

Economic Analysis

Business Investment: Stuck Between Uncertainty and Change

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- **Business perception of uncertainty is overstated relative to its true impact**
- **Equipment investment is back at its long-term growth rate as of 2011**
- **The share by industry in equipment investment has become more dispersed**

The sharp decline in business investment during the Great Recession and the lack of strong growth in the post-recession economic environment have become worrisome to many economists and global organizations, including the International Monetary Fund (IMF) and the Organization for Economic Co-operation and Development (OECD). This is due to the crucial contribution of business investment to the economy's future productive capacity and competitiveness. There is general agreement among economists that a productivity slowdown is often due to the failure of investment to keep the capital stock growing at the same pace as the number of workers. Within investment expenditures, investment in equipment and software is a predominantly productive contributor to capital stock¹ and economic growth.

The depth of decline in aggregate demand during the Great Recession coupled with the subsequent slow recovery are the most common factors cited as the cause of weakness in business investment. While weak sales are a contributing factor, alternative factors to consider for the weak growth rate in equipment investment are policy uncertainty and financial market volatility. However, when compared to past economic expansions the current expansion appears much weaker in terms of output growth than it does for business investment, especially for equipment investment. The expansion-by-expansion capital stock analysis of equipment and software investment highlight that the U.S. has been undergoing long-term and sizable structural shifts in the economy's industry make-up. These structural shifts towards higher contributions to capital stock from service oriented sectors and a declining share of capital stock from manufacturing, underline the weakened linkage between equipment investment and productivity. Thus going forward, focusing on the broader weaknesses in economic activity could boost potential output and consequently encourage higher business investment.

Table 1

Contributions to Real GDP Growth, Average of Quarterly Real Growth, SAAR, %

Recessions	Gross Domestic Product	Fixed Investment	Nonresidential Fixed Investment	Equipment Investment	Expansions	Gross Domestic Product	Fixed Investment	Nonresidential Fixed Investment	Equipment Investment
Dec/1948-Oct/1949	-1.4	-0.8	-1.4	-1.1	Nov/1949-Jul/1953	7.8	1.0	0.8	0.4
Aug/1953-May/1954	-2.4	0.0	-0.2	-0.4	Jun/1954-Aug/1957	4.1	0.8	0.7	0.4
Sep/1957-Apr/1958	-3.8	-2.0	-1.7	-1.5	May/1958-Apr/1960	5.7	1.3	0.8	0.6
May/1960-Feb/1961	-0.4	-0.6	-0.5	-0.8	Mar/1961-Dec/1969	4.9	1.0	0.8	0.5
Jan/1970-Nov/1970	-0.1	-0.2	-0.5	-0.4	Dec/1970-Nov/1973	5.1	1.4	1.0	0.8
Dec/1973-Mar/1975	-2.5	-2.1	-0.9	-0.6	Apr/1975-Jan/1980	4.3	1.4	1.0	0.6
Feb/1980-Jul/1980	-4.3	-2.8	-1.2	-1.0	Aug/1980-Jul/1981	4.5	1.1	1.2	0.6
Aug/1981-Nov/1982	-2.0	-1.3	-0.9	-0.7	Dec/1982-Jul/1990	4.3	0.9	0.6	0.4
Aug/1990-Mar/1991	-2.7	-1.7	-0.9	-0.6	Apr/1991-Mar/2001	3.6	1.2	0.9	0.6
Apr/2001-Nov/2001	0.6	-1.1	-1.2	-0.7	Dec/2001-Dec/2007	2.8	0.5	0.5	0.3
Jan/2008-Jun/2009	-2.8	-2.6	-1.6	-1.2	Jul/2009-Dec/2015	2.1	0.7	0.6	0.4
Historic Average	-2.0	-1.4	-1.0	-0.8	Historic Average	4.5	1.0	0.8	0.5

Source: BBVA Research & BEA

¹ Kopcke (1993); De Long and Summers (1990)

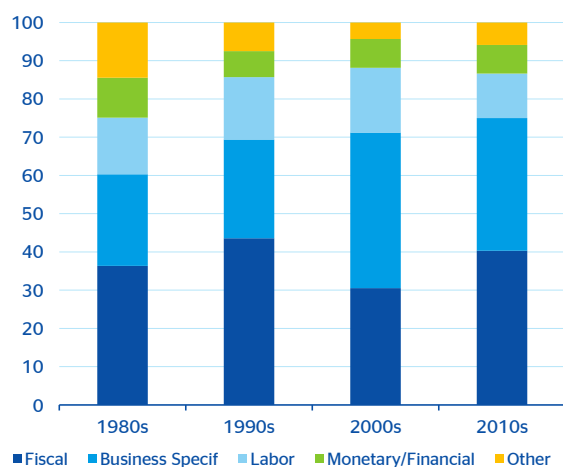
Explaining Weakness in Business Investment in Equipment

There are several notions regarding the direct relationship between business investment and economic activity. The most straightforward explanation is that firms hold off investing in capital when the current or expected future economic environment is weak. Limited opportunity to sell their products causes firms to reduce investment. Additionally, more complex macroeconomic theory puts forward a “financial accelerator” channel in which poor sales impact the firm’s financial standing with regard to its existing loans and its ability to borrow and thereby finance further investment in equipment and intellectual property. The “financial accelerator” channel implies that credit markets both propagate and amplify negative shockwaves across all sectors of the economy.²

Responses to the survey of small businesses, in which firms are asked to identify their single most important problem, have consistently reported concern in two areas: fiscal policy, which includes the regulatory and tax environment, and business specific factors including poor sales, competition from large businesses, and the cost of insurance. Indeed, poor sales as the single most important problem peaked during the Great Recession but has since declined to pre-recession levels. At the same time, taxes and government requirements have been identified as a problem much more often in the last five years, highlighting the constraint on business investment of policy uncertainty. While concern over taxes has remained almost constant and elevated for the last decade, the concern over government requirements has been on the rise since 2008.

