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REFEREED ARTICLE

COPING WITH THE CREDIT CRUNCH? A FINANCIAL APPRAISAL OF UK FARMING

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The seven sources of finance-related risk outlined by Harrison and Tranter (2989) are brought up-to-date, to conclude that UK farming is better placed now that it was in the late 1980s. However the mismanagement of the global financial markets, and the resulting credit crunch, have created new finance-related risks; (i) payback ability, (ii) adverse movement in land values, (iii) increased counterparty risk, (iv) dependency on increasingly transparent government subsidies, (v) additional exchange rate risk, (vi) threat to diversification and off-farm income streams, and (vii) a new wave of protectionism. The relative financial stability of agriculture may make it a target for a combination of tax increases and spending cuts as government strives to reduce its budgetary deficit.

Keywords: credit crunch, depression, UK agriculture, financial structure, risk, exchange rates

1. Introduction[1]

Despite high risk and uncertainty associated with farming, farm managers need to take decisions, so coping whilst basing actions on insufficient information is commonplace. An appreciation of this is critical to understanding farm-management decisions because each decision is part of a sequence that creates the future, and it is the accumulated effect of repeated choices which may have the most significant impact on overall business performance (Hardaker *et al.* 2004). Agricultural business managers therefore need to identify current sources of risk and how these sources change over time to evaluate how these changes might affect their decisions and coping strategies.

Several studies of the financial structure of UK farming were published in the late 1980s and early 1990s reflecting the downturn in the sector's fortunes at that time (Johnson 1986; Harrison and Tranter 1989; Johnson 1990; Harrison and Tranter 1994; Harrison and Tranter 1995). It is appropriate to return to this area of research as the UK enters the third year of the credit crunch[2] and with UK GDP having contracted by 0.1%, 0.6% and 1.8% in the second, third and fourth quarters of 2008 respectively, and by 2.4%, 0.6% and 0.4% in the first three quarters of 2009[3] (the European Commission forecast an overall decline of 3.8% in 2009). As "the UK economy is now clearly experiencing one of its worst recession in recent history" (Fildes 2009), and with most of the slowdown in economic activity occurring in the last quarter of 2008 and first quarter of 2009, the bulk of the setback in production will

1. This paper was written and finalised in autumn 2009. Inevitably, in the delay between completion and publication, the global economy has moved on. It is necessary to read it with this in mind; sovereign default and the pressure on the Euro, much talked about today, were rarely mentioned until recently. These developments suggest that we are far from over this crisis yet as the new government introduces the first of what is likely to be a series of public spending cuts.

2. The credit crunch is considered by many to have begun on 9th of August 2007 - the day the European Central Bank and the US Federal Reserve injected $90 billion (£45 billion) into financial markets (Elliott 2008).

3. The widely accepted definition of a recession is two consecutive quarters of negative growth in GDP (BusinessDictonary.Com 2010).

only be reflected in the statistics for 2009 (UNCTAD 2009: p 4), in which year UNCTAD predicts a 2.7% fall in global GDP.

The credit crisis poses additional financial risks to all businesses. The collapse of credit supply and financial asset prices in September 2008 meant that commercial banks had to recapitalise their balance sheets. They are doing this by selling toxic assets to government supported programmes or writing them off, by reducing lending and foreclosing on short-term, unsecured loans and recapitalising from current business, in part by failing to pass on low central bank interest rates and in part by increasing the fees charged to customers. This cutback in the provision of credit immediately translated credit risk into liquidity risk: many businesses which relied on short-term credit were forced to consider selling part of their assets in order to meet their short-term liabilities (UNCTAD 2009; Marshall 2009). For some sectors the reduced credit supply exerted additional downward pressure on asset prices, causing a further deterioration in the solvency of borrowers and additional loan foreclosures (UNCTAD 2009: p 14).

To pay back the unprecedented stimulus packages, monetary policy easing and support for ailing financial institutions was introduced by the UK government (ONS 2009). One result of which is that the UK public sector net debt is forecast to keep increasing as a share of national income until 2015-16 whilst the annual public sector budget deficit (PSBD) is halved over the four years from 2010/11 (H M Treasury 2009). Future spending plans are "so tight that all major spending departments are likely to be affected" (IFS 2009 p 182). Under the existing Spending Review, the Department of Environment, Food and Rural Development (DEFRA) received a real cut in spending of about 1.8% (2007/08 to 2010/11). If there is no real growth in total department expenditures other than where automatic stabilisers become effective (such as expenditure to fund rising unemployment), and assuming the financial cut-backs are shared equally, DEFRA will experience a 4% real cut in its departmental expenditure limit (between 2011/12 and 2013/14) (IFS 2009: p 182-183).[4]

This is the macroeconomic context against which the financial performance of the agricultural sector must be assessed. To assess the current financial structure of agriculture, this analysis takes as its starting point an updating of the "seven sources of growing risk in UK agriculture" identified by Harrison and Tranter in 1989, to see which of these remains a concern today. Section three presents seven current and emerging sources of risk to the agriculture sector. Section four concludes.

2.Updating Harrison and Tranter's growing sources or risk in UK agriculture

One approach to determining the current financial status of the UK agricultural sector is to compare current levels and trends in values of selected financial data against their historical level. This is the methodology adopted in this analysis. It takes as its starting point Harrison and Tranter's (1989) seven

4. These forecasts of revenue and expenditure are based on the UK economy growing by 1.25% in 2010 (H M Treasury 2009:p 18).

growing sources of risk, and updates them as far as it is possible to do so, to identify which, if any, are currently sources of risk to UK agriculture.

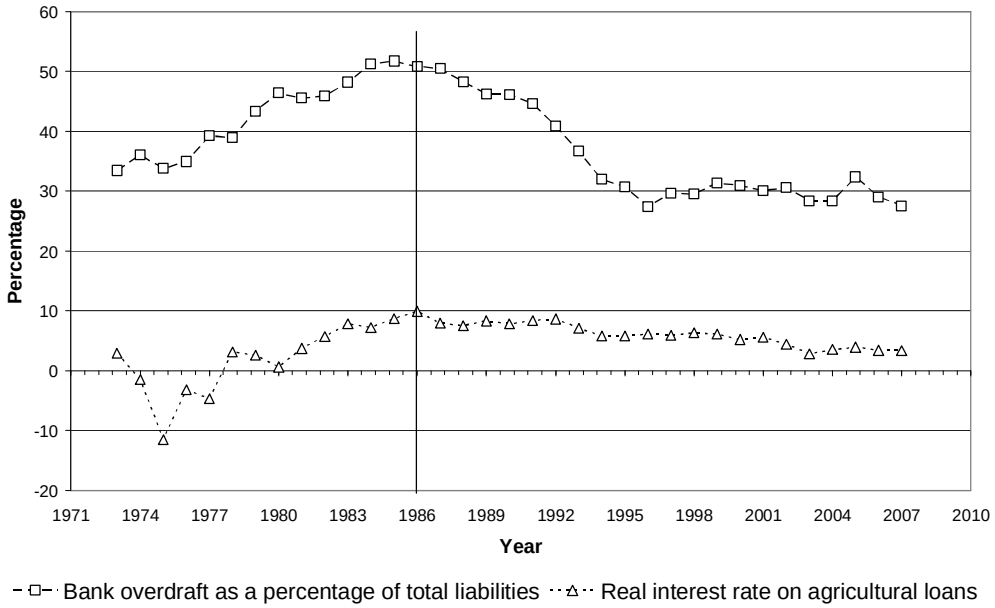
2.1 High interest rates, with a growth in exposure to variable interest rates.

Figure 1 shows the change in the percentage of liabilities held as bank overdraft and the trend in real interest rates. Bank overdrafts are more risky than long-term loans because they are subject to variable rather than fixed interest rates and foreclosure at short notice. The percentage had fallen to 28 in 2007 as farmers rebalanced their debt structure. Although there has been a 22% reduction from the peak in 1985, because total liabilities have increased the value of loans held as bank overdrafts has reduced by only 15%, £543 million from £3.56 billion to £3.06 billion. So a considerable sum of borrowing is still held on short-term, unsecured loans. Therefore, UK agriculture would still be badly affected should banks foreclose on these loans.

Nominal interest rates continued to rise through 1986 until 1990, by which time real interest rates had started to fall. By 2007 the nominal and real cost of borrowing, at 7.6 and 3.3% respectively, represent a long-term low, reducing the debt burden on businesses, whilst still delivering a real return on savers' bank deposits.

