

Consumption-led expansions¹

GDP growth has increasingly been led by consumption. However, consumption-led expansions tend to be significantly weaker than when growth is driven by other components of aggregate demand, often because of the build-up of imbalances. We show that while factors such as credit growth and rising house prices can boost consumption in the short run, the incidence of consumption-led growth and rising debt service ratios significantly dampen growth in the medium to long run. Policies that address the build-up of imbalances and strengthen investment are therefore central to fostering durable growth.

JEL classification: E21, E32, E50, F43, O40.

Private consumption has been the key driver of demand growth in the past few years in many economies. In major advanced economies, consumption contributed up to 1 percentage point to GDP growth in 2015–16 (Graph 1, blue bars in left-hand panel). And in the current year, it is expected to remain a key driver of global growth.² This is also true of several major emerging market economies: for instance, in China the pace of consumption growth has exceeded that of GDP growth over the last three years (Table 1).

Growth patterns in previous expansions were often different. A striking feature of the most recent one is that investment has played a relatively minor role. Indeed, while it turned positive over 2013–14, investment's average contribution to growth was only around 0.3 percentage points over 2015–16, when the recovery was already well under way (Graph 1, red bars in left-hand panel). In contrast, during 2003–07 consumption and investment made very similar contributions (right-hand panel).

The current role of consumption growth raises a number of questions regarding its drivers and macroeconomic implications. What features characterise growth periods when private consumption rather than investment, government consumption or net exports take the lead? How secure are the foundations for sustained growth? This feature seeks to answer these questions.

Overall, our analysis finds that during episodes of consumption-led growth GDP typically expands more slowly while investment and net exports are weak. Moreover, consumption-led expansions tend to be followed by weaker growth, even when

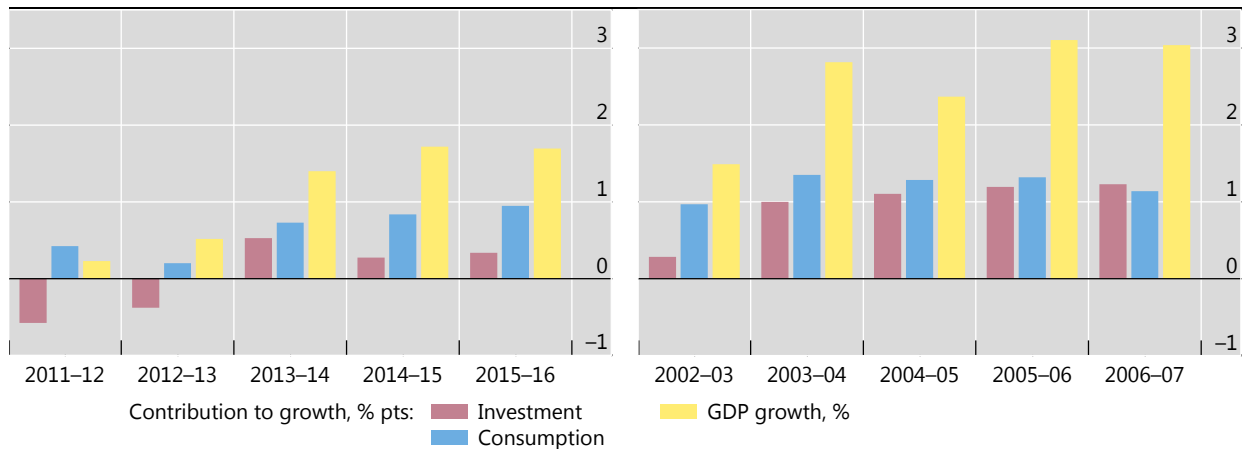
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² The latest OECD, IMF and Consensus forecasts, for instance, suggest that private consumption growth will continue to exceed overall output growth in the United States in 2017.

Consumption has provided the main contribution to growth recently

Advanced economies;¹ growth and contribution to growth

Graph 1



¹ Simple average across AT, AU, BE, CA, CH, DE, DK, ES, FI, FR, GR, IT, JP, NL, NZ, PT, SE and US.

Sources: OECD, *Economic Outlook*; authors' calculations.

controlling for a number of factors. This finding is consistent with the view that a revival of investment is a precondition for a sustainable expansion.

The next section looks at the characteristics of consumption-led expansions, before we turn to their implications for subsequent GDP and consumption growth.

