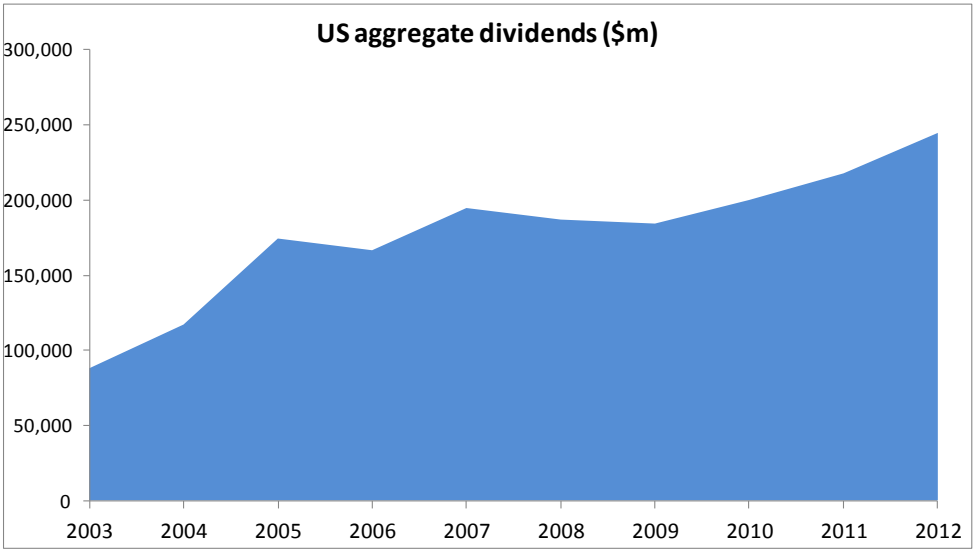
decrease experienced in earnings. The real shock for payout ratio happened in 2009, when earnings increased by 6%[2] but aggregate payout had been reduced by 36%, which provoked a massive decrease of the payout ratio to 73%. Then, in 2010, 2011 and 2012, the payout ratio increased again, reaching 73%, 85% and 87% respectively. This is due to an increase of the aggregate payout by 42% and 28% in 2010 and 2011 while earnings increased by 43% and 10%, respectively. In 2012, earnings decreased by 5% and aggregate payout by 2%, which explains why the payout ratio slightly increased from 85% to 87%.

[2] It would have been 41% instead of 6% taking into account General Motors ($30bn of loss in 2008 and more than $100bn of profits in 2009 thanks to the bailout and bankruptcy filling). The payout ratio is of 59% in 2009 with GM.

3) Absolute aggregate payouts evolution

Figure 3: US aggregate payout





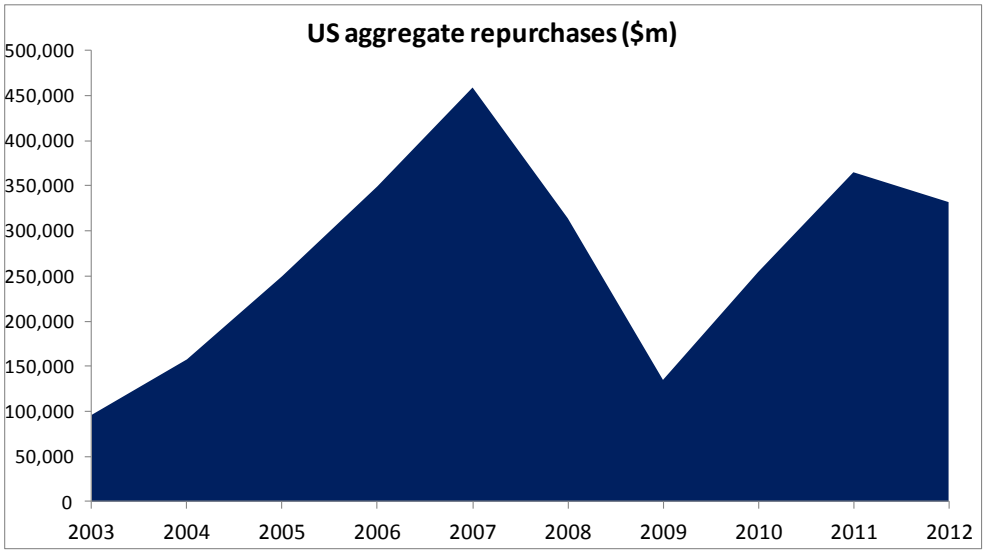
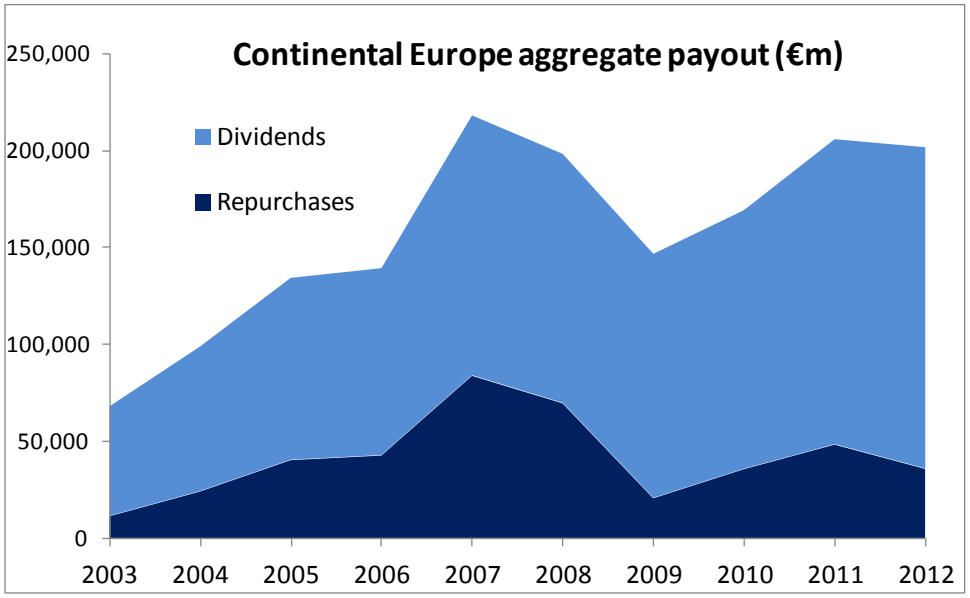
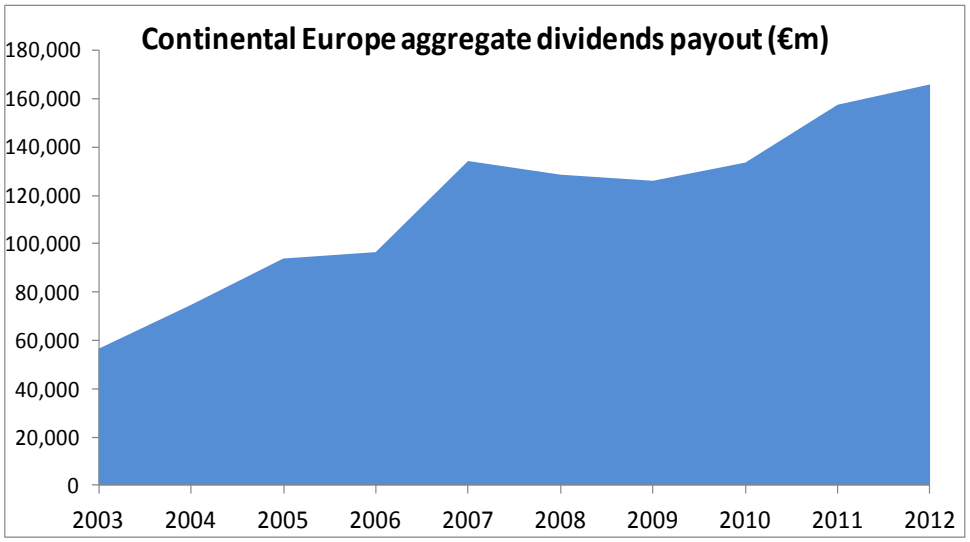


Figure 4: Continental Europe aggregate payout





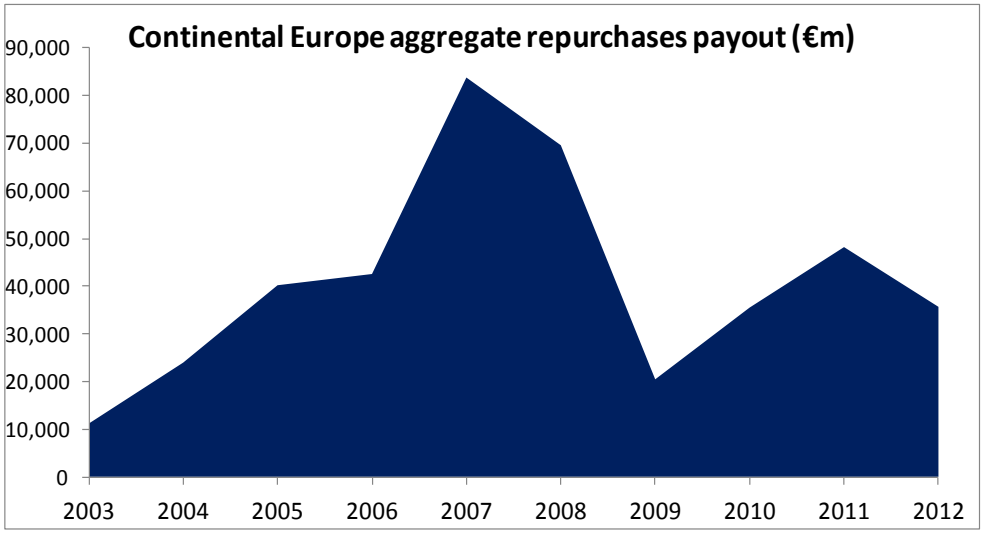
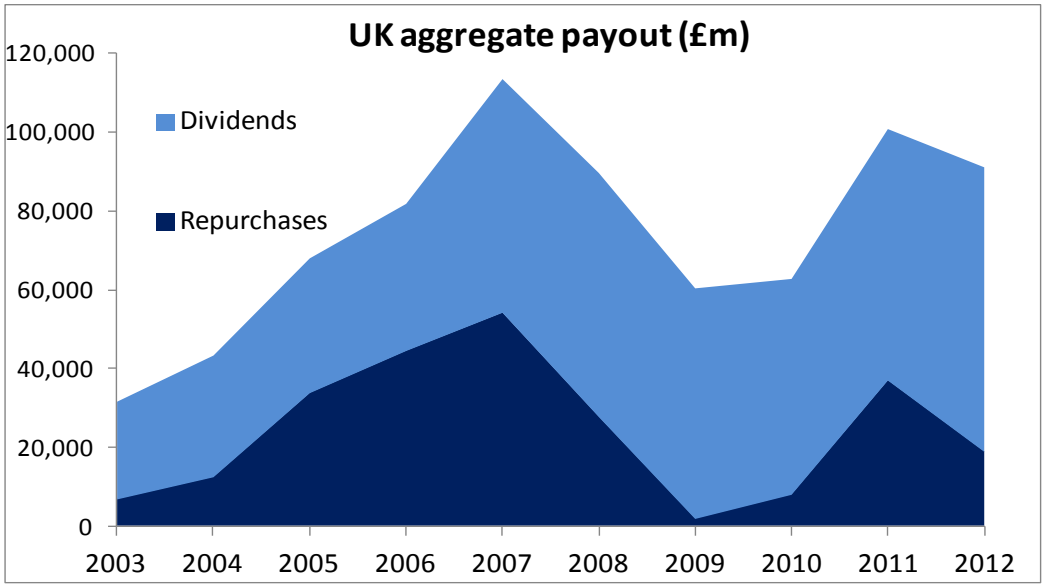
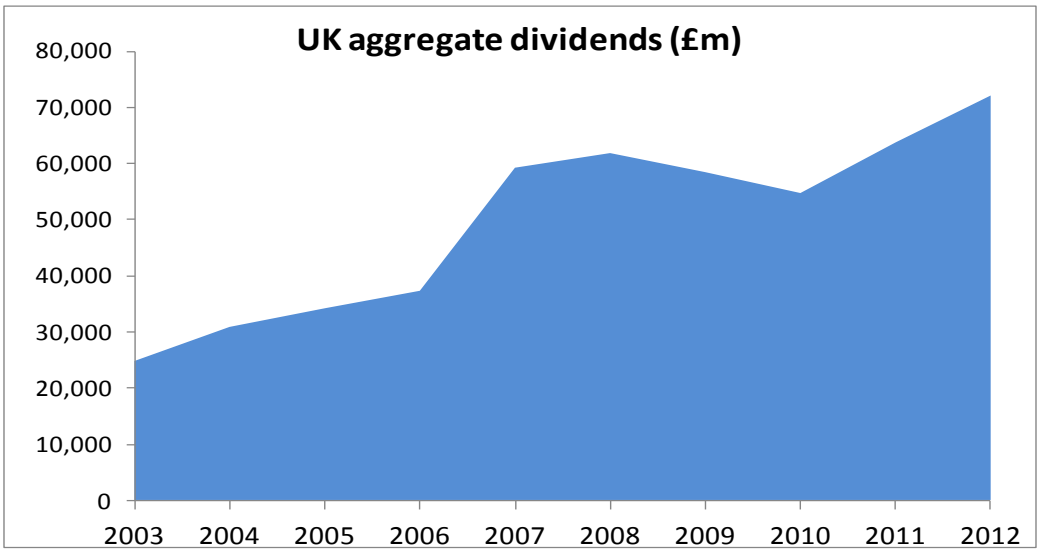
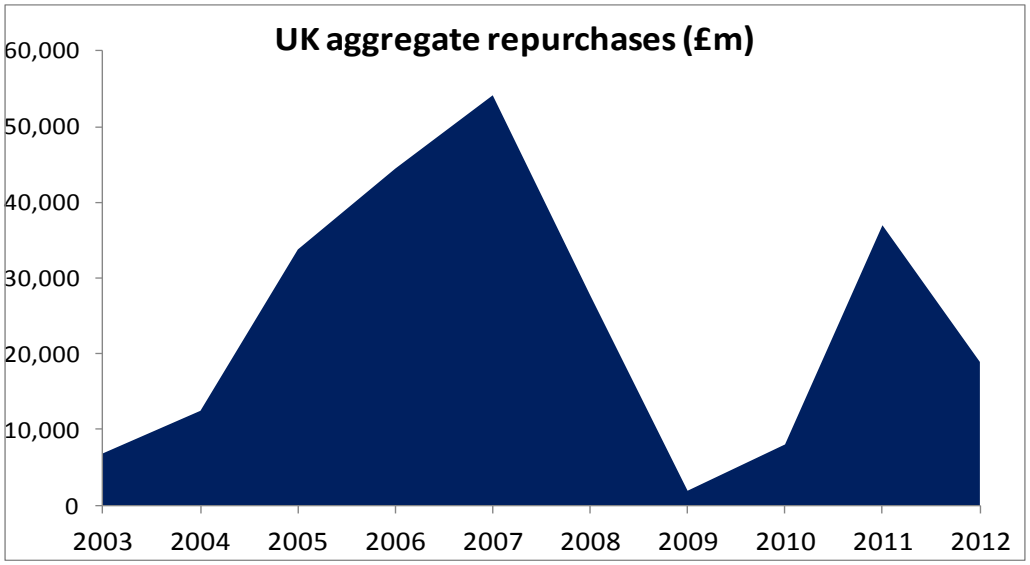