Total loans advanced to UK farming increased sharply up to 1985 thereafter they continued to rise but at a slower rate (Figure 2). In 2007 liabilities reached £11.1 billion, an increase of £4,026 billion (57%) over the 1986 level[5]. However, total farm asset values have also increased. In 1986, the

Figure 1 Trends in bank overdrafts and real interest rate.



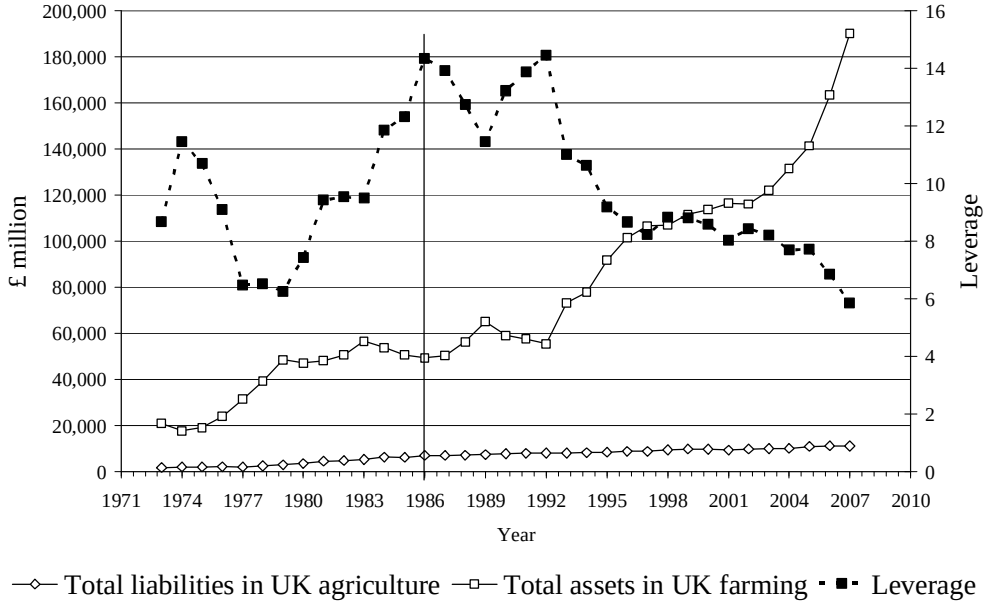
(Source: Table 9.3. Aggregate balance sheets for agriculture: United Kingdom, and Table 9.6 Interest; United Kingdom, both in Agriculture in the UK (DEFRA 2009b)).

5. All data used in this analysis are current values unless stated.

value of assets held by UK farming had remained at about the same level for 7 years, and they had returned to this level by 1992, the year in which leverage (the ratio of total debt to total assets) peaked at 14.5%. Thereafter, asset values increased faster than liabilities, and leverage fell, so that by 2007 total liabilities comprised 5.85% of assets which were estimated to be worth some £190 billion. This relatively strong balance sheet appears to offer some protection against the threats emerging from the macroeconomic environment.

However, much of the increase in asset values arose from the growth in farmland values, little through reinvestment in other farming capital. In the ten years up to 2008 the net stock of capital assets fell by £2,371 billion. Due to this prolonged period of low profitability, depreciation (a positive cash flow item) was largely used to meet living expenses rather than being reinvesting in new equipment and buildings. This trend was reversed in 2007 and 2008, when profits recovered principally because of the commodity price boom, and in 2008 investments raised the net stock of capital assets by £466 million as farmers replaced worn out equipment and dilapidated buildings[6].

Figure 2 Trends in total assets and total liabilities in UK farming, and leverage.



(Source: Table 9.3. Aggregate balance sheets for agriculture: United Kingdom; Agriculture in the UK (DEFRA 2009b)).

2.2 Withdrawal of institutions from land purchase.

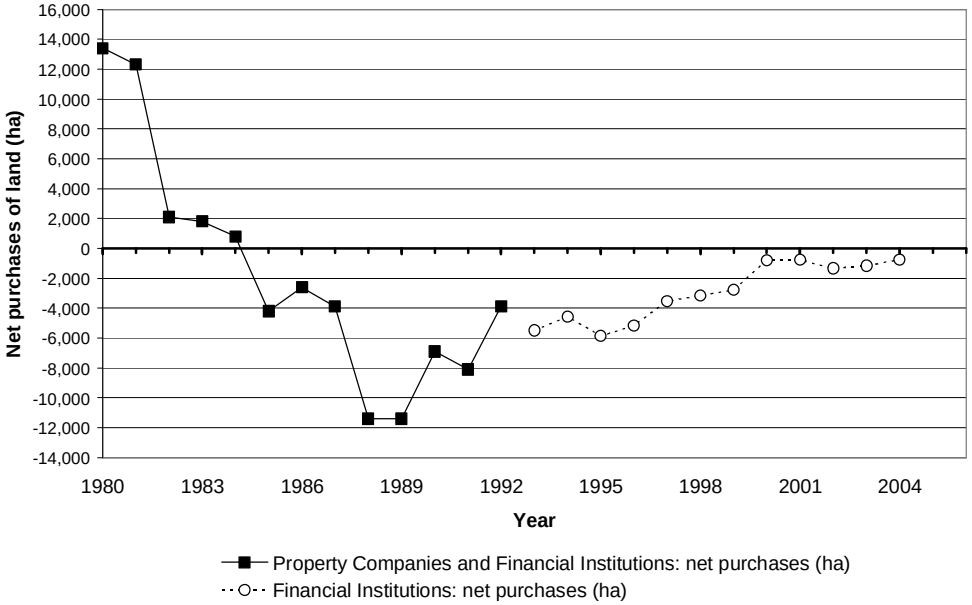
This is a risk to farming because it reduces opportunities "for farmers to sell land and lease it back in order to rid themselves of excessively heavy debt service burdens" (Harrison and Tranter 1989: p 61). Figure 3 shows how this trend has developed since 1986. The rate of disposal of farmland by financial institutions has slowed over the years but they remained net disposers in each

6. In the decade leading up to 1986 net stock of capital increased by £524 million, though in 1986 itself net stock decreased by £337 million (all current prices).

year up to 2004, the last year for which this data series is reported. In that year financial institutions purchased only 67 and sold only 811 ha of land.[7]

Data after 2004 are available from the Royal Institute of Chartered Surveyors (RICS)[8]. In 2007 the largest purchasers of farmland was 'Individual Farmers', their share of all buyers in the second half of 2007, both halves of 2008 and the first half of 2009 was 50%, 56%, 60% and 62% respectively, with a reduction in demand for farmland from life-style buyers as the credit crunch deepened. As farmers purchased land, on the back of a sharp increase in commodity prices and with the continued willingness of banks to lend to agriculture (RICS July-Dec 2008), land values jumped by an average of 24%, from £10,439 to £12,965, in the first half of 2008 (RICS Jan-June 2008)

Figure 3 Net purchases of land (ha) by 'Property Companies and Financial Institutions' (1980-1992) and by Financial Institutions (1993-2004).



(Source: Agricultural Land Sales and Prices in England, (DEFRA 2006), and Royal Institute of Chartered Surveyors (RICS various)).

