



BANK OF ENGLAND

April 2016

Understanding and measuring finance for productive investment

A Discussion Paper



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The Bank of England would welcome comments and views on the material set out in this Paper.

Comments should be sent by 3 June 2016 to: Productivefinance2016@bankofengland.co.uk

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Understanding and measuring finance for productive investment

A Discussion Paper prepared by Bank of England staff

Executive summary

Finance can and should be a powerful driver of economic growth and prosperity.

The financial system intermediates funds between borrowers and savers, it provides finance so that companies can invest, innovate and expand, and it rewards prudent risk-taking by savers. Not all finance leads to productive investment. Equally not all investment will be productive.

An objective of the Bank of England is to protect and enhance the stability of the financial system of the United Kingdom. One purpose of protecting and enhancing the stability of the UK financial system is to safeguard the stable provision of financial services to the real economy, including financing for productive investment. The Financial Policy Committee (FPC) exercises its functions with a view to contributing to the achievement by the Bank of England of its financial stability objective. Subject to this, the FPC exercises its functions with a view to supporting the Government's economic policy. The Chancellor's remit letter recommends that the FPC should support the Government's economic objectives by acting in a way that, where possible, facilitates the supply of finance for productive investment provided by the UK's financial system.¹

This Discussion Paper – produced by Bank of England staff – is a first step to initiate research on understanding and measuring finance for productive investment. It focuses on the corporate sector, which accounts for the largest share of total investment. The Paper concludes that better measurement of finance for productive investment is likely to require changes to current forms of data collection and additional frontier research. Recognising these challenges, the Bank will consider monitoring proxy indicators in the near term; a medium-term goal is to gather additional information to develop a better set of indicators that measure finance for productive investment.

Defining finance for productive investment

There is no standard definition of finance for productive investment. It is useful to define this concept in two stages:

- What is investment and when is it productive?

- Is there enough finance to ensure productive investment takes place?

Investment is defined as spending that has the potential to expand the capacity of the economy, by adding to capital, knowledge and technology. Investment is productive as long as the expected social return is greater than the expected social cost of capital.

Investment encompasses spending on tangible forms of capital (such as machinery, and new buildings) as well as intangible forms (such as, innovation and skills). And investment is productive when the net expected benefits to society are positive. Transactions that involve a transfer of the existing stock of assets – such as the purchase of a house that is already built – between two parties are defined as non-investment. Non-investment transactions may nevertheless support productive investment indirectly, as the funds used to purchase an existing asset will, in general, flow back into the financial system and can be recycled for other purposes.

If the UK economy is found to have unexploited productive investment opportunities, it is important to establish if they are unexploited due to the failure of financial markets to allocate the funds to their most efficient use, or if they arise from real economy frictions, such as barriers that stop firms entering the most profitable markets. The measure of finance for productive investment should ideally pick out movements relating to the former, and not the latter.

Measuring finance for productive investment

There is real merit in measuring finance for productive investment.

The challenge is that productive investment and finance for productive investment are concepts that are largely unobservable. As a result, to assess the supply of finance for productive investment, it is necessary to rely on a range of different data sources, recognising the known shortcomings in the data.

Taking these data proxies at face value there are no conclusive signs of a deficiency in productive investment in the United Kingdom in the most recent data. But there are some segments of the economy, where the returns to productive investment are higher than elsewhere, for example for small and young firms. However, it is difficult to ascertain, from available data, whether the availability of finance is still a constraint for small firms or simply a manifestation of the fact that

¹ See HM Treasury (2016).

small and young firms are on average more likely to fail than large firms. Improving data collection for these segments of the economy would enable more robust conclusions to be drawn.

The UK private non-financial corporate sector, in aggregate, has internal funds that are sufficiently large to finance all the investment that takes place. In fact, the corporate sector has decreased borrowing over the past few years and has become a net provider of funds to the financial system. But this is not true for all firms.

Large firms, with access to bond and stock markets, do not appear to have a shortage of finance for productive investment. Small firms that do have access to capital markets rely heavily on net equity issuance to finance their business. But the vast majority of small firms do not have access to market-based finance, and are heavily dependent on bank funding or internal funds. The investment decisions of small firms, which account for around 30% of total business investment, are likely to be sensitive to their access to external finance. Surveys show that small firm access to finance remains an issue, but it now affects a smaller proportion of firms than in recent years.

Past periods where firms had successfully raised high levels of overall finance were not always periods of high investment growth; instead those funds were used for non-investment financial activities, such as mergers and acquisitions. But at other times, such as during the global financial crisis, levels of finance accessible to firms fell sharply, as did investment. In other words, the overall level of finance raised has not always been a good proxy of finance for productive investment in the past.

A large share of the stock of outstanding bank lending is used to finance mortgages, which, as noted earlier, is defined as non-investment in this Discussion Paper. But a home sale is likely to lead to a chain of follow-on transactions, some share of which is allocated to investment. For example, when a last-time seller of a house deposits the proceeds of the sale into a bank, some share of those funds is likely subsequently to become available for investment.

Research on whether finance for non-investment in the United Kingdom 'crowds out' finance for productive investment would be useful. The potential reasons behind crowding out are also of interest. For example, is it related to the long-run shift of UK investment towards intangible assets, and the associated difficulty that these investments typically lack suitable forms of collateral?

Towards better measurement of finance for productive investment

The medium-term goal of this Discussion Paper is to initiate research that enables the development of a

better set of measures of finance for productive investment that could be monitored by the Bank and the FPC and published regularly.

In light of the existing data limitations, the analysis suggests this involves obtaining, in the most efficient manner, better information for the following nine data items. It is valuable to collect these data at a more disaggregated level than the whole economy, given the important differences that often exist across different segments of the economy (for example, small firms). The data are grouped into data that will improve an assessment of whether investment is productive; and data that will improve an assessment of whether there is enough finance for productive investment.

Data to measure productive investment:

1. marginal expected rate of return on new investment;
2. cost of funds;
3. required rate of return on new investment (firm investment hurdle rates);
4. investment and capital stock (particularly for small firms);

Data to measure finance for productive investment:

5. uses of internal funds;
6. uses of external finance;
7. marginal expected rates of return from other financial activities, for example mergers and acquisitions, and leveraged buyouts;
8. quantitative data on non-price terms of lending for investment (for example collateral); and
9. factors holding back investment (risk tolerance, regulation, taxation, etc.).

Some of these items relate to concepts that are inherently hard to measure; for instance the expected return on investment. Other data measures, such as the use of internal funds, are easier to observe, but require additional survey questions to be designed. Data collection can be costly, and typically better quality data are only available at a higher cost. A vital next step is gathering information from respondents on who could provide the above data and the likely costs involved.

In the near term, the Bank will:

1. use its Agency Network to trial a survey of businesses as a means of gathering additional data on the nine data items listed above;
2. organise a workshop to bring together interested parties and respondents; and
3. consider developing a set of preliminary indicators to monitor finance for productive investment that could be published regularly.

These are likely to draw on the following measures presented in this Discussion Paper:

- net returns on capital (Chart 5);
- real rates of return and risk premia (Chart 8);
- internal funds and investment (Chart 14);
- total net finance raised by companies, including bonds, equity and loans (Chart 13, 17, 21 and 22); and
- survey measures of factors influencing investment (Charts 25 and 26).

Having more and better quality data is a necessary condition for creating a metric of finance for productive investment. But the analysis suggests that the data are often consistent with a number of behaviours (or economic hypotheses). Therefore, additional frontier research that helps to understand the drivers of finance for productive investment is recommended.

The Bank would welcome comments from interested parties on all aspects of this Discussion Paper. A more specific list of questions on which the Bank would particularly welcome feedback is set out at the end of this Discussion Paper.

Comments should be sent by 3 June 2016 to:
Productivefinance2016@bankofengland.co.uk

1. Introduction

A statutory objective of the Bank of England is to protect and enhance the stability of the financial system of the United Kingdom. One purpose of protecting and enhancing the stability of the UK financial system is to safeguard the stable provision of financial services to the real economy, including financing for productive investment.

Productivity growth is desirable because it enhances economic growth and raises living standards of the people of the United Kingdom by enabling higher levels of consumption. While investment is undertaken at the cost of current consumption, investing in productive assets and processes plays a major role in delivering economic growth and hence higher levels of consumption in the future.

In support of the Government's priority to improve the United Kingdom's productivity performance, HM Treasury and the Department for Business, Innovation and Skills (BIS) have published a 'productivity plan'. This analysed the role of the financial sector in supporting productivity growth, both directly through the sector's own productivity performance, and though its role in allocating resources to support long-term investment. The productivity plan noted that:²

'To promote the provision of finance to support productive investment, it is important that it can be measured accurately. The Chancellor has therefore asked the Governor of the Bank of England, working with HM Treasury, to initiate research to create better measurement of 'finance for productive investment' covering all asset classes and all stages of finance, with a view to publishing the data on a regular basis.'

This Discussion Paper represents the first step in initiating research that seeks to understand and better measure finance for productive investment.

The Financial Policy Committee (FPC) exercises its functions with a view to contributing to the achievement by the Bank of its financial stability objective and, subject to that, supporting the

economic policy of HM Government, including its objectives for growth and employment.

HM Treasury specifies to the FPC the economic policy of the Government and also makes recommendations to the FPC, including regarding the FPC's responsibility to support the Government's economic policy, at least annually in a letter to the Governor of the Bank of England.

In his letter to the Governor of the Bank of England last July, the Chancellor noted that the Government had announced its intention to improve the United Kingdom's productivity performance.³ In light of this, the Chancellor recommended that, subject to achievement of its primary objective, the FPC 'should support the Government's economic objectives by acting in a way that, where possible, facilitates the supply of finance for productive investment provided by the UK's financial system.' The Chancellor further recommended that the FPC 'should consider the impact of its policy actions on the ability of the financial sector to provide finance for productive investment.'

In his role as Chairman of the FPC, the Governor of the Bank of England responded to the letter from the Chancellor.⁴ He noted that 'the Committee will continue to consider the capacity of the financial sector to supply finance for productive investment when judging whether its actions could have a significant adverse effect on the capacity of the financial sector to contribute to the growth of the UK economy in the medium or long term.' He further noted that 'The Committee also hopes to incorporate the results of the joint research work that is now starting between HM Treasury and the Bank to create a better measurement of productive investment'.

In the most recent letter to the Governor of the Bank of England on 16 March 2016, the Chancellor reiterated the Government's commitment to improve UK productivity, with a particular focus on facilitating long-term investment and developing reliable measures of finance for productive investment. He noted that achievement of the FPC's policy objectives would contribute to achieving those goals.⁵

² See HM Treasury (2015a).

³ See HM Treasury (2015b).

⁴ See Bank of England (2015b).

⁵ See HM Treasury (2016).

Section 2 of this Discussion Paper sets out a working definition of finance for productive investment. Section 3 provides measures that aim to assess how much capacity there may be at any point in time for productive investment. Section 4 examines different sources of finance available to the real economy and the extent to which they are deployed towards productive investment. Section 5 draws together the evidence to set out the next steps required to create a better measure of finance for productive investment.

2. Defining finance for productive investment

There is no agreed definition of finance for productive investment, and it can be interpreted in many ways. This section draws on different strands of the academic literature to define finance for productive investment. It is useful to define it in two stages:

- What is investment and when is it productive?
- Is there enough finance to ensure productive investment takes place?

What is investment and when is it productive?

Investment is defined as spending that has the potential to expand the capacity of the economy, by adding to the stock of capital, knowledge and technology.

Investment encompasses spending on new physical assets such as machinery for a business or new buildings, and intangible assets such as human capital.⁶

Non-investment spending is defined as transactions in existing assets, such as a house that has already been built, or consumption, such as the purchase of a car or a holiday. Transactions that are classed as non-investment, particularly consumption, can enhance living standards directly.

Not all investment is 'productive':

Investment is productive as long as the expected social return to investment is greater than or equal to the social cost of capital.

This is not a new definition; the idea goes back to the work of Tobin (1965):

'In classical theory the interest rate and the capital intensity of the economy are determined by "productivity and "thrift", that

⁶ Our definition is akin to the National Accounts definition of Gross Fixed Capital Formation, but it is broader in that conceptually it includes investment in human capital, which is absent from the National Accounts measure. This definition of investment is similar to that used in the G30 Working Group (2013).

is, by the interaction of technology [return to investment] and saving propensities [cost of capital]'.⁷

An important distinction to be made is between private and social returns (and costs).⁸ There are a number of reasons why the social and private returns and costs to investment are unlikely to be equal (see Box 1).

When private firms make investment decisions they consider if an investment is profitable – that is, if the private returns exceed private costs (or the net present value of the investment is positive). A simple example would be a firm that can borrow from a bank at a rate of 5% for one year. Any investment opportunity that yields more than 5% (with certainty) would be profitable. This example is based on private costs and returns. If these align with the social costs and returns on the investment, then the investment would also be productive.

A classic example of the social gains from investment differing from private gains is investment in infrastructure. For instance, a bridge without tolls may yield no private return to its owners. However, the increased mobility of goods and people that result from a bridge being built can yield substantial returns to society as a whole. So, according to the definition used in this Discussion Paper, building such a bridge could be a productive investment. Of course if the bridge was underutilised (a 'bridge to nowhere'), it may not yield sufficient social returns to be considered a productive investment.

In practice, investment is risky, so the returns to investment are not known with certainty or guaranteed. This means that investment may require compensation for risk. Thus risky investment is productive only when, on average, its expected social rate of return is at least as large as its social cost including an appropriate compensation for risk.⁹ This compensation is known as a risk premium.

⁷ Text in square brackets added by Bank of England staff.

⁸ An alternative potential definition is: investment is productive as long as the marginal product of capital is positive. But here investment may be inefficient, or sub-optimal.

⁹ This means that the net present value of an investment, adjusting for the risk premium, is positive. The risk premium should also reflect that some risks can be mitigated through diversification.

A useful concept in measuring productive investment is the theoretical 'optimal' level of capital in the aggregate economy – defined by the point at which an additional unit of investment produces a rate of return that perfectly compensates households both for their patience and their willingness to accept risk.

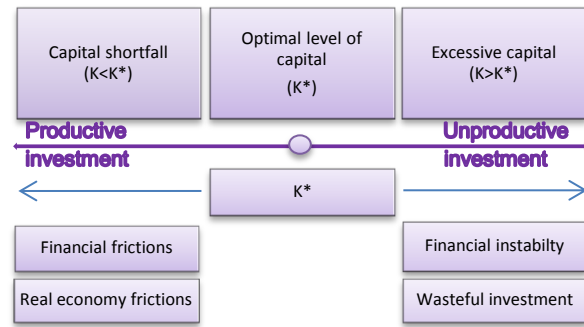
At times, the economy may have too little or too much capital. When there is too little capital, it is likely that new investments will increase the capital stock towards its optimal level and be productive.¹⁰ Furthermore, the lower the level of capital the more productive investment opportunities are likely to be available and the greater the potential returns. Conversely, when there is too much capital, an additional unit of investment is likely to yield returns that are insufficient to cover the compensation that savers require, and therefore can be considered unproductive.¹¹

Estimating with any precision the theoretical 'optimal' level of the capital stock is, of course, impossible. But there are nonetheless a number of indicators that can be reviewed to consider whether there are signs of systematic over- or under-investment.

Of course, it could be the case that, while the level of capital is optimal in the economy overall, in certain segments of the economy (for example, young firms, small firms or certain industries or regions of the economy) there is an over- or under-supply of capital. When investigating the evidence, it is therefore important to do so at both the aggregate and disaggregate levels.

Bearing these caveats in mind, a stylised view of this approach is summarised in Figure 1, with more details in Box 1.

Figure 1 Defining productive investment



Is there enough finance to ensure productive investment takes place?

In a dynamic economy, there will be new ideas that require new investment and render existing capital obsolete. According to standard economic theory, in a market economy capital should be allocated to where it is most useful, and investment should take place only if it yields a sufficient return. The role of finance is to provide the funds to facilitate this process.

If it can be shown that capital is not at its optimal level, it is necessary to examine why this might be the case. Potential causes can be divided into two sets of frictions: 'financial frictions', which limit the supply of funds available for productive investment; and 'real economy frictions', which limit the deployment of available funds by firms and households to productive investment opportunities.¹²

An instructive episode is the post-crisis period, during which UK investment fell and productivity stagnated.¹³ Financial frictions may have been at play here, either as financial providers cut back lending (particular to smaller enterprises) in response to a perceived increase in borrower riskiness, or as banks increased lending spreads to repair their balance sheets.

