Secular Stagnation (Or Corporate Suicide?)

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> ***Abstract***
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> *We advanced the null hypothesis that stock buybacks will have a positive impact on the market value of a business over a five-year horizon. We find that there is a negligible chance for this to be true (with a two tail heteroscedastic p=.000023).*
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> *We find that the more capital a business invests in buying its own stock, expressed as a ratio of capital invested in buybacks to current market capitalization, the less likely that company is to experience long-term growth in overall market value.*
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> *Our findings, for US firms worth more than $100 million, suggest that long-term investors, such as pension funds, should be wary of investing businesses that have engaged in significant cumulative stock repurchases (i.e. 50% or more of current market cap.)*
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> *We find that excessive buybacks in the past decades are a significant cause of secular stagnation, inasmuch as they effectively reduce corporate R&D while contributing, instead, to an asset bubble that creates no value.*

> ** This paper is also available at http://www.olen.com/2017/07/11/buybacks-or-corporate-suicide/*

The causes of stagnation

Economists often speak of “headwinds” to explain low (below “trend”) economic growth. This is a hot topic in the aftermath of Donald Trump’s election to the presidency of the United States. In brief, the old “Laffer Curve” – “supply-side economics” or what George Bush termed “Voodoo Economics” – is being renovated by the president and his men. They want to justify cutting corporate taxes from the current nominal 39% (which hardly any corporation actually pays) to a more competitive 15%, while also getting rid of a number of other taxes bothersome to billionaires, the estate tax, the alternative minimum tax and the surtax that pays for the subsidies in the Affordable Care Act. Secretary of the Treasury Steven Mnuchin has argued rather fiercely that all of the proposed tax cuts can be ‘paid for’ by increasing the real growth rate of the US over the past 15 years from 1.8% p.a. to an “historical” 3% p.a. Is that feasible?

This question was raised in the Wall Street Journal on March 1, 2017 by Edward Lazear, former chair of the Council of Economic Advisors from 2006 to 2009 under the second President Bush and currently a professor at Stanford University’s graduate School of Business. He notes the obvious macro-economic shifts. The post WW II U.S. average of 3% GDP growth per annum was achieved by allowing labor force (i.e. population) growth of 1% p.a. and productivity growth of 2% p.a. Simplifying, Eleazar says that the 3% target might be reached if certain policy changes can be implemented.

The first change, Prof. Lazear argues, is to spend more on research by changing the tax law to allow R&D to be charged as a cost rather than an investment. He cites studies suggesting that – over a ten-year period – this change

would increase the current growth rate by somewhere between 0.5% and 0.9%. (He fails to mention the possibility that faster expensing of research will allow CEOs to spend more on dividends and share buybacks, not on R&D.)

This leaves the other 1.1% to 1.5% p.a. needed to achieve the 3% p.a. goal. Increasing workers hours might achieve this goal. The obvious way to increase worker hours is increased immigration, but Trump wants to cut immigration. Another approach would be to keep people in the workforce longer. Extending the age at which Social Security coverage begins – from age 60 to 67 (depending upon birth year) – to age 70 or so would achieve that result. Longer lifespans arguably justify this change but pressures to find jobs for new graduates are likely, as in Europe, to push retirement ages earlier, not later.

Eleazar's "solution" is to change "existing policies that" (in his words) "subsidize leisure over work." Apparently "leisure" is recovering from illness and the policy he has in mind is the Affordable Care Act ("Obamacare"). The Congressional Budget Office (CBO) estimates that continuing Obamacare "will reduce the hours worked [annually] on net, by about 1.5% to 2% during the period from 2017 to 2024, almost entirely because workers will choose to supply less labor." Cutting hours worked – for the same output – would accomplish the goal. But cutting the Obama care subsidies merely forces sick people back to already overloaded hospital emergency rooms. Being sicker they would work less and output would decline, not grow. However, Eleazar seems to think that with less medical care they would work harder, to pay medical bills, not less. Voila!

So reducing immigration, and better health care for the poor and elderly, are headwinds. There are other headwinds he doesn't mention that may have contributed to the decrease in US economic growth from 3% p.a. to 1.8% p.a. in recent years. One is surely market saturation for consumer goods like cars, TVs and even houses, that were much scarcer in the 1950s and '60s. Back then, people saved for a down payment on a car or a house. Moreover, declining birth rates mean fewer children, so young people need smaller houses, and smaller cars. Further, many goods last longer: at some point there is no space for a larger television nor need to replace a car that lasts well over a decade. PC sales are down as computers are now "good enough" to meet the overwhelming majority of consumer needs.

Increasing scarcity of essential natural resource inputs, such as petroleum is another headwind. The scarcity issue, as regards agricultural land has been recognized by many economists, starting with Malthus (Malthus 1798 [1946]). Next came "The Coal Question" by (Jevons 1865 [1974]). More recently, one could reckon (Georgescu-Roegen 1971, Meadows et al. 1972), (Daly 1979), while dismissed as premature by others e.g.(Barnett and Morse 1963, Solow 1974, Stiglitz 1974, Simon and Kahn 1984). There is enormous literature on this topic.

The main reason for discounting resource scarcity is that technological progress has both increased the recoverable reserves of key resources and increased the efficiency of both extraction and use. Malthus certainly did not (could not) allow for this. However, technological progress in the field of resource recovery has limits. For instance the energy return on energy invested (EROI) in the oil and gas sector has declined dramatically since the 1930s, and the rate of decline is probably accelerating as deep sea drilling and shale 'fracking' account for an ever-increasing share of the current supply (Ayres 2016). The EROI for those resources is well above unity, but it is declining. When the EROI approaches unity, extraction will finally cease. There is a comparable relationship for copper and other geologically scarce metals.

There are still other "headwinds". The accumulation of regulations, bureaucracies and "checks and balances" that societies introduce as they get wealthier, and as periods of political stability (between revolutions or major shakeups) get longer, are also important growth impediments (Olson 1982, 1988, Graeber 2015). Debt (and deficits) is yet another headwind (Graeber 2011) (Ayres 1998). When growth rates fall below expectations ("trend"), there is an accumulation of debt that cuts profits and increases costs, resulting in a negative feedback e.g. (Reinhart and Rogoff 2010, Graeber 2011). This is why 'booms' are usually followed by 'busts'.

There is still another possible headwind, related to long "Kondratiev cycles" in technology. The basic idea is that during a growth phase (i.e. a boom), financial resources and labor are fully utilized, whereas during recessions,

consumer demand is slack and financial resources may be more available to support strategic industrial R&D and innovations. This theory of cyclic innovation has been called “The Schumpeter Clock” by Haag, Mensch and Weidlich (Mensch 1979, Haag, Weidlich, and Mensch 1988); also Ayres (Ayres 1989).

The present paper can be regarded as an inversion of that idea. However, we posit a new and very different mechanism for declining R&D. The work of Haag, et Al argues that weak consumer demand, governed by the business cycle, enables increased levels of industrial R&D resulting in more product innovation. To the contrary, in recent decades it appears that the classical R&D investment mechanism by corporations has been short-circuited. Instead, when managers have no idea how to use the firm’s profits to promote growth, they invoke the “shareholder value maximization”(SVM) antra and engage in share buybacks. The prime purpose of those buybacks seems to be to increase the wealth of top executives and short-term “activist” investors such as hedge funds.

As William Lazonick noted in his 2014 HBR article “Profits without Prosperity”, the 10 biggest share buybacks during 2003-2012 added up to $859 million.[1] The average CEO pay for those firms was $168 million, while the next 4 highest paid executives got $77 million each. The CEO pay was 58% based on stock performance (options and awards) while the other top executive pay was 56% based on stock prices. Incredibly, all but three of those companies spent more than their net income on buybacks. H-P (177%) was the highest on that list, followed by Pfizer (146%), Microsoft (125%), Cisco Systems (121 %), Procter and Gamble (116%), IBM (111%) and Intel (109%). The lowest was Walmart (73%).

We show hereafter that this strategy may have good for “activist investors”, like Carl Icahn, Nelson Pelz or David Einhorn, who come and go, skimming the cream, but not for long-term investors like pension funds. Nearly 60% of non-financial public companies in the US have bought their own shares since 2010. In the last reporting year (2015) share repurchases were $520 billion, along with $320 billion in dividends, adding up to $885 billion, as compared to net income of $847 billion.

