

**United Kingdom: Vulnerabilities of Household and Corporate Balance Sheets and  
Risks for the Financial Sector Technical Note**

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FINANCIAL SECTOR ASSESSMENT PROGRAM UPDATE

# UNITED KINGDOM

VULNERABILITIES OF HOUSEHOLD AND  
CORPORATE BALANCE SHEETS AND RISKS FOR  
THE FINANCIAL SECTOR

## TECHNICAL NOTE

JULY 2011

INTERNATIONAL MONETARY FUND  
MONETARY AND CAPITAL MARKETS DEPARTMENT

Contents	Page
Glossary .....	3
I. Introduction .....	4
II. Household and Financial Sector Linkages.....	4
A. Developments During and After the Crisis.....	4
B. Looking Forward: Household Sector Risks in the Recovery.....	7
C. Sensitivity Analysis of Household Balance Sheets.....	10
III. Corporate and Financial Sector Linkages.....	18
A. Developments During and After the Crisis.....	19
B. Contingent Claims Analysis of the Corporate Sector .....	22
C. Sensitivity Analysis of the Corporate Sector .....	25
IV. Conclusions .....	26
 Tables	
1. Descriptive Statistics by Income Category.....	11
2. Sensitivity Analysis of Household Sector: Baseline, September 2010 .....	15
3. Sensitivity Analysis of Household Sector: Summary of Shocks.....	18
 Figures	
1. Household Sector, 2000-10 .....	5
2. Household Balance Sheets and Mitigating Factors During the Crisis.....	6
3. Household Sector Write-off Rates and Nonperforming Loans .....	7
4. Housing Developments.....	8
5. Credit Availability .....	9
6. Household Debt Service-to-Income Ratio by Income Groups .....	13
7. Sensitivity Analysis of the Household Sector .....	16
8. U.K. Nonfinancial Corporate Sector.....	19
9. Funding of U.K. Nonfinancial Corporates.....	21
10. Debt at Risk of U.K Nonfinancial Corporates.....	21
11. Commercial Real Estate Sector .....	22
12. Default Risk of U.K. Nonfinancial Corporates.....	23
13. Contingent Claims Analysis of the U.K. Corporate Sector .....	25
14. Sensitivity Analysis of the U.K. Nonfinancial Corporate Sector .....	26
 Box	
1. Contingent Claims Analysis .....	24

**GLOSSARY**

CCA	Contingent claims analysis
CRE	Commercial real estate
DSI	Debt service to income ratio
FSA	Financial Services Authority
ICR	Interest cover ratio
LGD	Loss-given default
LTV	Loan-to-value
U.K.	United Kingdom
U.S.	United States

## I. INTRODUCTION<sup>1</sup>

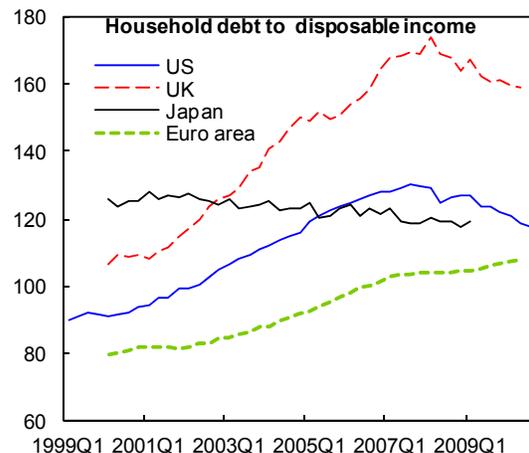
1. **The crisis and post-crisis recovery affected profoundly the U.K. household and corporate sector balance sheets.** Although the process of balance sheet repair is well underway, pockets of vulnerability remain in both sectors, particularly in commercial real estate, unsecured household debt, and some segments of the mortgage debt market. Stress in these segments—triggered by a rapid increase in interest rates, an increase in unemployment, a sharp decline in real estate prices, or a combination thereof—could have a significant impact on the banking sector, both directly and indirectly through feedback loops between the real and financial sectors. Concentration of credit risks in some large banks and widespread exercise of lender forbearance aggravate these vulnerabilities. This note explores these issues by reviewing the experience of the crisis, assessing the current state of the corporate and household balance sheets, and gauging the quantitative impact of risks using sensitivity analysis and contingent claims analysis.

## II. HOUSEHOLD AND FINANCIAL SECTOR LINKAGES

2. **High household indebtedness raises concerns about mortgage credit risk and the stability of the financial system, particularly if interest rates or unemployment were to rise or house prices were to fall further.** This section documents developments in the household sector during the crisis and recovery and assesses the potential risks to the banking sector emanating from household debt using micro-level data.

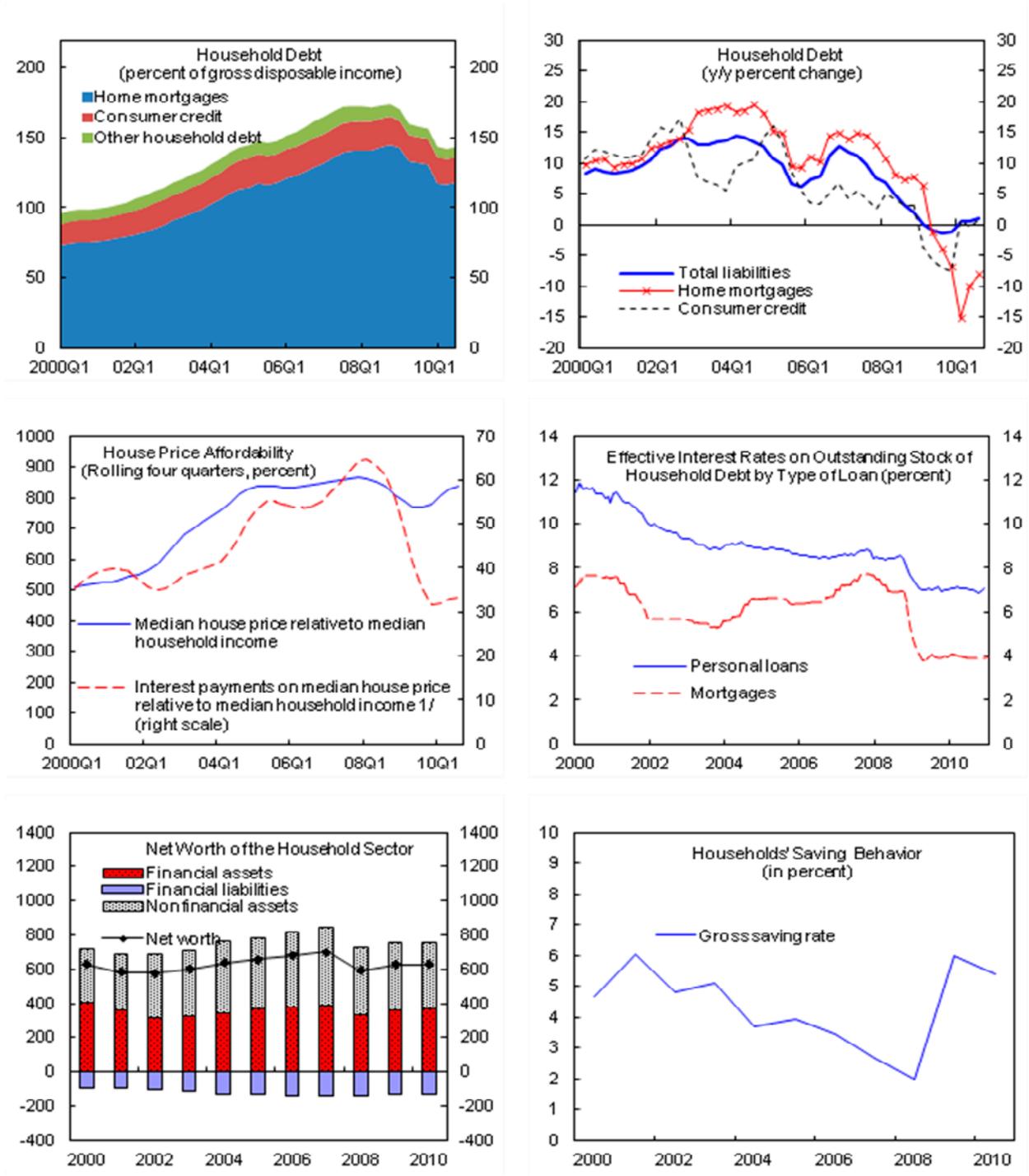
### A. Developments During and After the Crisis

3. **In the run-up to the crisis, household debt reached 175 percent of disposable income, fueled by rapid mortgage lending.** Household indebtedness increased faster in the United Kingdom than in the United States or the euro area as a whole. The rise in debt was matched by an increase in the value of housing as well as of pension funds and other financial assets held by households (Figure 1). Indeed, the asset side of household balance sheets increased faster than total debt, leading to a rapid growth in net worth.



<sup>1</sup> Prepared by Marta Ruiz-Arranz with research assistance from Stephanie Denis (both IMF/EUR).

**Figure 1. United Kingdom: Household Sector, 2000-10**



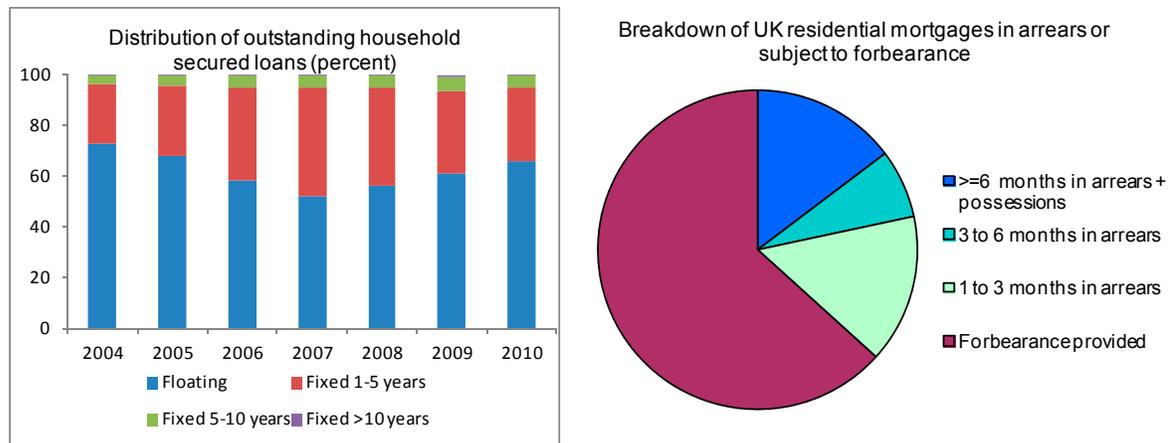
Sources: Haver Analytics; Land Registry; Department for Work and Pensions' HBAI Report; and IMF staff estimates.