More countries have been experiencing consumption-led growth since 2012¹

Table 1

	2010	2011	2012	2013	2014	2015	2016
Brazil		✓	✓	✓	✓		
Canada	✓		✓	✓	✓	✓	✓
China		✓	✓		✓	✓	✓
France					✓	✓	✓
Germany			✓	✓		✓	
India		✓		✓			✓
Italy					✓	✓	✓
Japan			✓	✓			
Russia	✓	✓	✓	✓	✓		
South Africa	✓	✓	✓			✓	✓
United Kingdom			✓			✓	✓
United States		✓			✓	✓	✓
<i>Number of economies</i>	3	6	8	6	7	8	8

¹ Growth is defined as consumption-led when the real growth rate of private consumption in a given year is higher than that of real GDP. Years with negative GDP growth are excluded. For 2016, OECD forecasts or BIS estimations.

Sources: OECD, *Economic Outlook*; World Bank; CEIC; national data; authors' calculations.

Characteristics of consumption-led growth

For our analysis, we define periods of consumption-led expansions as periods during which private consumption grows more quickly than GDP, either in nominal terms, so that the consumption-to-GDP ratio increases over time, or in real terms, so that real consumption growth exceeds real GDP growth.^{3,4}

The number of countries experiencing such consumption-led expansions has increased over the last few years. For a sample of 18 advanced economies, it rose from seven in 2013–14 to 10 in 2015–16 (Graph 2, left-hand panel). Taking a somewhat longer time window to compute consumption and GDP growth rates provides a similar result: depending on the specific definition, eight or 12 countries experienced consumption-led growth over 2014–16, while the corresponding figures over 2012–14 were five and seven (right-hand panel).⁵

What are the main characteristics of consumption-led expansions? To answer this question, we start by simply comparing output growth across consumption- and non-consumption-led episodes. Specifically, we consider one- to three-year windows and compute the distribution of GDP growth rates for both regimes across our 18 advanced economies since 1991.

Before turning to the main patterns, it is worth recalling two important features of private consumption. First, consumption is the largest component of aggregate demand. For instance, in our sample it accounts for around 56% of GDP. Second, it is much stickier than other demand components.⁶ Households try to smooth consumption over time, bridging periods of weak income growth or high unemployment by reducing saving. For this reason, recessions or periods of negative GDP growth are likely to witness an increase in the consumption-to-output ratio. Therefore, for the rest of this article we restrict our analysis to positive GDP growth periods so that we can confidently define consumption-led growth as periods of increasing consumption relative to output.

³ The leading driver of GDP growth is usually defined as either the component that makes the largest contribution to GDP growth or the one growing faster than GDP. But if all GDP components grow at the same rate, the largest contribution will simply be that of the largest component. In other words, a drawback of focusing on growth contributions is that a large share in GDP could compensate for the low growth rate of a given component. The second definition also has its drawbacks. First, there may be more than one component growing faster than GDP, making it difficult to say which is leading growth. Second, growth rates often reflect the cyclical properties of demand components. For instance, investment is more cyclical than GDP, while private consumption is less so, implying that investment-led growth could be observed more often when the economy is growing quickly, and consumption-led when the economy is growing slowly. However, these two issues can easily be addressed. First, in advanced economies consumption is by far the largest component of GDP. Hence, when consumption grows faster than GDP, it also tends to have the largest contribution. Second, focusing on periods with positive GDP growth significantly alleviates the problem due to differences in GDP components' cyclical properties.

⁴ The private consumption deflator tends to grow more slowly than the GDP deflator. As a result, real consumption can grow more quickly than real GDP even if the consumption-to-GDP ratio – which is computed using nominal values – is not necessarily increasing. Graph 2 therefore presents evidence using both alternative definitions. But the rest of the analysis focuses on consumption-led growth as periods of increasing consumption-to-output ratios, arguably a more restrictive definition.

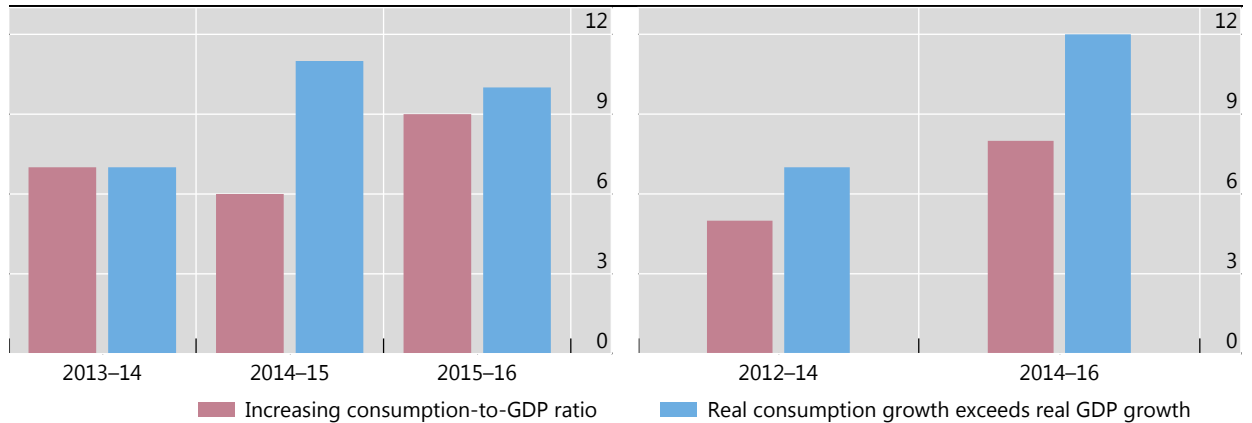
⁵ The numbers in the right-hand panel of Graph 2 are based on two-year windows.