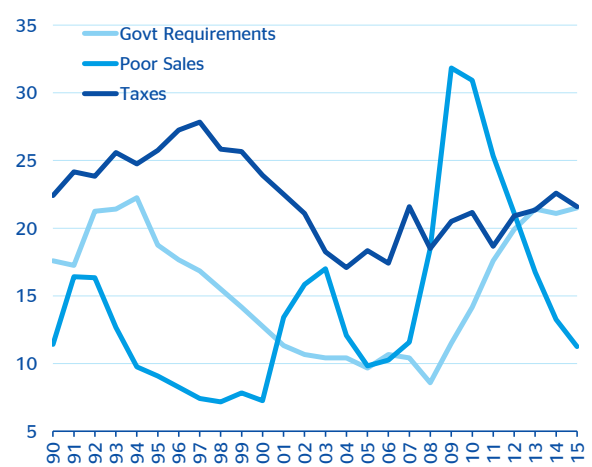
Similar unease with policy uncertainty was highlighted in the Business Climate Survey conducted by The Business and Industry Advisory Committee (BIAC) to the OECD. The survey polled 27 national business associations of both member and non-member countries and asked respondents to rate several factors as “very important,” “important,” or “less important.” The respondents reported policy uncertainty, taxes and regulation as the most important constraints to investment in their countries. Meanwhile, insufficient demand and financing were not considered as important.

Chart 1
Business Survey on Most Important Problem
%



Source: BBVA Research & NFIB

Chart 2
3 Major Single Most Important Problems
%



Source: BBVA Research & NFIB

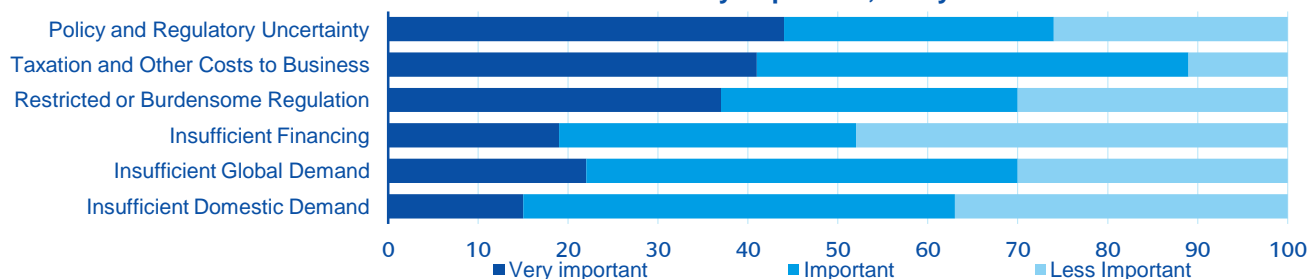
² Bernanke, Gettler, and Gilchrist (1996)

Policy uncertainty plays a distinct role in discouraging business investment. There is a negative relationship between uncertainty and business investment such that higher uncertainty reduces investment. Periods of heightened uncertainty press firms to postpone planned fixed investment, as decisions on such expenditures are hard to reverse but can be postponed until a more favorable economic environment of reduced uncertainty exists.³

Chart 3

2015 The Business and Industry Advisory Committee to the OECD Business Climate Survey, %

What are the most important factors that may be constraining investment in your country at present, if any?



Source: BBVA Research & BEA

At the same time, seven years of unconventional monetary policy should have strengthened firms' investment. The monetary policy transition channel suggests a positive relationship between monetary policy and investment expenditures, where accommodative monetary policy raises stock prices, increasing the net worth of the firms and Tobin's Q, and increases investment.⁴ (See ["How Sensitive are Economic Indicators to Monetary Policy?"](#))



Variance decomposition within a structural vector autoregressive model illustrates a degree of equipment sensitivity to gross output fluctuations, to policy uncertainty, as well as to financial volatility. The policy uncertainty measure consists of three components that quantify 1) newspaper coverage of policy related economic uncertainty, 2) the number of federal tax code provisions set to expire in future years, and 3) uncertainty about monetary policy and government purchases of goods and services at the federal level.⁵ Overall, the idiosyncratic variation in equipment investment explains 33% of its variance, output explains 36%, policy uncertainty 5%, and real S&P 27%. However, the outcome varies widely depending on the source of the shock to investment such that the variance explained by real output increases to 56% if the origin of the shock is real GDP. The same is true for the S&P which also rises to 56%. Contrary to expectations, policy uncertainty remains as the most minor explanation with a variance increase of only to 16% when the shock originates from uncertainty. The weight of policy uncertainty variance only increases marginally during the current expansion to 18% while the idiosyncratic equipment investment variance dominates. The impulse response functions for real equipment investment confirm the variance decomposition outcomes as well as the inverse relationship between equipment investment and the uncertainty measure. It takes 1 quarter longer for the uncertainty shock to propagate through equipment investment than it does for either GDP or the S&P, while the half-life for all the shocks is achieved within first two quarters.

