

# Bank of England

## Prudential Regulation Authority

# Appendix 7: Aggregated cost benefit analysis (CBA)

Consultation Paper | CP16/22

November 2022



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This appendix sets out the Prudential Regulation Authority's (PRA) quantitative impact analysis of the expected aggregated costs and benefits of implementing the proposals in this Consultation Paper (CP) as a whole.

The policy judgement in CP16/22 is based on a mixture of quantitative and qualitative CBA. This appendix presents the evidence that the PRA has collected that adds to the body of evidence on the CBA overall, in aggregate. The individual policy chapters contain additional analysis of the expected costs and benefits of the specific proposals set out in CP16/22 and provide the bottom-up CBA analysis. This appendix should; therefore, be read in conjunction with the policy chapters.

The PRA has provided quantitative estimates of those proposals expected to have the most material impact on affected firms and the PRA's objectives, and for which the PRA has been able to obtain sufficiently granular information to conduct meaningful analysis. As well as first-order impacts, the CBA also considers potential second-order effects (eg the pass-through of higher funding costs to the broader economy and what that means for UK economic activity) and feedback loops. Please note that the estimates presented are sensitive to several uncertainties and underlying assumptions, as set out in Box A below.

As addressing the mismeasurement of risk weights (the main case for the PRA's proposed policy intervention in CP16/22) is needed to realise the benefits of all policy measures under the Basel III standards, it makes sense to conduct this CBA on an aggregated basis. Consequently, the CBA compares all costs with all benefits from the full package of policy measures in the Basel III standards as a whole. The results suggest that the aggregate costs from implementing the full package of Basel III measures would be in the region of £10.8 billion per year compared to aggregate benefits in the region of £21 billion per year. This equates to an estimated net benefit of the proposals in the region of £10.3 billion per year.

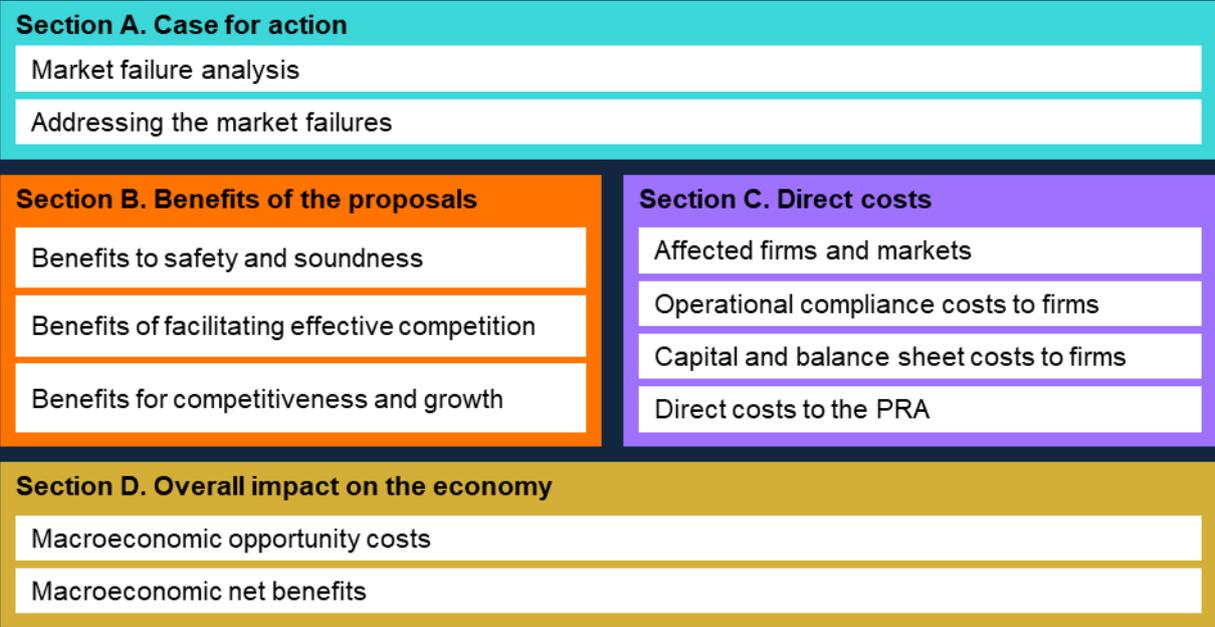
Although it makes sense to assess the proposals on an aggregated CBA basis, the PRA anticipates that the proposals in CP 16/22 are also justified on an incremental basis. Under the PRA's estimates, the mismeasurement of risk weights does not need to be very large for the net benefits of the proposals to be positive. Several pieces of evidence underpin the PRA's concern around mismeasurement of risk weights, including analysis undertaken by the PRA and its predecessor, the Financial Services Authority (FSA), the Bank for International Settlement (BIS), and external academics. Conservatively, the PRA estimates that the proposals would result in incremental macroeconomic benefits in the region of £1.8 billion per year, compared with incremental macroeconomic costs in the region of £1.3 billion per year.

The macroeconomic benefits to the UK economy of avoiding future financial crises, improving the competitive landscape for firms, and under-pinning international confidence in the UK, significantly outweigh the macroeconomic costs from higher borrowing charges on firms and households in the economy of implementing the Basel III standards and the proposals set out in CP 16/22.

As shown in Figure 1, the rest of the aggregated CBA is structured as follows:

- **Case for action:** Section A identifies the relevant market failures<sup>1</sup> of concern and how the proposals in CP16/22 seek to address them;
- **Benefits of the proposals:** Section B analyses the expected benefits of the proposals in CP16/22, including to the PRA’s objectives;
- **Direct costs of the proposals:** Section C provides estimates of the expected direct costs to the PRA and affected firms arising from the proposals in CP16/22; and
- **Overall impact on the economy:** Section D provides estimates of the expected macroeconomic costs and net benefits to the UK economy of the proposals in CP16/22.

Figure 1: Outline of the CBA analysis



<sup>1</sup> A market failure occurs where the characteristics of a market lead to outcomes the PRA would not expect from a well-functioning market. Examples include externalities, moral hazard, information problems, and market power.

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## Section A. Case for action

The PRA proposes changes to regulation where it identifies risks that may impact on its objectives that can arise when markets fail to operate in a well-functioning manner. This section identifies the relevant market failures that may impact the PRA's objectives and the way in which the proposals in CP16/22 would address them.

### Market failure analysis

After the global financial crisis, the Basel Committee on Banking Supervision (BCBS) highlighted several market failures that were distorting the risk management practices of firms and identified weaknesses in the regulatory framework. In particular, in examining the issue of capital adequacy of the banking system, the BCBS identified three main problems: (i) insufficient levels of capital in the system relative to the underlying risks; (ii) inadequate quality of capital in terms of loss absorption; and (iii) ineffective risk capture and measurement.<sup>2</sup>

A number of market failures contributed to these problems, as explained below:

1. In the lead up to the global financial crisis, firms' capital and risk management practices failed to consider the adverse consequences for the wider economy, especially during more trying conditions. This negative externality<sup>3</sup> meant that firms supported activities with levels and quality of capital that were not commensurate with their underlying risk.
2. Imperfect information also contributed to the global financial crisis. Well-functioning markets require buyers and sellers to be well-informed about the key characteristics of the products available in the marketplace. In financial markets, imbalances in the information available, known as information asymmetries,<sup>4</sup> can lead to market imperfections. The mounting complexity of firms' activities, together with the shortcomings in the Basel II standards, reduced the transparency of firms' balance sheets and resulted in a wide degree of variability in measures of regulatory risk weights. This outcome made it difficult for the market and regulators to assess the risk profile and capital adequacy of firms.
3. The presence of such information asymmetries encouraged some firms to believe that they were too-big or too-interconnected to fail. The belief that the government would

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<sup>2</sup> BCBS (2011): <https://www.bis.org/publ/bcbs189.htm>.

<sup>3</sup> A negative externality is a cost suffered by a third-party as a consequence of an economic transaction.

<sup>4</sup> Information asymmetries occur when one party to a financial contract knows more than the other and can exploit this information advantage.

step in and bail them out in the event of trouble, promoted a moral hazard,<sup>5</sup> posing additional threats to financial stability.

4. Adding to this problem was a lack of an effective mechanism by which firms could co-ordinate and provide comparable information on their underlying internal model (IM) measures. This co-ordination problem<sup>6</sup> not only reduced the transparency of IM firms' risk profiles, but also dampened market discipline over these firms' risk-taking and risk measurement practices. Together, these market failures justified the higher and better-quality capital requirements under the initial phase of the Basel III standards.

Nevertheless, concerns about whether the initial phase of Basel III standards adequately addresses these market failures remain. This is because the initial phase of the Basel III standards continues to give internal ratings based (IRB) firms considerable flexibility in determining their own measures of risk for regulatory capital purposes. This flexibility offers firms the ability to use modelling when it may not provide accurate measures of riskiness, and sometimes another way to minimise capital costs, increasing incentives to use IM approaches opportunistically to underestimate the risk of their activities and; therefore, the regulatory capital needed to support such activities. As a result, prudential regulators have raised concerns about the appropriateness of firms' risk capture and risk measurement practices, particularly when the benefit of using IM approaches is large but uncertain.