Importantly, the financial system can also oversupply funds and firms can overinvest. Overinvestment, when accompanied by rapid

¹⁰ This is the standard assumption of diminishing marginal returns to capital. The more that is invested, the lower the marginal return from an additional unit of investment (holding other inputs fixed).

¹¹ Spain and Portugal are good examples of a mis-pricing of risk in the run up to the global financial crisis that led to too much finance and unproductive investment. See Reiss (2013), Benigno and Fornaro (2014) and Gopinath et al (2015).

¹² As well as frictions, transitory shocks can also take the economy away from the optimal level over the economic cycle.

¹³ See Barnett et al (2014b) for potential explanations of the productivity puzzle and HMT (2015a).

credit expansion can generate systemic risks. If a period of high leverage is followed by a negative shock, for example, to income or interest rates, this can lead to severe macroeconomic dislocations.

Conversely, firms may choose not to invest if there are real economy frictions, such as regulatory and other barriers that stop firms entering the most profitable markets.

All asset classes need to be monitored when considering the supply of finance for productive investment. For households, this mainly includes their savings and loans from banks and other specialist lenders. For the private non-financial corporate sector, this includes all the liabilities recorded on their balance sheets – equity, bond issuance, bank loans and internal funds. The latter are funds that firms build up when revenue exceeds expenditure.

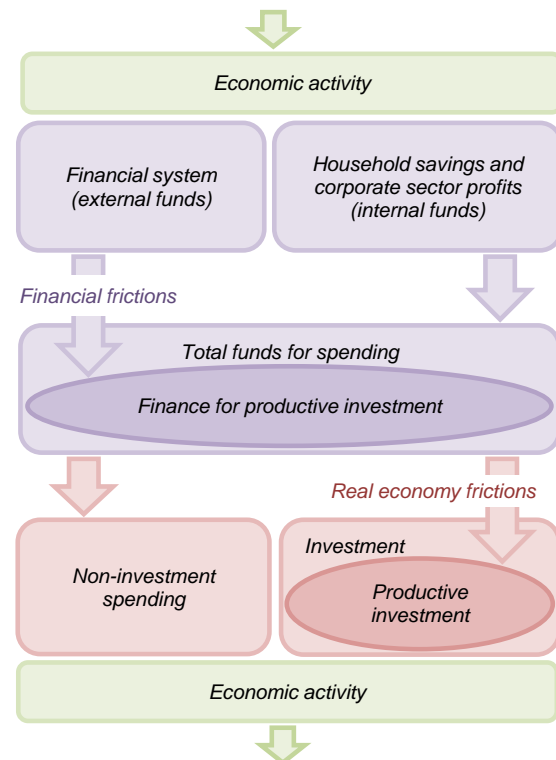
All stages of finance need to be monitored. This is interpreted to mean different stages through the lifecycle of a firm – from young to old. It is well known that the sources of finance available to young firms (typically proxied by looking at small firms) are different to older and larger firms.

It is also important to recognise that funds not used directly for investment may nevertheless support productive investment indirectly; although, in practice, it is difficult to trace through these channels. For example, the funds used to purchase an existing asset will, in general, flow back into the financial system and can be recycled for other purposes. On the other hand, non-investment spending may under some circumstances ‘crowd out’ the supply of finance for productive investment.

To conclude, this section has set out a working definition of finance for productive that can be summarised in Figure 2. There are two main sources of finance available to households and companies: internal funds and external funds, shown in the purple boxes towards the top of the Figure. These make up the total funds available for all spending as shown in the middle purple rectangle. Some proportion of these funds will constitute finance for productive investment, as shown in the dark purple oval. Borrowers use funds to finance investment and non-investment spending. Again, some proportion of investment will be ‘productive’, as shown in the dark pink oval. Any potential shortfall in productive investment is represented by two sets of

frictions: ‘financial frictions’, which limit the supply of external funds available for productive investment; and ‘real economy frictions’, which limit the deployment of available funds by firms and households to productive investment opportunities. The focus of this Discussion Paper is to understand and better measure the dark purple oval.

Figure 2 A working definition of finance for productive investment



Does this analytical approach seem broadly sensible given the objective of better measurement of finance for productive investment? What are the shortcomings of this approach and how could it be improved?

Box 1**Finance, investment and productivity**

This box sets out the role of the financial sector in funding investment and thereby contributing to economic activity. It is based on a simple set of assumptions about the production processes in an economy, and how those processes are financed.

Suppose that a firm produces output Y using capital K and labour L , with A representing a measure of technological efficiency. Output is assumed to be a function, F^{14} , of the inputs of production, K and L , which is augmented by the technological efficiency A :

$$Y = AF(K, L)$$

By re-arranging this function, labour productivity, defined as output per unit of labour (Y/L), can be expressed in terms of two main components: the level of technological efficiency, A , and a function, f , of capital per unit of labour or 'capital deepening' (K/L):

$$\frac{Y}{L} = A f\left(\frac{K}{L}\right)$$

Technological efficiency, A , also called total factor productivity (TFP), is an alternative measure of productivity, and reflects how efficiently labour and capital are combined to produce output. TFP is a key driver of long-term economic growth but it is not directly observable and is typically estimated as a residual in the equation above. Investments in research and development, to improve processes and create new products, can boost TFP. This set up does not consider human capital accumulation, but many of the arguments that follow can be extended to a model where human capital can also be accumulated through investment.

The extent of capital deepening is a second key determinant of long-term economic growth and labour productivity. This will include investments in tangible forms of capital – such as roads, plant and machinery – but also in intangible capital – such as skills or software. Measuring capital deepening is a challenge, because there is a large degree of uncertainty around official estimates of the capital stock.

¹⁴ F is assumed to be homogenous of degree 1.

The black line in Figure A shows a typical relationship between capital deepening and labour productivity in an economy where there are diminishing returns to scale.¹⁵

Now consider how investment in capital is financed. Imagine that savers discount future values at a rate $1/(1+p)$. This is to say that, in order to forgo £1 of consumption today, savers need £(1+p) of consumption tomorrow. How much consumption today is valued relative to tomorrow is referred to as the rate of time preference (or the discount rate). Savers will be willing to provide funds to firms to invest until the marginal product of capital (the return on investment) is equal to $1+p$. As such, the level of capital in this economy will be determined at point K^{**} in Figures A and B.

Investment can still be carried out beyond the point where $K=K^{**}$ and this will still boost output. However, by the definition adopted in this Discussion Paper, such investments will not be productive. This is because the return the investment generates is insufficient to compensate savers for the money they give up today. If K is larger than K^{**} , savers would rather consume the money today than lend it for investment, since the return they will receive tomorrow will be less than £(1+p).

This example is simple and stylised for two reasons:

First, there is no role for risk. Allowing for a risky return on investment, and assuming savers are risk averse, is akin to raising the effective discount rate (i.e. increasing p) and reducing the optimal level of capital (as illustrated in Figure B).

Second, financial intermediation is costless. In the example above, the financial sector can be thought of sitting between firms and savers, but it consumes no resources when it intermediates between the two. What would happen if, instead, the financial sector requires a return for itself for every unit of funds it intermediates? Imagine, for instance, if for every £1 lent to firms for investment the financial sector took an additional return r . To obtain £1 of funding firms must now pay $1+r+p$: p to compensate savers and r to cover the cost of financial sector

¹⁵ For simplicity, the remainder of this box will abstract from the labour market by assuming that labour is supplied inelastically with $L=1$.

intermediation. Hence, they will only invest to the point where the marginal product of capital is equal to $1+r+p$; this reduces the level of capital in the economy.

There will be a justifiable level of r . For example, the financial sector needs to hire staff to assess and monitor loans and they may need to reclaim assets when some firms default. Such costs are known as financial frictions as they prevent a completely smooth transition of funds between savers and borrowers.

Some such frictions are natural features of the financial system and are unavoidable. And while the presence of r lowers the optimal level of capital, these frictions should be reflected in the social cost of funds.

However, other market failures or externalities may be behind r , for instance, if the financial sector was able to charge a high loan rate due to a lack of competition among banks. In this case, r would be too high from a social point of view: the social cost of funds would be lower than the private cost.

From here, it is possible to define the optimal level of capital that determines if an investment is productive. Let r_1 denote the amount charged by the financial system to cover the cost of unavoidable frictions (and efficient costs) in financial intermediation and let r_2 denote any additional amounts due to market failures or externalities. Figure B shows three different levels of capital:

- K^{**} is the level of capital reached by the economy if funds could be frictionlessly transferred between savers and investors.
- The point K is the actual capital stock that would prevail if capital were allocated in the free market and equated the private cost of funds ($1+p+r_1+r_2$) with the private return.
- The point K^* equates the social cost of funds with the social benefit of investing (which in this case aligns with the private benefit). This is the optimal level of capital that can be achieved subject to the unavoidable frictions associated with financial intermediation (reflected in r_1).

The term $K-K^*$ can be thought of as a capital gap. If $K < K^*$, it is likely that measures to

encourage the supply of finance for new investments will be optimal and productive. The converse is true if $K > K^*$.

It is important to understand that there is no guarantee that market failures and externalities will imply that r_2 is positive. There are occasions where the social cost of funds will be higher than the private cost. A classic example would be the presence of government guarantees (either implicit or explicit) for the liabilities of banks. This means banks can engage in risky lending in the knowledge that tax payers will cover losses. Banks may then be tempted to lend too much from a social point of view as they fail to internalise the cost to taxpayers.

Figure A: Labour productivity

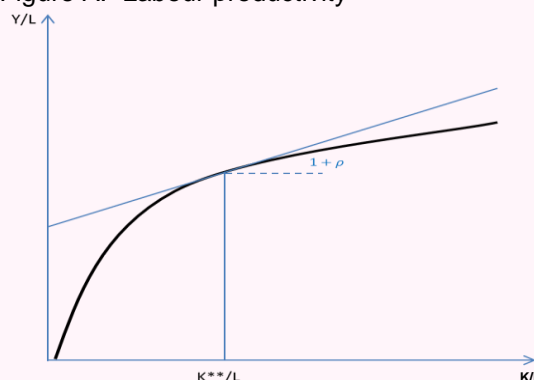
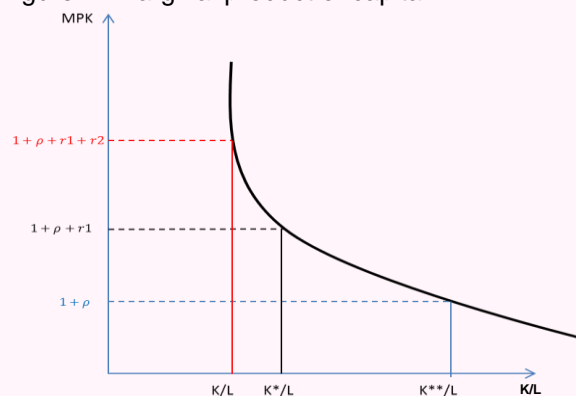


Figure B: Marginal product of capital



3. Measuring the capital gap

As set out in Section 2, although the theoretical 'optimal' size of the capital stock is impossible to estimate with any precision, it is nevertheless worth asking whether there are obvious signs of systematic under- or over-investment in the economy (i.e. a 'capital gap').

Unfortunately, key pieces of information, such as the expected marginal return on capital or the required risk premia that are crucial for assessing the size of a 'capital gap' have only rough proxies in the available data. In this section, data proxies are used to shed light on whether there is an obvious deficiency in the level of capital in the United Kingdom compared to other economies and to inspect the returns on investment relative to its cost. Implicit throughout is the standard assumption that as investment and the capital stock rises, the returns from capital fall all else equal.

Aggregate analysis

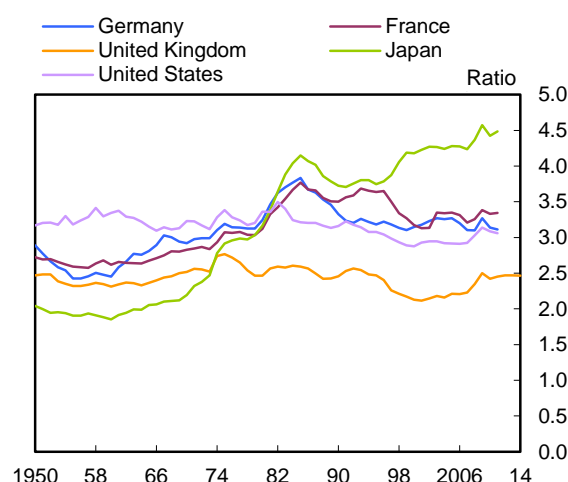
The stock of capital

To assess the level of capital in the United Kingdom different measures of the capital stock are compared to other industrialised countries. If the capital stock looks low relative to international benchmarks, and this cannot be explained by structural economic differences (such as the industrial mix), it might suggest that there is too little capital in the United Kingdom. If the stock is relatively high, the converse will be true.

The capital-to-output ratio measures how much capital the economy uses to produce one unit of output. The capital-to-output ratio in the United Kingdom is lower than other major industrialised countries (Chart 1), though it has been broadly flat around current levels for over 50 years. The US capital-to-output ratio has also been broadly stable over the same period, but at a higher level than the United Kingdom.

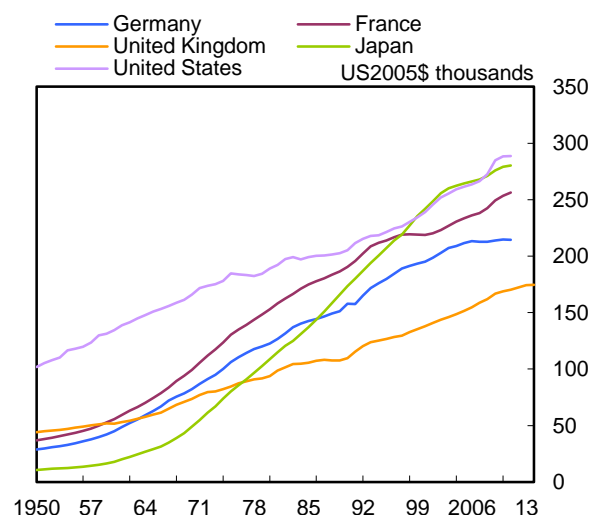
Another metric is the capital-to-labour ratio, which measures how much capital each employed worker has access to in producing goods and services (Chart 2). This metric is also lower in the United Kingdom relative to its peers.

Chart 1 Capital-to-output ratios^(a)



Sources: Centre for International Data, ONS and Bank of England.
(a) UK data for 2012-2014 updated using Bank of England estimates (see Oulton and Wallis (2015)). Capital to output ratio is the total economy capital stock (at replacement cost) over GDP.

Chart 2 Capital-to-labour ratios^(a)



Sources: Centre for International Data, ONS and Bank of England.
(a) UK data for 2012-2014 updated using Bank of England estimates (see Oulton and Wallis (2015)). Capital to labour ratio is the total economy capital stock over number of persons employed.

On this basis, the United Kingdom does look to have a deficiency in the level of capital. An important question is: how much of these cross-country differences in the capital-to-output ratio and the capital-to-labour ratio can be explained by differences in the structure of these economies?

Economies with more flexible labour markets, with lower costs of employing, hiring and firing

workers, are likely to have both a lower capital-to-output ratio and a lower capital-to-labour ratio. When labour is relatively cheap (including non-wage costs) compared to capital, firms are likely to use more labour than capital as inputs to production. The United Kingdom and the United States have particularly flexible labour markets, which may make firms in these countries more labour intensive than their international peer group.¹⁶

Similarly, it is well known that Germany is more manufacturing intensive than the United Kingdom. An economy concentrated in industries that make more use of physical capital is likely to have a higher measured capital-to-output ratio than an economy focused on services. As a service-intensive economy, the United Kingdom will naturally rely less on tangible physical capital for production.¹⁷

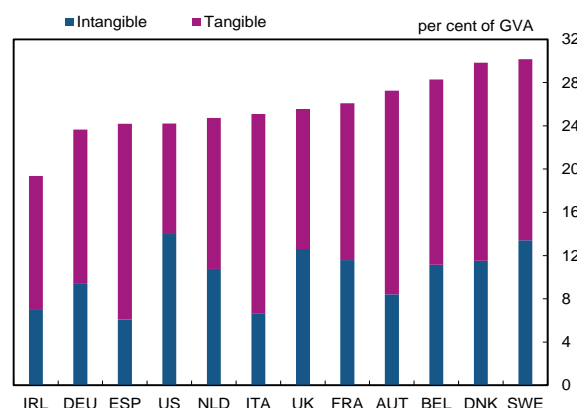
Related to this, measuring the capital stock may be easier in manufacturing sectors, which draw primarily on tangible capital – such as machinery. Measuring intangible capital such as: computerised information (software and data); innovative property (copyright and trademarks); and economic competencies (firm specific human capital and organisational knowledge) is much harder.¹⁸

A recent paper that carefully adjusts the capital stock through better measurement of intangible capital finds that the UK 'investment intensity' in output (measured as the share of investment in gross value added in the market sector of the economy) is higher than the United States and Germany (Chart 3).¹⁹ Indeed, expenditure, on intangible investment in the United Kingdom has been rising over time, while tangible investment

spending looks to have stabilised over the past decade (Chart 4).

