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Causes and Consequences of Capitalization in Canadian Agriculture

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1. Introduction

A feature of modern agricultural industries is continuous decreases in aggregate real farm incomes (Figure 1). In Canada, real net income in agriculture declined by 80% from 1973 to 2003. Net farm incomes in the United States, United Kingdom and France have been only modestly less dramatic during this time period. Although net cash farm income in Canada has been trending upwards in nominal terms, in real terms it peaked in 1975 and has continued its long-term downward trend (Figure 2). Realized net farm income (after adding income-in-kind and subtracting depreciation from net cash income) has shown a similar long-term downward trend (Figure 3).

The size of this downward trend, however, is much less clear. The data in Figure 1 picks the most extreme end points in at least 44 years, from an unusually high level of real farm income in the mid-1970s period to the lowest-ever year in 2003. This can be seen in Figure 2 where the data run from 1961 to 2003. The result of choosing such years will be to bias the trend toward much higher rates of decline than normal. To calculate a more typical long run trend requires the use of a longer time period and less year-specific values for ending points, such as three-year moving averages. If we take only a slightly different time period, from 1971 to 2003, and use three-year moving averages, the results show that the 2001-2003 average net farm income is a decline of 16 percent in real terms from the 1971-73 level. This would mean an annual decline of 0.6 percent per year. If we do what is more appropriate for a long run trend and exclude the year of lowest real net income, using instead the 2000-2002 average real net income, then that level is 93 percent of the 1971-73 value, or an annual decline of 0.24 percent per year.

So a more realistic and longer-run calculation of the decline in net farm income shows that it has been declining over this 30 year period, but only slightly in real terms, at one-quarter of one percent per year. This is in substantial contrast with the impression of dramatic net farm income decline given in the Farm Income Issues Source Book, published in February 2005 by AAFC.

At the same time, the value of farm capital has been increasing. Between 1928 and 2003, the value of land and buildings in Canada has risen from about $70 million to about $200 million (in constant 2003 dollars); see Figure 4. Although the value of farm assets has been increasing, the value of land and buildings has remained at about 70% of the value of total assets (except for a short period in the late 1970s and early 1980s when land prices spiked). During the same time period, the value of machinery and equipment has constituted about 15% of farm assets.

It seems counterintuitive that the value of farm assets has been increasing in real terms while net incomes have been decreasing in real terms. Even if real net incomes have been largely flat on trend, it is surprising on the surface to see real farm asset values increasing. It is well-known that agriculture in a developed country is a capital-intensive business but there is an issue about how highly priced some of the capital assets become and how farmers' own actions affect this valuation process. The major objective of this paper is to explain why this has continued to occur.

One element of this valuation process concerns the price of farm land and other inelastically-supplied assets such as farm marketing quota. When there are profits in a farming activity, the combination of free entry (competition) and the restricted supply of these inputs results in their prices being bid up in a process referred to as capitalization. This is particularly well studied when it concerns profits generated by government programs. There is an interest by policy economists in the effects of this process of capitalization because it can alter the distributional effects of government policies and changing farm market conditions. There has always been a concern about how this process may enrich those farmers who are leaving the industry and impose a heavy tax on those entering.

In the second section of this paper, the theory of capitalization is presented and discussed. The present value pricing model has been a much used analytical method to study values of capital assets. The theoretical foundation for this type of study rests on land as providing of an annual stream of net benefits, similar to a bond. An investor would be prepared to pay a price to obtain this stream of future income and the price would depend on opportunity cost of the capital required, i.e., the interest rate. For a given stream of income, a higher interest rate would reduce the relative value of the income stream and, hence lower the price an investor would be willing to pay for it. The capital asset pricing model, a quantitative estimation formula that is much used in finance and real estate theory, has also been applied to studies of agricultural land markets. Empirical studies have investigated the effects of various factors on land prices, including market prices, scale economies, government subsidies, price supports or guarantees, tax policy, and the risks associated with changes in government policy and the major results of these studies are discussed.