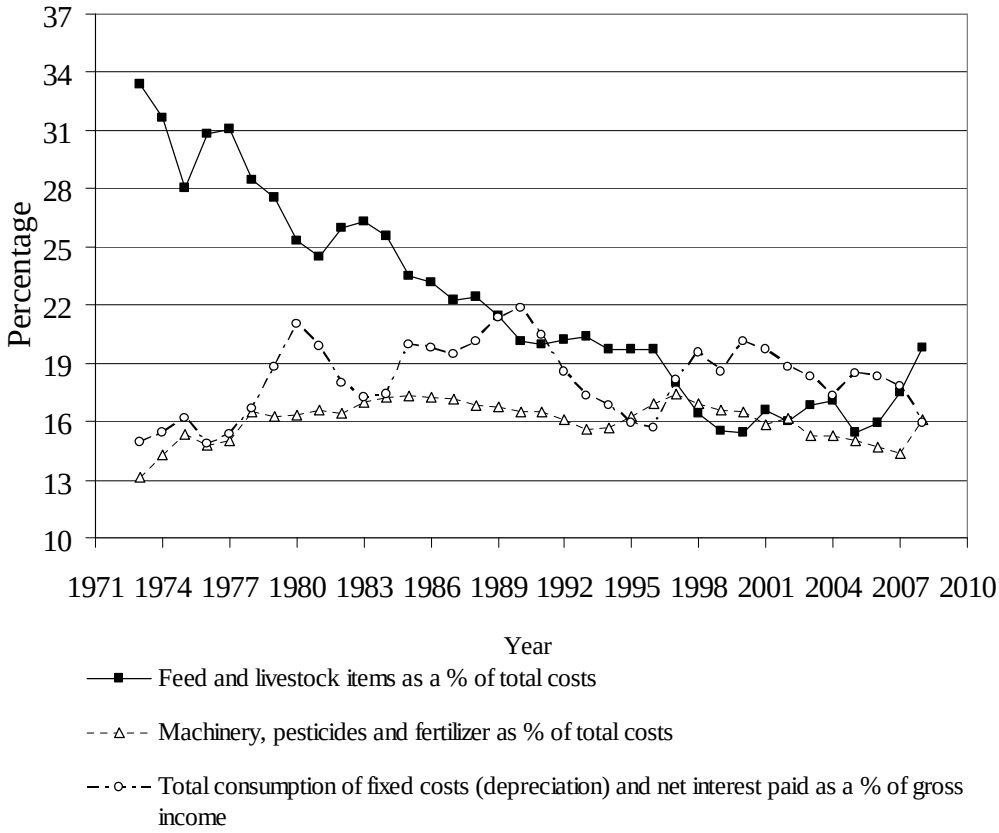
2.3 Increased dependency on purchased inputs and reduced possibilities of substituting family labour for wage labour.

Harrison and Tranter identified three series that showed an increased dependence of agriculture on inputs purchased from the rest of the economy. This they report, makes farming "subject to additional price risks, and farmers are increasingly unable to substitute low-cost family labour inputs for them - the traditional belt tightening exercise associated with family-farming" (p. 63). The evolution of these three series up to and beyond 1986 is shown in Figure

7. This data was collected by the Valuation Office Agency (VOA) and reported by DEFRA.
8. RICS publishes information, initially quarterly but since the second half of 2006 biannually, on land purchasers' background (RICS various).

4. The shift away from feed and livestock enterprises towards crop based ones has continued since 1986. To some degree, this shift is related to the incidences of farm animal diseases; for example the substantial drop in 1996 coincided with reports that BSE could be transmitted to humans by eating infected meat. Other major and costly farm-animal diseases - such as Food and Mouth Disease (outbreaks in 2001 and 2007) and pig diseases - have further reduced livestock numbers[9]. The reversal of this trend in recent years reflects the increase in livestock feed costs as a result of the boom in wheat and barley prices. The evolution of this series since 1986 suggests, from Harrison and Tranter's perspective, an increase the sector's price risk.

Figure 4. Feed and livestock items as a percentage of total costs, machinery, pesticides and fertilizer as a percentage of total costs and depreciation as a percentage of Total Income from Farming.



(Source: Index of the purchase price of the means of agricultural production (United Kingdom), and Index of the producers price of agricultural products; (United Kingdom) Agriculture in the UK (DEFRA 2009b)).

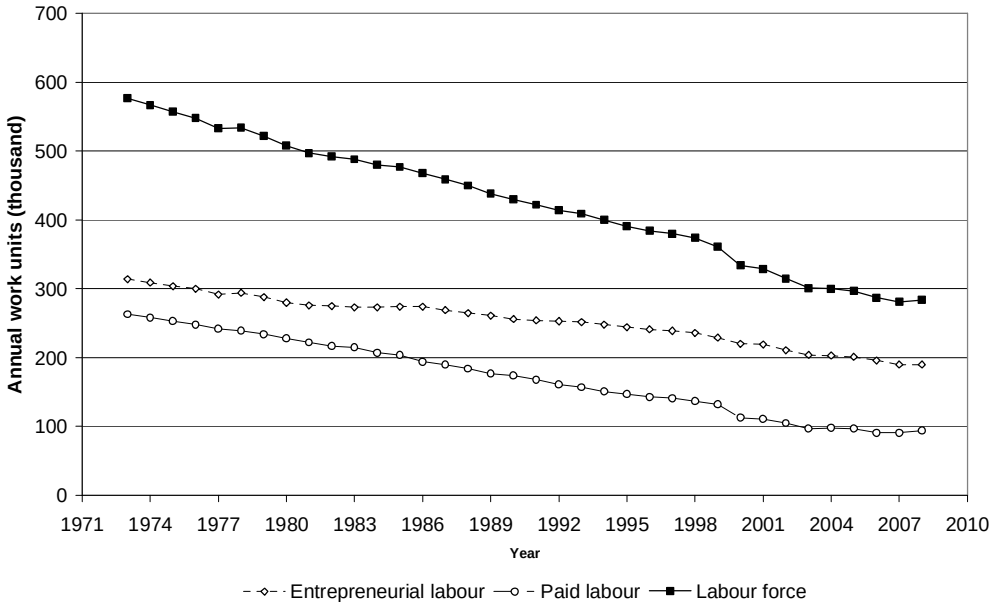
The dependency on mechanical and chemical inputs declined steadily after 1986, increased in the mid 1990s, and then fell once more, to 14.4%, in 2007. This variability is connected to changes in agricultural policy support

9. Particularly porcine postweaning multisystemic wasting syndrome (PMWS) and porcine reproductive and respiratory syndrome (PRRS).

payments, the introduction of agri-environment schemes, set-aside (which removed a variable percentages of arable land from production each year between 1995 and 2007), and will also have been influenced to some extent by the growth in the area of registered organic farmland. Figure 4 also shows the trend in depreciation and net interest payments as a percentage of gross income (defined as the total value of crop and livestock, and all support payments). These continued to increase after 1986 to peak at 21.9% in 1990, the year when net interest payment was at its highest. This series shows some volatility as market output value, support payments and interest repayments varied, but it has declined steadily since 2005 to 15.9% in 2007. The fall in these two series since 1986 indicates a reduction in the sector's risks related to its dependency on inputs purchased from the rest of the economy.

Of particular concern to Harrison and Tranter was farmers' increasing inability to substitute low-cost family labour inputs for waged employment, one of the "traditional belt tightening exercise associated with family-farming" (Harrison and Tranter 1989: p 63). Figure 5 shows the reduction in both family and employed labour in farming has continued after 1986. As the proportion of the workforce with an equity interest in farming increases and wage employment falls, so the ability to substitute between family and waged labour reduces still further. However, this also means that a larger proportion of total labour costs (waged and farmer and spouse, and others with an equity interest in the farm's drawings) is paid to workers who might be more willing to forego payment of their salary to help overcome a short-term liquidity crisis. So the decrease in waged labour is off-set by this additional flexibility.

Figure 5. The reduction in labour use, highlighting the fall in paid labour.



(Source: Table 3.8 Labour force in agriculture, United Kingdom, Agriculture in the UK (DEFRA 2009b)).

2.4 The continuing deterioration in the sector's terms of trade.

Harrison and Tranter (1989) note that in the years leading up to 1986 "inputs are costing more and products are commanding lower prices" (p 63), leading to a deterioration in the sector's terms of trade. Table 1 compares the change in input and output prices and the sector's terms of trade in the four years prior to 1986 and 2008. The earlier period recorded a decline in the terms of trade by 8.5 points as input prices increased faster than output prices to squeeze farm profitability. This compares with the 0.2% change in the four year period leading to 2007, suggesting no cost-price squeeze.

However, during this time input prices increased by 48% and output prices by 46%. These substantial movements suggest the timing of input purchases and sale of product has become more critical putting additional pressure on farmers with limited working capital, whilst farmers with access to savings or credit might benefit by buying inputs before selling outputs if they believe that to be the most beneficial trading strategy.

Table 1. Comparison of input and output indices and terms of trade 1982-1985 and 2005-2008.

	Change in input index	Change in output index	Change in terms of trade	standard deviation	Mean	CV
1982-1985	15	4	-8.5	3.81	97.8	3.89
2005-2008	48.1	46.2	0.2	1.58	96.3	1.64
(Source; Table 9.6 Interest; United Kingdom. Agriculture in the UK (DEFRA 2009b).)						

2.5 Increase variability of farm product prices.

A comparison of the coefficient of variation (standard deviation divided by mean price) of 13 items in each of the two three year periods, 1976-78 and 1984-86, allowed Harrison and Tranter (1989) to conclude "farm product prices are more volatile than they were 8 to 10 years ago" (p. 63). Their analysis revealed that "only 3 product groups (fresh fruit, flowers and plants, and eggs) had a narrower spread of prices in the later period than the earlier" (p. 63-64). However, they found that "quite the opposite appears to have occurred on the factor side" (p. 64), with only energy, fertilisers and seed showing more variable price movements between 1984 and 1986 than between 1978 and 1980. With higher variability in product prices but lower variability of factors, Harrison and Tranter concluded that "the evidence relating to price variability is not clear cut" (p. 64).