However, another report showed that the UK manufacturing sector may be undercapitalised compared to its peers internationally.²⁰ This would suggest that the gap in capital-to-output ratios shown in Chart 1 is not wholly due to the United Kingdom's industry mix.

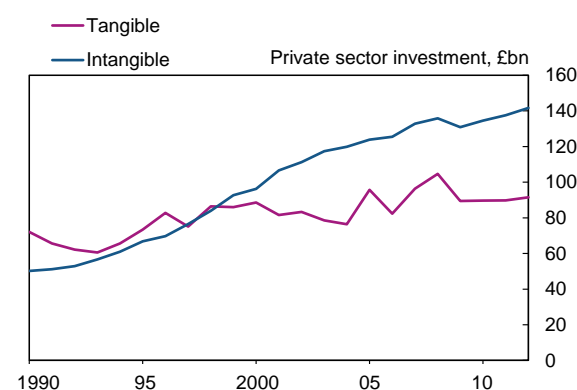
Chart 3 Market sector total (tangible and intangible) investment, 1995-2010^(a)



Source: INTAN and Llewellyn Consulting.

(a) Average between 1995 and 2010 as a proportion of 'market' sector GVA. Tangible assets exclude residential capital. The market sector excludes certain goods and services produced by the government (e.g. public services such as health and education) and households (e.g. childcare and housework).

Chart 4 UK market sector investment in tangible and intangible assets



Source: Haskell, Goodridge and Wallis (2014). The market sector economy is the subset of the economy where outputs are sold at market prices.

In summary, this discussion illustrates that structural differences across economies, exacerbated by measurement issues, means it is not possible to rely on purely standard measures of the capital stock to assess if the

¹⁶ The Organisation of Economic Cooperation and Development's indicators of employment protection suggest that UK labour market regulation offers the least protection for employees (both temporary and permanent) in Europe.

¹⁷ One explanation for why the UK economy is concentrated in less capital intensive industries is that the cost of capital is too high. The United Kingdom may have self-selected into a service-oriented economy due to the differences in factor costs. But the United Kingdom has been gradually shifting towards services over several decades suggesting other forces may also be at work.

¹⁸ Another issue is that certain forms of intangible investment may be less likely to yield a positive social return. Companies investing in intangibles such as branding may simply take market share from competitors to build up market power for the purposes of rent extraction. Similarly, purchases of intellectual property could help a firm's production process but could also only represent a shift in the cash-flows the asset yields from the seller to the buyer.

¹⁹ Corrado, Haskell, and Jona-Lasinio (2014).

²⁰ McKinsey Global Institute (2012).

United Kingdom has too little or too much capital.

Returns to capital

Another way to measure the capital gap is to compare the marginal return on capital in the United Kingdom to other countries and to historical averages.

Over time, assuming capital can flow across borders, (risk-adjusted) returns should equalise across countries and respond to cross-country differences in capital intensity and the cost of other inputs (such as labour). Inspecting returns therefore circumvents some of the issues prevalent when assessing the stock of capital. Another advantage of working with returns is that the surpluses generated by firms are closer conceptually to the flow of capital services.²¹

If returns on capital were excessively large in the United Kingdom compared to other countries, the concern would be that firms were underinvesting.

The return on capital or, more specifically, the expected marginal product of capital, is a measure that is hard to gauge precisely. But information on the realised average product of capital (APK) of UK firms in aggregate is available from the national accounts (ONS), and these data can be used as a proxy for the marginal product.²² However, there are a number of definitional issues to deal with when constructing the returns to corporate capital from national accounts, which are discussed in Appendix II.²³

Chart 5 presents time series evidence for the APK that accounts for depreciation and considers the capital stock at replacement cost for the United States, the United Kingdom and Germany. This shows that returns in the United Kingdom have evolved similarly to the two comparable economies.²⁴

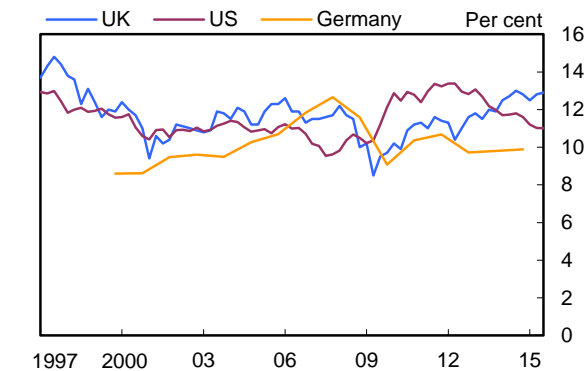
²¹ See Oulton and Srinivasan (2003) for a discussion of the link between capital services and the return on capital.

²² For a Cobb Douglas production function the marginal product of capital is inversely proportional to the capital-to-output ratio in the absence of any frictions; but this may not be a good proxy for the economy in practice.

²³ Another measurement issue is that the returns data from the national accounts relate to private returns. For most private companies these are likely to align with social returns but it is important to recognise there may be occasions where they do not.

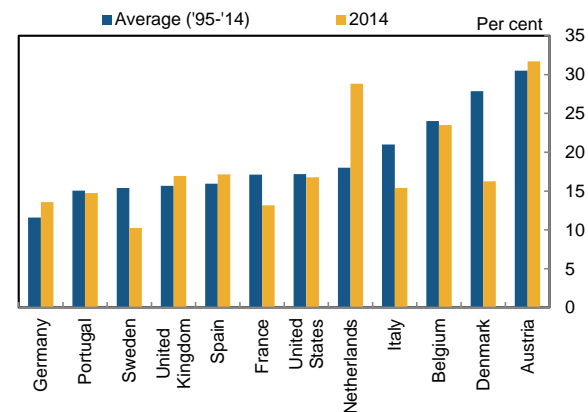
²⁴ A point also made by Weale (2015).

Chart 5 Time series evidence: net return on capital at replacement cost.



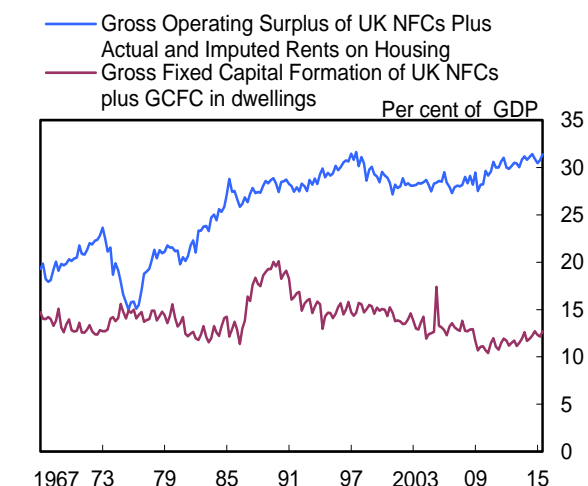
Sources: ONS, Destatis, BEA. Non-financial corporations' net operating surplus/net capital stock.

Chart 6 Returns on capital: how does the United Kingdom compare to its peers?^(a)



Sources: Eurostat, US Department of Commerce: Bureau of Economic Analysis, Destatis: Statistisches Bundesamt, OECD (a) Returns on capital calculated as a percentage of non-financial corporations' gross operating surplus/net-financial liabilities.

Chart 7 Abel et al (1989) test^(a)



Sources: ONS and Bank calculations.

(a) Calculated using seasonally adjusted Gross Domestic Product at current market prices.

Eurostat produces an alternative measure of returns on capital using a definition that ignores depreciation but is easier to compare across a wide range of countries. On this basis, over the past two decades, the APK for UK non-financial companies has been at the lower end of an international peer group (Chart 6),²⁵ but in line with France and the United States. On this evidence, the United Kingdom does not have an obvious shortfall of capital relative to its peers. And neither do the data for 2014 look very different to historical averages, although the latest ONS data show that the return on capital for UK firms in 2015 was the highest in a decade (Chart 5).

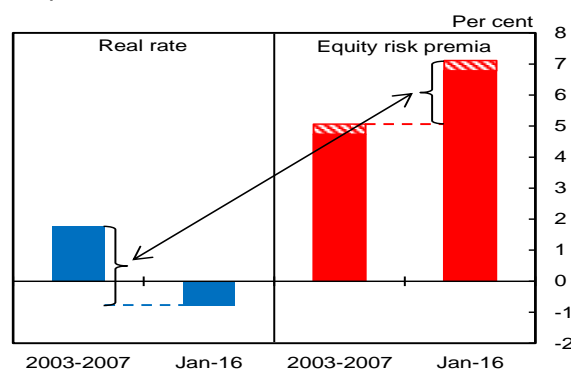
From the opposite perspective, Abel et al (1989) derive a simple test of whether an economy is investing too much. In devising this test, they are concerned with one particular externality related to intergenerational transfers.²⁶ But it is revealing to apply the test to the United Kingdom. It assesses whether or not the returns on capital (in this case, defined as the gross operating surplus) exceed the amount of new capital accumulation (in this case, defined as gross fixed capital formation). The intuition is that the corporate sector should never be a net drain on resources, that is to say the corporate gross operating surplus should cover corporate gross fixed capital formation. If that is not the case the economy is over-investing. Chart 7 shows that in the United Kingdom, the Abel et al (1989) test is passed for much of the period since the data began in 1967. This simple test suggests that the United Kingdom is not above its optimal level of capital, with the caveat that this relates to one particular externality.²⁷

Another way to assess if there is a shortfall or excess in the level of productive investment is to compare how returns on investments have evolved compared to the costs of funds over a given period of time. If firms are investing optimally they should attempt to equate the marginal product of investment to the cost of funding including an appropriate risk premia.

One element of the cost of funding is the risk free interest rate. This is shown for the United Kingdom in the blue bars of Chart 8, as proxied by the yield on long-term UK index-linked government bonds. This yield has fallen by around 200 basis points since the global financial crisis compared to its average in 2003-07. Other things equal, this fall should reduce the cost of funds and raise investment.

However, risk premia may have risen to offset lower real rates. Risk premia are hard to measure. To capture changes in the risk premium on investment in physical assets, two proxy measures derived from the equity market are used. The first, estimated using the inverse of the price to earnings ratio less the real interest rate; the second, derived from a simple Dividend Discount Model.²⁸ Both have risen by about 200 basis points compared to 2003-2007 - fully offsetting the fall in the risk free rate over the same period (Chart 8).

Chart 8 United Kingdom real interest rates and risk premia^(a)



Sources: Bank of England, Thomson Reuters Datastream and Bank calculations.

(a) Real rate: 10-year (RPI) index-linked gilt yields. Equity risk premia: Solid red bars estimate the equity risk premia using a dividend discount model. Dashed red bars computed by taking the inverse of the price to earnings ratio less the risk free interest rate (i.e. the index linked gilt yield).

Chart 5 showed that the returns on investment have been relatively stable, while the fall in real rates since the pre-crisis period has been fully offset by a rise in risk premia. Comparing rates of return with the cost of capital therefore suggests no obvious shortfall in productive investment. However, these figures are likely to vary depending on the period over which averages are taken and, given data measurement issues, this conclusion need to be interpreted with care.

²⁵ Data for Germany and the United States are not strictly comparable as the estimates are sourced from national sources and the OECD rather than Eurostat.

²⁶ They refer to such economies as being dynamically inefficient, that is when the capital stock exceeds its Golden Rule level (Phelps, 1961).

²⁷ The Abel et al (1989) definition is extended to include the returns on housing as this is also a component of the private capital stock.

²⁸ See Inkien et al (2010).

Disaggregate analysis

Looking at the aggregate returns on capital for the whole economy may be misleading if capital is misallocated and not directed to the most profitable investment opportunities that exist in certain sectors. Sectors with higher returns should see greater investment, all else equal.

One symptom of capital misallocation might be a large dispersion in rates of return across industries.

Chart 9 shows how rates of return have varied across industry. The finance industry is a large outlier. This could reflect the difficulty in measuring the value added from financial intermediation and that the financial services sector may have substantial quantities of intangible capital not captured in the gross capital stock figures.

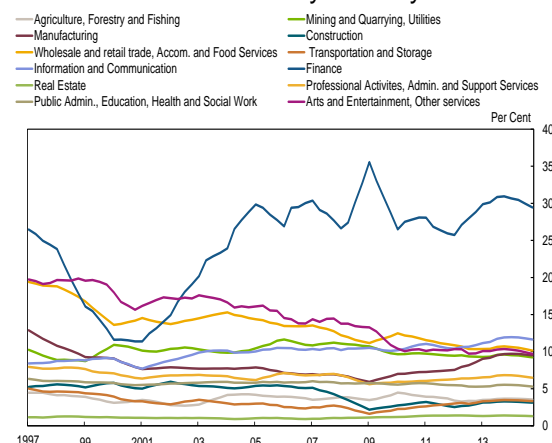
Chart 10 shows a few measures of dispersion – defined as the standard deviation of the rates of return across industry.²⁹ The first measure is computed from the national accounts industry-level data shown in Chart 9. This tracks the return in the finance sector as it is an outlier. The second measure excludes finance and shows that, on this basis, the dispersion of rates of returns across industries has been on a downward trend in the United Kingdom. The third measure of dispersion is derived from firm-level data and is volatile with no obvious trend. Taken together, these measures suggest that differences in the incentives to invest across industries may be less acute now than prior to the crisis.

Differences in the *level* of rates of return across industries do not indicate whether capital is able to move across sectors or whether new investment has taken advantage of these opportunities. Previous research has found that, while the financial crisis has changed the relative rates of return across different firms and industries, the movement of capital in response has been limited perhaps suggesting that certain frictions might have prevented the efficient allocation of capital.³⁰

²⁹ Note that this dispersion measure differs from that of Broadbent (2012), which takes the rates of return in Chart 9, removes their pre-crisis mean rate of return by industry, and then computes the standard deviation.

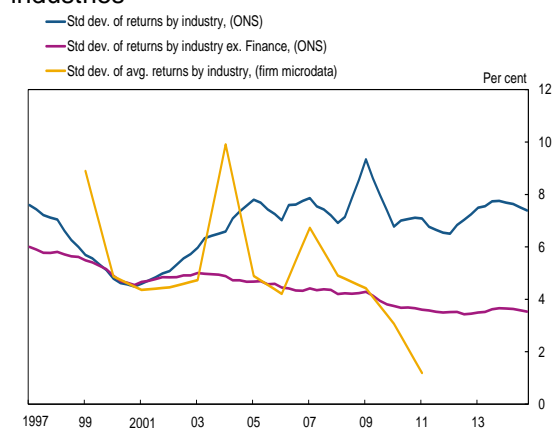
³⁰ Barnett et al (2014a) show that capital has generally not moved in response to such differences in rates of return, particularly after the financial crisis.

Chart 9 Rates of return by industry



Source: ONS and Bank Calculations
Gross operating surplus/gross capital stock for twelve UK industries.

Chart 10 Dispersion of rates of return across industries



Source: ONS. Bahaj, Foulis and Pinter (2016) using Bureau van Dijk data. ONS series is the standard deviation of returns (gross operating surplus over gross capital stock) across twelve UK industries. The firm-level data is returns for individual firms (net operating profit/total assets), averaged by industry. The standard deviation across nine industries is plotted.

Capital misallocation may be due to the financial frictions preventing the not reallocation of resources appropriately, for example, because some sectors have wider access to finance or more acceptable forms of collateral. It may alternatively reflect a more generic shortfall in the overall supply of credit by the financial system.

Alternatively, there may be important real differences that exist between industries, such as in industrial structure or barriers to entry and competition, which means that a wedge should be expected between rates of return. In other words, the data are consistent with a number of underlying causes, which may reflect real or financial frictions.

Chart 11 presents the dispersion of rates of return across regions rather than across industries. Dispersion based on two measures is shown: gross profits/turnover (or profit margins); and net profits/assets (as used for Chart 9).³¹ The relative merit of each is discussed in Appendix II. Dispersion rose in the run up to the crisis, but has since fallen back to levels seen in the early 2000s.