Figure 5: UK aggregate payout







European companies (UK included) seem to prefer a more conservative payout policy while US companies redistribute cash in a more opportunistic way. Indeed, American companies distribute on average more cash in comparison with their earnings and it even happens that they distribute more cash than their earnings as exemplified by year 2007 and 2008.

In 2008, US companies tried to maintain their payout. To do so, they almost maintained the absolute dividend but massively reduced share buybacks by 32% in 2008. Then, in 2009, they reduced cash dividends by 1% whereas aggregate share buybacks dropped by 57%. US companies seem to be extremely reluctant to cut dividends and they prefer to reduce buybacks than dividends. CE had almost the same approach; they slightly reduce the absolute value dividend payout between 2007 and 2008 by 4%. In 2009, they kept again the same level of dividends with a small decrease of 1% in aggregate value. At the same time, they reduced share buybacks by 17% in 2008 and 71% in 2009. The result is an absolute payout which dropped by 9% in CE and 23% in the US in 2008. Then, in 2009, it decreased by 36% in the US and 26% in CE. The UK behaved as its continental peer in 2008, i.e. UK companies slightly decreased aggregate dividends by 2% and increased it by 2% in 2009. At the same time, UK companies reduced their share buybacks by 53% in 2008 and 93% in 2009. Repurchases payout dropped severely in 2008 and 2009 in all our 3 samples while the amount of dividends paid remained almost flat.

In Europe, dividends represent the major part of the payout, and both dividends and repurchases were growing rapidly before 2007 as well as in the US. Between 2003 and 2007, the aggregate payout (dividends + repurchases) tripled in the UK as well as in Europe, which corresponds to the growth in financial incomes. In Europe, between 2003 and 2007, aggegate payout was multiplied by 3.2x, thanks to dividends which were multiplied by 2.4x and repurchases by 7.5x! In the UK, dividends were multiplied by 1.9x, and repurchases by 6.7x, which resulted in an aggregate payout multiplied by 3.0x.

They maintained during the crisis their payout at high levels, as we can see the lowest aggregate payout is neither in 2008 nor in 2009. For instance, the European payout of 2003 and 2004 were lower than 2008 and 2009. And in relative value, the dividend payout ratio remained at significant level during the financial crisis. For instance, in Europe, the dividend payout ratio between 2008 and 2010 was higher than between 2004 and 2007. This is not the case for Anglo-Saxon companies.

If we look at the split, major part of the US payout is done through repurchases while in the UK and Europe, dividends represent the major part. Most of the time, they evolve in the same direction, except:

(i) between 2005 and 2006 where US companies increased their repurchases while decreased the dividends

(ii) in 2009 and 2010 for the UK, but this is not significant as the amount of dividends was almost flat over this period

(iii) year 2012 looks like a specific year: In our three samples, companies increased the absolute amount of dividends while reducing the absolute amount of repurchases and it is worth studying the payout mix and its evolution over the past decade.

Figure 6: Increase and decrease in aggregate payout

	2004	2005	2006	2007	2008	2009	2010	2011	2012
EU (excl. UK) aggregate repurchases	+	+	+	+	-	-	+	+	-
EU (excl.UK) aggregate dividends	+	+	+	+	-	-	+	+	+
UK aggregate repurchases	+	+	+	+	-	-	+	+	-
UK aggregate dividends	+	+	+	+	-	+	-	+	+
US aggregate repurchases	+	+	+	+	-	-	+	+	-
US aggregate dividends	+	+	-	+	-	-	+	+	+

+ : increase in the absolute amount

- : decrease in the absolute amount

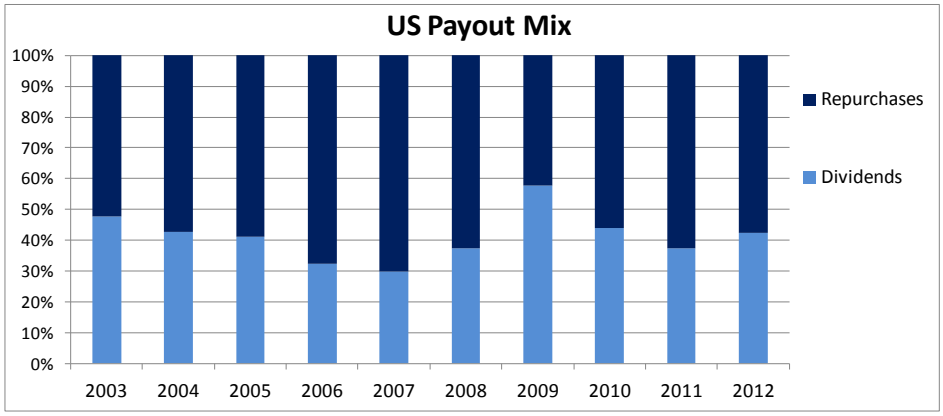
Repurchases and dividends have variations of opposite signs

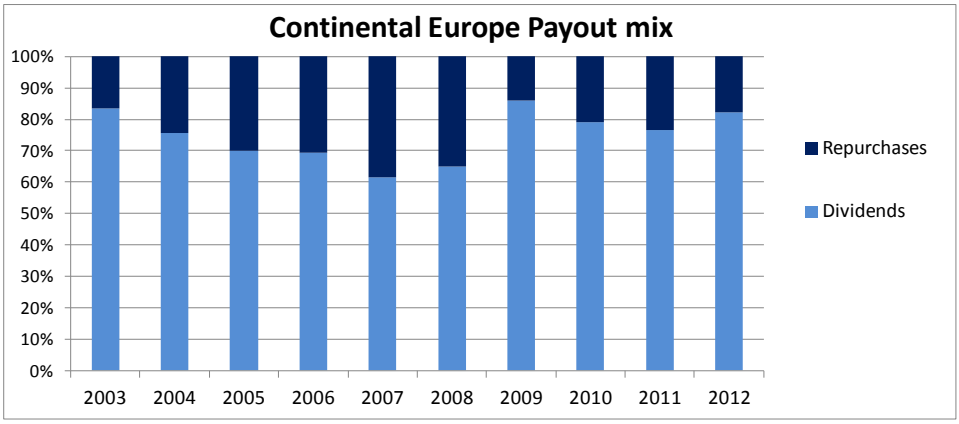
*

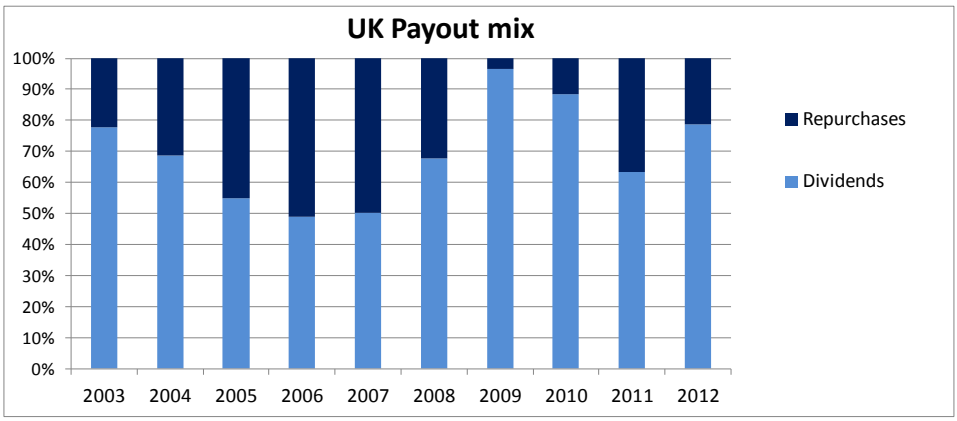
Now, we would like to study the payout split between repurchases and dividends with more granularity. Were they used in the same manner? Did they evolved differently during the crisis?

4) Payout mix evolution

Figure 7: Evolution of the payout mix







It is striking that we observe over 2003-2012 the same evolution of the relative payout mix in all of our three samples.

- From 2003 to 2007, on a relative basis, share buybacks were increasing their share in the payout mix. They went from 22% to 54% in the UK, 42% to 73% in the US, and 14% to 42% in CE.

- Then, from 2007 to 2009, the share of repurchases decreased strongly in the payout mix. In 2009, it reached 3% in the UK, 14% in CE, and 42% in the US.
- Share buybacks recovered in the payout mix from 2009 to 2011 reaching 37%, 63% and 23% in the UK, the US and CE respectively.
- And decreased slightly in 2012 as in our three samples. In absolute values, year 2012 is specific as the amount of dividends increased between 2011 and 2012 while the amount of share buybacks decreased.

It is interesting to note that 2009 is the year when dividends represented the most important part of the payout in the US, UK and CE. It is also when the crisis was at its worst point, i.e. when companies' valuations reached historical lows. It says something about the use of repurchases as a signal of undervaluation. In troubled times, companies prefer to use dividends, or said in another way, they probably do not want to cut dividends and prefer to adjust the payout with share buybacks. The crisis proved that the signaling power of repurchases does not look as strong as claimed by some studies. We would like to stress that, as explained before, the mix values are mainly driven by the use of repurchases and not by the use of dividends, as the amount of dividends paid does not fluctuate that much. The payout variations mostly depend on adjustments done on the amount of shares repurchased.

5) To buyback or not to buyback: that is the question

Almost all companies pay dividends in Europe as well as in the US. However, on share buybacks companies are more divided.

Figure 8: Percentage of payers

	Continental Europe				US				UK			
Year	Pay dividends	Repur-chases	Do both	Non-payer	Pay dividends	Repur-chases	Do both	Non-payer	Pay dividends	Repur-chases	Do both	Non-payer
2003	90%	31%	28%	8%	69%	65%	50%	16%	81%	33%	30%	11%
2004	90%	35%	34%	9%	72%	68%	52%	13%	84%	43%	42%	8%
2005	91%	50%	48%	8%	73%	75%	59%	11%	88%	57%	54%	4%
2006	94%	56%	54%	4%	73%	78%	60%	10%	90%	67%	65%	1%
2007	95%	67%	64%	2%	73%	80%	62%	8%	92%	69%	69%	2%
2008	96%	68%	66%	2%	73%	79%	61%	9%	90%	69%	67%	2%
2009	93%	35%	32%	5%	73%	60%	44%	11%	84%	53%	49%	6%
2010	94%	44%	42%	4%	74%	71%	53%	8%	88%	54%	53%	5%
2011	98%	53%	51%	1%	77%	80%	61%	4%	92%	61%	61%	2%
2012	96%	47%	45%	2%	79%	79%	63%	5%	92%	61%	61%	2%

On figure 8, we can note the growing popularity of share buybacks in the EU, UK and US. The percentage of companies using repurchases grew from 31% in CE to 67% in 2007.