⁶ Private consumption growth also tends to be stickier than total GDP growth, as the standard deviation of the former is 1.8%, versus 2.1% for the latter.

Advanced economies¹ experiencing consumption-led growth

Number of economies

Graph 2



¹ The sample includes AT, AU, BE, CA, CH, DE, DK, ES, FI, FR, GR, IT, JP, NL, NZ, PT, SE and US.

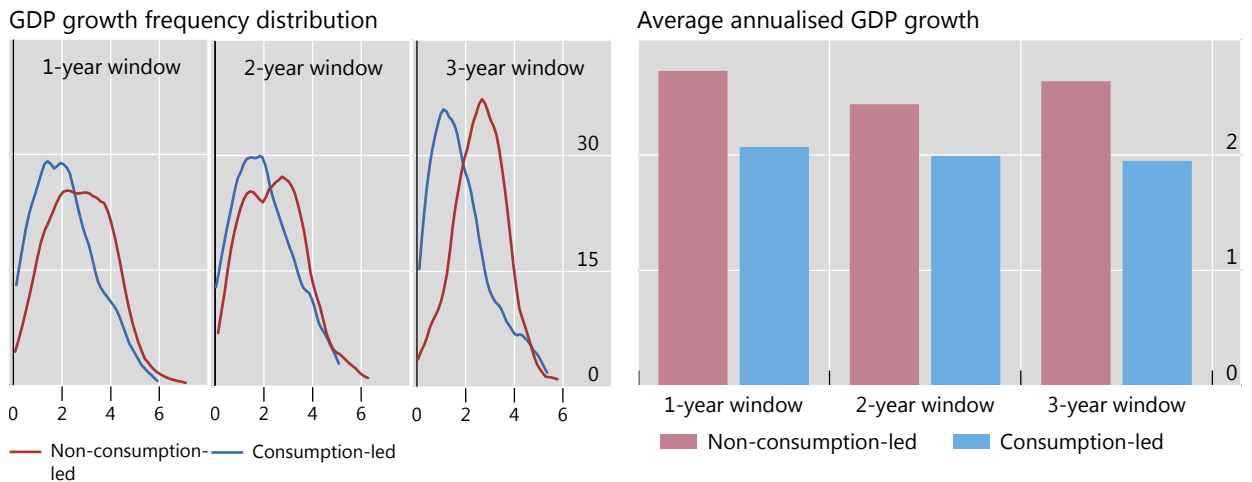
Sources: OECD, *Economic Outlook*; authors' calculations.

Some general patterns become clear at the outset. First, growth is weaker when it is consumption-led: the left-hand panel of Graph 3 shows that the distribution of GDP growth rates is tilted towards the right for non-consumption-led expansion. This holds whether one considers growth rates over one, two or three years. As noted above, this difference holds when we restrict our attention to periods of positive GDP growth: the difference in average annualised GDP growth is around 0.7 percentage points using a one-year window, 0.5 percentage points using a two-year window and

GDP growth under consumption- and non-consumption-led growth

Advanced economies,¹ 1991–2016; in per cent

Graph 3



¹ The sample includes AT, AU, BE, CA, CH, DE, DK, ES, FI, FR, GR, IT, JP, NL, NZ, PT, SE and US. Restricted to positive GDP growth rates. Growth is consumption-led if the consumption-to-output ratio increases over the period considered.