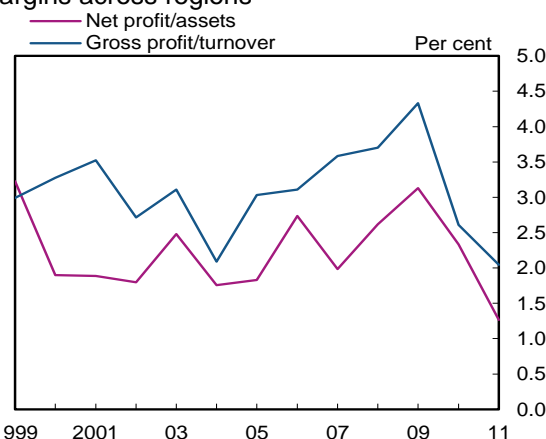
Chart 12 shows the differences in rates of return for small versus large firms, young versus old firms, and cash rich versus cash poor firms. Younger firms do return slightly more than old firms, but the difference is small (if statistically significant).³²

Small firms (defined as those with less than 50 employees) tend to earn a higher net rate of return on capital than large firms. Of course, small firms may be systematically different from large firms for a number of reasons, for example, due to the industries they operate in, their ability to generate internal funds, their available collateral, or their leverage. But even after controlling for these factors using regression analysis, small firms appear to have a 3% higher, and statistically significant, rate of return on capital. This could be taken as evidence that small firms have unexploited investment opportunities.

But there are other explanations for this difference. Small firms may simply be more risky and that is reflected in their rate of return.³³ Or there may be a response bias, where small successful firms are more likely to provide detailed accounting information. More problematic is that small firms may be more likely to rent capital (for example, the buildings they operate in) and hence the book value of capital assets may be significantly different from

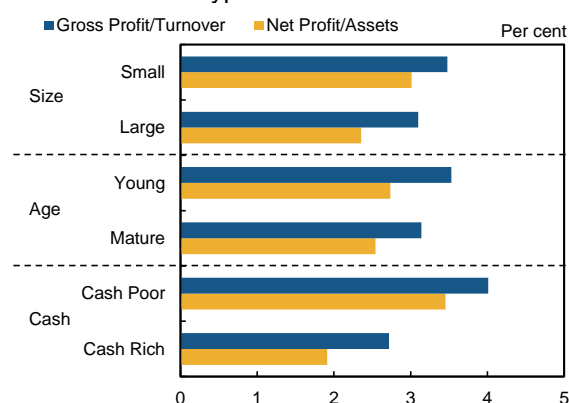
the value of capital employed.³⁴ Similarly, the value of small firms' assets may be an underestimate, if the firm makes more use of the owner's private assets, such as a home office. These measurement issues would manifest as higher net returns for small firms. So while there are issues relating to capital mis-measurement in general (for all firm sizes), there is a specific issue that makes the problem worse for small firms. This is an area where more representative data for small firms would be useful.

Chart 11 Dispersion of rates of return and profit margins across regions



Source: Bahaj, Foulis and Pinter (2016) using Bureau van Dijk data. Graph shows the standard deviation of average returns in firms located in 10 different UK (NUTS1) regions.

Chart 12 Rates of return and profit margins across different types of firms



Source: Bahaj, Foulis and Pinter (2016) using Bureau van Dijk data. Notes: Young is at most 5 years old. Small is less than 50 employees. Cash rich is when cash (as defined on the balance sheet) less overdrafts, divided by turnover is greater than the sample median. The median of the variable is presented over 1996-2012 for each group.

³¹ The data on firm level returns to capital are replete with measurement issues. See Appendix II for a discussion.

³² The rates of return from micro data are much lower than the aggregate data partly because median results are reported, as they are less susceptible to outliers, and partly because profits are divided by total assets rather than the fixed assets component, as the latter is also less reliable.

³³ This can be seen by inspecting the variation of returns within firm types. The standard deviation of returns (using either measure) among small firms is approximately twice as large as among large firms.

³⁴ Rental payments are deducted from the firm's revenues when calculating operating profit but there is no guarantee that the cost of renting matches the firms' return on capital.

Chart 12 also shows that cash rich firms return less than cash poor firms. This could be taken as evidence that firms that hold large cash balances invest more than those that rely on external funds (Section 4 offers a discussion of the importance of internal funds). However, as with firm size there are other explanations for this finding. For instance, it could be that firms with high returns are cash poor because they have less need to hold liquid assets due to the revenues they generate. Alternatively, cash poor firms may be more risky.

Why may firms under or over invest?

Section 2 suggested that a capital gap could arise due to financial frictions or real economy frictions. The academic literature offers a number of explanations for how those frictions may reflect market and regulatory failures that generate under- or over-investment. Given the experience of low levels of investment in the United Kingdom in recent years, the arguments below focus on the case of under-investment.

Firms might not invest due to an inadequate supply of finance. There may be good reasons why the supply of finance is constrained. For example, information asymmetries between lenders and borrowers imply the need for monitoring or the posting of collateral (both of which can be costly). Alternatively, the supply of finance may be constrained for undesirable reasons, for example, lack of competition among lenders, or lenders being constrained by a lack of capital.

It is not just the overall quantity of credit that matters. Firms may also be unable to source the funds they require at the desired non-price terms (such as maturity and collateral).

Firms may forgo investment in favour of transactions involving existing physical or financial assets. In this case, non-investment can 'crowd out' investment.³⁵ For example, firms may prefer to deploy available funds towards activities that offer faster rates of return, such as purchases of financial assets; or activities such as mergers and acquisitions (M&A).

³⁵ See Orhangazi (2008), Lazonick (2007), Milberg and Winkler (2010), Almeida et al. (2016).

The structure of corporate governance and executive compensation may also result in a situation where short-term gains are valued above long-term productive investment (Giovannini et al 2015, Haldane 2011, Miles 1993).

Alternatively, firms may be inefficient in determining the appropriate hurdle rates for investment, for example, if the nominal interest rate environment or risk environment has changed (Wardlow, 1994). The sharp decline in real interest rates since the global financial crisis may not yet be reflected in hurdle rates.

Another explanation for low investment is that the average return on capital (Chart 5) is a poor proxy for the marginal return. Firms may be making good returns on existing capital but face a paucity of profitable opportunities to invest in.³⁶ Alternatively, perceptions of future rates of return may be low in light of the macroeconomic environment. Keynes (1936) emphasises animal spirits, where investment is driven by beliefs about future returns, and the role of uncertainty.

The next section will return to these hypotheses in light of the evidence on how private non-financial companies finance themselves.

Conclusion and recommendations

A first stage to better measuring finance for productive investment involves working out if there is a capital gap. The available data, taken at face value, suggest that there is no obvious deficiency in the level of capital and productive investment, at present. To arrive at this conclusion, this section has explored a range of measures of the capital stock and rates of return to capital. Some evidence points towards insufficient investment – such as cross country comparisons in the stock of capital. Other indicators are more sanguine, for instance, the United Kingdom does not look like an outlier in terms of rates of return. Comparing rates of return to the risk-adjusted cost, suggests no obvious gap either.

³⁶ Assuming a Cobb-Douglas production function, the marginal product of capital is inversely proportional to the capital-to-output ratio. Since output growth has been weak relative to trend in the United Kingdom since the financial crisis, this suggests that the marginal return on investment has fallen. On this basis, given the current cost of capital, firms have no incentive to invest.

On a disaggregated basis, firm-level data suggest that the variation in rates of return across industry and region is not particularly out of line from historic averages. There are, however, some clear differences in the rates of return for small versus large firms and cash poor versus cash rich firms, though the reasons for this are unclear.

These findings need to be interpreted in light of the well-known data quality and uncertainty issues that pertain around capital measurement and the returns to capital in a service sector economy like the United Kingdom. What data are needed in order to be confident in this assessment?

Data recommendations

The following sets out some targeted data recommendations. As noted above, an accurate assessment of the capital gap requires accurate information on the marginal expected rate of return on new investment, while only actual (not expected) average (not marginal) returns are currently available. Better information is also needed regarding the cost of funds, including risk pricing, to assess how these differ across different segments of the economy, particularly for small and young firms. For small firms, a particular problem regarding information about their capital stock has been identified. A fuller set of data requirements is listed below:

- marginal expected rate of return on new investment;
- cost of funds;
- required rate of return on new investment (firm investment hurdle rates); and
- investment and capital stock (particularly for small firms);

Does this assessment of the capital gap seem accurate? How can it be improved?

Do the data recommendations here follow from the analysis? How easy or hard would it be to design survey questions to collect these types of conceptual data?

4. Measuring available finance

There are two main challenges to measuring the supply of finance for productive investment.

First, it is possible only to observe data on the finance actually raised by firms, rather than the finance they could have accessed.³⁷ In other words, it is hard to judge whether or not there is a deficiency (or indeed excess) of finance available for productive investment.

Second, in general, it is not possible to attribute to investment the amount of each type of finance raised. According to the Modigliani and Miller (1958) theorem, the value of a firm is independent of how it is financed (debt or equity). And so how firms finance investment is also irrelevant. But it is well known that the Modigliani-Miller theorem does not hold when there are financial and real frictions (for example taxes). Hence, the availability of different types of finance may well matter for investment.

In light of the challenges to measuring finance available for investment, this section assesses a range of different data sources, including firm and household balance sheet data and evidence from surveys. It starts by examining trends in the sources of finance accessed by firms. It continues by considering how that finance has been used, including for investment purposes. Finally, survey evidence is examined to assess the degree to which finance for productive investment might be subject to financial constraints.

The focus is on finance sourced and used by the private non-financial corporate sector (PNFCs). This accounts for around half of total investment; finance for household investment is covered in Box 3.

Aggregate analysis

Sources of finance

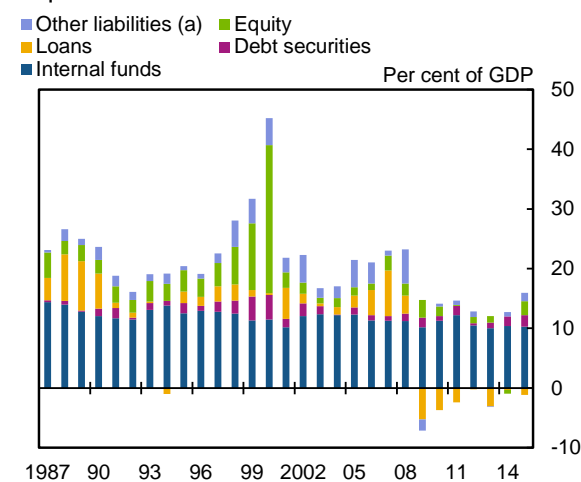
At the simplest level, firms have access to two types of finance – internal funds and external funds. Internal funds refer to profits after interest, taxes and dividends paid to

shareholders; and external funds to equity issuance, debt securities, bank loans, and other financial liabilities.³⁸

There is no unified theory of corporate finance setting out the conditions under which companies raise different types of finance. The commonly cited ‘pecking order’ theory of Myers and Majluf (1984) predicts that internal funds – the cheapest source of finance – will be companies’ first port of call. According to this theory, external finance is raised only if there are insufficient internal funds, given that it is perceived to be more expensive.

Chart 13 shows internal funds and the net acquisition of liabilities for UK PNFCs as a percentage of GDP. Two trends stand out. First, internal funds are a relatively stable source of finance over time. Second, external sources of finance are markedly more variable by comparison. Over the sample period, internal funds account for 67% of the aggregate net acquisition of funds, equity 15%, bonds 7%, and bank loans 3%.

Chart 13 UK PNFCs’ internal funds and net acquisition of financial liabilities



Sources: ONS and Bank calculations. 2015 data are up to Q3. (a) Other liabilities include FDI debt, pension liabilities, derivatives and other accounts payable.

Equity funding is the most volatile source of external finance (green bars in Chart 13). Equity issuance rose dramatically in the late 1990s, rising to a peak of around 25% of GDP in 2000. This fell back to 0.8% of GDP on average in 2011-15.

³⁷ This is a common challenge faced by many areas of economics. The data observed typically tells us about outcomes that reflect the balance (or equilibrium) between demand and supply. To infer the supply, economists use a variety of identification methods. For example, Barnett and Thomas (2014) analyse the role of credit supply and demand shocks after the global financial crisis.

³⁸ Changes in external funds are equivalent to the net acquisition of financial liabilities. Other financial liabilities include: inward foreign direct investment debt; pension liabilities; derivatives; and other accounts payable.

Corporate debt issuance has also varied over time, with net issuance peaking in the late 1990s. In recent years, net issuance has been comparable to pre-crisis levels, though the next section comes on to show that gross issuance has been at a record high – suggesting that this form of financing may be particularly sensitive to financial market conditions.³⁹

Bank loans increased significantly in the periods preceding both the early 1990s recession and the global financial crisis. Notably, during the crisis, the net acquisition of bank loans turned negative, as companies restructured their balance sheets (see Box 2 for further details).

Taken together these data show that, while internal funds tend to be relatively stable, the total amount and types of external finance accessed by firms varies considerably over time.

Uses of finance

For the non-financial corporate sector as a whole, internal funds appear to have been more than sufficient to finance investment since around 2002 (Chart 14), with PNFCs having been net lenders – acquiring more financial assets than financial liabilities. Prior to that, internal funds and investment had been more closely matched, with periods during which companies have been net lenders, and others where they have been net borrowers.

At face value, this suggests that, over the past fifteen years or so, external sources of finance have not been needed to fund PNFCs' productive investment opportunities. But there are two reasons why this would not be the correct conclusion to draw. First, while internal funds may be adequate to finance productive investment opportunities for the corporate sector as a whole, this may not be the case for some firms, for example, small firms. Second, some share of internal funds may have been used for purposes other than investment.

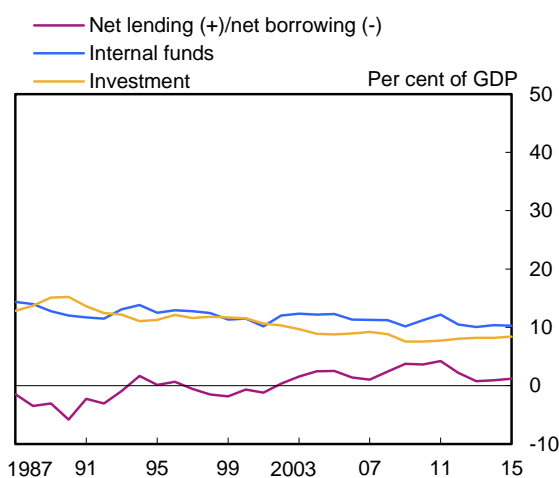
Ideally, it would be possible to observe how PNFCs deploy internal funds. But, in practice, the data for this are not available. One long-term trend is worth noting, however – rising

corporate sector cash balances. While there is some uncertainty over total cash balances held, more reliable data on deposits held with UK-resident monetary financial institutions show that these cash balances have steadily increased from 13% of GDP in 1987 to 20% in 2014.

Increased cash balances may reflect a desire in the corporate sector for additional working capital. Working capital represents the liquidity buffer available to corporations to fund their day-to-day operations, typically to pay for intermediate goods or wages before revenues are realised. Short-term external financing, such as overdrafts or trade credit can fill this role and the provision these facilities is another important way that the financial system contributes to corporate activity.

The diversion of internal funds towards raising cash balances, assuming that the rise in deposits seen in the data is intentional, may be a result of the corporate sector preferring to rely less on the financial system for working capital. The corollary is that there is less internal financing available to finance investment.

Chart 14 UK PNFCs' internal funds and investment



Sources: ONS and Bank calculations. 2015 data are up to Q3. Net lending (+)/net borrowing (-) is the difference between net acquisition of financial assets and net acquisition of financial liabilities.

Indeed, evidence since the crisis does suggest that external sources of finance have an important role to play regarding investment, at least at the margin. During this period, available external finance fell back, and there was a small fall in investment.⁴⁰ Among other things, this

³⁹ In the United Kingdom the evidence suggests that firms have significant access to long-term finance – most PNFCs' bond issuance is of maturity greater than 5 years, and most of the stock of loans from UK MFIs matures in more than a year.

⁴⁰ In 2009-15 bank loans fell to -25 % of total net external funds, offset by equity (12%) and debt securities (12%).

demonstrates the importance of the Bank's financial stability objective – to protect and enhance the resilience of the UK financial system – in the context of investment and economic growth.

Against this background, it is worth asking two high level questions:

- To what extent do fluctuations in firms' access to external finance coincide with fluctuations in investment?
- What information is available on the uses of external financing?

Chart 15 shows the net acquisition of financial liabilities against investment and the net acquisition of financial assets. It suggests that, at the aggregate level, much of the variation in external financing is driven by the acquisition of financial assets, rather than by investment.⁴¹ This can be illustrated with the following historical episodes.