³ Bernanke (1983), Dixit and Pindyck (1994)

⁴ Mishkin (2001)

⁵ Baker, Bloom, and Davis (2013)

Table 2

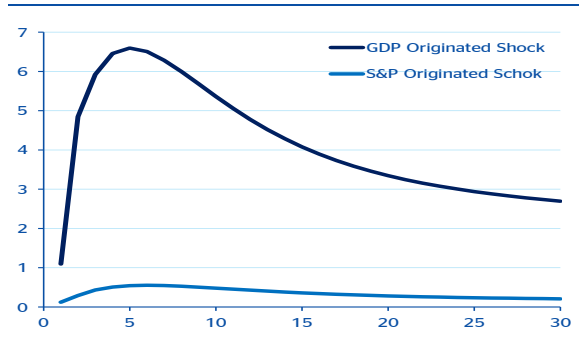
Equipment Investment Variance Decomposition
Equipment Investment, GDP and S&P 500 in real logs, Policy Uncertainty in log, 1985-2015

	Equipment Investment	Gross Domestic Product	Policy Uncertainty	S&P 500
GDP Originated Shock	22.0	55.6	3.1	19.2
S&P Originated Shock	31.4	12.4	0.7	55.5
Policy Uncertainty Shock	49.4	15.3	16.1	19.2
No Shocks	32.6	35.5	5.4	26.5

Source: BBVA Research

Chart 4

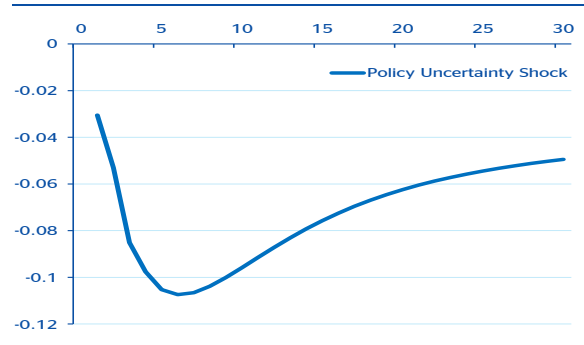
Equipment Investment Response Function
Real Quarterly, %



Source: BBVA Research

Chart 5

Equipment Investment Response Function
Real Quarterly, %



Source: BBVA Research

The Shape of Recovery

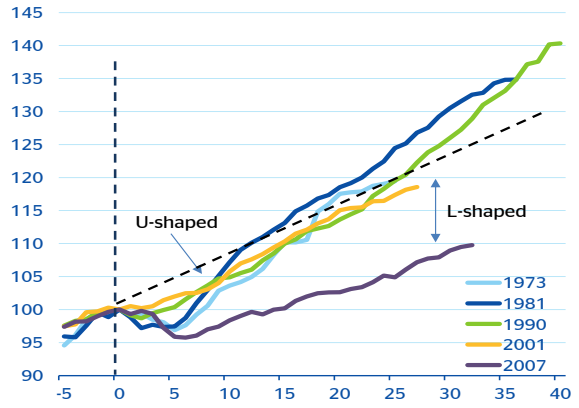
Strong comovement of business investment and GDP should prompt a similar response of both measures to the Great Recession and the subsequent recovery. The recovery periods in GDP growth were historically classified as “U-shaped” where output returns to its pre-recession long-term trend. Alternatively, the post-Great Recession recovery has been plausibly an “L-shaped” recovery in which the growth rate has been reestablished permanently below its long-term trend. When comparing the current recovery to previous ones, this “L-shaped” recovery is apparent for GDP but not as obvious for equipment investment and its components. Notably, the 1990s cycle was exceptional with strong growth in all of the equipment investment categories and very mild recessionary declines.

Friedman’s “plucking model”⁶ suggests that output is “bumping along the ceiling” of its long-term trend during the expansions while it is plucked down during the recession. Empirical application of Friedman’s plucking model, where recessions are modeled as the pluck in the cyclical component of investment and the trend is allowed to switch between its long-term growth rate and a lower growth rate during the recession, makes it possible to assess the shapes of equipment investment recoveries and to make a judgment as to whether the post-Great Recession recovery was different from past recovery episodes.⁷ As such, the timing of the start of the pluck indicates whether a deviation of the cycle from the long-term growth rate has occurred, while the end of the pluck indicates a return to the long-term trend. Consequently, the absence of a pluck is interpreted either as no recession or as a weak indication of recessionary behavior. Further, a complete pluck indicates a “U-shaped” recovery while an incomplete pluck would point towards an “L-shaped” recovery.

⁶ Friedman (1964, 1993)

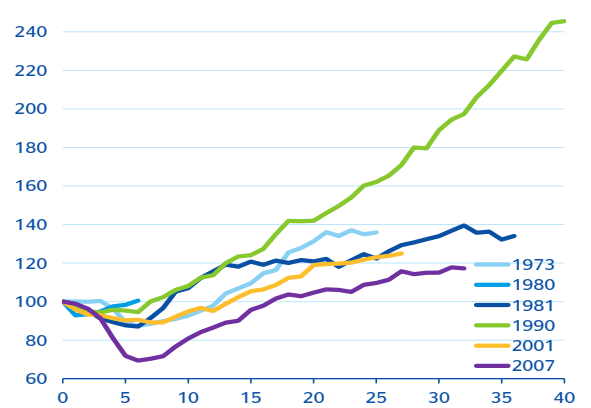
⁷ Kim and Nelson (1999), Kim and Murray (2002)

