OVERVIEW OF REGULATORY STRESS TESTING AROUND THE GLOBE – 2016
From the US to China, stress testing is being used by regulators around the world as a mean to determine the financial stability of banks under unfavourable conditions. However, not all stress testing are being implemented with the same methodology and approach. In this article, we will provide an overview on stress tests being conducted by major financial regulators around the world and their different approaches. This will give some idea on the robustness of the global financial system and potentially where the source of next crisis will come from.

**Stress Test in the United States**

Under the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act), Financial Stability Oversight Council (FSOC) requires Federal Reserve to conduct an annual assessment of Bank Holding Companies (BHCs) with total consolidated assets over $50 billion USD and of all nonbank financial companies designated by the FSOC for Federal Reserve supervision. This annual assessment has two related programs:

1. **The Comprehensive Capital Analysis and Review (CCAR)** is a comprehensive supervisory program that assesses, quantitatively and qualitatively, BHC’s capital adequacy, capital adequacy process, and planned capital distributions such as dividend payments and common stock repurchases under stressful scenarios. As part of CCAR, the Federal Reserve evaluates whether BHCs have sufficient capital to continue operations throughout times of economic and financial market stress and whether they have robust, forward-looking capital-planning processes that account for their unique risks. A BHC cannot make any capital distribution if the Federal Reserve disapproves the BHC’s capital plan, unless the Federal Reserve makes an exception in writing.

2. **Dodd-Frank Act Supervisory Stress Testing** evaluates and gauges the impact of stressful economic and financial market conditions on BHC capital. In addition to the annual supervisory stress test conducted by the Federal Reserve, each BHC is required to conduct annual company-run stress tests under the same supervisory scenarios and conduct a mid-cycle stress test under company-developed scenarios.

Together with both the Dodd-Frank Act supervisory stress tests and the company-run stress tests, they provide company management and boards of directors, the public, and supervisors with forward looking information to help gauge the potential effect of stressful conditions on the ability of these large banking organizations to absorb losses, while meeting obligations to creditors and other counterparties, and continuing to serve as credit intermediaries. To ensure this information is readily available, the Dodd-Frank Act requires both BHCs and Federal Reserve to disclose a summary of their stress test results respectively.

The Federal Reserve publishes three supervisory scenarios each year since 2010. The three scenarios are: (1) baseline, (2) adverse, and (3) severely adverse. While the adverse and severely adverse scenarios describe hypothetical sets of conditions designed to assess the strength of banking organizations and their resilience to adverse economic environments, the baseline scenario follows a similar profile to the average projections from a survey of economic forecasters.

The Federal Reserve will announce the results of its supervisory stress tests by June 30, 2016, with the exact date to be announced later.

For detail U.S. stress test scenarios, please refer to appendix A.

**Stress Test in the European Union**

The European Banking Authority (EBA) is the agency that governs the stress test methodology and macroeconomic scenarios. The EU - wide stress test is design in such a way that a common analytical framework can be utilized to consistently compare and assess the resilience of EU banks to economic shocks so that it can provides supervisors, banks and other market participants with an unbiased assessment. For Eurozone, the stress test exercise is carried out on a sample of banks covering 70% of the national banking sector. As for non-Eurozone EU Member State and Norway, banks that has total consolidated assets over $30 billion EUR as of the end of 2014 need to conduct the stress test exercise. Since the EU - wide stress test is run at the highest level of consolidation, lower representativeness is accepted for countries with a
wide presence of subsidiaries of non-domestic EU banks.

The stress test exercise assesses the resilience of EU banks under a common macroeconomic baseline and adverse scenario. The scenarios cover the period of 2016 to 2018. The application of the market risk methodology is based on a common set of stressed market parameters which is calibrated from the macroeconomic scenario as well as from historical experience, and on haircuts for sovereign exposures. The credit risk methodology includes a prescribed increase in risk exposure amount for securitization exposures and prescribed shocks to credit risk losses for sovereign exposures.

The process for running the EU-wide stress test start with the European Commission supplies the macroeconomic baseline scenario while the European Systemic Risk Board (ESRB) and European Central Bank (ECB), in close cooperation and collaboration with competent authorities, the EBA and the European commission, develops the macroeconomic adverse scenario and any risk type specific shocks linked to the scenario. In addition, the EBA coordinates the exercise, defines the common methodology as well as the minimum quality assurance guidance for competent authorities, and hosts a central question and answer facility. The EBA also acts as a data hub for the final dissemination of the common exercise and provides common descriptive statistics to competent authorities for the purpose of consistency checks based on banks’ submissions. Competent authorities are responsible for communicating and providing instructions to banks on how to complete the exercise and for receiving information directly from banks. In addition, they are also responsible for the quality assurance process such as validating banks’ data and stress test results based on bottom-up calculations and reviewing the models applied by banks. Under their responsibilities, competent authorities may also run the EU-wide stress test on samples beyond the one used for the EU-wide stress test and may also carry out additional national stress tests. They are also responsible for the supervisory reaction function and for the incorporation of the findings from the EU-Wide exercise into the Supervisory Review and Evaluation Processes (SREP).

For detail baseline and adverse macroeconomic scenarios, please refer to appendix B.

Since the result of the stress test will be reviewed under SREP, no single capital thresholds is set or defined. Decision on appropriate capital resource will be made and the final result of the exercise is expected to be publish in early Q3 2016.

Stress Test in the United Kingdom

In March 2013, UK Financial Policy Committee (FPC) has recommended to put regular stress testing in place to assess the UK banking system and individual institutions’ capital adequacy. The exercise aim to support both the FPC and Prudential Regulation Authority (PRA) in meeting their statutory objectives. On December 16, 2014, the first concurrent stress test results were published and explored many vulnerabilities stemming from the UK household sector. Similar stress test was done in 2015 but the scenario was designed specifically to assess the resilience of UK banks and building societies in a stressed global environment. In 2015, the framework was further developed to conduct Annual Cyclical Scenario (ACS) test. The ACS will be implemented for the first time in 2016 together with other aspects of the updated framework as well as the hurdle rate.

The 2016 stress test and methodology is designed and calibrated by Bank staff under the guidance of the FPC and PRA Board and cover seven major UK banks and building societies: Barclays plc, HSBC Holdings plc, Lloyds Banking Group plc, Nationwide Building Society, The Royal Bank of Scotland Group plc, Santander UK plc and Standard Chartered plc.

The 2016 concurrent stress test contains three types of stresses scenarios:

- A macroeconomic stress scenario, spanning a five-year period to the end of 2020.
- A traded risk stress scenario, which is consistent with the content and calibration of the macroeconomic stress scenario.
- A misconduct costs stress, which is in addition to the macroeconomic and traded risk stress scenarios.

On top of it, FPC and PRA will also exam the banks’ projected profitability and capital ratios under a baseline macroeconomic scenario together with the results of stress tests that banks conduct as part of the Internal Capital Adequacy Assessment Process (ICAAP) to co-ordinate their policy responses to ensure that the banking system has enough capital to absorb losses in a stress.
In October 2015, the seven major UK banks and building societies published “The Bank of England’s approach to stress testing the UK banking system”, also known as the Approach Document, to set out the UK stress-testing framework to 2018. Between 2016 and 2018, the banks will:

- Apply an approach to stress testing that is explicitly countercyclical, with the severity of the test, and associated regulatory capital buffers, varying systematically with the state of the financial cycle.

