Financing Agriculture and Rural America:
Issues of Policy, Structure and Technical Change

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A Comparative Study of the Financial Performance of Grain and Oilseed Farms in Ontario and Illinois

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Abstract

This paper provides a comparison between grain farms in Ontario and Illinois. The intent is to focus on how the two regions compare, economically, and how government programs in each region differ and affect asset valuations. In general the results indicate that the two economies move in tandem when it comes to revenue, income, and cash flow generation, the use of debt, and with bankruptcies. Significant differences appear in terms of government programs between the two regions. In Illinois the level of direct support per acre appears to be significantly higher than in Ontario. In terms of land values a paradox is found in that Ontario land values appear to be more highly correlated with the economics and level of support in Illinois and the United States. At the cursory level of analyses it appears that the farmland capitalization model is more supported in the U.S. than in Canada.

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1.0 Introduction

Farmers in many countries have seen changes in both the type and level of government support over the last 10 years. In Ontario, there have been reductions in the amount of market price support and in open-ended, coupled direct payment programs especially those affecting grain and oilseeds producers, whereas government payments in the U.S. have been rising, with even more support expected from the 2002 Farm Bill. Canada, the United States, Australia and the European Union have all taken new approaches or introduced new programs for their grain and oilseed producers.

While the nature and level of support in the countries mentioned can be well described and compared, it is not always clear to what extent financial stress in the farm sector differs in nature and severity, and how such stress may have changed over time. The role of the nature and effectiveness of government support in alleviating financial stress at the farm level more generally is not well understood. This report examines several related issues by comparing the structure and financial performance of cash crop farmers in Ontario and Illinois. This report examines the comparative economics in the context of four separate but related characterizations. The agricultural economies of Ontario and Illinois are reviewed in the first section. Farm structure is described in the context of revenues, costs and financial performance. Economic characteristics such as revenues, cost, liquidity and leverage are compared and contrasted. Particular attention is paid to the relationship between cash flows from farming and those provided through government stabilization programs. Macroeconomic factors that are exogenous to farmers in the two regions are examined in the second section. Inflation, interest rates, and foreign exchange are identified as key macroeconomic variables that have a common affect on both regions. Also exogenous to the farms, yet of utmost importance is the relationship between cash prices in Ontario and Illinois. This issue is examined in the context of risk bearing and comparative advantage. Cash corn, soybean and cattle prices in Ontario are compared with the nearby futures prices in Chicago. The differences in the price series attributable to foreign exchange and basis are examined.

The relationships among cash flow, government payments, farmland rental values and farmland market values are examined in the third major section. Some revealing insights into the effects of government policies are provided. For instance, even though the timing, sequencing and value of government payments and cash flow differ between Ontario and Illinois, it is difficult to find any systemic causality between government payments and land values. It has long been believed that government payments will increase land values by increasing expected cash flows or reducing uncertainty. While these aspects of farm policy may be important economic issues, the comparative analysis of this report brings these studies into question.

Microeconomic financial issues are examined in the fourth section. An overview of financial leverage and bankruptcy in the two economies is presented. The patterns of debt accumulation and reduction and farm bankruptcies are similar. Finally, some financial issues and patterns using data from two panel data sets from 1996-1999 that hold the same farms are examined. The Illinois data include 52 cash crop farms, while the Ontario data include 11.

1.1 An Overview of the Agricultural Economies in Ontario and Illinois

Despite a significant literature on policy and economic issues for Canadian and U.S. agriculture, there are few studies that compare farm economics in the two regions. Yet from a

policy perspective understanding the relationship between the two economies is important in identifying the effects of farm policy on land values and financial stability. An overview of the agricultural economies in the two regions from 1980 to 2000 is provided in this section. Three broad categories are discussed at the aggregate level. These include: (1) sectoral income statements and balance sheets with financial ratios for liquidity, solvency and profitability, (2) a comparison of land values, and (3) an overview of government payments from stabilization and crop insurance.

Table 1 and Figure 1 illustrate the differences in the agricultural economies of Ontario and Illinois. In Illinois the two major commodities in terms of cash receipts are corn and soybeans, representing $U.S. 2.6B and $U.S. 2.1B respectively. In Ontario corn and soybeans rank 8th and 6th respectively in terms of cash receipts which amount to $CDN 408M for corn and $CDN 586M for soybeans. On a $U.S. parity basis (at .65$CDN/$U.S.), gross receipts in Illinois for corn and soybeans are over 7 times that in Ontario. On a national basis however, corn and soybeans each represent about 17.1% of total U.S. production (in 2000), whereas corn and soybeans represent 60.6% and 84.2% of total Canadian production (in 2001) respectively.

Commodity	Illinois				Ontario			
	Rank in Illinois	Receipts * $U.S.1000	Percent of State	Percent of U.S.	Rank in Ontario	Receipts* $CDN 1000	Percent of Province	Percent of Canada
Corn	1	2,581,988	36.77	17.1	8	408,395	5.46	60.6
Soybeans	2	2,140,250	30.48	17.1	6	586,477	7.84	84.2
Hogs	3	825,933	11.76	7	3	829,372	11.08	24.8
Cattle and calves	4	531,190	7.56	1.3	2	979,652	13.09	16.2
Greenhouse/ nursery	5	259,731	3.70	2	4	826,366	11.04	50.5
Other		683,238	9.73			3,853,852	51.49	
Total		7,022,330	100.00			7,484,114	100.00	

Table 1: Economic Significance of Corn and Soybean Crops in Ontario And Illinois

The differences in the two economies in terms of diversification are illustrated in Figure 1. In Ontario, dairy receipts represent about 18% of the economy with cattle and hogs representing 13% and 11% respectively. Corn and soybeans represent only 5% and 8% of total cash receipts. In contrast, the largest proportion of cash receipts in Illinois is corn with 36% and soybeans with 30%. Receipts from hog and cattle production represent 12% and 8% respectively. Nurseries account for only 4% of cash receipts in Illinois but 11% in Ontario.

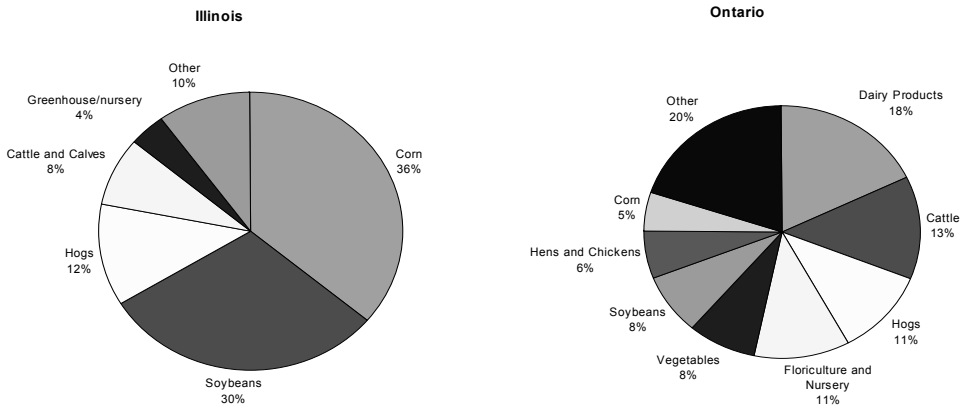

Figure 1: Major Commodities in Illinois and Ontario by Percent of Cash Receipts (2000)

The significance of Tables 1 and Figure 1 is that the agricultural economy in Illinois is heavily weighted in cash crops and is less diversified than Ontario's agricultural economy. For example corn, soybeans, cattle and hogs represent 86% of all Illinois cash receipts, while these same crops represent only 37% of Ontario's cash receipts. Moreover, the largest three commodities (dairy, hogs, and cattle) in Ontario represent 52% of total receipts. For this reason it would be expected that cash flow and business risks in Illinois will be significantly higher than that in Ontario.

A summary of nominal farm incomes and cash incomes between Ontario and Illinois over the 21-year period from 1980-2000 and in their domestic currencies is provided in Table 2. On average, cash receipts in Ontario were $5.8m in comparison to $7.8m in Illinois. The standard deviation of these cash flows was higher for Ontario than Illinois and this is reflected in the last column of Table 2, which provides the coefficient of variation, interpreted as the dollar of average receipts per dollar of risk. In aggregate, however it appears that the expenditures faced by Illinois farmers is much higher on a per dollar of output basis than in Ontario. Net cash income as a percent of receipts is 22% for Ontario and 17% for Illinois. The respective net income percentages were 10% and 3% after depreciation charges. Operating expenditures in Illinois appear to be a source of risk. On examination of the coefficient of variation for net cash income in Table 2 it is 7.35 for Ontario versus 1.97 in Illinois. In other words, Ontario farmers received on average $7 in net cash flow for every dollar of risk, while the Illinois farmers received approximately $2 of cash for every dollar of risk.

	Average	**Standard Dev**	**Coefficient of Variation (Per dollar of risk)**
	Ontario ($CDN)		
Total Cash Receipts	5,883,064	884,908	6.65
Operating exp after rebates	4,624,432	813,651	5.68
Net Cash Income	1,258,632	171,212	7.35
Depreciation Charges	710,976	128,693	5.52
Net Income	547,656	192,579	2.84
Net Cash Income %	22	3	7.05
Net Income %	10	4	2.55
	Illinois ($U.S.)		
Total Cash Receipts	7,766,233	712,423	10.90
Operating exp after rebates	6,446,114	560,906	11.49
Net Cash Income	1,320,118	668,569	1.97
Depreciation Charges	1,080,432	170,472	6.34
Net Income	239,686	651,905	0.37
Net Cash Income %	17	8	2.09
Net Income %	3	8	0.31

Table 2: A Summary of Aggregate Farm Income and Cash Flow, Nominal 1980-2000

1.2 Comparative Farm Incomes and Cash Flow

In part, the additional uncertainty in Illinois arose from the large reduction in cash flow in 1999. In 1999 net cash receipts in Illinois fell to -$250 m due to a sharp decrease in cash receipts and an increase in costs. In contrast Ontario's cash receipts in 1999 were $1.29 billion.

The flow of cash and income over the 1980-2000 periods are depicted in Figures 2 and 3. Figure 2 shows aggregate cash receipts from all sources. Cash receipts in Illinois did not grow as fast and as far as Ontario's cash receipts over this period. One can see the dip in cash receipts in Illinois in 1998-1999. 1998 was the year Illinois was substantially affected by hog prices while 1999 was a more severe crop year. Figure 3 depicts the net cash flow in Illinois and Ontario. Cash expenditures are subtracted from cash receipts to calculate net cash flow. Net cash in Ontario oscillated between $1 billion and $1.5 billion over this time period with relatively low volatility, however net cash receipts in Illinois were highly volatile ranging from a high of approximately $2.2 billion in 1980, 1995 and 1997 to a low of $-250 million in 1999.

The results of the aggregate measures suggest that the more diversified agricultural economy in Ontario provides sectoral stability. This contrasts with the agricultural economy of Illinois, which is heavily influenced by a large proportion of acreage planted to corn and soybeans.