We observe the same pattern in the UK where the percentage of firms using share buybacks grew from 33% to 69% over the same period. In the US, repurchases were already very popular in 2003 as there were 65% of firms whose repurchase value was strictly superior to 0 in 2003. It increased to 80% in 2007. This phenomenon was not detrimental to the use of dividends, which were gaining momentum at the same time. In our three samples, the proportion of firms paying dividends increased over the 2003-2007 period, from 90% to 95% in CE, from 69% to 73% in the US and from 81% to 92% in the UK.

It seems that repurchasing was not replacing dividends but it was used as a complement. The percentage of firms using both increased from 28% in CE to 64% in 2007 and from 30% to 69% in the UK over the same period. The percentage of companies using both was already at 50% in 2003 in the US. Then, what was the impact of the crisis? On Figure 8, the crisis is not visible in 2008. Indeed, the percentage of payers remained almost the same than 2007. It was only in 2009 numbers changed.

In the UK, the crisis had a small impact on the percentage of firms paying dividends, which decreased from 90% to 84% between 2008 and 2009. Then it returned at its pre-crisis level, i.e. 92%. We observed the same pattern in CE where the percentage of dividend payers experienced a small decrease between 2008 and 2009 but then returned to pre-crisis levels and above. It is worth noting the number of dividend payers was not affected in the US.

However, the impact of the financial crisis was important on the percentage of firms using repurchases, particularly in CE where it had been divided by two between 2008 and 2009 from 69% to 35% while it was not affected between 2007 and 2008. It also impacted the US to lesser extent, as the percentage of companies using repurchases went from 79% to 60% between 2008 and 2009. We observe the same impact in the UK, where it went from 69% to 53%.

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Figure 9: Percentage of firms which strictly increased their dividends / repurchases on a year-on-year basis

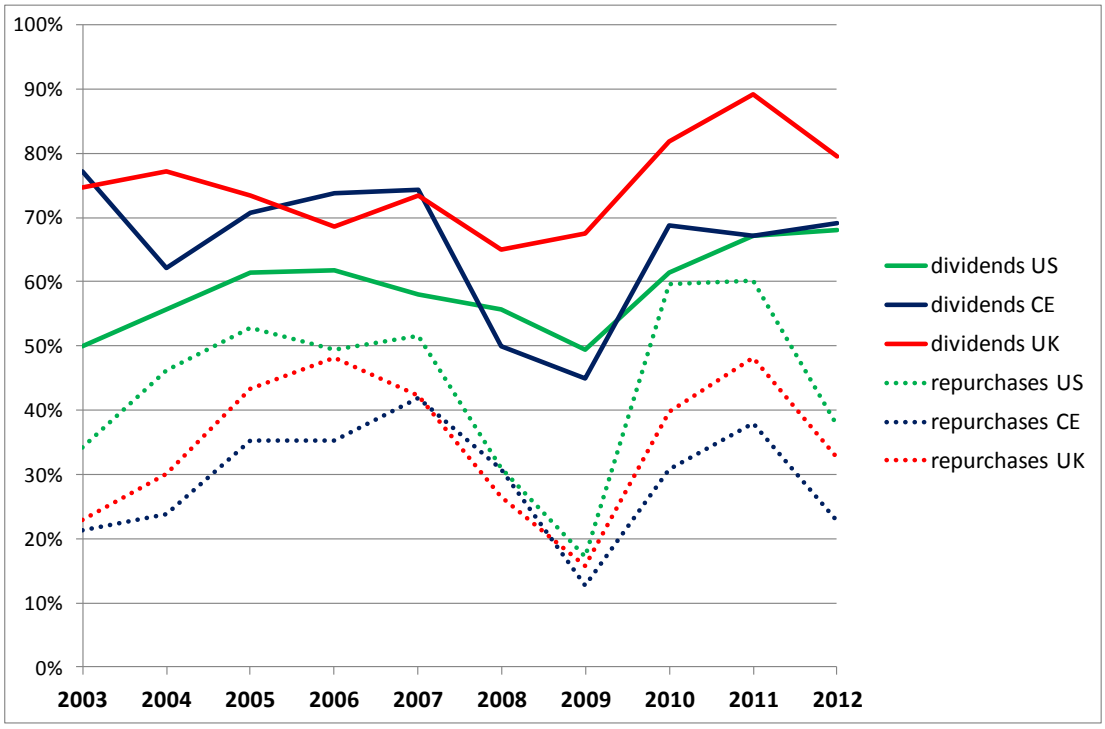
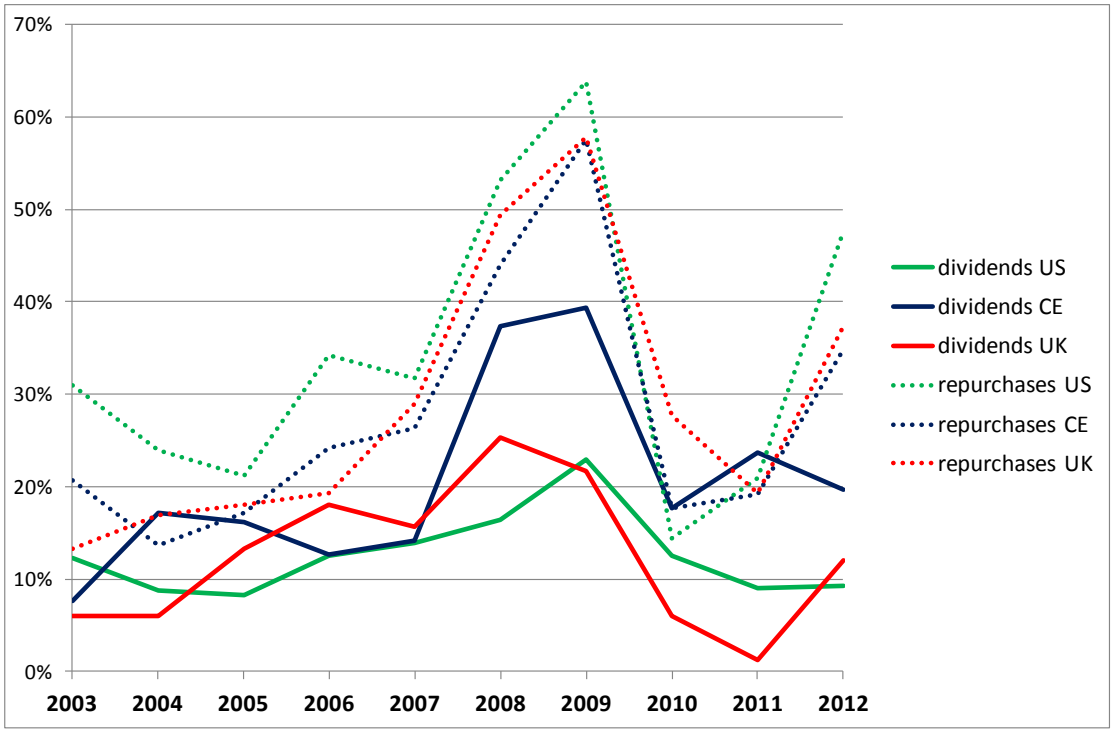
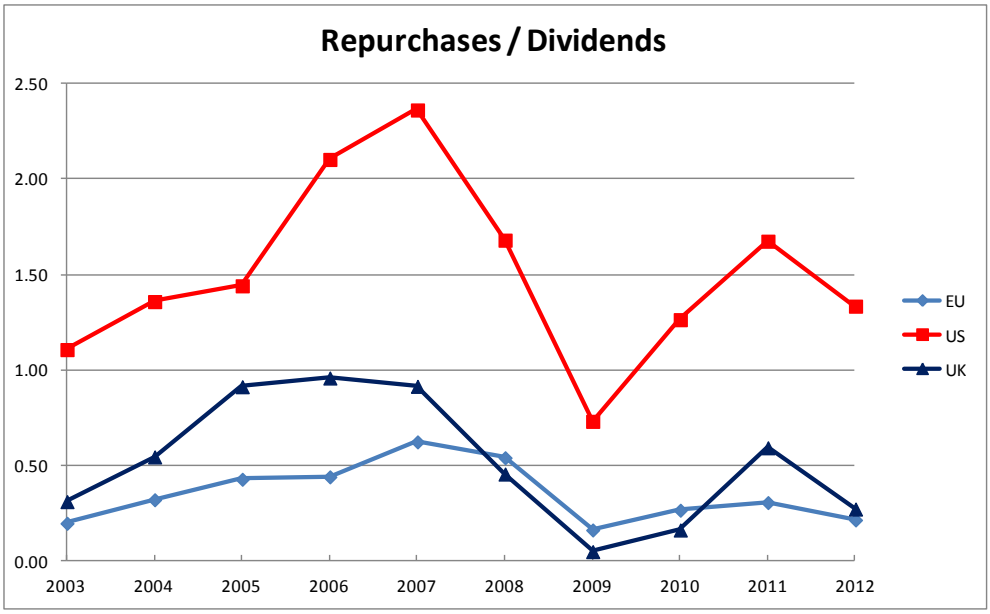


Figure 10 : Percentage of firms which strictly decreased their dividends / repurchases on a year-on-year basis



On figure 10, we observe again that many more CE companies decreased their dividends much more than their Anglo-Saxon peers. It is worth noting that more than 50% of companies strictly decreased their repurchases between 2008 and 2009 in the US, UK and CE. This is again a confirmation that companies do not think that repurchasing is efficient to fight decreasing share prices. Figure 9 is instructive and confirm what we observed previously on an aggregate basis; during the financial crisis, the majority of companies increased their dividends. Few of them increased the amount used to buyback their own shares. In 2009, only 20% of firms increased their repurchases while 45% increased their dividends in CE, 50% in the US, and 68% in the UK.

Figure 11: Amount spent on share buyback per one unit of dividend



Finally, Figure 12 sums it all up; from 2003 to 2007, repurchases were gaining momentum compared to dividends; more and more cash was used for share repurchases per unit of dividends. Nevertheless, it is important to precise that aggregate amount of dividends was increasing constantly over this period. Then, the financial crisis marked a strong halt to the trend. From 2007 to 2009, the use of share buybacks declined considerably compared to dividends. In 2009, US companies returned more cash to shareholders thanks to dividends than repurchases. Then, the trend reversed from 2009 to 2011, which is not surprising as repurchases almost vanished in 2009, particularly in the UK. This trend stopped again in 2012, a year when the share of repurchases amongst the payout mix declined again.

It is also visible on Figure 12 that the UK and CE behave similarly in terms of payout policy, which we noted previously: in Europe (UK and CE), dividends are the main tool to redistribute cash and the payout policy is more stable. Dividends have proven to be resilient during the crisis and companies preferred to cut repurchases than cutting dividends. It is striking that if we look at the graphs of absolute dividends, the crisis is almost not noticeable in the UK and in the US. In CE, we can guess that there was a crisis looking at dividends, but it does not let image its scale as it is a very slight decrease. Conversely, looking at the amount of share buybacks, the financial crisis is obvious as the amount of cash used to repurchase dropped significantly, particularly in Europe. This is consistent with signaling power of dividend (committing future free cash flows). Decreasing dividend is a solution of last resort and managers are extremely reluctant to do so.

It seems clear that companies do not think in relative value but absolute values when it relates to their payout policy, probably because DPS is metric which is broadly followed. A decrease in the DPS would send a negative signal. Conversely, increasing the DPS is a strong positive signal: managers are confident about the firm ability to pay future dividends. It seems clear that repurchases did not replace dividends during the crisis. Conversely, share buybacks were massively reduced while dividends were maintained. Now it would be interesting to study the evolution of payout policies at company level.

III. Empirical analysis of payout policies at firm level

1) Methodology & terminology

We used the same data than in part I, plus other data from Compustat:

- Market-to-book ratio (MKBKI)
- D/E (DCE)
- Free cash flow (FCF), but we added back cash dividends as the definition of FCF according to Compustat is as follows: "*This concept is the sum of Income Before Extraordinary Items plus Depreciation and Amortization less Cash Dividends less Non-Equity and Minority Interest Dividends Paid less Equity Dividends Paid less Capital Expenditures or Additions to Fixed Assets".* (Source: Compustat Guide)
- Return on Asset *(*ROA*)*
- Net operating cash flow (OANCF)
- Investing cash flow (INVCF)
- Common Book Equity (CEQ)
- And from Datastream, we used annualized volatility (DWC08806)
- We also used many other variables but as they have not provided significant results, we do not mention them. For the sake of clarity, we tried to present only significant results.

Thanks to these data, we created our own variables, which are defined as follows:

Variables and their definitions			
repearn	$repurchase_t/earnings_t$	**opcfas**	$operating\ cash\ flow_t/total\ assets_t$
divearn	$cash\ dividends_t/earnings_t$	**invcfas**	$investing\ cash\ flow_t/total\ assets_t$
totearn	$(cash\ dividends_t + repurchase_t)/earnings_t$	**fcfas**	$free\ cash\ flow_t/total\ assets_t$
repeq	$repurchase_t/book\ equity_t$	**mtbr**	$market\text{-}to\text{-}book\ ratio_t$
diveq	$cash\ dividends_t/book\ equity_t$	**repdivrep**	**$(repurchase_t)/(cash\ dividends_t + repurchase_t)$**
toteq	$(cash\ dividends_t + repurchase_t)/book\ equity_t$	**de**	D/E_t
toteqlag	$(cash\ dividends_{t-1} + repurchase_{t-1})/book\ equity_{t-1}$	**vol**	$volatility_t$
diveqlag	$cash\ dividends_{t-1}/book\ equity_{t-1}$	**crisis**	dummy variable 1 =[2008-2012] ; 0 = [2003-2007]
repeqlag	$repurchase_{t-1}/book\ equity_{t-1}$	**us**	dummy variable 1 if US company ; 0 if not

To analyze possible correlations between our variables, we used the software "R" to perform regressions and panel regressions. Ratios have been winsorized at percentile 0.01 and

0.99, except those bounded by 0, which have been winsorized at 0.98-level not to remove all zeros.