1/ Based on standard variable rate mortgage.

4. **U.K. household balance sheets were hard hit by the crisis and the deleveraging of the sector was a key feature of the downturn.** Private consumption declined sharply as households responded to mounting economic uncertainty and plunging asset prices. The fall in home values and equity prices resulted in a substantial decline in net worth. This loss of net worth helped stimulate increases in savings among households striving to rebuild their wealth. The gross saving rate surged to a peak of 7.5 percent in mid-2009—up 6 percentage points from its pre-crisis levels.

5. **Several factors cushioned the impact of the crisis on household balance sheets, averting a more severe adjustment.** These included (i) record low interest rates and dominance of variable mortgage rates, which boosted debt affordability; (ii) forbearance and restructuring of loans by banks, which contained the increase in foreclosures (Figure 2); and (iii) the relatively limited rise in unemployment compared to other countries and previous recessions.

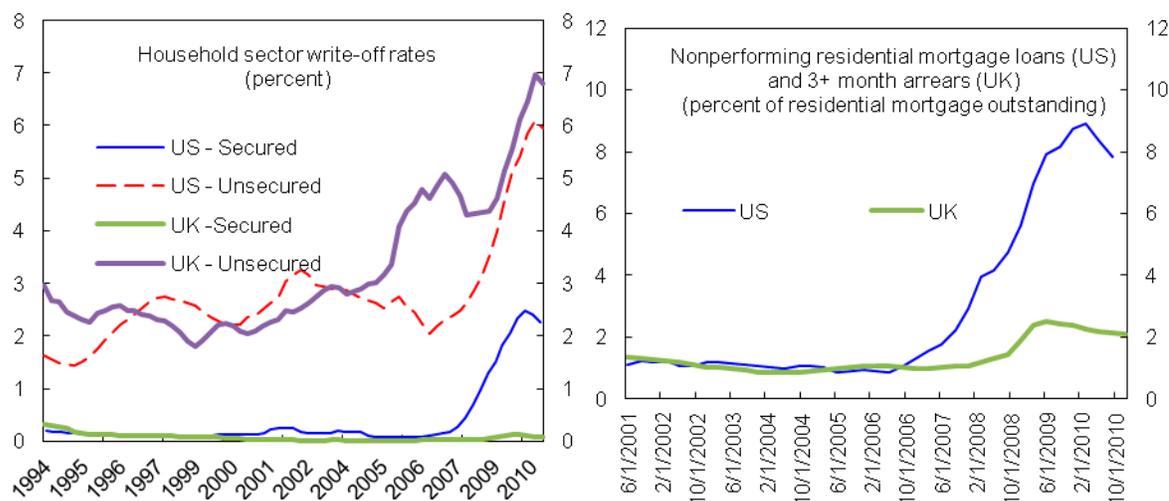
**Figure 2. United Kingdom: Household Balance Sheets and Mitigating Factors during the Crisis**



Source: Bank of England, FSA Prudential Risk Outlook

6. **Nonetheless, the stress on household balance sheets had an impact on banks' asset quality.** Household lending accounts for three-quarters of U.K. banks' domestic lending, most of which is secured against collateral. Household write-offs rates on secured lending increased a little, but write-off rates on unsecured lending are close to 7 percent, up 2.5 percentage points since 2008. Mortgage arrears and repossession rates also increased, albeit by less than in previous crises and relative to the United States (Figure 3). Higher default rates on U.S. mortgages may partly reflect U.S. bankruptcy laws, which make mortgage defaults less costly to households than in the United Kingdom. Another possible explanation is the significantly lower use of mortgage securitization in the United Kingdom, which has facilitated loan restructuring, as loans have tended to remain in the banks' books.

**Figure 3. United Kingdom: Household Sector Write-off Rates and Nonperforming Loans**



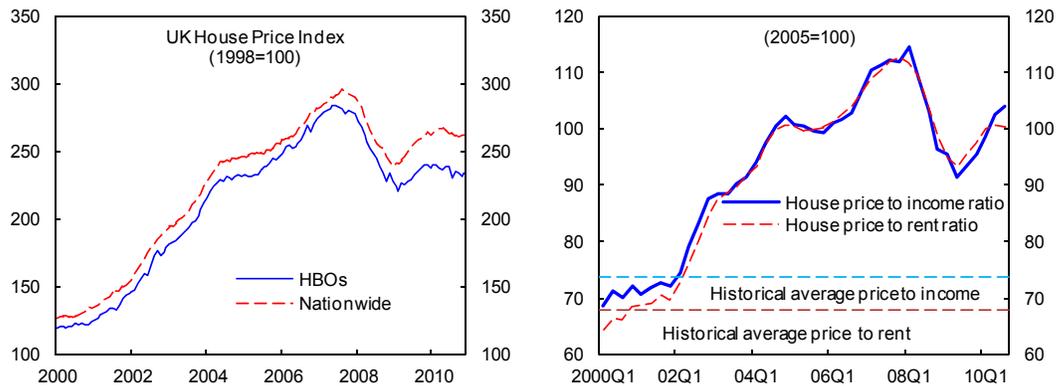
Sources: NY Fed; Bank of England; and Council of Mortgage Lenders.

### B. Looking Forward: Household Sector Risks in the Recovery

7. **Despite significant deleveraging, household balance sheets remain fragile in the United Kingdom.** Though off its peak, household debt remains high by historical and international standards. Its onerous impact has been mitigated to some extent by a build up of household sector currency and bank deposits since the second half of 2010. Higher saving rates have the potential to generate enough financial surpluses to reduce household indebtedness. However, the saving rate has already fallen back to 5 percent from its peak of 7.5 percent in mid-2009, as recovering asset prices and a stabilizing labor market lifted confidence in 2010, slowing the pace of balance sheet repair.

8. **Housing valuations continue to appear stretched relative to income and rents, leaving banks exposed to further falls in housing prices.** After falling by 20 percent since their peak in 2007, house prices staged a faster-than-expected recovery in 2009 and the first half of 2010. The upward momentum has since dissipated, with the three-month change in house prices turning negative, and surveys point to continued downward pressure on prices. Overall, prices remain about 15 percent below their peak in 2007. At this level, the price-to-income ratio and price-to-rent ratio remain 30 percent above historical averages (Figure 4). It is worth noting that supply constraints are likely to prevent house prices from fully falling back to their historical averages.<sup>2</sup>

<sup>2</sup> Other factors affecting real house prices are discussed in: [www.bankofengland.co.uk/publications/workingpapers/wp411.pdf](http://www.bankofengland.co.uk/publications/workingpapers/wp411.pdf).

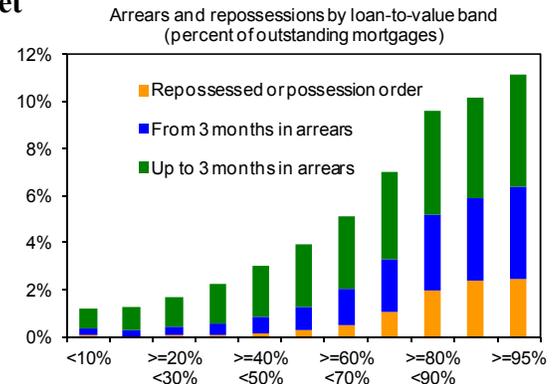
**Figure 4. United Kingdom: Housing Developments**

Sources: CML Research; Haver Analytics; OECD; and IMF staff calculations.

1/ Historical average refers to the period 1970–2010.

### 9. Some segments in the mortgage debt market appear vulnerable and represent yet another source of credit risk for banks.

Although overall arrears and repossessions have so far remained contained, they are concentrated in some groups of risky borrowers. In particular, arrears rates are higher for borrowers with high loan-to-value (LTV) loans and with buy-to-let loans, as these may reflect a higher share of second mortgages than owner-occupied mortgages (Financial Services Authority Prudential Risk Outlook). There are also regional variations: arrears in the North and in Wales, which experienced large house price declines and a slower housing market recovery, are significantly higher than in other regions.



Source: FSA Product Sales Database and Arrears Database  
Note: Performance as of August 2009 of mortgages sold between April 2005 and March 2009.

### 10. Unsecured write-offs have kept rising, posing further risks to the banks.

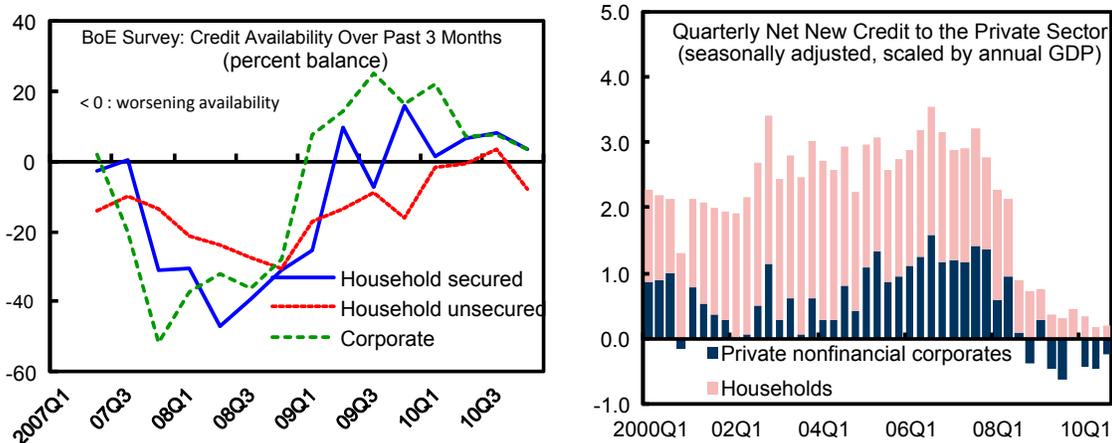
Although unsecured lending accounts for less than 10 percent of total loans, absolute losses from unsecured debt have so far surpassed losses from mortgage defaults. As reported in the most recent Bank of England (BoE) Credit Conditions Survey,<sup>3</sup> spreads on unsecured lending continue to widen (as banks appropriately price in the higher risk of default) and unsecured debt payments, notably on credit cards, have been rising as a share of household income despite the fall in policy rates. There has been, however, some recent improvement in the appetite for unsecured credit risk on the part of lenders. Evidence from the 2010 NMG Consulting survey confirmed that households' financial position remains under strain.