Some parts of the literature raise questions about the applicability of standard present value theories of capitalization, citing empirical results that show contradictory results. Theoretical and measurement shortcomings of the net present value pricing model are investigated and discussed in the third section of this paper.

The fourth section investigates attempts to explain the level and variation in land prices that are not based on theoretical foundations but rather use hedonic explanatory variables to explain observed price behaviour. Factors such as distance from major urban centres, population density, attractiveness of farmsteads, and characteristics of the soil have been used to explain land prices. Studies of this type tend to be *ad hoc* and have not enjoyed widespread application by researchers into agricultural land values.

The fifth and final section summarizes the major findings of this study. It would be surprising if any single estimation technique could explain the level and variability of prices of a specialized asset like land, each lot of which has unique characteristics. However, an understanding of the theoretical foundations of various pricing models and their application in empirical studies can lead to improved understanding of the role of economic variables within and outside the agricultural industry. Further study on farmland values in Canada is needed and we offer some priorities for this research.

2. Theory of Capitalization

2.1 Net Present Value Model

This widely used model can be complicated in many ways but at its simplest it is expressed as the following formula that explains the relationship between values of assets and net income, mediated by the real interest rate.

$$V = R/r \qquad (1)$$

where: V is the value of a capital asset
R is the expected annual net return from the asset, and
r is the expected real rate of interest.

This simplified version is applicable if the annual return accrues for an infinite number of years. If the returns only occur to a limited number of years, the formula becomes more complex,

$$V = \Sigma\ (R/(1+r)^t) \qquad (2)$$

where the summation occurs with t running from period 1 to N. To make this model more general still, the R value can be subscripted to take on a value for each period t, but as this model is usually used empirically, the R value is taken to be constant. An intermediate variant of this is where capital gains are allowed, which can be considered as R growing at some rate g or where the value V increases at rate g. In this case, the denominator expands to (1+r-g). In the version where N is infinite, where the returns are expected to go on into the distant future, the model with capital gains simplifies to

$$V = R/(r-g). \qquad (3)$$

If one is willing to accept constant annual returns, R, a constant discount rate and rate of capital gain, and an infinite time horizon, this model would serve as a useful starting point. This might be considered the case for valuing assets based only upon market returns, like land values when there were no government policies.

However, if there are government policies involved that generate income flows, their capitalization is likely to involve an additional factor, what is often described as policy or default risk. This can be considered in a simple fashion as augmenting the discount rate by a policy risk parameter, but in Barichello (1996) it is formulated in a way that transforms the valuation formula to

$$V = R(1- d)/(r + d - g) \qquad (4)$$

where d is the risk of a default in the government program that would cause the value of R to go to zero.

Any increase in R, the expected net annual returns, would increase V, the value of the asset. This would include an increase in gross market income, holding input costs constant, or a decrease in input costs holding gross returns constant. Also included in R is

any net benefit from government programs which would increase net income on this enterprise. Similarly, in increase in the expected capital gains from the asset would raise V, one interpretation of which is an increase in the expected rate of growth of net returns, R. A decrease in the real interest rate r would raise the value of the asset. Also, a decrease in the expected rate of default of the government program contributing to net returns would raise the price of the asset.

There are a multiplicity of ways in which this basic model can be made more complex but we will reserve a discussion of those to the review of the literature. The main point here is that even before turning to choosing appropriate empirical magnitudes for applying this model, any of models (2) to (4) are more complicated than model (1). Furthermore, there can be government program changes or market changes that may alter profitability of the commodity that may not be captured in the usual measures of net returns or the interest rate.

When it comes to finding the appropriate empirical variables, the underlying model uses expected values, not the current market value in any one period. This might prove to be a difficult matter to deal with. And the measure of net returns may be unobservable. This is commonly true in quota-constrained markets where the normal market clearing condition of price = marginal cost does not apply. Or there may be additional components to net returns in addition to market price, such as tax benefits that should be included, or even non-farm net returns.