To facilitate the reading of the results:

- **Y ~ X** represents the following regression: $Y_{t,i} = \alpha + \beta X_{t,i} + \mathcal{E}_{t,i}$ with t= [2003, 2004, ...,2012] and i= [company1, ..., company694]
- **Y ~ X + Z** represents $Y_{t,i} = \alpha + \beta_1 X_{t,i} + \beta_2 Z_{t,i} + \mathcal{E}_{t,i}$
- **Y ~ X + dummies** corresponds to a panel regression with dummies variable for each company in order to capture effects at firm level.
- **Reg*** is used to test if coefficients are different in US and in Europe (CE+UK). "us" is a dummy variable, coded as 1 for USA and 0 for Europe.
- **Reg'** is used to test if coefficients are significantly different between and after the financial crisis, according to the following split: Before crisis = [2003; 2007]; After crisis = [2008; 2012]. "Crisis" is a dummy variable coded as 1 for the post-crisis period and 0 before.
- **β and β_i** are thereafter named regression coefficients, or coefficients.
- **Pr (>|t|) significance code from R:** '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 '#' 1
- When there is no precision relative to the period, it means that we regressed parameters over 2003-2012. [Pre crisis] and [Post crisis] mean that we used 2003-2008 and 2008-2012 data respectively.

➢ We used simple linear regressions to capture effect at macro levels, i.e. to reveal the pattern among firms in general. For instance, a positive correlation between dividends and market-to-book ratios would mean that, generally speaking, firms with higher market-to-book ratios tend to pay more dividends compared to firms with lower market-to-book ratios.[3]

➢ We also used panel regressions with dummies variable for each company in order to capture effect at "micro level", i.e. to reveal tendencies at firm level. For instance, a positive correlation between dividends and market-to-book ratios with dummies would mean that firms tend to pay more dividend when their own market-to-book ratio is higher. It does not imply necessarily that firms with higher market-to-book ratios pay more dividends.

Then, particular attention should be paid on the presence of dummies variables.

[3] It does not imply a cause and effect relationship

2) 2008 – 2012: troubled years for share buybacks

First, to get an overview of the payout evolution, we created dummy variables for each year in order to capture how the level of dividends and repurchases (*repeq* and *diveq*) was impacted each year.

CE: repeq ~ 2007 + 2008 + 2009 + 2010 + 2011 + 2012

	Coeff.	Std. Error	t-value	Pr(>|t|)	Significance
(Intercept)	0.051	0.004	11.6	2.00E-16	***
2008	-0.009	0.006	-1.4	1.59E-01	#
2009	-0.041	0.006	-6.6	6.19E-11	***
2010	-0.036	0.006	-5.8	7.09E-09	***
2011	-0.024	0.006	-3.8	0.00014	***
2012	-0.034	0.006	-5.5	5.92E-08	***

CE: diveq ~ 2007 + 2008 + 2009 + 2010 + 2011 + 2012

	Coeff.	Std. Error	t-value	Pr(>|t|)	Significance
(Intercept)	0.077	0.004	17.3	<2e-16	***
2008	-0.003	0.006	-0.5	0.6335	#
2009	-0.015	0.006	-2.3	0.02	*
2010	-0.011	0.006	-1.8	0.0692	.
2011	-0.001	0.006	-0.1	0.8956	#
2012	-0.001	0.006	-0.2	0.8598	#

US: repeq ~ 2007 + 2008 + 2009 + 2010 + 2011 + 2012

	Coeff.	Std. Error	t-value	Pr(>|t|)	Significance
(Intercept)	0.123	0.006	19.9	2.00E-16	***
2008	-0.024	0.009	-2.8	0.005738	**
2009	-0.084	0.009	-9.7	2.00E-16	***
2010	-0.047	0.009	-5.4	6.02E-08	***
2011	-0.023	0.009	-2.6	0.008491	**
2012	-0.034	0.009	-3.9	0.000104	***

US: diveq ~ 2007 + 2008 + 2009 + 2010 + 2011 + 2012

	Coeff.	Std. Error	t-value	Pr(>|t|)	Significance
(Intercept)	0.047	0.003	14.8	<2e-16	***
2008	0.002	0.005	0.5	0.5941	#
2009	-0.001	0.005	-0.1	0.9025	#
2010	0.000	0.005	0.0	0.9698	#
2011	0.004	0.005	0.9	0.3695	#
2012	0.009	0.005	2.0	0.0486	*

UK: repeq ~ 2007 + 2008 + 2009 + 2010 + 2011 + 2012

	Coeff.	Std. Error	t-value	Pr(>|t|)	Significance
(Intercept)	0.096	0.010	10.1	2.00E-16	***
2008	-0.049	0.014	-3.6	0.000346	***
2009	-0.088	0.014	-6.5	2.51E-10	***
2010	-0.076	0.013	-5.7	2.05E-08	***
2011	-0.062	0.013	-4.6	5.33E-06	***
2012	-0.053	0.013	-4.0	7.93E-05	***

UK: diveq ~ 2007 + 2008 + 2009 + 2010 + 2011 + 2012

	Coeff.	Std. Error	t-value	Pr(>|t|)	Significance
(Intercept)	0.103	0.009	11.2	<2e-16	***
2008	-0.012	0.013	-0.9	0.351	#
2009	-0.015	0.013	-1.1	0.264	#
2010	-0.012	0.013	-0.9	0.37	#
2011	-0.002	0.013	-0.1	0.891	#
2012	-0.008	0.013	-0.7	0.514	#

It is striking that share buybacks suffered a strong and significant decrease compared to 2007 in all years in all samples, except in 2008 in CE. This was already visible on Figure 4, as the aggregate amount of share buybacks did not decrease that much between 2007 and 2008.

At the same time, dividends did not suffer significant decrease. These first regressions confirm that what we observed on a global aggregate basis in the second part of this paper happened at firm level, which is logical: share buybacks were massively reduced in our three samples (2009 was the worst year) while dividends did not suffer specific drop between 2008 and 2012 compared to year 2007.

3) Auto-correlation:

Given our previous results and according to corporate finance theory, we expect a strong auto-correlation for dividends as firms try to maintain their dividends while the auto-correlation for share buybacks should be much lower as they are used in a more opportunistic way.

To test auto-correlation, we regressed *Cash dividends/book equity at year t ("diveq")* on *diveq at year t-1 ("diveqlag")*. We performed the same regressions with share repurchases ("*Repeq*" and "*Repeqlag*")

Reg1: diveq ~ diveqlag						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.70	0.0085	82.9	<2e-16	0.54	***
US	0.84	0.0092	90.8	<2e-16	0.71	***
CE	0.64	0.0158	40.2	<2e-16	0.47	***
UK	0.40	0.0287	14.0	<2e-16	0.24	***
Reg1*: Diveq ~ diveqlag + us + us * diveqlag						
diveqlag*us	0.29	0.0166	17.5	<2e-16	0.57	***
Reg1': Diveq ~ diveqlag + crisis + crisis * diveqlag						
US: diveqlag*crisis	-0.04	0.0190	-2.0	0.0501	0.71	.
CE: diveqlag*crisis	0.04	0.0330	1.3	0.1848	0.47	#
UK: diveqlag*crisis	0.32	0.0568	5.6	4.26E-08	0.29	***

Reg2: repeq ~ repeqlag						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.015	0.0018	8.4	<2e-16	0.01	***
US	0.016	0.0024	6.5	8.76E-11	0.01	***
CE	0.096	0.0090	10.6	<2e-16	0.06	***
UK	0.003	0.0031	1.0	0.34	0.00	#
Reg2*: Repeq ~ repeqlag + us + us * repeqlag						
repeqlag*us	0.01	0.0032	3.1	0.0019	4.87E-03	**
Reg2': repeq ~ repeqlag + crisis + crisis * repeqlag						
US: repeqlag*crisis	-0.03	0.0072	-4.1	4.90E-05	0.02	***
CE: repeqlag*crisis	-0.27	0.0296	-9.1	<2e-16	0.11	***
UK: repeqlag*crisis	-0.13	0.0153	-8.5	<2e-16	0.13	***

Auto-correlation is positive and extremely significant for dividends with high coefficients and high adjusted R^2. For share buybacks, regression coefficients are significant but they are much lower (e.g. 0.70 instead of 0.015) as well as adjusted R^2 (0.54 vs. 0.01), which confirms our previous results: firms try to keep the absolute amount of dividends stable while the amount of share buybacks fluctuates much more on a year-on-year basis. Then, the amount of dividends paid in year t-1 will mostly determine the amount paid in year t, while for repurchases the amount of share bought back in year t-1 has little impact on the amount bought back the following year. The regression coefficient between *diveq* and *diveqlag* is

significantly higher in the US than in Europe (cf. Reg1*). We have not found significant difference in the regression coefficients of Reg1 before and after crisis.

Then, it is worth studying the total payout. For that purpose, we created "*toteq*", which is *(rep+div)/eq*, and we regressed it on "*toteqlag*", which correspond to *toteq* in t-1. Results are as follows:

Reg3: toteq ~ toteqlag						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.629	0.0108	58.4	<2e-16	0.38	***
US	0.597	0.0146	40.9	<2e-16	0.34	***
CE	0.703	0.0171	41.1	<2e-16	0.49	***
UK	0.633	0.0327	19.4	<2e-16	0.38	***
Reg3*: toteq ~ toteqlag + us + us * toteqlag						
toteqlag*us	-0.09	0.0231	-3.8	0.000157	0.38	***
Reg3': toteq ~ toteqlag + crisis + crisis * toteqlag						
US: toteqlag*crisis	-0.18	0.0303	-6.0	2.23E-09	0.35	***
CE: toteqlag*crisis	-0.23	0.0341	-6.8	1.78E-11	0.51	***
UK: toteqlag*crisis	-0.10	0.0647	-1.6	0.122	0.39	#

Absolute total payout (scaled by book equity) is mostly determined by the amount paid the previous year. The regression coefficient is significantly lower in the US than in Europe (cf. Reg3*) which is not surprising as we observed previously a global payout which fluctuates more in the US than in Europe. Reg3' reveals significantly lower coefficients after the crisis in the US as well as in CE, i.e. total cash returned to shareholders was still driven by the amount paid the year before but with a lower coefficient.

4) Payout and cash flows

a. Absolute payout and Operating cash flows:

We expect no significant relation between absolute dividend payout and operating cash flows, while we expect a positive relationship between share buyback payout and operating cash flows. Indeed, the dividend smoothing theory, as well as our previous results, lead us to think that dividends do no depend on the amount of operating cash flows. Conversely, it seems that share buybacks are used to return excess cash and so we could expect a positive relationship between repurchases and operating cash flow.

To test it, we regressed *repeq* and *diveq* over *operating cash flow scaled by total assets ("opcfas")* over the 2008-2012 period with dummies for each company to capture effects at firm level.

Reg4: diveq ~ opcfas + company dummies [POST CRISIS]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.03	1.50E-02	2.2	0.03	0.84	*
US	0.02	0.0	1.2	0.25	0.85	#
CE	0.04	3.05E-02	1.5	0.15	0.79	#
UK	0.06	4.51E-02	1.4	0.17	0.87	#

Reg5: repeq ~ opcfas + company dummies [POST CRISIS]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.18	4.00E-02	4.6	3.98E-06	0.47	***
US	0.26	6.42E-02	4.1	4.29E-05	0.42	***
CE	0.11	3.91E-02	2.9	3.66E-03	0.51	**
UK	0.11	3.91E-02	2.9	3.66E-03	0.35	**
Reg5*: repeq ~ opcfas + us + us * opcfas + dummies [POST CRISIS]						
opcfas*us	0.33	5.19E-02	6.3	3.72E-10	0.39	***

Our results match our hypothesis: at firm level, there is no significant link between dividends (scaled by book equity) and operating cash flows (scaled by total assets). Conversely, there is a significant and positive link between share buybacks and operating cash flows. As the amount of dividends is defined on the year before its payment, we also regressed *diveq* over *opcfaslag* to confirm the absence of correlation.

Reg6: diveq ~ opcfaslag + company dummies [POST CRISIS]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.01	1.42E-02	1.0	3.28E-01	0.84	#
US	0.01	1.69E-02	0.3	7.39E-01	0.86	#
CE	0.03	2.99E-02	0.9	3.52E-01	0.78	#
UK	0.02	4.10E-02	0.4	6.69E-01	0.87	#

According to Reg5*, the regression coefficient which links *repeq* and *opcfas* is significantly higher in the US than in Europe, which is in line with our previous results as US companies redistribute more cash through share buybacks than European companies.