<sup>3</sup> [www.bankofengland.co.uk/.../creditconditionssurvey100401.pdf](http://www.bankofengland.co.uk/.../creditconditionssurvey100401.pdf).

Households report that the burden of unsecured credit was higher and concerns about the debt level have increased, particularly among high LTV mortgagors. The survey also points to increased difficulties in keeping up with bills and credit commitments, and a marked concern about the impact of fiscal consolidation measures.

11. **Furthermore, banks' own deleveraging efforts and funding pressures could constrain credit conditions for households.**<sup>4</sup> Households remain dependent on banks for refinancing, but bank credit availability is still tight, as suggested by the BoE survey on credit availability (Figure 5). Mortgage approvals and net lending amounts have also stayed at low levels, and evidence from the 2010 NMG Consulting survey shows an increase in the proportion of households reporting a tightening in credit conditions, especially among unsecured debtors and high LTV mortgagors. Lending standards have appropriately strengthened: average LTV ratios on new first mortgages are around 75–80 percent, well below the ratios observed during the pre-crisis boom, which should contain potential losses given default.

**Figure 5. United Kingdom: Bank Credit Availability**



Source: Bank of England.

12. **The discussion above suggests continuing fragility that, under stress, may translate into credit losses in the banking system.** In particular, banks would be exposed to higher defaults, were interest rates or unemployment to rise or house prices to fall. Write-offs on secured lending have so far remained contained, largely due to exceptionally low interest rates. Given the dominance of variable-rate mortgages, households' debt affordability could fall sharply if interest rates were to rise. These vulnerabilities are

<sup>4</sup> New regulatory requirements and the unwinding of policy support, including repayments to the Special Liquidity Scheme, may increase pressure on banks' balance sheets and affect credit availability.

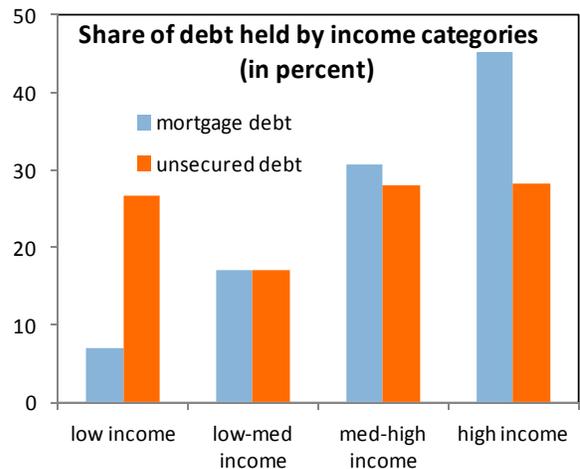
aggravated by the fact that risks are concentrated in some vulnerable banks with very large exposures.

### C. Sensitivity Analysis of Household Balance Sheets

13. **This section takes a more rigorous approach to the risks discussed above and attempts to quantify some of the potential threats to financial and macroeconomic stability from household indebtedness.** What happens to households' ability to pay if interest rates go up or unemployment rises? How many households will end up with negative equity if house prices fall further? What would be banks' credit losses in these scenarios?

14. **This exercise uses micro data to analyze the stability risks arising from household indebtedness.** The scope for using aggregate data from the financial and national accounts to evaluate these risks is limited, as such data do not provide information regarding the distribution and matching of debt, interest expenditures, income, and assets. More granular data regarding individual households may reveal pockets of vulnerability in the household sector. This study uses data from the September 2010 NMG consulting survey of U.K. households.<sup>5</sup> The survey provides balance sheet information (secured and unsecured debt, housing, and financial assets), as well as data on income, debt expenditures, and self-reporting indicators of financial stress (e.g., ability to meet payments).

15. **One rough measure of the risks in household lending is the distribution of household debt across income categories.** In principle, the smaller the share of debt held by lower-income households, the lower the risks associated with household lending. As expected, high-income households hold the larger share of total household debt, especially mortgage debt. In contrast, low-income households' share of unsecured debt is more than commensurate to their income.<sup>6</sup> The descriptive statistics in Table 1 also point to other potential sources of vulnerability. The median low-income household has significantly higher mortgage debt-to-income and debt mortgage payments-to-income ratios than other income categories. This suggests that



<sup>5</sup> The survey covers about 2000 households. Sampling techniques attempt to make the sample representative of the population. See [www.bankofengland.co.uk/publications/quarterlybulletin/qb100408.pdf](http://www.bankofengland.co.uk/publications/quarterlybulletin/qb100408.pdf).

<sup>6</sup> Income groups are defined as follows: low-income: gross annual income up to £17,500; low-medium income: £17,500–£35,000; medium-high income: £35,000–£60,000; and high income >£60,000.

low-income households' ability to service their debt could be compromised under financial stress, leading to credit losses for the banking sector.

**Table 1. United Kingdom: Descriptive Statistics by Income Category 1/**

	Low Income	Low-Med Income	Med-High Income	High Income
Mortgage debt-to-income ratio	481	297	223	170
Mortgage payments to income	36.9	23.0	17.6	12.9
Unsecured debt-to-income ratio	41	21	21	12
Unsecured debt payments to income	12.7	10.4	7.7	4.6

Sources: 2010 NMG Consulting survey; and staff estimates.

1/ Income groups are defined as follows: low-income: gross annual income up to £17,500; low-medium income: £17,500-£35,000; med-high income: £35,000-£60,000; and high income >£60,000.

16. **Three stress scenarios are considered:** an increase in interest rates of 300 basis points (well above the 60–65 basis points rise in interest rates assumed in the solvency stress test of the banking sector),<sup>7</sup> a decline in household income of 20 percent, and a decline in house prices of 20 percent (in line with the solvency stress test of the banking sector). These are severe (low probability/high impact) stress scenarios. To put in perspective, it is worth noting that SONIA futures suggest a rise of around 100 basis points in rates within a year. The IMF baseline scenario assumes a reduction in the house-to-income ratio of around 5 percent to 10 percent over the medium term.

**To assess the impact of these shocks, a mortgagor household is defined to be financially stressed if its mortgage debt service-to-income ratio (DSI) is larger than a certain threshold.** The stress threshold is defined as a DSI of 40 percent of income. This threshold is higher than many used in the literature, but the purpose is to identify the truly vulnerable households.<sup>8</sup> In addition, two other thresholds were considered as a robustness check, but the results were essentially the same.<sup>9</sup> The left-hand side panels of Figure 6 show the distribution of household DSI ratios by income groups relative to each of the three stress

<sup>7</sup> See FSAP Technical Note, “Stress Testing the Banking Sector.”

<sup>8</sup> May and Tudela (2005) find that a DSI ratio of 20 percent or above is associated with higher probability of mortgage payment problems in England. For Austria, Beer and Schurz (2007) define financially distressed households as those that have a DSI ratio above 30 percent. This note uses thresholds as in Karasulu (2008).

<sup>9</sup> The two alternative thresholds are (i) two standard deviations of the average DSI within each income group; and (ii) two standard deviations of the average DSI of mortgagors reporting difficulties in paying for their mortgage (a self-reporting measure of financial distress). Results from the sensitivity analysis are similar under the three alternative measures. However, the distributional implications are different, with the uniform threshold identifying a larger number of low-income financially stressed households than the other two measures.

thresholds under consideration. This gives an indication of how many households in each income category are below the stress threshold and how close the other households are to it. In 2010, about 35 percent of low-income households had debt-service ratios above 40 percent, compared to 9 percent, 5 percent, and zero percent in the higher income categories.

17. **The share of vulnerable households captures the impact of different stress scenarios on the household sector as a whole, but different indicators are needed to monitor possible bank losses.** Two such indicators are used in this exercise:

- Since default data are not available at the household level, *debt-at-risk* is defined as the debt of financially stressed mortgagors. Debt-at-risk does not correspond directly to nonperforming loans; rather, it is the debt that could come under financial strain or could potentially become nonperforming. As such, debt-at-risk likely overestimates credit losses.
- A *loss-given-default* (LGD) measures the share of debt at risk that is not covered by the household's assets (both real and financial). The intuition is that if a household defaults on its debt, the bank will only incur losses to the extent that the household's assets are not able to cover its debt. This measure, however, is likely to underestimate credit losses, as the banks may not be able to repossess all assets. In addition, the estimated LGD is based on the prevailing value of the assets. In a situation of macroeconomic stress, the value of both real and financial assets is likely to fall, which means that a smaller fraction of debt would be covered by assets. Finally, this LGD measure does not take into account the potentially large transaction costs involved in defaults.