These several factors bedevil the empirical application of the net present value model. As is shown in the following section, several empirical attempts to model land market prices using a simple net present value framework have been rejected. After the discussion above, this should come as no surprise. Even examining quota values, where there is no alternative value of this asset aside from its value in farming, the valuation process, although basically a net present value process, is more complicated than the simple version of equation (1). We now examine in more detail those empirical applications.

2.2 Empirical Studies of Capitalization in Agricultural Asset Markets

There is a large number of studies that examine agricultural asset markets, mostly land markets, to determine if there is any evidence of the capitalization of the benefits of government programs.[1] Most of these studies have been focused on US farmland markets but there are at least a dozen studies that use Canadian asset value data, as well as numerous similar studies in the European Union, Australia, and New Zealand. The models and empirical methods vary but most of these studies begin with what has become the standard model in this literature, a net present value model of asset pricing.

The clear conclusion in these studies is that the benefits of government programs generally become capitalized into the value of an asset, usually farm land but sometimes quotas or allotments (in the case of tobacco). These assets have the common feature that

[1] A detailed review of these studies to 1994 is found in Turvey et al (1995).

they are in relatively inelastic supply. However, the process is more complex than is found in simple models, leading to a substantial amount of debate on related issues. This debate is concentrated on studies of farm land prices, due to its widespread importance, and we will follow this emphasis, but add debates and insights as appropriate from studies into the capitalization process observed with quotas.

Among the earlier papers on farmland values during the 1960s and 1970s a present value approach along Ricardian lines was common, as was a supply-demand approach for farm land. However, as later studies used data from the 1970s when farm land prices were booming, creating a divergence between current income and land values, followed by the early 1980s when land prices fell dramatically, the earlier models failed to track land values well (Pope). This led to a re-examination of the various land price models, including the present value model. Most modifications followed the general principle that farmland values reflected net returns, but broadened the notion of what were included in net returns and relaxed some of the assumptions of an overly simplified version of the present value model.

Broadening the set of factors that should be included in net returns focused on the larger number of explanatory variables that could contribute to land values that should be in these models. One of the most important was the factor of capital gains (Melichar). This is equivalent to allowing the annual net returns, including but not restricted to land rents, to grow in real terms over time. Alston (1986) raised the important issue of after-tax net returns being the critical factor, not just before tax returns. This is particularly relevant to capital gains because usually capital gains income is taxed at lower rates than annual income flows. Feldstein (1980) broadened the role of land to an investment asset, not just a production asset, raising the issue of land returns relative to equity and bonds in a portfolio. This led to introducing inflation as a potentially important variable, not only due to differential taxes on capital gains but because inflation affects the real returns to different classes of capital differently. A fourth important contribution during the 1980s was that of Burt (1986), emphasizing the importance of long run considerations, that expectations on net returns are important, and that the relevant discount rate is the long run real rate, not for the most part a varying annual rate.

Another class of factors that has been introduced is that of non-farm returns to land. These could be important in those agricultural areas adjacent to urban centers where the demand for urban land (residential, commercial and industrial) could affect farmland prices. In Canada these factors may be quite relevant in parts of Ontario, and in the Lower Fraser Valley area of BC where urban factors may actually determine the price of farmland. In the larger picture, vast areas of farm land in Canada and the U.S. are outside the influence of urban factors, leading aggregate (national) studies of farmland prices to usually show little or no influence from urban variables. Some of the factors that have been introduced have been shown to have no important role at the market level or higher, such as debt and credit rationing.