Chart 6
Real GDP Cycles
 Normalized, Peak=100, Peak Date= 0



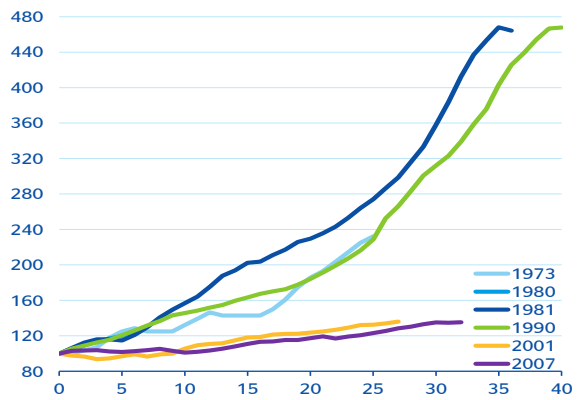
Source: BBVA Research

Chart 7
Real Equipment Investment Cycles
 Normalized, Peak=100, Peak Date= 0



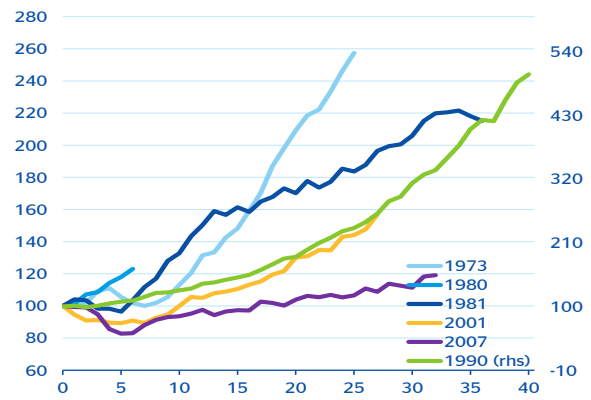
Source: BBVA Research

Chart 8
Real Software Investment Cycles
 Normalized, Peak=100, Peak Date= 0



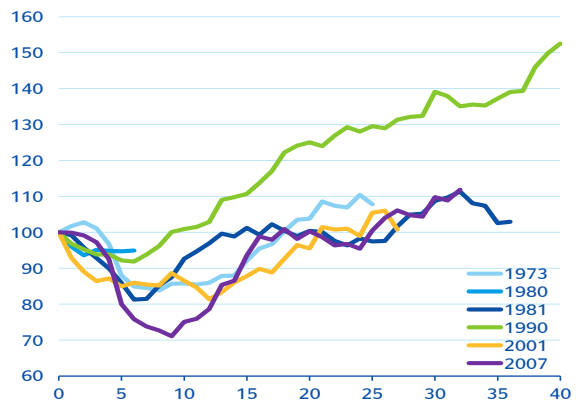
Source: BBVA Research

Chart 9
Real Information Processing Cycles
 Normalized, Peak=100, Peak Date= 0



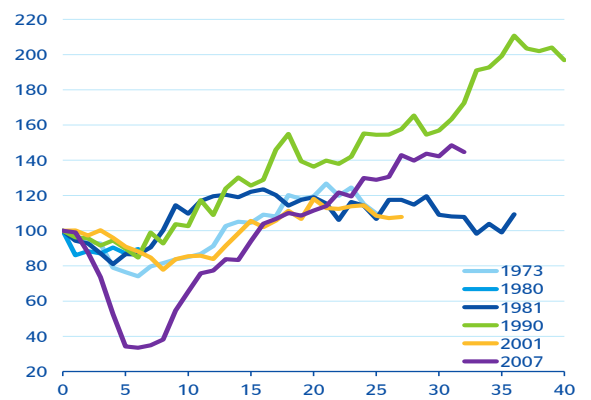
Source: BBVA Research

Chart 10
Real Industrial Equipment Cycles
 Normalized, Peak=100, Peak Date= 0



Source: BBVA Research

Chart 11
Real Transportation Equipment Cycles
 Normalized, Peak=100, Peak Date= 0

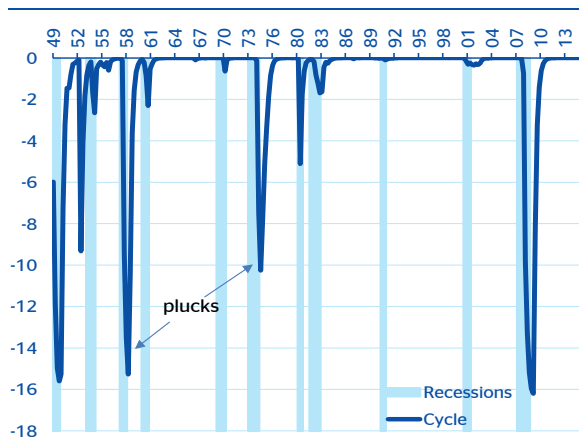


Source: BBVA Research

The “plucking model” estimations reveal no evidence of an L-shaped post-Great Recession recovery for equipment investment (Chart 11). The Great Recession recovery for equipment investment can be characterized as U-shaped while the estimated recession probability infers 1Q10 as the end of recessionary dynamics (3 quarters after the NBER’s end-of-recession date). The plucking model implies that equipment investment has returned to its long-term trend as of 4Q10. It also estimates the largest of all plucks during the Great Recession. At the same time, the model demonstrates that three out of the eleven recessions examined had hardly any recessionary dynamics, while another two resulted in only mild deviations from the long-term trend.

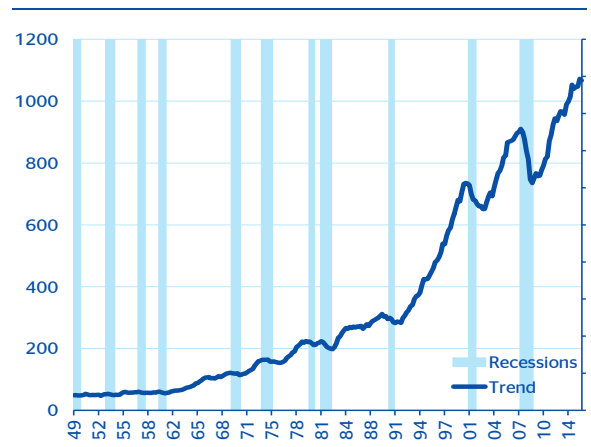
Evidence of an L-shaped recovery is found in Information Processing (IP) equipment investment – one of the equipment investment components (Chart 13). Unlike the aggregate equipment investment, IP equipment investment has exhibited substantial cyclicity during five out of the last six recessions. Moreover, the pluck corresponding to the Great Recession has not yet converged to the long-term trend. Noticeably, the pluck for the 2001 recession is deeper than for the Great Recession and the convergence to the long-term trend did not occur until the end of 2Q05 – three and half years after the NBER’s end-of-recession date.