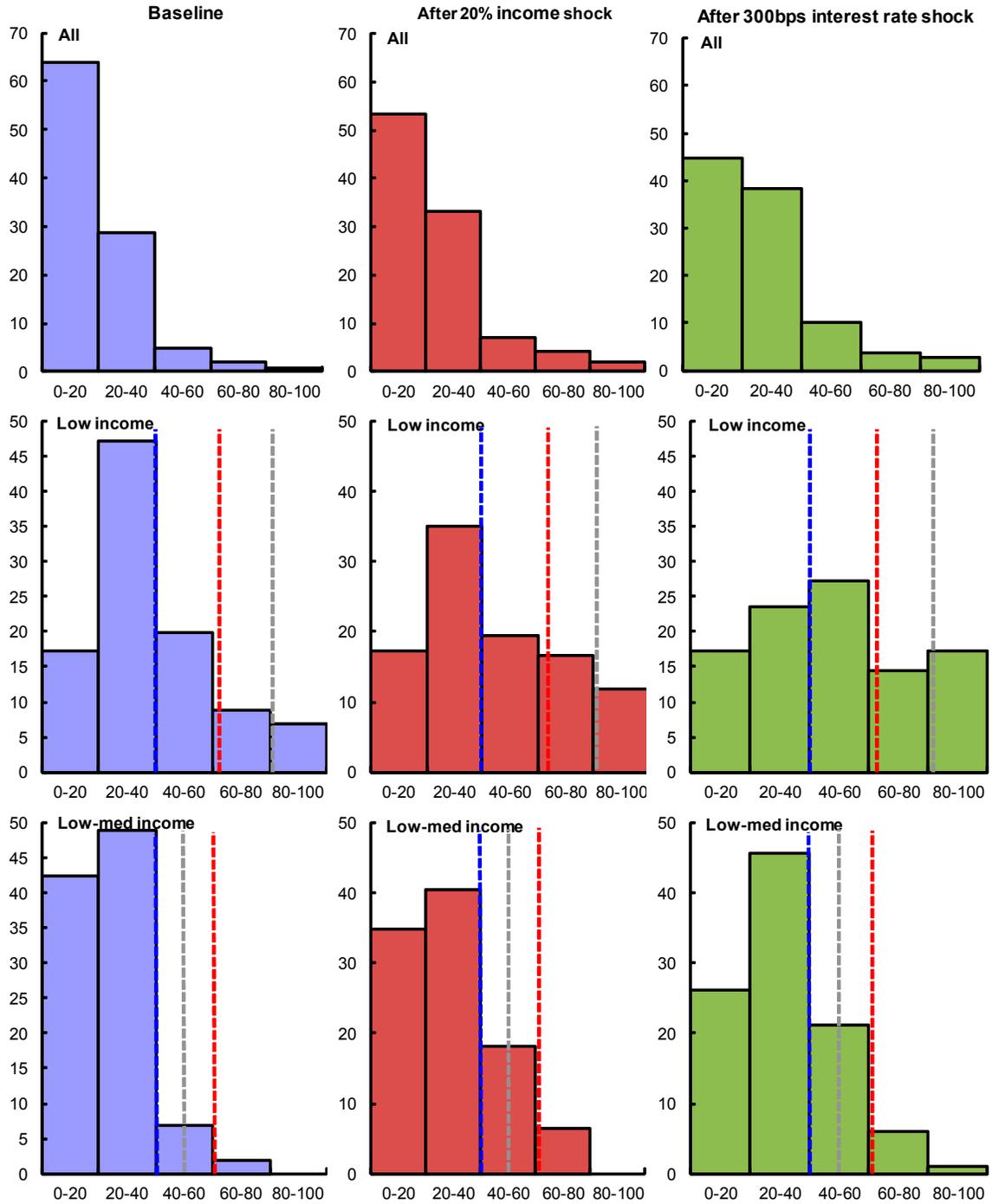
Formally,

$$\text{Debt at risk} = \frac{\sum_i S_i D_i}{\sum_i D_i}, \quad \text{where } S_i = \begin{cases} 1 & \text{if } DSI_i > 40 \\ 0 & \text{otherwise} \end{cases}$$

$$\text{LGD} = \frac{\sum_i S_i L_i}{\sum_i D_i}, \quad \text{where } L_i = \begin{cases} -NW_i & \text{if } NW_i < 0 \\ 0 & \text{otherwise} \end{cases}$$

Where  $D_i$  is the debt of household  $i$  and  $NW_i$  is the net worth of household  $i$ , which is defined as the sum of household assets (real estate and financial) minus total debt (mortgage and unsecured debt). The survey provides information on households' assets and liabilities to estimate net worth.

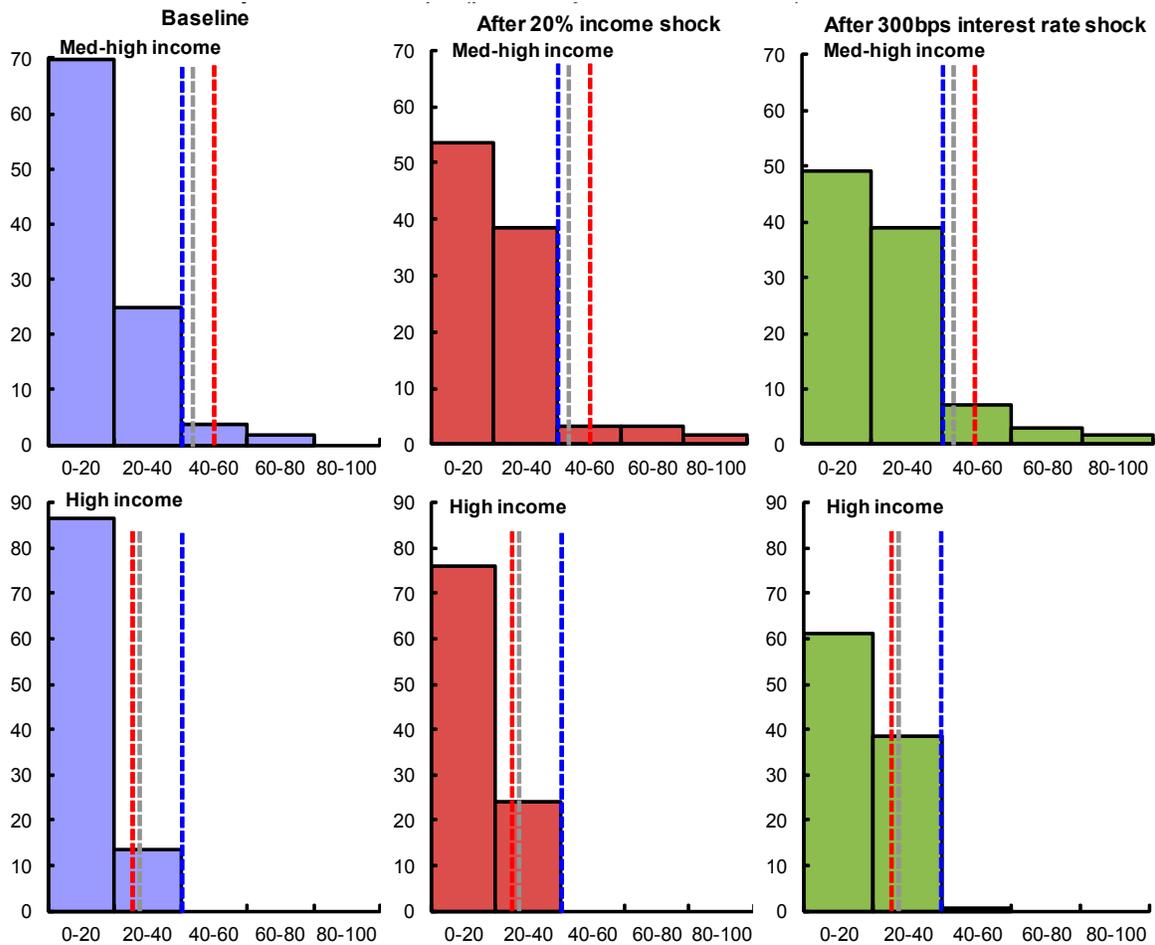
**Figure 6. United Kingdom: Household Debt Service-to-Income Ratio by Income Groups (percent y-axis; DSI x-axis)**



Sources: UK Household Survey; and IMF staff calculations.

Note: Each vertical dotted line represents a DSI threshold., i.e. T1 (blue); T2 (red); T3 (gray). Low income : T1=40, T2= 62, T3 = 81. Low-med income: T1=40, T2=61, T3= 50. Med-high income: T1=40, T2= 50 T3= 43. High income: T1=40, T2= 25, T3 = 26.

**Figure 6. United Kingdom: Household Debt Service-to-Income Ratio by Income Groups (concluded)**



Sources: UK Household Survey; and IMF staff calculations.

Note: Each vertical dotted line represents a DSI threshold, i.e. T1 (blue); T2 (red); T3 (gray). Low income: T1=40, T2=62, T3=81. Low-med income: T1=40, T2=61, T3=50. Med-high income: T1=40, T2=50, T3=43. High income: T1=40, T2=25, T3=26.

**18. The state of household balance sheets in September 2010 (date of the household survey) is the starting point for the sensitivity analysis.**

- Eight percent of mortgagors were financially stressed in September 2010. The average DSI for financially stressed households was 58 percent and their average mortgage debt was six times their average annual gross income (Table 2).
- Ten percent of total mortgage debt was at risk. With total household mortgage debt in the economy amounting to 96 percent of GDP, this means that about 10 percent of

GDP worth of mortgages could come under financial strain (this is based on the presumption that the survey is representative of the population).<sup>10</sup>

- Estimates of LGD show that most mortgage debt is covered by household assets, mostly real estate. They suggest that if vulnerable households were to default on their debts, creditors would suffer losses corresponding to 0.4 percent of total household debt.

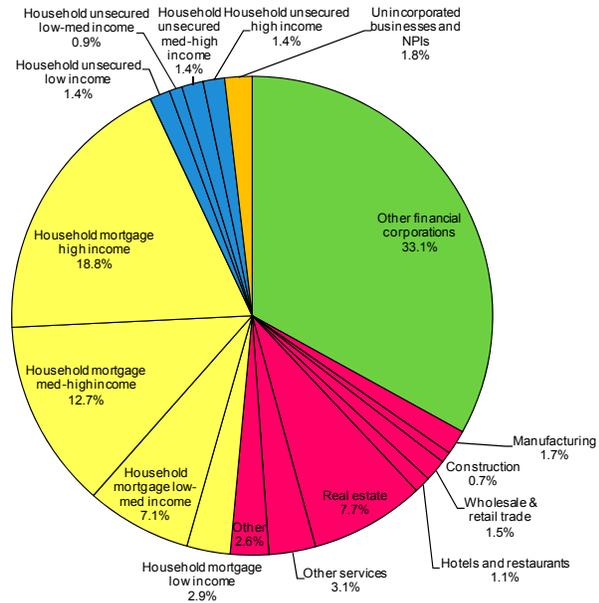
**Table 2. United Kingdom: Sensitivity Analysis of Household Sector: Baseline, September 2010**

	Share of Stressed Households in Each Income Category	Share of Debt-at-Risk in Each Income Category	Debt-at-Risk (in Percent of Total Household Debt)	LGD (in Percent of Total Household Debt)
Low-income	35.6	52.4	3.6	0.0
Low-med-income	8.7	14.1	2.4	0.3
Med-high-income	5.4	13.7	4.3	0.1
High-income	0.0	0.0	0.0	0.0
ALL	8.2	10.3	10.3	0.4

Sources: NMG Consulting Survey; and staff estimates. Note: Debt refers to mortgage debt only.