A different strand of empirical testing of net present value models of land prices arose in the late 1980s and early 1990s using time series data and cointegration tests. This approach is statistical but raises the question of whether the estimated regression relationship between annual returns and asset values is spurious. It draws on the Engle

and Granger (1987) concept of cointegration between a dependent variable (e.g., the land price) and a set of explanatory variables in the situation where the data are characterized by unit roots. Campbell and Shiller (1987) applied this to present value models showing that if the present value model is correct, net rents and land prices should have the same time series properties. Such tests were imposed on farmland data in a variety of studies, including several in Canada (e.g., Clark, Fulton and Scott, 1993), and most studies concluded that the simple present value asset pricing model did not hold. There are a variety of reasons why this result could be obtained, mostly that the present value model that would be expected to work in actual data would be more complicated than a simple net annual farm returns and farmland price relationship, as has been discussed above in our own version of this model and in the literature already summarized. For example, the net returns could include more than annual farm rents (including capital gains not derived from annual farm rents, nonfarm returns, or other benefits not measured in farm rents), the discount rate could vary over time (due to policy or default risk as only one factor), and there could be speculative bubbles where the normal price/earnings ratio varies for other reasons such as those associated with booms and busts in asset prices where the usual fundamentals related to returns and interest rates do not appear to apply.

Focusing more on government programs and their effect on asset prices, there is a small number of papers estimating quantitative effects on land prices from changes in government support programs. Some of these are simulation models while others measure the effects on land prices more directly. The results are also quite variable by policy, country and time period. Veeman, Dong and Veeman (1993) estimated that the abolition of direct government transfer payments in Canada would lower land prices by 18 percent in the long run. Goodwin and Ortalo-Magne (1992), using wheat data from six regions across France, the U.S. and Canada estimated a 1 percent increase in PSEs would raise land prices by only 0.38 percent. Just and Miranowski find that U.S. government payments account for 15-25 percent of the value of land but that changes in such payments have little effect on annual changes in land prices. Turvey et al (1995) find provincial differences in the effect of government programs relative to market factors on land prices. Land prices in Ontario are more responsive to market income than to government payments, whereas there is little difference in Saskatchewan. In both cases, a 1 percent increase in government payments would lead an inelastic (0.5-0.6 percent) increase in land prices.

This issue of possibly differing discount rates between market income and government payments is an example of the more specific questions that have been raised in capitalization studies in the past decade. Clark, Weersink and Sarkar (2002) found that contrary to the Turvey et al result, discount rates in Saskatchewan and Ontario were not significantly different. And they also found that contrary to Weersink et al (1997), there was no statistical difference in the discount rate between market and government payment income in land prices in these two provinces.

Goodwin, Mishra and Ortal-Magne (2004) found, in a broad-ranging paper, that using expected returns produced better results than actual returns, but that with expected returns, an extra dollar of government payments increased land prices by more than an extra dollar of market returns, the reverse of what was found for actual returns. They also found that land values increased differently depending on the type of government

program, and that tenants (leaseholders) get some benefits of government programs, although less than half, and until lease rates and contracts are revised. Kirwan (2004) also finds that leaseholders get a significant share of government subsidies, more like 60 percent, but this too is a short run response, subject to some reduction when lease rates and contracts would be revised over time.

Moss (1997) finds that inflation rates are the single most important determinant of farmland prices in the 1960-1994 period, in contrast to Feldstein's earlier result. Plantinga et al (2002) find the importance of urban land development in influencing farmland prices, but this depends on the proximity to urban centers. Near rapidly developing areas, future development rents account for more than half the agricultural land values, but in major agricultural regions like California's Central Valley, the figure is only 5 percent.[2]

The benefit of tax advantages and its role in agricultural asset prices has rarely been measured. One case where some attempt to value the benefit from a tax saving was undertaken was for quota purchases in Canada (Barichello and Glenday, 1985). The tax provision allows for a depreciation calculation to be undertaken on new quota purchases, but any depreciation used must be "recaptured" upon sale of that quota. In essence this provision gives the quota purchaser an interest free loan from the Government of Canada for as long as the quota is held. Although this is an advantage, it works out in present value terms to be a small factor in the total profitability of a quota purchase, less than three percent of the quota's value.