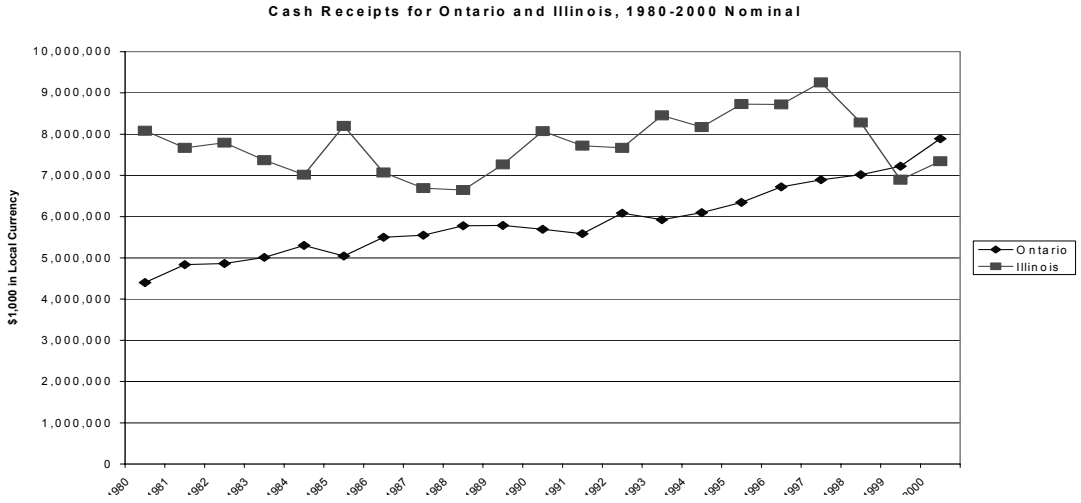

Figure 2: Cash Receipts in Ontario and Illinois

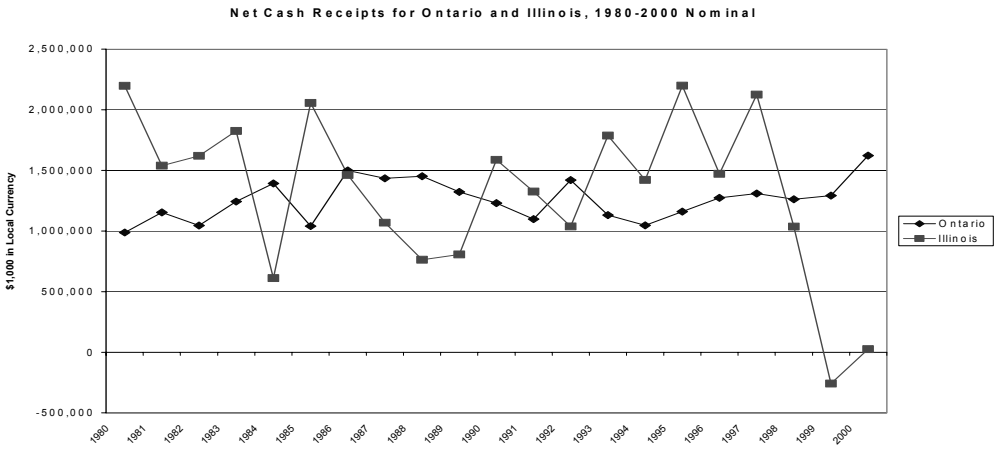

Figure 3: Net Cash Receipts

1.3 Comparative Farm Balance Sheets

Time series measures comparisons of the aggregate current ratio and debt to asset ratio are provided in Figures 4 and 5. Keeping in mind that these are aggregate values and that a substantial variation would have been found on a farm-level basis, the trend between Ontario and Illinois is similar. While Ontario farms appear to be more liquid as measured by the current ratio, the patterns are nonetheless consistent. The same macroeconomic forces that caused a significant diminution of liquidity in the early 1980s affected both Ontario and Illinois in a systematic fashion. Likewise, the pattern of rising liquidity throughout the early 1990s and a decrease towards the end of the decade are also similar. The absolute differences require further examination, particularly for Illinois. However the differences could be attributed to the greater diversity found in Ontario agriculture versus Illinois. For example a significant amount of value in Ontario as a percentage of receipts is dairy, which is supply managed and less volatile than dairy production in the U.S.

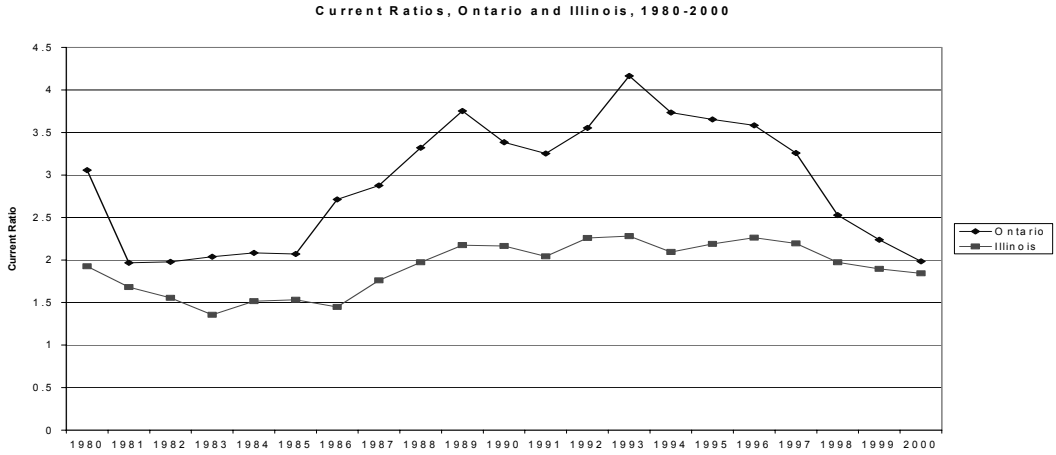

Figure 4: Liquidity Comparison, 1980-2000

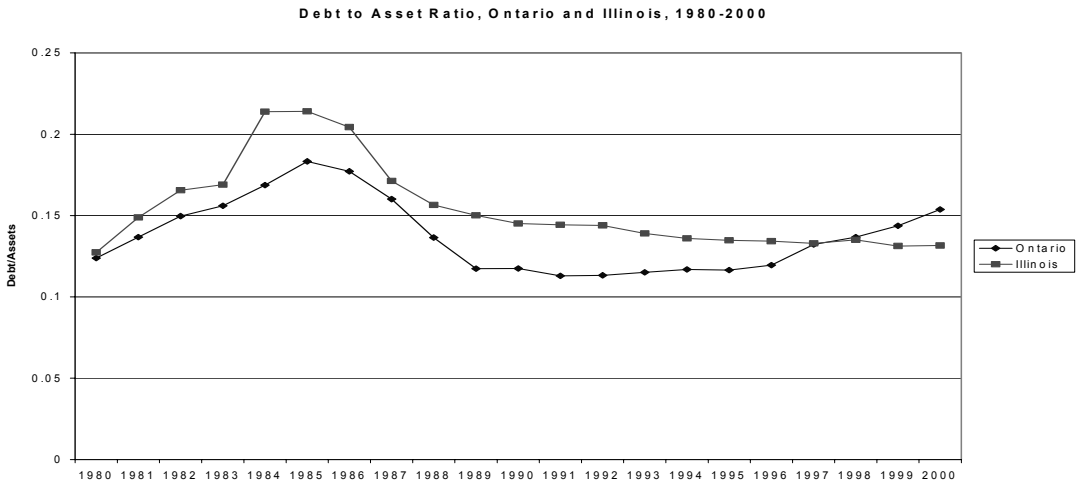

Figure 5: Leverage Comparison, 1980-2000

Leverage comparisons, as measured by the debt to asset ratio are shown in Figure 5. Again, industry wide the pattern between Ontario and Illinois is very similar. The debt to asset ratio increased from 1980, peaking at about 1984-1985. From an industry perspective the debt to asset ratios are quite low ranging from about 5% to 18% for Ontario and above 20% for Illinois. The systematic decline in both Ontario and Illinois can also be observed from about 1985 through the late 1990s. Both regions had similar (and low) debt to asset ratios in 1980, and it was not until about 1997 that the financial leverage in the two regions was equal again. For the first time the debt to asset ratio in Ontario exceeded that in Illinois. A large part of that new debt use can likely be attributed to rapid expansion of hog facilities in Ontario and rising quota prices for dairy. Still, care must be taken in interpreting these values as signaling a low level of leverage in either region. While most other industries report the debt to the book value of assets the agricultural statistics generally report the ratio of debt to the market value of assets. Hence rising debt in absolute terms can easily be offset by a rise in market values and unrealized capital gains. Finally, the pattern of rise and decline in debt to assets corresponds inversely with the current ratio in Figure 4.

1.4 The Value of Land and Buildings

The pulse of the primary agricultural sector can generally be measured by the value on land assets (including buildings). In principle, the value of land represents the collective wisdom of current and future cash flows, opportunity costs of capital, and risk. Figure 6 shows the value of land and buildings for Ontario (1980-2000) and Illinois (1980-1995). Keeping in mind that the values of land and buildings are in domestic currencies (i.e., $CDN/acre and $U.S./acre), both regions show similar patterns. Land prices fell in the early 1980s until approximately 1985 and then rose steadily after that. The value per acre is generally higher in Ontario than Illinois, and although Ontario showed a slight decline in 1990-1992, land values have been rising steadily.

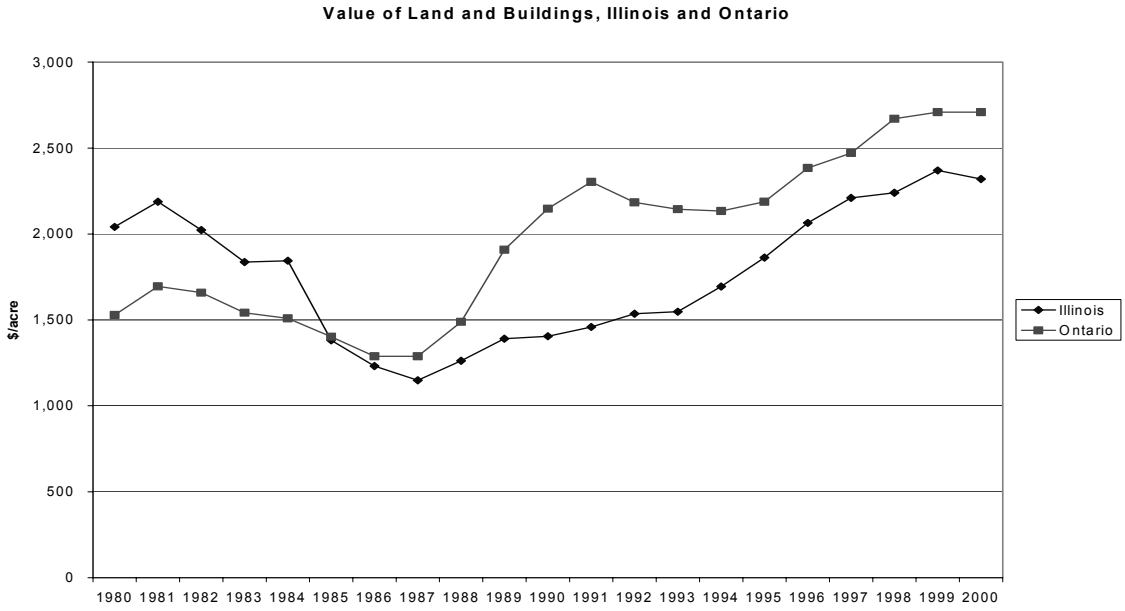

Figure 6: Value of Land and Buildings, 1980-2000

1.5 Government Payments to Agriculture

Illinois and Ontario farmers receive stabilization payments from their respective governments albeit using different forms. In Ontario stabilization for cash crops is provided through a market revenue, or gross revenue plan. In Illinois protection is provided by a similar program of target prices (and loan rates). In Ontario farmers pay a percentage of the actuarial premium of the revenue insurance program whereas in the U.S. stabilization is provided at no direct cost to the farmer, but as an opportunity cost through conservation programs and other forms of cross compliance. Both regions have policy provisions for crop insurance.

For purposes of this examination gross payments as recorded by ERS are used. This payment series excluded special payments to dairy and most forms of crop insurance. In Ontario a significant portion of stabilization payments are in the form of dairy support and subsidies and the Net Income Stabilization Account (NISA) as well as crop insurance. To be consistent between the two regions, payments in Ontario include only those under the Agricultural Stabilization Act, the Gross Revenue Insurance Plan (GRIP or Market Revenue) and other ad hoc assistance. Net crop insurance payments are excluded.

Figure 7 shows how support payments have changed in Ontario and Illinois relative to 1980 as a base year. As a percent of base, U.S. policy has increased significantly more than in Ontario, but much of that is due to the fact that it started at a lower base. The importance of Figure 7 is illustrated by the pattern of the changes over time. Increases in 1983-84, 1987-88, and 1992-1993 are common for both regions, but since 1996 stabilization in Illinois has increased whereas that for Ontario has decreased.