Sources: OECD, *Economic Outlook*; authors' calculations.

around 0.7 percentage points using a three-year window, with these differences being statistically significant in all three cases (Graph 3, right-hand panel).⁷

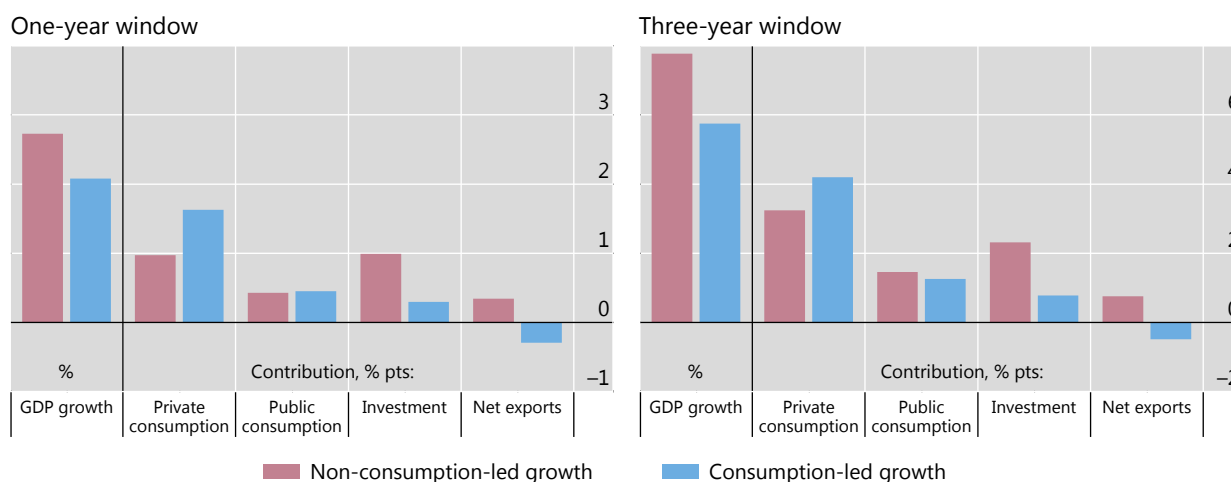
To understand why growth is systematically weaker when it is led by consumption, we decompose GDP by its demand components. As would be expected, consumption tends to contribute more to aggregate GDP growth when it is consumption-led: on average 1.6 percentage points versus 1 percentage point for non-consumption-led expansions (Graph 4, left-hand panel). Over a three-year window, the difference in the consumption contribution is around 1 percentage point, and therefore slightly lower on an annualised basis.

Public sector spending contributes about the same amount to GDP growth across both regimes, suggesting that differences between the two regimes are not related to differences in fiscal policy. Meanwhile, the respective contributions of investment and net exports to growth appear to be much weaker during consumption-led expansions, to an extent that this more than offsets the stronger contribution of private consumption. This finding suggests that the nexus between current consumption and investment is key for understanding the implications of consumption-led expansions.

Composition of GDP growth under consumption- and non-consumption-led growth

Advanced economies,¹ 1991–2016

Graph 4



¹ The sample includes AT, AU, BE, CA, CH, DE, DK, ES, FI, FR, GR, IT, JP, NL, NZ, PT, SE and US. Restricted to positive GDP growth rates. Growth is consumption-led if the consumption-to-output ratio increases over the window considered.

Sources: OECD, *Economic Outlook*; authors' calculations.

⁷ Consumption being stickier than output, the consumption-to-output ratio tends to rise during recessions, ie episodes of negative GDP growth, while investment drops faster than GDP. This holds irrespective of the length of the window used to compute growth rates.

Implications of consumption-led expansions

The key question in assessing the implications of consumption-led expansions regards causality. Do such episodes cause lower overall GDP growth, or are they the consequence of a lack of growth opportunities? In other words, how secure are the foundations for sustained growth?

Strong consumption growth today could induce subsequent economic weakness through a number of possible mechanisms. First, if increased consumption is financed by debt, this may constrain spending in the future. Recent research (eg Jordà et al (2015) and Lombardi et al (2017)) has found that past credit growth tends to hinder future growth, either because a financial crisis occurs or simply because agents have over-borrowed relative to their repayment capabilities and need to deleverage. It could therefore be that a consumption-led expansion financed through borrowing ends up hurting future demand because households need to devote a larger fraction of their income to debt servicing.

Second, consumption-led growth may be driven by wealth effects, in particular housing wealth effects. When real house prices go up, property owners may decide to consume part of their capital gains, which boosts consumption and hence GDP. Yet if incomes do not grow in line with house prices, or if house price increases reverse, households have to cut back on consumption, thereby lowering GDP growth.

But consumption need not play a causal role. In particular, if there are few growth opportunities, then investment is weak. Weak investment would then be associated with low growth, which would, in turn, show up as consumption-led growth, not least since consumption is stickier than GDP.