Prior studies of the economic consequences of share repurchases include INSERT REF (Peyer and Vermaelen 2005, Kaplan 2015).

Later in this paper we show that the more the company spends on buybacks, the less it is likely to grow, over a five year time-scale. Companies that have spent a large fraction of their current market cap on buybacks are virtually guaranteed to decline in the coming years. Exxon Mobil (88.7% of market cap is buybacks), Xerox (119.2%) IBM (107.4%) and HP (271.7%) are all in this category.

> *Boards of Directors (usually appointed by the CEO) buy stock when they have run out of ideas for better uses of the money.*
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> *Part of the problem today, is that CEOs of big firms are hired help, not founders. CEOs have only a short time in office, in which to make their fortune. They are often lawyers, MBAs, or professional consultants (many are graduates of McKinsey). Hardly any have scientific training or any experience in creating new technology.*

The origins of Shareholder Value Maximization (SVM) theory

This theory is said to stem from Milton Friedman’s widely quoted assertion, in an article in the NY Times Magazine. In his words “In a free-enterprise, private property system, a corporate executive is an empoyee of the owners of a business. He has direct responsibility to his employers….to conduct the business in accordance with their desires…. [which Friedman assumed to be] “to make as much money as possible …” (Friedman 1970). Elsewhere in the article he said that the only social responsibility of CEOs is to maximize profits on behalf of shareholders, ignoring all other “stakeholders”. Friedman even argued that any act of “corporate social responsibility” is ‘*taxation [of the*

shareholders] without representation' recalling the argument used by colonial Americans against the British stamp tax back in 1776 (op cit.)

The context of Friedman's article is fairly important. The headline "The social responsibility of business is to increase its profits" was followed by a photo of GM Chairman James Roche replying to members of "Campaign GM", a national group that had demanded that GM should name three new directors to represent the "public interest".[2] Not surprisingly, management hated the idea and campaigned fiercely against it. Friedman's article was one of his weapons. The shareholders loyally rejected the proposal.

There was prior context, often forgotten these days. It began in 1956 when a second year Harvard Law student named Ralph Nader began doing research on the auto industry and its policies regarding safety. He started collecting material. In 1965 he found a publisher (Nader 1965). It focused especially on a long list of safety related design problems of GM's "innovative" attempt to design a small fuel-efficient car, the Chevrolet Corvair. This got attention from some legislators, especially Senator Abraham Ribicoff of Connecticut. Ribicoff convened a Senate hearing on auto safety and Nader was the star witness. Meanwhile, GM management in Detroit imagined that Nader, a lawyer, might be working for personal injury lawyers in Corvair litigation. They hired an investigator to follow him around, looking for proof (they said). When this was uncovered, it backfired, GM had to apologize, and Nader became an international celebrity. His book became a best-seller. A year later (1966) Lyndon Johnson signed the National Traffic and Motor Vehicle Safety Act. The fact that every car made today has seat belts and airbags (and many other changes) is only one of the consequences of this episode. (Nader later organized an NGO called Public Citizen and still later, ran for President twice, with notorious results.)

The above paragraph may seem to be an irrelevant digression. It isn't. Milton Friedman probably believed what he wrote, but he must have known he was taking sides in a major public dispute. GM management won the battle over (not) including representatives of the public interest on their board.

But they lost the war, by putting themselves on the wrong side of several controversies, not only the safety issue, but the issue of air pollution, fuel economy and small cars.[3] The US car-makers wanted to make big "fuel guzzlers" (they still do) because they are more profitable. There was a market for small, well-designed fuel efficient cars. It was met, not by Ford or GM but by VW's "Beetle" and Honda's "Civic", giving the foreign auto-makers their first real foothold in the US. The whole US auto industry lost that war. The lesson not learned was that corporations really cannot safely neglect "social responsibility" in their decision-making. (The analogy between the US auto industry's obsession with big cars and IBM's obsession with big computers is also interesting.)

Apart from Friedman's misunderstanding about the legal rights accruing to share-ownership, Friedman's narrow view of corporate responsibility led to a mini-revolution in economics, known as the 'principal-agent' theory. This was elaborated in two influential papers on the theory of the firm, by Michael Jensen and William Meckling (Jensen and Meckling 1976) (Jensen and Meckling 1994). They sought to devise a simple objective function for managers – as opposed to vague objectives such as "public interest", or multiple objectives such as "triple bottom line" that cannot be mathematically maximized.

To simplify the problem they assumed that everything of importance in a business must be monetized. Consistent with Milton Friedman's ideas, they saw no need for businessmen to maximize consumer satisfaction, community welfare or environmental protection. Only shareholder's ("owners") need be satisfied. Having made that (quite radical) assumption, they argued that an deal objective function for a manager must be *to maximize the return on capital invested in terms of free cash-flow relative to a risk-adjusted "hurdle rate" i.e. based on what investors of capital "expected*". Generations of MBA students, notably at Harvard Business School (where Jensen taught) were persuaded that this was the golden rule for managers.

Unfortunately, even this theoretical objective function is impossible to calculate in practice for day-to-day decision-making. Real executives cannot use it. What they can (and do) do is to ask themselves whether a given action is likely to raise or lower the market price of the stock. Hence, it is the *price of the shares*, rather than the overall value

of the business, that has become the test of managerial performance. [4]

However, in law, corporations are “legal persons”, contrary to Milton Friedman’s assertion. Corporations legally own themselves. This has been confirmed a number of times in the courts, including the US Supreme Court (at least with respect to political contributions). The courts have ruled that Boards of Directors are required to act in the “best interests” of their client (the firm). But they do not have any direct fiduciary responsibility to the shareholders (Stout 2012).

It is argued by some proponents of SVM that returning money to shareholders is the most efficient way of re-allocating capital that is not needed for current business purposes. But this implies that shares should be repurchased during slumps, when there is no need for investment.

Curiously, the record shows the opposite: that most buybacks occur in boom times, when re-investment makes sense. Moreover, there is no evidence that firms buy back their shares as “investments” in the same way that one might invest in any growing business, with the objective of selling at a higher price. The record shows that firms that buy their own shares almost never sell at higher prices. If they do sell, because they need the money for some reason, it is likely to be at lower prices. For example, during the first three quarters of 2008 GE spent $3.2 billion buying its shares at $31.84 per share, but in the 4^{th} quarter it sold $12 billion in stock at $22.25 per share because of losses in GE Capital (Lazonick 2014).

Figure 1, below, from the Federal Reserve Economic Database (FRED) shows the market value of all traded shares in US public companies, from 1900 through 2015. Total market cap for all shares was comparatively very small in absolute terms until the mid-1950’s. Of course, the economy was much smaller then. But allowing for that, share prices were also rising, on average, but not very fast. The correlation of market cap to the DJI average during this time was close. The market cap rose considerably from 1954 through 1972, then fell by 50% thanks to the oil embargo and associated recession until 1975 but recovered until 1980, when the second oil crisis occurred. Curiously, the DJI average was not affected so much in 1979-80. But there was a deep recession in 1984 due to the Fed’s decision in 1982, under Paul Volcker, to raise interest rates very sharply. The announced purpose was “to kill inflationary expectations” because inflation had gradually become institutionalized in the US by a variety of institutional adjustments, such as the automatic adjustment of many wage agreements, and social security payments. to the cost of living.