Then, if we look at total payout and operating cash flows, we observe a significant difference between the US and Europe relating to correlation between *toteq* and *opcfas*: there is no particular link between these two parameters in Europe whereas there is a positive and significant link in the US.

Reg7: toteq ~ opcfas + company dummies [POST CRISIS]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.20	5.29E-02	3.8	1.39E-04	0.57	***
US	0.29	8.15E-02	3.6	3.20E-04	0.54	***
CE	0.04	6.21E-02	0.6	5.26E-01	0.68	#
UK	0.21	1.45E-01	1.5	1.43E-01	0.55	#

The results of Reg5, Reg6 and Reg7 combined lead to the following conclusion: US firms fine tune their total payout depending on their cash flow generation thanks to share buybacks

which are used as an adjustment variable. In Europe, it seems that the total payout is not adjusted in function of cash flow generation.

b. Payout ratios and Free cash flows:

- To start this analysis, we define two payout ratios: (i) "*repearn"*, which is the amount of shares repurchased divided by the earnings of the same year (ii) "*divearn"*, the amount of cash dividends divided by the earnings of the same year. We do not expect specific relationship between free cash flows and dividend payout ratios according to the dividend smoothing theory. Nevertheless, if there is a relationship, it should be negative as companies try to maintain their absolute amount of dividends more than their payout ratio, then the higher the operating cash flows, the lower the payout ratio, and vice-versa.
  We conducted these regressions over the 2003-2012 period to better capture the fluctuations due to the crisis in comparison with the pre-crisis period.

Reg8: divearn ~ fcfas + dummies for each firm						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	-0.11	1.06E-01	-1.0	3.10E-01	0.34	#
US	-0.29	1.26E-01	-2.3	2.19E-02	0.42	*
CE	0.30	2.31E-01	1.3	1.93E-01	0.19	#
UK	-0.24	2.81E-01	-0.8	4.01E-01	0.23	#

Reg9: repearn ~ fcfas + dummies for each firm						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	1.08	1.44E-01	7.5	6.08E-14	0.30	***
US	1.69	2.20E-01	7.7	1.91E-14	0.28	***
CE	0.58	2.09E-01	2.8	5.60E-03	0.14	**
UK	-0.07	2.91E-01	-0.3	7.98E-01	0.10	#

Reg8 and Reg9 confirm our expectations. At firm level, we observe no significant relationship between dividend payout ratio and free cash flows, except maybe in the US where there is a moderate significant relationship, but negative as expected. Conversely, we observe strong and positive relationship between repurchase payout ratios and free cash flows.

Then, it is worth removing dummies to get a better understanding of what is happening at a macro level.

Reg9: divearn ~ fcfas						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	-0.10	8.16E-02	-1.2	2.37E-01	0.00	#
US	-0.25	0.098615	-2.523	0.0117	0.001435	*
CE	0.27	1.68E-01	1.6	1.14E-01	0.00	#
UK	0.33	2.21E-01	1.5	1.38E-01	0.00	#

Reg10: repearn ~ fcfas						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	1.94	1.02E-01	19.0	<2e-16	0.05	***
US	2.44	1.45E-01	16.8	<2e-16	0.07	***
CE	0.94	1.45E-01	6.5	1.22E-10	0.02	***
UK	0.72	2.09E-01	3.4	5.94E-04	0.01	***

In the light of Reg10 and Reg11's results, it seems that cash flow generation had an impact on the use of share buybacks. We observe strong and positive relationships between the amount of free cash flows and the repurchase payout across all our three samples. The comparison with dividend payout is striking. In the UK as well as in CE, free cash flow generation does not affect the dividend payout ratio. Nevertheless, in the US, we observe a relationship, but it is a negative one. It means that firms with high free cash flow generation tend to have lower their dividend payout ratios.

Then, it is worth looking at the total payout ratio and its relation with *fcfas*.

Reg11: totearn ~ fcfas + dummies for each firm						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	1.03	1.67E-01	6.2	6.48E-10	0.25	***
US	1.58	2.37E-01	6.7	3.03E-11	0.28	***
CE	0.68	2.93E-01	2.3	1.95E-02	0.17	*
UK	-0.28	3.52E-01	-0.8	4.32E-01	0.19	#

We observe a strong and positive relationship in the US between the total payout ratio and cash flow generation at firm level. In Europe, the link is less strong and less significant, not to say absent in the UK. Then, it could explain why we observed on a global basis in Figure 1 an American payout ratio that fluctuates a lot while in Europe the total payout ratio was more stable. If we combine the results of Reg11, Reg9 and Reg8, we can draw the following conclusion: American firms adjust their payout ratio depending on their own level of free cash flows generation. Conversely, European firms do not adjust their total payout ratios depending on their own free cash flows, or marginally (cf. Reg11). It is worth pointing out that American firms use share buybacks as an adjustment variable to adjust the total payout ratio.

Then, we investigate what is happening at a macro level without the dummies.

Reg12: totearn ~ fcfas						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	1.80	1.18E-01	15.2	<2e-16	0.03	***
US	2.17	1.63E-01	13.3	<2e-16	0.05	***
CE	1.12	2.08E-01	5.4	9.16E-08	0.01	***
UK	1.06	2.71E-01	3.9	1.02E-04	0.02	***

Results are clear and significant: firms generating higher free cash flows per unit of asset have higher payout ratios. Has this been impacted by the crisis?

Reg13: totearn ~ fcfas [2003-2007]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	2.18	1.79E-01	12.1	<2e-16	0.04	***
US	2.72	2.51E-01	10.8	<2e-16	0.06	***
CE	1.52	2.99E-01	5.1	4.52E-07	0.03	***
UK	0.91	4.19E-01	2.2	2.96E-02	0.01	*

Reg14: totearn ~ fcfas [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	1.49	1.56E-01	9.5	<2e-16	0.03	***
US	1.72	2.11E-01	8.2	6.32E-16	0.03	***
CE	0.85	2.92E-01	2.9	3.66E-03	0.01	**
UK	1.13	3.38E-01	3.3	9.17E-04	0.03	***

The relationship existed before the crisis and was still there after. Nevertheless, it seems that regression coefficients are lower. Are they significantly lower?

Reg15: totearn ~ fcfas + crisis + crisis*fcfas						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-1.00	3.27E-01	-3.0	2.32E-03	0.05	**
CE	-0.67	4.19E-01	-1.6	1.09E-01	0.02	#
UK	0.22	5.38E-01	0.4	6.90E-01	0.03	#

Reg15 shows that only the US coefficient is significantly lower, i.e. the link of the payout ratio due to high cash flow generation was still there between 2008 and 2012 at macro level, but it was lowered by the financial crisis: the difference in payout between cash rich firms and cash poor firms narrowed.

The impact of free cash flow generation on payout policy raises a natural question: are share buybacks used by mature firms or growth firms? Do we observe differences?

5) Payout policies and firms' maturity:

We expect mature firms to use relatively more dividends than growth firms. Indeed, growth firms will prefer share buybacks to dividends (cf. high tech firms with massive repurchases program who pay few dividends as Apple). Nevertheless, we also expect mature

firms to use repurchases as a mean to redistribute "excess cash" due to their low investment needs and high cash flows.

To answer our interrogation, we regressed *divearn* and *repearn* over *market-to-book ratio ("mtbr")* and over *investing cash flows scaled by total assets ("invcfas") as* mature firms tend to have lower *mtbr* and lower *invcfas*.

Reg16: divearn ~ mtbr						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	-0.0077	1.61E-03	-4.8	1.57E-06	0.004	***
US	-0.0070	1.98E-03	-3.5	3.97E-04	0.003	***
CE	-0.0053	3.38E-03	-1.6	1.16E-01	0.001	#
UK	0.0024	3.98E-03	0.6	5.52E-01	-0.001	#

Reg17: repearn ~ mtbr						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.0160	2.06E-03	7.8	8.44E-15	0.009	***
US	0.0099	3.02E-03	3.3	1.07E-03	0.003	**
CE	0.0156	2.96E-03	5.3	1.47E-07	0.014	***
UK	0.0124	3.69E-03	3.4	8.35E-04	0.014	***

Reg12 confirms our hypothesis only in the US as our regressions do no provide significant coefficient in Europe. We tested it before and after 2008: significant relationship between *divearn* and *mtbr* only existed in the US between 2003 and 2007. Then, between 2008 and 2012, the correlation disappears. According to Reg13, firms with higher market-to-book ratios repurchase more (higher repurchase payout ratio) than firms with lower valuation, i.e. growth firms have higher repurchase payout ratios than value firms. This result was true before the crisis and was still significant between 2008 and 2012.

We could expect then that share buybacks represent a higher part of the absolute payout for firms with higher market-to-book ratios. To check this hypothesis, we regressed *repurchases/(repurchases + dividends) ("repdivrep")* over *mtbr*.

Reg18: repdivrep ~ mtbr						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.0222	1.51E-03	14.7	<2e-16	0.035	***
US	0.0219	2.09E-03	10.5	<2e-16	0.032	***
CE	0.0146	2.13E-03	6.8	1.07E-11	0.024	***
UK	0.0085	2.59E-03	3.3	1.10E-03	0.014	**

Reg14 delivers the expected result in Europe as well as in the US. We checked it before and after crisis, and we found the same relationships. Then, we tested it at firm level adding dummies for companies and we found no significant relationship except in the US between 2008 and 2012 (cf. Reg18b). It shows that firms gave preference to share buybacks when their *mtbr* were low. We have not found similar results in Europe. As this relationship did not exist

between 2003 and 2007, this is a sign that companies used share buybacks as a tool to maintain their share price.

Reg18b: repdivrep ~ mtbr + dummies [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-0.014	0.004	-3.6	3.59E-04	0.65	***

We can now look at the relationship between payout ratios and investing cash flows scaled by assets. Note: Investing cash flows are positive numbers.

Reg19: divearn ~ invcfas						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	-0.41	5.31E-02	-7.7	2.32E-14	0.01	***
US	-0.58	7.23E-02	-8.1	8.31E-16	0.02	***
CE	-0.30	1.26E-01	-2.4	1.85E-02	0.00	*
UK	-0.07	7.90E-02	-0.8	4.02E-01	0.00	#
Reg19': divearn ~ invcfas + crisis + crisis * invcfas						
invcfas*crisis	-0.12	0.1150	-1.0	0.309	0.02	#

Reg20: repearn ~ invcfas						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	-0.65	7.08E-02	-9.1	<2e-16	0.01	***
US	-1.26	1.11E-01	-11.4	<2e-16	0.03	***
CE	-0.36	1.11E-01	-3.2	1.43E-03	0.00	**
UK	-0.08	9.61E-02	-0.9	3.80E-01	0.00	#
Reg20': repearn ~ invcfas + crisis + crisis * invcfas						
invcfas*crisis	0.20665	0.15175	1.362	0.173	0.01635	#

Results are significant in the US: firms with high investing cash flows compared to their assets have lower payout ratios, in terms of dividends as well as share buybacks. In Europe, it is still a negative relationship but less significant. We found no relationship in the UK. Results are almost the same before and after crisis. We introduced dummies but we found no significant relationship.

To distinguish mature and growth firms, we could test ROA as growth stocks tend to deliver a higher ROA than value stocks due to unconsolidated markets. Then, we expect firms with higher ROA to use comparatively more share buybacks than firms with lower ROA. Conversely, a lower ROA would favor dividends.

Note: *in our data, a ROA of 10% was expressed as 10.0, and then the scale of the coefficients should not misguide their interpretation.*

Reg21: repdivrep ~ roa						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.019	0.001	21.9	<2e-16	0.07	***
US	0.021	0.001	17.6	<2e-16	0.08	***
CE	0.010	0.001	7.9	3.21E-15	0.031	***
UK	0.010	0.002	6.0	3.77E-09	0.046	***
Reg21': repdivrep ~ roa + crisis + crisis * roa						
roa*crisis	0.00	1.74E-03	-0.5	6.52E-01	0.07	#

Reg21 delivers expected results: firms with higher ROA use more share buybacks in their payout mix. The relationship is significant across all our three samples and the crisis did not change the coefficient. Is it true at micro level?

Reg21bis: repdivrep ~ roa + dummies						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	0.021	1.17E-03	17.6	<2e-16	0.08	***
CE	0.010	1.24E-03	7.9	3.21E-15	0.03	**
UK	0.010	1.75E-03	6.0	3.77E-09	0.05	***
Reg21bis': repdivrep ~ roa + crisis + crisis * roa						
US: de*crisis	0.00	1.69E-03	-1.2	2.20E-01	0.61	#
CE: de*crisis	-0.01	2.13E-03	-2.6	9.18E-03	0.40	**
UK: de*crisis	-0.01	3.22E-03	-3.1	2.17E-03	0.29	**

The share of repurchases is positively correlated to ROA at firm level. The financial crisis reduced the coefficient of the correlation in Europe but not in the US. We should investigate further regression *repearn*, *divearn* and *totearn* over ROA.