Impact of consumption-led expansions on growth

Dependent variable: subsequent real GDP growth

Table 2

	Years ahead					
	1	2	3	4	5	5
Consumption-led growth	-0.169 (0.155)	-0.437* (0.252)	-0.570*** (0.275)	-0.618** (0.304)	-0.571* (0.342)	-0.816** (0.319)
GDP growth	0.027 (0.054)	0.028 (0.082)	0.061 (0.098)	0.041 (0.118)	0.030 (0.130)	
Real house price growth	-0.002 (0.010)	-0.012 (0.015)	-0.031* (0.020)	-0.037* (0.022)	-0.042* (0.022)	
Private credit-to-GDP growth	0.028* (0.010)	0.069* (0.030)	0.093** (0.038)	0.073** (0.041)	0.044 (0.043)	
Debt service ratio	-0.194*** (0.057)	-0.404*** (0.088)	-0.635*** (0.109)	-0.817*** (0.140)	-0.940*** (0.172)	
Number of observations	183	183	183	183	183	183
R-squared	0.800	0.803	0.814	0.821	0.838	0.787

The table reports the results of regressions where the dependent variable is GDP growth h years ahead and the independent variables are named at the beginning of each row. The sample includes AU, BE, CA, CH, DE, DK, ES, FI, FR, IT, JP, NL, SE and US; the estimation period is 2000–16. All estimations include country and time fixed effects. Robust standard errors in parentheses; ***/**/* denotes statistical significance at the 1/5/10% level.

Source: Authors' calculations.

We test the relevance of these mechanisms with a simple econometric exercise.⁸ We estimate the relationship between the number of consumption-led growth years in a given period and the subsequent growth rate of GDP or consumption. The estimated coefficient for the consumption-led growth variable then quantifies the subsequent growth gain/loss in GDP or consumption stemming from an additional year of consumption-led growth. In parallel, we include the aforementioned mechanisms using private credit-to-GDP growth, real house price growth and the debt service ratio to tease out the channels through which consumption-led growth could harm subsequent output and consumption (see the box for details).

Table 2 presents the estimation results. The first five columns relate to different estimation horizons, h , from one to five years ahead; the sixth column shows results for the estimation horizon $h = 5$ without any control variables. Three main takeaways can be drawn from this exercise.

First, real house price growth has a weakly significant negative effect on subsequent GDP growth at horizons of three to five years. This is consistent with the view that households need to adjust their consumption downwards after having consumed part of the increase in their housing wealth. Another interpretation is that

Estimation of the effects of consumption-led expansions on subsequent GDP and consumption growth

Our econometric specification relates the growth rate of GDP (or the growth rate of private consumption) in country i between year t and $t+h$, denoted $Y_{t+h,i}$ to:

- A variable counting the number of years of consumption-led growth in country i between year $t-3$ and t , denoted $CL_{t,i}$, consumption-led growth years being defined as those over which the consumption-to-output ratio increases.

In addition, we add a number of control variables as follows:

- The growth rate of GDP between year $t-3$ and t , denoted $Y_{t,i}$. In this respect, if growth opportunities are correlated over time, having past GDP growth on the right-hand side can capture this autocorrelation in growth opportunities.
- The growth rate of private credit-to-GDP between year $t-3$ and t , denoted $PC_{t,i}$.
- The growth rate of real house prices between year $t-3$ and year t , denoted $HP_{t,i}$, with real house prices being computed by deflating nominal values with the CPI index.
- The debt service ratio in year t , denoted $DSR_{t,i}$, defined as the ratio of debt repayments to income.

Focusing on 16 advanced economies using annual data since 2000, we therefore estimate for each horizon $h=1,2,\dots,5$ a separate regression following the specification:

$$Y_{t+h,i} = \alpha_{h,i} + \alpha_{h,t} + \beta_h CL_{t,i} + \gamma_h PC_{t,i} + \delta_h HP_{t,i} + \theta_h DSR_{t,i} + \lambda_h Y_{t,i} + \varepsilon_{t+h,i} \quad (1)$$

where $\alpha_{h,i}$ and $\alpha_{h,t}$ denote country and year fixed effects, respectively; β_h , γ_h , δ_h , θ_h and λ_h are parameters to be estimated and ε is a residual.

⁸ Overall, we find that increases in the private consumption-to-GDP ratio tend to act as a drag on subsequent growth, rather than the long-term level of this ratio in any given country. We leave it to future research to determine which factors explain the substantial cross-country heterogeneity in this ratio.

stronger house price growth, to the extent that it implies pouring more resources into housing, can act as a drag on resources that could be employed in more productive uses.