During 1996 to 2000 there was a sharp rise in the net acquisition of financial assets, particularly equity (Chart 16). This was primarily driven by foreign direct investment by UK PNFCs and cross-border mergers and acquisitions activity, particularly in the technology, media and telecommunications sector.⁴² This largely accounts for the correspondingly large rise in the net acquisition of equity liabilities (Chart 13).

During 2003 to 2008 there was a wave of leveraged buyouts (LBO) and equity buybacks (see Box 2), as well as a boom in the commercial real estate (CRE) market, which may have pushed up the net acquisition of financial assets. This was matched by a corresponding fall in equity issuance and a rise in bank loans, around half of which were to the CRE sector (Chart 17).

⁴¹ This has been referred to as financialisation in the literature (see Annex I), when non-financial firms increasingly behave like financial firms by participating in financial activities.

⁴² Equity-financed M&A activity between two UK-resident companies would not be shown here, given that the equity issuance of the two firms involved in the acquisition would net to zero. Cross-border activity culminated in 2000, when Vodafone implemented a record takeover of Mannesmann, involving the issuance and acquisition of around £100 billion of equity.

Chart 15 UK PNFCs' net acquisition of financial assets and liabilities

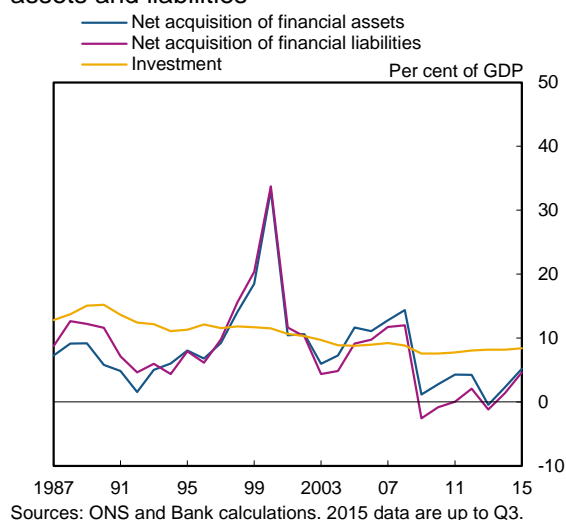
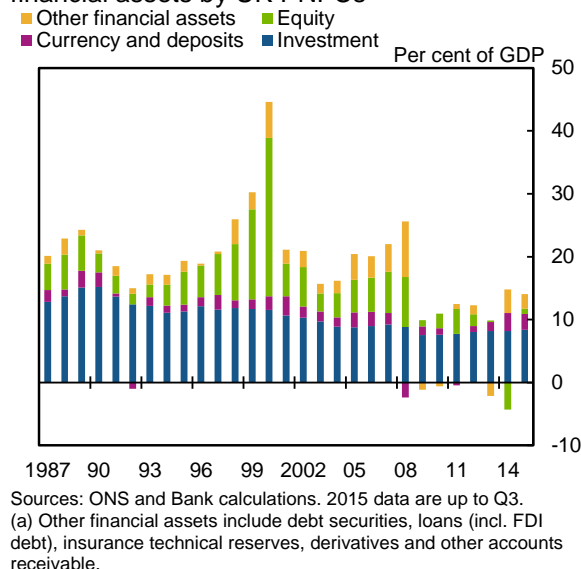


Chart 16 Investment and net acquisition of financial assets by UK PNFCs



In the period since 2009 the most important source of net finance is bond issuance (Chart 17, yellow bars).

In these past episodes, investment was relatively stable, suggesting that there was little impact on investment of the supply of external finance. But a clear unknown is to what extent internal funds would have been diverted to the acquisition of financial assets had external forms of finance not been available. There is also a question as to what extent mergers and acquisitions activity and balance sheet restructuring might be considered productive, even though these activities are strictly defined as non-investment in this Discussion Paper.

Turning to the reported uses of funds accessed by PNFCs, there are some, albeit partial, data available in the context of corporate bond issuance, syndicated lending and other bank lending. The general point to note is that gross bond issuance has increased dramatically in the post-crisis period and has been robust in recent years. It has clearly been an important source of finance for those companies who can access these markets.

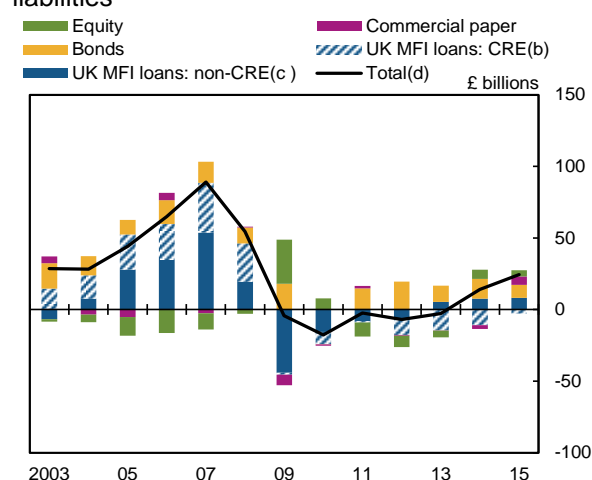
Only 1% of the proceeds from corporate bond issuance are explicitly stated as being used for investment, with 70% used for 'general corporate purposes' (Chart 18). Arguably some of the latter could also be used for investment.

Only five percent of gross syndicated lending is reported as used for investment (Chart 19).⁴³ Again, the amount deployed to investment could be higher if it is captured in 'general corporate purposes', which is larger at 12% on average. The vast majority of syndicated loans were used for corporate restructuring and mergers and acquisitions, consistent with the narrative above. Having more reliable information on which forms of finance are more likely to end up in investment would be useful.

Data on the purpose of bank lending are more limited, as lenders are not required to report the use of bank loans by borrowers. However, the Bank of England's *Credit Conditions Survey* asks lenders to report the factors driving changes in the demand for corporate credit. The results show that investment has been more of an important driver in explaining the fall in the demand for loans in the post-crisis period, but less of a factor in explaining the more recent recovery (Chart 20).

⁴³ Data on the syndicated loan market, provided by Dealogic, differs from the net lending data collected by the Bank of England, making it difficult to compare the two. First, Dealogic records facilities granted to companies, not loans drawn, and so will overestimate the amount of gross lending done over the period to the extent that not all facilities were drawn. Market contacts indicate that this is a significant factor. Second, without data on repayment or restructuring of loans, it is not possible to construct net lending data, and thus to compare the syndicated lending data to the lending data collected by the Bank of England. Third, the data on syndicated loans is not collected on the basis of the lending bank's location, and so is not directly comparable to the loan data collected by the Bank of England.

Chart 17 UK PNFCs' net acquisition of financial liabilities^(a)



Sources: Bank of England and Bank calculations.

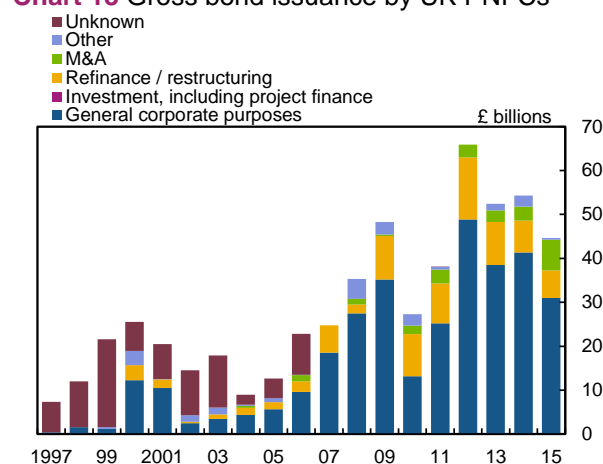
(a) Finance raised by PNFCs from UK monetary financial institutions (MFIs) and capital markets. Data cover funds raised in both sterling and foreign currency, expressed in sterling. All data are until 2015 Q4 and are non-seasonally adjusted.

(b) UK MFI loans to non-financial businesses involved in the buying, selling and renting of own or leased real estate, and the development of buildings.

(c) UK MFI loans to PNFCs less CRE non-financial businesses.

(d) Total net acquisition of financial liabilities in this chart is a subset of net acquisition of liabilities shown in Chart 13, for which the data are available from the Bank of England. This subset includes such key instruments as domestic MFI (banks and building societies) loans, debt instruments and equity, but excludes, e.g., loans from foreign financial institutions, FDI and trade credit.

Chart 18 Gross bond issuance by UK PNFCs



Sources: Dealogic and Bank calculations.

Overall, the data suggest that only a small fraction of external finance is used for investment, but it is difficult to assess precisely how much it accounts for, including as a substitute for internal funds, and hence how important external financing is to finance investment at the margin. Further data that specified the precise intentions both when deploying internal funds and when raising

different forms of external finance would therefore be useful.

Disaggregated analysis

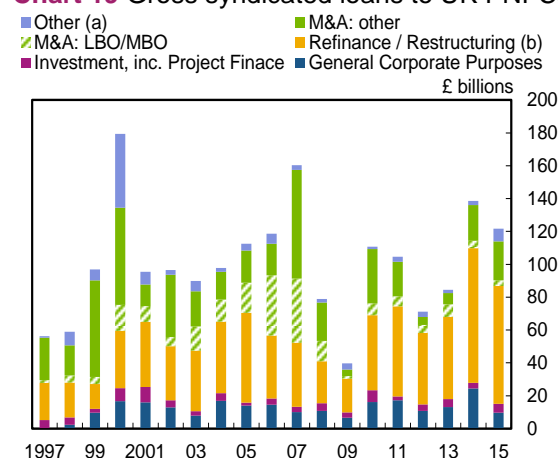
The sources of finance available to and / or accessed by the aggregate non-financial corporate sector may not be a good guide to the finance available to firms at different stages in their life cycle. To gain some insight into this, it is worth considering three sub-groups – large publicly listed firms, small and medium-sized firms (SMEs) that are publicly listed, and SMEs that do not have access to capital markets, but may have access to banks.^{44,45} Note that SMEs account for around 30% of total UK business investment.

Large non-financial companies appear to generate material and reasonably stable internal funding (Chart 21). Many large companies also have access to capital markets, raising both equity and debt. Between these two forms of external finance, debt appears more closely correlated with the financial deficit, which is consistent with the pecking order theory.

The publicly listed non-financial SMEs (around 500) are not representative of the population of UK SMEs that use external finance (around half a million).⁴⁶ Still, it is useful to explore their financing decisions. These listed SMEs have, in aggregate, operated at a loss over the past 20 years or so (Chart 22). At the same time, the SMEs have conducted significant issuance of equity. This suggests that some smaller firms are heavily reliant on net equity issuance, including for investment purposes.⁴⁷ Intuitively, these are likely to be start-up firms, which are able to attract equity investors despite current negative profits.⁴⁸ In turn, this conveys that to

measure finance for productive investment, there is merit to collecting data on SME access to all forms of finance, not just loans.

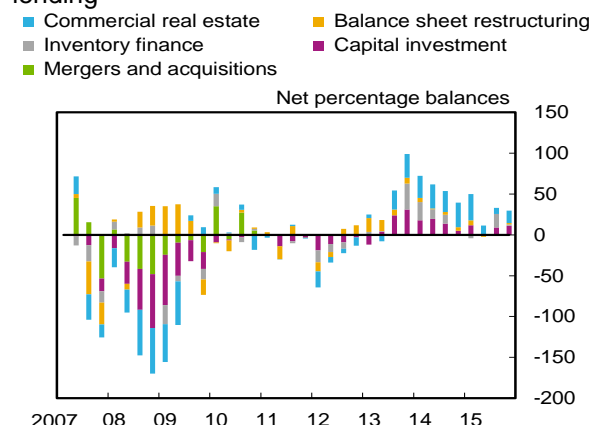
Chart 19 Gross syndicated loans to UK PNFCs



Sources: Dealogic and Bank calculations.

(a) Other includes expansion, working capital, property/mortgage, ECA financing, offshore services, securitisation, shipping, spin-off, standby / CP support, structured commodity finance, trade financing and 'other'. It was large in 2000 due to standby / CP support.
(b) Refinance/restructuring includes dividend recapitalization, exit financing, IPO financing, recapitalization, refinancing, debt repayment and restructuring.

Chart 20 Changes in corporate demand for lending^(a)



Source: Bank of England *Credit Conditions Surveys*.

(a) The survey asks "What have been the main factors contributing to changes in demand for lending over the past 3 months?"
(b) Net percentage balances are calculated by weighting together the responses of those lenders who answered the question by their market share. A positive balance indicates that the changes in the factors described have served to increase credit demand.

Net debt raised (including from banks) by publicly listed firms is surprisingly low, given that bank lending accounts for the majority of the flow of finance to SMEs.⁴⁹ This is likely to be because, as noted earlier, this is not a representative sample of small firms. It is worth noting that Companies House does have some

⁴⁴ Based on the standard definition from the Companies Act 2006, a company qualifies as small/medium sized if it satisfies two of the following three criteria: (i) it has turnover of no more than £25.9 million; (ii) the total size of its balance sheet is no more than £12.9 million; and (iii) it has no more than 250 employees.

⁴⁵ This draws on the Worldscope database of all firms with publicly listed equity. For more information on the firm-level data see Farrant et al (2013). The data are annual; the latest available is 2014.

⁴⁶ There are about 2.5 million enterprises in the UK (ONS 2015), and about 80% of SMEs are "happy non-seekers" of external funds (SME Finance Monitor Q3 2015, p. 52).

⁴⁷ Farrant et al (2013) find that firms with capital market access were able to increase investment by more than those that did not during 2010/11.

⁴⁸ This is consistent with Brown and Petersen (2009) and Frank and Goyal (2003) for the US.

⁴⁹ British Business Bank (2016, p. 12).

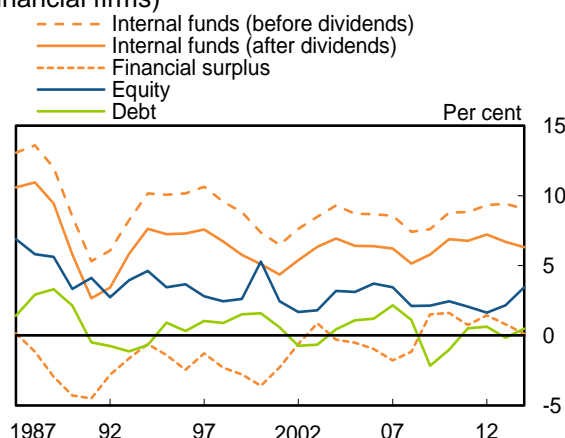
additional coverage of SMEs that do not have access to capital markets, but these data are of a poorer quality.

Charts 21-22 show that large non-financial companies' internal funds fell during the financial crisis. For large companies there was also a reduction in debt raised and, similarly, there was a fall in equity raised by listed SMEs. So a reduction in the availability of internal and external finance during the crisis is likely to have affected companies of all sizes. But these sources of finance have largely recovered more recently.

Overall, these results confirm the commonly-held view that access to external funding varies by firm size. In principle, these data can be used to explore differences across industry types, but size is found to be the more important determinant. This is consistent with the findings of a recent paper, which concluded that overall there is little evidence of a shortage of long-term finance for European companies with access to bond and stock markets.⁵⁰ But there is mounting evidence of a supply of finance problem for small and medium-sized enterprises.

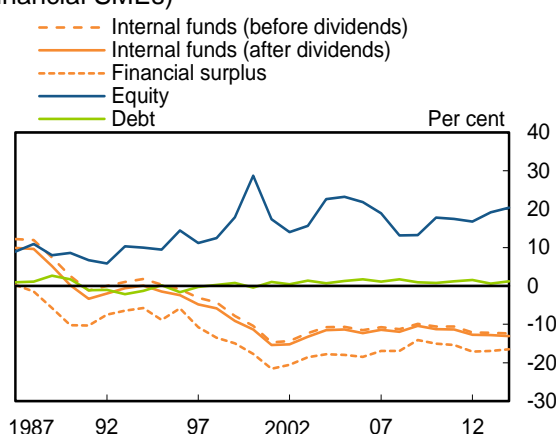
Against this background, it is worth noting that, in addition to the traditional sources of external finance – bonds, equity and debt – SMEs' use of alternative forms has grown rapidly in recent years (Chart 23). But these markets remain small. For example, peer-to-peer business lending amounted to around £1.3 billion – compared to £2.4 billion of gross equity issuance, and £53 billion of gross bank lending to SMEs in 2015.^{51 52}

Chart 21 Net flows of funds and financing surplus as percentage of total assets (large non-financial firms)



Sources: average for large listed non-financial firms in Thomson Reuters Worldscope/Bank database. Internal funds are: Cash Flow from Operations (exc. items relating to changes in net working capital). And the financial surplus is that less dividends, less capital expenditure (net of disposal of fixed assets), less acquisitions.