- Improve the consistency between the concurrent stress test and the overall capital framework, by ensuring that systemically important banks are held to higher standards.

- Enhance its own modelling capability, while ensuring that participating banks continue to play an important role in producing their own projections of the impact of the stress.

In 2017, the banks also intends to complement the ACS by running additional “exploratory scenario” to probe the resilience of the system to risks that may not be neatly linked to the financial cycle.

A bank will be required to take action to strengthen its capital position over an appropriate time frame if its capital is deemed inadequate from the result of the concurrent stress test. This is determined by two factors: 1) whether the bank is designated as Global systemically important banks (G-SIBs) and 2) whether the banks’ capital level is above the System Reference Point (SRP).

The SRP is made up of two components: a hurdle rate and a G-SIB buffer. Hurdle rate is defined as the minimum capital level a bank is expected to maintain in the stress scenario while G-SIB buffer is only applicable to those banks that are designed as G-SIBs in UK which are Barclays, HSBC, RBS and Standard Chartered. The G-SIB buffer is set at 35% of their corresponding risk-weighted capital buffer and will phase in starting 2016 and will proceed in equal increments with the buffers coming into full effect in 2019. The table below illustrates a hypothetical bank’s hurdle rate and system reference point which evolve during the 2016 stress-test scenario.

The results of the stress test will be published in Q4, 2016 and used by FPC as input to the system-wide policy interventions and by PRA as input to the bank-specific supervisory actions for global policy setting.

**Stress Test in Australia**

The Australian Prudential Regulation Authority (APRA) is taking a different approach from U.S. and EU. APRA doesn’t try to predict the probability of a period of stress. They simply start with the premise that there are financial and business cycles and these business cycle may cause financial institutions to experience adversity and be placed under severe stress from time to time. APRA’s approach differs somewhat from international practice with the focus being put on the industry first and foremost to improve their capabilities.

APRA established principles for stress testing best practice around five key areas:

- the use of stress testing to drive decision-making within the institution, as an integral part of risk management and the setting of capital buffers;
- strong governance, with results routinely reported to board risk committees and senior management, and challenged by them;
- the development of “severe but plausible” scenarios;
- the importance of robust data and IT systems to support the stress testing process; and
- credible modelling, combining quantitative approaches and expert judgement to effectively translate economic scenarios into financial impacts.

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1 Stress testing the UK banking system: key elements of the 2016 stress test -

Against these principles, APRA supervisors have been reviewing banks’ current practice and identifying areas for further development. The last stress test that APRA conducted was in 2014 with focus on housing risk. The 2014 stress test involved 13 large locally-incorporated banks which covered 90 per cent of total industry assets. Participating banks were provided with two stress scenarios developed by the Reserve Bank of Australia (RBA) and in collaboration with Reserve Bank of New Zealand (RBNZ).

Central to both scenarios was a severe downturn in the housing market. Scenario A was a housing market double-dip, prompted by a sharp slowdown in China. In this scenario, Australian GDP growth declines to -4 per cent and then struggles to return to positive territory for a couple of years, unemployment increases to over 13 per cent and house prices fall by almost 40 per cent. Scenario B was a higher interest rate scenario. In the face of strong growth and emerging inflation, the RBA lifts the cash rate significantly. However, global growth subsequently weakens and a sharp drop in commodity prices leads to increased uncertainty and volatility in financial markets. In Australia, higher unemployment and higher borrowing costs drive a significant fall in house prices.

APRA has no stress test scheduled for 2015 and 2016.

**Stress Test in Japan**

The Bank of Japan (BOJ) conducts Macro Stress Testing to assess the stability of Japan’s financial system by capturing salient risks that would materialize in financial institutions and by simulating profitability and capital of financial institutions under selected stress scenarios. These stress tests have large emphasis on macro-prudential perspective and the result is published semi-annually in the Financial System Report.

BOJ’s macro stress testing employs the Financial Macro-econometric Model (FMM) which has two significant features. First, the model incorporates the financial sector and the macroeconomic sector, and takes account of the feedback loop between the sectors. Second, the model analyses both the aggregated variables of the financial sector and variables of individual financial institutions such as capital adequacy ratios and profit. These two features of the model enable an analysis of the feedback loop such that substantial stress on the macro economy lowers the profits and capital adequacy ratios of individual financial institutions, which in turn adversely affects the macro economy through a decrease in loans and a rise in loan interest rates.

There are three scenarios that BOJ derived to assess the stability of the financial system through macro stress testing: the baseline scenario, the tail event scenario and the tailored event scenario.

For the detail version, please refer to the appendix D.

**Stress Test in Hong Kong**

The Hong Kong Monetary Authority (HKMA) issued a Supervisory Policy Manual (SPM) – IC5 in February 2003 to guide all authorized institutions (AIs) on the use of the risk management vehicle and to describe HKMA’s approach to evaluating the appropriateness and effectiveness of stress tests conducted by AIs. Although this guideline is non-statutory, AIs were expected to have in place a stress-testing program that was appropriate to the nature and complexity of their business activities. AIs have been given till the end of February 2004 to comply with the relevant requirements of the SPM.

The HKMA’s focus was on whether AIs have adopted a stress-testing program that was appropriate to the nature and complexity of their business activities. However, HKMA neither require AIs to follow the stress scenarios strictly as those scenarios are for illustrative purpose nor require AIs to seek HKMA’s endorsement for their stress-testing programs. Instead, HKMA would just review and evaluate the appropriateness and effectiveness of the tests conducted, based on the principles set out in the SPM.

HKMA reviews the stress testing results with AIs once a year or on a needs basis including when action is needed from AIs regarding the result generated. HKMA will discuss these matters with the AI’s senior management during prudential meetings and request the AI to submit additional stress tests on those positions where the risk is considered to be significant.

Due to the global financial crisis in 2012-2013, it has demonstrated the need for comprehensive and robust stress-testing programs as an integral part of banks’ risk management frameworks and decision-making processes. As a result, HKMA issued a revised SPM IC-5 to incorporate “the Principles for sound stress testing practices and supervision” in
May 2009, the HKMA’s relevant supervisory practices and experience as well as recommendations and observations made by international organizations and industry groups to address weaknesses in banks’ stress-testing practices in the wake of the global financial crisis. As part of its ongoing supervision, the HKMA will monitor the progress of AIs in enhancing their stress-testing capabilities and evaluate the appropriateness and effectiveness of the tests conducted through its off-site reviews or on-site examinations.

**Stress Test in Taiwan**

Taiwan’s banking authorities, Financial Supervisory Commission (FSC), the Central Bank of the Republic of China (CBC), the Bankers Association of the Republic of China (Taiwan) and the Joint Credit Information Center are responsible for supervising the stress tests on local financial institutions since 2010.

The FSC required domestic banks to implement stress tests on bank-specific market risk and credit risk according to the requirement of pillar 2 of Basel II to increase their resilience against financial crisis. In 2010, the CBC established a macro stress testing model of market risks to gauge the effects of different market shocks on individual banks’ CARs and Tier-one capital ratios using their market exposure positions during 2007 to 2009, and in turn to assess domestic banks’ risk-bearing capabilities in abnormal market conditions. Then a macroeconomic model was built to verify whether the parameters of the stressed scenarios could be mapped onto the macroeconomic environment by means of a Vector Auto-regression (VAR) analysis. These stress tests were performed to estimate one-year-ahead potential losses and the test results are required to be submitted to the FSC for review.