**Interest rate shock**

19. **The household sector is sensitive to increases in interest rates, but loan losses in the banking sector appear to be manageable—at least as long as the underlying assets maintain their value.** A rise in interest rates by 300 basis points would increase the share of financially stressed households to 18 percent, from 8 percent in the baseline (Figure 7). Debt-at-risk would increase by over 10 percentage points, bringing total debt-at-risk to 20 percent of GDP. The

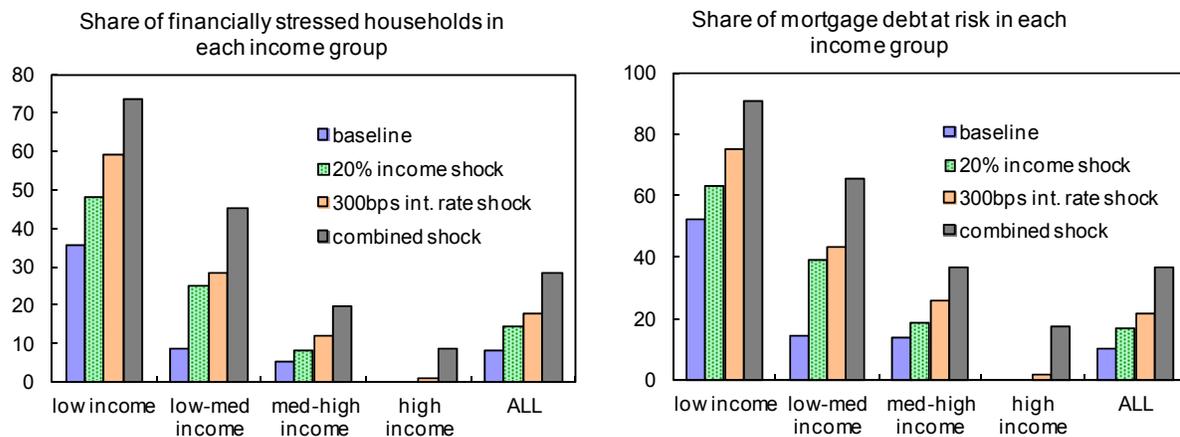


<sup>10</sup> These aggregate figures mask important differences across household income groups. The percentage of financially stressed households decreases with household income. Low income households appear very vulnerable: over 35 percent of these households are financially stressed and more than 50 percent of this group’s total debt is at risk. However, this only represents 3.6 percent of total household sector debt.

impact would be most severe among low-income households, as they tend to have high DSI ratios to begin with: indeed, about three-fourth of low-income household debt would be considered at risk. However, given the relatively low share of bank loans to this income group, the impact on asset quality is likely to be small (see pie chart). This shock would more than double LGD (debt-at-risk not covered by assets) compared to the baseline, to almost 1 percent of total household sector loans (about 1 percent of GDP). This low LGD estimate reflects the partial-equilibrium nature of this exercise, which assumes that the value of the underlying asset is not affected. It is worth noting that this analysis suggests that even if household balance sheets were shocked with a 300 basis points interest rate increase (well above the 60–65 basis points rise in interest rates assumed in the more severe scenarios in the solvency stress test of the banking sector) the impact on banks would be manageable.

20. **These estimates represent the long-run impact of the interest rate shock.** They are based on the assumption that all mortgages are affected by the interest rate increase (as in the long-run, even fixed-rate mortgages are affected due to renegotiation of interest rates). As such, they are likely to be an upper limit estimate of financial distress. The short-run impact of the shock, affecting only variable-rate mortgages, would be half as large. This lower estimate should be interpreted with caution. First, the share of fixed-rate mortgages in our sample of mortgagors (almost 50 percent) is larger than the actual share in the population, which is about a third of outstanding mortgages. Second, mortgagors are currently moving from expiring fixed-rate mortgages to floating-rate mortgages (BoE, Financial Stability Report, December 2010), increasing the sensitivity of borrowers to interest rises.

**Figure 7. United Kingdom: Sensitivity Analysis of the Household Sector**



Source: 2010 NMG Consulting Survey and staff estimates. Financially distressed households are defined to have mortgage debt service above 40 percent of income.

### *Income shock and combined interest rate-income shock*

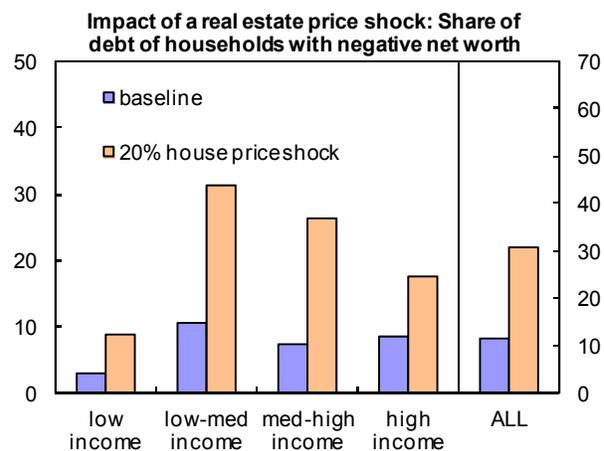
21. **Similarly, income shocks would significantly affect individual households, but may not necessarily generate large bank losses.** A drop in income by 20 percent would increase the share of vulnerable households to 14 percent (Figure 7). Debt-at-risk would rise by 6 percentage points of GDP and LGD would reach almost 1 percent of total loans. Again, this shock would disproportionately affect low-income households. However, since they account for a relatively small proportion of total bank mortgage lending, the impact on bank asset quality is likely to be limited. This shock is indicative of the risks were unemployment to rise beyond current rates or the economy to slow down. In contrast, a combined interest rate and income shock could have a major impact on household balance sheets, and thus the potential to inflict larger losses on the banks.

### *Housing price shock*

22. **Further declines in house prices would affect households' net worth and carry implications for bank LGDs.** With less home equity available, homeowners would tend to have fewer options to refinance existing mortgage debt or take on new debt that could be used to pay off other debt contracted at higher rates. Since house price shocks do not directly affect household debt service payments, an alternative measure of financial stress is needed to assess the sensitivity of households to falls in house prices. One such measure is based on household net worth. Households whose net worth becomes negative are considered financially stressed. By associating financial stress to wealth, this measure attempts to capture the ability of households to

liquidate assets (or pledge real estate assets) in order to service debt before default. By late 2010, less than 6 percent of households, accounting for about 8 percent of total household debt (mortgage and consumer debt) had negative net worth. After a 20 percent house price drop, about 16 percent of households would have negative net worth, pushing debt at risk to 22 percent of the total. Potential losses for banks as measured by LGD would climb to 4 percent of all household loans. Tellingly,

arrears in the North and Wales, which experienced large house-price declines and a slower housing market recovery, are higher than in other regions. This also suggests that a combined shock that affects both household debt service capacity—such as an increase in unemployment—and the collateral value of secured debt could have a material impact on asset quality. A mitigating factor, nonetheless, is that, unlike in the United States, mortgagors in the United Kingdom have historically tended to service their mortgages, even during the



Source: 2010 NMG Consulting Survey and IMF staff estimates

worst of times, in part because of a greater willingness on the part of banks to restructure loans in order to maintain debt affordability.

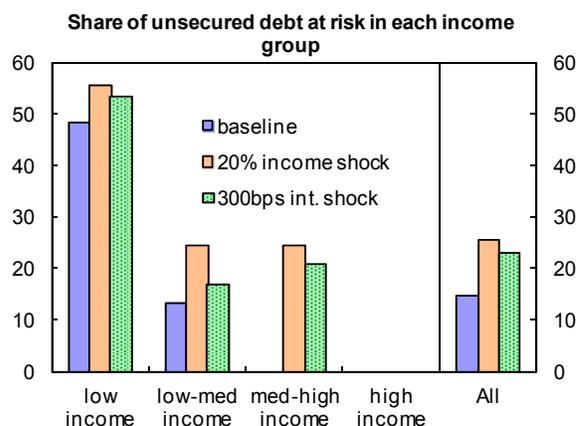
**Table 3. United Kingdom: Sensitivity Analysis of Household Sector: Summary of Shocks**

	Share of Stressed Households in Each Income Category	Share of Debt-at-Risk (In Percent of Total Household Debt)	LGD (In Percent of Total Household Debt)
Baseline	8.2	10.3	0.4
Interest rate shock	17.8	21.5	0.9
Income shock	14.1	16.7	0.9
Housing price shock	15.6	22.1	4.0
Combined interest rate and income shock	28.4	36.4	0.9

Sources: NMG Consulting Survey; and staff estimates.

### *Unsecured debt*

23. **The burden of unsecured credit could increase further were interest rates to rise or income to decline.** About 26 percent and 23 percent of total unsecured debt would become at risk following a 20 percent negative income shock and a 300 bps interest rate rise, respectively. This would represent about 5 percent and 4.5 percent of GDP, respectively, of potential default losses, given that total unsecured debt was 20.5 percent of GDP at end-2010. These estimates assume a stress threshold of unsecured debt service payments-to-income of 20 percent.