Figure 1: Market Capitalization of Shares: US 1900-2015

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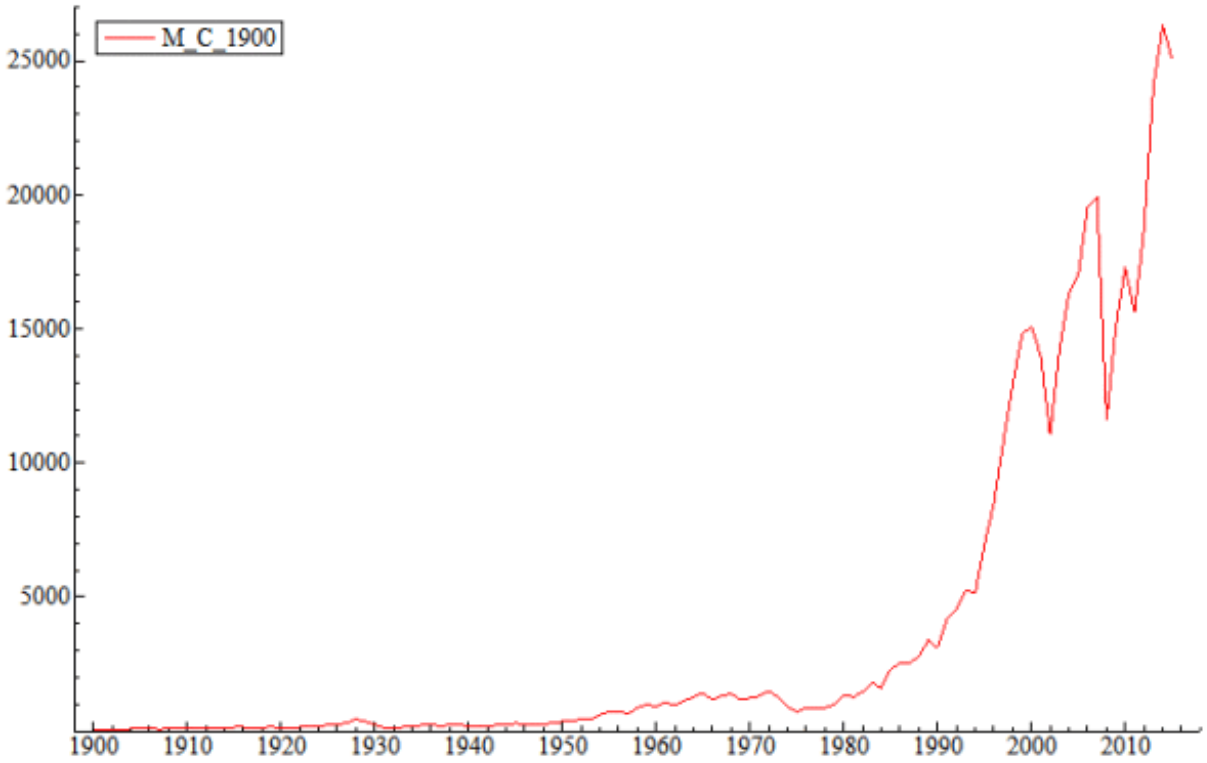


That “inflation killer” policy caused immense pain to foreign borrowers of US dollars, especially in Latin America, and it cost up to a million jobs in the US auto industry. But the recession did kill the inflation. Of course, interest rates fell sharply in 1983-84. Volcker’s gimmick succeeded in kick-starting the economy. A decline in oil prices in 1985-86 helped a lot, also.

From 1985 to 2000, the overall market cap increased from roughly 2000 to roughly 15,000, a factor of 7.5. (This increase was considerably less than the increase in the DJI average over the same period). Either the prices of DJI shares were rising faster than other shares, or the number of shares being traded was decreasing, or both. Since the Dow –Jones Industrial Average is (by definition) based on the prices of shares of the 30 the largest companies, it is likely that many of them had grown by merger and acquisition, at least as much as by “organic” growth. Since shares of acquired companies disappear after the merger, that could account for a decline in the number of shares, hence the rising price per share.

The deregulation in the world of finance started in the 1970’s, during Nixon’s administration. The first step was Nixon’s unilateral closure of the “gold window” in 1971, by revoking the US commitment to sell gold for dollars at a fixed price. This effectively finished the Bretton-Woods era of stability and severed the link between the US dollar and gold. (Nixon maintained the price of gold for a year, then raised it by 20% a year later, then let it fly in March 1973. Gold is now just another commodity, albeit much higher in price than it was in 1972.)

The first conversion of a partnership in the brokerage and investment banking sector occurred in 1970, when the brokerage Donaldson, Lufkin and Jenrette (DLJ) incorporated itself. They were followed by all of the other Wall Street partnerships. Salomon Brothers did it in 1981. The last to convert was Goldman-Sachs, which incorporated itself in 1998.

The net effect of this was to sharply decrease the personal risks of financiers for speculation, while simultaneously enriching them enormously. The former partners risked their own capital. After an IPO, the people in charge could risk other people’s money at much less risk to themselves. They have done so, in spades.

Two other deregulations from the 1970s were made by the SEC, during Ford's administration. One change in 1975 was that three privately owned credit rating organizations (Moody's, Standard and Poor's and Fitch) were given "official" status as Nationally Recognized Statistical Rating Organizations (NRSRO) arbiters of credit quality. The fact that they are paid for ratings by credit issuers was one of the major factors in the so-called "sub-prime" crisis of 2008. Another SEC innovation (also in 1975) was to eliminate fixed fees by brokers, introducing competition into a *status quo* oriented financial world.

Another step in deregulation was the privatization of the federal housing support system, known as Fannie Mae and it's junior spin-off Freddie Mac, in 1970-72. At that point Fannie Mae and Freddie Mac were allowed to buy mortgages (from S&Ls and other mortgage creators) that were not insured by the Federal Housing Authority (FHA). Soon the mortgages were being bundled and bought sold in packages, and soon after that mortgage-based bonds were "invented" in 1978 or so by Lewie Ranieri and his bond traders at Salomon Brothers (Lewis 1989). Soon mortgage-based bonds were treated as AAA-rated assets, for use as bank capital reserves, and as collateral for loans of all kinds.

At first, such loans were used primarily for financial purposes (e.g. mergers and acquisitions) but gradually the money moving around in the Wall Street stratosphere trickled down through the banks, enabling them to finance credit cards and educational loans. In short, the money supply grew rapidly thanks to the creation of mortgage-based bonds and their use as collateral. Yet, for some reason the increased money supply since 1980 has not resulted in a corresponding increase in the output of real goods and services, or in the wages of most workers (except those in the finance sector itself). The explosion in "finance" as a component of overall economic activity started in the 1980s.

Starting in 1983 or so a new breed of "activist" investors, arrived on the scene. Financed by "junk bonds" sold by Drexel Burnham Lambert's employee, Michael Milken, their names remain well-known in corporate board-rooms: Edelman, Einhorn, Goldsmith, Icahn, Jacobs, Peltz, Perelman, Pickens, Steinberg and others. Many current hedge and private equity funds were started during this period, including the Blackstone Group and Kohlberg, Kravis & Roberts (KKR).

The structural factors behind the change were (1) a peak in oil prices in 1979-80, (2) a recession, (3) a peak in the US inflation rate to more than 12% p.a. in 1981-2. That was followed by the Fed's dramatic prime interest rate increase to 20.5% in August, 1982. This rate was designed to kill inflationary expectations, which it did, although it also resulted in a wave of financial crises in countries that had borrowed US dollars to buy oil after the two crises. This rise in interest rates resulted in a very sharp (but short) recession that ended in 1984. That was followed by declining interest rates, declining oil prices and certain tax cuts (although social security tax, that primarily affects middle-class workers, was increased). Starting in 1885 there was an increase in GDP growth attributed by American Republicans to the income tax cuts, though lower borrowing costs – both from interest rates and securitization – abd lower petroleum prices are more likely explanations.

In 1982, President Reagan's newly appointed Chairman of the Securities and Exchange Commission (SEC), John S.R. Shad (previously at E.F. Hutton, a broker) decided to re-interpret the Glass-Steagall law, allowing firms to repurchase their own shares in the stock market. The creation of Rule 10b-18 created a "safe harbor" for firms to repurchase their own shares, as long as they didn't do it too fast.[5] This had previously been forbidden by the banking law of 1933 as "manipulation." What buybacks do, in practice, is to give money to shareholders (who will usually re-invest it elsewhere in the market), reduce the number of shares outstanding and thus increase profitability, and price, per share. Since 1982 – thanks in part to Jensen and Meckling's theory of the firm (Jensen and Meckling 1976) – top manager's compensation has been increasingly linked to share price, a supposed measure of managerial performance.[6] This has resulted in a boom in corporate share 'buybacks', especially since the full repeal of the Glass-Steagall law in 1998.