In 2011, CBC further developed a framework to stress test the credit risk of the banking sector in Taiwan in a top-down fashion. A macroeconomic model was used to analyse the statistical correlation between the default rates of banks’ portfolios and relevant macroeconomic variables such as Taiwan’s real GDP, global real GDP, global exports, interest rates, property prices and unemployment rates. In addition, a satellite model was applied to link a measurement of the credit risks to the variables that proxy macroeconomic conditions and to map the external macroeconomic shocks onto banks’ balance sheets. Accordingly, one-year-ahead potential credit losses for domestic banks’ loan portfolios could be estimated to scrutinize the effect of shocks on banks’ overall profitability and capital adequacy under different macroeconomic stressed scenarios.

There is no major change on stress test framework after 2012.

**Stress Test in Singapore**

Singapore participated in the IMF World Bank Financial Sector Assessment Program (FSAP) in 2002 - 2004. As part of the FSAP, the MAS coordinated an annual industry level stress test (IWST) involving systemically important banks and insurance companies using a common macroeconomic stress scenario. This test usually takes place during the first quarter of every year.

For 2015, the stress test assumed a significant weakening of the external economic environment with the US Federal Reserve raising interest rates more aggressively than expected by markets and a prolonged slowdown in China as structural reforms stall. In addition, USD funding squeeze ensued and core euro zone and Japan slip into recession. On the back of these hypothetical events, growth was expected to be slow and unemployment to increase across the rest of Asia. Financial conditions were assumed to be tighten significantly through sharp increases in interest rates and credit spreads and regional currencies depreciating against the USD. These in turn could trigger large corrections in property markets in Singapore and the region.

At the time of writing this article, MAS has not published the stress test scenario for 2016 yet.

**Stress Test in China**

Unlike the stress tests that the U.S. and European central banks conducted in the aftermath of the financial crisis, which were intended to restore investor confidence in western banks, China Banking Regulatory Commission (CBRC) are not transparent on their stress test framework or regulation and therefore is unlikely to publish any result of their tests. However, CBRC has implemented the CARPLES risk indicators framework in early 2012 and said it will conduct regional and national stress tests after the domestic banks saw a spike in bad loans in 2013. The CARPLES framework was incorporated into the internal assessment mechanism of banks and the assessment was conducted both on a solo and
consolidated basis together with the application of systemic supervisory benchmark.

Conclusion

All major regulators conduct stress testing on their systemically important banks but not all of them conduct stress testing to the same extent. US, UK, EU and Japan have the most stringent and transparent stress testing framework while Singapore, Australia, Taiwan, and Hong Kong are conducting customized stress testing that fit their unique situation and portfolio. One country that is falling behind of stress-testing its systemically important banks is China. China has neither published its stress testing result nor being transparent with their stress testing scenarios that they used. However, as the world finance market is more connected to China and given the financial crisis in China observed in the first month of 2016, it is imperative for China to enhance their stress-testing framework and be transparent to it.
Appendix A: Detailed US Stress Test Scenarios

2016 Baseline Scenario

The baseline scenario for the United States is a moderate economic expansion through the projection period. Real GDP grows at an average rate of 2.5 percent per year. The unemployment rate declines to 4.5 percent in the middle of 2017 and remains near that level through the end of the scenario period. CPI inflation rises to 2.5 percent at an annual rate by the middle of 2017 before dropping back to about 2 percent in the first quarter of 2018 and remaining near that level thereafter.

Accompanying the moderate economic expansion, Treasury yields are assumed to rise steadily across the maturity spectrum. Short-term Treasury rates increase from about 0.5 percent at the beginning of 2016 to about 2.75 percent by the beginning of 2019, while the yields on 10-year Treasury securities rise from 2.5 percent to about 3.75 percent over the same period. The prime rate increases in line with short-term Treasury rates and mortgage rates rise in line with long-term Treasury rates. Reflecting strengthening economic conditions, spreads between yields on investment-grade corporate bonds and yields on long-term Treasury securities narrow modestly over the scenario period. Equity prices rise an average of about 4.75 percent per year and equity market volatility is assumed to remain near its historical average level. Nominal house prices rise an average of 2.75 percent per year and commercial real estate prices rise an average of 4.25 percent per year. The outlook for international variables is similar to that reported in the January 2016 Blue Chip Economic Indicators and the International Monetary Fund’s October 2015 World Economic Outlook. The baseline scenario features an expansion in international economic activity, albeit one that proceeds at different rates in the four countries or country blocks included in the scenario. Real GDP growth in developing Asia averages 6 percent per year over the scenario period; real GDP growth in the United Kingdom averages 2.75 percent per year; and real GDP growth in the euro area and Japan averages 1.75 percent per year and 1 percent per year, respectively.

2016 Adverse Scenario

The adverse scenario is characterized by weakening economic activity across all countries or country blocks included in the scenario. The economic downturn is accompanied by a period of deflation in the United States and in the other countries and country blocks. The adverse scenario features a moderate U.S. recession that begins in the first quarter of 2016. Real GDP in the United States falls 1.75 percent from the pre-recession peak in the fourth quarter of 2015 to the recession trough in the first quarter of 2017, while the unemployment rate rises steadily, peaking at 7.5 percent in the middle of 2017. The U.S. recession is accompanied by a mild deflationary period, with consumer prices falling about 0.25 percent over the four quarters of 2016. Reflecting weak economic conditions and deflationary pressures, short-term interest rates in the United States remain near zero over the projection period. The 10-year Treasury yield declines to 1.25 percent in early 2016 before rising gradually thereafter to 3 percent in the first quarter of 2019. Financial conditions tighten for corporations and households during the recession, with spreads between investment-grade corporate bond yields and 10-year Treasury yields and spreads between mortgage rates and 10-year Treasury yields widening through the end of 2016. Asset prices decline in the adverse scenario. Equity prices fall approximately 25 percent through the fourth quarter of 2016, accompanied by a moderate rise in equity market volatility. Aggregate house prices and commercial real estate prices experience moderate declines; commercial real estate prices fall 12 percent through the third quarter of 2017 and house prices fall 12 percent through the third quarter of 2018. Following the end of the recession in the United States, real activity picks up slowly at first and then gains speed; real U.S. GDP growth rises from 1.25 percent at an annual rate in the second quarter of 2017 to 3 percent at an annual rate by the middle of 2018. The unemployment rate declines modestly, to about 7 percent by the end of the scenario period. Consumer price begins to rise.

2 The 2016 US stress scenario is excerpted from 2016 Supervisory Scenario for Stress Tests Required under Dodd-Frank Act Stress Testing and the Capital Plan Rule. For the complete detail scenario, please refer to the link in the References section.