Source: NMG Consulting survey and staff estimates. Financially stressed households have unsecured debt service payments above 20 percent of income

### III. CORPORATE AND FINANCIAL SECTOR LINKAGES

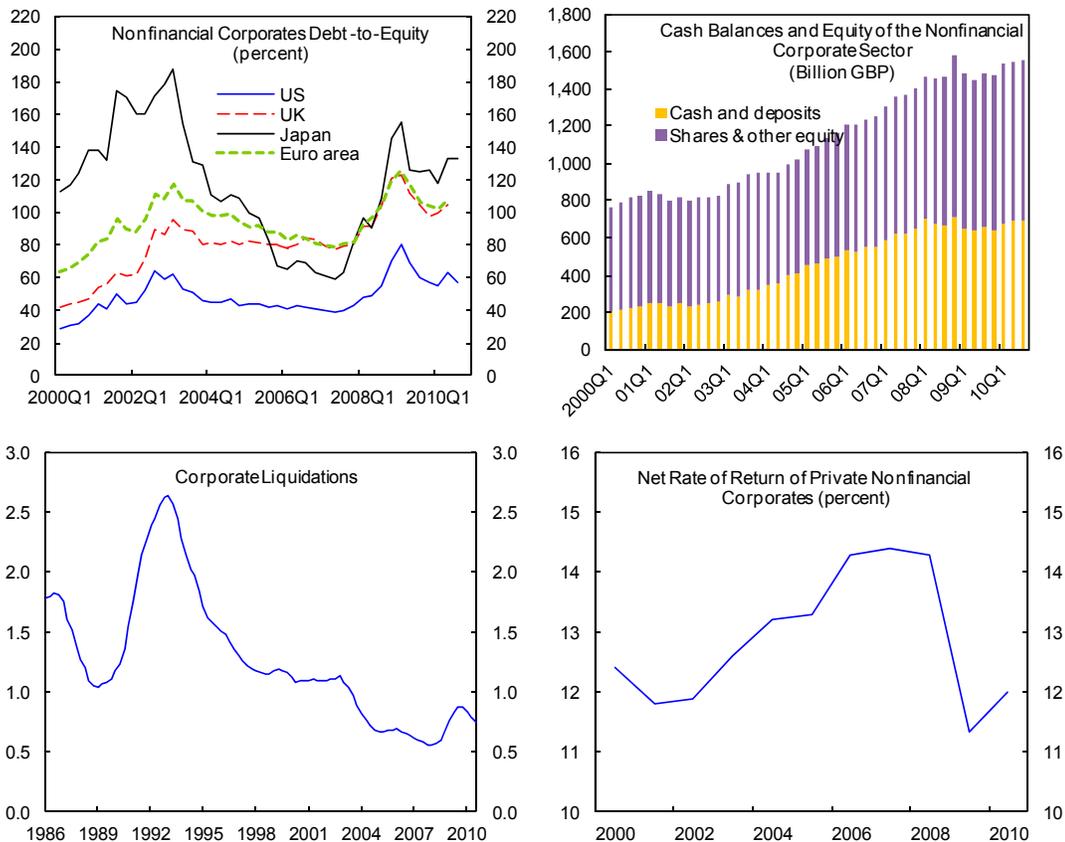
24. **This section discusses how the nonfinancial corporate sector was affected by the crisis and the recovery.** It goes on to assess how vulnerable the corporate sector is, going forward, using two different methodologies. Contingent claims analysis (CCA) is used to estimate expected losses from corporate defaults one year from now. And sensitivity analysis is used to assess how the corporate balance sheets would be affected by interest rate

and profitability shocks. The results suggest that the corporate sector as a whole remains relatively resilient to shocks, but there is significant variation across sub-sectors.

### A. Developments During and After the Crisis

25. **The U.K. nonfinancial corporate sector weathered the financial crisis relatively well.** Firms entered the crisis with relatively solid financial balances, despite high debt levels. As demand and profits contracted and the outlook deteriorated, firms cut back on investment to preserve cash flow. Still, the increase in the number of company liquidations during the crisis was moderate compared to previous crises and has been declining since late 2009. Low interest rates and bank restructuring have helped companies avoid default (Figure 8).

**Figure 8. United Kingdom: U.K. Nonfinancial Corporate Sector**



Sources: Bank of England; Bloomberg; ONS; and IMF staff calculations.

26. **Corporate sector balance sheets have strengthened over the last year, along with the rest of the economy.** Debt represents about half of the total sources of funding for U.K. nonfinancial corporate (Figure 9). The crisis triggered deleveraging and changes in the composition of debt financing away from bank debt. Since the crisis, leverage ratios have continued to trend downwards, corporate profitability has increased, and investment has rebounded. Corporate bond spreads are back to pre-crisis levels and equity prices have been

rising. A key indicator of firms' viability, the interest cover ratio, has also recovered. The interest cover ratio (ICR) measures the degree to which cash flows are sufficient to cover interest on debt. Firms where earnings before interest and taxes are less than interest payments due (i.e., the ICR is less than one) are vulnerable and their debt is considered "at risk." They can survive by selling assets to meet their obligations, but this is not sustainable over the long term. Just before the crisis, one-third of listed companies in the Worldscope database had ICRs of less than one. But most of these were small, accounting for 13 percent of corporate sector debt. In 2009, the share of firms with ICR less than one rose to 45 percent, accounting for 16.5 percent of total corporate debt. Preliminary data suggest that at the end of 2010, total debt-at-risk was slightly below pre-crisis levels (Figure 10).<sup>11</sup>

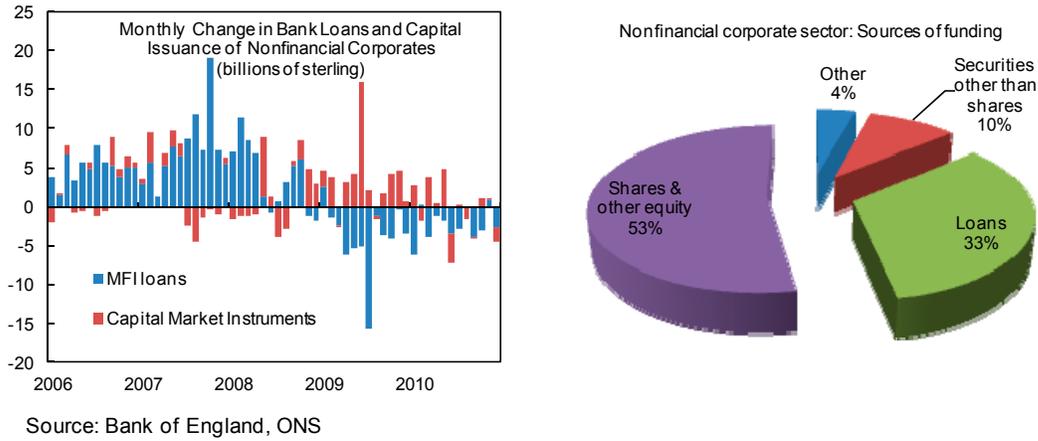
27. **These aggregate figures mask substantial variation across sectors:**

- Many *real estate* firms had interest cover ratios close to one before the crisis, and so quickly crossed over the viability threshold when earnings suffered. By 2009, about 60–70 percent of total debt in this sector was at risk. Although this sector has since recovered somewhat, the share of debt-at-risk remains very high.
- *Services and manufacturing* were also hit by the crisis, albeit to a lesser extent. The number of financially stressed firms has fallen significantly and the share of debt-at-risk is now close to pre-crisis levels.
- The ongoing restructuring and deleveraging of *transportation and communication* translated into a continuous decline of debt-at-risk, which was barely dented by the crisis.
- In contrast, the debt-at-risk in *retail* kept increasing in 2010 relative to 2009. As a result, the share of distressed debt is still significantly above pre-crisis levels.

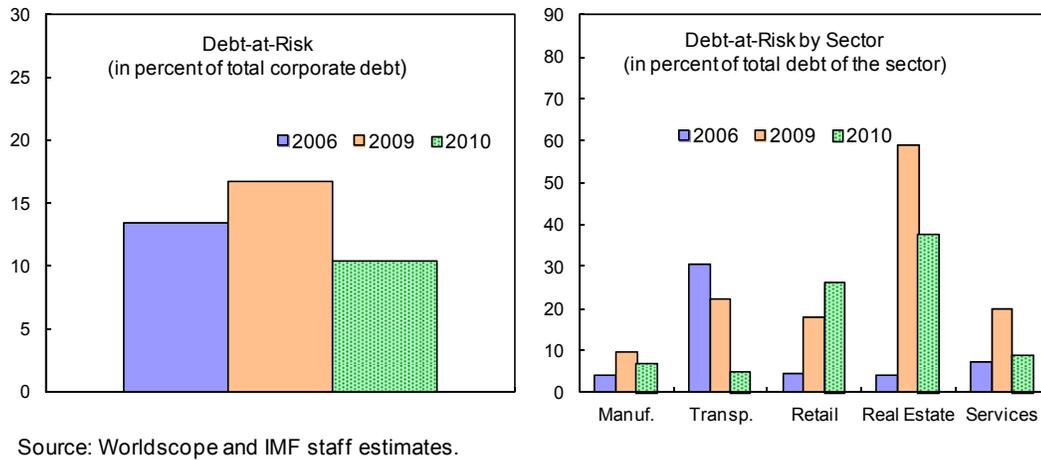
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<sup>11</sup> Data coverage is limited for 2010, as not all firms had posted financial results in Worldscope. It is worth noting that due to data availability limitations, firm coverage in this analysis is smaller than in the firm-level analysis conducted at the BoE (only listed firms are included). This implies that the estimates in this analysis may not match similar estimates in BoE publications. Nonetheless, the thrust of our results and qualitative assessment are in line with the authorities' own analysis.