Several pieces of evidence underpin this concern. First, a benchmarking exercise undertaken by the FSA, revealed significant dispersion in firms' measures of default probabilities for the same underlying portfolios.<sup>7</sup> The BIS also conducted a number of similar studies, finding analogous results.<sup>8</sup> Second, since 2015, there has been a persistent downwards drift in the average risk weight densities of the largest UK firms which may only in part be accounted for by decreases in risk (see Chart 1). This trend, coupled with the considerable variability in risk

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<sup>5</sup> A moral hazard is a situation where the actions of one party may prove to be damaging for another party. The former, who is not concerned about the cost accrued to their actions, tends to get involved in high-risk activities, which, in turn, effects the latter in a negative way.

<sup>6</sup> In an economic system with multiple equilibria, a coordination problem occurs when a group of firms could achieve a more desirable equilibrium but fail to because they do not coordinate their decision making.

<sup>7</sup> Le Leslé, V and Avramova, S., IMF Working Paper WP/12/90, <https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Revisiting-Risk-Weighted-Assets-25807> quotes analysis from the FSA, 2010, 'Results of 2009 Hypothetical Portfolio Exercise for Sovereigns, Banks and Large Corporations' and 'Banks, Sovereigns and Large Corporates HPE: Technical Appendix'.

<sup>8</sup> BSBC (2013) <https://www.bis.org/publ/bcbs240.htm>  
– (2013) <https://www.bis.org/publ/bcbs256.htm>  
– (2015) <https://www.bis.org/bcbs/publ/d337.htm>.

weights, both across firms and over time, also support concerns about the appropriateness of firms' risk measurement and, subsequently, risk capture.<sup>9</sup>

Subsequent empirical studies find evidence consistent with the idea that banks use such discretion under IM approaches to underestimate risk and minimise regulatory capital requirements.<sup>10</sup> This need not be deliberate, but a reflection of the fact that modelling can lead to very large reductions in risk weights, and modelling is itself particularly uncertain. Behn et al. (2022),<sup>10</sup> for example, find that German banks using the IRB approach to estimate risk weights for corporate loan portfolios significantly underestimate borrower-level default, risk-weighted assets (RWAs), and regulatory capital needed to support such an asset class. At the same time; however, these banks charge interest rates consistent with relatively higher market-implied probability of default (PD), indicating that their underwriting practices are not consistent with the risk-measures used for determining regulatory capital requirements.

While these results may not be fully generalisable to the UK and other asset classes, the Basel III standards afford IRB firms opportunities to reduce regulatory capital requirements by underestimating risk. Information about whether and how IRB firms exploit discretion under IM approaches and, in particular, about their risk capture and measurement practices; however, remains inaccessible to the market and regulators. This makes it difficult to assess the safety and soundness of IRB firms. Moreover, underestimation of regulatory risk reduces the overall level of capital in the system for any given level of risk, increasing the likelihood of a financial crisis, misallocation of economic resources, and losses to the UK economy. The ongoing presence of such information asymmetries and externalities justify the Basel 3.1 standards (ie the final phase of the Basel III standards) aimed at ensuring better risk capture and measurement. These incremental standards, in turn, help support the benefits to firm safety and soundness and overall financial stability that derive from the broader package of post-crisis Basel III standards.

### Addressing the market failures

The initial phase of implementation of the Basel III standards addressed the amount and quality of capital in the system. These standards sought to promote the appropriate capture of risks on firms' balance sheets by raising '[...] both the quality and quantity of the regulatory capital base and enhance the risk coverage of framework.'<sup>11</sup> More and better quality capital in the system realised benefits to the UK economy by addressing the market failures identified above and, in turn, helped to support the PRA in meeting its objectives (see individual chapters for details) by reducing the likelihood of future financial crises.

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<sup>9</sup> Bastos e Santos, E, Esho, N, Farag, M and Zuin, C (2020), <https://www.bis.org/publ/work844.htm>.

<sup>10</sup> Behn, M, Haselmann, R. and V, Vikrant (2022), <https://doi.org/10.1111/jofi.13124>, The Journal of Finance, Vol. 77(3).

<sup>11</sup> BCBS (2011), <https://www.bis.org/publ/bcbs189.htm>.

The proposed implementation of the Basel 3.1 standards, as set out in CP16/22, complement the initial phase of implementation of the Basel III standards and seek to restore credibility in the calculation of RWAs and improve the comparability of firms' capital ratios. In reducing such information problems, they help promote robust measurement and effective capture of firms' balance sheet risks, both of which are critical to better quality capital as originally expected under the initial phase of the Basel III standards. More specifically, the PRA considers its proposals do this in three broad ways:

- The proposals would improve the measurement of risk within the IM approaches by: reducing excessive complexity; reducing coverage and methods where calculation of risk cannot be effectively measured; and providing a consistent methodology for those components of risk that the PRA assess could not be effectively modelled (see Chapter 4 – Credit risk–internal ratings based approach). In this way, the proposals in CP16/22 would address incentives for firms to underestimate risk using IM approaches.
- The proposals would enhance risk-sensitivity of the SA while maintaining simplicity and reduce the reliance on external ratings (see Chapter 3 – Credit risk–standardised approach).
- The proposals would limit the regulatory capital benefits that firms using IM approaches can derive relative to those using the SA with the introduction of the output floor, thereby maintaining comparability between the two approaches (see Chapter 9 – Output floor). The enhancement of the SA and the introduction of the output floor would help address the potential for mismeasurement of risk and excessive variability in measured risk weights across the banking system.

The international regulatory community recognised limitations to the prudential framework that were left unaddressed by the initial phase of the Basel III standards.<sup>12</sup> In response, the PRA used existing regulation to partially address some of these limitations by requiring some firms to hold additional Pillar 2 capital. The internationally-agreed proposals set out in CP16/22 provide a more comprehensive approach that replaces, builds, and improves upon the way the PRA has addressed known issues with the appropriate capture of risk in the Basel III standards. In particular, the proposals in CP16/22 would:

- revise IM approaches to credit risk, which is expected to raise non-stressed RWAs for some firms and more comprehensively capture risks measured under Pillar 1. In turn, all else equal, the size of the PRA's buffer for some firms may be reduced (see Chapter 10 – Interactions with the PRA's Pillar 2 framework);
- amend the Pillar 1 treatment of market risk and operational risk in line with the new international standards. To the extent these changes improve risk capture in Pillar 1, Pillar 2A requirements which cover risks not adequately addressed by Pillar 1 would

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<sup>12</sup> See <https://www.bis.org/publ/bcbs258.htm>.

be adjusted accordingly (see Chapter 6 – Market risk and Chapter 8 – Operational risk; and

- limit the extent to which firms can use the IRB approach to model RWAs, given evidence of excessive variability in IRB calculations<sup>13</sup> (see Chapter 4 and Chapter 9).

In addition, the PRA considers that any shift of risk measurement from Pillar 2A to Pillar 1 would improve the transparency of capital adequacy, since Pillar 3 disclosures support ongoing, consistent exposure of information available on more accurate Pillar 1 measures. While capital markets provide substantial incentives to firms to disclose information voluntarily,<sup>14</sup> these incentives do not necessarily mean that the level of disclosure would be sufficient to make effective judgements on firms' risks, or that voluntary disclosures would be sufficient to overcome the presence of market failures. Better information available to markets and counterparties would help address some of the information problems that led to too little capital and mismeasurement of risk (as noted earlier in this section).<sup>15</sup> The proposals set out in CP 16/22 enhance market discipline over firm risk-taking, and hence their safety and soundness.

## Section B. Benefits of the proposals

The benefits of the proposals in CP 16/22 arise primarily from how they advance the PRA's objectives and 'have regards'. This section describes the analysis and, where possible, provides quantitative estimates of the benefits expected from the proposals.

In August 2013, the PRA estimated the overall macroeconomic net benefits of all prudential reforms introduced in response to the global financial crisis at the time of the initial phase of the Basel III standards. The PRA's CP5/13 'Strengthening capital standards'<sup>16</sup> first set out the techniques and models for estimating the macroeconomic costs and benefits of the measures introduced in response to the global financial crisis (see Box A below). Using similar tools and techniques, the PRA updated its analysis of the macroeconomic costs and

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<sup>13</sup> See BIS (2013) <https://www.bis.org/publ/bcbs258.htm>, BIS Discussion Paper; and Edson Bastos e Santos, Neil Esho, Marc Farag and Christopher Zuin (2020) <https://www.bis.org/publ/work844.htm>, BIS Working Paper 844.

<sup>14</sup> For a comprehensive overview of the theoretical motivations for and a discussion of the empirical evidence on these incentives, see Leuz, C and Wysocki, P (2016), <https://doi.org/10.1111/1475-679X.12115>, Journal of Accounting Research, Vol. 54, pages 525–622. DOI.

<sup>15</sup> For a more detailed discussion, see Calver, P. and Owladi, J. (2017), <https://www.bankofengland.co.uk/quarterly-bulletin/2017/q3/pillar-3-disclosures-looking-back-and-looking-forward>, Bank of England Quarterly Bulletin 2017 Q3.