Table 2 reproduces their analysis, comparing the coefficient of variation for product and factor input prices for two periods, between 2001 and 2004 and from 2005 to 2008. For nine of eleven product prices the coefficient of variation has increased and the index of "total of all products" has increased from 3.8 to 16.3. Seventeen of the nineteen factor input prices also have increased coefficient of variation and the index of "all means of agricultural production" has increased from 4.04 to 16.33: a similar increase as the "total

of all product" index. Fertilizers, animal feeding stuffs and 'energy and lubricants' reported the largest volatility in the most recent period, inputs for which substitutes are not readily available.

The nature of the risks related to terms of trade appears to have changed. Farmers have passed on some of the benefit of higher commodity prices to input suppliers, and though they have avoided the price squeeze of the 1980s they face significant risks related to asymmetric price adjustments: should output prices fall whilst input prices remain high, the sector may experience a sudden and extreme adverse shift in its terms of trade.

2.6 Series that cannot be updated due to lack of comparative data.

Two of the seven sources of growing risk were derived from a large-scale survey of farms, confirmed by bank managers. Similar survey data is not available so it is not possible to compare Harrison and Tranter's findings with current conditions. However, some useful comments and comparisons can be made. The two series are:

> (1) a diminishing of within-the-family funding sources increases the splitting-up farms on the death of the owner, and
>
> (2) an increased annual volatility of farm incomes.

2.6.1 Diminishing within-family funding sources

Harrison and Tranter reported that "the years of rapidly rising land values – and of prices generally – caused many members of farming families (often brothers and sisters) who had been left farm assets, under terms which excluded them from equity participation and therefore capital gains on them, to demand that their shares be paid in cash" (Harrison and Tranter 1989: p 61-63). One result of this, they conclude, is that "farmers' debt levels are higher than they would otherwise have been" having "been compelled to borrow from higher cost sources than the low-cost, within-family ones they enjoyed in earlier years, when family ties were stronger and less influenced by narrowly commercial considerations" (p 63).

There are no reasons to believe that motivations of family members who have been left farm assets have changed, and as asset values have increased more rapidly recently than in the early 1980s, these incentives to extract equity most likely remain, and indeed to have increased in recent years. However, easy access to cheap loans characteristic of the 2000s would have decreased the costs to the continuing farmer of paying out family members thus decreasing the impact of this source of risk today.

2.6.2 An increased annual volatility of farm incomes.

Harrison and Tranter's (1989) conclusion that year-to-year variation in farm incomes had become more volatile in the period from 1981 to 85 compared to the period between 1976 and 1980 is based on comparing the coefficient of variation of 150 individual farms. Table 3 examines a related, but by no means identical issue, the change in coefficient of variation of Total

Table 2. Change in coefficient of variation of agricultural product prices and factor inputs (between 2001-2004 and 2005-2008).

Agricultural products

	Total of all products	Crop products	Cereals	Potatoes for Consumption	Animals & animal products	Animals (for slaughter and export)	Cattle	Pigs	Sheep	All Poultry	Milk	Eggs
CV (2001-2004)	3.84	4.23	7.58	20.24	3.79	4.61	5.05	4.79	12.04	1.67	4.94	12.55
CV (2005-2008)	16.31	18.90	34.27	18.27	15.01	13.61	15.84	9.56	10.15	16.04	17.55	16.53
Change in CV	12.47	14.67	26.70	-1.97	11.23	9.00	10.78	4.78	-1.89	14.37	12.62	3.99

Factor inputs

	All means of agricultural production	Goods and services currently consumed	Seeds	Energy and lubricants	Fertilisers and soil improvers	Straight Nitrogen[1]	Triple Super Phosphate	Potassic	Compound Fertiliser	Other Fertiliser
CV (2001-2004)	4.04	4.29	3.97	7.01	7.15	8.89	5.86	4.55	6.00	1.57
CV (2005-2008)	16.33	17.87	18.48	21.53	53.73	42.30	75.37	71.44	65.51	6.04
Change in CV	12.29	13.58	14.52	14.52	46.57	33.41	69.51	66.89	59.51	4.47

	Plant protection products	Animal feedingstuffs	Maintenance and repair of plant	Maintenance and repair of buildings	Veterinary services	Other Goods & Services (General expenses)	Goods & services contributing to investment	Machinery and other equipment	Buildings	Engineering & Soil Improvements
CV (2001-2004)	2.38	3.33	7.00	4.59	3.05	4.66	2.32	0.99	5.73	4.56
CV (2005-2008)	2.81	23.71	6.40	8.27	3.50	3.60	4.24	6.88	7.95	4.89
Change in CV	0.43	20.38	-0.60	3.68	0.45	-1.05	1.93	5.89	2.21	0.33

CV = coefficient of variation (=(standard deviation/mean price)*100)
(Source: DEFRA (2009a) Index of producer prices of agricultural products: UK)

	standard dev	Mean	CV		standard dev	Mean	CV
1982-1985	439.02	1,871	23.4612	1981-1985	326.38	1,618	20.17
2001-2004	500.64	2,335	21.4453	1973-1985	564.62	3,064	18.42
2005-2008	576.21	2,604	22.1320	1995-2007	1202.95	2,277	52.83

(Source: Chart 2.1 Long-term trend in farming incomes in real terms (at 2008 prices), Agriculture in the UK (DEFRA 2009b)).

Income from Farming and Cash Flow measured at the sector level for three periods; between 1982 and 1985, from 2001 to 2004, and from 2005 to 2008. The comparison shows little difference in the co-efficient of variation in TIFF between the three four year periods, but Cash Flow has a considerably higher coefficient of variation in the most recent period. To a large extent this is due to the difficulties experienced in the first year of the Single Farm Payment Scheme (2005/06) when many farmers had to extend their borrowing facilities to tie themselves over this period. This liquidity problem arose directly from changes to agriculture specific policies but confronting a similar cash shortfall – from whatever source - would pose considerable more problems in today's economic climate.

Table 3. Coefficient of variation for Total Income from Farming, and Cash Flow.

Total Income from farming				**Cash flow**			
	standard dev	Mean	CV		standard dev	Mean	CV
1982-1985	439.02	1,871	23.4612	1981-1985	326.38	1,618	20.1719
2001-2004	500.64	2,335	21.4453	1973-1985	564.62	3,064	18.4291
2005-2008	576.21	2,604	22.1320	1995-2007	1202.95	2,277	52.8307

(Source: Chart 2.1 Long-term trend in farming incomes in real terms (at 2008 prices), Agriculture in the UK (DEFRA 2009b)).

2.7 Summary.

Some of the risks identified by Harrison and Tranter in 1986 have reduced, some have altered in ways that make any net change in risk difficult to assessed, and some have increased. Those to have decreased include; (i) a stable and lower interest rate, (ii) the lower percentage and total amount of borrowing held as bank overdraft, (iii) the level of asset values, which means that although total liabilities have increased, leverage at 5.85% is nearly 10 points less than in 1986, and (iv) terms of trade have ceased moving against the sector.

The evidence related to dependency on inputs from outside agriculture is mixed. The decline in the livestock sector represents a reduced opportunities for farmers to add value to the arable enterprises, but the share of purchased chemical and fertilizer inputs to total costs has declined as has total consumption of fixed costs as a percentage of gross income. And the increase in the proportion of the workforce with an equity share in the farm suggests on the one hand less substitution possibilities, but it also means a larger proportion of the workforce might be more willing to forego a proportion of their salary; this net effect of these counter-balancing changes may well may a reduction in farming's liquidity risk (i.e. a higher proportion of total labour (waged and unwaged) costs can be deferred at least in the short-term).

Some of the series continue to be sources of threat to farming. For

example, total borrowing has increased by 57% since 1986, and although lower interest rates have reduced the costs of borrowing, this increase results in the relatively small reduction of interest repayments of £137m (from £762 million in 1986 to £625.2 million in 2008). This is still a substantial sum, and calls into question the ability of the sector to service these loans should the interest rate increase. The data also indicate a continuing absence of financial institutions in the land market. Most land purchasers in recent years have been farmers, and whilst this suggests valuations are based on farmland's contribution to expected farm profitability, the reduction in sale-and-lease-back opportunities removes one route to restructuring farm debt. Whilst the terms of trade has ceased to move against farming, removing this as a source of cost-price squeeze on profits, recent years have seen a steep increase in both input and output prices, increasing liquidity risk. In recent months output prices have returned towards their long-run means, so if input prices remain high or are slow in adjusting downwards, farming will be faced with a sudden adverse movement in its terms of trade. Any pressure on profitability will reduce the sectors debt service possibilities.