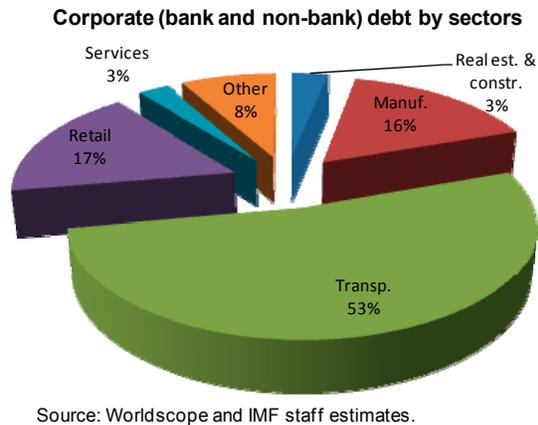
**Figure 9. United Kingdom: Funding of U.K. Nonfinancial Corporates**



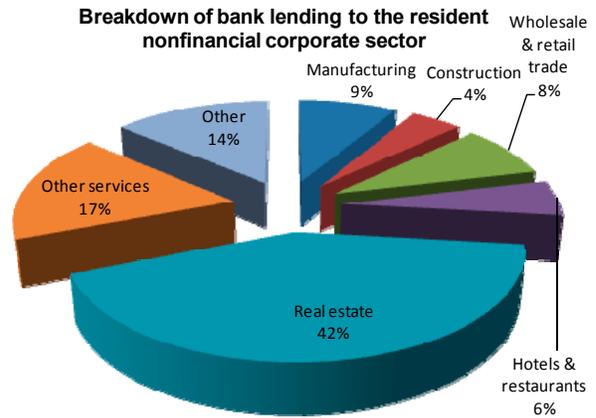
**Figure 10. United Kingdom: Debt at Risk of U.K. Nonfinancial Corporates**



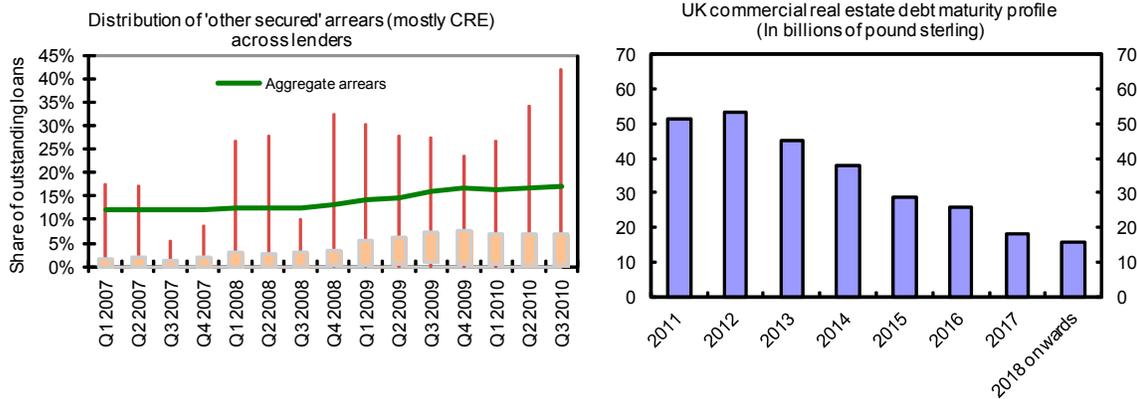
28. **The hardest-hit sectors represent only about 20 percent of total corporate sector debt.** Despite the increase of debt-at-risk, the total debt of the real estate, construction, and retail sectors is only about 20 percent of total (bank and nonbank) corporate debt, while the financial performance of the most leveraged sector at the beginning of the crisis (transportation and communication) strengthened significantly, pushing the aggregate level of debt-at-risk down.



29. However, these sectors represent a disproportionately high share of total bank claims on the corporate sector. Over 40 percent of total outstanding bank loans are to the real estate sector. Real estate companies remain exposed to further declines in property prices. Real estate companies remain exposed to further declines in property prices. Despite the rebound in commercial property values, prices remain substantially below their peak, leaving a number of borrowers in negative equity or in breach of LTV covenants. So far, defaults have been contained by banks' forbearance and low interest rates. Lenders are exercising forbearance by ignoring breaches in LTV covenants, when borrowers continue to service their debt, and by evergreening loans. But a large share of loans is due to be refinanced in the next few years, and a large funding gap may arise if banks are less willing or able to roll over or restructure loans (Figure 11). In addition, commercial real estate (CRE) lending is very concentrated, with a few big banks accounting for a large share of the outstanding debt. Banks with large exposures would thus be hard-hit if economic and market conditions were to deteriorate sharply. Indeed, it is already the case that some lenders are facing arrears rates in excess of 30 percent in their CRE loan portfolios.



**Figure 11. United Kingdom: Commercial Real Estate Sector**



Source: FSA, Prudential Risk Outlook. CB Richard Ellis.

Note: The data is for the 40 largest lenders. Spikes and bars show minimum, maximum and interquartile range.

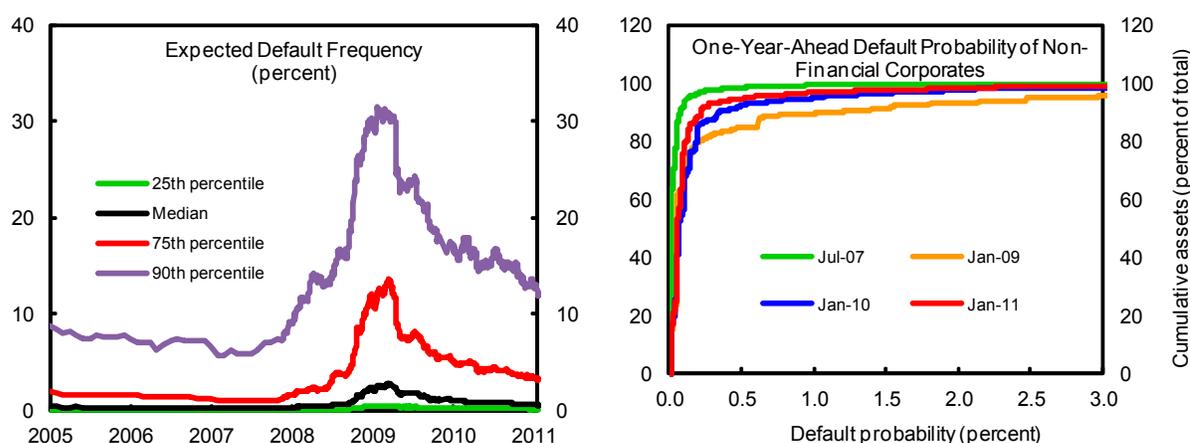
**B. Contingent Claims Analysis of the Corporate Sector**

30. This section assesses the near-term prospects for the U.K. corporate sector. It attempts to answer two questions. First, how high is the risk of corporate sector defaults and what sectors are most vulnerable? Second, how large are the expected losses from defaults?

31. **To answer these questions, the note uses CCA to estimate risk indicators for the nonfinancial corporate sector.** The CCA approach combines balance sheet accounting information, with equity prices prevailing in the financial market to obtain forward-looking measures of the risk of defaults and potential losses (Box 1). Under this approach, the risk of default is related to the probability that the value of a firm's assets will fall below the value of its liabilities. This in turn depends on two factors: firm leverage and uncertainty about the value of firm assets, which reflects the expected value of future profits.

32. **Expected default probabilities increased markedly after September 2008, but have fallen back to near pre-crisis levels.** The median expected one-year default probability for listed corporates in the United Kingdom (derived from Moody's KMV-implied CDS spreads) increased from 0.3 percent in early 2008 to 2.8 percent in March 2009, an amount equivalent to a 15-standard deviation increase relative to the 2004-2008 average (Figure 12). At the height of the crisis, the risk of default exceeded 13.6 percent for a quarter of firms (seventy-fifth percentile series in the chart) and 30 percent for 10 percent of firms (ninetieth percentile series in the chart). The increase in default probabilities was triggered by the collapse of share prices and rising volatility as well as by tighter financing conditions and increased rollover risks. Default probabilities are now back to about 0.5 percent. Similarly, before the crisis (July 2007), only a small fraction of firms (accounting for less than 1 percent of total assets) had a default risk one year ahead that exceeded 1 percent. By January 2010, this proportion had increased to 10.5 percent, and it has narrowed to 3.25 percent in February 2011.

**Figure 12. United Kingdom: Default Risk of U.K. Nonfinancial Corporates**



Source: Moody'S KMV.

33. **However, default risks vary widely across sectors.** At the height of the crisis, default risk in some sectors (real estate, business products, leisure, and entertainment) increased sharply above the median for the overall corporate sector. Currently, these sectors continue to display higher default risk. In particular, the median real estate firm has a

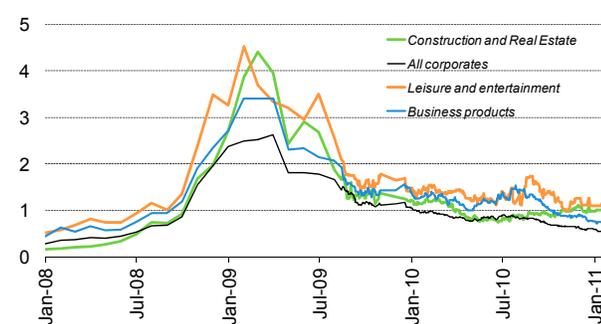
probability of default twice as large as the corporate sector as a whole. This is also the case for the leisure and entertainment sector, which was severely affected by the sharp decline in consumption, the slow turnaround during the recovery, and the cold winter weather.

### Box 1. Contingent Claims Analysis

Contingent claims approach is a risk-adjusted balance sheet framework where equity and risky debt of a corporation or financial institution derive their value from assets. In this framework, first proposed by Robert Merton (1973) and by Black and Scholes (1973), the total market value of assets of a firm or bank at any time is equal to the market value of equity and risky debt. Asset values are uncertain and, in the future, may decline below the point where debt payments on scheduled dates cannot be made. Debt is “risky” since there is a chance of default.

#### UK: Expected Default Probabilities by Industry

(Median, In percent)



Source: Moody's KMV.

In CCA, the equity and risky debt can be valued using finance techniques, i.e., valued using formulas for implicit call and put options, whose values are derived from assets, uncertainty of assets, and the promised debt payments. The value of risky debt is equivalent to the default-free debt minus the expected loss due to default. In CCA, the value of the equity is computed as the value of an implicit call option and the value of the expected loss due to default can be modeled with an implicit put option. The risk-adjusted balance sheet components can be calibrated by using forward-looking information from the equity market and information from the balance sheet to define the default barrier. The implied market value of assets and implied asset volatility are inferred from the market and balance sheet information; credit risk indicators can then be calculated, e.g. default probabilities and credit spreads. See Gray and Malone (2008) for a comprehensive analysis of the CCA framework.

The value of expected loss due to default can be modeled with an implicit put option and can be estimated using information from Moody's KMV implied CDS spreads and expected default probabilities inferred from market and balance sheet information.  $Loss = LGD * RNDP * B \exp(-rt)$ , where  $LGD$  is the loss given default (which is one minus the recovery rate),  $RNDP$  is the risk-neutral default probability.  $B$  is the default barrier, and  $r$  is the risk free rate.

Sources: Moody's and KMV.