3 The four countries or country blocks included: the euro area (the 19 European Union member states that have adopted the euro as their common currency), the United Kingdom, developing Asia (the nominal GDP-weighted aggregate of China, India, South Korea, Hong Kong Special Administrative Region, and Taiwan), and Japan.
slowly in the first quarter of 2017 and inflation remains subdued through the end of the scenario window. Consumer price inflation reaches 1.75 percent at an annual rate in the first quarter of 2019. Outside of the United States, the adverse scenario features moderate recessions in the euro area, the United Kingdom, and Japan, as well as below-trend growth in developing Asia. Weakness in global demand results in deflation across all of the foreign economies under consideration as well as a broad-based decline in commodity prices. Headline consumer prices decline modestly through the end of 2016 in the euro area and the United Kingdom, and decline through the middle of 2017 in developing Asia. Japan experiences a sharper and more prolonged deflationary period, with prices falling through the second quarter of 2018. The U.S. dollar appreciates relative to the currencies of the countries and country blocks under consideration, reflecting flight-to-safety capital flows; the dollar appreciates most strongly against the euro and the currencies of developing Asia.

2016 Severely Adverse Scenario

The severely adverse scenario is characterized by a severe global recession, accompanied by a period of heightened corporate financial stress and negative yields for short-term U.S. Treasury securities. In this scenario, the level of U.S. real GDP begins to decline in the first quarter of 2016 and reaches a trough in the first quarter of 2017 that is 6.25 percent below the pre-recession peak. The unemployment rate increases by 5 percentage points, to 10 percent, by the middle of 2017 and headline consumer price inflation rises from about 0.25 percent at an annual rate in the first quarter of 2016 to about 1.25 percent at an annual rate by the end of the recession. Asset prices drop sharply in the scenario, consistent with the developments described above. Equity prices fall approximately 50 percent through the end of 2016, accompanied by a surge in equity market volatility, which approaches the levels attained in 2008. House prices and commercial real estate prices also experience considerable declines, with house prices dropping 25 percent through the third quarter of 2018 and commercial real estate prices falling 30 percent through the second quarter of 2018. Corporate financial conditions are stressed severely, reflecting mounting credit losses, heightened investor risk aversion, and strained market liquidity conditions; the spread between yields on investment-grade corporate bonds and yields on long-term Treasury securities increases to 5.75 percent by the end of 2016. As a result of the severe decline in real activity and subdued inflation, short-term Treasury rates fall to negative 0.5 percent by mid-2016 and remain at that level through the end of the scenario. For the purposes of this scenario, it is assumed that the adjustment to negative short-term interest rates proceeds with no additional financial market disruptions. The 10-year Treasury yield drops to about 0.25 percent in the first quarter of 2016, rising gradually thereafter to reach about 0.75 percent by the end of the recession in early 2017 and about 1.75 percent by the first quarter of 2019. The international component of this scenario features severe recessions in the euro area, the United Kingdom, and Japan, and a mild recession in developing Asia. As a result of acute economic weakness, all foreign economies included in the scenario experience a pronounced decline in consumer prices. Reflecting flight-to-safety capital flows during weak economic conditions, the U.S. dollar is assumed to appreciate against the euro, the pound sterling, and the currencies of developing Asia. The dollar is assumed to depreciate modestly against the yen, also in line with flight-to-safety capital flows.

Appendix B: Detailed EU Stress Test Scenarios

Baseline Scenario

Projections for the 2016 stress tests baseline scenario

The Directorate General for Economic and Financial Affairs (DG ECFIN) of the European Commission produces under its own responsibility, three fully-fledged European Economic Forecasts per year—in winter, spring and autumn. These forecasts cover the principal macropolicies for the EU Member States, the candidate countries and the European Union as a whole, as well as the euro area and the international environment.

The autumn 2015 forecast, which was published on 5 November 2015, provides the stress test baseline scenario for 2015-2017 for most variables. The baseline scenario is extended to 2018 through a model-based approach or technical assumptions. The scenario for 2018 is not a part of the published macro-financial scenario. For the complete detail of scenarios, please refer to the link in the reference below.

4 The 2016 EU stress scenario is excerpted from 2016 EU-wide stress test-Explanatory note on baseline and 2016 EU-wide stress test-Adverse
European Economic Forecast and has only been derived for the purpose of this exercise. It should therefore not be referred to as a Commission staff forecast. Projections for house prices for the period 2015 to 2018 have also been obtained through a model-based approach and are not part of any published forecast.

**Autumn 2015 forecast highlights**

The economic recovery in the euro area and the European Union as a whole is now in its third year. Against a backdrop of declining oil prices, accommodative monetary policy and a relatively weak external value of the euro, the economic recovery this year has been resilient and widespread across Member States. It has, however, remained slow. The impact of the positive factors is fading, while new challenges are appearing, such as the slowdown in emerging market economies and global trade, and persisting geopolitical tensions. Backed by other factors, such as better employment performance supporting real disposable income, easier credit conditions, progress in financial deleveraging and higher investment, the pace of growth is expected to resist the challenges in 2016 and 2017. Overall, euro area real GDP is forecast to grow by 1.6% in 2015, rising to 1.8% in 2016 and 1.9% in 2017. For the EU as a whole, real GDP is expected to rise from 1.9% this year to 2.0% in 2016 and 2.1% in 2017.

The labor market continues to strengthen at a slow and uneven pace across Member States. In the euro area, employment is expected to grow by 0.9% this year and next, and to pick up to 1% in 2017. In the EU, employment is set to increase by 1.0% this year and 0.9% in 2016 and 2017. Overall, unemployment is expected to continue to decline only gradually, with substantial disparities between Member States.

The steep fall in oil and other commodity prices has driven headline inflation to very low levels. However, this masks the fact that wage growth, strengthening private consumption and the narrowing of the output gap are beginning to add increasing pressure to prices. Annual inflation is expected to rise from 0.1% in the euro area and 0.0% in the EU this year, to 1.0% and 1.1% respectively next year, and to 1.6% in both areas in 2017.

**Concepts, sources and assumptions**

The cut-off date for taking new information into account for the autumn 2015 forecast was 22 October. The forecast incorporates validated annual public finance data as published in Eurostat’s News Release 186/2015 of 21 October 2015.

This forecast is based on a set of external assumptions, reflecting market expectations at the time of the forecast. To shield the assumptions from possible volatility during any given trading day, averages from a 10-day reference period were used for exchange and interest rates, and for oil prices.

The technical assumption as regards exchange rates was standardized using fixed nominal exchange rates for all currencies. Interest-rate assumptions are market-based. Short-term interest rates for the euro area are derived from futures contracts. Long-term interest rates for the euro area, as well as short-and long-term interest rates for other Member States are calculated using implicit forward swap rates, corrected for the current spread between the interest rate and swap rate. In cases where no market instrument is available, the fixed spread vis-à-vis the euro-area interest rate is taken for both short-and long-term rates.

For 2016, budgets adopted or presented to national parliaments and all other measures known in sufficient detail are taken into consideration. In particular, all the information included in the Draft Budgetary Plans submitted by 15 October is reflected in this forecast. For 2017, the ‘no-policy change’ assumption used in the forecasts implies the extrapolation of revenue and expenditure trends and the inclusion of measures that are known in sufficient detail.