Chart 22 Net flows of funds and financing surplus as percentage of total assets (listed non-financial SMEs)



Sources: average for listed non-financial SMEs in Thomson Reuters Worldscope/Bank database. Internal funds are: Cash Flow from Operations (exc. items relating to changes in net working capital). And the financial surplus is that less dividends, less capital expenditure (net of disposal of fixed assets), less acquisitions.

Survey evidence

Surveys offer a more direct read on the finance available to firms generally and for the purpose of investment. As such, surveys overcome the two challenges mentioned at the start of this section with respect to measuring the supply of finance and matching the supply of finance to investment decisions. One limitation of surveys, however, is that they often provide only qualitative evidence on changes in financial constraints, as opposed to quantitative metrics.

⁵⁰ Giovannini et al. (2015).

⁵¹ See British Business Bank (2016, p. 12).

⁵² Measures to improve the access of firms to these alternative forms are being pursued elsewhere, for example, as part of the Capital Markets Union. See Bank of England (2015a) and European Commission (2015).

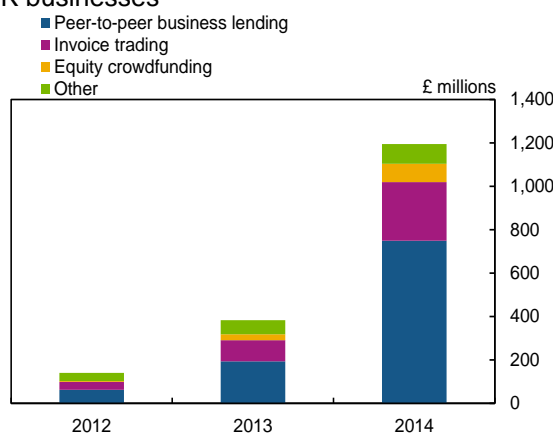
Moreover, these data do not distinguish between a shortfall in the supply of finance due to constraints within the financial system versus the possibility that the firms seeking funds are considered unviable by potential providers of that finance.

Consistent with the data on actual finance raised, firm level surveys confirm that the cost and availability of finance differs by firm size – small firms are more financially constrained than large ones (Chart 24).⁵³ For all firms, credit conditions deteriorated sharply during the financial crisis, but have improved since, probably at a faster rate for large firms.⁵⁴ Bank and building society lenders confirm these results, as does information received from the Bank's Regional Agency network.⁵⁵

In terms of financing investment spending, internal funds were reported to be the primary source for both large and small firms, followed by bank loans for small and medium-sized firms and market finance for large firms (Chart 25).⁵⁶

The CBI survey asks firms about their investment intentions over the next twelve months, and then allows firms to select a range of factors that may be limiting investment (Chart 26). The balances of firms reporting the cost and availability of internal and external finance as a constraint on investment peaked during the crisis, but now stand at levels below their long-term average. Consistent with this, a survey by the Bank's Agents in 2015 concluded that the most commonly cited factor boosting investment was achieving future gains in productivity, with uncertainty about the economic outlook being the main reason holding back investment.

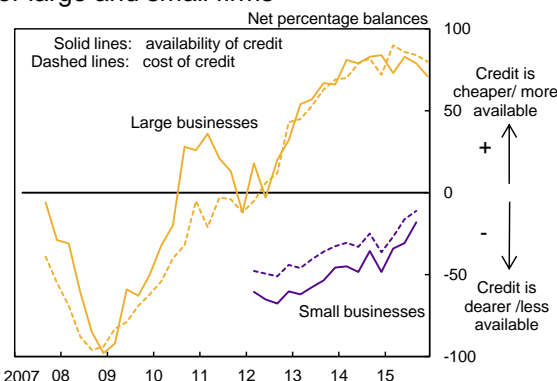
Chart 23 Gross flows of alternative finance for UK businesses (a)



Sources: Nesta (2014) and Bank calculations.

(a) 2014 data were captured via an industry-wide tracking survey mainly distributed through the UK crowdfunding association (UKCFA) and the P2P Finance Association. Peer-to-peer business lending is debt-based transactions between individuals and existing businesses who are mostly SMEs. Invoice trading is firms selling invoices or receivables to a pool of individuals or institutional investors. Equity-based crowdfunding is the sale of stake in a business to a number of investors in return for investment, predominantly used by early-stage firms. 'Other' includes community shares, reward-based crowdfunding, pension-led funding, debt-based securities and donation crowdfunding.

Chart 24 Perceived availability and cost of credit for large and small firms (a) (b)



Sources: Deloitte CFO Survey, FSB Voice of Small Business Index, Bank calculations.

(a) Net percentage balances for the cost (availability) of credit are calculated as the percentage of respondents reporting that bank credit is 'cheap' (available) in the *Deloitte CFO Survey* for large corporates or is 'good' in the *Federation of Small Businesses' (FSB) Voice of Small Business Index* for small businesses less the percentage reporting that it is 'costly' ('hard to get') in the *Deloitte CFO Survey* for large corporates or 'poor' in the *FSB Voice of Small Business Index* for small businesses.

(b) A positive balance indicates that a net balance of respondents report that credit is cheaper or credit is more available.

⁵³ This is likely to be a long-term phenomenon. See, for instance, Macmillan Report (1931).

⁵⁴ To some extent this reflects the fact that small firms may be riskier.

⁵⁵ See Bank of England (2016).

⁵⁶ In this question, investment includes mergers and acquisitions, so strictly speaking it is not comparable to the definition of investment used in this Discussion Paper.

Conclusion and recommendations

This section has demonstrated that, while the UK non-financial corporate sector in aggregate has internal funds sufficient to finance investment, this is not true for all firms.

Large publicly listed firms do have substantial internal funds; and the recent significant growth in bond finance illustrates that they are successfully accessing capital markets as well. Small and medium-sized firms that do have access to capital markets rely heavily on net equity issuance to finance their business. But the vast majority of SMEs do not have access to market-based finance and are entirely dependent on bank funding and internal funds. The investment decisions of small firms, which account for around 30% of total business investment, are likely to be sensitive to their access to external finance.

External finance raised varies considerably over time, but generally not with investment, which tends to be relatively stable. But given alternative profitable opportunities facing firms, external finance is likely to support investment, at least at the margin. Access to finance looks to have continued to improve since the financial crisis, with access for small firms lagging behind.

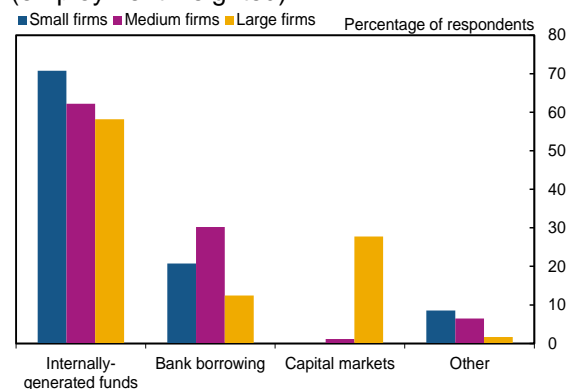
Financial frictions and investment

What does the evidence in this section convey about the supply of finance for productive investment? And relatedly, if firms are not taking advantage of productive investment opportunities, to what extent is this due to the list of real and financial frictions that were set out at the end of Section 3? For example:

- Firms may be demanding hurdle rates that are too high for productive investment, particularly during a heightened risk environment.
- Returns from non-investment activities such as leveraged buyouts, or investments abroad, may be higher or the returns may be earned sooner relative to returns from productive investment (crowding out).
- Firms may be reluctant to invest, preferring instead to maintain higher cash buffers against higher uncertainty over cash flows and the availability of bank lending.
- Or they might prefer to increase payouts to shareholders, given that 'shareholder

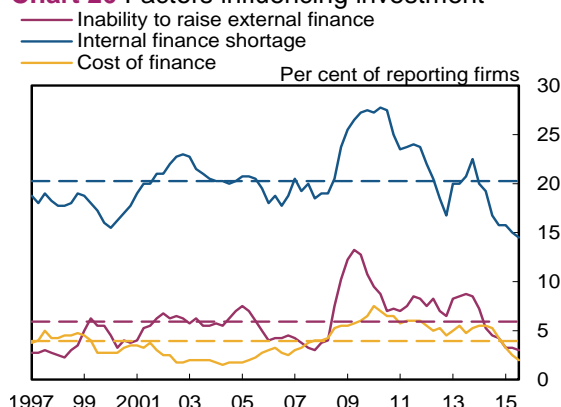
orientation' has become the key principle of corporate governance.

Chart 25 Primary source of investment finance over next 12 months by firm size (employment weighted)



Source: Bank of England.

Chart 26 Factors influencing investment (a) (b)



Sources: CBI Industrial Trends survey and Bank calculations.

(a) Survey asks firms what factors are likely to limit capital expenditure authorisation over the next 12 months.
(b) Four-quarter moving average. The dashed lines indicate the average since 1997Q1.

Unfortunately, the data available make it difficult to distinguish between these behaviours. Indeed, the behaviours may differ for different firms. In order to be able to distinguish between the above hypotheses and uncover the role of financial rather than real economy frictions, more data and analysis are required.

Data recommendations

What data are required to better measure finance for productive investment?

First, it is important to improve understanding of corporate financing and investment decisions. For example, when and how do firms allocate finance between investment and other financial activities? Second, more data are required to match the investment that takes place with the finance that is raised. Of course finance is

fungible – money raised for one purpose could be diverted to another use. But investment may have a very different funding structure to other financial activities, and additional data and new research are needed to establish if those differences are material and how they may affect corporate investment decisions. These specific data recommendations are listed below:

- uses of internal funds;
- uses of external finance;
- marginal expected rates of return from other financial activities, for example mergers and acquisitions, and leveraged buyouts;
- quantitative data on non-price terms of lending for investment (for example collateral); and
- factors holding back investment (risk tolerance, regulation, taxation, etc.).

To what extent should balance sheet restructuring be thought of as investment rather than non-investment? How should foreign direct investment be thought of in this context?

Is there any evidence to suggest that firms tend to choose to underinvest given their internal or external funds and, if so, for what reasons?

What proportion of internal funds can be thought of as being available to finance investment?

To what extent are trends in non-investment corporate activities and in bank lending indicative of 'crowding out' of finance for productive investment?

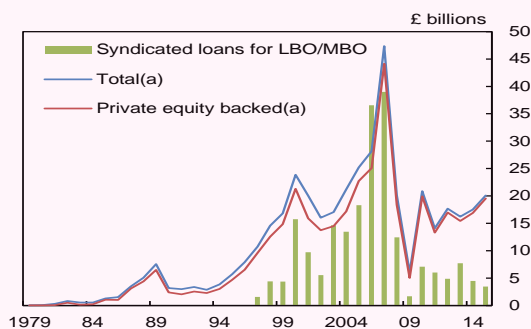
To what extent can 'general corporate purposes' borrowing by PNFCs be classed as indirect finance for productive investment?

Box 2

Balance sheet restructuring by UK PNFCs

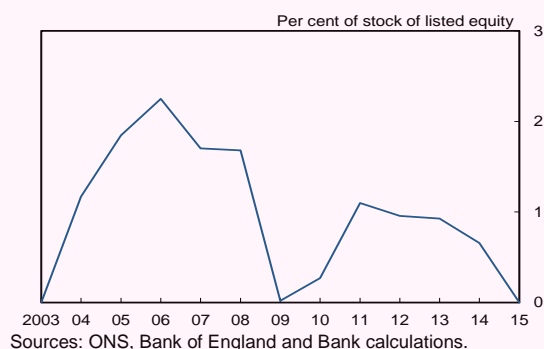
As noted in the main text, the net acquisition of external funds varies significantly over time, but generally not with investment – instead, it co-moves with other corporate activities. A striking example is the wave of balance sheet restructuring by the UK corporate sector in 2003-2008 (Figures A-B). While it is difficult to argue that there is no contribution to growth arising from balance sheet restructuring, there are also potential financial stability implications. For example, the highly leveraged buyouts implied relatively high credit risk for the providers of syndicated lending, which will have included UK banks. Similarly, to the extent that equity buybacks were financed using debt, they are likely to have led to higher leverage in the United Kingdom.⁵⁷

Figure A UK corporate sector buy-outs



Sources: CMBOR/Equistone Partners Europe, Dealogic and Bank calculations.

Figure B Equity buybacks by UK PNFCs



Sources: ONS, Bank of England and Bank calculations.

⁵⁷ See Bank of England (2007), Barwell and Burrows (2011), and Anderson, Brooke, Hume and Kürtösiová (2015) for a further discussion of implications for financial stability.

Box 3

Finance for household investment

This Box examines households' financing and investment decisions.⁵⁸ It concludes that household access to finance varies over time, but generally not with investment; although external finance and investment both fell back during the crisis.

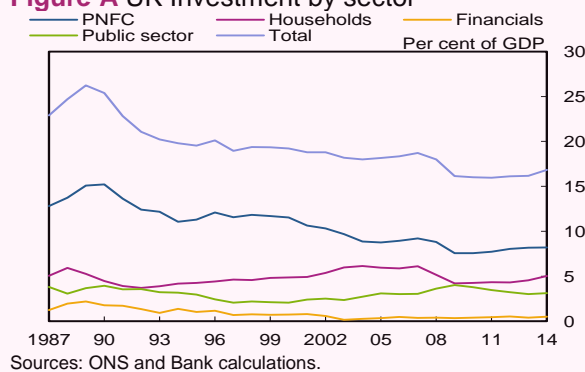
Household investment amounts to about a third of total UK investment (Figure A).⁵⁹

The sources of funds for household investment are much more straightforward than for companies. Households do not have access to capital markets, so all of their investment is financed by internal funds and loans from banks and other specialist lenders (Figure B).⁶⁰

The balance between internal and external finance varies over time. For example, between 2005 and 2008 household borrowing rose substantially, before falling back significantly after the global financial crisis.

Households use finance for investment, but also to acquire pension and insurance assets (Figure C). As access to external finance fell post-crisis, so too did household currency and deposits and the take up of pension and insurance services. Household investment has been relatively stable, with investment in housing being the main type of investment (Figure D).

Figure A UK Investment by sector



⁵⁸ The data suffer from the same two challenges noted for companies.

⁵⁹ Households include non-profit institutions serving households (for example universities).

⁶⁰ Internal funds are defined as net saving – the difference between disposable income and consumption expenditures.

Figure B Internal funds and net acquisition of financial liabilities by UK households

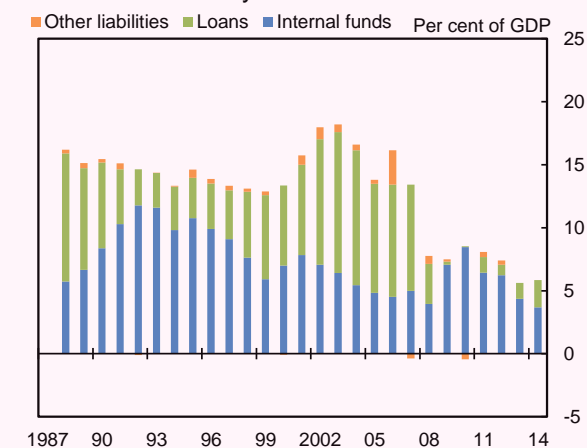


Figure C Net acquisition of financial assets by UK households

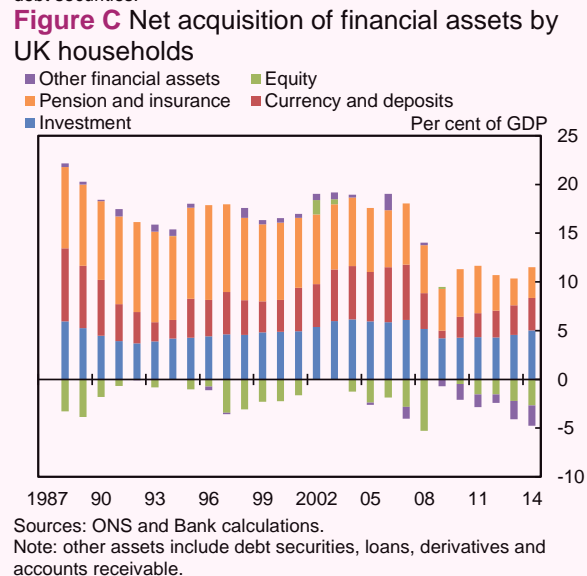
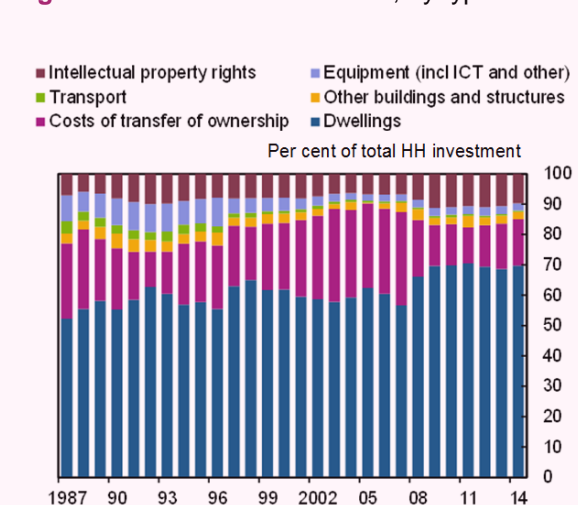


Figure D Household investment, by type



Box 4

Mortgage finance

This box examines mortgage finance with the aim of illustrating its complex impact on investment and the economy more broadly. It is important to understand this impact given that, over the past few decades, mortgage lending is the largest component of lending by UK-resident monetary financial institutions (Figure A), using up the largest share of non-financial sector deposits in the economy (Figure B).