Chart 12
Equipment Investment Decomposition: Cycle
%



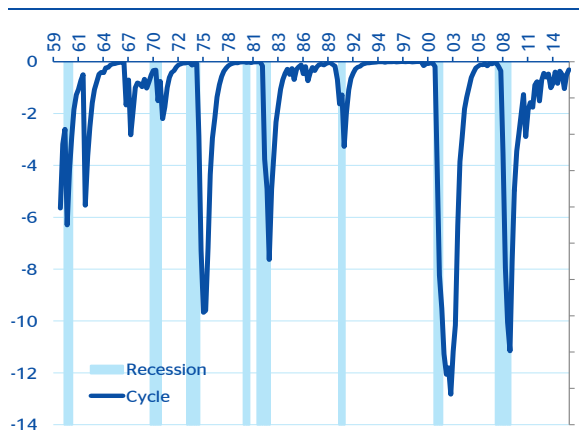
Source: BBVA Research

Chart 13
Equipment Investment Decomposition: Trend
Real, \$Billions



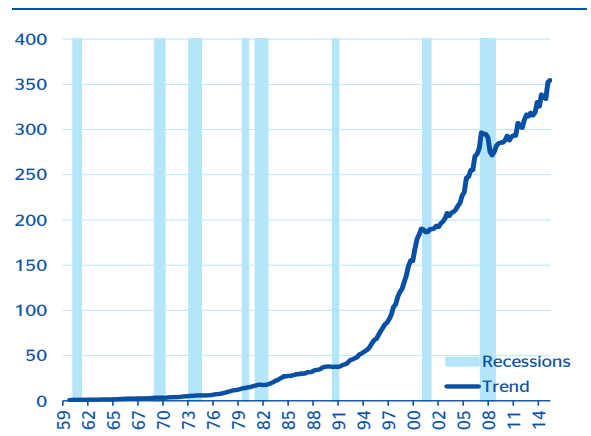
Source: BBVA Research

Chart 14
Information Processing Equipment: Cycle
%



Source: BBVA Research

Chart 15
Information Processing Equipment: Trend
Real, \$Billions



Source: BBVA Research

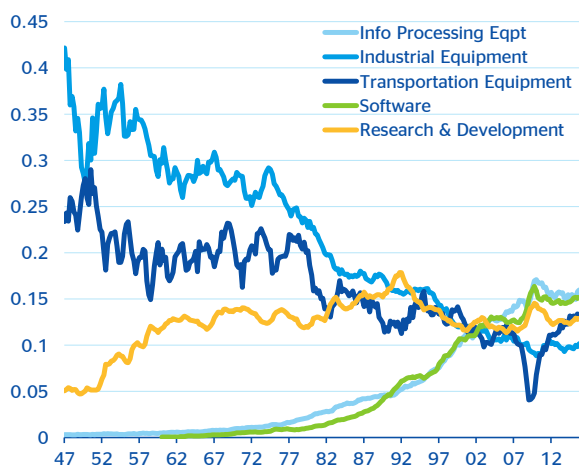
Structural Change Within

The business cycle assessment of the equipment and software investment expenditures underscored substantial differences in the recovery dynamics during the post-Great Recession for each of the subgroups. Despite the sharp decline during the Great Recession, the industry and transportation equipment recovered with a speed that was similar to those of past cycles. By contrast, the information processing equipment and software had little to no decline during the Great Recession while also exhibiting sluggish recovery dynamics. However, these recovery dynamics in software and information processing equipment have to be assessed in conjunction with the ongoing long-run change in 1) the deflation in prices of information processing equipment and software and 2) the change in the contributing share from business investment.

The prices of information processing and software have been declining since the early 1980s which resulted in 78% and 35% deflation in information processing equipment and software respectively. Studies indicate that the real investment in information processing equipment and software can be higher than reported because there are limitations on correctly measuring quality adjusted prices of information technology components, and the fast fall of those prices creates additional measurement disruptions.⁸

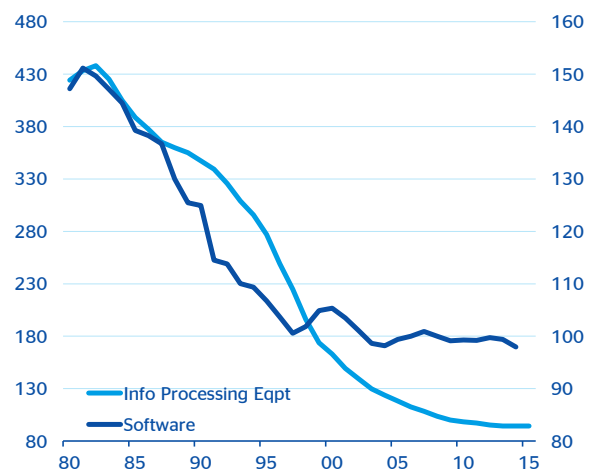
At the same time, the real shares of information processing equipment, software, as well as the ratio of research and development expenditures to real business investment has been on the rise and have suppressed equipment and transportation shares in 2001. Comparison of the capital stock expenditures by industries during expansions reveals long-term industry shifts in both equipment and intellectual property investment and provides a solid backdrop to the rise of information processing and software as a share of business investments and long-run decline in the share of industrial equipment.