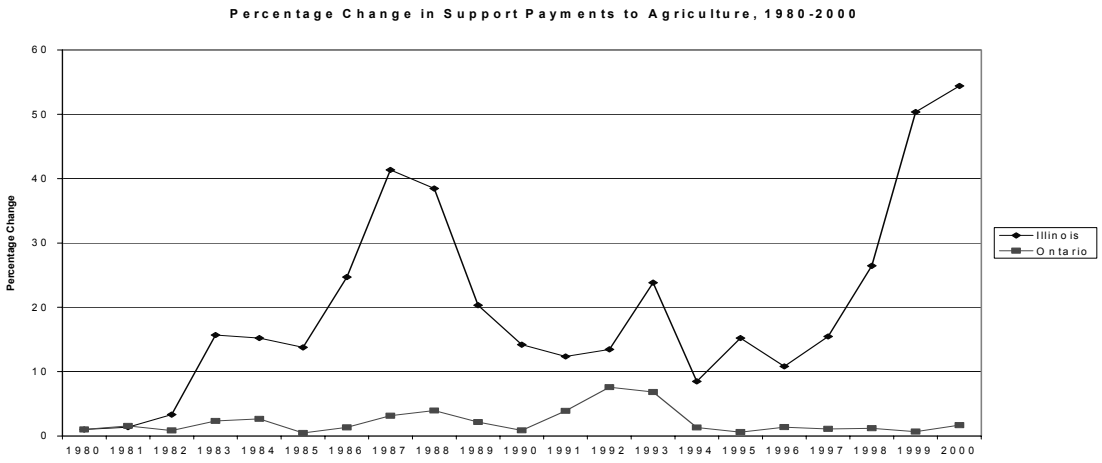

Figure 7: Percentage Change is Stabilization Payments

Stabilization payments as a percent of net cash income in both regions are shown in Figure 8. In 1980 Illinois had much lower payments as a percent of income than in Ontario, but this increased over time. By 1986-1987 Illinois farmers were receiving more than 20% of net income from subsidies while Ontario farmers had only about 12%. U.S. payments declined as the 1980 farm bill expired near the end of the decade. In Ontario, the Agricultural Stabilization Act governed stabilization payments up to approximately 1990. In 1990-1991 reforms placed the structure of the program in the hands of the provinces and Ontario settled for a gross revenue insurance plan (GRIP). In 1992 a 15-year rolling average price of grains and oilseeds far exceeded market prices so that GRIP payments in 1992 were substantial and significantly higher than in Illinois. The average trigger price smoothed out in the late 1990s as the GRIP program evolved into the current Market Revenue program. However, under FAIR program in the U.S. there were substantial payments in the late 1990s. In 1999 and 2000, Government payments have exceeded net farm income.

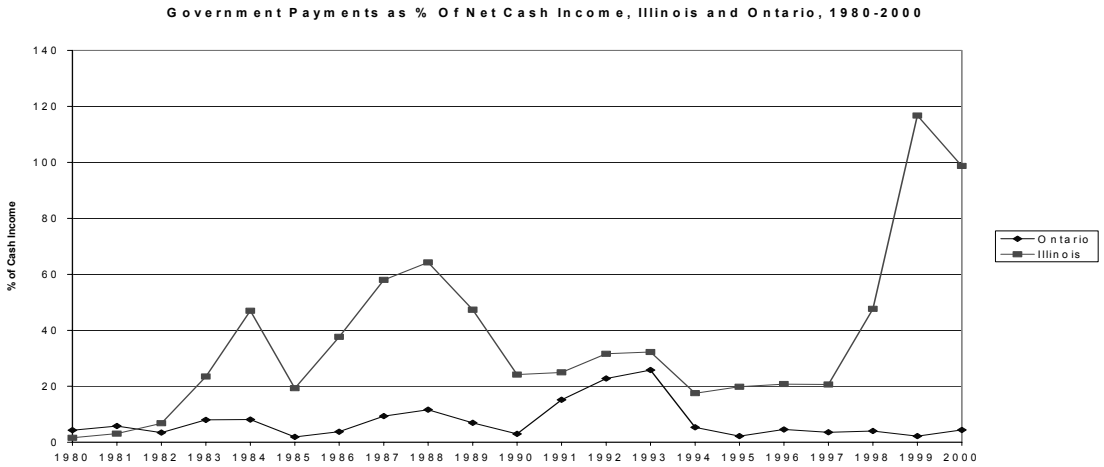

Figure 8: Government Payments as a Percent of Net Farm

1.6 Summary and Conclusions

The analysis provided some key insights into the agricultural economies of Ontario and Illinois. The analysis provides the following observations.

1. In the local currency measures, cash receipts in Illinois are generally higher than those in Ontario, but with higher average cash receipts come a significantly higher risk. In fact for every dollar of risk in Ontario, there are about $7 of average receipts whereas in Illinois, for every dollar of risk there is about $2 of average revenues.
2. Cash flow, at an aggregate level has generally remained positive in Ontario, but in Illinois wide fluctuations, particularly in 1999 have led to significant economy-wide negative cash flows.
3. Between 1980 and the early 1990s stabilization payments in Ontario and Illinois remained the same. However new policies in both jurisdictions led to divergent patterns in the 1990s. In Ontario in 1996 government payments spiked and then decreased thereafter, but in general the 1990's saw an increase in government payments in Illinois and a general decrease in Ontario.
4. Notwithstanding differences in cash flow and government payments, the pattern of land prices in Ontario and Illinois are remarkably similar. In both jurisdictions land prices peaked in the late 1980s, declined through the early to mid 1990s and then have stabilized or increased in the late 1990s.

While the analysis describes the two economies between 1980 and 2000, segregating the differences in each jurisdiction must also consider the respective macroeconomic influences. These issues are discussed in the next section.

2.0 Macroeconomic Influences on Farm Structure and Profitability

2.1 Inflation, Interest Rates and Exchange Rates

Three key macroeconomic factors affecting Ontario and Illinois farms -- inflation, interest rates and the U.S.-Canadian exchange rates -- are important because they reflect the differences in the general economies of the two countries as well as monetary and fiscal policies. Inflation is important because it measures the erosion in purchasing power over time. If inflation in Ontario is greater than that in Illinois then over time the Illinois farmer will have a greater ability to consume goods and make further investments into the farm infrastructure. In real terms we care about inflation because it is the present value of real cash flows that ultimately dictate the value of land, and it is the residual cash flow that is used to service debt. Interest rates reflect the general economic strength of the country as well as the respective monetary policies. The market rate of interest reflects the real cost of borrowing plus an inflationary component. All other things held constant higher inflation in one country suggests that interest rates in that country will rise faster than the other. In fact a high growth-high inflation economy is subject to monetary policies put in place with higher interest rates to slow down economic growth and place an artificial cap on inflation. All other things held constant a higher interest rate differential implies that the real rate of discount applied to farm valuation models will result in a lower value of land to compensate for higher costs of borrowing or higher opportunity costs of capital in general.

Lastly, the effects of foreign exchange rates are important because so much of Ontario's cash price is tied to forward markets in the U.S. Since the primary exchanges of concern are located at the Chicago Mercantile Exchange and the Chicago Board of Trade, changes in Ontario's cash prices will be highly correlated with the cash price in Illinois. For Ontario cash commodities tied to U.S. markets, the cash price rises and falls in tandem with the exchange rate. The economic influence is direct. In general the cash price in Ontario equals the U.S. nearby futures price, adjusted for foreign exchange plus a basis. If the Canadian dollar rises against the U.S. dollar then the cash price in Ontario will fall and if the Canadian dollar falls cash prices tend to rise. The exchange rate therefore provides parity to some extent between Illinois and Ontario farms, at least in terms of general cash movements in the U.S. cash price. But along with this equalization function, Ontario cash crop and livestock farmers are also subject to exchange rate volatility as an additional source of risk. Therefore Ontario farmers face greater uncertainty than U.S. Illinois farmers, all other things such as basis held constant.

In addition to added variability, the exchange rate will also have some perverse effects that can explain differences between Ontario and Illinois. For example, as the Canadian dollar rises relative to the U.S. dollar, Ontario cash prices will fall. As Ontario cash prices fall, so will the cash flows from farming, and this in turn will reduce the value of farmland. In addition, as cash flows decrease so will farm liquidity, which means a lower capability to invest in agricultural inputs or farm capital from cash flows. This in turn requires an increase in borrowing, but with the erosion of the cash flows the risk premium facing the Ontario farmer will increase, resulting in constrained credit and increased financial risk. Of course, the opposite is true as well. As the Canadian dollar falls relative to the U.S. dollar the Ontario agricultural economy will strengthen relative to that in Illinois, and will then provide a distinct advantage in capital appreciation of assets and borrowing ability.

2.2 Prime Interest Rates

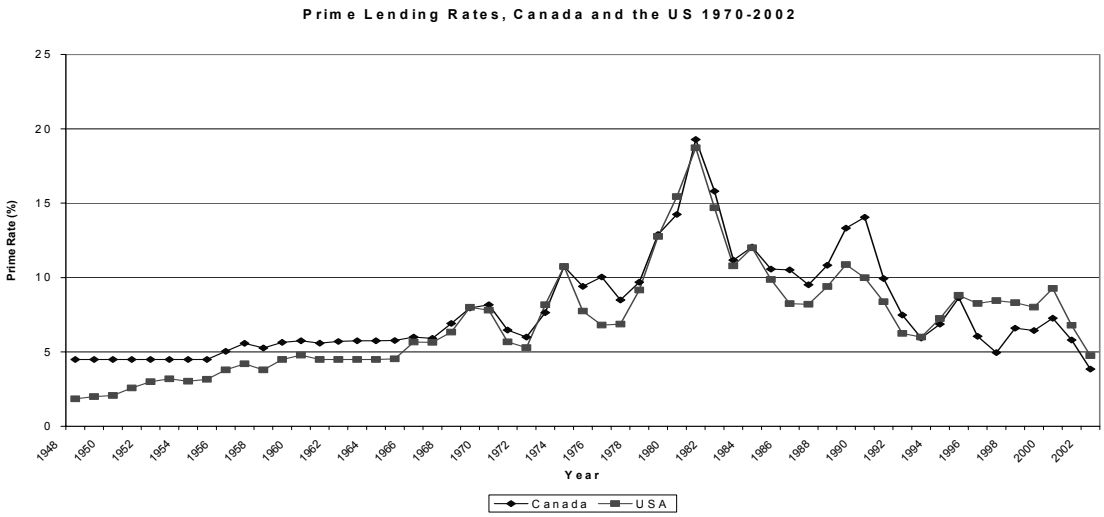

Figure 9: Prime Lending Rates in Canada and the U.S.

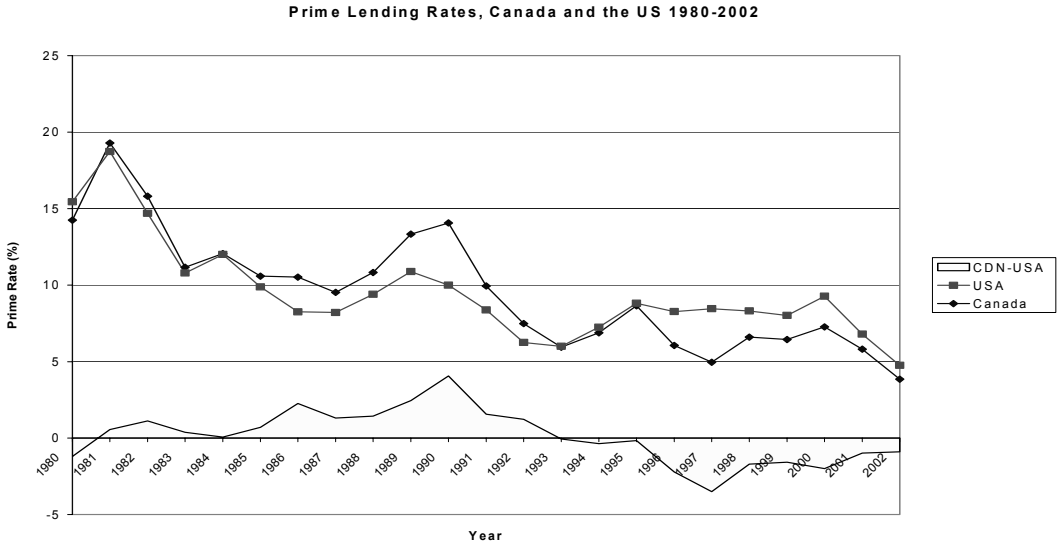

Figure 10: Prime Lending Rates and Spreads

The prime interest rates for Canada and the United States from 1948-2002 are plotted in Figure 9. From an historical perspective, Canadian rates have generally been greater than or equal to U.S. rates. In fact it has only been since about 1995 that Canadian rates have fallen below the U.S. rates for a sustained period of time. Between 1984 and 1992 Canadian rates were substantially higher than those in the U.S. These differences, between 1980 and 2002, are plotted in the shaded area of figure 10. The Canadian rate peaked in 1990 with a prime rate about 5% higher than in the U.S., but dipped to about 3% below the U.S. prime rate by 1997. By Spring of 2002 prime rates in Ontario and Illinois were at their lowest levels since about 1958 with less than a percentage difference between them. Assuming that Ontario and Illinois farmers face similar price and yield risks, recent history since about 1995 suggests that the costs of borrowing money in Ontario has been less than that in the U.S. In principle this suggests that, other things being equal, Ontario farmers were in a better position to borrow capital and grow their farms' infrastructure with a lower burden of debt servicing. This would also suggest that Ontario farmers were better able to obtain operating loans or supplier credit to purchase farm inputs, and were in a better position to repay operating credit than Illinois farmers. While this is a recent outcome, the advantage was reversed in the early 1990s and mid to late 1980s. The advantage in borrowing for farm expansion and operations was with Illinois farmers. While trade policies such as the Free Trade Agreement and the North American Free Trade Agreement have had significant cross border effects on growth in the two economies, and therefore make it difficult to predict relative interest rate movements in the future, the historical record suggests that the current low interest rates facing Ontario farmers is an aberration of history, and it is quite possible that the more consistent historical pattern of Canadian rates being at parity or higher than the U.S. rates can return.