<sup>16</sup> Bank of England (2013), '<https://www.bankofengland.co.uk/prudential-regulation/publication/2013/strengthening-capital-standards-implementing-crd-4>', CP 5/13, and de-Ramon, S., Iscenko, Z. Osborne, M., Straughan, M., Andrews, P. (2012) '<https://dx.doi.org/10.2139/ssrn.2996973>' FSA Occasional Paper 42. DOI.

benefits in February 2021 when implementing measures that completed the initial phase of the Basel III standards (see CP5/21 – [‘Implementation of Basel standards’](#)).

### **The PRA’s primary objective: benefits to safety and soundness of PRA-authorised firms**

The PRA’s implementation of the initial phase of the Basel III standards raised the overall amount and quality of capital relative to total risk in the financial system which advances safety and soundness. The key benefits of the Basel III standards are to reduce the likelihood of a financial crisis, and thereby avoid any resulting disruption to economic activity.

Accurate and appropriate risk measurement and capture are the foundations that help ensure the benefits of more and better quality capital are able to be realised in the future. The mismeasurement of risk has significant implications for the UK economy. Underestimation of risk reduces the overall level of capital in the system for any given level of risk, increasing the likelihood of a financial crisis, misallocation of financing, and substantial losses to the UK economy. Overly conservative estimation of risk, while still realising the benefits of reducing the likelihood of financial crisis, unduly raises costs, misallocates financing, and reduces the deposit-taking sectors’ ability to support the wider economy. Proper measurement of risk helps ensure that firms are holding sufficient capital for the level of risk that they are taking and thereby helps mitigate the risk of financial crises.

In December 2017, the BCBS noted that its own empirical analysis showed a ‘worrying degree of variability’ in the calculation of risk weights at the peak of the crisis.<sup>17</sup> While some variability is to be expected in RWAs calculated using IMs, a high degree of variability undermines confidence in capital ratios, and; therefore, confidence in the resilience of firms. Importantly, variability in RWAs also makes firms’ capital ratios less consistent and comparable. If the lack of confidence in risk-weighted capital ratios increased in a downturn and put in doubt the adequacy of capital levels in firms, it could have implications for the resilience of the financial system as a whole. As a consequence, the financial system may not be able to continue lending to households and businesses during a downturn, which would amplify, rather than absorb, economic shocks.

In the absence of implementation of the Basel 3.1 standards set out in CP 16/22, the macroeconomic benefits expected of the initial phase of the Basel III standards would be considerably less certain. In 2013, the PRA estimated the total benefits of implementing the Basel III standards in terms of the contribution to the UK’s gross domestic product (GDP), to the extent that the PRA was able to provide quantitative estimates.<sup>18</sup> The gross benefits,

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<sup>17</sup> Basel Committee on Banking Supervision (2017), [‘https://www.bis.org/bcbs/publ/d424.htm’](https://www.bis.org/bcbs/publ/d424.htm).

<sup>18</sup> See CP 5/21 <https://www.bankofengland.co.uk/prudential-regulation/publication/2021/february/implementation-of-basel-standards> for updated estimates of the benefits of all prudential measures taken in response to the financial crisis, converted to 2019 GDP. For

updated for the UK's GDP in 2021 and accounting for the proposals in CP 16/22, are expected to be approximately £21 billion per year to the UK economy (see Section D – Overall impact on the economy). Underpinning this estimate of the benefits of the PRA's response to the global financial crisis is the critical assumption that the regulatory framework appropriately captured risks within the banking system. Put another way, the expected benefits of raising the amount and quality of capital would only be realised if the regulatory framework captures risks appropriately.

The mismeasurement of risk weights does not need to be very large for the net benefits of the proposals to be positive, under the PRA's estimates. As discussed in section D, even if firms are under-reporting risk weights by merely 3% (eg UK firm's average risk-weights should be 30% rather than 29%), the incremental net benefits of the proposals in CP 16/22 are positive, thus supporting the Basel 3.1 standards.

The proposals in CP 16/22 would; therefore, help support the UK to realise the benefits of all regulatory measures introduced in response to the global financial crisis. In particular, having more, and better quality, capital in the banking system. In the absence of implementing the Basel 3.1 standards set out in CP 16/22, especially those that limit the discretion of IM approaches, the PRA considers that risks would not be sufficiently captured by firms, particularly within Pillar 1, as measures of risk within complicated IMs become less aligned over time. This outcome would reduce the safety and soundness of firms because it would become more difficult for the market and the PRA to detect these inconsistencies over time and, in turn, prevent the probability of another financial crisis from rising in future.

### **The PRA's secondary objective: benefits of facilitating effective competition**

There are also additional benefits considered by the PRA to accrue from the proposals in CP 16/22, for which the PRA is unable to provide quantitative estimates at this point in time. The proposals in CP 16/22 are considered by the PRA to facilitate effective competition, in line with the PRA's secondary objective. Currently, firms using the IRB approach to credit risk typically gain a competitive advantage over firms using the SA, given the capacity in the IRB approach for judgement on the size of credit risks and the relative risk-insensitivity of the SA. The PRA's research indicates that this advantage is reflected in firms' pricing and portfolio specialisation and demonstrates the impact that such regulation has on the structure of the market in the UK.<sup>19</sup> Improvements to the risk-sensitivity of the SA (Chapter 3 – Credit risk – standardised approach) and the application of the output floor (Chapter 9 – Output floor) help

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initial estimates in 2013, see CP5/13 <https://www.bankofengland.co.uk/prudential-regulation/publication/2013/strengthening-capital-standards-implementing-crd-4>.

<sup>19</sup> See Benetton, M., Eckley, P., Gararino, N., Kirwin, L., Latsi, G. 2021.

<https://doi.org/10.1016/j.jfi.2020.100883> Journal of Financial Intermediation Vol 48.

to limit the extent to which measurement of RWAs diverges between IRB and SA firms and improve competition.

Separate research by the PRA on the links between risk and competition<sup>20</sup> demonstrates that overall risk levels for those firms most at risk of default (and for large banks in particular) are reduced when competition is more intense. This indicates that the proposals in CP 16/22 are expected to advance both the PRA's primary objective of firm safety and soundness while also facilitating effective competition, in line with the PRA's approach to the secondary competition objective.<sup>21</sup>

### Benefits for PRA 'have regards'

Adopting the Basel III standards in a manner that is relevant in the UK helps maintain trust and confidence among relevant stakeholders (including international investors and regulators) in the UK's financial system, and in London as a global financial centre (see individual policy chapters for details).

As set out in paragraph 1.25 of Chapter 1 – Overview, the PRA has considered the proposals set out in CP 16/22 against its 'have regards'. There are particular benefits to competitiveness and growth from adhering to international standards which would support the relative standing of the UK's financial system. There is evidence that firms value predictable and consistent regulation.<sup>22</sup> Alignment with international standards supports the UK's competitiveness by making it easier for international firms to conduct business in the UK. International firms avoid inefficiencies arising from applying different rules in different jurisdictions. Moreover, the predictable and stable way in which the international standards are applied in the UK provides assurance to other jurisdictions on interconnections with the UK financial system.

The PRA considers that the proposals in CP 16/22 would provide a permanent and internationally-aligned basis for capturing risks appropriately by addressing key issues in the measurement of risk in the existing regulatory framework. This would in turn provide both international active firms, and other jurisdictions, with the confidence to continue to do

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<sup>20</sup> See de-Ramon, Francis and Straughan (2020) <https://www.bankofengland.co.uk/working-paper/2020/the-link-between-bank-competition-and-risk-in-the-united-kingdom-two-views-for-policy-making>, Bank of England SWP 885.

<sup>21</sup> See Dickinson, S., Humphry, D., Siciliani, P., Straughan, M. and Grout, P. (2015), <https://www.bankofengland.co.uk/quarterly-bulletin/2015/q4/the-pra-secondary-competition-objective>, Bank of England Quarterly Bulletin, 2015 Q4.

<sup>22</sup> See Wardle, M and Mainelli, M (2021), '<https://www.longfinance.net/programmes/financial-centre-futures/global-financial-centres-index/qfci-publications/global-financial-centres-index-30/>', Long Finance and Financial Centre Futures.

business in the UK, supporting the UK's position as a global financial centre while ensuring robust prudential standards.

## Section C. Direct costs

This section describes the direct costs to firms and the PRA of implementing the proposals in CP 16/22. The direct costs to affected firms arise from them being asked to make changes to their operations and adjusting their balance sheets to meet the revised requirements. The direct costs to the PRA arise from its supervision function adjusting to the proposed changes to regulations.

The rest of this section proceeds by:

- discussing the affected firms and the markets in which they operate;
- providing estimates of the operational compliance costs to firms;
- providing estimates of the capital and balance sheet costs to firms; and
- providing estimates of the direct costs to the PRA of implementation, and ongoing supervision, of the proposals in CP 16/22.

### Affected firms and markets

Chapter 2 – Scope and levels of application sets out the scope of the firms affected by the proposals in CP 16/22 and the level of application. There are 371 PRA-authorized firms potentially within scope of the proposals,<sup>23</sup> comprising 320 banks, 43 building societies, and eight designated investment firms, at the time of publication of the PRA's Business Plan 2022/23.<sup>24</sup> PRA-approved or PRA-designated financial or mixed financial holding companies are also within scope. The level of application for the proposals in CP 16/22 is at the top-tier level. The analysis of costs therefore considers the impacts across these top-tier institutions. At the time of the PRA's analysis, there were 162 top-tier institutions (ie bank groups or standalone banks not part of a wider group) that encompass all 371 PRA-authorized firms.