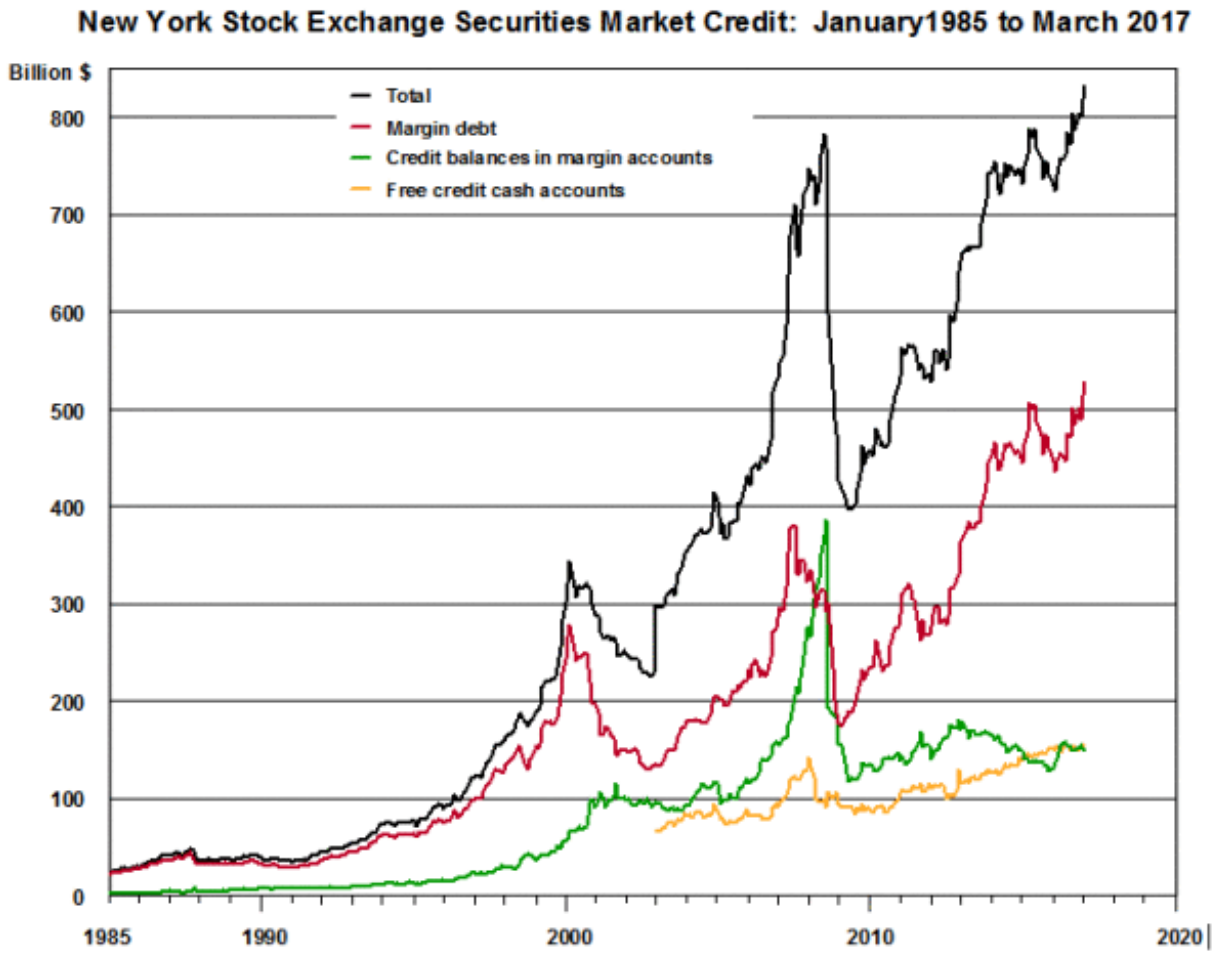
So-called "activist" investors (informally called "raiders") [7] have managed to impose their shareholder value-maximization ideology in most of the corporate board rooms of publically traded companies. Consequences vary

from firm to firm but, overall, the result has been to spend an increasing share of corporate profits on share buybacks and dividends, while cutting back on re-investment in the firm's business, and on R&D.

One of the interesting, but little known consequences of the changes since 1982 has been the use of periods of ultra-low interest rates to purchase shares. Data for margin credit the New York Stock Exchange are shown in Figure 3. In 1985, when the "Reagan boom" started, borrowing on margin, sometimes for the purpose of buying shares, was negligible, around $20 billion. By the "dot com peak it had risen to around $320 billion. After a short pullback in 2002, it rose again to over $750 billion in the summer of 2008 before falling to $400 billion in the winter of 2009. In 2017 the level of borrowing on margin to buy shares is at an all-time high, above $800 billion. The rise in market cap has been accompanied by a rise in borrowing for the purpose of buying shares (Figure 2).

Figure 2, Borrowing to finance buybacks

Figure 1Figure 2, Borrowing to finance buybacks



Since that time, many big US corporations have invested increasingly large fractions of their earnings in buybacks and dividends, while reducing their investment in physical capital and R&D. In many cases they have actually borrowed money (during periods of low interest rates) to do so. Investment in buybacks and dividends by US firms, overall, increased from negligible levels in the 1980s to 38% in 2000, 63% in 2009, 79% in 2011, 89% in 2013, 105% in 2014 and **110%** in 2015 (Brettell, Gaffen, and Rohde 2015).

While corporate R&D appears to be at record or near record levels in the US economy as a whole, it is increasingly concentrated in a few sectors, by a few fast-growing firms – mainly in Silicon Valley – that invest heavily in financing growth to create value, not to buy their own stock. Tables 1 and 2 present the data for public companies with market caps above $100 million, registered in the US). The tables below compare US firms in terms of total buybacks from January, 1990, through June, 2017. Our data is from the S&P Capital IQ database. The data base included all

buybacks, whether open market repurchase, fixed price, or accelerated share repurchased.

This yielded 4,229 businesses. We included only public companies whose shares are traded. We excluded businesses where we could not compute five-year market cap growth, either because the businesses no longer exist as a publicly traded entity (1,532 firms), did not exist five years ago (242 firms), are trading over-the-counter (338 firms) and firms, or have a market capitalization below $100 million 278 firms).

This leaves a dataset covering 1,839 firms with an aggregate volume of 6,516 inflation-adjusted [8] buyback transactions. These firms have a mean market capitalization of $12.6 billion and a median of $1.9 billion. We find that 199 firms have repurchased shares equal to at least half their current value. These firms are responsible for 29.7% of all buybacks ($1.7 trillion) but only 8.5% of total market cap ($1.97 trillion).

Of this group, 64 firms have spent over 100% of their current market cap on buybacks. This group includes well-known businesses: Sears Holdings, J.C. Penny, HP Inc., CBS, Macy's, Nordstrom, Motorola, IBM, Symantec, and Xerox. Office Depot, VeriSign, Target Corporation and others have spent well over 90% of their current market cap on buybacks. (Note that HP and IBM were among Lazonick's top ten largest individual purchasers of their own shares).

Market value is usually regarded as the net present value of expected future earnings after taxes. Net present value assumes an implicit discount rate for future earnings. Many economists argue that the "correct" rate should be about 7% p.a. (Weitzman 2001 2007). The sum of actual (current) market value plus total buybacks is what the company "should have been" worth, if it had not invested in buybacks but just kept the money in a money-market account.

Table 1 shows the 50 weakest companies in our set, in terms inflation-adjusted total buybacks since the year 2000 and current market capitalization (MC).