2.3 The Effects of Inflation on Farm Structure and Finance

The consumer price index for all goods (CPI) in Canada and the U.S from 1970 to 2002 is plotted in Figure 11. The CPI has been indexed to 1973 since that was the last time that the Canadian dollar and U.S. dollar were at par. The graph shows that relative inflation following 1973 has been higher in Canada than in the United States. Inflation captures many macroeconomic influences including labor markets (wage rates) and economic growth (prices of goods and services). The shaded section of Figure 12, and the line in Figure 13, show the difference between the Canadian and U.S. CPI. By 1991 the cost of a good purchased for $1.00 in 1973 cost about $3.00 in the U.S. and about $3.44 in Canada. This suggests that the purchasing power of the Canadian dollar has fallen relative to the U.S. dollar over this time period. However, since about 1992 the rate of inflation in Canada, as measured by changes in the CPI, has slowed relative to the United States. The real purchasing power of a Canadian dollar has improved considerably since 1991 such that the difference relative to the 1973 base narrowed from a peak of $.44 to only $.16.

While Illinois farmers might have had an advantage in purchasing power historically, the advantage since 1992 has favored Ontario farmers. A lower inflation rate in Ontario suggests that the residual value of a dollar earned is higher, which in turn implies that Ontario farmers are, all other things being equal, in a better position to reinvest savings into capital and debt servicing. Also as discussed above, the lower inflation rate in Canada implies a lower cost of borrowing. Comparing the changes in CPI in Figure 11 to the prime interest rates in Figure 10, it becomes evident that the inflation factor in the Canadian rate is lower than the U.S. prime rate and this has contributed significantly to lower interest rates in Ontario.

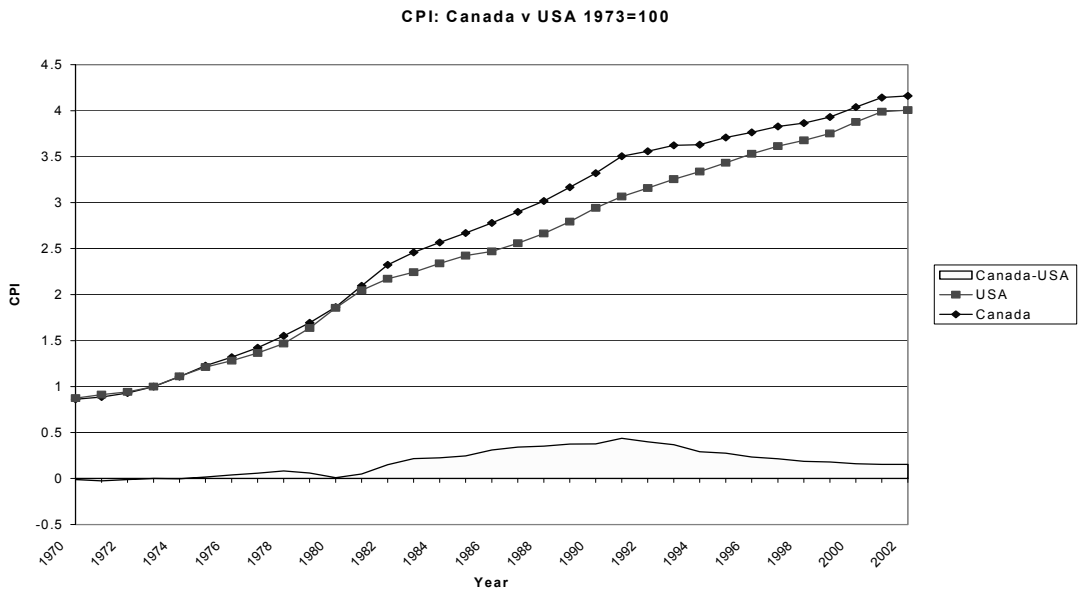

Figure 11: Consumer Price Index and Inflation

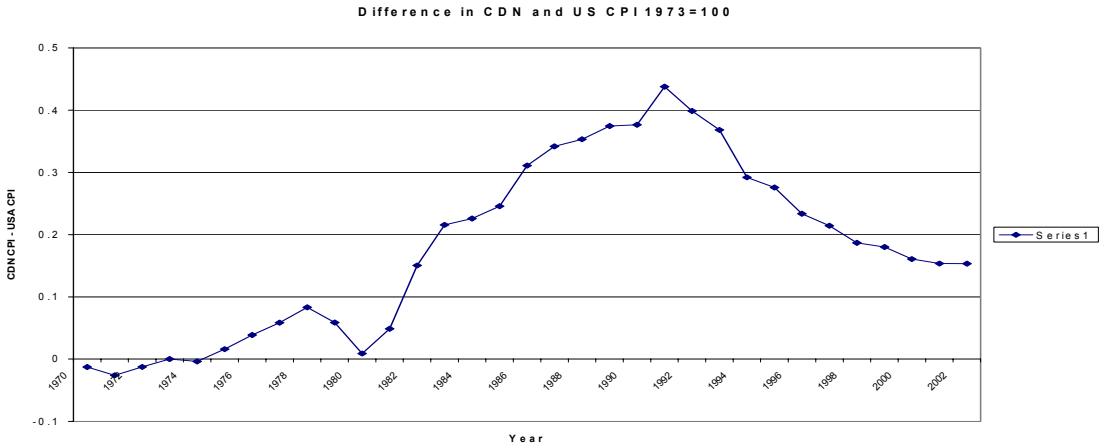

Figure 12: Differences in CPI between Ontario and Illinois

2.4 Canada/U.S. Exchange Rates

The average annual U.S. –Canadian exchange rate from 1970 to 2002 is plotted in Figure 13. Keeping in mind that the dollars were at parity in 1973, the value of the Canadian dollar has fallen considerably since then. By 1987 it cost CDN $1.40 to purchase U.S. $1.00. This had fallen to less than CDN $1.20 by 1991, but since then the relative strength of the U.S. dollar has increased its value to CDN $1.588. Put another way, by the spring of 2002 one Canadian dollar was worth only 62 U.S. cents.

Exchange rates have dual impacts on Ontario farmers. On the input side, fertilizer and other inputs and manufactured goods purchased from the U.S. become more expensive in Canadian dollar terms. This in turn decreases profitability via increased expenses, all other things being equal. On the other hand, for cash crops such as corn and soybeans and livestock such as cattle and hogs, that are priced to the U.S. markets, an increase in the exchange rate increases the cash value of these crops in Ontario. There are several economic effects that are important. On the one hand, as cash crop and livestock prices increase, the value of these commodities sold also increases. However, for feed grains such as corn, livestock producers face higher feed costs. In other words the benefits of high exchange rates are transferred from commodity consumers to farmers. As the price of goods increase, demand decreases, so there could be (at least locally) periods of excess supply that can erode prices somewhat.

Figure 14 represents the cash flow per acre in Ontario and Illinois, with the exception that an additional series is added to reflect the value of the Ontario cash flows when considered at parity with the U.S. dollar. While it is unlikely that purchasing power parity exactly holds between Ontario and Illinois, the effect of a low exchange rate is clear. The lower curve in Figure 14 represents the value of the Ontario cash flows in American dollars. In 1980 the average cash flows were approximately $CDN 66/acre in Ontario and $U.S. 76/acre in Illinois. On an unadjusted basis the difference is approximately $10 /acre in local currencies, but after conversion to U.S. the spread between Ontario and Illinois in terms of parity in purchasing power the spread fell to approximately $56 so that the spread in common currency units increased by almost 100% to $U.S. 20. In 1990 Ontario cash flows were approximately $17/acre on an unadjusted basis. However with the exchange in 1990 of 1.16 the parity value of Ontario cash flow was $U.S. 77.73 compared to $U.S. 73.50 in Illinois. When considered in common currency units the spread between Ontario and Illinois fell by approximately 75.3%. Likewise in 2000 the unadjusted spread between Ontario and Illinois was $41.29 in Ontario's favor, but after adjusting for an exchange rate of 1.485 the spread fell to $4.57/acre, a decline of almost 89%.

While the exchange rate is determined by many factors other than consumable goods (e.g.. the ratio of per capital GNP, interest rates) the results do suggest that Ontario farmers are at a disadvantage in terms of competing for goods and investments in foreign markets. Perhaps an alternative view is to consider the relative values of land and real estate, which are significant investments in both countries. Figure 15 shows the per acre values in local currency as well as the Ontario value in $U.S. currency. While in local currency Ontario land values were consistently higher than Illinois, after adjusting for foreign exchange the $U.S. dollar value of Ontario land exceeded those in Illinois only in the years 1988 through 1993. For example, in 2000 the value per acre in Ontario was $CDN 2,709 whereas in Illinois it was $U.S. 2,320. After converting to U.S. dollars at an exchange rate of 1.485 the Ontario price was $U.S. 1,824, a value that was lower in common currency by $U.S. 496. In terms of international investments (and perhaps cross-border arbitrage) Illinois farmers clearly have an advantage over Ontario farmers. All things being equal an Illinois farmer upon retirement would have a much greater opportunity to benefit from U.S. and other international investments than an Ontario farmer would.

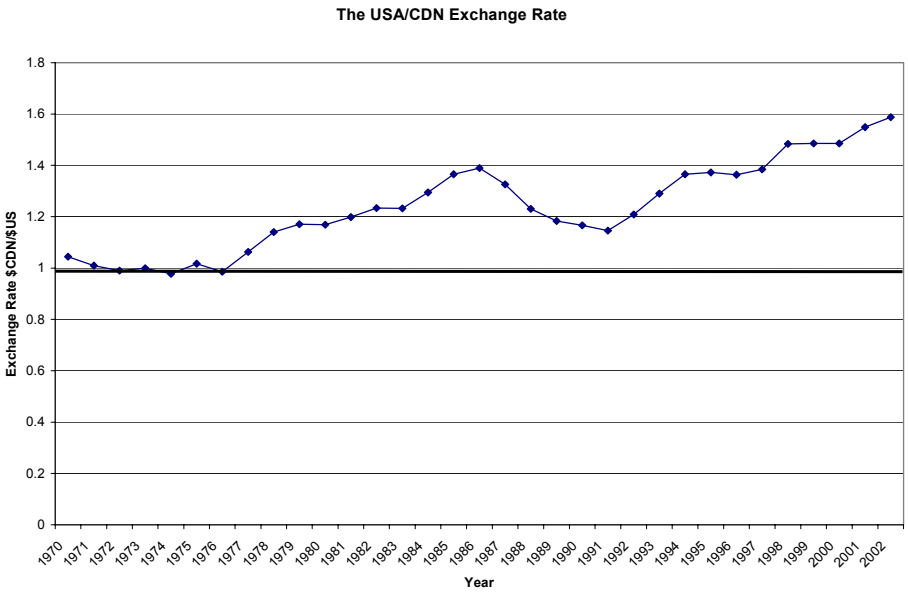

Figure 13: The U.S.-Canadian Exchange Rate

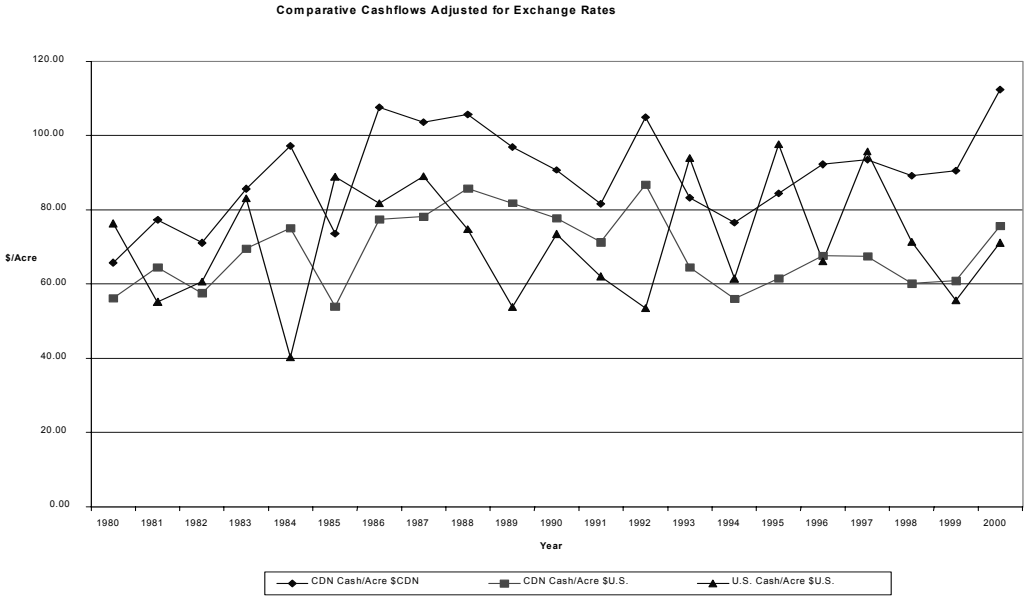

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Figure 14: Effects of Exchange Rates on Comparative Cash Flow/Acre