Table 1 sets out the number and categorisation of firms used in the PRA's analysis. Firms are divided into 'large' and 'small and medium-sized' categories, with small and medium-sized firms broken down further into banks and building societies. Table 1 also sets out the number of firms in additional categories. These categories include firms using the IRB approach to credit risk, PRA-designated investment firms, and firms that meet the updated proposed definition of a firm meeting the Simpler-regime criteria (see Box A in Chapter 2). These categories can include both large firms and small and medium-sized firms, as well as

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<sup>23</sup> The exact number of these firms and groups changes as new firms enter, other firms close or vary their permission, and entities within groups restructure.

<sup>24</sup> <https://www.bankofengland.co.uk/prudential-regulation/publication/2022/april/pr-a-business-plan-2022-23>

both banks and building societies, and are included in the analysis to highlight the potential impact on these cohorts of firms. Due to the limited sample available for the analysis, and to avoid revealing firm-specific information, it is not possible to provide a more complete breakdown of firms either for firm size or additional categories. The proposals set out in CP 16/22 do not directly affect other PRA-regulated firms, such as insurers and credit unions.

**Table 1: Population of affected firms used in the aggregated CBA  
By type of firm**

Type of firm	Number
Total all firms <sup>(a)</sup>	162
Large firms <sup>(b)</sup>	16
Small and medium firms <sup>(c)</sup>	146
<i>of which:</i>	
Banks	104
Building societies	42
Additional categories	
IRB firms <sup>(d)</sup>	20
Investment firms <sup>(e)</sup>	8
Simpler-regime <sup>(f)</sup>	61
<i>of which:</i>	
Banks	27
Building societies	34

Source: PRA regulatory data

Notes:

(a) in the analysis, firms are defined as top-tier institutions (consolidated groups and firms not included within a wider group).

(b) firms with leverage total exposure measure greater than £100 billion.

(c) firms with leverage total exposure measure less than £100 billion.

(d) firms with permission to use the internal ratings based (IRB) approach to calculating RWAs. Includes both banks and building societies.

(e) PRA designated investment firms.

(f) Firms that are expected to meet the proposed Simpler-regime criteria.

The markets in which the affected firms operate cover products most closely associated with the credit intermediation process, including deposit-taking, retail and wholesale lending, and interbank lending. However, some affected firms (including PRA-designated investment firms) operate in a number of other markets for similar or complementary products, such as cash flow management for non-financial corporates, securitisation, repurchase agreements, securities lending and borrowing, over-the-counter (OTC) derivatives, and asset management. The impact of the proposals in CP 16/22 on the broader economy depend on the type of firms, and therefore the markets that are affected.

As many firms have the capacity to cross-subsidise operations across business lines, it is possible that the proposals in CP 16/22 would also affect other markets indirectly, such as in the provision of liquidity to corporate bond markets. The PRA has not considered a strict definition of 'markets' in this analysis. A more complete definition would include products that perform very similar functions, whether used for this purpose or not ('imperfect substitutes'), and it would include those firms not currently in the market that could supply these products. The PRA expects any indirect effects to be limited and considers that a high level description of markets is sufficient for the analysis. The proposals in CP 16/22 are not expected to disrupt the business models of existing firms (given their relatively small impact), or to change the balance of costs and benefits of the overall regulatory response to the global financial crisis.

### Operational compliance costs to firms

The incremental operational compliance costs to affected firms arise from the requirement on firms to make changes to the way they calculate risks using either IM approaches or the SA. Operational compliance costs are separate from the adjustments expected to firms' capital and balance sheet composition, which are set out below.

The PRA conducted a survey to estimate the operational compliance costs of the proposals in CP 16/22. The survey asked affected firms to provide estimates of the incremental compliance costs stemming from the proposed adjustments to the regulatory framework as well as the proposed changes to regulatory reporting templates. Respondents were asked to anticipate changes in their initial and ongoing effort (including the potential for cost-savings) required to meet the proposed requirements. The PRA received responses from 32 banks, building societies, and PRA designated investment firms, or approximately 20% of all affected firms. To estimate aggregate total costs (one-off and ongoing) for all affected firms, the PRA first separated the responses into two categories: small and medium-sized firms (less than £100 billion in total exposures as measured by the leverage exposure measure<sup>25</sup> (LEM)) and large firms (greater than £100 billion in LEM). It then used the median cost within each size category (reported in Table 2) as a proxy for the operational compliance costs for all firms within each size category and extended this figure by the total number of affected firms within each category to estimate aggregate incremental operational compliance costs (reported in Table 3).

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<sup>25</sup> The analysis uses total exposures to calculate the leverage ratio rather than total assets as these take into account relevant off-balance sheet exposures.

**Table 2: Median operational compliance costs by type of firm**£ million<sup>(a)</sup>

Type of firm <sup>(b)</sup>	Total costs	One-off costs	Ongoing costs per year	Present value of ongoing costs <sup>(c)</sup>
Large firms	319.2	87.7	8.1	231.5
Small and medium firms	1.6	0.3	0.05	1.3
of which:				
Small and medium banks	1.5	0.2	0.05	1.3
Small and medium building societies	0.1	0.0	0.0	0.0 <sup>(d)</sup>

Source: The PRA's survey of affected firms, the PRA's calculations

Notes:

(a) Table shows the incremental costs for the median firm in each type of firm category in the survey sample. Costs are calculated against a baseline where the proposals in CP 16/22 would not be implemented.

(b) Firm types include banks, building societies, and PRA-designated investment firms. Large firms are defined as having a leverage total exposure measure greater than £100 billion, and small and medium firms having a leverage total exposure measure of less than £100 billion.

(c) The present value of ongoing costs is calculated assuming they last forever using a discount rate of 3.5%, in line with current HM Government guidelines. See HM Treasury (2022),

<https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>.

(d) Costs for small and medium-sized building societies are positive, but too small to be shown in the table. One-off and ongoing costs are estimated at approximately £20,000 and £80,000, respectively.

Table 2 shows the estimated incremental operational compliance costs for the median firm in each type of firm category in the survey. The table also reports the present value of the estimated ongoing costs in CP 16/22 to facilitate comparison with the one-off costs. For large firms, the PRA estimated total compliance costs to be £319.2 million per firm, comprising one-off costs of £87.7 million and ongoing costs of £231.5 million. For small and medium-sized banks, the PRA estimated total compliance costs to be £1.6 million, comprising one-off costs of £0.3 million and ongoing costs of £1.3 million. Within this small and medium-sized category, the PRA estimated the total compliance costs for a bank to be around £1.5 million (£0.2 million one-off and £1.3 million ongoing) and to be considerably lower for a building society at £0.1 million.

Table 3 shows the total operational compliance costs for all affected firms. Total operational compliance costs are estimated to be £4.9 billion, of which £1.3 billion are one-off costs and £3.6 billion is the present value of ongoing costs. Large firms are expected to incur operational compliance costs of around £4.8 billion (97% of total operational compliance costs for all firms). By contrast, small firms are expected to incur operational compliance costs of £161 million (3% of total operational compliance costs for all firms). Within the small and medium-sized category, banks are expected to incur £159 million and small building societies are expected to incur £2 million incremental operational compliance. To provide

some context, the ongoing operational compliance costs for all affected firms of £0.1 billion per year are equivalent to 0.2% of aggregate annual non-interest expenses reported for the UK banking sector in 2019.

**Table 3: Total operational compliance costs for all affected firms**  
£ million<sup>(a)</sup>

Type of firm <sup>(b)</sup>	Total costs	One-off costs	Ongoing costs per year	Present value of ongoing costs <sup>(c)</sup>
Large firms	4,788	1,316	122	3,472
Small firms	161	28	5	134
of which:				
Small and medium banks	159	27	5	132
Small and medium building societies	2	1	0.0	2
All firms	4,949	1,344	127	3,605

Source: The PRA's survey of affected firms, the PRA's calculations

Notes:

(a) Table shows the total operational compliance costs for all affected firms in the survey sample. Costs are calculated against a baseline where the proposals in CP 16/22 would not be implemented.

(b) Firm types include banks, building societies, and PRA-designated investment firms. Large firms are defined as having a leverage total exposure measure greater than £100 billion, and small and medium firms having a leverage total exposure measure of less than £100 billion.

(c) Ongoing costs are calculated as the present value of annual costs, assuming they are permanent, using a discount rate of 3.5% in line with current HM Government guidelines. See Note (c) in Table 2.

Table 4 shows how the total operational compliance costs break down by element of the regulatory framework. The largest share of the costs stems from the changes to the market risk framework, which accounts for £3.8 billion (or 77% of the total operational compliance costs for all firms), of which £3.8 billion (or more than 99% of total market risk framework costs) are incurred by large banks (which also captures PRA-designated investment firms). Adjustments to the credit valuation adjustment (CVA) framework account for £0.7 billion (or 14% of total costs for all firms), of which £0.6 billion (or 88% of total CVA costs) are incurred almost entirely by large banks. Finally, changes to the IRB approach to credit risk account for £0.2 billion (or 3% of total costs for all firms), which are incurred solely by large banks.