Finally, Sumner and Wilson (2004) show for California dairy quota that default risk is not only important in the market for that asset but that it is much more significant in size than the more normal portfolio risk prominent from capital asset pricing models.

Summary

The lessons from this literature can be summarized as follows. First, farmland values reflect the net returns from that asset. However, net returns include market returns, government payments, and other returns not included in those two factors, often due to government policies. One example of such "other" returns could be insurance benefits in cases where the government program may reduce the volatility of net income of farmers, or it could be tax benefits. Expected returns are usually more relevant than actual received returns. Capital gains can be highly important, although they are usually a reflection of an expected increase over time in future returns to the asset. This would include new quantity allocations of quota which can be seen as a type of capital gain. Nonfarm factors, such as urban development returns, can be important but are usually most relevant in regional markets near growing urban areas.

[2] We have neglected the large body of research that uses hedonic approaches to value the various characteristics of individual land parcels which is a common and productive avenue of research when using micro data on individual transactions in a cross section. Our focus is more on aggregate time series data.

Second, risk is an important consideration in asset purchases. This can arise from "portfolio risk",[3] and from default risk,[4] although the latter appears to be much more important in the case of dairy quotas (Sumner and Wilson 2004, and Barichello, 1996). These risk factors can vary over time due to changing perceptions of the likelihood of changes in government policies, and because they are embedded, and often not observed directly, in the discount rate, these factors are usually the key variables responsible for what are referred to in this literature as changes in the discount rate. The interest rate (the private opportunity cost of capital) is also a component factor in the discount rate and can be important, although it is relatively small compared to default risk factors (e.g., long run real interest rates are in the range of 5 percent whereas default risk can add up to 25 points to that risk (Sumner and Wilson 2004, Barichello 1996).

These discount rates may differ depending on whether the income is from market sources or government payments. No clear rule is evident on this issue. Which discount rate is higher depends on the empirical situation, on the details of the government program and the context of normal market returns.

The effects of government programs on capitalization varies considerably by government program. Different programs have different current and future net benefits, different expected time horizons, that is, differences in terms of being permanent or transitory, and are imposed on different market situations where the status quo situation is not the same.

Finally, the incidence of government program benefits may differ according to the situation. Nor all program benefits are observed to end up in land values. Some benefits remain with renters, particularly in the short term until rental contracts can be adjusted, and in some cases there are legislative attempts to impose benefits for tenants.

Most of this capitalization literature applies to land values. There is a much smaller literature applying to capitalization for quotas. In these cases, quota values appear to respond to income changes more substantially than do land prices. This is not surprising, given that all the returns to the quota are from the income flows they generate, particularly from the influence of government policy. Land returns can come from a greater variety of sources (e.g., farm, nonfarm, consumption benefits, land as a portfolio asset vs. a productive asset).

3. Other Issues Related to Use of the Present Value Pricing Model

There are a number of additional reasons why observed asset prices might diverge from what calculated asset values might be determined or expected to be. The main reasons are discussed in the following sections.

[3] This is the standard concept of risk from the capital asset pricing model in the finance literature where the risk premium demanded is measured as the contribution of that investment to the future variability of the investor's whole portfolio of assets (Sumner and Wilson).

[4] The risk that some negative effect on the whole system of returns will reduce or remove the stream of income due to that asset, sometimes referred to as policy risk when it is a change in government policy that will lower the income flow (government policy-related payments) accruing to that asset.

3.1 What is the Numerator?: Difficulties in calculating net returns to land

The annual return from land can be a difficult concept to compute. In perfect competition (the market organization that characterizes the part of agriculture that uses land extensively for production), total returns exactly equal total costs of production, on average in the long run. The costs of production include the market or opportunity costs for all resources used in production, including opportunity costs of owner's labour and capital, true economic depreciation of all owned assets, and costs paid for all purchased inputs. By calculating the costs of all inputs in that way, there can be no economic profit (or loss) in cropping agriculture in long run equilibrium. Farmland at the margin would earn no economic rent above its opportunity cost in its best alternative, and inframarginal units of land would each earn its own rent, depending on its unique productivity in the use to which it is being put.