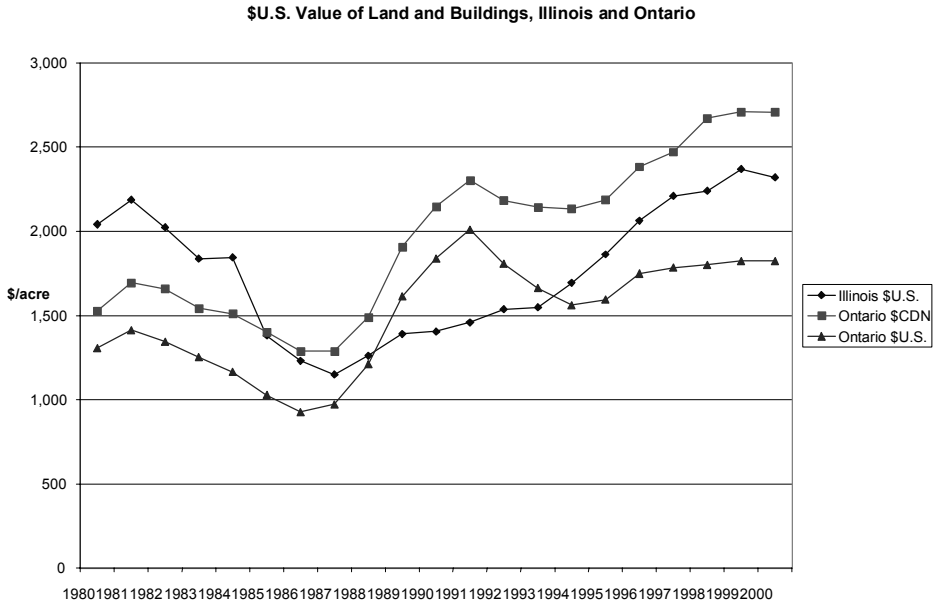

Figure 15. Effects of Exchange Rates on Ontario

2.5 A Comparison of Corn, Soybean and Cattle Prices in Ontario and Illinois

Given the significance of the corn, soybean and cattle markets to Illinois agriculture and to a lesser extent the Ontario market, this section provides a comparison of the prices between Ontario and Illinois. The importance of examining major commodity price movements is that by showing similarities or dissimilarities one can make inferences about market factors affecting the economics of both regions.

Figures 16 and 17 show the relationship between daily corn and soybean cash prices in Illinois (as measured by the nearby CBOT futures) and Ontario (Chatham basis), and Figure 18 shows the price relationship for live cattle. In all three figures the shaded areas represent the difference between the cash price and the Chicago price. This is often referred to as the unadjusted basis. The unadjusted basis captures two main effects. These are the local basis due to regional supply and demand factors, and the exchange rate variability. However, one aspect of the three figures is clear. The Ontario cash prices correspond closely with the Illinois cash price and a large component of the unadjusted basis is due to the exchange rate.

	Average Cash Price $CDN	Standard Deviation Cash Price $CDN	Average Futures Price $U.S.	Standard Deviation Futures Price $U.S.
Livestock	89.60	5.88	66.11	3.48
Corn	3.64	1.05	2.70	0.64
Soybeans	8.60	1.47	6.28	1.15
$CDN/$U.S.	1.42	0.06	-	-

Table 3: Summary of Livestock, Corn and Soybean Prices

Table 3 provides some simple statistics on the prices. As expected the Ontario commodity prices are higher than the U.S. prices, but what is not obvious from the figures is that the standard deviation of corn, soybean and cattle prices in Ontario is higher than that in Illinois (as measured by the nearby futures prices). For example the standard deviation of cattle prices is $5.88/cwt whereas the U.S. price standard deviation is $3.48/cwt. Likewise, the corn price standard deviations are $1.05/bu. and $0.64/bu. and the soybean standard deviations are $1.47/bu and $1.15/bu. While some of this can be attributed to local Ontario basis, a significant part of this can be attributed to variability in the exchange rate. The standard deviation of the exchange rate as reported in Table 3 is $0.06, but when multiplied to multiple dollars the effect can be significant. While it is difficult to separate out the foreign exchange effects from local supply and demand effects it is clear that price volatility in Ontario is considerably higher than that in Illinois (basis Chicago)

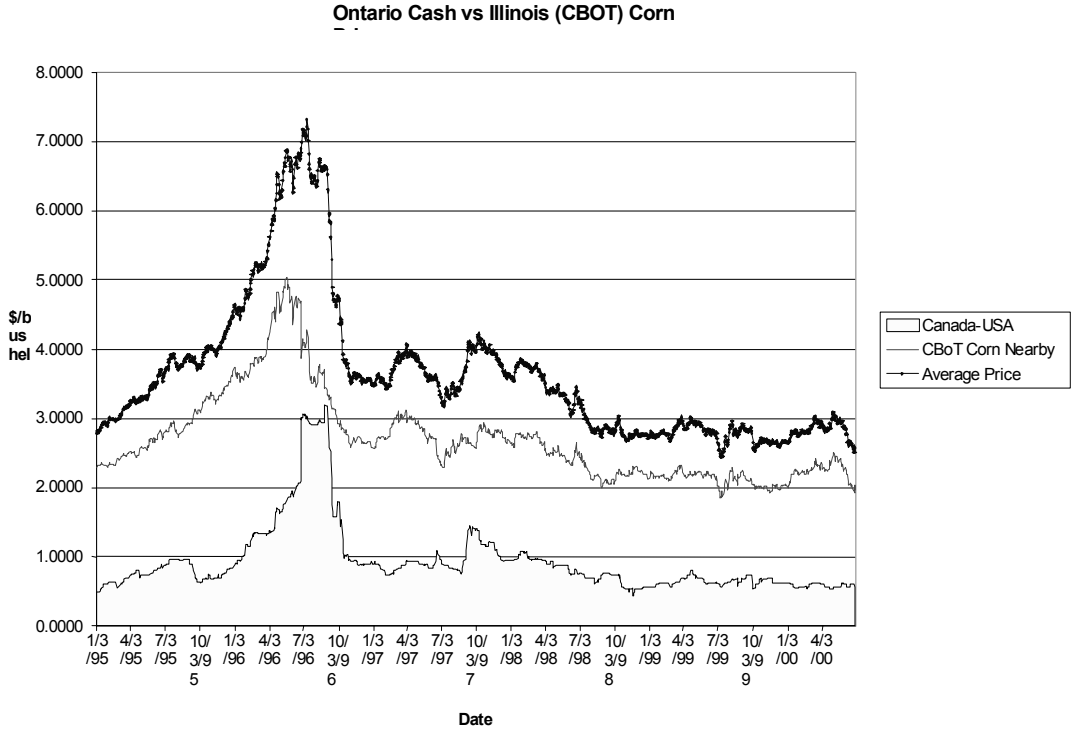

Figure 16: Comparative Corn Prices: Ontario and Illinois

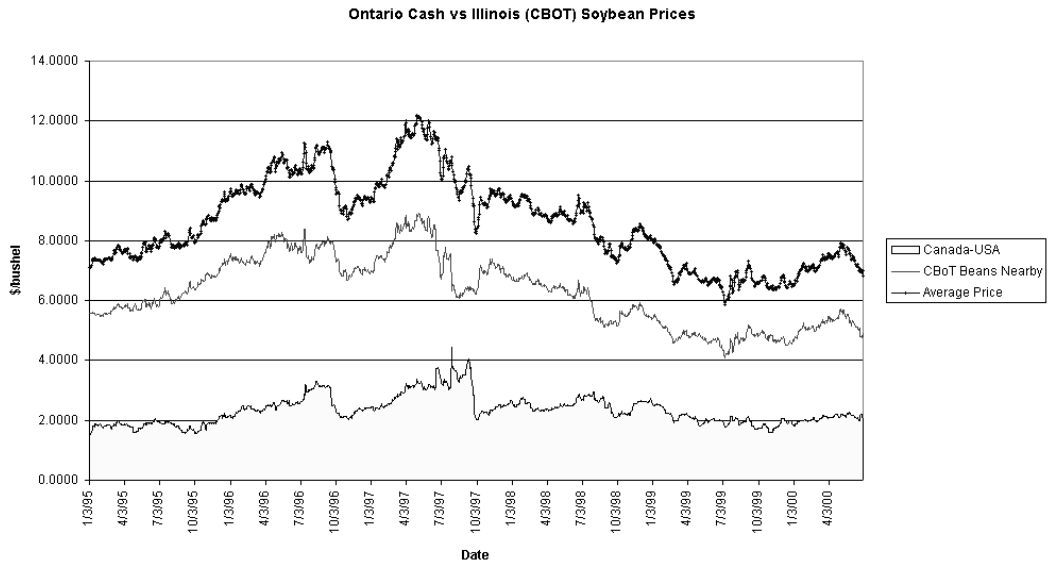

Figure 17: Comparative Soybean Prices: Ontario and Illinois

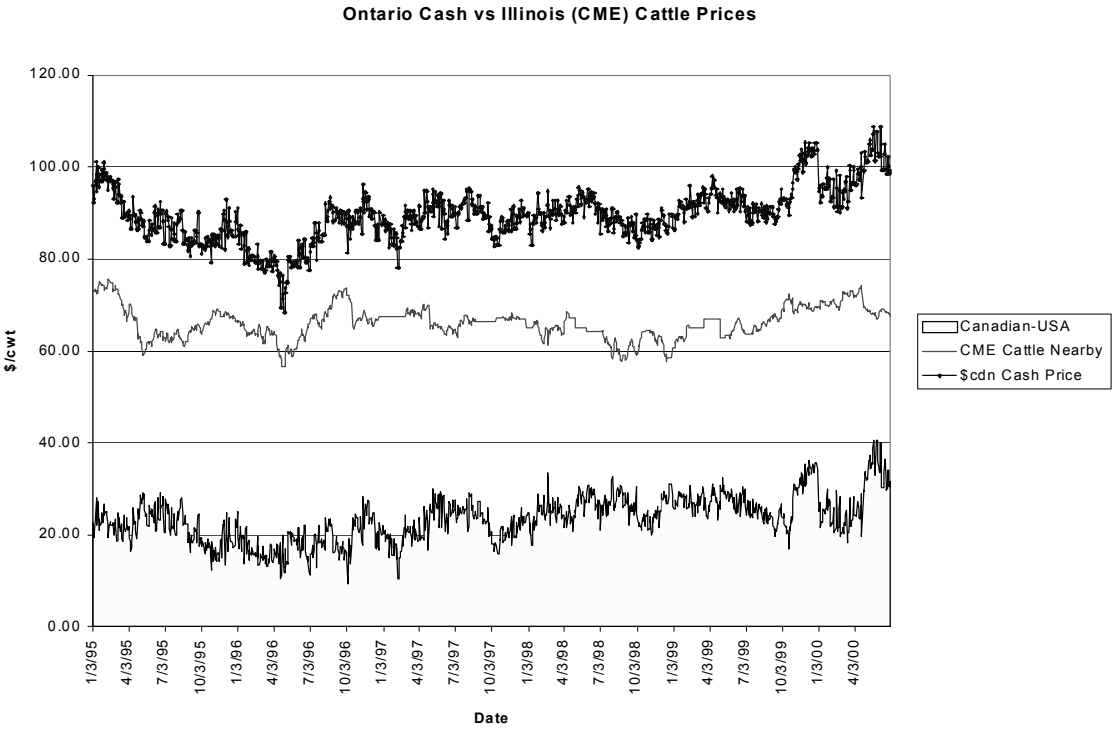

Figure 18: Comparative livestock Prices: Ontario and Illinois

2.5 Summary of Macroeconomic and Commodity Price Effects

When comparing the structure of agriculture between Ontario and Illinois, it is also important to take into consideration macroeconomic influences in addition to farm level effects. This section has briefly explored the effects of interest rates, inflation and foreign exchange on the two agricultural economies. The key result is that the comparative advantage between Ontario and Illinois oscillates over time. Interest rates, that have historically been higher in Illinois, have in recent years been lower in Ontario thereby providing an advantage in financing to Ontario farmers and lowering certain financial risks. Likewise, while inflation has generally been higher in Ontario than Illinois, this pattern has been reversed since the early 1990s as Canada has experienced an inflation rate lower than that found in the U.S. Finally this section explored the impact of exchange rates. On the commodity pricing side, the effect of a weak Canadian dollar is to increase the notional value of a commodity in Ontario relative to the notional (cash) values in Illinois. This has benefited cash crop producers in general, but there have also been costs accruing to livestock producers in terms of higher feed costs. Ontario farmers would also be disadvantaged in terms of inputs and manufactured goods imported from the U.S. since as the Canadian dollar weakens these goods become more expensive.