These data reflect the influence of events and policies, for example, animal diseases and epidemics. As these are largely unpredictable events and generally beyond the control of individual farmer's, they will act to increase the production and financial risk associated with livestock[10]. As agriculture looks forward it can identify other policy, production and technical changes that may affect its portfolio of risks. For example the recent proposals to ban selected pesticides may increase production risks associated with arable cropping (Rickard 2008).

3. Current finance-related sources of risk in UK Agriculture

The previous sector explored the financial pressures on the agricultural sector in 1986 as interpreted by Harrison and Tranter. This section identifies seven sources, and growing sources of financial risk which are likely to influence the agricultural sector over the next 5 to 10 years. What ties them together is that they are all linked to the credit crunch. Some directly, such as increase in interest charges, and some indirectly, such as growth in land values as money looks for a safe haven. The extent to which each develops as a risk will largely be influenced by the severity of the current financial crisis, for example, the prospect of protectionism is more likely if financial crisis spreads further through the banks and causes countries to default on their national debt[11].

3.1 The growth in land values

An asset bubble occurs when there is trade in high volumes and at prices that are considerably at variance with intrinsic values. It was the easy credit that was partly to blame for the bubble in stock and shares and house prices,

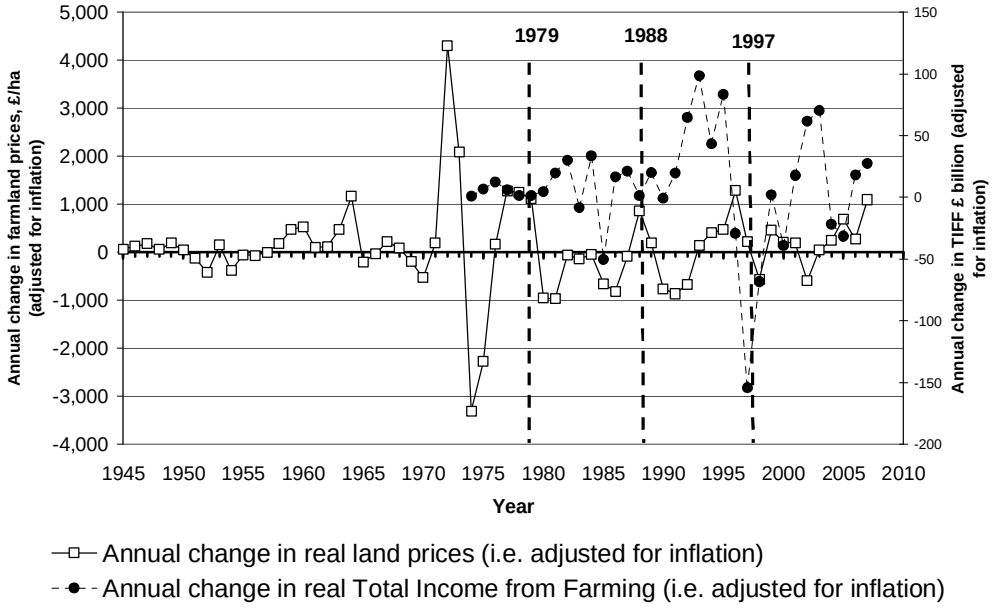
10. At least to the extent that the affected farmers are not fully compensated for their losses.
11. This paper was completed in the autumn of 2009, before the pressures on the Euro arising primarily from the Greek, and to a lesser extent the Spanish and Portuguese, sovereign debt crisis. It therefore has not considered any possible impact of the demise of the Euro as a European currency.

and there must be a danger that the years of easy access to cheap loans have generated a bubble in the farmland market even if the recent preponderance of farmer purchasers suggest that farmland is valued according to profit expectations based on buoyant commodity prices.

Figure 6 shows recent cycles in farmland value, measured as annual change in real farmland prices (£/ha), and the annual change in real Total Income from Farming (TIFF), measured in £ billions. As the majority of farmland purchasers are working farmers, farmland's intrinsic value is best calculated as the present value of the expected future profitability of farming[12]. Figure 6 shows four periods of growth in land price, 1971-3, 1977-9; 1988 and 1994-7, each followed by years of negative growth as the markets readjusted their expectation. The growth in farmland prices between 1993 and 1997 followed several years of high TIFF, the readjustment in 1998 follows a substantial drop in TIFF, evidence of the linkage between farmland prices and farming profitability, which suggests the growth in the preceding years was based on agricultural profitability, and so do not represent asset price bubbles.

The recent increase in land values between 2003 and 2007 also followed several years of increased TIFF, with the slower growth in 2006 reflecting reduced growth of farming profitability. This provides additional evidence that

Figure 6. The annual percentage change in real farmland price and Total Income from Farming.



(Sources: Table 4.3 Agricultural Land Prices, Agriculture in the UK and Chart 2.1 Long-term trends in farming income in real terms (at 2008 prices); United Kingdom (various, DEFRA 2009b)).

12. Traditionally the intrinsic value of land has been considered the expected agricultural net rent. But this is related to the profitability of farming through time lags dictated by agricultural tenancy legislation. As most land is purchased by owner-occupiers, its net value to the farmer is directly related to the expected increase in profitability to the purchaser. So Total Income from Farming (TIFF) is a suitable measure of its expected intrinsic value to the sector.

farmland values over this period have remained linked to farmers' expectations of the profitability of farming. Therefore, any future fall in TIFF would most likely be reflected in a reduced rate of growth, or fall in farmland values.

However, a recent analysis of commodity markets (UNCTAD 2009: p 53-84) suggests the extreme scale of recent changes in primary commodity prices (the price boom between 2002 and mid 2008 was followed by a decline across all major categories of commodities) was largely driven by a major new element in commodity trading over the past few years, namely financial investors treating commodities as an asset class. The speculative activities of financial investors that are active in both financial and commodity markets appear to have influenced price movements to higher or lower levels that those dictated by market fundamentals[13]. If this is the case, then whilst farmland values may be based on expectations of the profitability of farming, because these expectations are in turn based upon a bubble in commodity prices, farmland may be overvalued. It is difficulties such as these that make differentiating between an asset bubble, a bull market and a boom difficult - and often conclusive identification is only possible in retrospect when a sudden drop in prices appears and the market crashes, and the more speculative gains are quickly wiped out.

3.2 Payback (profitability, cash flow and interest charges).

The importance of the debt-to-asset ratio (Figure 2) is clear as it is used in the context of evaluating insolvency. However, Penson (1987), analysing US agriculture, noted that farmers' ability to service their farm debt was deteriorating long before the debt-to-asset ratio began to rise in the 1980s. He concluded that when used by itself this ratio is a "poor indicator of farm cash flow problems before they become insolvency problems" (p 15). He suggests three ratios to use to predict exposure to increased leverage;

- Times Interest Earned ratio (TIE), dividing total earnings before interest and tax (TIFF plus net interest plus rent paid) by total (net) interest payments;

- Financial Leverage Index (FLI), dividing the rate of return (TIFF as a measure of return) on equity capital (sector net worth) by the rate of return on total capital; and

- Debt Burden Ratio (DBR), dividing net cash farm income by total farm debt.