**Updates after the autumn forecast**

Updates of quarterly GDP data (estimates for the third quarter of 2015 and revisions for earlier quarters) published by national statistical offices /Eurostat between 22 October and 30 November 2015 were taken into account. Where necessary annual forecasts for 2015 and 2016 were updated mechanically by replacing quarterly forecasts with the published realizations and recalculating the resulting annual growth rates. The assumptions for interest rates were re-calculated on 23 November (at the same time as the assumptions for stock market indices which are not part of the forecast).

**The methodology for projecting house prices for 2015-2018**

Similar to the EU-wide stress test exercise of 2014, the house prices projection over the scenario horizon was constructed using an error-correction model estimated on an EU Member States panel. The model was initially developed by the ZEW...
institute for the Commission, and was later adapted and re-estimated internally. The panel covers most EU Member States, except those where data or estimation issues were signaled (Croatia, Cyprus, Estonia, Germany, Latvia, Malta and Portugal), in which case slightly modified versions of the model were used. The full sample period is 1973-2014, but the starting year for each country depends on availability of data. The model uses five fundamental variables: the inflation-adjusted house price index, total population, the real residential investment, the real disposable income per capita, and the real long-term interest deflator.

The house price scenario corresponds to the path consistent with the 2015 autumn forecast for the fundamental variables. It was calculated as the response of house prices conditional on i) changes in the fundamental variables, ii) the recent house price changes (capturing the persistence in house price dynamics), and iii) the gap with respect to the equilibrium level (capturing the reversion to the equilibrium). Finally, the nominal house price growth rate was obtained using the 2015 autumn forecast for the consumption deflator.

A common panel estimate of the model parameters was used, in order to ensure higher consistency across Member States and to mitigate the risk of estimation error due to short data series. Country specificities were taken into account via adjustments to two model parameters. First, the parameter guiding the speed of reversion to the equilibrium was reduced for countries where a more gradual return to the equilibrium price is expected (e.g., Spain or Ireland). Second, the parameter guiding the inertia in house price changes was reduced for countries where house price movements have been strong (e.g., Ireland). Lastly, the 2015 growth carryover has been taken into account by taking a weighted average with the 2015 forecast.

The model-based approach used for estimating 2018 GDP growth, unemployment rates and HICP inflation

In contrast to the judgmental, desk officer based, forecasts used for 2016/2017, Commission staff has relied on a non-judgmental, model based, approach for carrying out the projections for 2018. This approach is justified given that there is substantial evidence that the errors associated with judgmental forecasts tend to grow the longer the projected time horizon. In essence the approach adopted by Commission services incorporates both the supply and demand side influences on expected 2018 developments. With respect to the supply side, the technology, employment and capital formation determinants of potential output are all taken into account, with trends in all of these three areas derived from applying well-established trend extraction methods. Demand side determinants, on the other hand, are driven by the closure of the output gap, with the forecast for the 2018 output gap based on an estimated AR model. Explicitly incorporating both potential output and cyclical (i.e. output gap) elements into the overall forecasting methodology for 2018 provides not only a credible forecasting framework but also ensures a level of internal consistency between the forecasts for the five target variables.

For Greece and Cyprus the extended forecasts that were developed in the programme context are used.

Adverse Micro-Financial Scenario

The European Banking Authority (EBA) 2016 EU-wide stress testing exercise will require banks to use the presented outcome of the adverse macro-financial scenario for variables such as GDP, inflation, unemployment, asset prices and interest rates in order to estimate the potential adverse impact on profit generation and capital. The adverse scenario covers three years, starting from the first quarter of 2016, when the shocks are assumed to materialise, and ending in 2018.

1. Main risks to stability of the EU financial sector

The narrative of the adverse scenario reflects the four systemic risks identified by the ESRB General Board as representing the most material threats to the stability of the EU financial sector:

1. an abrupt reversal of compressed global risk premia, amplified by low secondary market liquidity;

2. weak profitability prospects for banks and insurers in a low nominal growth environment, amid incomplete balance sheet adjustments;

3. rising of debt sustainability concerns in the public and non-financial private sectors, amid low nominal growth;

4. prospective stress in a rapidly growing shadow banking sector, amplified by spillover and liquidity risk.

In the adverse scenario, the first systemic risk, assessed to be the most significant of the four,
materialises through a change in investor preferences in the developed financial markets and, most notably, in the United States, with an increasing aversion to holding long-term fixed income securities. This induces a portfolio reallocation towards short-term instruments, causing a rise in US long-term risk-free interest rates and risk premia across all financial asset classes. The increases are amplified by limited secondary market liquidity. A protracted period of global financial market uncertainty would follow, leading to a confidence-driven contraction of domestic demand in emerging markets, in line with country-specific vulnerabilities.

The first systemic risk acts as a trigger for the vulnerabilities related to the remaining three sources of risk. In the EU this would lead, in particular, to a weakening of domestic demand, a decline in property prices and a renewed widening of sovereign credit spreads, as well as to a sell-off by the shadow banking sector that would amplify the shocks to financial asset prices in the EU.

2. Macro-financial shocks driving the outcome of the adverse scenario

Concerning the calibration of the specific shocks, the yields on long-term Treasury securities United States are assumed to rise sharply, deviating by 250 basis points (bps) from the baseline by end-2016. The increased investor risk aversion would affect the prices of European fixed income instruments, and yields on ten-year German sovereign debt would increase by about 80 basis points over the same horizon. The impact on sovereign bond yields would be lasting, so that German ten-year bond yields would remain some 53 basis points above the baseline levels in 2018.

In addition, sovereign credit spreads in the euro area would widen, reflecting broadly the market assessment of individual sovereigns' vulnerabilities. Overall, long-term interest rates in the EU would be higher by 71 basis points in 2016, 80 basis points in 2017 and 68 basis points in 2018. Against the backdrop of global financial tensions, bilateral nominal exchange rates of the central and eastern European (CEE) countries against the euro would depreciate sharply, by between 8% and 24% in the course of 2016, corresponding to the historical exchange rate volatilities. Subsequently, these exchange rates would remain stable at the weaker levels for the remainder of the exercise horizon. The increase in bond yields in the CEE countries would be stronger than that observed in the euro area and western European non-euro area countries. At the same time, the Swiss franc would appreciate by 23% against the euro (see Table 3). These exchange rate movements would take place despite the implied strong fundamental misalignment of the respective currencies that would not begin to correct before end-2018.

More generally, the global increase in risk premia has effects well beyond fixed income markets. Global equity prices would decline by 36% by the end of 2016. As a result, and amplified by a sell-off by shadow banking entities, EU stock prices would fall, on an annual basis, by 25% in comparison with the baseline scenario in 2016, followed by a mild recovery that would reduce the average deviation from the baseline scenario to about 16% in 2018 (see Table 4). Commodity prices would also be affected, responding to financial shocks and the expected weakening of global economic growth, with oil prices falling by about 48% in 2016 compared with the baseline projection of about 54 US dollars per barrel, standing at about 44% below baseline levels in 2017 and 2018. Money market rates (three-month interbank offered rates) in all EU countries would rise by about 33 basis points compared with the baseline scenario in 2016, reflecting a higher credit premium. This additional credit premium would decline to 23 basis points in 2017 and 6 basis points in 2018. As monetary policy is assumed to follow the expectations implied by the baseline scenario also under the adverse scenario, this increase should not be interpreted as being driven by monetary policy decisions.