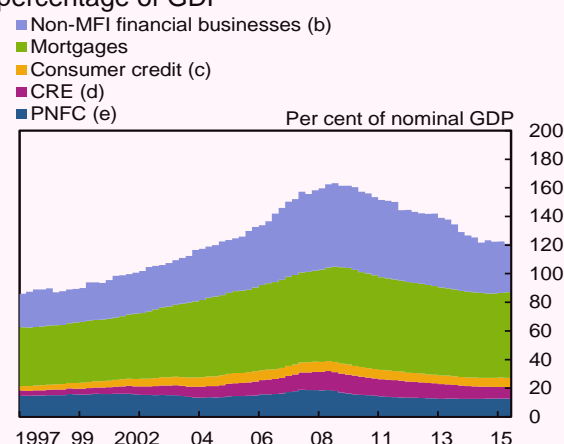
Mortgage lending is often considered 'unproductive'. For example, the recent finance and growth literature finds no relationship between credit to households and economic growth or productivity, unlike lending to firms that is positively related to growth (for example Arcand et al. 2015, Beck et al. 2012, see Appendix I for a review of the literature).

But the impact of mortgage lending on the broader economy is complex, as it operates through several channels. In this box, the role of mortgage finance is assessed in three steps: its direct contribution to investment; its broader indirect contribution to the economy through resource reallocation and enhancement of welfare; and its potential impact on financial stability risks.

Direct contribution to investment

In a narrow sense, mortgage lending finances investment when used to purchase a newly built house, and non-investment when used to purchase an existing house. On this basis, the direct contribution of mortgage finance to investment is small. Over the period 2005-15, only about 4% of mortgage lending financed purchases of new houses. Mortgages can also help finance some business investment. During the same period, it is estimated another 2% of mortgage flows were used by company directors to finance their business needs and, potentially, investment by their businesses (Bahaj et al., 2016). Taken together, this suggests that 6% of mortgage lending directly financed investment; the remaining 94% was used to facilitate an exchange of the existing stock of houses (Figure C).

Figure A Stock of UK MFI lending as percentage of GDP ^(a)



Sources: Bank of England, ONS and Bank calculations.

(a) Series are not seasonally adjusted, break adjusted. Data cover lending in both sterling and foreign currency, expressed in sterling and include overdrafts.

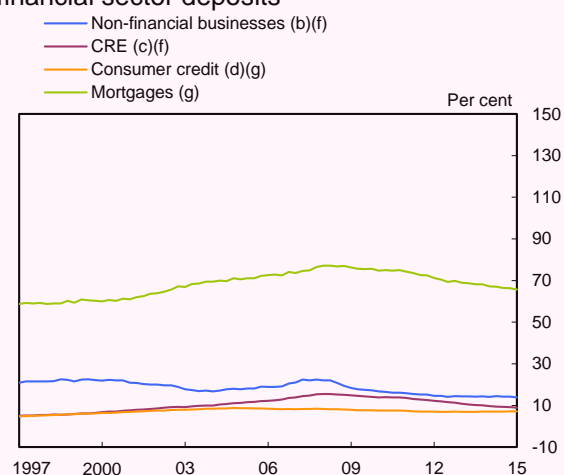
(b) UK MFI loans to financial businesses involved in financial intermediation, insurance companies and pension funds and activities auxiliary to financial intermediation.

(c) Credit card lending and other loans and advances, excluding student loans.

(d) UK MFI loans to non-financial businesses involved in the buying, selling and renting of own or leased real estate, and the development of buildings.

(e) Excluding the real estate sector.

Figure B Loans as percentage of total non-financial sector deposits ^{(a)(e)}



Sources: Bank of England, ONS and Bank calculations.

(a) Series are not seasonally adjusted, break adjusted. Data cover lending in both sterling and foreign currency, expressed in sterling and include overdrafts.

(b) Excluding the real estate sector.

(c) UK MFI loans to non-financial businesses involved in the buying, selling and renting of own or leased real estate, and the development of buildings.

(d) Credit card lending and other loans and advances, excluding student loans.

(e) Deposits are total UK MFI domestic deposits excluding deposits from financial businesses.

Resource reallocation and welfare

The fact that mortgage lending does not have a strong direct impact on investment does not necessarily make it a less useful form of finance

because mortgage finance also has a broader impact on the economy, to the extent that it improves resource allocation and contributes to welfare.

Some of the impact of mortgage finance on resource reallocation can be quantified. For example, about 1% of UK households take a mortgage while moving regions (Boeheim and Taylor, 2002). Some of these moves are job-related, and mortgage finance can facilitate a better allocation of resources across regions. But not everyone who moves regions for job-related reasons will want a mortgage: some may prefer to rent.

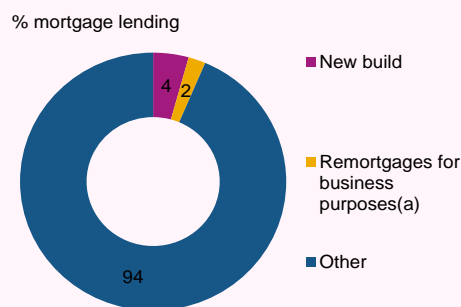
It is difficult to quantify all the other ways in which mortgage finance can indirectly affect the economy. A simple ‘follow the money’ approach can help illustrate this role conceptually. When one individual sells a house to another, the seller can do one of the following things with the proceeds from the sale:

- consume and thus stimulate aggregate demand;
- invest (for example, if the seller owns a firm);
- purchase other financial assets (which could include the debt and equity of PNFCs, used for investment or other uses);
- deposit funds with a bank (which could help finance further credit extension, some of which could finance investment); and
- buy another house (investment in the case of a new build) and use proceeds for one of the above if the seller downsizes.

Each of these transactions would lead to a sequence of others, and so on. The important point is that the sale of an existing house could lead to a chain of transactions involving the reallocation of resources. Some of it could be consumed or used for purposes other than investment. But some of it could be invested and contribute to growth.

Finally, mortgages allow an individual to buy a house without waiting for decades until they accumulate a sufficient amount of saving. This inter-temporal consumption smoothing enhances individual welfare, and in that sense is vital for the economy.

Figure C Gross mortgage lending, by type (2005-15 average) ^{(a)(b)(c)}



Sources: Bank of England, FCA Product Sales Data, BvD and Bank calculations.

^(a) The chart shows the average percentage of mortgage lending (including remortgages) used for purchasing a new-build property and for business purposes.

^(b) Data for new-build cover 2005-2015 whilst data for business purposes cover 2005-2012.

^(c) The FCA Product Sales Data include regulated mortgage contracts only, and therefore exclude other regulated home finance products such as home purchase plans and home reversions, and unregulated products such as second charge lending and buy-to-let mortgages.

Financial stability risks

The positive impact of mortgage finance on investment and the broader economy should be assessed against the potential risks associated with it. Rapid growth in mortgage lending could serve to fuel unsustainable rises in household indebtedness, posing risks to financial stability.

It was on this basis that ‘...the FPC recommended in June 2014 a limit on the flow of new residential mortgages that could be extended at loan to income multiples at or greater than 4.5.’⁶¹

High mortgage lending can also pose direct risks to the stability of the UK banking sector. For example, in the mid-2000s significant growth in mortgage lending was associated with a widening of the customer funding gap for UK banks, posing a significant risk to their ability to fund themselves during times of stress, as evidenced by the global financial crisis.

⁶¹ See Bank of England (2014a).

5. Better measurement of finance for productive investment

The purpose of this Discussion Paper is to initiate research to better measure the supply of finance for productive investment, with a view to developing a set of indicators that can be published regularly and used to inform policy-making. As the discussion in this paper has illustrated, the task is complicated because there is no standard definition of finance for productive investment in the existing literature. To simplify the task the working definition is broken up into two stages:

- What is investment and when is it productive?
- Is there enough finance to ensure productive investment takes place?

Measuring finance for productive investment is also challenging because neither the scale of productive investment nor the funds to support it are directly observable in the data. Recognising these limitations, this section summarises what can be learnt from existing evidence and how some concrete ideas for new data and research can enable better measurement of finance for productive investment.

What can existing evidence tell us?

Productive investments

An assessment of the appropriate level of productive investment in the economy draws on concepts, such as the marginal social rate of return on investment and the marginal social cost of capital, that have only rough proxies in the data. In particular the social cost is proxied by the private cost, the marginal return by the average return, and the expected return by past actual returns.

Those rough indicators, taken at face value, suggest there are currently no conclusive signs of a shortfall in productive investment in the United Kingdom. This judgement derives mainly from comparing rates of return on capital across countries where the United Kingdom is found to be in the middle of the pack relative to other advanced economies. In addition, the gap between the current rate of return to capital and the current cost of capital is around the same level as it was during pre-crisis period, because the reduction in the risk free rate has been fully offset by increases in the risk premia. This suggests that productive investment is taking

place to ensure that the net returns to investment are similar now to what they were during the pre-crisis period.

Section 3 also highlights that while there may be adequate levels of productive investments for the economy as a whole, this may hide a shortfall of productive investments in some sectors of the economy that are offset by over investment elsewhere. As an example, rates of return on capital are found to be higher for small and young firms, relative to large and old firms respectively. That said, to the extent that the capital stock (and returns to capital) are less well measured for small firms, without more robust data on the returns and costs of capital for small firms, one cannot infer from these data that small firms face larger unexploited productive opportunities than large firms.

Finance for productive investments

The concept of finance for productive investment is also largely unobservable in the data. In part, because it is not possible to match the finance raised by companies to the investment that they undertake, and in part because it is difficult to disentangle changes in the supply of finance from changes in demand. A broad range of proxy indicators, including data on household and corporate balance sheets and survey evidence, suggest that available finance and financing constraints have continued to improve since the financial crisis, albeit from a low base.

A lower proportion of small firms are now reporting access to finance as a problem for their business. However, it is impossible, with the current data, to ascertain whether the overall level of finance is still an excessive constraint on investment or simply a manifestation of the greater risk (and associated higher costs of capital) associated with less well established small companies.

Some other interesting patterns emerge from the data that are informative about corporate behaviour and the extent to which firms may be using finance for investment. In particular, the level of external finance raised varies considerably over time, but not generally with investment. Instead those funds are used to fund other financial activities (e.g. M&A and share buy-backs). So, to measure finance for productive investment, it is important to expand existing data collection to include the marginal rate of return on financial activities, and investment, as well as desired rates of return from investment (or firm level investment hurdle

rates). These data will allow an examination of when and why firms may choose to raise finance for non-investment activities rather than for investment. It is also useful to try to identify which forms of finance are more likely to be used for investment. Funds are, of course, fungible but investment may have a different funding structure to other forms of corporate spending. Having separate measures of finance raised and used for non-investment purposes is also useful and could help uncover whether financial or real factors deter firms from taking advantage of productive investment opportunities.

How can new data and research help?

Data requirements

Producing an accurate measure of finance for productive investment is likely to require material improvements in data collection.

What data requirements follow from the analysis of this Discussion Paper?

These can be summarised under two broad headings: data to improve an assessment of productive investment; and data to improve an assessment of the finance that is used for investment purposes. Ideally these metrics would be available at the firm-level, but failing that at some form of disaggregated level. This is because, as noted earlier, there are important differences that exist across different segments of the economy (for example, by firm size).

Data on productive investment

The analysis in Section 3 argues that evidence on the following concepts, even if some are impossible to measure precisely, could improve an assessment of productive investment:

1. marginal expected rate of return on new investment;
2. cost of funds;
3. required rate of return on new investment (firm investment hurdle rates); and
4. investment and capital stock (particularly for small firms);

Data on finance for productive investment

Similarly, the analysis in Section 4 suggests that the following data could improve an assessment of finance for productive investment:

5. uses of internal funds;
6. uses of external finance;
7. marginal expected rates of return from other financial activities, for example mergers and acquisitions, and leveraged buyouts;
8. quantitative data on non-price terms of lending for investment (for example collateral); and
9. factors holding back investment (risk tolerance, regulation, taxation, etc.).

Collecting new data: understanding the options

The difficulty in measuring some of the above concepts – such as the marginal rates of return – may make gathering such information costly. It not only involves surveying firms directly (as the ONS and other organisations currently do), but it also involves explaining complex questions to firms and requires them to put material effort into providing answers.

A potentially better approach is to observe firms' actions in detail and infer their behaviour and expectations. For example, one may be able to infer marginal expected rates of return on investment from the rules of thumb that firms use, such as target internal rates of return and expected pay back periods. In addition, firm-level information about their investment and non-investment uses of funds is also desirable. For public firms, these data are available from their financial accounts. For large private firms, this is available to some degree from their Companies House submissions, although the data are not timely and the range of information is narrower. For smaller private firms, Companies House submissions often contain insufficient detail but increased reporting requirements could be a burden for small firms.

Other data items – such as data on corporate hurdle rates – are easier to collect, but will require either new corporate surveys or existing ones to be expanded.

Data on how internal funds are allocated (for investment and other purposes) must come from the investing firms themselves, as would any information required on firms' decision-making process, such as their expectations or their risk tolerance. Were the reporting burden on firms not an issue, all financing data could in theory be collected from the firms themselves.

Data on the use of external funds could be sought from providers of finance, either as a complement (and cross-check) to the data reported by firms or as a substitute. Statistical and regulatory data from individual lenders are typically collected at an aggregate level. These data include individual lenders' balance sheets, income statements, etc. If it were instead collected at the level of individual loans, it would be possible to ask lenders to provide details on the borrowers' intended use of the funds and for detail on non-price terms. The existing data on the use of proceeds from bond issuance and syndicated loans (Section 4) are a good example of what such loan level data collection might look like. Use of existing credit registers could also provide insight, and this will be explored as part of the Bank's SME credit pilot study.⁶²

Very little data in the United Kingdom are currently collected on the provision of alternative sources of market-based finance, such as venture capital. For public equity and debt markets and the market for syndicated loans, some information is already available on uses of funds, although it is often quite general in nature.

Finally, alongside regular data collection, there are a variety of one-off options to collect data that better measure finance for productive investment. For example, surveys could be conducted to assess whether firms can report in a meaningful way the concepts that are set out in theory. The surveys could also answer whether the data proxies used, in Sections 3 and 4, are good ones. For example, how material is the difference between the marginal and average rates of return on investment? Is the realised rate of return a good proxy of the expected social return on a new investment? Are there differences in the uses of external versus internal funds?

In addition, a complement to collecting new data is to link individual data sets that individually contain important pieces of information into a comprehensive dataset that offers a fuller picture of firms' investment and financing behaviour. For example, if one dataset contains proxies for the rate of return to capital and another the cost of capital, combining them produces a firm-level dataset with both pieces of data. Such matching is more efficient and

accurate if there is a centralised collection of unique business identifiers.⁶³

To sum up, this Discussion Paper sets out the data required to enable better measurement of finance for productive investment. But it does not set out what is the best and most cost-effective way of collecting the data. That is a vital next step.

Does collecting the nine data measures that follow from economic analysis seem an appropriate way to proceed? How easy or hard do respondents envisage it would be to collect these types of data?

What alternative options exist for practically obtaining data that are informative about the nine data items listed above?

Who are the most likely data providers of each of the nine data items set out above? How costly is it likely to be to collect these types of data?

What is the most cost-effective way of collecting these data? And do the benefits outweigh the costs?

Are there currently any initiatives underway elsewhere that could be extended, on the margin, to include some of the above data measures?

Are more data on large firms required, or should the focus simply be on small firms?

Can the timeliness of gathering existing firm level data be improved? Data from centralised sources on the balance sheet of publicly listed companies are currently available with a 1-2 year lag, is that too long?