Reg22: totearn ~ roa						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.013	0.001	9.3	<2e-16	0.01	***
US	0.016	0.002	8.1	6.74E-16	0.02	***
CE	0.008	0.002	3.1	1.70E-03	0.004	**
UK	0.003	0.003	0.9	3.45E-01	0.000	#
Reg22': totearn ~ roa + crisis + crisis * roa						
roa*crisis	-0.006	2.77E-03	-2.0	4.66E-02	0.01	*

Reg23: divearn ~ roa						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	-0.006	0.001	-6.5	7.91E-11	0.01	***
US	-0.006	0.001	-5.1	3.40E-07	0.01	***
CE	-0.002	0.002	-1.0	3.05E-01	0.000	#
UK	-0.009	0.003	-3.4	6.65E-04	0.015	***
Reg23': divearn ~ roa + crisis + crisis * roa						
roa*crisis	0.00	1.88E-03	-1.0	3.35E-01	0.01	#

Reg24: repearn ~ roa						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.019	0.001	16.2	<2e-16	0.04	***
US	0.021	0.002	12.5	<2e-16	0.04	***
CE	0.011	0.002	6.2	5.65E-10	0.019	***
UK	0.010	0.003	3.8	1.33E-04	0.019	***
Reg24': repearn ~ roa + crisis + crisis * roa						
roa*crisis	0.00	2.39E-03	-1.5	1.22E-01	0.04	#

Results of Reg22, Reg33 and Reg24 are particularly interesting: ROA has a positive impact on the total payout. If we look more precisely, there is a positive relationship between ROA and repurchases payout while there is a negative relationship with the dividend payout, except in CE where we observe no significant relationship between dividends and ROA. Said in another way, firms with a high ROA tend to have a lower dividend payout ratio than firms with a lower ROA, while they have a higher repurchase payout ratio. We can interpret these result in the light of corporate theory: firms with higher ROA are growth firms, they have a lot of cash flow but prefer not to commit themselves so they return excess cash through share buybacks. The crisis had no impact on the regression coefficients. It is important bear in mind that in Europe, a higher ROA has no significant impact on the dividend payout ratio.

We should now investigate further to determine what the factors that influence the payout mix are.

6) Relations between share buybacks and dividends

First, we would want to test if share buybacks are more used by firms with higher payout. We formulate this hypothesis because it seems that share buybacks often come in addition of dividends. To test it, we regressed the share of repurchase amongst the payout mix *("repdivrep")* over the total payout ratio (*"totearn"*).

Reg25: repdivrep ~ totearn						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.2146	7.36E-03	29.2	<2e-16	0.124	***
US	0.1982	9.38E-03	21.1	<2e-16	0.116	***
CE	0.1454	1.11E-02	13.1	<2e-16	0.082	***
UK	0.1877	1.88E-02	10.0	<2e-16	0.122	***
Reg25': repdivrep ~ totearn + crisis + crisis * totearn						
totearn*crisis	-0.08	1.47E-02	-5.6	2.24E-08	0.13	***

We found that indeed, the higher the total payout ratio, the higher is likely to be the share of repurchases in the payout mix. This relationship is very significant in all our three samples, before and after crisis. After crisis, the coefficients are slightly lower but still highly significant. This result confirms our intuition: share buybacks are more used by firms that have high payout ratios.

We then check if this result holds at firm level, introducing dummies variables for companies, in order to capture the time series effect.

Reg26: repdivrep ~ totearn + dummies for companies						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.1701	5.51E-03	30.9	<2e-16	0.664	***
US	0.1756	7.15E-03	24.6	<2e-16	0.655	***
CE	0.1442	9.94E-03	14.5	<2e-16	0.450	***
UK	0.2172	1.79E-02	12.1	<2e-16	0.411	***
Reg26': repdivrep ~ totearn + crisis + crisis * totearn + dummies						
totearn*crisis	-0.05	9.75E-03	-5.6	2.65E-08	0.67	***

At firm level, we observe a very significant relationship between the share of repurchases amongst the payout mix and the global payout ratio. The higher the payout ratio, the higher is the share of repurchases. This relation is strong in our three samples. It holds before and after the crisis but with lower coefficients after the crisis. It means that generally speaking, when firms return more cash, they tend to use share buybacks. The use of share buybacks is not linear across the payout: they are more used to return the last dollars than first. But this phenomenon was less important between 2008 and 2012: "last dollars" were less paid through share buybacks. It could suggest that firms use repurchases to return "excess" cash.

So what are the relationships between the dividend payout ratio and the payout mix? Is there a relation?

Reg27: repdivrep ~ divearn						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	-0.31	0.011	-28.8	<2e-16	0.121	***
US	-0.36	0.015	-24.6	<2e-16	0.150	***
CE	-0.12	0.014	-8.2	3.56E-16	0.034	***
UK	-0.09	0.025	-3.7	2.71E-04	0.017	***
Reg27*: repdivrep ~ divearn + us + us * divearn						
divearn*us	-0.25	1.99E-02	-12.7	< 2e-16	0.27	***

Reg28: repdivrep ~ divearn + dummies for companies						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	-0.07	0.009	-7.7	1.44E-14	0.287	***
US	-0.10	0.014	-6.9	5.03E-12	0.590	***
CE	-0.05	0.013	-3.9	8.94E-05	0.391	***
UK	-0.04	0.026	-1.4	1.73E-01	0.254	#
Reg28*: repdivrep ~ divearn + us + us * divearn + dummy						
divearn*us	-0.05	1.85E-02	-2.7	7.10E-03	0.61	**

We observe a negative relationship with and without dummies. The higher the dividend payout ratio, the lower is the share of repurchases amongst the payout mix. It suggests that companies with different dividend payout ratios do not make the same use of repurchases. At firm level, it confirms that the use of share buybacks is not linear accross the total payout.

Reg29: repearn ~ divearn + dummies [2003-2007]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.15	0.037	4.1	5.17E-05	0.348	***
US	0.21	0.061	3.4	5.82E-04	0.344	***
CE	0.16	0.049	3.2	1.24E-03	0.230	**
UK	-0.01	0.067	-0.1	8.88E-01	0.185	#
Reg29*: repearn ~ divearn + us + us * divearn + dummies						
divearn*us	0.11	7.36E-02	1.5	1.26E-01	0.27	#

Reg30: repearn ~ divearn + dummies [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.140	0.022	6.3	2.98E-10	0.37	***
US	0.15	0.040	3.8	1.62E-04	0.34	***
CE	0.13	0.024	5.5	5.38E-08	0.194	***
UK	0.15	0.051	2.9	4.00E-03	0.128	**
Reg30*: repearn ~ divearn + us + us * divearn + dummies						
divearn*us	0.02	4.50E-02	0.4	6.69E-01	0.37	#

Reg30': repearn ~ divearn + crisis + crisis * divearn + dummy						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-0.18	0.049	-3.6	3.61E-04	0.28	***
CE	-0.10	0.042	-2.3	1.94E-02	0.191	*
UK	0.06	0.072	0.8	4.17E-01	0.153	#

Finally, Reg29 and Reg30 confirm that even at firm level, there is a significant and positive relationship between dividend payout and repurchases payout. The higher is the dividend payout, the higher the repurchase payout is. It was true before and after crisis but coefficient changed in the US and in CE after 2008. Indeed, Reg30' shows that regression were significantly lower between 2008 and 2012, which means that there was still a positive relationship between the dividend payout and repurchases payout at firm level, but in lower proportions. It does not contradict Reg28's results: the share of repurchases can be lower in the mix even if repurchases payout grows with dividends payout (but at a lower pace).

What about the results at macro level? Is there a correlation between repurchase payout and dividend payout?

Reg30bis: repearn ~ divearn [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-0.049	2.99E-02	-1.6	1.03E-01	8.62E-04	#
CE	0.092	2.09E-02	4.4	1.09E-05	0.02	***
UK	0.124	3.83E-02	3.2	1.34E-03	0.03	**

Reg30bis provides interesting results: in Europe, firms with higher repurchase payout ratios tend to have higher dividend payout ratios, said in another way: repurchase and dividend come hand in hand. In the US, there is no such a relation, even not negative. It means that the level of repurchase payout is not correlated with the level of dividend payout.

Finally, as we saw that repurchases are driven by cash flow generation, and that dividends are not driven by cash flow generation, we could expect a strong relationship between share of repurchases in the payout mix and free cash flow generation.

First, at macro level, our hypothesis is confirmed:

Reg31: repdivrep ~ fcfas						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	1.549	0.075	20.8	<2e-16	0.07	***
US	1.985	0.098	20.3	<2e-16	0.11	***
CE	0.619	0.107	5.8	8.96E-09	0.017	***
UK	0.384	0.152	2.5	1.19E-02	0.007	*

And then at micro level, our hypothesis as confirmed as well (except in the UK):

Reg32: repdivrep ~ fcfas + dummies						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.744	0.080	9.3	<2e-16	0.60	***
US	1.133	0.116	9.8	<2e-16	0.59	***
CE	0.421	0.132	3.2	1.43E-03	0.381	**
UK	0.173	0.191	0.9	3.64E-01	0.234	#

Then, what was the impact of the crisis? What did it change in payout policies?

Reg31: repearn ~ crisis + dummies						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	-0.05	0.011	-4.1	4.080	0.291	***
US	-0.04	0.017	-2.2	2.70E-02	0.274	*
CE	-0.04	0.016	-2.7	6.71E-03	0.153	**
UK	-0.10	0.026	-3.9	1.29E-04	0.122	***

Reg32: divearn ~ crisis + dummies						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
Global	0.07	0.008	8.8	<2e-16	0.355	***
US	0.08	0.010	8.2	2.39E-16	0.432	***
CE	0.10	0.018	5.8	7.43E-09	0.207	***
UK	-0.04	0.026	-1.6	1.17E-01	0.232	#

Compared to 2003-2007, the financial crisis increased the dividend payout ratio while it decreased the repurchase payout ratio at firm level. It is worthing noting that the negative relationship between repurchase ratio and crisis is not that significant (*). It should also be noted that there is no significant relation between dividend payout ratios in the UK and the 2008-2012 period.

7) Payout and indebtness

Reg33: repearn ~ de						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-0.048	1.06E-04	-4.5	5.87E-06	0.01	***
CE	-0.004	1.02E-04	-0.4	6.96E-01	0.00	#
UK	0.021	1.19E-04	1.8	7.41E-02	0.00	.
Reg33': repearn ~ de + crisis + crisis * de (US sample)						
de*crisis	0.00	2.12E-04	0.9	3.90E-01	0.01	#

Reg34: divearn ~ de						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	0.078	6.73E-05	11.5	5.87E-06	0.03	***
CE	0.044	1.16E-04	3.8	1.32E-04	0.01	***
UK	0.045	1.26E-04	3.6	3.57E-04	0.02	***
Reg34': repearn ~ de + crisis + crisis * de (global sample)						
de*crisis	0.00	2.12E-04	0.9	3.90E-01	0.01	#

We found no correlation between the repurchase payout and the debt/equity ratio, except in the US where that correlation is negative, i.e. companies which are more indebted have lower repurchase ratios. Results are different for the relation between the dividend payout ratio and indebtness: there are strong positive correlations across all our three samples. Companies with higher debt level pay more dividends, which is counterintuitive. We develop a possible explanation in III 9) through the example of the utilities sector.

At firm level, we would expect a negative correlation between the share of repurchase in the payout mix and indebtness, which is confirmed by Reg35. We do not detect significant differences in regression coefficients before and after crisis.

Reg35: repdivrep ~ de + dummies						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-0.039	8.05E-05	-4.9	9.68E-07	0.58	***
CE	-0.029	1.05E-04	-2.8	5.19E-03	0.38	**
UK	-0.039	8.05E-05	-4.9	9.68E-07	0.24	***
Reg35': repdivrep ~ de + crisis + crisis * de (global sample)						
de*crisis	0.00	7.34E-05	-0.4	6.99E-01	0.61	#

8) Payout and sectors

Finally, we tried to discover differences in payout policies depending on sectors (Industrial, Consumer staple, Consumer discretionary, Materials, Energy, Healthcare, IT, Utilities).