Second, past credit-to-GDP growth has a significant and positive effect on subsequent GDP growth at a three- to four-year horizon. Moreover, the debt service ratio has a strongly significant and persistent negative effect on subsequent GDP growth, which seems to last even at a five-year horizon. These two results are consistent with each other. If credit expands more quickly while the repayment burden is stable, then more credit is available to sustain aggregate demand, thereby lifting future GDP growth. Conversely, an increase in the repayment burden for a given credit-to-GDP increase means that the economy faces higher interest rates which ought to weigh on future growth. These results are consistent with a growing body of literature that highlights how credit extension can act as a drag on growth through a higher debt service ratio (Drehmann and Juselius (2012), Dynan (2012), Mian et al (2013), Juselius et al (2016) and Drehmann et al (2017).

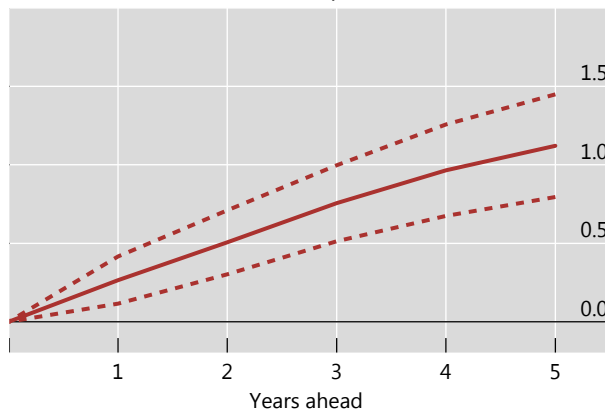
To explore how these variables affect consumption, we carry out a similar exercise using subsequent real *consumption* growth as a dependent variable. We use the same independent variables as before, but replace past GDP growth with past consumption growth and private credit-to-GDP growth with household credit-to-GDP growth. This way, there is a closer relationship between the left-hand and right-hand side variables.^{9,10}

Consumption-led growth, debt service ratio and subsequent consumption growth

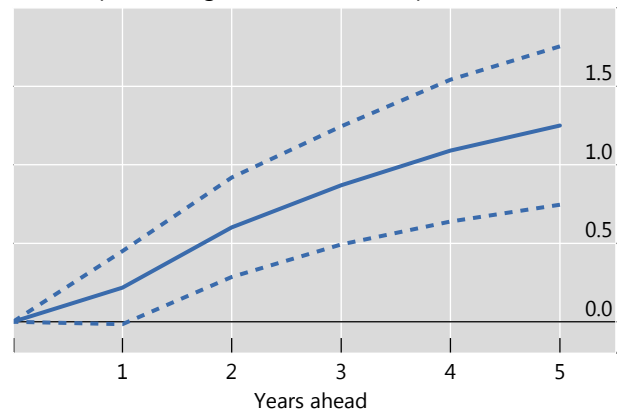
Advanced economies,¹ consumption growth loss, in percentage points

Graph 5

Debt service ratio and consumption²



Consumption-led growth and consumption³



¹ The sample includes AU, BE, CA, CH, DE, DK, ES, FI, FR, IT, JP, NL, SE and US; the estimation period is 2000–16. ² The simulation represents the estimated effect on real private consumption of a one standard deviation increase in the debt service ratio based on the results from equation (1) in the box estimated for one to five years ahead. ³ The simulation represents the estimated effect on real private consumption of one additional year of consumption-led growth based on the results from equation (1) estimated for one to five years ahead.

Sources: OECD, *Economic Outlook*; BIS; authors' calculations.

⁹ Unfortunately, due to data limitations we cannot use the household sector debt service ratio, which forces us to use the economy-wide debt service ratio.

¹⁰ Adding household income growth to the specification does not change the results significantly, either qualitatively or quantitatively.

Qualitatively, the results are very similar (Table 3). The estimated coefficients for the number of consumption-led expansion years and the debt service ratio are both negative and statistically significant at most horizons. The estimated coefficients are lower (in absolute value) for the debt service ratio variable but larger for the consumption-led growth variable than in the GDP growth regression. Household credit growth also provides a significant boost to consumption over the one- to three-year horizon.

In contrast to the results for GDP growth, however, the other variables (past consumption growth, past real house price growth and past household credit-to-GDP growth) have little explanatory power. This suggests that the debt service ratio and the number of consumption-led growth years are strong determinants of subsequent consumption growth.

An additional year of consumption-led expansion (Graph 5, right-hand panel) or a one standard deviation increase in the debt service ratio (left-hand panel) have roughly the same estimated effect on consumption growth. In both cases, after five years consumption is between 1 and 1.2 percentage points lower than it would have been otherwise, or 0.2–0.24 percentage points per year.