**Table 4: Total operational compliance costs for all firms(a)**  
Impact by major category of the Basel 3.1 standards: £ million<sup>(b)</sup>

Type of firm <sup>(c)</sup>	Total	Market Risk	Credit Value Adjustment	Credit Risk	
				IRB	Other <sup>(d)</sup>
Large firms <sup>(e)</sup>	4,788	3,814	598	152	224
Small firms <sup>(f)</sup>	161	5	85	–	71
of which:					
Small and medium banks	159	5	85	–	69
Small and medium building societies	2	0	0	–	2
All firms	4,949	3,818	683	152	296

Source: The PRA's survey of affected firms, the PRA's calculations

Notes:

(a) Total operational compliance costs are calculated as the sum of one-off costs, and the present value of ongoing costs calculated using a discount rate of 3.5%. Total costs include costs for affected firms that meet the proposed Simpler-regime criteria because these firms may choose to implement the proposals in CP 16/22.

(b) Impacts are calculated against a baseline where the proposals in CP 16/22 would not be implemented

(c) Firm types include banks, building societies, and PRA-designated investment firms.

(d) 'Other' includes operational risk, standardised approach to credit risk, the output floor, reporting, and disclosure changes.

(e) Large firms are defined as having a leverage total exposure measure greater than £100 billion.

(f) Small and medium-sized firms having a leverage total exposure measure of less than £100 billion.

Firms that meet the proposed Simpler-regime criteria would not need to implement the proposals in CP 16/22 and could instead enter a Transitional Capital Regime. The Transitional Capital Regime would be substantially the same as those requirements currently applicable under the Capital Requirements Regulation (CRR) during the interim period between the proposed implementation date for the Basel 3.1 standards and the future implementation date for an intended permanent risk-based capital framework for the simpler regime. The Simpler-regime criteria are a revised version of the scope criteria consulted on in [CP5/22 – 'The Strong and Simple Framework: a definition of a Simpler-regime Firm'](#). As set out in Table 1, there are 27 banks that the PRA estimates would meet the criteria in CP5/22 were those proposals in place at the date CP 16/22 was published. The estimated costs for small and medium-sized banks could reduce by £41 million (or 26% of the total costs to small and medium-sized banks), from £159 million to £118 million if these firms entered the Transitional Capital Regime. Similarly, there are 34 small building societies that the PRA estimated would meet the criteria in CP5/22 were those in place at the date CP 16/22 was published. This reduces costs for those building societies by £1.9 million (80% of total costs for these firms) from £2.4 million to £0.5 million. The compliance costs for these firms are included in Table 4 as firms meeting the Simpler-regime criteria can choose to implement the Basel 3.1 standards, and it is not clear what proportion might choose to do so. Total compliance costs reported in Table 4 may therefore be lower than estimated.

There is considerable uncertainty around these estimates for several reasons, as explained below:

1. There was only a very limited sample available to the PRA for it to estimate the costs. Estimates of the sum of total costs for all firms can therefore vary considerably depending on the assumptions made. For example, the estimate of total costs for all firms increases to £6.9 billion from £4.9 billion if all individual firm responses are included in the calculation, rather than using the estimated median costs from the sample for all firms.
2. The magnitude of the estimate of total costs depends on the discount factor employed to calculate the present value of ongoing costs. The above estimate of total costs would fall to £4.5 billion from the £5.0 billion reported in Table 3 if the PRA were to raise the discount factor from 3.5% to 4%. Third, the survey asked firms to report estimates of costs before details of the proposals in CP 16/22 were known. It is likely that firms reported conservative estimates of the costs, given uncertainty over how the proposals in CP 16/22 could be finalised. Consequently, the survey results may over-estimate the likely size of the operational compliance costs to the industry of such proposals.

### Capital and balance sheet costs to firms

In addition to the operational compliance costs, firms may face some costs associated with adjusting their balance sheets and/or raising capital to maintain their capital ratios to the extent that lower capital ratios are not warranted by lower minima, to comply with the proposed regulations.<sup>26</sup> The proposals in CP 16/22 would change the measurement of RWAs and hence the calculation of firms' regulatory ratios. As a result, the PRA expects some costs across the sector associated with firms raising additional capital to maintain their capital ratios.

In assessing the capital costs to firms and to avoid double counting, the PRA has considered areas where Pillar 2 adjustments may offset some impacts of the proposed package. The PRA has in the past used existing regulation, at least partly, to address potential mismeasurement of risk by firms under Pillar 2A and the PRA (stress testing) buffers. Therefore, to the extent that the proposals in CP 16/22 improve risk capture in Pillar 1, Pillar 2A requirements have been adjusted accordingly (see Chapter 10 – Interactions with the PRA's Pillar 2 framework). Furthermore, the PRA anticipates that the proposals in CP 16/22

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<sup>26</sup> The modelling approach assumes that firms operating with head room above the minimum capital requirements respond to increases in capital requirements by raising capital and reducing risk weights with a view to maintaining pre-policy capital ratios (in other words, the management buffer plays an important role in affecting firm behaviour), to the extent that lower capital ratios are not warranted by lower minima when pillar 2A is reduced. See Box A for more detail.

might lead to higher non-stress RWAs which could change the capital drawdown of some UK firms in a severe stress testing scenario. This could reduce the total size of PRA buffer capital set by the PRA, which has also been considered. It has not been possible to take into account potential interactions with the stress testing exercises, which implies that the analysis of capital costs to firms presented here is likely to be an over-estimate.

Based on the PRA's analysis of the data available and an in-house banking sector model (see Box A), the PRA expects a small increase in capital levels by the end of the transitional period in 2030 for the output floor. This is primarily driven by the impact of the proposals, especially the output floor, on large IRB firms. The PRA also estimates a moderate increase in capital for small and medium-sized firms, although this increase masks an estimated reduction in capital for small and medium-sized building societies using standardised approaches (SAs).<sup>27</sup>

The PRA's analysis estimates that firms would raise on average around 3.1% additional Common Equity Tier 1 (CET1) capital, or £14.2 billion (see Table 5) in total across all firms, compared with a baseline in which the proposals in CP 16/22 are not implemented in the UK. Total capital, which includes CET1 capital, Additional Tier 1 capital, and Tier 2 capital, would also be expected to rise by 3.1%, or £19.7 billion in total across all firms. The PRA considers this to be an upper bound impact given the conservatism of survey respondents in the impact estimates, the potential interaction with stress testing (not considered here), and the long transition period that allows firms to take other actions to mitigate the impact.

The impact is expected to vary by type of firm, in particular banks and building societies. Large firms make up the largest part of this proposed increase, with CET1 capital expected to increase by £12.8 billion, or over 90% of the total impact. Firms that use the IRB approach<sup>28</sup> would see an increase of £11.0 billion in CET1 capital, or 78% of the overall increase in all CET1 capital. Not only are the IRB firms typically larger and make up a large share of firms' total assets, the impact to RWAs for those firms would be most pronounced due to the output floor (see Chapter 9 – Output floor).

The PRA considers there would be a much more modest impact on small and medium-sized firms, with an increase in CET1 capital of 2.5% or £1.4 billion overall. However, this increase masks some underlying differences between different firms. Small and medium-sized IRB firms are expected to see higher impacts (3.3% increase in CET1 requirements for IRB firms

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<sup>27</sup> Some firms participating in the QIS reported falling measures of RWAs as a result of the proposals. The estimates shown in Table 5 mask these results because the very limited number of firms that responded to the QIS exercise would not allow a further breakdown of the results without potentially revealing individual firm responses.

<sup>28</sup> Not all IRB firms are large under the categorisation in this analysis.

overall), while small and medium-sized SA firms would see either very small increases or, for smaller building societies in particular, decreases in capital.

For PRA-designated investment firms, the increase in CET1 is expected to be approximately £8.3 billion. PRA-designated investment firms are more affected by the market risk proposals than other firms and are expected to incur the vast majority of the costs across all firms arising from the market risk proposals in CP 16/22 (see Chapter 6 – Market risk).

In addition to adjusting capital in response to the Basel 3.1 standards, firms would also alter their assets and RWAs. These combined adjustments move firms back towards their desired, target capital ratios (see Box A). The estimated increase in capital is therefore expected to be accompanied by a 1.0% reduction in RWAs for all firms. Reductions in RWAs are expected to be smaller for small and medium-sized firms (0.7% than for larger firms (1.0%)), with the small and medium-sized building societies facing the smallest change (0.4%). In contrast, designated investment firms are expected to see a significantly higher reduction in RWAs of 1.8%, while IRB firms are expected to reduce RWAs by roughly 1.0%.