3.0 Panel Farm Comparisons

3.1 Introduction

In previous sections the comparison between Ontario and Illinois farms has been on a highly aggregated basis, based upon census and other statistical data. However, it is often useful to examine how individual farms have changed over time. Tracking the same farms over the 10-year period between 1990 and 2000 would have been ideal, but such data are not available. For example contacts with the Ontario Farm Management Accounting Project found no farms in their data set that consistently provided financial data over a prolonged period of time. However, continuous data are available from two short run studies from 1996-1999 for Illinois and Ontario. In Ontario a study by Lynn Marchand and Ken McKewan tracked 11 farms from 1996 through 1999 and present annual averages for a number of financial variables. For Illinois, Cesar Escalante and Peter Barry published results of a study that monitored 52 farms over the same period. The financial variables in both tracking studies were similar, and Cesar Escalante was kind enough to provide annual data that could be compared to Marchand and McKewan.

The financial performances of a panel farms in Ontario and Illinois over the period 1996-1999 are examined in this section. Although quite limited in size and time frame, the analysis provides some insights that are useful for comparative purposes. The analysis follows closely to that presented in Escalante and Barry (2002). In that study the main objective was to investigate factors impacting growth strategies for Illinois grain farms. Escalante and Barry identified a number of variables tied to firm growth. Table 4 is constructed from the data provided in the two reports plus additional Illinois data furnished by Escalante. The top panel represents Illinois, the middle panel represents Ontario and the third panel represents the differences in percentage terms between the two regions.

In general, the change in (market-valued) equity was higher for the 52 Illinois farms than the 11 Ontario farms (Figure 20). With 1996 missing for Ontario, the average change in equity for Illinois over 1997-1999 was 8.2% while that for Ontario was 4.8%. Overall the change in equity value in Illinois was about 58% higher than that in Ontario. However, there appears to be a systematic relationship in equity growth between the two regions. For example in both regions,

growth fell in 1998 from 1997, only to rise again in 1999. This observation suggests that while the financial parameters of farms between the two regions might differ, there are systemic effects common to both.

The asset turnover ratio measures gross revenues divided by total assets. Over the 1996-1999 period the average turnover ratio was .368 in Illinois and .217 in Ontario. With a turnover ratio in Ontario 59% that of Illinois, the result suggests that Ontario farmers are less efficient in converting asset value into revenues. For example, the inverse of the asset turnover ratio, measured in years, gives the number of years it takes gross revenues to cover the value of the assets. It takes 1/.368 or 2.72 years of gross revenue on average to cover the value of assets in Illinois, while it takes 1/.217 or 4.61 years, on average, in Ontario.

	1996	1997	1998	1999	Average
			Illinois (52 Farms)		
Equity Growth Rate	0.162	0.128	0.024	0.094	0.082
Asset Turnover Ratio	0.446	0.391	0.302	0.334	0.368
Tenure Ratio	0.144	0.145	0.155	0.158	0.150
Cash Leasing Ratio	n.a.	n.a.	n.a.	n.a.	0.25
Share Leasing Ratio	n.a.	n.a.	n.a.	n.a.	0.59
Debt-Asset Ratio	0.351	0.335	0.347	0.323	0.339
Interest Expense ratio	0.054	0.050	0.047	0.051	0.051
Net Farm Income	76,728	58,463	15,543	42,257	48,248
Operating Expense ratio	0.593	0.639	0.788	0.689	0.677
			Ontario (11 Farms)		
Equity Growth Rate	n.a.	0.047	0.022	0.075	0.048
Asset Turnover Ratio	0.246	0.220	0.212	0.191	0.217
Tenure Ratio	0.370	0.379	0.373	0.393	0.379
Cash Leasing Ratio	0.590	0.580	0.584	0.553	0.577
Share Leasing Ratio	0.039	0.042	0.044	0.053	0.045
Debt-Asset Ratio	0.337	0.335	0.355	0.343	0.343
Interest Expense ratio	0.093	0.090	0.108	0.125	0.104
Net Farm Income	61,795	61,232	43,781	43,452	52,565
Operating Expense ratio	0.522	0.469	0.494	0.477	0.490
			Ratio of Ontario / Illinois		
Equity Growth Rate	Na	0.363	0.890	0.793	0.579
Asset Turnover Ratio	0.552	0.562	0.702	0.572	0.590
Tenure Ratio	2.575	2.616	2.407	2.480	2.516
Cash Leasing Ratio	n.a.	n.a.	n.a.	n.a.	2.308
Share Leasing Ratio	n.a.	n.a.	n.a.	n.a.	.075
Debt-Asset Ratio	0.961	1.002	1.024	1.062	1.011
Interest Expense ratio	1.719	1.804	2.280	2.429	2.051
Net Farm Income	0.805	1.047	2.817	1.028	1.089
Operating Expense ratio	0.880	0.734	0.626	0.692	0.724

Table 4: Summary of Key Financial Variables for 52 Illinois and 11 Ontario Cash Crop Farms 1996-1999

The tenure ratio provides a compelling contrast in attitudes towards farmland ownership. In Ontario, about 38% of farmland was owned under a cash or share arrangement, whereas only 15% of Illinois farmer's land was owned (Figure 22). Farmland rental markets are obviously different between the two regions. The tenure differences impact the asset turnover ratios discussed above in that Ontario farmers will generate a dollar of revenue from a higher owned-land asset base. The cost efficiency of renting versus buying may explain the large difference in asset turnover ratios.

The average debt-asset ratio was about 34% for both groups of farmers. The debt to asset ratio fell in the 4-year period, but the decline is not large in scale. As a percentage of gross revenue the interest expense was much higher in Ontario than Illinois. Between 1996 and 1999 the interest expense ratio actually declined in Illinois while it increased in Ontario. The result likely reflects the conclusions of earlier discussions that the interest rate in Canada over this same time period increased relative to that in the United States. In this context the U.S. farmers may have a distinct cost advantage in terms of interest rates.

However, the Ontario farmers appear to have a distinct advantage in terms of operating costs since over the 4-year period, operating costs as a percentage of revenue in Ontario were only 79% those in Illinois. The operating cost ratio increased from about 60% to 80% in Illinois while holding fairly steadily at approximately 49% in Ontario. The ratio represents two sources of uncertainty. A high cost ratio can result from an increase in costs, holding revenue constant, a decrease in revenue, holding cost constant or a combination of the two. Nonetheless, it appears that the operating efficiency in Ontario is substantially less variable than in Illinois.

3.2 Relationship of Panel Data Farms to Aggregate Data

The above discussion focused on a limited number of farms over the period 1996-1999. Yet there are characteristics common to this group of farms and the aggregate data presented earlier. First, based on the aggregate data there were higher profit margins in Ontario. This result is present in the panel data where it was found that the operating cost ratio was significantly lower in Ontario than Illinois. In both data sets the debt to asset ratio exceeded 30%, which is more than twice that of the aggregate data. From this it may be concluded that the panel data are not representative of the economies as a whole. However, when one looks at the leverage ratios from 1996-1999 the panel data reveals the same stability observed in the aggregate data. Furthermore, while the panel data may represent farms with higher financial risk than the average of all farms, there is no evidence that this leverage represents financial distress. In fact upon examination of the interest expense ratios it is found that interest expense does not make up a significant portion of expenses. The fact that the average interest costs in Ontario is higher than that in the United States could be due to lower interest charges in the United States.

The panel data also show a consistency in net income with the aggregate data. From Table 4 it can be seen that net farm income for the U.S. farms fell dramatically in 1998 and 1999 relative to 1996 and 1997. Farm incomes for the 11 Ontario farms also fell but not by as much. In 1996 farm incomes in Ontario were only 86% of the Illinois group in local currency. In 1998 this ratio rose to 2.817 and for 1999 the ratio was almost at par. As with the aggregate data, the patterns for the representative Ontario farms exhibit greater stability in net farm income than in Illinois.

4.0 Bankruptcy, Financial Stress and Financial Structure

4.1 Introduction

The purpose of this section is to explore the financial stability of farms in Ontario and Illinois and to determine whether there are any jurisdictional differences. The section proceeds with an aggregate analysis of cash flow, government support, liquidity and financial leverage and how these affect the rates of bankruptcy. An aggregate approach is used only because it is difficult to get bankruptcy data on a sectoral basis.

4.2 Bankruptcy Trends in Ontario and Illinois

Bankruptcy trends and key economic data are presented in Table 5. The bankruptcy numbers are not specific to grain and oilseed farms, but the trends are telling of the agricultural economies in the two regions. The Illinois data are prorated from data provided for the group of cornbelt farms by the American Banking Association. In terms of farm numbers, Illinois represents about 18% of cornbelt farms. Assuming that cornbelt bankruptcies are evenly distributed the pro-rated share used for Illinois should be reasonably represented. Data beyond 1999 are not yet available for either jurisdiction.

The data start in 1986 in order to illustrate the financial situation in the 1990s relative to the financial crisis of the mid-1980s. As shown in Table 5, bankruptcies were highest over the 1986-1987 period. In Ontario there were a total of 154 bankruptcies in 1986/87 while in Illinois there were 252. On a percentage basis, these bankruptcies represented about 0.14% and 0.262% of the total farms in the respective peak years for Ontario (1986) and Illinois (1987).

While on a percentage of farms basis these numbers are quite low, from a visibility perspective the years of 1986 and 1987 stand out as a point of contrast for the years that followed. The number of bankruptcies and the percentage of farms declaring bankruptcies declined significantly. For example, bankruptcies in Ontario and Illinois in 1998 and 1999 were only 18.8% and 17.1% of the number in 1986 and 1987.

Factors affecting farm bankruptcies and financial stress in credit scoring studies have been identified as profitability, financial leverage, liquidity and repayment capacity among others (Turvey 1991, Turvey and Brown 1990, Barry and Ellinger 1989, Barry and Calvert 1983, Lufburrow, Barry and Dixon, Miller and LaDue 1989). Financial leverage, measured as the ratio of debt to assets represents the percent of assets financed with debt. The current ratio measures the amount of cash available to meet fixed financial obligations as they come due. The return on assets is a profitability measure that captures the operating efficiency of the farm. The leverage, current ratios, per acre cash flow from operations as well as the per acre level of government support (in local currency) are provided in Table 5.