Europe: divearn ~ dummies for sectors [2008-2012]						US: divearn ~ dummies for sectors [2008-2012]				
	Coeff.	Std. Error	t-value	Pr(>|t|)	Signif.	Coeff.	Std. Error	t-value	Pr(>|t|)	Signif.
(Intercept)	0.22	0.15	1.47	0.14	#	0.30	0.07	4.22	0.00	***
Consumer Discretionary	0.25	0.15	1.66	0.10	.	-0.05	0.08	-0.68	0.50	#
Consumer Staple	0.26	0.16	1.67	0.09	.	0.13	0.08	1.62	0.11	#
Energy	0.17	0.16	1.10	0.27	#	-0.14	0.08	-1.74	0.08	.
Healthcare	0.17	0.16	1.07	0.28	#	-0.16	0.08	-2.10	0.04	*
Industrials	0.23	0.15	1.48	0.14	#	-0.02	0.08	-0.22	0.82	#
IT	0.35	0.16	2.23	0.03	*	-0.04	0.08	-0.52	0.60	#
Building & Materials	0.17	0.15	1.07	0.28	#	0.13	0.08	1.68	0.09	.
Utilities	0.53	0.16	3.34	0.00	***	0.33	0.08	4.19	0.00	***

Europe: repearn ~ dummies for sectors [2008-2012]						US: repearn ~ dummies for sectors [2008-2012]				
	Coeff.	Std. Error	t-value	Pr(>|t|)	Signif.	Coeff.	Std. Error	t-value	Pr(>|t|)	Signif.
(Intercept)	0.01	0.11	0.06	0.95	#	0.48	0.09	5.27	0.00	***
Consumer Discretionary	0.10	0.11	0.94	0.35	#	0.11	0.09	1.16	0.25	#
Consumer Staple	0.15	0.11	1.31	0.19	#	0.04	0.10	0.38	0.70	#
Energy	0.07	0.11	0.65	0.51	#	-0.37	0.10	-3.68	0.00	***
Healthcare	0.21	0.11	1.88	0.06	.	0.04	0.10	0.36	0.72	#
Industrials	0.16	0.11	1.43	0.15	#	-0.07	0.10	-0.78	0.44	#
IT	0.21	0.11	1.89	0.06	.	0.09	0.10	0.91	0.36	#
Building & Materials	0.09	0.11	0.78	0.44	#	-0.27	0.10	-2.72	0.01	**
Utilities	0.07	0.11	0.63	0.53	#	-0.40	0.10	-4.00	0.00	***

Between 2008 and 2012, the utilities sector paid higher dividend payout ratio than other sectors. It was also the case in the US. Conversely, this sector repurchased significantly less than other sectors during the financial crisis in the US as well as the energy sector and the building & materials sector. In Europe, there is no particular pattern for repurchase payout among the different sectors. How can we explain this specific results for utilities during the financial crisis?

Utilities have higher visibility on their future cash flow, and so they are able to deliver a higher dividend payout ratio. But why do they repurchase less?

This is a confirmation of the free cash flow theory: utilities have high visibility on their future cash flows, but they are not particularly cash rich. Consequently, they do not have excess cash each year to return. They commit themselves with dividends to signal the confidence they have in their future cash flows. It is striking that, in the US, the sector with the higher dividend payout is also the sector with the lower repurchase payout. It is a perfect illustration of what we developed theoretically in the first part and confirm that repurchase and dividend are not used in the same manner. The difference is less striking in Europe.

de ~ dummies for sectors					
	Coeff.	Std. Error	t-value	Pr(>|t|)	Signif.
(Intercept)	62.12	11.11	5.59	0.00	***
Consumer Discretionary	3.12	11.39	0.27	0.78	#
Consumer Staple	15.34	11.66	1.32	0.19	#
Energy	-18.65	11.83	-1.58	0.12	#
Healthcare	-11.57	11.72	-0.99	0.32	#
Industrials	6.66	11.37	0.59	0.56	#
IT	-3.14	11.52	-0.27	0.79	#
Building & Materials	2.87	11.65	0.25	0.81	#
Utilities	**87.82**	**11.76**	**7.47**	**0.00**	***

We also observe that utilities is the most indebted sector. A higher visibility of future cash flows allows higher debt levels. It could explain why we found negative relationship between debt levels and repurchase payout, while this relationship was positive for dividends: it is not a cause and effect relationship between debt and repurchases. It is rather that higher visibility on cash flows allows higher debt levels as well as higher dividend payout.

9) Volatility as an indicator of different policies (EU vs. US)

Among the different parameters we tested, volatility provided strong relationships with dividends and share buybacks payout. These relationships are significantly different in the US and in Europe and that is why the study of volatility could be a valuable contribution to our study. Results of regressions are as follows:

Reg36: vol ~ repdivrep						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	4.470	0.380	11.8	<2e-16	0.04	***
CE	-16.321	1.831	-8.9	<2e-16	0.04	***
UK	-12.493	2.893	-4.3	1.82E-05	0.03	***

Reg37: vol ~ repdivrep [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	2.549	0.510	5.0	6.56E-07	0.01	***
CE	-19.952	2.777	-7.2	1.43E-12	0.05	***
UK	-19.134	4.507	-4.2	2.84E-05	0.05	***

Reg38: vol ~ repearn [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-1.657	0.363	-4.6	5.30E-06	0.01	***
CE	1.722	2.495	0.7	4.90E-01	0.00	#
UK	5.844	3.604	1.6	1.06E-01	0.00	#

Reg39: vol ~ repeq [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-11.462	1.713	-6.7	2.98E-11	0.02	***
CE	-0.231	13.216	0.0	9.86E-01	0.00	#
UK	28.826	15.919	1.8	7.11E-02	0.01	.

Reg40: vol ~ divearn [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-6.436	0.417	-15.4	<2e-16	0.12	***
CE	41.225	1.940	21.3	<2e-16	0.34	***
UK	67.586	3.372	20.0	<2e-16	0.55	***

Reg41: vol ~ diveq [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-61.417	2.903	-21.2	<2e-16	0.21	***
CE	168.441	11.771	14.3	<2e-16	0.19	***
UK	152.536	14.303	10.7	<2e-16	0.27	***

As revealed by Reg36 and Reg37, there is a strong and significant link between the payout mix and stock volatility. In Europe, the higher is repurchase among the payout mix, the lower is the volatility of the stock. In the US, this same relation is positive. This surely says something about the difference in payout policies in Europe vs. US. To investigate further, we regressed *vol* over *repeq*, *repearn*, *diveq* and *divearn* (Reg38 to Reg41).

The opposite signs above mentioned come from the strong relationship of opposite signs in the US (negative) and in Europe (positive) between dividend payout and volatility (Reg40 and Reg41). There is also a strong negative relationship between repurchase payout and volatility in the US while no significant relationship in Europe. In the light of what we discovered previously, we formulate a possible explanation:

Higher dividend payouts could refer to stability and so lower volatilities. This could (partly) explain the negative relationship in the US between dividends and volatility. Nevertheless, this relationship is of opposite sign in Europe. To explain these paradoxical results, it is important to note that we have found a strong and positive relationship between the gearing (D/E) and the dividend payout ratio in our previous results (in the US as well as in Europe, cf. Reg34), which could explain why higher dividend payout ratios come with higher volatilities in Europe. Indeed, higher leverage should imply higher stock volatility, *ceteris paribus*. The results of the correlation between leverage and volatility are as follows:

vol ~ de					
	Coeff.	Std. Error	t-value	Pr(>|t|)	Signif.
US	-0.010	1.71E-03	-5.91	3.82E-09	***
EU (UK+CE)	0.026	4.91E-03	5.36	9.19E-08	***

These results correspond to our hypothesis in Europe, i.e. there is a strong positive relationship between volatility and leverage. It may explain why higher dividend payout ratio come with higher volatility in Europe as we saw previously that there is a positive correlation between debt levels and dividend payout; higher debt levels are allowed by higher visibility of future cash flows, which allows also to commit to higher dividend payout ratios.

However, to explain the results found in the US, we could argue that mature firms have lower volatility and higher debt levels, hence the higher is the maturity, the higher is the debt level and then, even if it does increase the volatility of the stock *ceteris paribus*, these stocks still have lower volatility than growth stocks. Nevertheless, it does not explain the difference with Europe.

In Reg16, we found a significant negative correlation between the dividend payout ratio and the market-to-book ratio in the US, while no significant correlation in Europe. It suggests that mature firms in the US more specifically use dividend than European firms, and then, as mature firms have lower volatility, it would explain why we found a negative relationship in the US and not in Europe between dividends payout ratios and volatility.

The positive relationship between volatility and repurchase ratio in the US has several possible explanations: it could be due to the efficiency of the share price management thanks to share buybacks (cf. "operations of stabilizations"), but it may also be because firms that repurchase a lot have lower volatility. In that case, lower volatility is not a consequence of the repurchase. These two explanations are not exclusive. To investigate further, we should regress volatility over repurchase ratio including dummies to discover if there is correlation between the level of repurchase and the volatility of the stock.

Reg40bis: vol ~ repeq + dummies [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-5.28	7.81E-01	-6.8	2.04E-11	0.91	***
CE	18.61	1.50E+01	1.2	2.17E-01	0.55	#
UK	-2.99	1.42E+01	-0.2	8.34E-01	0.61	#

The results of Reg40bis are of particular interest: there is a very significant and negative correlation between the level of repurchase and the volatility at company level in the US, while there is not significant correlation in Europe. Do US firms repurchase more when their volatility is low? Alternatively, is the volatility lower thanks to the repurchase activity? These two possible explanations are not exclusive. Again, we observe a very significant difference between US and EU results.

Reg41bis: vol ~ diveq + dummies [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-22.01	3.31E+00	-6.6	4.32E-11	0.91	***
CE	87.31	2.17E+01	4.0	6.20E-05	0.57	***
UK	104.53	3.51E+01	3.0	3.21E-03	0.64	**

Reg41bis shows that there is also a strong negative correlation between the dividend payout and volatility at company level. At first sight, we could say that as the dividend payment is not a tool to manage the share price, and so companies payout more in the US when the volatility is lower, which would induce that the lower volatility observed in Reg40bis is not due to share buybacks. Nevertheless, are we sure that the payment of dividend is not a tool to stabilize the share price? For diverse reasons, we could argue that paying higher dividend is a way to reduce the volatility. For instance, investors could feel more confident about the stability of future cash flows (signaling theory).

We still have results of opposite signs in Europe with dividends and volatility at company level. Companies pay much more dividends when their volatility is high. There is no obvious answer to explain these very different relationships, but it does confirm that US and EU firms does not use repurchase and dividends in the same way.

In an attempt to better identify these differences, we created the variable "*rep*", which is 1 if rep>0 and 0 if not. We regressed *de*, *divearn*, *totearn*, *invcfas* over *rep*.

Reg42: de ~ rep [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-21.446	4.87E+00	-4.4	1.11E-05	9.94E-03	***
CE	-0.863	5.08E+00	-0.2	8.65E-01	0.00	#
UK	22.770	1.37E+01	1.7	9.81E-02	0.00	.

Reg43: divearn ~ rep [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-0.096	2.37E-02	-4.1	5.29E-05	8.14E-03	***
CE	0.001	3.25E-02	0.0	9.76E-01	-9.15E-04	#
UK	0.050	3.91E-02	1.3	1.98E-01	1.81E-03	#

Reg44: totearn ~ rep [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	0.697	3.30E-02	21.2	2.00E-16	2.02E-01	***
CE	0.391	3.33E-02	11.8	2.00E-16	1.24E-01	***
UK	0.386	5.38E-02	7.2	4.06E-12	1.23E-01	***

Reg45: invcfas ~ rep [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-0.027	5.12E-03	-5.2	2.23E-07	1.44E-02	***
CE	-0.009	5.70E-03	-1.6	1.04E-01	1.64E-03	#
UK	1.255	4.16E-01	3.0	2.71E-03	2.28E-02	**

Reg42 reveals that US companies using share buybacks are significantly less indebted than other US firms, while in Europe there is no correlation, and in the UK this correlation would tend to be positive. We also found that the dividend payout ratio of repurchasing firms is significantly less important in the US, while we found no correlation in Europe.

Companies using share buybacks tend to have a higher total payout (Reg44). Finally, we observe no correlation between the level of investment and the decision to repurchase in Europe, while in the US there is a negative relationship and a positive one in the UK. (UK repurchasing firms invest more)

Reg46: invcfas ~ de [2008-2012]						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
US	-6.73E-05	2.40E-05	-2.8	5.01E-03	3.70E-03	**
CE	1.06E-04	3.12E-05	3.4	7.40E-04	1.04E-02	***
UK	1.26E+00	1.26E+00	0.4	3.02E+00	2.71E-03	**

The relationship with investment and debt levels is negative in the US, positive in Europe.

It is worth looking at the specificities of US firms vs. EU firms.

Reg47: mtbr ~ us						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
	7.20E-01	8.28E-02	8.7	<2e-16	1.15E-02	***
		Reg47': mtbr ~ us + crisis + crisis * us				
crisis * us	-1.35E-01	1.64E-01	-0.8	4.13E-01	2.80E-02	#

Reg48: de ~ us						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
	-5.00E+00	2.34E+00	-2.1	3.31E-02	5.35E-04	*
		Reg48': de ~ us + crisis + crisis * us				
crisis * us	9.95E-01	4.69E+00	0.2	8.32E-01	1.50E-03	#

Reg49: invcfas ~ us						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
	1.06E-02	2.48E-03	4.3	1.90E-05	2.65E-03	***
		Reg49': invcfas ~ us + crisis + crisis * us				
crisis * us	-1.08E-03	4.97E-03	-0.2	8.29E-01	2.37E-03	#

Reg50: roa ~ us						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
	1.09E+00	1.38E-01	7.9	4.43E-15	9.06E-03	***
		Reg50': invcfas ~ us + crisis + crisis * us				
crisis * us	4.32E-01	2.76E-01	1.6	1.18E-01	1.13E-02	#

Reg51: fcfas ~ us						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
	7.38E-03	1.60E-03	4.6	4.32E-06	3.04E-03	***
		Reg51': invcfas ~ us + crisis + crisis * us				
crisis * us	9.96E-03	3.21E-03	3.1	1.90E-03	4.87E-03	**

US firms tend to be less indebted, have higher ROA, higher investment ratio (*invcfas*) and significantly higher market-to-book-ratio. The financial crisis did not change significantly these differences. They also have higher free cash flows generation and the financial crisis increased the gap (cf. Reg51 et Reg51').