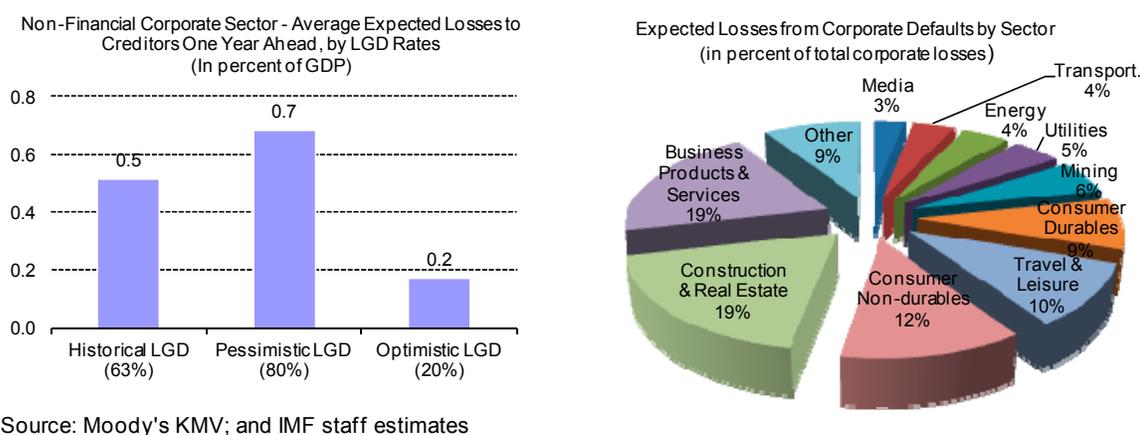
#### 34. Expected losses from corporate defaults appear contained relative to GDP.

Based on default probabilities inferred from equity price data as of February 2011, the listed corporate sector is estimated to incur losses amounting to about 0.5 percent of GDP (Figure 13). This loss calculation is based on historical LGD rates, which, in the case of

U.K. listed companies, is around 60 percent. With a lower LGD rate of 20 percent, corporate losses could be just 0.2 percent of GDP.

35. **Corporate losses are expected to be the largest in the real estate sector.** With higher than average default probabilities and historical LGD rates, construction and real estate is the most vulnerable sector, followed by business products and services (Figure 13). Overall, losses are expected to be larger in the nontradable sector. Breaking down the sample of listed companies by size shows that about three quarters of losses are expected to fall on small- and medium-sized firms.

**Figure 13. Contingent Claims Analysis of the U.K. Corporate Sector**



### C. Sensitivity Analysis of the Corporate Sector

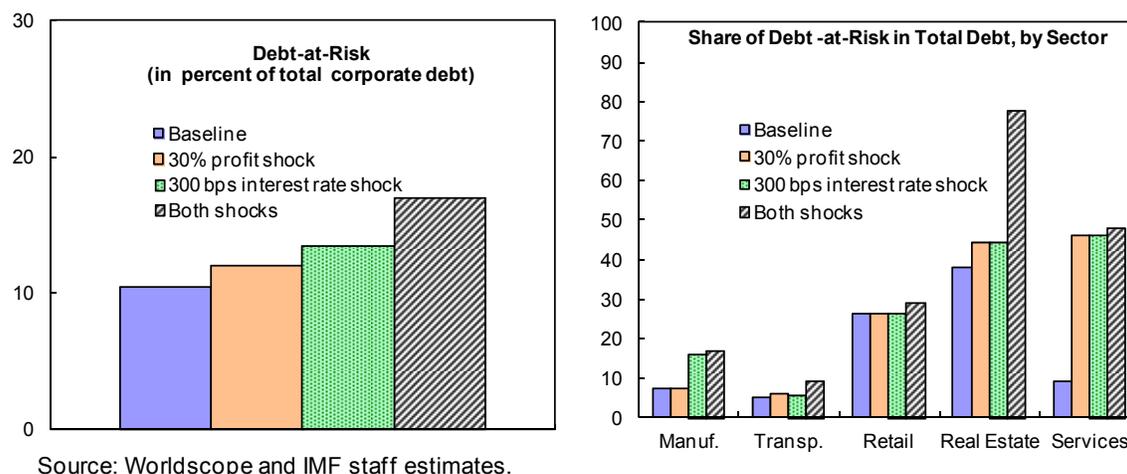
36. **This section examines how different types of shocks to the corporate sector would affect firms' viability.** Firms where earnings before interest and taxes are less than interest payments due (i.e., ICR less than one) are considered unviable and their debt "at risk." The objective of this section is to analyze how many firms would face financial difficulties when impacted by interest rate and profitability shocks. The results are expressed in terms of the debt of firms with ICR less than one, or in other words, the *debt-at-risk* as a percent of total corporate sector debt. The sensitivity analysis uses firm-level data from Worldscope. As in the sensitivity analysis exercise for households, corporate balance sheets at end-2010 are the starting point for the analysis. The results that follow are based on a partial equilibrium exercise, and, as such, should be treated with caution.

37. **The results suggest that the corporate sector as a whole is vulnerable to profit and interest rate shocks.** Nevertheless, the overall picture is not alarming as the increase in debt-at-risk is modest (Figure 14). In particular, a 300 basis points increase in interest rates would increase debt-at-risk by 3 percentage points, which is about the same increase observed during the crisis. In turn, a 30 percent decline in profits would increase debt-at-risk

by 2 percentage points. The combined shock would have a more than proportional impact, pushing debt-at-risk by 6½ percentage points.

38. **Macroeconomic shocks would exacerbate sectoral differences and further deteriorate the financial position of real estate companies, increasing the probability of default of those firms whose debt is at risk.** The main concern is that the large portion of CRE firms that are already facing financial difficulties go into actual bankruptcy. Furthermore, a big enough shock, such as the combined shock under consideration, would result in over three-quarters of construction and real estate companies becoming unviable. This would have a significant impact on the banking sector, given that these firms make up a disproportionate share of total bank loans. Indeed, the most vulnerable firms (real estate and construction) have mainly bank debt, while the stronger companies (manufacturing) have more nonbank debt. In contrast to what happened during the crisis, the retail sector appears relatively resilient to both interest rate and profit shocks, but the services sector would be particularly affected. The shocks would push the share of debt of firms with ICR less than one to almost 50 percent from 10 percent currently. Some sectors, such as manufacturing, are more vulnerable to interest rate increases than to profit shocks.

**Figure 14. Sensitivity Analysis of the U.K. Nonfinancial Corporate Sector**



#### IV. CONCLUSIONS

39. **The U.K. households remain heavily indebted and vulnerable to shocks, but on the whole the potential impact on banks appears to be manageable.** Though off its pre-crisis peak, household debt relative to disposable income remains high by both international and U.K. historical standards. This makes households vulnerable to income and interest rate shocks. Indeed, a very rapid normalization of interest rates to pre-crisis levels would have a large impact on household debt affordability, with negative implications for the economy. But the potential knock-on effect of these shocks on banks, albeit nonnegligible, would be mitigated, as most household bank debt is secured. Furthermore,

low-income households, which are most sensitive to interest rate and income shocks, account for a relatively small proportion of bank mortgage lending. These results are based on a partial equilibrium exercise and hinge on the assumption that the underlying asset value is not affected by interest rate and income shocks and, as such, should be treated with caution. If house prices fell simultaneously, banks' LGD would be much higher, as discussed below.

40. **At a more granular level, however, there are important vulnerabilities.** First, while unsecured debt is a relatively small share of bank lending, absolute losses from unsecured debt have so far surpassed losses from mortgage defaults, which have remained low relative to both those in the United States and to previous crises. Since low-income households account for a relatively large share of banks' unsecured lending, bank losses could jump if interest rates were to increase rapidly. Second, since the ratio of house prices to income remains significantly above the historical average, further sharp declines in house prices could have a major impact on household net worth, and, thus, the potential to inflict significant losses on the banks. Finally, some segments in the mortgage debt market appear vulnerable and negative shocks would especially affect borrowers with high LTV ratios and buy-to-let loans.

41. **The corporate sector weathered the crisis relatively well and leverage has subsequently declined and profitability strengthened.** The increase in the number of company liquidations during the crisis was moderate compared to previous crises and has been declining since late 2009, supported by the low interest rate environment. The sector as a whole appears relatively resilient to profitability and interest rate shocks. CCA, which combines balance sheet and equity market information to obtain forward-looking measures of the risk of default, also suggests that losses from corporate defaults one year ahead are expected to be limited.

42. **One important exception is the corporate real estate sector.** Both sensitivity analysis and CCA suggest that macroeconomic shocks would affect disproportionately this sector, which is still recovering from the impact of the crisis. Although the share of this sector in total corporate sector liabilities is relatively contained, it represents almost half of total bank loans to the nonfinancial corporate sector, and, thus, is an important potential risk for the banking system. Furthermore, a large share of loans is due to be refinanced in the next few years, and a large funding gap may arise if banks are less willing or able to roll over or restructure loans. The CRE companies remain exposed to further declines in commercial real estate prices. Despite the recent rebound, these prices remain substantially below their peak and many borrowers are in negative equity or in breach of LTV covenants.

43. **Financial distress and credit risks may be larger than suggested by the headline figures of write-offs and liquidations.** Two important factors are at play: lender forbearance and concentration of risks in some banks. Lenders forbearance has played a material role in containing defaults to date, particularly in the CRE sector, and may be

disguising the true extent of risks. Lenders are exercising forbearance by ignoring breaches in LTV covenants when borrowers continue to service their debt and by evergreening loans. While some degree of restructuring is acceptable for a reasonable period of time, it is unclear how widespread this practice is and whether it is masking true impairment, and whether restructures assets are properly accounted for and monitored. In addition, CRE lending is very concentrated, with a few big banks accounting for a large share of the outstanding debt. Banks with large exposures would thus be hard-hit if economic and market conditions were to deteriorate sharply.

44. **Furthermore, banks are exposed to the household and corporate sectors not just through loan portfolios but also through holdings of securities.** In the latter case, markets have tended to react much more quickly to changes in risk factors—higher interest rates, unemployment, changes in house prices—well before these factors have had any kind of impact on loan portfolios. This was, in fact, a key feature of the recent crisis, with its impact on residential and commercial mortgage-backed securities and consumer asset-backed securities.

45. **Finally, credit risks may also arise from banks' exposures to non-U.K. household and corporate sectors.** In particular, some banks have significant exposures to the residential and commercial property markets in the United States and some countries in Asia. Interest rate and house price developments in these markets could have implications for major U.K. banks' financial positions.