Future research

Having better quality data is a necessary condition for creating a metric of finance for productive investment. But the data can often be consistent with a number of economic hypotheses. There may be correlations between levels of available finance and the level

⁶² For more details see Bank of England (2014b).

⁶³ This technology is already available in Portugal. Relatedly at the Cannes Summit in November 2011, the G20 Leaders supported the creation of a global legal entity identifier which uniquely identifies business. Bean (2016) discusses potential initiatives to improve unique company identifiers in the United Kingdom, which would enable the United Kingdom to reach the frontier of data quality.

of productive investment, but the direction of causality between them may be unclear. Research that helps to identify when a capital gap is the result of financial factors is the fundamental question of this Paper. An investment shortfall that follows from real frictions should not affect an effective indicator of finance for productive investment.

Below are three broad areas for future research that can help establish the link between investment decisions and financing conditions.

Marginal source of finance for investment

Section 4 illustrated that, in aggregate, the (private non-financial) corporate sector has sufficient internal funds to finance investment. External finance raised does not always co-move with investment. However, there are also periods where finance and investment are in sync, such as the financial crisis. Therefore it would be useful to extend previous firm-level correlation analysis to uncover how the marginal sources of finance for investment evolve over time, and when these marginal sources are constrained by financial factors.

There is an existing literature exploring the link between firm-level investment and different sources of funds. A common approach is based on cash flow-investment sensitivities, but there is lack of agreement in the literature on how to distinguish financially constrained firms from unconstrained firms.⁶⁴ Therefore, academic research does not offer any conclusive evidence. This literature speaks directly to the goals of this Discussion Paper regarding the importance of the financial system in funding investment. Updating this body of work in light of additional data (particularly for SMEs) and new empirical methodologies would be useful.

General equilibrium analysis of 'crowding out' theories

An outstanding question is to what extent investment is crowded out by non-investment activities, defined earlier as the transactions that relate to the purchase of existing assets – housing or financial, such as M&A, purchases of financial assets or stock buybacks.

Tobin (1965) argued that investment in financial assets can crowd out investment in tangibles, if those activities generate a higher rate of return. Recent studies found evidence that such crowding out is present in the United States.⁶⁵ Similar research for the United Kingdom would be helpful.

Recent research using matched data on bank loans to individual firms in the United States shows that banks located in states with high house price growth have tended to lend more to households than to firms. And firms in these states have tended to invest less. This evidence is used to suggest that finance for non-investment activities can crowd out investment activities.⁶⁶ It would be good to see if those studies apply to the United Kingdom, and if the findings apply at all times or only during credit booms. In addition, it would be important to clarify if such crowding out is a partial equilibrium or general equilibrium feature, given that money used for non-investment purposes is likely to circulate through the economy with a share flowing back to investment.

Finance and the non-price terms of lending

Section 3 has illustrated that the United Kingdom is experiencing a long-term shift in the structure of investment towards intangible investment. Recent research has shown that banks tend to favour borrowers who can offer collateral;⁶⁷ which is easier to offer when companies invest in tangible assets (such as machinery and buildings).⁶⁸ Equally, intangible investments such as software and R&D are more difficult to offer as collateral for debt financing. Research that uncovers how intangible investment is financed, and the role played by non-price terms of lending will improve measurements of the supply of finance for these new types of investment. This strand of research could also encompass financing of broader forms of intangible investment, such as education and skills. Relatedly, understanding whether non-price terms of lending in the United Kingdom makes crowding out easier, would also be of use.

⁶⁴ See Fazzari et al. (1988, 2000) and Kaplan and Zingales (1997).

⁶⁵ See Orhangazi (2008), Lazonick (2007), Milberg and Winkler (2010), Almeida et al. (2016).

⁶⁶ See Chakraborty et al (2014).

⁶⁷ See Cecchetti and Kharroubi (2012, 2015).

⁶⁸ See IPO (2013) for a discussion about the difficulty in using intangible assets for collateral and recommendations to improve financing for intangible investments.

What other research is currently underway that can help better measure finance for productive investment?

Are there any alternative and new methods available to help identify finance for productive investment with the data that are already available?

Do researchers feel that a particular subset of the data set out above would be particularly helpful to collect for research purposes?

Next steps

The medium term goal of this Discussion Paper is to develop a set of accurate measures of finance for productive investment that can be monitored by the Bank and published regularly. This section has noted that to do this there is a need to gather, in the most efficient manner, information on the following nine data items:

1. marginal expected rate of return on new investment;
2. cost of funds;
3. required rate of return on new investment (firm investment hurdle rates);
4. investment and capital stock (particularly for small firms);
5. uses of internal funds;
6. uses of external finance;
7. marginal expected rates of return from other financial activities, for example mergers and acquisitions, and leveraged buyouts;
8. quantitative data on non-price terms of lending for investment (for example collateral); and
9. factors holding back investment (risk tolerance, regulation, taxation, etc.).

These nine data items follow from the analysis presented and some (but not all) of them may be hard to measure in practice. And there will be a range of ways to obtain that data, for example from regulatory data collection and firm level surveys. On some occasions it is also useful to ask both parties, the potential investor and borrower, and compare responses. But collecting data can be costly, and those costs need to be considered against the benefits. A vital next step is gathering information from respondents on who could provide the above data and the likely costs involved.

In the near term the Bank will:

1. use its Agency Network to trial a survey of businesses as a means of gathering additional data on the nine data items listed above;
2. organise a workshop to bring together interested parties and respondents; and
3. consider developing a set of preliminary indicators to monitor finance for productive investment that could be published regularly. These are likely to draw on the following measures presented in this Discussion Paper:
 - net returns on capital (Chart 5);
 - real rates of return and risk premia (Chart 8);
 - internal funds and investment (Chart 14);
 - total net finance raised by companies, including bonds, equity and loans (Chart 13, 17, 21 and 22); and
 - survey measures of factors influencing investment (Charts 25 and 26)

Having additional better quality data is a necessary condition for creating a metric of finance for productive investment. But the analysis suggests that the data are often consistent with a number of behaviours (or economic hypotheses). Therefore an additional next step is frontier research that helps illuminate the drivers of finance for productive investment.

6. Feedback on DP

The Bank would welcome comments from interested parties on the different considerations for better measurement of finance for productive investment set out in this Discussion Paper. The Bank hopes to engage with a broad range of stakeholders, including other public authorities, banks, credit reference agencies, industry bodies, academics and other interested parties.

Although the Bank is keen to elicit views on all aspects of this Discussion Paper, it particularly welcomes feedback on the questions explicitly set out in the text — and repeated in the list below.

Does this analytical approach seem broadly sensible given the objective of better measurement of finance for productive investment? What are the shortcomings of this approach and how could it be improved?

Does this assessment of the capital gap seem accurate? How can it be improved?

Do the data recommendations here follow from the analysis? How easy or hard would it be to design survey questions to collect these types of conceptual data?

To what extent should balance sheet restructuring be thought of as investment rather than non-investment? How should foreign direct investment be thought of in this context?

Is there any evidence to suggest that firms tend to choose to underinvest given their internal or external funds and, if so, for what reasons?

What proportion of internal funds can be thought of as being available to finance investment?

To what extent are trends in non-investment corporate activities and in bank lending indicative of 'crowding out' of finance for productive investment?

To what extent can 'general corporate purposes' borrowing by PNFCs be classed as indirect finance for productive investment?

Does collecting the nine data measures that follow from economic analysis seem an appropriate way to proceed? How easy or hard do respondents envisage it would be to collect these types of data?

What alternative options exist for practically obtaining data that are informative about the nine data items listed above?

Who are the most likely data providers of each of the nine data items set out above? How costly is it likely to be to collect these types of data?

What is the most cost-effective way of collecting these data? And do the benefits outweigh the costs?

Are there currently any initiatives underway elsewhere that could be extended, on the margin, to include some of the above data measures?

Are more data on large firms required, or should the focus simply be on small firms?

Can the timeliness of gathering existing firm level data be improved? Data from centralised sources on the balance sheet of publicly listed companies are currently available with a 1-2 year lag, is that too long?

What other research is currently underway that can help better measure finance for productive investment?

Are there any alternative and new methods available to help identify finance for productive investment with the data that are already available?

Do researchers feel that a particular subset of the data set out above would be particularly helpful to collect for research purposes?

Appendix I

Literature Review

This Appendix sets out several strands of the literature that have informed the framework developed in this Discussion Paper.

Finance and growth

The question of the contribution of finance to the rest of the economy is at the core of the literature on finance and development. The question itself is not new; it goes back to the studies by Schumpeter and Goldsmith. But the answers to this question have evolved.

For several decades the common approach was “the more finance – the better”, summarised by Levine (2005) in his seminal review of finance and development literature.

More recent studies show that the relationship between finance and growth is non-linear. More finance is good only “up to a point”, after which its productive contribution declines or can even become harmful (e.g., Arcand et al., 2015, Cecchetti and Kharroubi, 2012 and de la Torre et al., 2011).

This inverted-U shape relationship between finance and growth is usually explained by one of the following.

- a. With economic development the share of lending to households increases, but household credit is not positively associated with growth (Beck et al., 2012).
- b. Finance disproportionately favours lending to high collateral / low productivity industries (e.g., construction), as opposed to riskier projects requiring high R&D spending (Cecchetti and Kharroubi, 2015).
- c. Financial sector attracts talents at the expense of other sectors – the “resource drain” argument (Tobin, 1984, Philippon and Reshef, 2013, Cecchetti and Kharroubi, 2012).
- d. Excessive credit growth and financial development cause volatility and financial instability (Minsky, 1982, Kindelberger, 1978, Rajan, 2005, de la Torre et al., 2011).

- e. The role of financial services other than credit provision – such as derivatives or shadow banking – increases with economic development. Credit-based measures of financial development do not capture that (Beck et al., 2014). And some financial activities can be unproductive; trading in financial assets would be one example (Kay, 2015).
- f. The role of markets rises and the role of banks declines with economic development (Demirguc-Kunt et al., 2013). Bank credit-based measures of financial development do not capture that either.

This literature suggests that there are several reasons why more finance might not be better for the rest of the economy. To be able to capture this complex relationship, measuring finance for productive investment requires a set of indicators – not just one. As a minimum, these indicators should distinguish between finance available to different economic sectors (e.g., firms and households), consider both bank-based and market-based finance, and take into account financial stability implications of different types of finance.⁶⁹

Corporate finance

The framework developed in this paper also draws on the literature on corporate finance and financialisation of non-financial firms.⁷⁰ This literature highlights that firms engage in many activities, not just investment, and the scale of non-investment activities has been rising during the past few decades. This raises several important questions.

- a. To what extent can M&A and LBO be viewed as productive? Some studies treat the market for corporate control as a mechanism for improving capital allocation, disciplining managers and eliminating excess capacity (seminal paper by Jensen (1993)). An alternative view is

⁶⁹ There is also a broader question of resource drain and structural transformation of the economy away from capital-intensive industries to the less capital-intensive financial sector. To account for it, one would need an even broader suite of measures.

⁷⁰ Financialisation of non-financial firms usually refers to their increased engagement in financial activities over the past few decades, including M&A and LBO, financial asset holding, balance sheet restructuring, short-termism and maximising shareholder value as the key principle of corporate governance.

that M&A leads to wealth transfers from creditors and employees without efficiency improvements (Shleifer and Summers, 1988).⁷¹ Subsequent empirical evidence has been inconclusive.

- b. To what extent is investment 'crowded out' by alternative uses of funds? Tobin (1965) argued that purchases of financial assets can crowd out investment, if those activities generate higher rates of return. Recent empirical studies for the US found evidence for such crowding out by firms' holdings of financial assets (Orhangazi, 2008) and stock buybacks (Almeida et al., 2016, Lazonick, 2007).
- c. How to measure finance for investment, given that firms have many sources and many uses of funds? The Modigliani-Miller theorem suggests that spending and financing decisions are made independently of each other. Although there are reasons why the theorem might not hold in the real world, it is an important reminder that it is difficult – if not impossible – to identify sources of funds for investment specifically. A possible practical way of measuring finance for investment was proposed by Corbett and Jenkinson (1997) who used net external funds and emphasised the role of retained earnings in financing investment.⁷²

Thus, the literature on corporate finance and financialisation of non-financial firms highlights the many uses of funds and conceptual challenges of interpretation that come with it.

Conclusion

Overall, the existing literature suggests that the role of finance for investment and productivity is complex. Higher levels of finance do not unambiguously lead to higher levels of investment and growth. Firm behaviour is affected by a range of financial and real factors, and it is not always easy to separate these two effects.

⁷¹ Shleifer and Vishny (2003) develop a model of the second approach and discuss empirical evidence. See also Holmstrom and Kaplan (2001) for a discussion of various approaches.

⁷² What they called net external funds is actually "net of the net" – the difference between net acquisition of financial liabilities and net acquisition of the same type of financial assets (e.g., net bond issuance less net purchase of bonds issued by others, net bank loans less net deposits, etc).

Appendix II

Rates of return to capital: measurement issues

This box considers the concept of returns to capital, how to measure it and data challenges that makes this difficult. It sets out a variety of ways in which the rates of return on capital can be measured and their merits and drawbacks.

National accounts data

Term	Definition
Gross operating surplus (GOS)	The value of the gross output of the corporate sector less the cost of intermediate inputs and compensation of employees. Also netted out are taxes and subsidies directly charged on the firms' production.
Net operating surplus	GOS less consumption of fixed capital (depreciation).
Consumption of fixed capital	How much capital was used up during the year (e.g. a machine wearing out as it is used).
Gross fixed capital formation (GFCF)	The amount spent on creation of new non-financial assets (excluding inventories)
Net capital stock at replacement cost	The cost of repurchasing the physical capital used by companies accounting for depreciation. Usually calculated using the perpetual inventory method. The net stock in one year is the previous year's stock less consumption of capital plus GFCF.
Gross capital stock at replacement cost	Defined similarly to the net stock except that consumption of capital is not deducted.
Net-financial liabilities	Financial liabilities (including unlisted equity) less financial assets. This is a measure of the market value of firms' non-financial assets.

The ideal way to measure returns is to divide the net operating surplus - the amount of value generated by capital less the capital lost in production - by the net capital stock, which measures the value of existing capital available to the firm. This is how the return on capital is defined in many macroeconomic models and the ONS computes this measure for UK private non-financial corporations.

However, the consumption of fixed capital is difficult to measure and the methodologies used may differ across countries; hence, relying on net figures may lead to comparability issues. An alternative is to calculate returns on a gross basis, gross operating surplus over gross capital employed. The ONS also computes this measure for the United Kingdom and it is similar to the net figure, see Chart A.

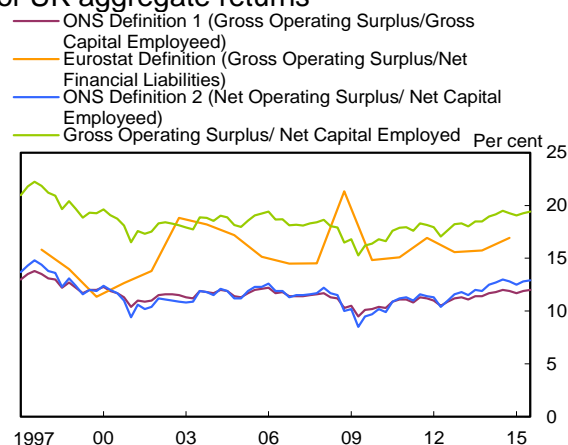
A further issue for cross country comparability is that not all countries produce capital stock estimates. An alternative is to use the market value of non-financial assets: this is how Eurostat define the rate of return in Chart 6.

Regardless of the approach, the United Kingdom is not an outlier when it comes to the returns on capital when measured at an aggregate level (Charts 5 and 6). Oulton and Rincon-Aznar (2012) provide corroborative evidence with similar cross-country comparisons on rates of returns using the EU-Klems database rather than the data directly from national accounts. Their analysis runs from 1971 to 2005 and also finds that the United Kingdom is in the middle of the pack of countries on a returns basis.

Firm level data

The main text defined two measures of returns using firm level data: gross operating profits/turnover and net operating profits/assets. The latter measure appears to make sense conceptually. However, the book value of assets is a poor proxy for capital employed as accounting depreciation rates are often different from how productive capital is consumed over time. The book value of assets may also lead to deviations from the value of capital at replacement cost and rented capital is excluded. Financial assets will further distort the data. A cleaner measure is simply to look at profit margins (gross profits/turnover) - although this is not a measure of a rate of return on capital, it does tell us about the success of a firm.

Figure A Comparison of different measures of UK aggregate returns



Source: ONS, Eurostat, Bank Calculations

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