Chart 16
Ratios to Real Nonresidential Fixed Investment
Real, \$Billions



Source: BBVA Research & BEA

Chart 17
Private Invest Chain Price Index
2009=100

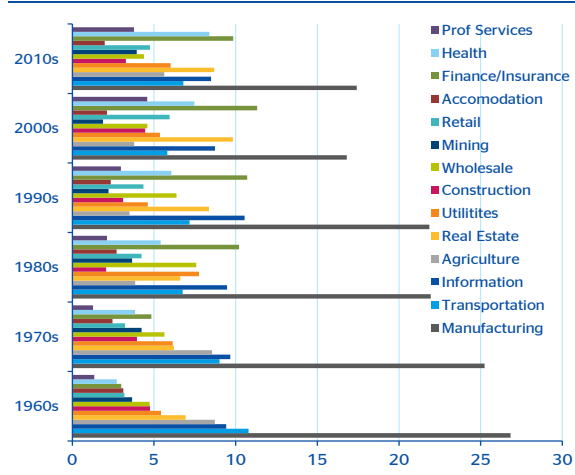


Source: BBVA Research & BEA

⁸ Doms (2004)

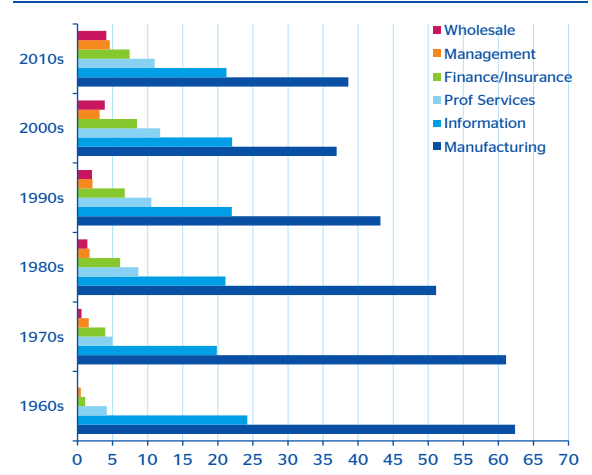
In nominal terms, the Manufacturing sector's investment in both equipment and intellectual property has consistently declined since the 1960s as a share of total equipment investment. The share of Manufacturing declined by 35% in total equipment capital stock and by 38% in intellectual property capital stock from the 1960s expansion to the 2010s. Within the Manufacturing sector, shares of Durable Goods and Nondurable Goods manufacturing of equipment investment remained roughly unchanged, but the subsectors' shares have changed. Within the Durable Goods Manufacturing industries, the nominal share of the Primary Metal subsector's investment has declined while the Computer and Electronics sector's share peaked during the 1990s expansion. Within the Nondurable Goods Manufacturing industries, the Chemical Production and Food/Beverage Production subsectors' shares have consistently increased.

Chart 18
Expansions' Nominal Equipment Investment by Industry, Share of Total Equipment Capital Stock, Private Fixed Assets, Average, %



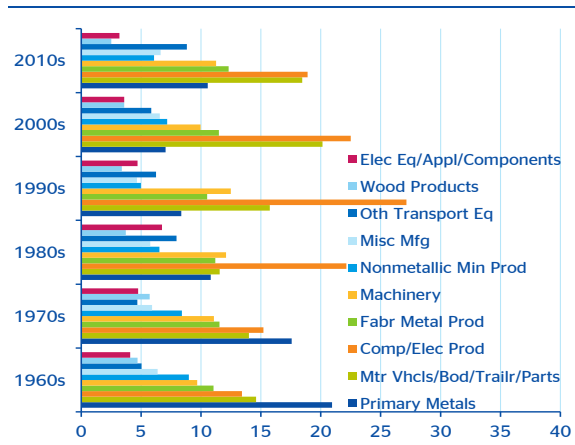
Source: BBVA Research & BEA

Chart 19
Expansions' Nominal Intellectual Prop. Investment by Industry, Share of Total Intel. Prop. Capital Stock, Private Fixed Assets, Average, %



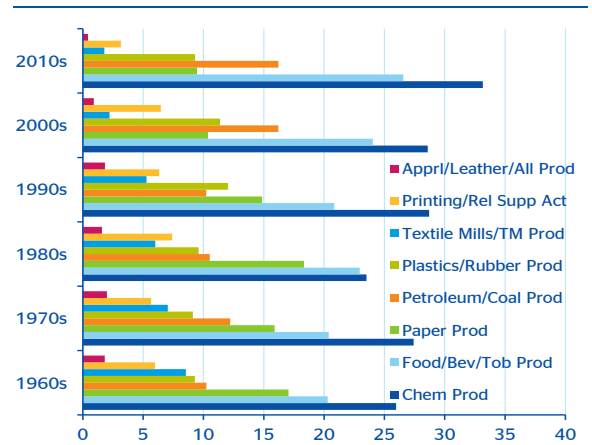
Source: BBVA Research & BEA

Chart 20
Expansions' Nominal Equipment Investment by Industry, Share of Total Durable Capital Stock, Private Fixed Assets, Average, %