Year	Number of Bankruptcies	Number of Farms	Bankruptcy %	Current Ratio	Debt/Asset Ratio	Cash/Acre	Government Payments /Acre
			Ontario				
1986	102	72713	0.140	2.713	0.177	107.56	5.85
1987	52	71897	0.072	2.877	0.160	103.61	11.35
1988	35	71081	0.049	3.321	0.136	105.61	13.75
1989	18	70265	0.026	3.752	0.117	96.85	8.70
1990	32	69449	0.046	3.386	0.117	90.70	5.17
1991	15	68633	0.022	3.252	0.113	81.63	14.53
1992	21	68410	0.031	3.554	0.113	104.91	26.44
1993	22	68188	0.032	4.165	0.115	83.18	24.65
1994	15	67965	0.022	3.735	0.117	76.54	6.77
1995	23	67743	0.034	3.655	0.116	84.41	4.43
1996	17	67520	0.025	3.584	0.119	92.20	6.56
1997	15	65962	0.023	3.258	0.132	93.45	5.96
1998	12	64403	0.019	2.529	0.137	89.15	6.48
1999	17	62845	0.027	2.239	0.144	90.43	4.48
				Illinois			
1986	19	91000	0.021	1.449	0.204	81.70	30.75
1987	233	89000	0.262	1.761	0.171	89.03	51.67
1988	80	88000	0.091	1.973	0.156	74.75	48.04
1989	52	86000	0.060	2.175	0.150	53.80	25.47
1990	41	83000	0.049	2.165	0.145	73.50	17.78
1991	38	82000	0.046	2.043	0.144	62.02	15.49
1992	47	81000	0.058	2.259	0.144	53.49	16.92
1993	38	81000	0.047	2.282	0.139	93.92	30.29
1994	22	80000	0.028	2.094	0.136	61.40	10.78
1995	22	80000	0.028	2.190	0.135	97.63	19.35
1996	21	79000	0.027	2.264	0.134	66.17	13.76
1997	16	79000	0.020	2.195	0.133	95.66	19.73
1998	17	79000	0.022	1.973	0.135	71.28	33.99
1999	26	79000	0.033	1.897	0.131	55.62	64.94

Table 5: Bankruptcy and Financial Trends in Ontario and Illinois

In terms of financial leverage, at the height of the 1986/87 financial crisis the debt to asset ratios of all farms averaged 17.7% and 20.4% in Ontario and Illinois respectively. The managerial response to risk in both jurisdictions was quite similar. By 1990 the debt to asset ratio fell by 34% in Ontario and 29% in Illinois. By 1996 the debt/asset ratio fell even further in Illinois to 65% of the 1986 values while in Ontario the percentage change increased slightly to 67%. By 1999, the debt to asset ratio in Illinois was constant at about 13% while in Ontario it rose from its low of 11.3% in 1992 to 14.4% in 1999. These ratios are more than 50% lower than the individual farm debt/asset ratios presented in the previous section.

In 1986 and 1987 the average liquidity ratios for Ontario and Illinois were 2.79 and 1.60 respectively. Ontario farmers had more cash or liquid assets at their disposal than their Illinois counterparts. From 1986 to 1990 the liquidity ratio increased by about 25% in Ontario and almost 50% in Illinois. Liquidity management as a response to financial risk was present in both

jurisdictions, but the need for cash preservation was more critical in Illinois. Liquidity peaked in both Ontario (4.17) and Illinois (2.28) in 1993. From 1990 through 1999 the average current ratio in Ontario was approximately 56% higher than in Illinois. However, the pattern of liquidity management remained the same. By 1999 liquidity in both regions had fallen substantially with the current ratio in Ontario being only 54% of its 1993 high and Illinois being 83% of its 1993 high.

Cash flows in Table 5 represent the operating cash flow from farming activities. The year to year changes represent the varied risks in production, prices and input costs, and thus serve as a point of comparison on the operating economies of the two jurisdictions. In nominal terms, cash flow/acre in 1986 and 1987 were about $CDN 105/acre in Ontario and $U.S. 85 in Illinois. In comparison to the average 1990-1999 cash flows of $CDN 88.65 and $U.S. 73.07, the average cash flows in 1986/87 were 19% higher in Ontario and 17% higher in Illinois. These numbers suggest that the main risks facing farmers in the 1980s was not cash flow or liquidity per se, but rather high debt loads. In contrast, problems emerging in the mid to late 1990s suggest that the main source of risk is the business risk from markets and production.

In response to business risks, governments in both jurisdictions have provided some level of support. However, between 1990 and 1999 the average nominal per acre level of support was $U.S. 24.3/acre in Illinois and only $CDN 10.5 in Ontario. The different approaches do have a public policy rational in that cash flow variability (standard deviation) in Ontario was only $CDN 7.83 in comparison to $U.S. 16.82 in Illinois. Given the higher degree of uncertainty in the Illinois agricultural economy versus that of Ontario and a policy objective of income stabilization the relative subsidies are explained. However, care must be taken in terms of attributing these aggregate values to grain and oilseed production. As discussed in a previous section there is a systemic relationship between price variability in corn, soybean and cattle prices. In other words Illinois and Ontario farmers face similar price risks. Likewise, grain for feed will also hold similar systemic risks between the two jurisdictions. Discrepancies in cash flows can only be explained through production risk caused by uncorrelated specific-event weather patterns, input cost differentials, and the different make-ups of the two agricultural economies.

5.0 Cash Rents, Government Payments and Land Values

5.1 Introduction

The relationship between per acre returns, government payments and cash rents are discussed in this section. From a theoretical perspective, cash rents represent the opportunity cost of cropland in its next best alternative use. In this context cash rents represent the marginal value product of land. The marginal value product of land represents the sum of per acre profits plus per acre government payments (if the government payments accrue to the tenant rather than the landlord.). There is, therefore a direct relationship between cash rents and land values in that the latter is often measured as the present value of cash rents, or put another way, the present value of the cropland's opportunity cost. Without explicit consideration of risk these relationships can be summarized as follows:

$$(1)\quad V = R / (i - g) = (\pi + G)/ (i - g)$$

Where, on a per acre basis, V is the value of land, R is total cash returns to the land, π is expected profits from growing crops, G is expected net government subsidies, i is the discount rate or the farm's cost of capital, and g is the anticipated average growth rate in cash flows from all sources.

Figure 19 illustrates the relationship in a classical economic framework with P representing per unit price (e.g., $/bushel), G representing government payments, Q representing output, and MC marginal costs. Two firms with different marginal costs are represented. The firm facing MC1 has a higher cost structure than that with MC2 and thus can optimally and efficiently produces Q1 rather than Q2. With price rising above marginal costs the shaded area A represents the economic rents accruing to an acre of land for firm 1. In the absence of a subsidy the equilibrium point determines the level of output where price is equal to marginal cost. Firm 2 can optimally produce more output than firm 1, so at Q2 the economic rents above that for firm one are the areas represented by D.

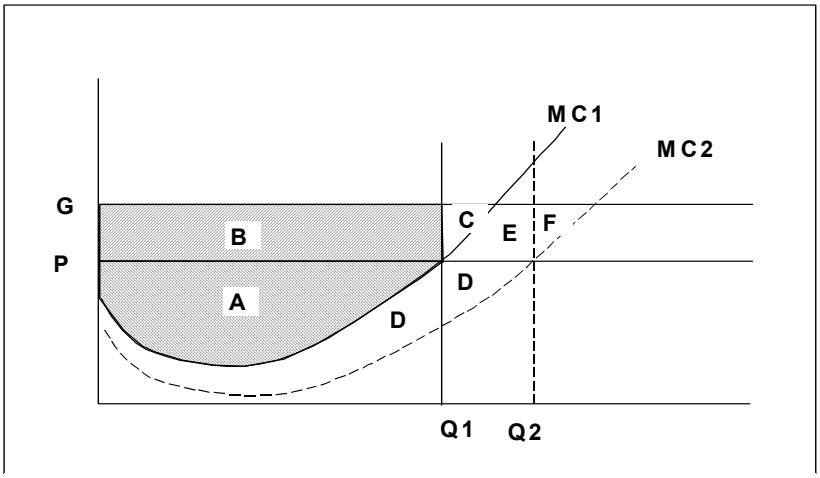

Figure 19: Economic Rents and Farmland Valuation

Cash rent determination is based upon the level of economic profits. Economic profits in this context can be viewed the same as producer surplus. If the land owner rents for less than the shaded area A, the tenant will profit by the difference and if the landlord rents for more than this the tenant will lose by the difference. The effects of marginal cost can also be seen. More productive soils, can lead to lower marginal costs, so that the combined areas of A+D represent the rental value of the more productive land.

Government payments have two impacts on economic rents. First, if the land is grown with crop yield specified by the marginal price=marginal cost rule, then the subsidy is paid only on that output. For firm 1 the shaded area B in Figure 19 represents this. If the subsidy is not decoupled, there may be an incentive to increase production even further, and the economic rents increase to include areas A+B+C. In either case one outcome of a price subsidy is clear. First, if the subsidy accrues to the tenant (and is forgone by the landlord) then its value will become part of the rental value of land. The shaded areas A+B represent the total rental value of the land in the presence of government programs assuming output remains at Q1.

In the presence of a subsidy, the rental value of farmland will be even higher for firm 2. Three effects are as follows. Economic profits at an output level Q2 are A+B. Therefore lower cost firms will charge a higher rental rate. Second, with a subsidy in place the rent increases by the area B+C+E, fully exhausting the effects of the subsidy to the betterment of the landlord, and third, if the subsidy policy is output increasing, rents could increase by the total area represented by B+C+E+F.

In a classical economic sense, the rental value of land should equal the economic profits derived from the land, including profits from production and profits from government subsidies.

It follows that the value of land is simply the present value of the rental value as presented in equation 1. For simplicity assume that the growth term in (1) is zero. Then if profits or economic rents, π=100 and the cost of capital i = .10, then the value of land is 100/.10 = 1,000. If a subsidy equivalent to $25/acre is paid to the tenant then the value of land will be 125/.10 = 1,250. In other words the value of the government program gets capitalized into the value of land.

Table 6 presents the cash flows per acre from operations and subsidies, the per acre subsidies, rental values of land, and per acre land values from 1992-1999. No cash rent series for Ontario could be found so the Ontario cash rent values represent an index of cash rents with 1992=100. The Illinois cash prices were obtained from ERS and are based on actual survey data. ERS did not use a survey method prior to 1992, but rather extracted cash rents as a percent of land values. Cash income for both Ontario and Illinois were obtained by adding to aggregate net income, depreciation charges and deducting any changes in inventory value and other imputed or non-cash costs. The aggregate values were then divided by the number of acres in each region to come up with a per acre value. The lower panel of Table 7 presents the same data but with all values normalized to 1992=100.

	Ontario				**Illinois**			
Year	Cash Profit	***Subsidy***	Cash Rent	Land Value	Cash Profit	Subsidy	Cash Rent	Land value
1992	104.91	23.91	100.00	2,184.00	53.49	16.92	95.79	1,536.00
1993	83.18	21.47	103.00	2,144.00	93.92	30.29	95.42	1,548.00
1994	76.54	4.11	99.15	2,134.00	61.40	10.78	99.50	1,694.00
1995	84.41	1.86	103.33	2,188.00	97.63	19.35	99.70	1,863.00
1996	92.20	4.24	105.61	2,384.00	66.17	13.76	106.00	2,064.00
1997	93.45	3.36	107.96	2,471.00	95.66	19.73	109.00	2,210.00
1998	89.15	3.63	66.64	2,670.00	71.28	33.99	111.00	2,240.00
1999	90.43	2	67.62	2,709.00	55.62	64.94	111.00	2,370.00
				Normalized Values 1992=100				
Year	Cash Profit	Subsidy	Cash Rent	Land Value	Cash Profit	Subsidy	Cash Rent	Land value
1992	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1993	79.29	89.80	103.00	98.17	175.57	178.98	99.61	100.78
1994	72.96	17.19	99.15	97.71	114.79	63.69	103.87	110.29
1995	80.46	7.78	103.33	100.18	182.50	114.34	104.08	121.29
1996	87.89	17.73	105.61	109.16	123.70	81.31	110.66	134.38
1997	89.08	14.05	107.96	113.14	178.82	116.58	113.79	143.88
1998	84.98	15.18	66.64	122.25	133.24	200.83	115.88	145.83
1999	86.20	8.36	67.62	124.04	103.96	383.70	115.88	154.30

Table 6: Ontario and Illinois Cash, subsidy, rent and land prices per acre. 1992-1999

In local dollars, cash profits in Ontario are higher than in the U.S. on average, although the correlation is not perfect. The difference between the two regions lies in the relationship between cash from operations and cash from subsidies. In Ontario subsidies were substantially

lower than in the U.S. in all but one year. In 1999, the per-acre subsidy in Ontario was only 16.95% that of its 1992 value, whereas in Illinois subsidies were over 3.8 times that of the 1992 values. On the other hand, the fact that the cash flows in Ontario are higher on average than in the U.S. means that, in general, operating profits in Ontario before subsidies are higher than in Illinois. Keeping in mind that the values in Table 7 are aggregate data, Ontario appears to benefit from having a more diverse agricultural economy than Illinois.

How cash flow and subsidies affect cash rents and land values is difficult to gauge given the data in Table 7. Cash rents in Ontario remained stable through 1997 but then dropped dramatically in 1998 and 1999. The drop in the last two years is inconsistent with what would normally be expected, and could be due to increased uncertainty brought about by diminishing subsidy levels. In contrast, cash rental values in Illinois generally increased over the time horizon, even though economic rents were lower. For example cash profits only increased 3% between 1992 and 1999 while cash rents increased by about 15%. The result is reasonably consistent with what should be expected since a reduction in economic rents would reduce rental values while an increase in subsidies would increase them. The cash rental rates capture both of these values. The fact that cash rental rates have increased at a rate greater than cash profits may be due to a reduction in uncertainty brought about by the U.S. government showing its willingness to support Illinois farmers.