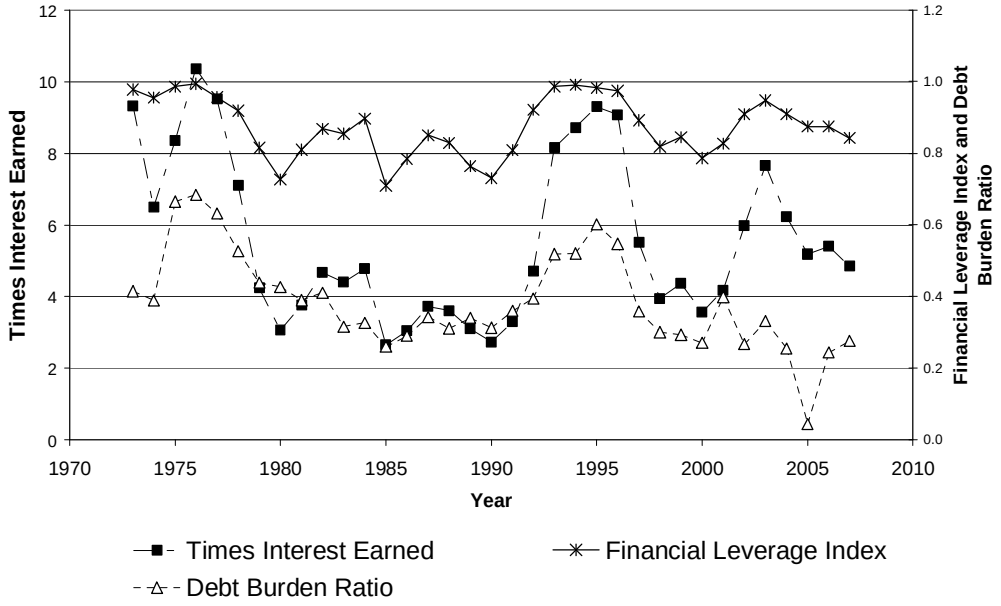
These indices are shown for UK agriculture from 1973 to 2007 in Figure 7. The TIE ratio has fallen from nearly 8 (in 2003) to less than 5 (2007) which shows that interest payments have risen as a proportion of farm sector profit.

13. "The fact that these market participants do not trade on the basis of fundamental supply and demand relationships, and that they hold, on average, very large positions in commodity markets, implies that they can exert considerable influence on commodity price developments" (UNCTAD 2009: p 54).

There has also been a fall in the FLI since the mid 1990s, showing that returns to agricultural assets have fallen in comparison with the costs of borrowing. DBR has also fallen in most years since 2001 (though the 2005 value is an anomaly due to the delay making the first Single Payment Scheme payment), showing the reduced ability of the sector to service its interest payments.

Whilst UK agriculture has substantial equity, the three debt-service ratios in Figure 9 indicate an increasing weakness in its ability to service borrowing from farm profits and cash flow. Though the current Bank of England interest rate is low, these rates have not been entirely passed on to commercial loans as banks seek to recapitalise their balance sheets. These indices therefore, suggest reasons for concern if pay-back becomes even more problematic and for DBR and FLI at least, approach long-term lows. In the event that banks call in more of their short-term loans or interest rates rise (to help the recapitalisation process or to reduce expectations of inflation), farmers may need to sell assets to repay loans and principal, which would most likely reduce the growth in farmland prices.

Figure 7. Trends in leverage and other financial ratios.



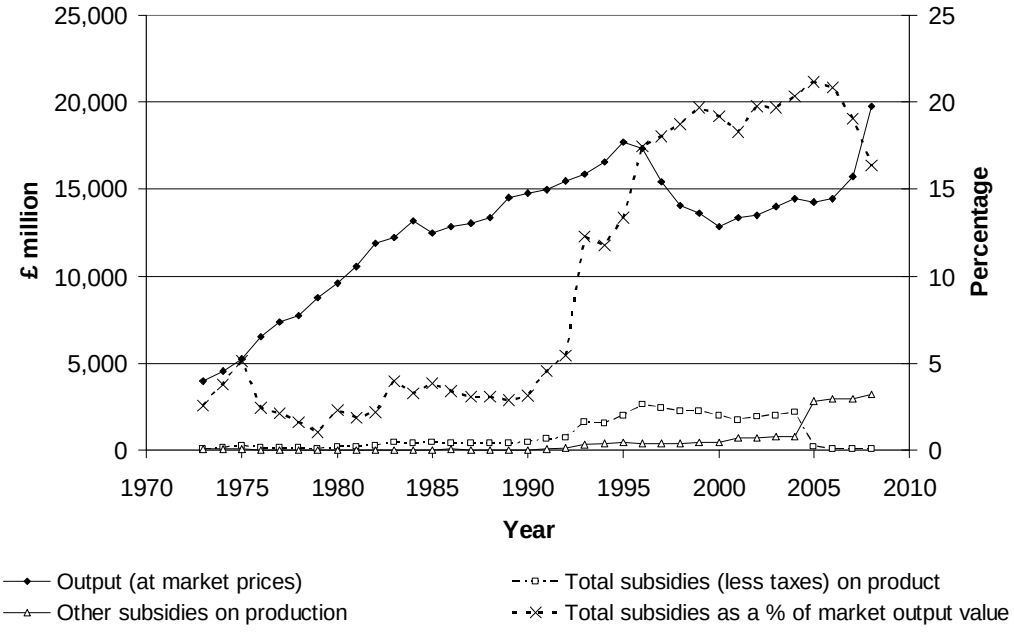
(Source: calculated from various tables reported in Agriculture in the UK (DEFRA 2009b)).

3.3 Agriculture sector policy risk.

Policy affects production and changes in policy have helped empty cereal, butter and skimmed milk intervention stores, as the intervention price was reduced when the Single Payment Scheme (SPS) was introduced. Figure 8 shows the evolution in the dependency of the agriculture sector on government support payments. The substantial decrease in proportion of agricultural commodities and increase in the proportion of subsidy payments after 1992 is

explained by MacSharry's reforms, and the shift in 1996 by the BSE crisis. In 2005, the switch to decoupled support payments (the Fischler reforms) moved the bulk of this support into transparent SPS payments (Franks 2006). In 1986 direct support payments represented only some 4% of the total value of farm produce, by 2007-8 it was in excess of 15% (down from its peak of 21% in 2005) (own calculations from Table 10.3 (Costs and volumes of labour engaged in agricultural work (a)); United Kingdom (DEFRA 2009b)). The recent fall is largely a result of the global commodity price boom, and the proportion of support payments to total output is likely to increase when market prices return to their pre-boom long-run average.

Figure 8. Total subsidies paid to agriculture as a percentage of value of agricultural output (at market prices). (Total subsidies (less taxes) on product are payments linked to the production of agricultural products. "Other subsidies on production" include payments not linked to production from which agricultural producers can benefit as a consequence of engaging in agricultural activities e.g. Single Payment Scheme, agri-environment schemes).



(Source: Table 9.3 Aggregate balance sheets for agriculture; (United Kingdom) Agriculture in the UK (DEFRA 2009b)).

The SPS in England sets out future support payments, in Euros, up to 2012. This helps cash flow planning and so reduces financial risk, but there has been an increasing dependency on government subsidies since 1986, and the SPS has, importantly, also introduced a new type of risk to agriculture; because of their transparency, payments made to each farm business can be identified and recorded separately (FarmSubsidy.org 2009). This allows policy makers not only to question the notion that all farm businesses require support, but makes action to, for example, cap the payments made to individual farms,

administratively possible. Moreover, the recent switch in DEFRA's preferred measure of on-farm profitability, from Net Farm Income to Farm Business Income, also makes targeting agricultural support payments to households with agricultural incomes below some agreed level easier (Franks 2009a).

3.4 Exposure to exchange rate risk.[14]

SPS payments and commodity intervention support prices are set in Euros (before 1st Jan 1999 in ECUs), so payments in sterling have depended partly on the exchange rate, and partly on agricultural policies, such as agri-monetary compensation, modulation and financial discipline. Figure 9 shows the trends in sterling exchange rate against the Euro and US dollar. After several years of largely stable and slightly rising exchange rates, sterling steadily depreciated against the Euro for two years from mid 2007, thus increasing the value of SPS payments - a 5% shift in the £/Euro is reckoned to change UK total income from farming by £0.3 billion or 15% (Working Group on Risk Management 2003: p 4). However, the recovery in early 2009 suggests at least a temporary end to this windfall benefit. Figure 10 illustrates the impact of variations in exchange rates. It shows the difference in direct payments payable to UK farmers given the strongest and weakest sterling:Euro exchange rate between 1995 and 2008 to be 23.25 p/Euro[15].