Table 1

Company	Adjusted Buybacks	Revenue	Market Cap-5 Yrs	Current Market Cap	Percent buybacks contribute to market cap	5-Yr Market Cap Growth
WMIH Corp. (NasdaqCM:WMIH)	$8,414.12	$5.40	$866.70	$250.00	3365.6%	-71%
Sears Holdings Corporation (NasdaqGS:SHLD)	$6,919.27	$22,138.00	$5,614.60	$729.40	948.62%	-670%
Fossil Group, Inc. (NasdaqGS:FOSL)	$2,305.69	$3,042.40	$4,691.30	$454.60	507.19%	-932%
J. C. Penney Company, Inc. (NYSE:JCP)	$6,547.08	$12,547.00	$4,966.30	$1,422.90	460.12%	-249%
Ruby Tuesday, Inc. (NYSE:RT)	$519.99	$1,091.20	$431.20	$118.60	438.44%	-264%
GNC Holdings, Inc. (NYSE:GNC)	$1,796.64	$2,540.00	$3,885.30	$504.80	355.91%	-670%
RealNetworks, Inc. (NasdaqGS:RNWK)	$454.33	$120.50	$287.10	$163.20	278.39%	-76%
HP Inc. (NYSE:HPQ)	$81,556.68	$48,238.00	$40,018.40	$30,013.90	271.73%	-25%

Barnes & Noble, Inc. (NYSE:BKS)	$1,257.30	$4,163.80	$368.90	$471.10	266.88%	22%
Macy’s, Inc. (NYSE:M)	$16,569.63	$25,778.00	$14,427.20	$6,729.60	246.22%	-53%
Brinker International, Inc. (NYSE:EAT)	$4,448.00	$3,257.50	$2,343.70	$1,852.00	240.17%	-27%
Essendant Inc. (NasdaqGS:ESND)	$1,327.47	$5,369.00	$1,027.00	$553.90	239.66%	-85%
Bed Bath & Beyond Inc. (NasdaqGS:BBBY)	$10,941.00	$12,215.80	$14,299.90	$4,920.30	222.36%	-66%
Avis Budget Group, Inc. (NasdaqGS:CAR)	$3,995.46	$8,659.00	$1,549.70	$1,821.20	219.39%	15%
Iconix Brand Group, Inc. (NasdaqGS:ICON)	$801.07	$368.50	$1,156.70	$368.60	217.33%	-214%
SPX Corporation (NYSE:SPXC)	$2,255.53	$1,472.30	$3,236.20	$1,060.60	212.67%	-205%
SEACOR Holdings Inc. (NYSE:CKH)	$1,211.36	$831.00	$1,790.40	$591.40	204.83%	-203%
Consumer Portfolio Services, Inc. (NasdaqGM:CPSS)	$205.35	$162.30	$37.10	$100.70	203.93%	63%
Abercrombie & Fitch Co. (NYSE:ANF)	$2,114.31	$3,326.70	$2,556.70	$1,050.30	201.31%	-143%
The Gap, Inc. (NYSE:GPS)	$17,332.97	$15,516.00	$13,355.60	$8,758.20	197.91%	-34%
Pier 1 Imports, Inc. (NYSE:PIR)	$863.19	$1,828.40	$1,735.00	$438.50	196.85%	-296%
Dillard’s, Inc. (NYSE:DDS)	$2,908.90	$6,418.00	$3,226.60	$1,516.40	191.83%	-113%
Career Education Corporation (NasdaqGS:CECO)	$1,264.06	$704.40	$404.70	$668.20	189.17%	39%
MBIA Inc. (NYSE:MBI)	$2,108.43	$288.00	$1,926.60	$1,122.20	187.88%	-72%
Denbury Resources Inc. (NYSE:DNR)	$1,057.06	$960.60	$5,308.00	$565.60	186.89%	-838%
DHI Group, Inc. (NYSE:DHX)	$255.03	$227.00	$592.80	$136.60	186.70%	-334%
Kohl’s Corporation (NYSE:KSS)	$11,287.83	$18,686.00	$10,497.90	$6,142.40	183.77%	-41%
Rent-A-Center, Inc. (NasdaqGS:RCII)	$1,115.15	$2,963.30	$2,009.90	$610.70	182.60%	-229%
R.R. Donnelley & Sons Company (NYSE:RRD)	$1,518.69	$6,895.70	$1,970.70	$847.00	179.30%	-133%

Genworth Financial, Inc. (NYSE:GNW)	$3,248.28	$8,369.00	$2,531.20	$1,821.20	178.36%	-39%
Viacom, Inc. (NasdaqGS:VIAB)	$22,532.89	$12,488.00	$25,316.00	$13,970.10	161.29%	-45%
Black Box Corporation (NasdaqGS:BBOX)	$185.67	$855.70	$466.40	$116.70	159.10%	-300%
TEGNA Inc. (NYSE:TGNA)	$4,789.19	$3,341.20	$3,164.90	$3,106.00	154.19%	-2%
Motorola Solutions, Inc. (NYSE:MSI)	$21,514.22	$6,038.00	$13,870.00	$14,015.90	153.50%	1%
Dean Foods Company (NYSE:DF)	$2,503.72	$7,710.20	$3,075.60	$1,636.80	152.96%	-88%
Big Lots, Inc. (NYSE:BIG)	$2,971.37	$5,200.40	$2,459.00	$2,071.40	143.45%	-19%
Entercom Communications Corp. (NYSE:ETM)	$585.78	$460.20	$202.30	$415.30	141.05%	51%
Urban One, Inc. (NasdaqCM:UONE.K)	$145.27	$456.20	$48.00	$103.10	140.90%	53%
Ocwen Financial Corporation (NYSE:OCN)	$466.10	$1,387.20	$2,440.70	$332.60	140.14%	-634%
World Acceptance Corporation (NasdaqGS:WRLD)	$885.29	$531.70	$906.20	$635.50	139.31%	-43%
PrimeEnergy Corporation (NasdaqCM:PNRG)	$145.02	$60.40	$71.10	$106.30	136.4%	50%
Hibbett Sports, Inc. (NasdaqGS:HIBB)	$596.88	$973.00	$1,477.70	$457.90	130.35%	-223%
DST Systems, Inc. (NYSE:DST)	$4,708.82	$1,556.70	$2,381.90	$3,747.60	125.65%	36%
Xerox Corporation (NYSE:XRX)	$8,585.23	$10,771.00	$10,269.80	$7,200.60	119.23%	-30%
CBS Corporation (NYSE:CBS)	$28,604.51	$13,166.00	$20,596.30	$24,696.10	115.83%	20%
Bank Mutual Corporation (NasdaqGS:BKMU)	$488.38	$96.20	$191.30	$422.60	115.6%	121%
Resources Connection, Inc. (NasdaqGS:RECN)	$446.65	$598.50	$504.50	$397.40	112.39%	-27%
Kforce Inc. (NasdaqGS:KFRC)	$539.03	$1,319.70	$471.60	$484.50	111.26%	3%
GameStop Corp. (NYSE:GME)	$2,316.48	$8,607.90	$2,288.00	$2,090.10	110.83%	-9%

Chico's FAS, Inc. (NYSE:CHS)	$1,250.99	$2,476.40	$2,345.90	$1,133.00	110.41%	-107%

> *These companies are now worth much less than they would have been if they had not repurchased their own stock. All have spent more inflation-adjusted capital on buying back their stock than the total current value of their business. We tend to refer to the companies in Table 1 as "zombies."*

Our list of "healthiest" companies is substantially larger; 269 firms have repurchased 2 percent or less of their market value. In the case of Amazon (0.42%), Facebook (0.05%), and Alphabet (1.16%) we guess that the buybacks were only to obtain shares for employees. Tesla, and some other high-quality businesses, are not on the list because there have been no buybacks at all.