**Table 5: Impact on affected firms' balance sheets**

Impact of all the Basel 3.1 standards<sup>(a)</sup>

Type of firm <sup>(b)</sup>	Number of firms <sup>(c)</sup>	Capital		Capital		RWAs <sup>(d)</sup>
		CET1	Total	CET1	Total	
		£ billion		% change		
<b>Total All Firms</b>	162	14.2	19.7	3.1%	3.1%	-1.0%
Large <sup>(e)</sup>	16	12.8	18.0	3.1%	3.1%	-1.0%
Small and medium <sup>(f)</sup>	146	1.4	1.6	2.5%	2.6%	-0.7%
of which:						
Banks	104	1.1	1.4	2.5%	2.6%	-0.8%
Building societies	42	0.3	0.3	2.8%	2.4%	-0.4%
<b>Addenda</b>						
IRB Firms <sup>(g)</sup>	20	11.0	15.7	3.3%	3.2%	-1.0%
Investment Firms <sup>(h)</sup>	8	8.3	11.8	5.3%	5.4%	-1.8%

Notes:

(a) Impacts are calculated against a baseline where the proposals in CP 16/22 would not be implemented.

(b) All affected firms are designated as banks or building societies, noting that some individual banks are part of groups. PRA-designated investment firms are included within total banks: separate estimates are provided only where possible.

(c) Number of firms calculated at time of publication. The number of firms is calculated as the number of groups and firms that are not part of a wider group.

(d) Change in RWAs is the response to the changes in measurement of RWAs generated by the proposals in CP 16/22.

(e) Large firms are defined as having a leverage total exposure measure greater than £100 billion.

(f) Small and medium firms having a leverage total exposure measure of less than £100 billion.

(g) Firms with permission to use the internal ratings based (IRB) approach to calculating RWAs. Includes both

banks and building societies.

(h) PRA-Designated Investment Firms, see [‘Designation of investment firms for prudential supervision by the PRA’](#)

To put the aggregate impacts into context, all else being equal, the Basel 3.1 standards proposed in CP 16/22 would only partly reverse the downwards drift in major UK firms’ average risk weights seen in the past decade (see Chart 1). In 2015, major UK firms’ average risk weights (the ratio of RWAs to assets) stood at 37%. This has fallen to historically low levels of 25% in 2020. By 2030, when the output floor is fully implemented, the PRA expects average risk weights to rise to 30%, close to 2018 levels, but well below the starting point in 2015. The downward trend in recent years may reflect a number of factors, including firms shifting to less risky assets and historically low levels of losses based on recent data. However, it could also reflect, in part, under-estimation of internally modelled risks due, for example to model risk and data uncertainties. This highlights the importance of ensuring risk measurement remains robust, both to underpin confidence in capital ratios and the total amount of capital set against those risks.

**Chart 1: Major UK banks’ aggregate risk weights have fallen over time**  
 The Basel 3.1 reforms will only partly unwind the fall in aggregate risk weights<sup>(a)</sup>



Source: Firms’ published accounts and related public disclosures, firms’ data submissions, PRA regulatory returns, PRA analysis and calculations.

Notes:

(a) Major UK banks are Barclays, HSBC, Lloyds Banking Group, Nationwide, NatWest Group, Santander UK, and Standard Chartered. Aggregate risk-weight is defined as RWA divided by total balance sheet assets. RWAs are defined using the prevailing regulatory standards at each data. The forward projection assumes firms implement the Basel 3.1 standards as set out by the BCBS and make no other changes to their balance sheets.

## Direct costs to the PRA

The proposals in CP 16/22 would also impose some costs on the PRA, as the PRA's supervisors would need to incorporate the proposed changes into their supervisory processes. These costs would arise from the additional resources required by the PRA to implement the proposals in CP 16/22 (ie one-off costs) and carry out additional supervisory activities on an ongoing basis to meet the proposed requirements. In contrast, the costs incurred by the PRA in developing the proposals in CP 16/22 are treated as part of the PRA's business-as-usual costs and are not included in this estimate. Table 6 sets out estimates of the total one-off and ongoing costs to the PRA for both the financial cost and the effort required by full-time equivalent (FTE) employees. The ranges reflect the costs associated with different supervisory approaches and intensity of assurance work.

**Table 6: PRA compliance costs**

Incremental costs to the PRA of implementing the proposals in CP 16/22<sup>(a)</sup>

	Cost (£ million)	Effort (FTE) <sup>(b)</sup>
Total cost	7.5 – 19.3	
One-off cost	1.8 – 4.0	17.7 – 39.6
Ongoing cost	5.7 – 15.3 <sup>(c)</sup>	1.7 – 4.6 p.a. <sup>(d)</sup>

Source: PRA estimates

Notes:

(a) Costs to PRA supervision of implementing the Basel 3.1 standards, including changes to supervisory processes. The costs to the PRA's Prudential Policy Directorate (PPD) of developing the proposals in CP 16/22 are treated as part of the PRA's business-as-usual costs and are not included in this estimate.

(b) Represents the effort required from a FTE employee.

(c) Net present value of ongoing costs assuming they are permanent, capitalised at a discount rate of 3.5%.

(d) The additional effort required from full-time staff on an annual basis, assuming effort required is permanent.

The estimated effort in terms of FTE per year takes into consideration the anticipated incremental hours involved in implementing and embedding each new element of the proposals in CP 16/22 for all firms in scope of the proposals. The PRA considers that resource requirements for each policy proposal in CP 16/22 would vary, depending on materiality, novelty, and the likelihood of some potential (inadvertent) non-compliance. In some cases, resource savings may be realised, particularly where the proposals involve a simplification of existing requirements. The estimates reflect such savings.

Estimated costs reflect the median daily FTE cost for general staff,<sup>29</sup> multiplied by the average number of working days per year going forward. As with the operational compliance costs to firms, the present value of the estimated ongoing cost has been calculated (using a 3.5% discount rate) to allow for an appropriate comparison with the estimated one-off cost.

<sup>29</sup> Estimates are based on the PRA's compliance cost survey, which shows a cost of around £400 per FTE day for general staff.

The total one-off and ongoing costs to the PRA would likely be relatively small, estimated to be approximately 5% – 13% of total PRA's staff costs,<sup>30</sup> equivalent to approximately 3% –7% of PRA fee income, in 2021.<sup>31</sup> Furthermore, the ongoing costs would be incurred over an extended period, and they differ in nature and timing for each element of the proposals in CP 16/22. To meet these costs, the PRA would seek to make some efficiencies in its existing supervisory processes, with any remaining costs met by the PRA's cost recovery from firms.

## Section D. Overall impact on UK economy

This section brings together the benefits of the proposals in CP 16/22 to the PRA's objectives and relevant estimates discussed in Section B and the costs to firms discussed in Section C to consider their broader macroeconomic impacts. The macroeconomic CBA builds off the foundation set out in [CP 5/13 –'Strengthening capital standards'](#), which estimated aggregate macroeconomic costs and benefits of more stringent (higher levels and better-quality) capital standards under the Basel III standards. Updated to reflect recent UK GDP levels, the macroeconomic CBA expresses the impact of the Basel III package of policy measures as a whole in terms of its annual contribution to UK economic activity.

It is important to note that the aggregate estimates rest critically on the notion that the models used by firms capture and measure risks appropriately and; therefore, that the capital requirements under the Basel III standards are commensurate with the identified risk in the system overall. The macroeconomic CBA takes as its starting point these aggregate cost-benefit estimates and then evaluates the extent to which risk mismeasurement affects each. If the measurement of risk is too low, for example, then the required level and quality of capital will also be too low, increasing threats to the safety and soundness of firms and financial stability of the UK economy more broadly. The portion of aggregate benefits lost due to such mismeasurement represents the incremental benefits that derive from the proposals in CP 16/22 that aim to address the mismeasurement problem. Similarly, the reduction in aggregate costs that arise in this case represents the incremental costs of the proposals in CP 16/22. The results suggest that even for a modest degree of mismeasurement, the incremental net benefits of the proposals in CP 16/22 are positive.

### Macroeconomic opportunity costs

This section specifies the calculations for the estimated aggregate macroeconomic costs to GDP of additional capital in the financial system of the Basel III standards, as well as the portion of these costs attributable to the proposals in CP 16/22. These costs arise as higher

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<sup>30</sup> See <https://www.bankofengland.co.uk/annual-report/2022>, 2021-22.

<sup>31</sup> See PRA income statement for the period ended 28 February 2022 in <https://www.bankofengland.co.uk/annual-report/2022>.

capital resources under the Basel III standards (which encompass the estimates set out in Section C) raise funding costs for firms in scope of the proposals set out in CP 16/22. Firms recover these costs (at least partially) by increasing the spread between lending and deposit rates to customers. Households and non-financial corporates face higher borrowing charges and lower deposit returns which, in turn, affect real economic activity (see Box A for details).