Tighter financing conditions caused by a reduction in the availability of funding from shadow banking entities would contribute directly to a contraction in economic activity. It is assumed that banks would respond by tightening lending standards on loans to the private non-financial sector. This funding shock is represented by country-specific shocks to the cost of corporate credit and loans to households, via an increase in the user cost of capital and a reduction in the financial wealth of households respectively. The corresponding impact on 2018 GDP is estimated to be limited to about 0.12%

Finally, swap rates would respond to the increase in money market rates and long-term government bond yields. Depending on the maturity, euro swap rates would increase by between 44 and 58 basis points in 2016 compared with the baseline, and remain elevated until 2018. Detailed paths for swap rates for the US dollar and most EU currencies are presented in the annex.

The increased global uncertainty would reduce global economic growth, notably through
confidence and financial spillovers to emerging market economies (EMEs), spanning all major emerging market regions (Asia, Latin America, emerging Europe). The spillovers give rise to a sudden reassessment of growth expectations in these countries. In turn, sizeable capital outflows from EMEs lead to a reduction in emerging market asset prices, causing domestic demand in these economies to suffer from both tighter financing conditions and business and consumer confidence shocks. This would have an impact on the EU economies through trade channels, as foreign demand for EU exports would be materially reduced.

The estimated impact of the above-mentioned financial and real shocks on economic activity in the countries outside the EU would be sizeable, in particular for EMEs that are also commodity exporters (see Table 5). Cumulative GDP growth in the developed economies would be between 2.5% and 5% lower than under the baseline scenario in 2016-17. By 2018, as the impact of the shocks would begin to wear off, GDP growth rates would approach those projected under the baseline scenario. Among the main emerging economies, the impact would be particularly strong for Brazil, Russia and Turkey, while for China and India total GDP would stand about 4.5% below the baseline projections in 2018. Overall, the demand for EU exports would stand nearly 8% below the baseline projection in 2017 and 6.5% below the baseline in 2018.

The global shocks are also assumed to negatively affect confidence, resulting in country-specific reductions in private consumption and investment in all EU countries. Lower consumer confidence, together with increased risk premia, would additionally cause a slowdown in property market activity, both in the residential and commercial property segments. The exogenous shocks to house prices reflect the country-specific misalignment of house prices with regard to estimated fundamental levels and historical volatility of house prices. These shocks, which overall drive the house prices down by about 6%, are supplemented with a common shock of about 7.5% affecting all EU countries and some country-specific exogenous add-ons calibrated according to the assessment of national competent authorities. Commercial property prices are also affected by a common shock, calibrated in a uniform way for all EU countries at about 7%.

3. Results for the euro area and European Union

As a combined result of the foreign demand shocks, financial shocks and domestic demand shocks in the EU, the scenario implies a deviation of EU GDP from its baseline level by 3.1% in 2016, 6.3% in 2017 and 7.1% in 2018. The implied EU real GDP growth rates under the adverse scenario over the three years of the exercise amounts to -1.2%, -1.3% and +0.7% respectively.

The major part of the impact on GDP is driven by the domestic demand factors, namely the exogenously set reductions in consumption and investment, which collectively reduce EU real GDP by about 3.6% compared with the baseline by 2018 (see Chart 1). Assumed shocks to foreign demand contribute a further 2.7% to the total 2018 deviation of EU GDP from the baseline. The combined impact of interest rate, house price and stock price shocks is somewhat weaker. The positive contribution of lower commodity prices and weaker exchange rates to EU GDP moderates the negative deviation from the baseline by about 0.8%. In combination with substantially lower headline inflation, the impact on nominal GDP would be particularly pronounced.

In a historical perspective, the adverse scenario, leading to a total reduction in EU GDP by 1.7% in 2018 from the 2015 level, is slightly less severe than the 2008-10 period when the EU economy contracted by about 2.0% over three years. The recession considered under the adverse scenario is longer but shallower than the 2008-10 events.

The Harmonised Index of Consumer Prices (HICP) inflation rate in the EU under the adverse scenario is well below the baseline scenario, by -2.0 p.p. in 2016, -1.9 p.p. in 2017 and -2.1 p.p. in 2018 (see Table 7). Following a sharp reduction in energy and food commodity prices in early 2016, under the adverse scenario HICP inflation would reach -0.9% in 2016. Prices would fall slightly in 2017 and 2018, with annual inflation rates of -0.2% and -0.2% respectively.

The projected inflation is initially driven by much lower commodity prices, which explain a large majority of the deviation of HICP inflation rate from the baseline scenario in 2016. Over time, the deviation is increasingly explained by the impact on prices of weaker aggregate demand, both domestic and foreign.

The adverse scenario implies a substantial increase in the EU unemployment rate, instead of a slight reduction expected under the baseline scenario.
The EU unemployment rate would reach 11.6% in 2018, some 2.8 percentage points higher than the baseline (see Table 8).

Residential property prices in the EU would fall, reflecting the assumed exogenous shocks as well as their reaction to the general deterioration in the economic outlook. Overall, EU residential property prices would stand about 21.3% below the baseline levels by 2018 (see Table 9), having contracted by about 10.7% from the 2015 levels. Commercial property prices, similar to residential property prices, would deviate downwards from the levels consistent with the baseline economic projections. By 2018, prime commercial property prices would contract by about 15% from their 2015 levels, and stand about 23% below the baseline projections.

In comparison with the adverse scenario of the 2014 EU-wide stress testing exercise, this scenario would result at the end of the horizon in a similarly-sized deviation from baseline of EU GDP level (-7.1% compared with -7.0% in the 2014 exercise) and a much stronger deviation of the price level (-5.8% and -2.8% respectively) from the baseline.

The impact on GDP is driven primarily by more severe domestic demand shocks, as foreign demand shocks are less severe than in the 2014 scenario and lower commodity prices stimulate growth in the EU economy. Owing to a more favourable baseline projection than in the 2014 exercise, GDP over the three-year horizon falls by -1.7% in the adverse scenario, which is slightly higher than the -2.1% assumed in the 2014 exercise. Consumer prices fall by 1.3% over the horizon in the adverse scenario, while they were assumed to increase by 1.7% in the 2014 exercise.

The impact of both scenarios on the EU unemployment rate and residential property prices is similar. The change in residential property prices over the horizon, however, is somewhat less adverse in this scenario (-10.7%) than in the 2014 exercise (-15.4%), again owing to a substantially more favourable baseline. As the impact of this scenario on commercial property prices is stronger than that assumed in the 2014 exercise, the change over the horizon is also more adverse (-15.0%, compared to -8.3% in 2014).

Appendix C: Detailed UK Stress Test Scenarios

The 2016 UK stress scenario is excerpted from Stress testing the UK banking system: key elements of the 2016 stress test. For the complete detail scenario, please refer to the link in the reference below.

Macroeconomic Stress Scenario

The 2016 stress scenario spans a five-year period. It begins in 2016 Q1 and extends through to 2020 Q4.

Global output contracts by close to 2% over the first year of the stress scenario as economies around the world experience severe and synchronized slowdowns. The magnitude of this contraction is broadly similar to that experienced during the 2008 financial crisis, although the mix of shocks is different, with the Chinese economy, for example, experiencing a larger downturn under the 2016 stress scenario than it did in 2008. (2) Subsequently, growth resumes, averaging around 3.3% per annum over the final three years of the stress, but the level of output remains persistently below baseline.