Table 2

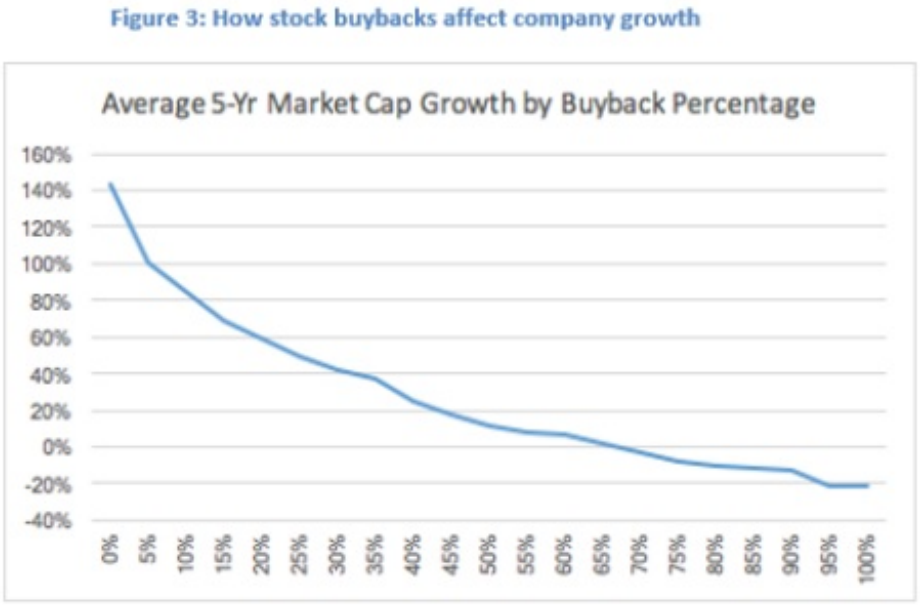
Company	Adjusted Buybacks	Revenue	Market Cap-5 Yrs	Current Market Cap
Facebook, Inc. (NasdaqGS:FB)	$229.32	$27,638.00	$68,076.60	$441,247.40
Xcel Energy Inc. (NYSE:XEL)	$41.82	$11,106.90	$13,561.40	$24,210.10
Berkshire Hathaway Inc. (NYSE:BRK.A)	$1,402.58	$214,596.00	$201,058.60	$420,750.70
Amazon.com, Inc. (NasdaqGS:AMZN)	$1,986.81	$135,987.00	$99,374.80	$474,433.70
Public Service Enterprise Group Incorporated (NYSE:PEG)	$103.88	$9,061.00	$15,955.90	$22,415.50
Essex Property Trust, Inc. (NYSE:ESS)	$101.50	$1,329.70	$5,279.00	$17,522.80
NextEra Energy, Inc. (NYSE:NEE)	$408.06	$16,155.00	$27,781.40	$66,460.00
D.R. Horton, Inc. (NYSE:DHI)	$83.87	$12,157.40	$5,186.30	$12,833.50
Kinder Morgan, Inc. (NYSE:KMI)	$275.80	$13,058.00	$35,270.90	$41,346.20
Centene Corporation (NYSE:CNC)	$97.69	$37,688.00	$1,567.10	$13,493.00
The Blackstone Group L.P. (NYSE:BX)	$172.60	$4,973.20	$6,190.20	$22,540.10
Duke Realty Corporation (NYSE:DRE)	$108.58	$918.00	$3,759.60	$10,120.20
Alphabet Inc. (NasdaqGS:GOOGL)	$7,674.05	$90,272.00	$184,272.60	$663,931.10
AvalonBay Communities, Inc. (NYSE:AVB)	$324.54	$2,052.10	$13,183.40	$26,922.00
Equinix, Inc. (NasdaqGS:EQIX)	$468.03	$3,612.00	$8,064.70	$33,809.10
Ventas, Inc. (NYSE:VTR)	$355.37	$3,447.00	$17,836.20	$24,961.80
American Water Works Company, Inc. (NYSE:AWK)	$250.38	$3,302.00	$5,896.20	$14,485.20
American Electric Power Company, Inc. (NYSE:AEP)	$629.46	$16,380.10	$18,937.00	$35,678.60

Netflix, Inc. (NasdaqGS:NFLX)	$1,159.60	$8,830.70	$3,655.10	$65,533.60
Crown Castle International Corp. (NYSE:CCI)	$725.86	$3,921.20	$16,357.20	$36,837.90
Danaher Corporation (NYSE:DHR)	$1,183.44	$16,882.40	$35,475.90	$59,472.20
Hologic, Inc. (NasdaqGS:HOLX)	$254.68	$2,832.70	$4,586.40	$12,712.50
Public Storage (NYSE:PSA)	$791.42	$2,617.30	$23,693.00	$36,812.70
Simon Property Group, Inc. (NYSE:SPG)	$1,072.56	$5,435.20	$45,316.00	$49,633.20
BB&T Corporation (NYSE:BBT)	$867.82	$10,221.00	$20,938.20	$35,659.70
Molson Coors Brewing Company (NYSE:TAP)	$483.19	$4,885.00	$7,008.40	$18,655.50
CME Group Inc. (NasdaqGS:CME)	$1,142.08	$3,595.20	$18,049.40	$42,837.50
UDR, Inc. (NYSE:UDR)	$317.89	$964.40	$6,288.00	$10,765.20
PPL Corporation (NYSE:PPL)	$813.28	$7,517.00	$16,026.00	$26,876.10
Markel Corporation (NYSE:MKL)	$418.83	$5,612.00	$4,079.40	$13,421.90
Reynolds American Inc. (NYSE:RAI)	$2,954.55	$12,503.00	$24,700.90	$94,300.80
SL Green Realty Corp. (NYSE:SLG)	$339.01	$1,745.50	$6,763.70	$10,718.90
Micron Technology, Inc. (NasdaqGS:MU)	$1,150.72	$12,399.00	$5,586.40	$34,107.50
Raymond James Financial, Inc. (NYSE:RJF)	$368.15	$5,375.10	$4,546.90	$10,879.50
FleetCor Technologies, Inc. (NYSE:FLT)	$456.22	$1,831.50	$3,029.40	$12,992.70
Ulta Beauty, Inc. (NasdaqGS:ULTA)	$650.13	$4,854.70	$5,982.70	$18,392.60
The Cooper Companies, Inc. (NYSE:COO)	$422.64	$1,966.80	$3,827.70	$11,861.90
Arthur J. Gallagher & Co. (NYSE:AJG)	$385.34	$5,536.20	$4,165.80	$10,530.30
WEC Energy Group, Inc. (NYSE:WEC)	$751.85	$7,472.30	$8,847.20	$20,241.30
Kansas City Southern (NYSE:KSU)	$435.27	$2,334.20	$7,571.50	$10,757.90
DTE Energy Company (NYSE:DTE)	$824.02	$10,630.00	$9,948.10	$19,915.60
Cabot Oil & Gas Corporation (NYSE:COG)	$445.91	$1,194.60	$7,310.50	$10,427.70
Noble Energy, Inc. (NYSE:NBL)	$595.75	$3,389.00	$14,036.80	$13,879.40
Align Technology, Inc. (NasdaqGS:ALGN)	$517.76	$1,079.90	$2,636.60	$11,807.90
Vulcan Materials Company (NYSE:VMC)	$804.85	$3,592.70	$4,440.70	$17,119.50
The Williams Companies, Inc. (NYSE:WMB)	$1,112.60	$7,499.00	$17,781.00	$23,491.00
Alexion Pharmaceuticals, Inc. (NasdaqGS:ALXN)	$1,279.02	$3,084.00	$18,246.70	$26,733.50
Ford Motor Company (NYSE:F)	$2,153.24	$151,800.00	$39,194.10	$44,279.70

Annaly Capital Management, Inc. (NYSE:NLY)	$635.97	$1,743.30	$16,529.30	$12,615.00
Las Vegas Sands Corp. (NYSE:LVS)	$2,620.84	$11,410.00	$36,673.10	$51,196.50

The 535 firms that repurchased less than 5 percent of their market value saw their market value increase an average of 247.8 percent over the prior five years. The 64 firms that repurchased 100% or more of their market capitalization experienced a 21.7% decline in value over the same timeframe. Looking at the entire spectrum, from zero buybacks to more than a 100% of market cap, we can expect a strong statistical relationship. Plotting the ration of buybacks to market cap and comparing with the average growth of all companies with smaller buybacks, the following curve emerges (Figure 3). (See *Appendix* for data and methodology)

Figure 3: How stock buybacks affect company growth



On this graph current market cap growth is based on the past five years. Five years was used as a benchmark because older data was more difficult to obtain from our data source. Moreover, a small but significant number of important companies did not exist, in their current form, ten years ago, due to mergers, spinoffs, and other changes.

The strength of this relationship can be tested statistically. Starting from the null hypothesis, i.e. that there is *no* negative relationship between buybacks and market cap (using a two-tail heteroscedastic statistical test), it turns out that the probability that the hypothesis is true is effectively zero ($p = 0.000023$). In other words the null hypothesis can be rejected absolutely. This means that there is a strong causal relationship between buybacks and lower growth rates. Indeed, the graph suggests that companies that engage in excessive buybacks — beyond 50% or so of market cap — will almost certainly lag behind the S&P. Firms where buybacks exceed 65% of market cap are likely to experience zero net growth, over five years, and beyond that point losses can be expected.[9]

What does all this mean? For one thing, it means that firms that have “invested” in buybacks (to support the price of the stock and to keep the senior executives happy) have actually wasted swallowed money that should probably have been invested in the business, especially in R&D.