3.5 Counterparty risk.

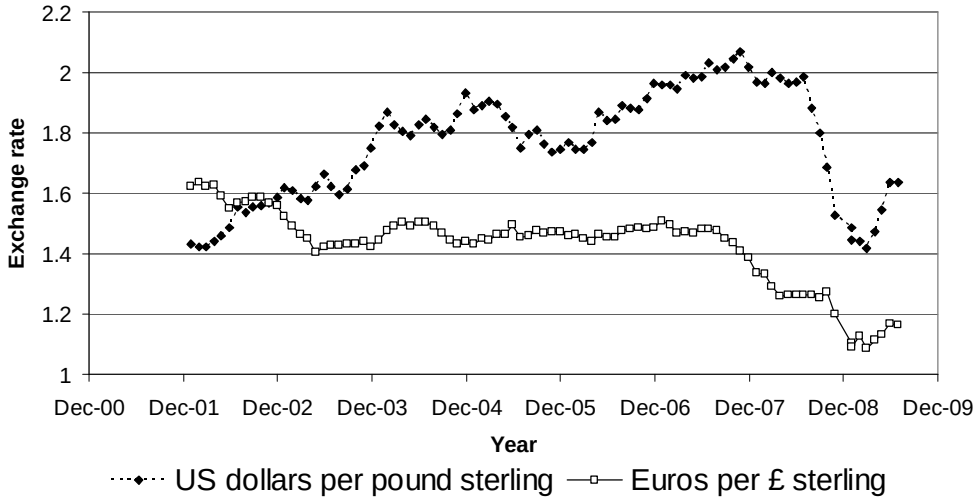
A key reason why liquidity dried up shortly after Lehman Brothers was allowed to go bankrupt in September 2008 was that banks did not know how solvent their customers (which included other banks) were. This risk, which is termed counterparty risk, refers to the danger that the other party in a financial transaction may go bust.

And this was one reason that banks rationed credit to businesses and indeed to one another. By calling in debts and reducing overdraft facilities, banks both reduced their counterparty risk and started to recapitalise their balance sheets. The extent to which this has happened to UK farm businesses is not known, but the increase in lending suggests that the sector as a whole has not been subject to credit rationing. However, farm businesses, like all businesses, face increased counterparty risk, and therefore do need to tighten their credit control and review trading arrangements. The example of the withdrawal of bank funding for the failed farmer owned dairy co-operative, Dairy Farmers of Britain which went bankrupt on 3 June 2009 owing their farmer members an estimated £92 million (DIN 2009: p 9), shows the

14. Exchange rate risk was not identified by Harrison and Tranter as a growing source of risk to UK agriculture. In the mid 1980s the agri-monetary system set the sterling value of European commodity support prices, which at that time were denominated in European Units of Account. The mechanism for setting the green rate changed between 1973 and 1992, in 1986 the green rate was the central market rate times the switchover coefficient. The switchover coefficient changed whenever the spread in monetary compensatory amounts (MCAs) between the strongest and weakest member state's currency exceeded 5 points. The overall effect of this complicated mechanism was to insulate UK agriculture from adverse exchange rate movements in sterling, and to allow it to benefit from revaluations in other member state currencies. The reduction in commodity support prices, and the complete removal of the agri-monetary system, means that UK farming is now more exposed to variations in exchange rates than in 1986 (Ritson and Swinbank 1997).

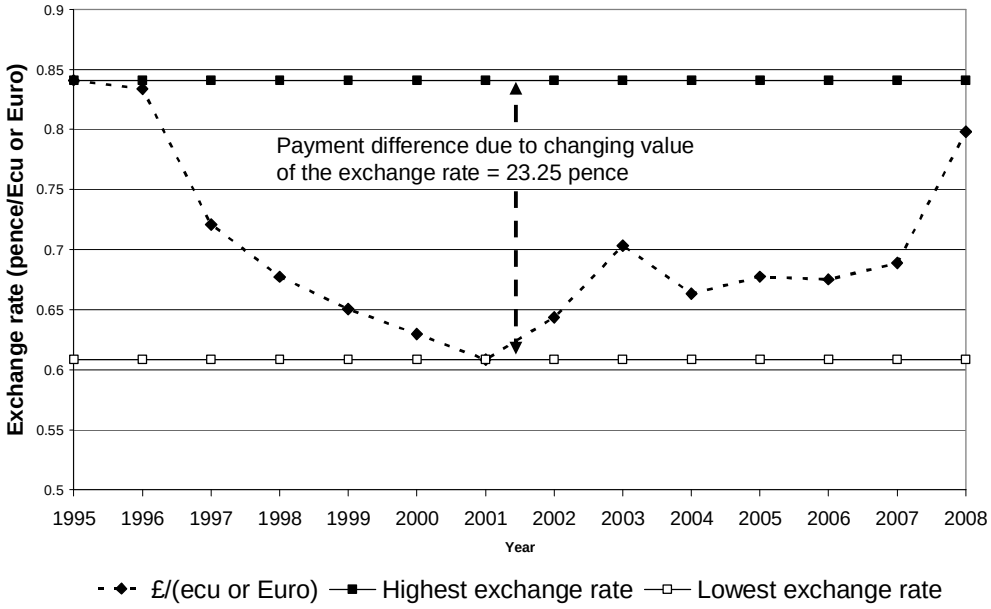
15. The actual payments received depend on other factors, such as agri-monetary compensation and modulation, which introduces an element of sector specific policy risk alongside exchange rate risk.

Figure 9. Exposure to macro-economic policy: exchange rate risk (Euro/£)



(Source: Exchange rates taken from Bank of England website (Bank of England 2009)).

Figure 10. Annual exchange rate used to convert arable area payments and single payment scheme payments from ECU/Euros to sterling (1995-2008: values for 1999, 2001, and between 2005 and 2008 estimated).



(Source: own calculation).

potential losses that can arise from counterparty risk (Pricewaterhouse Coopers 2009).

3.6.1 Economic recession: impacts on farm diversification activities.

Harrison and Tranter (1989: p 22) acknowledged the importance of the increase in income arising from on-farm diversification activities, but lacked information to allow them to assess the risk associated with this trend. But a report on diversification which surveyed 10,000 holdings in England and Wales was published in the same year as the Harrison and Tranter report, by McInerney and Turner (1989). They found that "over 40% had at least one non -farming enterprise, with an estimated one third of all holdings in the UK having diversified in some way" (p i). The general scale of operation was described as "fairly low", with "nearly two thirds of enterprises producing less than £5,000 output and one quarter less than £1,000". A key driver of diversification was found to be insecure farm incomes, "as incomes from farming have seemed less secure many operators of agricultural holdings have been looking to see whether any of the [diversified enterprises] were relevant to their businesses. As a result there has been a noticeable expansion in farm diversification in Britain in the last decade" (McInerney and Turner 1989:p 58). A later study undertaken by Centre of Rural Research (CRR 2003: p 155) arrived at a similar conclusion, whilst noting that the scale and extent of these activities had grown, as agriculture continued to adjust to new opportunities afforded by the developing rural economy. That study concluded that 58% of holdings engaged in some form of diversified activity.

Definitions of farm diversification have changed over time (Ilbery *et al.* 2006; Caron and Cairol 2008), so have sampling frameworks and survey methods, so comparisons between studies are not strictly valid. However, DEFRA has produced a consistently defined time series of diversified activities based on the Farm Business Survey (DEFRA Various)[16] which reported that 51% of farm businesses[17] had some form of diversified activity in 2007/08, a similar percentage to that reported each year since 2003/04. In 2007/08 this activity generated some £400 million of income, 15% of farm aggregate income in that year.[18]

This level of resource deployment out of the farming sector directly exposes agriculture to new risks. The majority of this income was generated through letting buildings for non-farm use (39%), other important activities include processing/retailing of farm produce (7%), sport and recreation (8%), and tourism (3%). Activities such as these have high income elasticity of

16.. The definition used by DEFRA, unlike that used by McInerney and Turner, excludes the provision of agricultural services as a diversification activity.

17. Larger than one half of a Standard Labour Requirement, the size that indicates a full-time or part-time farm business. The Standard Labour Requirement (SLR) for a farm business represents the labour requirement (in full-time equivalents) for all the agricultural activities on the farm, based on standard coefficients for each commodity on the farm. The SLR is representative of labour requirement under typical conditions for enterprises of average size and performance, it may be different from actual labour use on a farm (DEFRA 2010).

18. But there is a wide variation between farms: for 36% of businesses with diversified activities, diversified income accounted for a quarter or more of the total farm income, and for 22% of businesses, the estimated income from diversification exceeded the income from the rest of the farm business (DEFRA 2009c: p 6). Other studies have shown the importance of diversified income to different farming sectors (Franks 2009b)

demand, and this makes them exposed to any economic downturn. Moreover, not all diversification activities are successful, they involve financial risk as investments are made into new uncertain markets, introducing new risks.