Financial market participants’ perceptions of risk increase, and their risk appetite diminishes. Risk premia rise in a number of markets. Investment-grade US corporate bond spreads increase from around 170 basis points in 2015 Q4 to around 500 basis points by 2016 Q4, while high-yield US corporate bond spreads rise from around 640 basis points to around 1,690 basis points over the same period. Liquidity conditions deteriorate and liquidity risk premia rise across a number of financial markets.

Term premia on long-term government debt rise over the first year of the stress before falling back. For example term premia on ten-year US government debt rise by 250 basis points, while term premia on ten-year UK government debt rise by 215 basis points.

The US dollar appreciates as some capital is withdrawn from emerging market economies. The US dollar appreciates by 10% against the Chinese renminbi, though the US dollar/Hong Kong dollar peg holds in the scenario, as the Hong Kong authorities support the peg. The Hong Kong interbank lending rate (Hibor) rises substantially. The dollar appreciates by 10% against EMEs.

Measures of market volatility also rise, with the VIX index averaging 37 during 2016 in the stress. That compares to a quarterly average of around 40 between H2 2008 and H1 2009, during the financial crisis.
UK output contracts by 4.3% over the first year of the scenario. Reflecting the fall in output, unemployment peaks at 9.5% in 2017. Although growth returns and unemployment falls back, the level of output remains persistently below the baseline path. That reflects a weakening of potential supply through the course of the stress.

As the economy weakens, long-term interest rates rise and property prices fall. A pro-cyclical withdrawal of buy-to-let investors exacerbates the sharp fall in UK residential property prices, which decrease by 31% from peak to trough. Similarly, a pull back by overseas investors contributes to the pronounced fall in CRE prices in the scenario. In aggregate, UK CRE prices fall by 42% from peak to trough.

UK inflation turns negative during 2016, and is close to zero for the first two years of the stress scenario. Meanwhile, nominal household income shrinks by 5.5% and nominal corporate profits contract by 8.5% in 2016. Inflation and nominal household income recover gradually over the final years of the stress scenario though corporate profit growth remains very sluggish.

Monetary policy is assumed to respond. Bank rate is assumed to be cut to zero, and through further asset purchases under the hypothetical scenario, long-term market interest rates are pushed down, following their initial spike.

Sterling depreciates by 7% against the US dollar in the early part of the stress, while the sterling exchange rate index (ERI) falls by just under 3%. These exchange rate moves then unwind gradually over the remainder of the scenario.

Over the five years of the stress scenario, lending to the UK real economy increases by around 4.5% in total. Banks in the stress test will be expected to submit lending projections which are consistent with this aggregate profile (see Box 3 on page 20).

Euro-area GDP contracts by 3.0% in 2016, with moderate growth resuming in 2018. Headline euro-area inflation turns negative in 2016 reflecting weaker demand and lower commodity prices, and does not rise above zero until 2017 H2. Meanwhile, core inflation remains weak throughout the scenario. Aggregate unemployment climbs to over 13%, before receding to around 12%, close to its recent peak in 2013.

Residential property prices fall by 15% across the euro area, while CRE prices fall by 25% in the stress. French CRE prices are an outlier, falling by 35%, reflecting rapid recent price increases. Euro-area property prices recover modestly over the final years of the stress.

The European Central Bank is assumed to pursue significant further monetary stimulus under the stress scenario, putting further downward pressure on long-term market interest rates.

US GDP contracts by 3% during the first year of the stress scenario while unemployment peaks at 9% in 2017. Thereafter, modest output growth resumes and unemployment falls back.

On a peak to trough basis, US house prices decrease by 19% in the stress, while CRE prices fall by 30%. Residential prices recover somewhat over the final years of the stress horizon ending 11% lower than in 2015 Q4, while CRE prices finish 19% down.

Overall US corporate profitability falls and the cost of corporate credit rises. Spreads on US investment-grade and high-yield corporate bonds rise by around 330 basis points and 1,000 basis points respectively, and equities fall by just over 40%. Corporates involved in the oil and gas extraction industry, and highly leveraged corporates are among those most severely affected.

US government bond yields rise initially as term premia increase. But as the US Federal Reserve injects monetary stimulus by making further large-scale asset purchases, ten-year government bonds fall back to their level at the end of 2015 of around 2.5% by the end of the stress horizon.

China’s GDP growth falls from just under 7% a year at the end of 2015 to -0.5% by the end of 2016. Thereafter, it recovers gradually, averaging around 5.3% over the final three years of the stress. This contraction in output is accompanied by a fall in residential property prices of around 35%. Prices recover around half of that fall by the end of 2020.

The slowdown in Chinese economic activity is associated with a weakening in household income growth. Nominal Chinese household income growth slows from around 8.5% in 2015, to an average of 2.4% over the first two years of the stress.

It is assumed that the Chinese authorities support China’s banking sector throughout the stress, as well as providing additional stimulus to economic activity but this stimulus takes time to boost output.

Hong Kong’s output, which has been more volatile than China’s, over recent decades, contracts by
almost 7.5% over the first year of the stress scenario. Risks to property prices in Hong Kong are judged to be elevated. Consistent with that, residential property prices and CRE prices are assumed to fall by 50% and 60% respectively over the first three years of the stress. These falls are accompanied by a widening of the Hibor-Libor spread, as the currency peg to the US dollar comes under pressure. It is assumed that the currency peg holds in the stress.

Economic activity slows similarly in Singapore, Korea and India as the downturn in growth becomes more broad-based across Asia. Singapore and Korean GDP contracts by 6.7% and 4.8% respectively, and Indian GDP slows to an annual rate of 2.3%. Actions by authorities support economic recovery from 2017 onwards.

Commodity prices fall in response to the weak global demand conditions. Oil prices fall from US$43 per barrel at the end of 2015 to around US$20 per barrel in the stress, and remain around this level until 2018, before rising back to around US$43 per barrel by the end of the five-year scenario horizon. Other commodity prices also fall and remain weak throughout the scenario.

Falling commodity prices particularly affect economic activity in Brazil and South Africa. The current downturn in the Brazilian economy continues in the scenario, with GDP contracting by a further 4.4% over 2016. South African GDP contracts by 3.4% over 2016. Their currencies depreciate by 10% against the US dollar, and this particularly affects companies that have dollar-denominated debt and are not fully hedged financially or do not match their liabilities with dollar assets or revenues.

Traded Risk Stress Scenario

As in 2015, the 2016 stress test will incorporate a traded risk scenario that has been designed by Bank staff. This element of the 2016 stress test will principally examine the resilience of the investment banking operations of UK banks to a severe financial market shock.

The traded risk component of the 2016 stress test requires banks to apply an instantaneous price shock to their market risk positions as of 19 February 2016. Any available-for-sale (AFS) and fair value option (FVO) positions in the banking book are stressed over the full five-year stress scenario, starting end-2015. The price shock applied to the trading book and the full five-year stress scenario applied to AFS and FVO positions will translate into losses and gains to a firm’s capital resources and changes to its risk-weighted assets. In 2015, the traded risk element of the stress test formed an important element of the overall impact of the stress scenario on banks’ capital positions.