Some case histories

What went wrong at IBM? Dedication to ‘main-frame’ computers, treating PCs as “terminals” –and failure to respond adequately to the market challenge for PCs posed by DEC, Compaq, Apple and other nimbler companies in the 1980s was the first cause of its fall from grace. (Why did IBM fail to acquire its step-child Microsoft or its tiny rival

Apple when that would have been so easy?) But since the 1990s blind dedication to SVM (which continues) has led to unending emphasis on cost-cutting (by job cutting), lack of product innovation, and misuse of cash to finance corporate stock buy-backs. Between 2005 and 2014, IBM delivered $32 billion in dividends to shareholders and spent $125 million buying its own shares (to prop up the share price), while investing only $111 billion in capital and R&D, altogether. It laid off large numbers of employees.

IBM today is a sad shadow of what it was in my youth. It could have pre-empted most of the innovations stemming from Silicon Valley. Even IBM's vaunted pivot to services is little more than a transformation to a low-value labor broker. Ironically, the current rush to invest in the "cloud" is exactly what the leaders of IBM expected to happen back in the 1980s. The operating system they invested (and wasted) millions on (OS2) is probably essentially what the "cloud" clients of Amazon, Google and MicroSoft need today. Today PCs are, increasingly, nothing but terminals for cloud computing. But IBM dropped the ball, spend too much money on share buybacks and is out of the IT business (except for artificial intelligence).

This story is not unique to IBM. Xerox is another case in point. Why did the company, another high flyer in the 1960s, fail to exploit any of the inventions from its own famous Palo Alto Research Center (PARC) beyond the laser printer? The Rochester-based executives, with roots in the photography business, thought they were in the document copying business. Yet as a manufacturer of copying machines they soon lost leadership to Canon. The scientists at PARC invented most of the key components of PCs: laser printers, What You See Is What You Get (WYSIWG), bitmap graphics, vector fonts, the mouse-operated graphic user interface (GUI), object-oriented programming, the Ethernet (local area networking), the first commercial minicomputer (Alto) and universal packet architecture (the predecessor of the internet). PARC was arguably the most innovative lab since AT&T Bell Labs. It generating dozens of spinoffs.

Yet the executives had no long view. They failed to understand the future of information technology, and thus failed to invest in, and to commercialize the work of PARC. What they did was to essentially invite Steve Jobs to help himself to PARC technology and people. Late in the day they tried to buy Apple, but all they got was a small bloc of shares in Apple's IPO. But later still they did repurchase their own shares at a cost of 126.4% of their current market cap.

The recent history of Hewlett-Packard (HP), the grandfather of Silicon Valley, is equally or even more depressing. When Carly Fiorina took over in 1999 she started a share buyback program. During her term (until 2005) HP acquired Compaq and became the world's largest PC manufacturer. That lasted from from 2003 to 2007 (when Lenovo – IBM's startup, sold to a Chinese firm – took over first place). Meanwhile, HP under Fiorina's rule, HP bought back $14 billion in its own stock, while earning only $12 billion in profits. Under the next CEO, Mark Hurd, HP paid $43 billion for more of its own stock, while earning only $36 billion in profits over 5 years. The pattern continued under Leo Apotheker ($10 billion in stock repurchase) and Meg Whitman, the most recent CEO. By the time HP's current "turnaround" (and breakup) is complete, it will have cost 80,000 jobs (Brettell, Gaffen, and Rohde 2015). Overall, HP repurchased $81.5 billion in buybacks, 271% of its $30 billion market cap, and failed to capitalize on any of the web, mobile, or cloud technology revolutions that happened literally in its back yard.

A recent example of the SVM doctrine in action was the attempt by Warren Buffet's Berkshire Hathaway with Brazil's 3G Capital, to merge Kraft-Heinz (the result of a $47 billion 2012 merger) with Unilever, a much larger English-Dutch consumer products firm. Since 2012 the new owners of Kraft-Heinz have cut $1.5 billion in annual operating costs (by cutting 6% of its staff or 2500 jobs), thus raising its profit margin to a level about double that of Unilever. This achievement is much admired by some in the world of high finance. It has further enriched the shareholders of Kraft Heinz (including Warren Buffet).

The proposed Kraft-Heinz LBO with Unilever was kicked off by an offer of $50 a share, representing an 18% premium over the then-current share price of about $43 per share. It was generally supposed by the "market-watchers" that his was an opening bid that would need to increase before succeeding. The takeover would have been financed by debt, of course, and the debt would then become a liability of the "new" Unilever. Paying interest

on the new debt and raising profit margins would require cost cuts much larger than those at Kraft-Heinz, probably not less than $3 billion per year from Unilever revenues of $53 billion. How many jobs would have been lost? Without a sharp increase in revenues (unlikely), a 6% cut in the Unilever work-force would mean job losses of around 10,000 out of the global workforce of 168,000. To the “value-creating” capitalists, those are just numbers. To the workers and their families, they are disasters.

This particular deal didn’t happen, partly because Paul Polman, CEO of Unilever, rejected it immediately, in very strong terms, on grounds that it had no “strategic” value. What he really meant was that Unilever has long-term goals that do not mesh with the short-term SVM goals of the would-be raiders. Polman is a strong opponent of favoring short-term gains over long-term growth; he refuses to give Wall Street guidance, has argued for reduced executive compensation (and froze, then lowered, his own compensation), routinely argues against excess compensation at financial firms, and argues that Unilever should have a 100-year decision making horizon. Also, Unilever’s long-term record of returns to shareholders — 9% p.a. for the last 20 years — is second only to that of Nestlé in the food industry. Hence Paul Polman, the CEO of Unilever, cannot be accused of “sleepiness” or incompetence or disregard of shareholders. But, as the *Financial Times* noted, this case was exceptional: in the vast majority of such cases, the “activist” capitalists and private equity investors succeed in enriching themselves still further at the cost of employees, customers, communities and the global environment.

General Electric represents another example. GE has repurchased $114.6 billion of its own stock and has, at the end of Q1, 2016, a market capitalization of $253.25 billion, a ratio of 45%. GE recenty announced the unexpected retirement of Chief Executive Jeffrey Immelt, the fate of many chief executives who invest heavily in their own stock while the underlying business fails to realize substantial growth. Despite the buybacks, GE’s stock well underperformed both the S&P 500 and GE competitors United Technologies (40%), Honeywell (22%), and Danaher (2%). Each of those GE competitors grew their market value faster than GE while spending less on buybacks in relation to market cap. Despite the stock related compensation, CEO Jeffrey Immelt saw his pay drop 35% (to $21.3 mil.) for the year 2016. Even so, *Fortune Magazine* suggests that he will retire with $211 million. GE recently made a huge bet on the future of the oil and gas industry by buying Baker-Hughes, making GE one of the biggest companies in the field. Will it pay off?

Implications

At some risk of over-simplification, it can be argued that buybacks are far from an indication, as explained by some proponents [e.g Vermaelen] that corporate insiders see good news ahead – above market expectations — (which would be illegal manipulation, if true). The contrary view, that we share, is that Boards of Directors (usually appointed by the CEO) buy stock when they have run out of ideas for better uses of the money. Pert of the problem today, is that CEOs of big firms are hired help, not founders. Lou Gerstner, who was hired to run IBM in 1990 came from Nabisco, and before that from American Express. He knew nothing about computers or information technology, and cared less.

CEOs have only a short time in office, in which to make their fortune. They are often lawyers, MBAs, or professional consultants (many are graduates of McKinsey). Hardly any have scientific training or any experience in creating new technology. Annual total real returns of US public companies (as percent of market value) from 1940 to 1990 were about 7% p.a. However, real returns since 1990, allowing for the share price rises due to supply reduction due to share buy-backs, is barely 5% p.a. (Montier 2014) Exhibit 3. This is why pension funds and insurance companies are now in deep trouble, since they mostly predicated their pension and insurance offerings on a continuation of that 7% p.a. history.