To estimate macroeconomic costs of higher capital resources under the Basel III standards and the proposals in CP 16/22, the PRA used outputs from the [National Institute Global Econometric Model \(NiGEM\)](#), modified to include the PRA's research on the response of the banking sector to changes in their capital ratios.<sup>32</sup> See Box A for an explanation of the modelling approach and the assumptions made. The aggregate macroeconomic cost of implementing all measures (the initial phase of the Basel III standards and the Basel 3.1 standards in CP 16/22) is estimated to be approximately £10.8 billion per year, which represents approximately 0.5% of UK GDP in 2021.<sup>33</sup>

To isolate the incremental macroeconomic costs of the proposals in CP 16/22 (ie the portion of the aggregate costs to the economy due to the proposals), the PRA used the additional capital costs (£19.7 billion reported in Table 5) and operational compliance costs (of £4.9 billion reported in Table 3) strictly attributable to the proposals set out in CP 16/22. As noted in Table 5, the proposals in CP 16/22 are expected to increase the amount of capital held by firms across the sector by approximately 3.1% and decrease sector RWAs by 1.0%. In the modelling framework set out in Box A, the estimated changes translate into an increase in the sector wide risk-based capital ratio of approximately 100 basis points. This increase raises firms' funding costs, which, in turn, leads to higher borrowing costs, reducing the UK's annual GDP marginally, by approximately £1.3 billion per year. At around 11% of aggregate macroeconomic costs, this amount represents the incremental cost to the economy of the proposals in CP 16/22 (see Table 7).

### Macroeconomic net benefits

The expected overall net impact on the UK economy of the proposals in CP 16/22 are expected to make an overall positive contribution to the UK economy.

As noted in Section B above, accurate and appropriate risk measurement and capture are the foundations that help ensure the benefits of more and better-quality capital are realised in the future. The mismeasurement of risk has significant implications for the UK economy. Higher and better-quality capital raised by the Basel III standards support both the safety and soundness of firms and financial stability by reducing the likelihood of another financial crisis.

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<sup>32</sup> For detail of this approach, see de-Ramon, S. and Straughan, M. (2017), <https://www.bankofengland.co.uk/working-paper/2017/vecm-approach-for-estimating-and-testing-the-banking-sectors-response-to-changes-in-capital-ratios>, Bank of England Staff Working Paper No. 663.

<sup>33</sup> UK GDP was approximately £2.1 trillion in 2021.

This means that the estimated aggregate benefits of the Basel III standards depend critically on risks being appropriately identified and captured within the regulatory framework. The proposals set out in CP 16/22; therefore, would support the realisation of macroeconomic benefits from all measures implemented in response to the global financial crisis.

To estimate the aggregate macroeconomic benefits of higher capital resources under the Basel III standards and the proposals in CP 16/22, the PRA used outputs from the NiGEM, taking into account the PRA's research on the likelihood and costs of financial crises.<sup>34</sup> Box A provides an explanation of the modelling approach and the assumptions made. The aggregate macroeconomic benefits of implementing all measures (the Basel III standards and the proposals in CP 16/22) are estimated to be around £21.0 billion per year, which represents approximately 1% of UK GDP in 2021. This amount equates to a permanent increase in the economic activity of the UK economy each year, reflecting the value of reducing systemic risk in the banking sector and mitigating the prospect of negative externalities from possible future crises.

Implicit within the estimated aggregate prudential benefits of the Basel III standards (to safety and soundness and financial stability) is the idea that firms are, in fact, appropriately capturing and measuring risks and, therefore, that the regulatory framework accurately considers risk within the UK banking sector more broadly. This also means that models used by firms appropriately capture and measure risks. If models underestimate risks, the estimated aggregated benefits of the Basel III standards will also be lower. The reduction in prudential benefits in this situation reflects the incremental value of the proposals set out in CP 16/22 aimed at mitigating the risk of such underestimation.

To estimate the portion of aggregate benefits attributable to the proposals set out in CP 16/22, the PRA modelled economic activity in the absence of these proposals. As set out in Table 5, the proposals imply an increase in capital resources of around 3%. If capital in the system were 3% lower, then the probability of financial crises would be higher, leading to a permanent reduction in economic activity of around £1.8 billion per year, or around 9% of the estimated aggregate annual macroeconomic benefits of £21.0 billion. This amount represents the incremental benefits to the economy of the proposals in CP 16/22.

Table 7 summarises the expected net impact of the Basel III standards and the proposals in CP 16/22. Total macroeconomic benefits amount to £21.0 billion per year, of which £1.8 billion, or 9% of annual benefits, are attributable to the standards set out in CP 16/22. These compare below with aggregate macroeconomic costs of £10.8 billion per year, £1.3 billion of which stem from the proposals in CP 16/22. The standards set out in CP 16/22 are expected to contribute to a permanent net increase of around £0.8 billion to annual UK activity. In sum,

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<sup>34</sup> de-Ramon, S., Iscenko, Z. Osborne, M., Straughan, M., Andrews, P. (2012), <https://dx.doi.org/10.2139/ssrn.2996973>, FSA Occasional Paper 42. DOI.

the Basel III standards, complemented by the proposals set out in CP 16/22, are expected to permanently add approximately £10.3 billion per year to the UK's annual GDP.<sup>35</sup>

**Table 7: Summary of the expected impact of the proposals in CP 16/22**

£ billion, per year<sup>(a)</sup>

	UK economy	
	£ Billions <sup>(b)</sup>	% of Total
Macroeconomic benefits	21.0	100%
Proposals in CP 16/22	1.8	9%
Other relevant prudential requirements <sup>(c)</sup>	19.2	91%
Macroeconomic costs	10.8	100%
Proposals in CP 16/22	1.3	11%
Other relevant prudential requirements <sup>(c)</sup>	9.5	89%
Net benefits <sup>(d)</sup> of relevant prudential policy	10.3	

Source: PRA estimates

Notes:

(a) Costs and benefits are calculated against a baseline where the proposals in CP 16/22 would not be implemented.

(b) Annual annuity estimate of the present value of the chained volume measure (2021) of GDP.

(c) Other relevant prudential requirements include the initial phase of implementation of the Basel III standards in the UK.

(d) The size of the net benefits should be considered in the context of annual GDP for the UK economy, which was £2.1 trillion in 2021.

The PRA also considers there would be additional (unquantified) benefits from more effective competition among PRA-authorized firms, which would promote greater choice and competitive prices available to customers that are appropriate for the risks and the maintenance of trust and confidence in the UK as a global financial centre, which, in turn, would support the international competitiveness of the UK economy.

<sup>35</sup> The total net benefits should be considered in the context of annual GDP for the UK economy, estimated at £2.1 trillion in 2021 (the last full year for which data are available).

Overall, the costs and benefits of the proposals set out in CP 16/22 need to be considered in the context of all regulatory measures taken in response to the global financial crisis. The PRA considers that benefits to the UK economy of avoiding future financial crisis, as well as the additional benefits of improving the competitive landscape for firms in the UK and underpinning international confidence in the UK as a global financial centre, significantly outweigh the costs of implementing all the Basel III standards.

## Box A

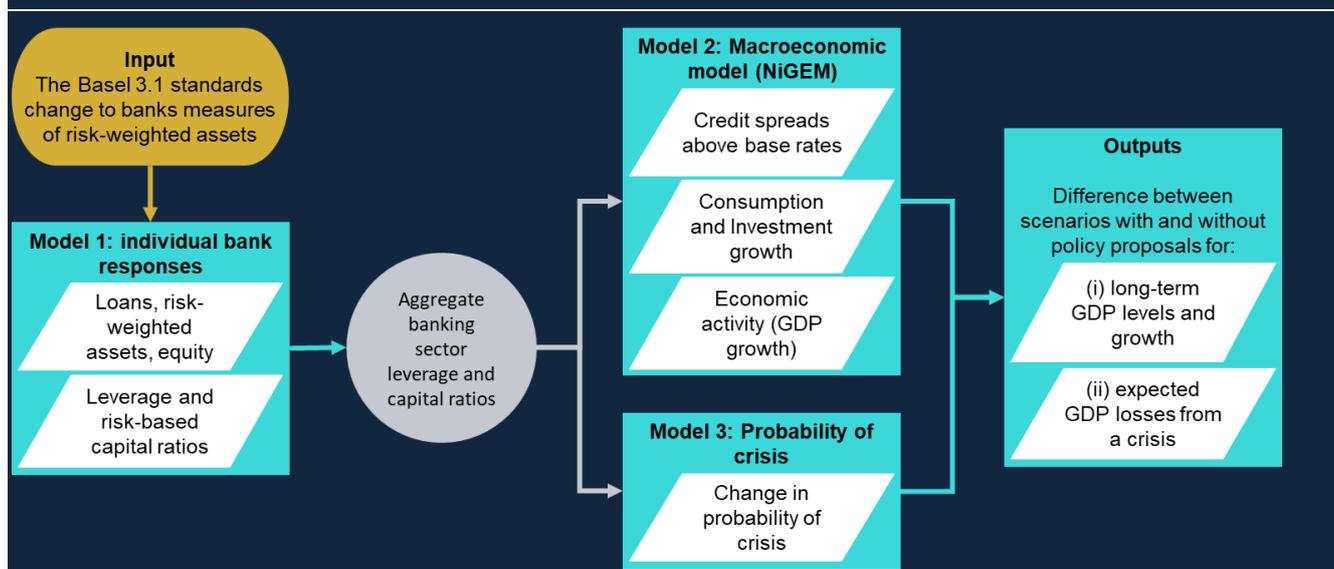
### Modelling approach to the CBA

This box summarises the approach to modelling the impact of the final Basel III standards (including the Basel 3.1 standards proposed in CP 16/22) on the regulated financial sector and the economy more broadly. More detailed information on the overall approach is set out in [de-Ramon et al \(2012\)](#).