While house prices do not generally have a significant effect on consumption over longer horizons, this is not always the case in the very short run. As one would expect, the effect of housing market conditions on consumption varies considerably across countries and over time. An analysis of the short-term effect confirms this view

Impact of consumption-led expansions on consumption

Dependent variable: subsequent real consumption growth

Table 3

	Years ahead					
	1	2	3	4	5	5
Consumption-led growth	-0.218 (0.141)	-0.602*** (0.192)	-0.869*** (0.228)	-1.090** (0.274)	-1.253*** (0.306)	-1.374*** (0.302)
Consumption growth	-0.053 (0.055)	-0.051 (0.075)	0.052 (0.089)	0.041 (0.107)	0.065 (0.120)	
Real house price growth	0.006 (0.011)	0.009 (0.015)	0.003 (0.017)	0.002 (0.021)	-0.013 (0.023)	
Household credit-to-GDP growth	0.047*** (0.016)	0.079*** (0.023)	0.061** (0.027)	0.036 (0.032)	-0.001 (0.036)	
Debt service ratio	-0.175*** (0.060)	-0.333*** (0.082)	-0.497*** (0.097)	-0.635*** (0.116)	-0.738*** (0.130)	
Number of observations	180	180	180	180	180	180
R-squared	0.619	0.725	0.772	0.786	0.812	0.770

The table reports the results of regressions where the dependent variable is consumption growth h years ahead and the independent variables are named at the beginning of each row. The sample includes AU, BE, CA, CH, DE, DK, ES, FI, FR, IT, JP, NL, SE and US and the estimation period is 2000–16. All estimations include country and time fixed effects. Robust standard errors in parentheses; ***/** denotes statistical significance at the 1/5% level.

Source: Authors' calculations.

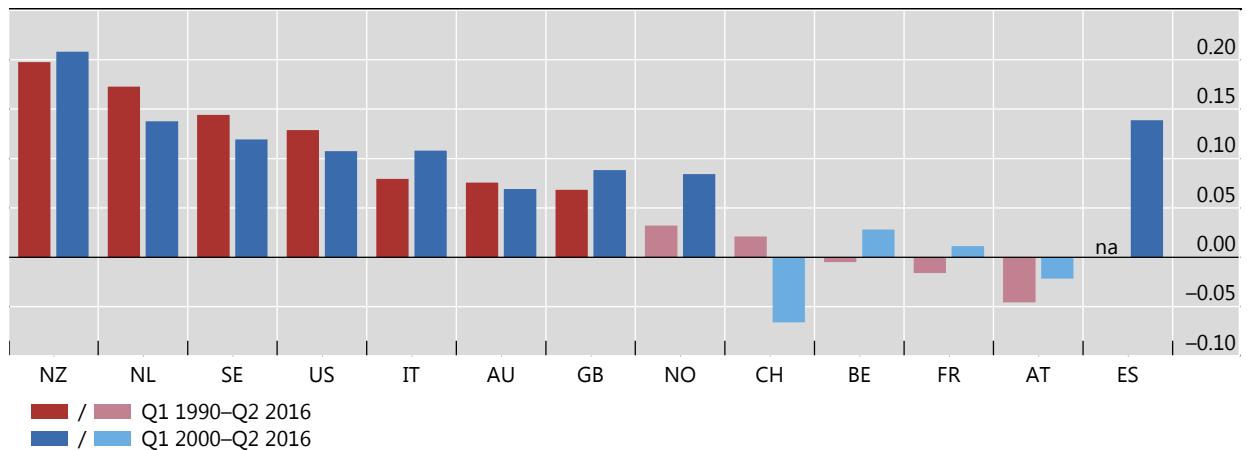
(Graph 6 and Table A1 in the Annex).¹¹ In nine of 13 countries, information on house price changes in a given quarter improves the prediction of consumption growth in the subsequent quarter in a way that is economically and statistically significant (in the post-2000 sample). The point estimates suggest that it would take an 8% increase in the respective house price indices (in real terms) to boost consumption by about 1 percentage point in the United States. The estimates also suggest that the short-term sensitivity of consumption to house prices has increased in some countries (eg Norway and the United Kingdom).

On the whole, the above association tends to be stronger in countries where mortgage refinancing and home equity extraction is more prevalent. Rising house prices may enable homeowners to take out larger loans, as the value of pledgeable collateral rises.¹² These loans may take the form of consumption or re-mortgaging lending (from which part of the gains may be consumed). Rising house prices also increase homeowners' net wealth, which may explain higher consumption. These channels tend to be stronger in the aggregate whenever the share of homeowners in the population is large. Indeed, there is a positive cross-country correlation (0.53) between the house price elasticity of short-run consumption and the home ownership rate.¹³

Short-term effect of housing market conditions on consumption¹

Coefficient of house price growth in following-quarter consumption growth

Graph 6



The lighter bars denote coefficients that are not statistically significant at the 10% level.