From a very long-term economic perspective, one cannot help but wonder whether buybacks are a form of gradual and (relatively) painless corporate suicide. That would fit well with Schumpeter’s idea of economic growth as a consequence of “creative destruction”(Schumpeter 1911 [1961]). From that perspective buybacks can be regarded as a sort of disinvestment. And from that perspective, it makes sense for Exxon-Mobil, Chevron, Shell, BP, Total and

others in the hydrocarbon to disinvest gradually in the petroleum industry if worries about climate change being driven by human activity – especially the combustion of fossil fuels – are accurate. By the same token, it probably makes sense for the old automobile companies, Ford, GM and Fiat Chrysler to do the same. More generally, companies with no stake in the internet technologies, or the "renewables" business, should probably be disinvesting in old businesses and shifting capital to new ones.

> *However, this is not an argument for using buybacks as a way of providing corporate CEOs and other top executives with compensation far higher than "ordinary" workers can ever aspire to. There may occasionally be an argument for small buybacks (perhaps to reward exceptional employees) but top executives should be rewarded on the basis of long-term growth, not short-term share prices. But the current system is generating an asset bubble for which there is no positive beneficial argument. Asset bubbles are not productive – they usually end up destroying real wealth – and increasing inequity. When they collapse, as they always do, the last in are usually the last out. Those lose most who can afford it least.*

Appendix: analysis methodology and data.

Data was derived from the S&P Capital IQ database. We used the following initial criteria for inclusion:

Buyback Features: Market Repurchase or Fixed Price Buyback or Accelerated Share Repurchase

Equity Buyback Announced Date: Jan. 1, 1990 to Mar. 31, 2017

Company Type: Unspecified (though all non-public companies were later excluded from analysis)

Industry Classification: Any (no filter)

Geographic Location: United States of America

This yielded 11,376 buyback transactions by 4,229 businesses that are now or once were publicly traded. We discarded 2,390 companies, representing 4,860 buyback transactions. Of these 1,532 are no longer publicly traded, 242 were not traded five years ago (making it impossible to compute growth), 338 are traded over-the-counter and 278 have a market cap less than $100 million.

Our analysis is based on the remaining 1,839 businesses and their 6,516 buyback transactions. These companies have an average market cap of $12.6 billion, a mean market cap of $1.9 billion, average revenue of $6.5 billion and mean revenue of $1.2 billion. Collectively these businesses spent $5.8 trillion, adjusting for inflation, on buybacks with an average inflation adjusted transaction of $3.16 billion and a median transaction of $214 million.

For each company we computed their inflation adjusted buybacks then compared that to their current market cap to obtain a ratio. For example, Quest Diagnostics repurchased $7.471 billion. Their current market cap is $14.823 billion. Therefore, their buyback ratio is 50.4%. We also computed the five-year growth in market capitalization for each business.

We then divided every business into 5-percent tranches by their buyback ratio, rank ordering from lowest to highest and grouping those above 100% (64 businesses) into the top tranche.

For each five-percent of businesses we computed the total number of inflation-adjusted buybacks, in dollars, the total current market cap, the market cap from five years prior, and the average market cap growth as a percentage.

For the resulting 20 tranches we compared buybacks to current market cap and computed a heteroscedastic 2-tail

p-value of .0069. We also compared current market cap to five-year growth, using the same method, and found a p-value of .000023.

Table 4-A: Aggregate data by 5-percent tranches

			Raw $		% of total		
	Count	Count % tot.	Buybacks	Current Mkt Cap	Buybacks	Market Cap	Avg. 5-Yr Growth
0%	535	29.1%	$60,813.62	$4,157,521.40	1.0%	18.0%	247.83%
5%	285	15.5%	$157,052.42	$2,148,400.80	2.7%	9.3%	158.90%
10%	208	11.3%	$324,077.96	$2,507,598.80	5.6%	10.8%	144.45%
15%	160	8.7%	$367,846.64	$2,038,018.30	6.3%	8.8%	109.22%
20%	133	7.2%	$814,310.10	$3,718,445.00	14.0%	16.1%	100.35%
25%	105	5.7%	$527,744.42	$1,894,765.30	9.1%	8.2%	76.98%
30%	61	3.3%	$379,883.43	$1,155,921.20	6.5%	5.0%	68.68%
35%	74	4.0%	$653,600.97	$1,758,331.40	11.3%	7.6%	82.58%
40%	41	2.2%	$318,352.20	$755,841.60	5.5%	3.3%	70.23%
45%	38	2.1%	$480,331.86	$1,022,135.60	8.3%	4.4%	45.31%
50%	19	1.0%	$102,203.64	$192,253.70	1.8%	0.8%	45.23%
55%	17	0.9%	$46,629.13	$81,936.90	0.8%	0.4%	23.62%
60%	19	1.0%	$80,239.73	$128,938.10	1.4%	0.6%	39.55%
65%	17	0.9%	$103,679.08	$151,930.70	1.8%	0.7%	39.99%
70%	21	1.1%	$267,460.63	$377,747.10	4.6%	1.6%	24.65%
75%	12	0.7%	$62,362.18	$81,493.70	1.1%	0.4%	6.11%
80%	7	0.4%	$15,544.54	$18,932.70	0.3%	0.1%	3.96%
85%	9	0.5%	$404,541.58	$457,008.90	7.0%	2.0%	-1.95%
90%	7	0.4%	$53,724.50	$58,493.90	0.9%	0.3%	75.05%
95%	7	0.4%	$53,802.19	$55,734.60	0.9%	0.2%	-13.40%
100%	64	3.5%	$533,010.86	$371,577.80	9.2%	1.6%	-21.74%

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[1] The "top 10" in order were Exxon-Mobil, Microsoft, IBM, Cisco-Systems, Procter & Gamble, Hewlett-Packard. Walmart, Intel, Pfizer and GE (Lazonick 2014).

[2] Confession: The brother of one of us, Edward Ayres, was quite active in that "Tame GM" campaign. He later wrote a book about it with a forward by Senator Gaylord Nelson of Wisconsin (Ayres 1970).

[3] Another confession: One of us (RUA) testified at a Congressional Hearing, organized by Nader, on the issue of non-polluting power sources for automobiles, a report of a study sponsored by Resources for the Future Inc., entitled "Technology and Urban Transportation: Environmental Quality Considerations (Ayres and McKenna 1968) and (Ayres 1968).

[4] In fairness, Jensen later modified his views to reflect the legitimate interests of other stakeholders (Jensen 2002)

[5] The "safe harbor" protects buybacks that do not exceed 25% of the volume of trades in the previous 4 weeks.

[6] The most admired practitioner was Jack Welch, CEO of General Electric Co. from 1981 to 2001 who led the growth of his firm from $14 billion to $280 billion in market value, making 600 acquisitions along the way, earning

$750 million for himself.

[7] During the 1980's "raiders" used high-yield debt ("junk bonds") – mostly from Michael Milken– to acquire businesses against the wishes of the then current Board of management, "hostile takeovers." They'd leverage the assets of the businesses against the debt, often replacing management, laying off staff, selling assets (including pension funds), and diverting profits to service the debt used to take over the business. Eventually, they used the *threat* of takeovers to demand payouts ("greenmail"). Laws were eventually changed so that hostile takeovers were more difficult but, by that time, the raiders were well funded and regrouped as "activist investors," demanding that management do their bidding.

[8] Data for the expiration of equity buyback or buyback closed dates were not always available. When data was available we would use the close or expiration date to compute inflation. When unavailable we would use the midpoint between June, 2017 and the equity buyback definitive agreement date.

# # #

About the authors:

Robert U. Ayres is a physicist and economist, currently Novartis professor emeritus of economics, political science and technology management at INSEAD.. He is also Institute Scholar at the International Institute for Applied Systems Analysis (IIASA) in Austria, and a King's Professor in Sweden. He has previously taught at Carnegie-Mellon University, and as a visiting Professor at Chalmers Institute of Technology. He is noted for his work on technological forecasting, life cycle assessment, mass-balance accounting, energy efficiency and the role of thermodynamics in economic growth. He originated the concept of "industrial metabolism", known today as "industrial ecology" with its own journal. He has conducted pioneering studies of materials/energy flows in the global economy. Ayres is author or co-author of 21 books and more than 200 journal articles and book chapters. His most recent books are Energy, Complexity and Wealth Maximization (Springer, 2016), The Bubble Economy (MIT Press, 2014) "Crossing the Energy Divide" with Edward Ayres (Wharton Press, 2010) and The Economic Growth Engine with Benjamin Warr (Edward Elgar, 2009). He can be reached at Robert.AYRES@insead.edu.

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