The approach consists of three different elements (see Figure 2):

- Model 1: a model of the banking system that estimates how individual firms adjust elements of their balance sheets, including lending (asset side) and target capital levels (liabilities side), following a proposed change to the regulations;
- Model 2: a macroeconomic model that translates the proposed changes in aggregate banking sector risk-based capital ratios into average lending spreads, and hence impacts on economic output; and
- Model 3: a crisis model that estimates the probability of crisis under different banking sector leverage ratios.

**Figure 2: Illustration of the modelling approach**



### Model 1 – individual bank responses

The proposed change in capital regulations driven by recalibrations in risk weights alter RWAs and hence firms’ surplus capital above their requirements. From a practical perspective, the approach uses individual firm data on the immediate, static impact of regulatory changes on firms’ balance sheets (from quantitative impact study (QIS) data provided by firms). The model of the banking system (Model 1) uses this static impact data to estimate how each firm would adjust its balance sheet back towards a target capital level. The key assumptions in Model 1 are:

- each firm maintain a target capital ratio that depends on the supervisors’ prudential requirements and other macroeconomic and individual risk factors (see de-Ramon et al., 2022);
- if the only change is to capital regulations (ie macro and risk factors do not change), firms set their desired capital ratios simply to restore the level of their capital surplus.
- firms adjust both assets and liabilities to meet their desired capital ratio, lowering the total amount of capital needed as firms also adjust the level of their RWAs (eg lending).

Model 1 provides two key outputs. First, it provides an estimate of the absolute change in capital across the banking sector that is likely to occur in response to the proposals in CP 16/22. Second, Model 1 delivers the expected change in the aggregate risk-based capital and leverage ratios, taking into account individual firm responses. Calculating individual firm responses is necessary since differences in their business models generate different

responses that cannot be calculated from aggregate firm data. Aggregate capital and leverage ratios are then used as inputs for the macroeconomic models in the framework.

### Calculating capital impacts under the Basel 3.1 standards using Model 1

To assess the size of the impact from the proposals in CP 16/22, the PRA estimated the size of the expected change in RWAs using data from QIS templates submitted to the PRA in 2019. The PRA used data from this time period for two reasons. First, in 2019 the PRA invited all firms to report using QIS templates and the submitted data covered a much wider population than the ongoing, semi-annual QIS exercises run by the BIS.<sup>36</sup> Second, in the PRA's Model 1, forward-looking firms are expected to adjust to the new proposed requirements ahead of their implementation to minimise the overall adjustment costs. Using more recent QIS data may under-estimate the capital impact, as the data would include adjustments already made in anticipation of the proposals in CP 16/22.

Additional adjustments to the 2019 data and Model 1 (the PRA's model of balance sheet adjustments) were necessary. In particular, information from more recent QIS submissions was used to adjust the 2019 data where firms acknowledged errors in their earlier submissions. Moreover, the impact on firms that are expected to be bound by the UK leverage ratio requirement, and not the risk-based capital ratio, were adjusted, as these firms are assumed to leave their balance sheets unchanged (in response to a change in RWAs) in the model framework.<sup>37</sup>

To estimate changes to capital ratios across the sector, the PRA first calculated the change in RWAs for each firm that submitted QIS data to the PRA in 2019. The PRA then used these firm-specific calculations to calculate the average change in RWAs within each of the following categories: by size (large firms, and small and medium-sized firms), business model (banks and building societies), and approach to risk measurement (IRB and SA). To calculate aggregate impacts, it then applied the average changes to other firms in each firm-size and firm-risk category that were not included in the QIS exercise. This resulted in varied impacts across these different firm-types and firm-risk categories. Table 5 reports aggregate impacts for all firms, and for each category of firm set out in Table 1.<sup>38</sup>

The PRA also adjusted Model 1 to take into account the interaction with the PRA's Pillar 2 framework, as noted in Chapter 10, so as not to double count the impacts of better risk-

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<sup>36</sup> The BIS QIS is voluntary, and only large UK banks submit their data regularly.

<sup>37</sup> Firms bound by the leverage ratio will not be affected by changes in measures of RWAs, as the required capital is calculated independently of RWAs.

<sup>38</sup> It is not possible to report the outcomes for all the categories of firms used in the calculations due to the limited size of the sample and the need to maintain the confidentiality of individual firm responses to the 2019 data collection exercise.

capture under the Basel 3.1 standards and Pillar 2. To make the adjustments, the PRA used regulatory reporting and supervisory data to gauge the likely reduction in Pillar 2A requirements and the PRA's buffers for firms that submitted data in a recent, semi-annual BIS QIS exercise. The average size of the reduction calculated for these QIS firms was then used to adjust the size of the RWAs impact reported in the QIS data as a proxy for the impact, though in practice when Pillar 2A falls required capital ratios fall in line. To estimate the adjusted impacts for the population of affected IRB firms, the average effect of the Pillar 2 adjustments calculated for QIS firms was applied to all IRB firms not in the QIS sample.<sup>39</sup> No adjustment was made where firms were expected to see a reduction in capital requirements, or where an appropriate comparison across cohorts could not be made.

Lastly, Model 1 assumes that firms would start to adjust to the full impact of the proposals in CP 16/22 from the PRA's proposed implementation date of 1 January 2025, although the implementation of the output floor would be phased in over a five-year period, and not fully implemented until 2030. This assumption is necessary to avoid making arbitrary decisions about the likely timing of firms' adjustments (and hence the outcomes calculated by the model). That said, the impact of the proposals in CP 16/22 on measures of RWAs at the start of the transitional period is small. Moreover, the long transitional period means that firms would have considerable time to adjust to the proposed changes, and they may find more efficient (and less costly) ways to adjust to any new proposed requirements than the PRA's modelling suggests. The estimate of total capital costs for the sector is; therefore, expected to be highly conservative, and it overestimates the likely impact on capital overall.

## **Model 2 – macroeconomic model (NiGEM)**

The NiGEM model (Model 2) is a collection of sub-models that generates estimates of economic outputs across different sectors within the economy and across global economies. Importantly, NiGEM has been modified to include a UK banking sector sub-model that shows how lending is repriced over time in response to the change in the aggregate risk-based capital ratio calculated from Model 1 (see de-Ramon and Straughan, 2017). The key assumptions in Model 2 are:

- the change in the aggregate capital ratio affects the capital-debt mix of firms' liabilities and hence firms' average funding cost;
- firms use lending spreads over (central bank set) base rates to recover the increase in higher funding costs;
- changes in average funding costs are partly offset as firms' equity (capital) and debt investors respond to changes in firms' balance sheet structure (the 'Modigliani-Miller' offset);

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<sup>39</sup> There is considerable uncertainty over the estimate of this effect given the limited size of the sample.

- the average spread charged to households adjusts more slowly than to corporates in the short-term, as household loans are dominated by long-term mortgages that cannot be repriced quickly;
- spreads charged to both the household and corporate lending sectors adjust by the same amount after approximately three years.

Other NiGEM sub-models deliver key macroeconomic outputs, including UK consumption, investment, and GDP levels that depend on changes to loan spreads generated in the UK banking sector sub-model (for details on the NiGEM model, see Barrel et al, 2009). Additional key assumptions in the NiGEM model are:

- credit spreads affect the non-financial corporate cost of investment, investment growth, the rate of physical capital accumulation, production capacity, and consequently, GDP growth;
- the cost of other forms of finance (eg corporate debt issuance) move in line with changes in credit spreads over base rates ensuring there is no arbitrage in the model from non-bank finance sources;
- the UK is a small open economy with capital mobility—household consumption and the savings rates change, but after an adjustment period, any lasting effects are offset by the current account, foreign assets, and incomes from abroad—the savings rate does not affect the productive potential of the economy; and
- elasticities in the model are estimated from dynamic macroeconomic time-series equations.

Overall, the key output from Model 2 is a path for future UK GDP under different assumptions. In particular, Model 2 traces the impact of the proposed policy changes as the difference between (i) GDP output assuming policy is in place; and (ii) GDP output assuming no change in policy.

### **Model 3 – probability of crisis**

The probability of crisis model (Model 3) links banking industry leverage (and not risk-based capital ratios, as in Model 2) to the probability that a financial crisis occurs. Increases in the aggregate banking sector leverage (equity to assets) ratio reduces the probability of financial crises occurring (other factors being equal). Alongside estimates of the cost of financial crises, estimated from historical data using NiGEM (Model 2), the key output from Model 3 is the change in the expected loss to the UK's GDP arising from changes to the probability of a financial crisis occurring. The key assumptions in Model 3 are:

- drivers of financial crises are high banking sector leverage (ie low equity to asset ratios), low banking sector liquidity, and fast house-price growth; and

- frequency of crises and associated GDP costs are based on Organisation for Economic Co-operation and Development (OECD) country averages (see Barrel et al, 2009).

The overall outputs from Models 2 and 3 are:

- the macroeconomic 'cost' of policy proposals, calculated as the difference between accumulated changes in GDP output (at present value) with and without the proposed policies from Model 2; and
- the macroeconomic 'benefit' of policy proposals, calculated as the present value change in expected GDP losses from a reduction in the probability of financial crises from Model 3.

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