The scenario has been designed to be consistent with the macroeconomic scenario — both in terms of the broad movements in market prices and the types and locations of counterparties affected — and to take account of the liquidity of trading book positions.

The calibration of shocks to market prices in the traded risk scenario reflects the FPC and PRA Board’s risk assessments concerning financial markets and is in line with the Bank’s approach to implementing the ACS framework, described in Box 1, pages 10–11. The FPC and PRA Board have judged it appropriate to allow changes in financial market prices between the start of 2016, the balance sheet cut-off date for the macroeconomic stress, and 19 February to be reflected in the severity of the traded risk shocks applied under the stress.

Specifically, if there have been significant changes in market prices prior to 19 February — which would be reflected in firms’ actual profit and loss up to that date — then the shocks applied under the stress test will be correspondingly smaller.

The impact of a financial market shock on banks’ trading books will be critically dependent on the liquidity of their positions and, in particular, how the liquidity of these positions may be reduced in a stress scenario. This element of the approach to traded risk reflects policymakers’ concerns about market liquidity risks, described in Section 2.2. As in 2015, the Bank’s approach to traded risk takes account of different liquidity horizons of banks’ traded risk positions by imposing larger shocks on positions that banks would take longer to close out, and smaller shocks for those positions that could be sold or hedged within shorter time frames.

Consistent with the macroeconomic scenario, the 2016 stress test will examine the ability of banks to withstand the default of seven counterparties that would be vulnerable to the macroeconomic scenario. In determining the counterparties to default, banks are instructed to consider both the current creditworthiness of their counterparties, and how that creditworthiness might deteriorate under the stress scenario. In addition to examining the impact of the default of specific counterparties, the scenario will also test the impact of the default
of a portion of counterparties falling within a specific sector vulnerable under the scenario.

Misconduct Costs Stress Scenario

In addition to the macroeconomic and traded risk elements of the stress, the 2016 stress test also incorporates stressed projections for potential misconduct fines and other costs beyond those paid or provided for by the end of 2015 — the start point of the scenario. There remains a very high degree of uncertainty around any approach to quantifying misconduct cost risks facing UK banks. Following very similar methodology to that applied in the Bank’s 2015 stress test, the stressed projections for misconduct costs over and above those incurred or provided for at end-2015 will relate to known misconduct issues, such as mis-selling of payment protection insurance and misconduct in wholesale markets, and will be in addition to the macroeconomic element of the test.

Banks are asked to provide stressed projections for misconduct costs which have a low likelihood of being exceeded. Partly because they relate only to known issues, however, they cannot be considered a ‘worst case’ scenario.

Baseline Scenario

In addition to the stress scenario, the 2016 test will assess projections of banks’ profitability and capital ratios under a baseline macroeconomic scenario. The UK macroeconomic variables in the baseline scenario have been developed by Bank staff and are broadly consistent with the forecasts published in the February 2016 Inflation Report. The international macroeconomic variables are largely consistent with the IMF’s October 2015 WEO projections. The remainder of this section provides a short summary of the key features of the baseline scenario.

World PPP-weighted GDP has grown at an average rate of around 3.5% a year since its 2009 trough. Having slowed slightly during 2015, world GDP growth is projected to rise from 2016 onwards in the baseline projection, averaging 3.8% through the five-year horizon. This is marginally weaker than the baseline incorporated in the Bank’s 2015 stress test, in which world GDP grew by an average of 4%.

Advanced economies continue to recover in the 2016 baseline, albeit at different rates. US growth is expected to peak at 2.6% in 2017. Growth in the euro area is weaker, peaking at 1.7% in 2017. Chinese growth slows to around 6% over the first two years of the projection, before picking back up to around 6.3% by the end of 2020. In the near term, past declines in oil prices push down on inflation globally. Euro-area inflation remains low through the horizon, reaching 1.7% by 2020.

In the United Kingdom, growth remains fairly solid in the near term, averaging 2.2% in 2016 before rising a little thereafter. In common with the baseline for world growth, however, the UK baseline output projection is slightly weaker than the baseline incorporated in the Bank’s 2015 stress test. Unemployment continues to drift down slightly, settling at around 4.7%. Inflation remains low for much of 2016 before picking up to a little above 2% in 2018. These projections are consistent with the modal projections presented in the Bank’s February 2016 Inflation Report. Asset prices continue to rise throughout the baseline scenario.

Appendix D: Detailed Japan Stress Test Scenario

Baseline Scenario

The baseline scenario is designed to provide a benchmark for assessing the simulation results of the tail event scenario and the tailored event scenario. In developing the baseline scenario, private sector forecasts are used for the growth rate of the domestic economy, and the global economic forecast by the International Monetary Fund (IMF) is used for the growth rate of overseas economies. Other variables are set in line with the forecasts considering model predictions and the historical patterns of business cycles.

In addition, other variables that are not derived from the model or the forecasts by the institutions are set based on simple assumptions (e.g., data follows past trends).

Tail Event Scenario

In each Report, the tail event scenario offers fixed-point observations that assess the stability of the financial system under severely adverse financial and economic conditions comparable to that at the complete detail scenario, please refer to the link in the reference below.

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6 The 2016 Japan stress scenario is excerpted from Japan Financial System Report (Oct 2015). For the
time of the Lehman shock. Although the same scenario is employed in each Report, the degree of impact on the financial system may differ depending on the risk profile and financial strength of financial institutions, or the financial and economic conditions. The scenario is designed according to the following 2 rules.

Rule 1: The output gap reaches around minus 7 to minus 8 percent.

Rule 2: The output gap worsens at least by 3 to 4 percentage points (i.e., the average in past economic recessions).

By ensuring that the output gap reaches the historical lowest level since 1980, Rule 1 makes it possible for the tail event scenario to reflect a certain level of severe economic downturn in each stress test. That is, regardless of the economic conditions at the time of stress testing, the tail event scenario is basically developed to reflect the most severe economic downturn equivalent to the Lehman shock, which enables an assessment of the stability of the financial system under such severe conditions. This offers a fixed-point observation that analyses how the financial system’s resilience to stress changes over time in response to changes in capital strength and exposures of financial institutions, and macroeconomic environment.

Rule 2 ensures sufficient severity when the economy is in recession.

Under Rule 1, the severity of stress (i.e., changes in the output gap) increases in an expansion phase where the output gap is increasingly positive. Conversely, the stress decreases in a recession phase where the output gap is increasingly negative and the stress would not be sufficient for a tail event. For this reason, Rule 2 is introduced to ensure that the output gap worsens by at least 3 to 4 percentage points.

Tailored Event Scenario

The tailored event scenario is designed each time to investigate the vulnerability of the financial system under specific circumstances. The tailored event scenario is developed flexibly to analyse important macro-prudential topics taking account of financial and economic conditions and risk profiles of financial institutions. The tailored event scenario features various topics that the tail event scenario does not cover as the tail event scenario is basically developed to reflect the same financial and economic conditions at each time of stress testing. While the severity of stress is not necessarily as intense as that in the tail event scenario, the tailored event scenario is designed to assess the transmission mechanism of salient risks from a new point of view by extending the model and source data as appropriate.
References


2016 Supervisory Scenario for Stress Tests

2015 Supervisory Scenario for Stress Tests


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