Reg52: totearn ~ us						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
	1.02E-01	1.56E-02	6.6	5.45E-11	6.35E-03	***
			Reg52': totearn ~ us + crisis + crisis * us			
crisis * us	4.31E-02	3.12E-02	1.4	1.66E-01	6.53E-03	#

Reg53: divearn ~ us						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
	-1.72E-01	1.03E-02	-16.7	<2e-16	4.01E-02	***
			Reg53': divearn ~ us + crisis + crisis * us			
crisis * us	2.20E-02	2.05E-02	1.1	2.83E-01	4.67E-02	#

Reg54: repearn ~ us						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
	2.73E-01	1.30E-02	21.0	<2e-16	6.23E-02	***
			Reg54': repearn ~ us + crisis + crisis * us			
crisis * us	2.18E-02	2.61E-02	0.8	4.03E-01	6.40E-02	#

Reg55: repdivrep ~ us						
Sample	Coeff.	Std. Error	t value	Pr(>|t|)	Adjusted R^2	Significance
	3.19E-01	8.84E-03	36.2	<2e-16	1.75E-01	***
			Reg55': repdivrep ~ us + crisis + crisis * us			
crisis * us	-3.27E-03	1.77E-02	-0.2	8.53E-01	1.78E-01	#

Eventually, US firms tend to have higher total payout than EU firms (Reg52), thanks to much higher repurchase payouts (Reg54) and despite lower dividend payouts (Reg53). It results in a higher share of repurchase in the payout mix (Reg55). The financial crisis have not affected significantly these differences between the US and EU (Reg52' to Reg55').

US and EU firms had different payout policies before the financial crisis and it does not seem that the financial crisis had a particular impact on these differences. Interactions between maturity, debt levels and payout policies are complex. We think that part of the differences between US and EU payout policies come from the fact that US firms are less mature and generate more cash. As a consequence, they return more cash to shareholders, but they use more share buybacks to do so not to commit on the long term.

Nevertheless, differences in payout policies seem to come also from a differentiated use of payout tools, *ceteris paribus*. For instance, as revealed by Reg16, there is a strong correlation in the US between the dividend payout ratio and the market-to-book ratio while this

relationship does not exist in Europe. US companies do not make the same use of share buybacks and dividends than European firms. For instance, in opposition to the US, there is no correlation in Europe between the decision to repurchase and debt level, investment levels, and the dividend payout. There is also no relationship between ROA and dividend payout. These results tend to show that the use between share buybacks and dividends is less differentiated in Europe than it is in the US and it could explain why there is such differences in the correlation between repurchases, dividends and volatility in the US and in Europe.

10) Summary

- Share buybacks dropped during the financial crisis and the worst year in terms of absolute payout was 2009. In Continental Europe, firms almost did not reduced their repurchase program in 2008. In the UK and the US, 2008 was also no that dramatic for repurchase compared to the following years. On the other end, the payment of dividend was overall not affected: we do not observe significant difference in the dividend payout level between 2008 and 2012 compared to year 2007, except in 2009 in Continental Europe (Nevertheless, the relationship in Europe is feebly significant).
- Dividends are strongly auto-correlated whereas share buybacks have auto-correlation coefficients which are c. 50 times lower. Overall, the total payout is strongly auto-correlated with coefficients close to 0.7 in Europe and 0.6 in the US. The crisis impacted negatively the auto-correlation coefficient of repurchases in the US as well as in Europe. Nevertheless, this negative impact was of a lower extent in the US than in Europe. Conversely, the auto-correlation coefficients of dividend payout was not affected by the crisis in the US and in CE. And in the UK, we observe a significantly higher auto-correlation coefficient in dividend between 2008 and 2012! Overall, the auto-correlation coefficient of the total payout is less important in the US.
- The absolute amount of dividends is not correlated to the level of operating cash flows at firm level, which is totally in line with the dividend smoothing theory. Conversely, there is a strong positive correlation between repurchase absolute payout and operating cash flows at firm level. Overall, the total payout is strongly correlated to operating cash flows in the US, but not in Europe, which is in line with our first analysis: US are more

opportunistic in their payout, which fluctuates more, and share buybacks are the adjustment variable. Said in another way, American firms fine tuned their total payout with repurchases. We do not observe such a thing in Europe.

- At firm level, the repurchase payout ratio is positively correlated to free cash flows, while the dividend payout ratio is not. This is true at intra-company level as well as macro level. Overall, the total payout ratio has positive relationship with free cash flow generation at macro level. It is also verified at firm level, but at firm level this relationship is less significant in Europe than in the US. In addition, the crisis had an impact on the regression coefficient between total payout and free cash flow in the US while it had no impact in Europe. This is a confirmation of the results found with operating cash flows: American firms adjust their total payout in function of their cash flow generation (operating cash flow, free cash flows) whereas European firms do not. More precisely, US firms adjust the payout and payout ratio with the absolute and relative share buybacks payout.
- Repurchase payout ratio is positively correlated to the market-to-book ratio, in Europe as well as in the US. Relating to dividends and market-to-book ratios, there is no relationship in Europe, while we observe a strong and negative relationship in the US. It means that US firms do not make the same use of dividends depending on their maturity, while it is not the case for European firms. As a consequence, in Europe as well as in the US, at macro level, the payout mix is driven by market-to-book ratio: the higher it is, the higher the share of repurchase among the mix.
- At firm level (i.e. with dummies in the regression), we found that US companies tend to gave favor to share buybacks when their market-to-book ratio were at low levels. It does not confirm that American firms adjust their payout mix depending on their valuation, nevertheless it is a sign of it. We did not find such positive correlation at firm level between the market-to-book ratio and the share of repurchase in Europe, which is not surprising as European share buybacks almost vanished during the financial crisis.
- Without surprise, at macro level we found negative correlation with the investing cash flow for both dividend and repurchase payouts, i.e. firms that invest relatively more payout less. The financial crisis did not affect that relationship.
- Dividends and repurchases payout ratios have significant relationship with ROA at macro level. Indeed, we observed a positive correlation with repurchase payout ratio in Europe

as well as the US whereas we found a negative relationship with the dividend payout ratio in the US and in the UK. In Continental Europe, a higher ROA had no impact on the dividend payout. The payout mix is significantly driven by ROA at micro and macro level; the financial crisis reduced the coefficient of correlation (which were still significant) between these two parameters in Europe but not in the US.

- At firm level, a significant and positive relationship does exist between dividend payout and repurchase payout in our three samples between 2008 and 2012, i.e. firms tend to have higher dividend payout ratios when they have higher repurchase ratios. Nevertheless, at firm level, the share of repurchase in the payout mix is negatively linked to the dividend payout ratio while positively related to total payout ratio. This is not surprising as it does mean that firms total payout ratio is higher when the repurchase ratio is higher, and at the same time, the share of dividend in the payout mix is lower, which is almost mechanical. At macro level, firms who have higher repurchase ratios tend to have higher dividend payout ratios in Europe, but it is not the case in the US. It confirms that American and European companies make a different use of repurchases and dividends.
- At firm level, if we compare the 2003-2007 period with the 2008-2012 period, we observe that over 2008-2012, firms significantly reduced share buybacks ratios in Europe as well as in the US (but the relationship is less significant in the US) while it significantly increased dividend payout ratios except in the UK.
- At macro level, indebtness is positively correlated to dividend payout in Europe as well as in the US and this correlation was not affected by the financial crisis. Conversely, debt is negatively related to repurchase payout in the US. In Continental Europe, we found no relationship between the leverage and the repurchase payout. At firm level, higher indebtness is signifcantly correlated to a lower share of share buybacks in the payout mix, i.e. firms tend to have higher debt level when they repurchase more.
- Payout policies are different depending on sectors. More particularly, we have found that the utilities sector pay significantly higher dividends and repurchases less. In parallel, utilities are significantly more indebted than other companies, which has given us some indication about a possible link between debt levels and dividends.
- Eventually, volatility stressed that significant differences do exist between US and EU payout policies. Volatility is the result of many parameters as well as complex interactions with overall market. More precisely, we found that at macro level as well as

firm level, volatility is negatively correlated to dividends in the US whereas positively correlated in Europe. In parallel, we found that volatility is negatively correlated at macro and micro level to repurchases in the US, and we do not observe any correlations in Europe. Explaining the origin of these differences remain tricky. Some possible factors could explain these differences: (i) American firms are less mature than European firms (higher M/B, higher investment, lower D/E, higher ROA, higher free cash flow generation etc.) (ii) Ceteris paribus, they tend to make a different use of share buybacks than European firms. For instance, share buybacks is a tool to adjust the total payout

- Overall, we found that correlations between different factors deliver close results in Continental Europe and in the UK, while results can be significantly different in the US. Surprisingly, when it relates to payout policy, UK firms behave like their continental peers.

IV. Conclusion

The results of our analysis at aggregate level, as well as our analysis at firm level are coherent and converge toward the same conclusion: the financial crisis marked a halt to the growing popularity of share buybacks in Europe as well as in the US. Nevertheless, the drop was more significant in Europe than in the US, where share buybacks were still at much more higher levels than in Europe. In the meantime, dividends were thriving.

Then, on the one hand, the crisis has proven the signaling power of repurchases is weak. On the other hand, it revealed the strong signaling power of dividends. Firms maintained their dividends despite the financial crisis, in Europe but also in the US. In 2009, US firms returned more cash with dividends than with repurchases, for the first time since 2003. US firms massively reduced their use of repurchases during the financial crisis, but they still repurchased much more than European firms because US repurchase levels were much higher than EU levels before the crisis. Share buybacks are a common tool to redistribute cash in the US, and it seems that US companies make a differentiated use between dividends and repurchases in function of their characteristics (maturity, stability of future cash flows, investment levels etc.). In Europe, our results showed that the use of share buybacks is less tailored to firm characteristics.

Our study showed that the payout of European firms is more stable. The total payout is not correlated with cash flow generation at firm level. In the US, the payout policy is much more opportunistic: the total payout is significantly correlated with cash flow generation thanks to the use of repurchase. Share buybacks allows more flexible payout policies. In Europe, even if share buybacks were gaining momentum before the financial crisis, they represented a low share of the payout mix before the financial crisis and it could explain why they almost totally disappeared during the crisis: European firms gave priority to maintaining dividends. As US firms pay less dividends than European firms, it allowed them to perform significant repurchase program during the crisis. Nevertheless, share buybacks came back at high levels in 2010 and 2011 in Europe as well as in the US, but not at the expense of dividends. Eventually, the financial crisis proved that share buybacks are far from replacing dividends, particularly in Europe in troubled times.

Appendix

Appendix 1: Repurchase regulation (Source: Dhanani & Robert, 2009)

Country	Regulatory categories					
	Shareholder approval	Timing restriction	Price restriction	Volume restriction	Disclosure requirement	Insider trading
UK	✓	✓	✓	✓	✓	✓
US	x	x	x	x	x	x
Japan	x	✓	✓	✓	✓	✓
France	✓	✓	✓	✓	✓	✓
Germany	✓	✓	✓	✓	✓	x
Canada	x	✓	✓	✓	✓	✓
Italy	✓	x	✓	✓	✓	✓
Netherlands	✓	x	✓	✓	✓	✓
Switzerland	✓	✓	✓	✓	✓	✓
Hong Kong	✓	✓	x	✓	✓	✓

Appendix 2 : Share repurchase and stock options (Source: K. Kahle (2002))

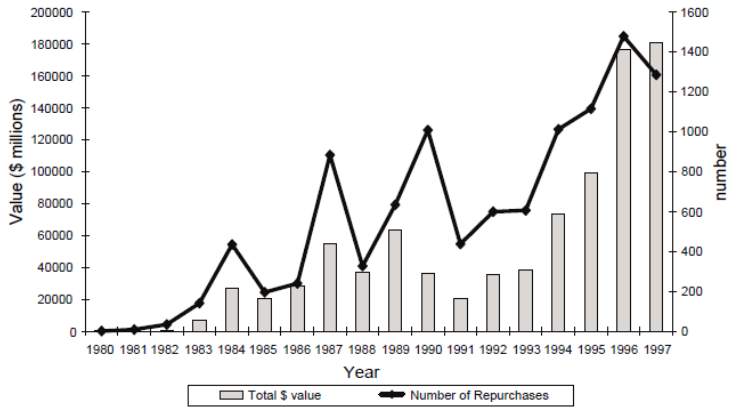


Fig. 1. Yearly number and dollar value of all repurchases announced between 1980 and 1997, as reported by Securities Data Corporation.

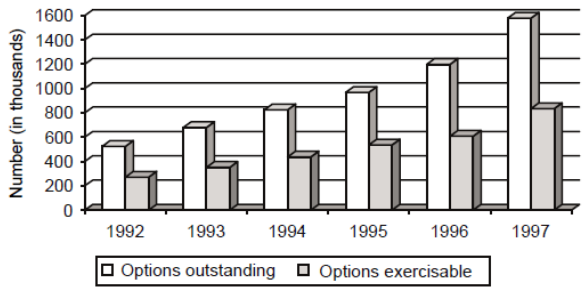


Fig. 2. Average number of managerial options outstanding, exercisable, and exercised (in thousands) from 1992 to 1997 by firms listed on Standard and Poor's Execucomp database.

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