The relationship between cash rents and land values is also depicted in Table 7. The results are somewhat consistent with what is economically expected, but it appears that there are factors other than cash flow that are affecting current land prices. From 1992 through 1999 land prices increased from 2,184 to 2,709 in Ontario and 1,536 to 2,370 in Illinois. This represents an increase of 24% and 54% respectively. The land-price paradox relates to the mismatch between land prices and the underlying economic value of that land. Recall that in Ontario cash flow and cash rents fell to 86% and 67% of their 1992 values while in Illinois, cash flow increased by only 3% while cash rents increased by only 15%. The relative changes between Ontario and Illinois make sense since in Ontario government subsidies fell while in the U.S. they increased in value. Heightened uncertainty in Ontario would require a higher risk adjusted discount rate than in Illinois because of the greater business risks faced by reduced subsidies, but it is still surprising that in the economic climate depicted by the data in Table 7 that land prices would increase at all. Anticipated growth in cash flow could explain the rise in land prices, but in terms of market signals there is little evidence in the data that for Ontario, at least, there should be an expectation of higher future cash flows.

5.2 Correlations Among Farmland Value Variables

In this section we use some simple correlations to examine the relationship between land values in Ontario and Illinois and the factor affecting them. An absence of time series on cash rents limits our discussion to a measure of correlation rather than an explanatory econometric model. Table 7 shows the correlation coefficients between the key variables.

		Ontario				Illinois			
		Profit	Subsidy	Cash Rent	Land Value	Profit	Subsidy	Cash Rent	Land value
Ontario	Profit	1							
	Subsidy	0.391096	1						
	Cash Rent	-0.00701	0.286735	1					
	Land Value	0.229302	-0.52198	-0.77444538	1				
Illinois	Profit	-0.32055	-0.08731	0.44706362	-0.22728	1			
	Subsidy	0.0391	-0.16173	-0.78693395	0.703633	-0.2077	1		
	Cash Rent	0.093504	-0.728	-0.60470539	0.944396	-0.11782	0.505662	1	
	Land value	0.079888	-0.76482	-0.57593813	0.92892	-0.04939	0.553968	0.98418	1

Table 7: Correlation Matrix of Land Value Determinants, 1992-2000

The correlations in Table 8 reveal an interesting relationship that has not been previously explored. The results show a persistent pattern between Illinois and Ontario land prices. In fact, the degree of correlation between the two is .928. In Ontario the degree of correlation between cash flow and land values is 0.229, but it is negatively correlated with crop subsidies and cash rents. There is little relationship between economic profits and cash rent in Ontario, but the lack of positive correlation between farmland prices and support programs is surprising. In contrast, farmland in Illinois is not correlated with profits but is correlated to the extent of 0.553 to subsidies and stabilization in the U.S. and almost .98 with respect to cash rents. In other words, Ontario land prices reflect some of the cash flow and profits and not government payments, whereas in Illinois land is priced relative to cash rents and government payments. In Illinois, government payments are being capitalized into land prices whereas in Ontario they are not.

These results raise a critical issue in regards to Ontario land prices, and one that needs further and more sophisticated analyses. The results suggest that land prices in Ontario are determined to a large extent by land prices in the United States. On a cash flow basis, the strong correlation between Ontario and Illinois price movements can explain why the relationship is so strong. These affects appear to be captured in cash rental rates in Illinois, and these rental rates are capitalized into land values. Ontario land values then follow suit. As for subsidies and stabilization payments in Illinois, the results suggest that there exists a distortionary effect or externality on Ontario land values. As stabilization payments increase in the United States, these get bid into rental rates and then capitalized into the value of land. Land price movements in the U.S., under this theory, then signal farmland price movements in Ontario. For existing farmers in Ontario, who benefit in terms of capital gains when U.S. farm policy increases subsides, this results in a positive externality, but for beginning or expanding farmers who must pay a price that is only weakly related to existing market conditions in Ontario, this poses a negative externality effect.

There may also be elements of arbitrage, although we cannot prove that in this report. However, recall from Figures 15 and 16 in the discussion of foreign exchange, it was shown that the U.S. dollar value of Ontario cash flow and land values is substantially lower. When Ontario cash flow is higher than Illinois cash flow in local currency, the effect of adjusting the Ontario

value to a common U.S. currency was to decrease the spread when Ontario cash flows were higher than Illinois, and to exacerbate the spread when Ontario values were lower. Likewise, while in local currency, Ontario land values were generally higher than those in the U.S., in a common currency Ontario land values were lower than those in the U.S. except for the years between and including 1988 and 1993.

If farmland is viewed not only as a productive asset, but also as an investment, then it is possible, but not proven here, that the assets related to the stronger U.S. dollar will lead the value of the assets held in the weaker Canadian currency. The basis for this argument is not so much an argument of purchasing parity for consumer goods, but rather on the opportunity cost principle of investment goods. If ultimately, upon retirement of the real estate asset, the proceeds from sales compete for investment grade securities in an international portfolio, then it is entirely possible that some kind of feedback rule exists in which the investment value proceeding from the sale of farmland in Ontario is captured or capitalized into the value of farmland preceding the sale.

Keeping in mind the limitations of data to perform a detailed analysis, the correlation coefficient between the $CDN/$U.S. exchange rate and Ontario land values in local currency was .813 over the 1993-1999 period. This may suggest that the exchange rates are important, however the correlation between Illinois land prices and the exchange rate was about .88. At best we can only conclude that land values in Ontario and Illinois increased in a related way to the exchange rate as the U.S. dollar rose relative to the Canadian dollar, but we can say nothing about cause and effect at this time.

There is a corollary argument to this. Turvey (2002) uses a real options approach to the valuation of farmland in Ontario. In that paper it is argued that given future uncertainties, owners of land will postpone the sale of land in the hopes of future, but uncertain, capital gains. The buyer of the land must purchase part of the option value from the seller and because the option value is in addition to fundamental value, Turvey (2002) suggests that this could possibly explain why farmland values are persistently higher than their fundamental values. To extend this argument to the foreign exchange issue, the seller of the land may postpone the sale not only in response to higher capital gains from improvement in firm cash flow, but also from improvements in the U.S./Canadian exchange rate that will then in turn improve post sale investment opportunities. Further work, using an extended time series, is required to determine precisely the causality, if any, that can explain the apparently high correlation between Ontario and Illinois land values.

5.3 Relationship to Other Studies

The findings above, while seemingly inconsistent with an orthodox model of capital budgeting and bid price modeling, are not inconsistent with some of the empirical literature found in related studies. Canadian studies include those by Weersink, Clark, Turvey and Sarker (1999), Veeman, Dong and Veeman (1993) and Clark, Klein and Thompson (1993). Keeping in mind that all of these studies used data prior to 1993, which represents a different policy regime than that introduced post 1990, Weersink, et al. (1999) found some evidence that Ontario land prices were influenced by farm policy. In fact they found that the rate of discount applied to government payments was generally lower than that applied to economic rents, which in turn suggests that dollar for dollar, government subsidies and payments would have a larger influence on land values than economic rents. Veeman, et al. (1993) concluded that if all subsidies in Western Canada were eliminated, economic rents would decrease by approximately 13%, while in the short run, land values would fall by 5% and then in the longer run about 18.5%. Goodwin and Ortalo-Magne (1992) concluded that a 50% reduction in producer subsidy equivalents for all

producers would have only a minimal (albeit positive) affect on land prices, as commodity prices would equilibrate to the new regime. Likewise, Just and Miranowski (1993) found that government payments were only a minor factor in explaining year-to-year fluctuations in U.S. land prices.

While we are unaware of any Canadian studies that examined the relationship between cash rents and land values there is support for such a proposition in several U.S. models including Burt (1986) and Featherstone and Baker (1987; 1988). While these studies were able to show a relationship between lagged land values and cash rental rates, at least Featherstone and Baker (1987) were also able to show deviations from what would be expected using a general capitalization model, and attributed such deviations to speculative bubbles. The presence of speculative bubbles suggests that the orthodox relationship between cash flow and the value of an asset is weakened, regardless of the source of that cash flow. Irrational expectations perhaps, but the Featherstone and Baker (1987) proposition led to numerous analyses which questioned the land capitalization model directly. These criticisms include Falk (1991), Clark, Fulton and Scott (1993), Baffes and Chambers (1989), Tegene and Kuchler (1993), and Hanson and Myers (1995). Weersink, et al. (1999), however find that in order to fully explain land capitalization one must decompose sources of cash into different risk classes such as government payments and economic rents, and allow for time varying discount rates.

Alternative explanations have also emerged. One explanation, which on the surface at least is consistent with the data, was put forth by Shalit and Schmitz (1982). They argue that credit constraints and credit rationing also impact land price dynamics. Extrapolating their ideas to the late 1980s and 1990s, the high debt loads of the mid to late 1980's led to credit rationing, which in turn forced the liquidation of farm assets increasing supply. As the financial crises expanded, the demand for assets also fell and land prices fell precipitously. Towards the mid 1990's, when the (aggregate) debt to asset ratio was at its lowest, credit rationing was relaxed. The demand for land increased with increased debt capacity, and this in turn caused an increase in equity. As equity, via capital gains, increased faster than debt accumulation, farmers could anticipate increased credit reserves by buying land that would in turn provide more equity over time. The dynamic would be a natural, albeit speculative, one. The Shalit and Schmitz (1982) hypothesis was questioned by Burt (1986), Weisensal, Schoney, and Van Kooten (1988) and Just and Miranowski (1993) for a number of reasons including weak statistical relationships between leverage ratios and land values, However, the Shalit and Schmitz (1982) argument is somewhat consistent with Turvey's (2002) real options approach in that the increase in land values, or the rise in land values above fundamental value, is due to future anticipation of capital gains (increases in market valued equity). Furthermore, the cycle or pattern of land values and financial leverage from the early 1980's through to the year 2000 is not inconsistent with what is observed in the data. Such points of view, which should be investigated as stated hypotheses in a more rigorous setting, do offer an alternative explanation as to why land prices could depart from fundamental value, but they do not explain why the economic fundamentals in Ontario can be so different from those in Illinois.

Conclusions

This comparison of Ontario and Illinois grain and oilseed farms was based on three broad objectives:

1. Provide an analysis and comparison of economic and financial performance measures for grain and oilseeds farms in Ontario and Illinois.
2. Examine changes that have occurred in the structure of the grain and oilseed sectors in the two regions over last decade.

3. Show how differences in farm level stress indicators and changes in farm structure are linked to the levels and nature of support.

Different economic and financial performance measures are analyzed and compared. Farm receipts and costs are compared in Ontario and Illinois. It is found, on a local currency basis, that in general cash receipts are higher in Illinois. However, it is also found that net income and cash flow variability is much higher in Illinois than in Ontario. In part this is due to the different degrees of diversification and investment in grains and oilseeds. For example, in Illinois over 60% of gross receipts came from corn and soybeans, whereas less than 35% of cash receipts in Ontario came from these crops.

The level and type of government support provided grain and oilseed farmers in the two regions are examined. It is found that subsidies in Ontario (excluding supply managed commodities and NISA) are about $8/acre whereas in Illinois it is $28/acre over the 1990-2000 period.

The balance sheet, total assets and total liabilities of the two economies are examined, as are solvency measures such as the debt/asset ratio and liquidity ratios such as the current ratio. Both Ontario and Illinois face highly correlated systemic risks, particularly in terms of grain, oilseed and livestock commodities. But it is also found that patterns of inflation and interest rates are also common. The financial crisis in 1986/1987 is common to both sectors, and following the crisis both regions reduced the amount of debt relative to assets and increased liquidity. The report suggests that the difference between the economic crisis of the 1980s and that of the late 1990s is due to high financial risk brought about by excessive leverage in the former years, and highly volatile and high business risks in the latter years. Furthermore, the pattern of farm bankruptcies between Ontario and Illinois were examined. Farm bankruptcies peaked at the height of the financial crisis in 1986/1987 and decreased thereafter.

The study examines the degrees of diversification and similarities/differences in the mix of crop and livestock used on farms in two regions. The Ontario economy is more diversified overall than the Illinois economy and this is reflected in the lower variability of income and cash flows in Ontario versus Illinois.

Land and rental value trends are examined for any indication of possible capitalization of subsidies into land values. An important result of this study is that while a relationship between land values, cash rents, cash flows and government payments exist for Illinois farms the relationships in Ontario are weak at best. Indeed, the report conjectures that farmland prices in Ontario are more highly correlated with economic conditions in Illinois than in Ontario.

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