¹ The bars refer to the coefficient of quarterly house price growth (deflated by CPI), in a quarterly consumption growth equation. The specification includes controls for changes in a proxy for permanent income, a risk indicator and the real interest rate (see Table A1).

Source: Authors' calculations.

¹¹ Control variables in these regressions include a proxy for changes in permanent income, where permanent income is computed by extrapolating the growth rate of income over the previous eight years (ie the moving average) into the future and applying a fixed discount rate of 5% (as in Aron et al (2012)). See also Muellbauer (2016).

¹² See Tsatsaronis and Zhu (2004), Scatigna et al (2014), BIS (2015) and Jordà et al (2015).

¹³ While further refinement by the use of detailed micro-data analysis of this link is beyond the scope of this feature, several papers in the literature find confirmation of such channels. Campbell and Cocco (2007), for instance, find significant effects of house prices in the United States on the consumption of homeowners, but not of renters.

In contrast, when housing is obtained mostly through rental agreements, house prices are less likely to have first-order effects on aggregate consumption. Indeed, in several countries in continental Europe, the link between house prices and household consumption is not as evident. This is partly due to weaker incentives for households to take on leverage, which translate into low home ownership.¹⁴

The very short-term growth rate of consumption in several economies is affected by past house price developments, and house prices thus can be an important channel of monetary policy transmission. In the medium to long run, however, house price effects on consumption are typically superseded by the dynamics of the debt service ratio and investment.

Conclusion

All in all, the evidence suggests that the composition of growth matters for medium-term growth prospects. We find that increasing shares of private consumption in GDP can be a leading indicator of future growth slowdowns, particularly if consumption-led expansions come on the back of growing imbalances and rising debt burdens. High household debt service ratios tend to become a potent drag on economic growth, frequently leading to costly deleveraging processes.

The increasing prevalence of consumption-led growth since 2012 therefore presents new challenges for policymakers in several economies. Policies that address the build-up of imbalances and strengthen investment are thus central in fostering sustainable growth.

¹⁴ In this regard, Schneider and Wagner (2015) document how the tax systems of Austria and Germany tend to favour renting over owning.

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Annex

Short-term consumption growth equations

Dependent variable: quarter-on-quarter log change in household consumption index

Table A1

	Full sample			Post-2000			Sample period [number of observations]
	Change in house prices	R ²	Forecast standard error	Change in house prices	R ²	Forecast standard error	
Australia	0.076*** (2.85)	0.134	0.00513	0.069** (2.19)	0.185	0.00467	Q3 1990–Q2 2016 [104]
Austria	−0.045 (1.66)	0.089	0.00573	−0.022 (0.62)	0.085	0.00587	Q4 1996–Q2 2016 [79]
Belgium	−0.005 (0.69)	0.055	0.00482	0.028 (0.46)	0.071	0.00401	Q3 1990–Q2 2016 [104]
France	−0.016 (0.74)	0.070	0.00562	0.011 (0.36)	0.093	0.00421	Q3 1992–Q2 2016 [96]
Italy	0.079* (1.80)	0.186	0.00595	0.108** (2.28)	0.337	0.00457	Q3 1990–Q2 2016 [104]
Netherlands	0.173*** (4.54)	0.420	0.00559	0.137*** (4.23)	0.253	0.00545	Q4 1996–Q1 2016 [78]
New Zealand	0.198*** (5.55)	0.267	0.00742	0.208*** (4.81)	0.297	0.00762	Q4 1996–Q2 2016 [79]
Norway	0.032 (0.69)	0.071	0.00968	0.084** (2.30)	0.078	0.00797	Q3 1992–Q2 2016 [96]
Spain	0.139*** (3.81)	0.632	0.00585	Q4 2003–Q2 2016 [51]
Sweden	0.144*** (2.65)	0.178	0.00800	0.119** (2.48)	0.131	0.00623	Q3 1990–Q2 2016 [104]
Switzerland	0.021 (0.74)	0.095	0.00316	−0.066 (1.42)	0.157	0.00286	Q3 1990–Q2 2016 [104]
United Kingdom	0.068*** (2.88)	0.365	0.00620	0.088*** (3.12)	0.516	0.00517	Q3 1990–Q1 2016 [103]
United States	0.129*** (3.85)	0.438	0.00398	0.107*** (3.01)	0.490	0.00354	Q3 1990–Q2 2016 [104]

Variables are log changes and in real terms. *t*-statistics, in parentheses, are based on robust standard errors; ***/**/* denotes statistical significance at the 1/5/10% level. All equations include a constant and controls for changes in a proxy for permanent income, perceived risk (proxied by the VIX) and in the real interest rate.

Source: Authors' calculations.