Source: BBVA Research & BEA

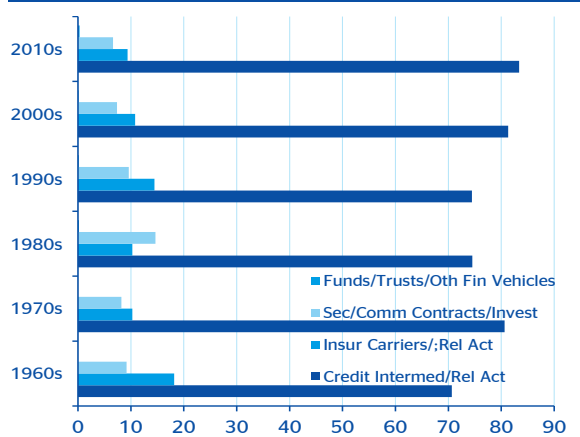
Chart 21
Expansions' Nominal Equipment Investment by Industry, Share of Total Nondurable Capital Stock, Private Fixed Assets, Average, %



Source: BBVA Research & BEA

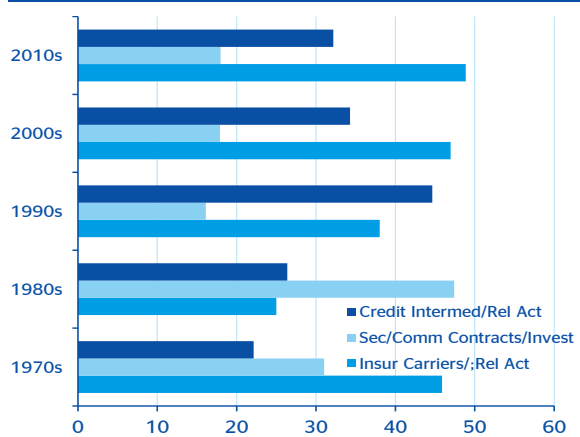
The share of the Finance and Insurance sector for both equipment and intellectual property investment has increased. The Finance and Insurance sector's share of equipment and intellectual property capital stock from the 1960s expansion to the 2010s increased 3.3 times and 7.5 times, respectively. Within that sector, the Credit Intermediation and Related Activities subsector continues to carry the substantial chunk of equipment investment, while intellectual property investment for the subsector peaked during the 1990s expansion at 45% contribution but declined slightly since then to 32% in the 2010s expansion.

Chart 22
Expansions' Nominal Equipment Investment by Industry, Share of Total Finance Capital Stock, Private Fixed Assets, Average, %



Source: BBVA Research & BEA

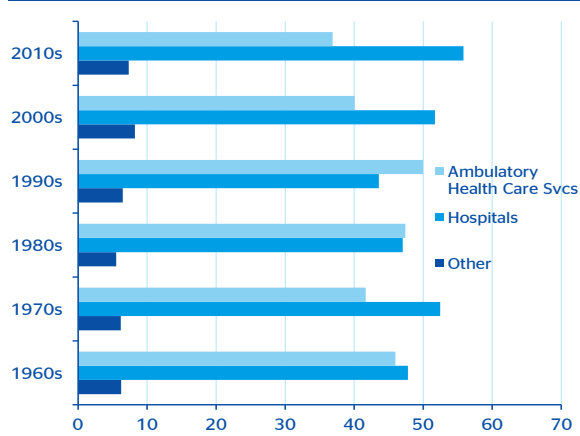
Chart 23
Expansions' Nominal Intellectual Property Investment by Industry, Share of Total Finance Capital Stock, Private Fixed Assets, Average, %



Source: BBVA Research & BEA

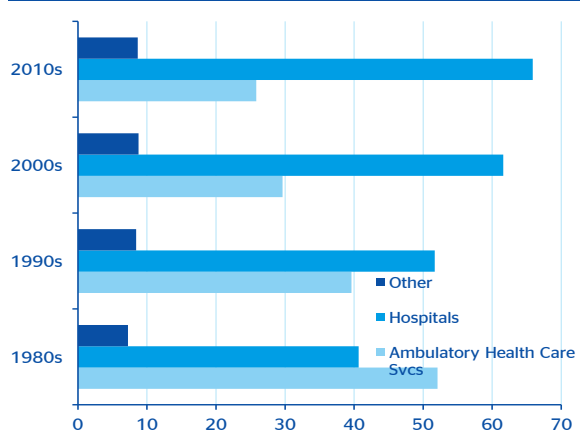
Similar to the Finance sector, the Health Care and Social Assistance sector's share in equipment investment increased 2 times from the 1960s expansion to the 2010s. At the same time, while the Health Care and Social Assistance sector's share in intellectual property capital stock in 2010s expansion has been quite small at 1.9%, the share has increased 3.2 fold since the 1960s. Within the Health Care and Social Assistance sector, the Hospitals subsector remains the main contributor in both equipment and intellectual property investment.

Chart 24
Expansions' Nominal Equipment Investment by Industry, Share of Total Health Care Capital Stock, Private Fixed Assets, Average, %



Source: BBVA Research & BEA

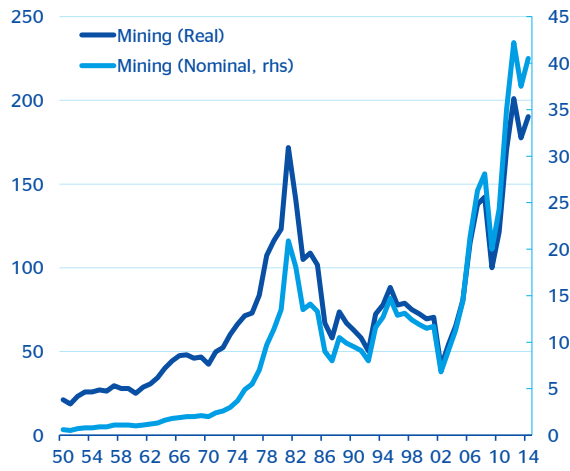
Chart 25
Expansions' Nominal Intell. Prop. Investment by Industry, Share of Total Health Care Capital Stock, Private Fixed Assets, Average, %