3.6.2 Economic recession: impact on off-farm income.

Consistent data is now becoming available about farmer and spouse off-farm employment. In 2003/04 about 24% of farmers (or their spouse's) in England earned off-farm income of, on average, £14,200 (compared to the average income from farming of £17,200). The proportion had increased to 32% in 2007/08 (DEFRA 2009c). With data on diversification activities and off-farm income becoming available it has now become possible to research (i) the impact of the wider economy on diversified and off-farm income, (ii) the degree of risk-balancing undertaken by farmers, that is the extent to which lower risk from a more reliable income streams permit more risk taking in other income-earning enterprises, and (iii) the fungibility[19] of different sources of farm household income.

3.7 Future threats: protectionism.

In the immediate aftermath of September 2008 financial crisis, G20 leaders met in Washington and pledged that they would not lead the world into a new era of protectionism. However, the full impact of the many and varied government responses, many of which have been unconventional, are not known, and unemployment is likely to continue to rise, and politicians find pressure to protect jobs difficult to resist. A report produced by Global Trade Alert (Evenett 2009) believes it likely some of these measures will either intentionally or unintentionally discriminate against trade partners: their investigation of 172 state initiatives introduced by G20 nations since June 2009 found that "121 were found to tilt the playing-field against foreign commercial interests. Only 23 of the 121 discriminatory measures related to the imposition of duties following anti-dumping actions, countervailing duties, and safeguards investigations, implying that resort to other means to close borders has been widespread. These findings imply that, on average, a G20 member has broken the no-protectionism pledge every three days" (Evenett 2009: p 3). The research found that a large majority of these discriminatory measures are in smokestack (low productivity manufacturing), declining industries and in agriculture (Evenett 2009: p 18 and their Table 2.8 (p 24)).

The effect of a raft of protectionist measures is difficult to estimate. Doubtless an increase in protectionism would benefit some farmers and disadvantage others. But any overall benefit would likely be short-lived as relative prices adjusted to the new trading environment. As a high proportion of farm inputs are imported, (perhaps a more important indicator than the value of inputs purchased from the rest of the economy), retaliatory tariffs and duties are likely to increase costs. The timing and overall impact are difficult to assess but protectionism is identified with the worsening of the Great Depression in the 1930s, a period that saw many bankruptcies in farm

19. *fungible:* equivalent and interchangeable, so that a pound income from one source is the same and equivalent to a pound's income from another source *(Ed.)*

businesses in the UK.

3.8 Seven growing sources of risk to UK farming: some implications.

Seven growing sources of risk to UK farming have been identified as:

- The rapid growth in farmland values, following the boom in commodity prices, given the evidence that commodity prices are influenced by trader holding commodities as assets, rather than trading on their underlying supply and demand relationships. If this is so, then it is likely farmland is currently over-valued.

- Measures of payback have moved against the sector, as profitability and cash flow fail to grow at the same rate as interest payments.

- Agriculture's increasing dependency on government subsidies which have at the same time become more transparent, making targeting payments for social rather than agricultural-specific reasons easier.

- Exchange rate risk.

- Counterparty risk.
-
- Impact of recession on;

- (i) incomes from diversification activities that have high income elasticities of demand and
  (ii) off-farm employment may reduce as unemployment continues to increase.

- Threats of increased protectionism.

These growing sources of risk mean that farmers need to (i) get the big decisions right and (ii) have sufficient short-term flexibility to cope with different circumstances. Getting the big decisions right (e.g. land purchase, machinery investment) is critical (Pannel *et al.* 2000; Just 2003) is an area that receives less attention than it should. Pannel *et al.* (2000) cite papers to support the statement that the farmers "most likely to be under acute financial strain at any time are those who brought land or machinery at the wrong time or at the wrong price or who made significant and incorrect major adjustments to their farm operations" (p. 72).

Short-term adjustment to farm management can make the most substantial impact to farm profitability because tactical adjustment are generally observed in extreme years, good and bad when optimal management practices may be very different to most years. Due to the impact on increasing profit at a time when other farmers are reporting lower profits, this has important consequences for farm growth and development. However, retaining options

means keeping surplus capacity, for example, a wider range of cultivation equipment, which increases farm costs, so identifying the optimum surplus capacity becomes a balance between certain costs and unknown benefits.

This analysis has shown agriculture's conservative attitude to credit, and for this reason it is more likely to be less affected by the credit crunch than other sectors. But does the strength of the sector make agriculture a target for a combination of increased taxation or reduced support payments as government attempts to reduce its budgetary deficit and public sector debt? This is the eight credit crunch related risk, that agriculture could be targeted through loss of preferential tax status, for example the loss of preferential tax rate on red diesel, or the withdrawal of the zero rating of Value Added Tax (VAT) on food, or the introduction of new taxes, such as a farmland property tax. Removal of zero rate on food might raise £11.95 billion (Adam and Browne 2009). A farmland property tax could be introduced along the lines applied in the USA, where farmland is valued on its agricultural use value which is multiplied by a combined county and state property tax rate to raises some $4.9 billion annually (USDA ERS 2009). This might have the additional appeal of expanding the local tax base and so supplement the council tax, the only significant local tax left in the UK (Adam and Browne 2009).

4 Conclusions

Many of the financial trends Harrison and Tranter's identified as growing sources of risk continued to deteriorate into the early 1990s before farmers put into operation the processes of adjustment – leading to the shedding of costs and control of debt. Some farmers, principally the heavily indebted, were forced out as part of this readjustment, as shown by the level of insolvencies in the agricultural sector which reached 500 in 1992, an all time sector high. It is salutary to be reminded of this history as the UK economy enters the third year of the credit crunch and the second year of a recession. But unlike the late 1980s and early 1990s, the agricultural sector in 2007 looks well placed, and certainly better placed than if a similar assessment had been done in for the years leading up to 2004. It has particularly benefited from two years of high commodity prices, which reversed the adverse long-term movement in product prices relative to factor prices, and from a devalued pound. Farmers have used this period of relative prosperity to replace worn-out equipment and to replace short-term bank overdrafts with more secure longer-term loans.

Despite increased borrowings, leverage has fallen below 6% and net equity increased to £178.9 billion (in 2008). Farm asset values have remained buoyant notwithstanding the slump in the housing property market, principally because of a 59% increase in the price of farmland in the 5 years between 2002 and 2007, and prices have continued to rise through to the first half of 2009. But one consequence of the increase in debt and reduced cash flow leading up to 2007 is a reduction in the Debt Burden Ratio and gradual increases to interest rates, from 5.6 in 2003 to 7.6 in 2007 have caused the Financial Leverage Index to fall. Though they are perhaps indicators of trouble ahead, neither DBR nor FLI is out-of-line with historic trends. The increase in interest payments, of 46.4% between 2003 and 2008, has caused the Times

Interest Earned ratio to fall to the lower end of its long-term trend, which indicates some cause for concern as commercial interest rates can be expected to remain high into the foreseeable future. And the credit crunch is a source of further concern in the form of counterparty risk, as poorly financially structured businesses struggle and banks foreclose, forcing bankruptcy and insolvency. The example of Dairy Farmers of Britain, whose bankruptcy appears to have cost dairy farmer members some £92 million is a poignant lesson as total insolvencies in England and Wales exceeded 120,000 in 2006 and 2007, years prior to the seizing up of liquidity in September 2008 and subsequent economic downturn.

Another potential risk is posed by the cumulative effect of changes to agricultural support mechanisms, particularly the increase in transparency of payments. The cumulative effect of regular, largely piecemeal and incremental reforms introduced since 1986 have been to radically change support payments and mechanisms, and this has affected the risks involved in farming. Decoupling support from commodities and coupling it to the area farmed reduces exposure of total revenues to price and yield risk. However these benefits are off-set to some extent by (i) a reduction in commodity price support which increases output price risk, (ii) the increased difficulties of predicting future prices and profitability now markets are increasingly globalised and currently attracting interest from financial investors, (iii) exchange rate risk as only the Euro level of Single Payments made to each farm are known up to 2012, and (iv) that Single Payments are subject to reduction at short notice, through modulation and possibly in the future financial discipline. Therefore, the evidence relating to the net effect of decoupling subsidies from production on risk is not clear cut.

Above all, UK agriculture is now exposed to global price movements. And the globalisation of the financial markets has exposed farming to the financial implications of the large public sector debt. Relatively strong sectors, such as agriculture, which have transparent support mechanisms, risk being easy targets for a combination of cuts to public sector payments, loss of tax benefits and higher taxes. In 2009, trends in global financial and commodity markets together with the UK's fiscal policy and macro-economic management as it seeks to repay debts and balance the annual deficit, have become the most important sources of risk to UK agriculture.

About the author

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