Source: BBVA Research & BEA

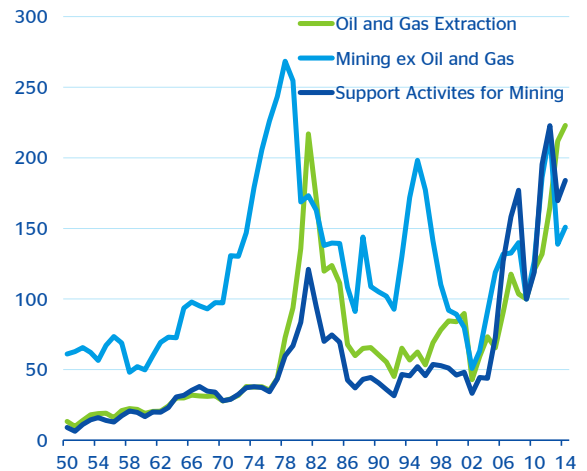
The 2014-2015 oil price decline led to a slowdown in business investment in the Mining industry, shedding 1.2% of equipment growth in 2015. However, the cutbacks in the Energy sector's business investment are not expected to have a visible effect on long-term growth in equipment and intellectual property investment since the Mining sectors' share in equipment and in intellectual property investment in 2010s expansion was at 3.9% and 0.6% respectively. These shares haven't changed much since the 1960s. Overall, the Mining sector's investment has flattened, after seeing a sharp decline in Mining (except for Oil and Gas) and the Support Activities for Mining subsectors in 2013. Notably, between the 1960s expansion to the 2010s, the share of Support Activity for Mining in the total Mining equipment investment increased from 30% to 43% while the share of Mining (Except Oil and Gas) declined from 37% to 22%.

Chart 26
Investment: Private Fixed Assets
\$Billions, Chained Quantity Index, 2009=100



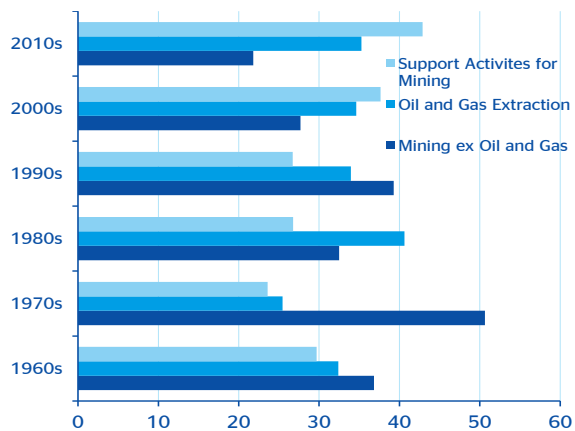
Source: BBVA Research & BEA

Chart 27
Investment: Private Fixed Assets
Chained Quantity Index, 2009=100



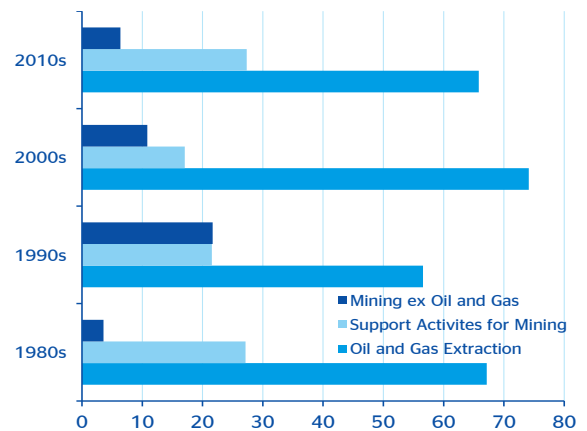
Source: BBVA Research & BEA

Chart 28
Expansions Nominal Equipment Investment by Industry, Share of Total Mining Capital Stock, Private Fixed Assets, Average, %



Source: BBVA Research & BEA

Chart 29
Expansions Nominal Intellectual Property Investment by Industry, Share of Total Mining Capital Stock, Private Fixed Assets, Average, %



Source: BBVA Research & BEA

Bottom Line: Elusive growth in investment reveals structural shifts

The direct relationship between business investment and economic activity, such that firms hold off business investing when aggregate demand is weak, is plausible but is hard to disentangle from the inverse causality where weak business investment is behind weak output growth. At the same time, it is apparent that equipment investment has returned to its pre-Great Recession long-term trend while gross output has converged to a growth rate below its historic trend. Thus, even higher rates of equipment and software investment would be necessary to boost productivity and achieve higher long-term economic growth. The latter is questionable because manufacturing is losing its lead as the primary contributor to equipment and software expenditures and is in the process of becoming overshadowed by service sector contributors, such as Finance; Professional, Scientific, and Technical Services; Administrative and Support, and Waste Management and Remediation; Health Care and Education. The industry shares of equipment investment capital stock have become more dispersed as industries with a share below 10% make up 81% of equipment investment in the 2010s expansion, compared to only 60% in the 1960s. In the absence of large contributions from manufacturing and due to the shift from industrial equipment expenditures to information processing equipment and software, the nominal loss in equipment and software investment expenditures is likely permanent. These structural shifts within equipment investment also highlight weakening linkage between equipment investment and productivity.

Going forward, to boost business investment growth, policies focusing on the broader weaknesses in economic activity that are aimed to increase potential output can become vital. The implementation of measures that increase long-term economic outlook of potential output can bring the necessary boost to business investment. The U.S., together with other advanced economies, reveals a linkage between declining public investment and reduced levels of business investment,⁹ where a case for “crowding in” can be made. Public infrastructure investment would revitalize short-term aggregate demand, heighten potential output, and “crowd in” business investment.

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⁹ *World Economic Outlook*, October 2014, IMF

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