There is no easy way to calculate some of the important costs in agriculture, especially opportunity costs of owned land and labour. Typically, data series are developed that show total gross returns above variable costs or above those costs that are actually paid by the farmer during the year of production. Sometimes, an estimate of depreciation is added to the costs. By subtracting only those costs that are easy to compute, some estimate of a net margin can be calculated. This margin is sometimes called net farm income or net cash income. However, it is not a true indicator of the annual return from the farming operation.

Suppose net farm income is calculated as the difference between gross income and farm costs (excluding the opportunity costs of owned labour and land). The net farm income then can be attributed as returns to those two key inputs. But how much goes to labour and how much goes to land? If labour is valued at an average industrial wage (what may be considered the opportunity cost for this input), the balance then would represent the return to land. However, if farmers choose to remain as farmers despite low relative returns (because they like the life style, for example), that implies that the opportunity cost of their own labour may be well below the average industrial wage. A lower opportunity cost for labour translates directly into a higher residual return to land.

The true opportunity cost for own farm labour is the minimum amount that they will accept and still remain on the farm (i.e., their supply price). There is plenty of evidence that this figure might be quite low for many farmers. In a recent survey, 90 percent of Canadian farm operators rated their standard of living as good, very good or excellent (Figure 2) despite the pervasive low incomes in the industry. If most farmers are happy with their life style, that means that the true opportunity cost of their labour may be lower than often is calculated, resulting in higher (than calculated) residual returns to land.

The point of this discussion is to demonstrate that any use of data series that arbitrarily assign opportunity costs of labour (and thus establish residual returns to land) may result in a downward bias in the estimate of annual returns to land (the numerator in the capitalization formula). If the estimated annual returns are biased downwards, then use of the formula to estimate the price of land also would be biased downward. This

may explain part of the reason why land prices often appear higher than those estimated with any model using data based on collected or calculated net returns.

3.2 Prices are Determined at the Margin

The present value pricing model specifies a relationship among net farm income, real interest rate and value of the underlying asset. Nearly all empirical analyses that attempted to explain this relationship have had to rely on data collected from *average* farming operations. Although various definitions of net farm income have been used in previous studies, the data on net farm incomes that have been available for statistical analyses have been averages across a group of farmers in some area under study.

This procedure may be satisfactory if the average purchaser of farm land also was average in size and average in net income. Anecdotal evidence exists, however, that this is generally not the case. Purchasers of land and production quotas tend to be larger and more specialized producers who also tend to have net incomes that are well above average. For example, Figure 7 shows that large business-focused farms in Canada had average family incomes from farming operations of over $42,000 in 2003, very large business-focused farms had family income from farming of more than $167,000, as compared to an average family income from farming of less than $30,000.

In data from the 1995 Statistics Canada Whole Farm Data Base (AAFC, 1997), the calculated net operating income of Canadian grain and oilseed farms averaged over $31 per acre for farms that had $250,000 or more of sales whereas the net operating income for the "average" farm was just over $25 per acre. If it is true that most land is purchased by large farmers, land that produces an income stream that averages $6 per acre extra would be valued at $100 per acre more in the present value model if the real interest rate is 6 percent ($150 per acre more if the real interest rate is 4 percent). In general, the use of average values of net returns generally would bias downwards the estimated value of land if the following two conditions hold:

i) larger than average farms have higher than average net margins per acre, and
ii) purchasers of land are disproportionately in the large size category.

3.3 Role of Off-farm Employment and Hobby Farming

A further problem for the net present value pricing model is the role of off-farm employment opportunities and hobby farming. Nowadays, modern technologies make rather large-scale extensive farming operations possible with limited labour inputs. There are many examples of modest sized farms being operated where the farm operator (and maybe even spouse) holds down full-time jobs off the farm. This permits an attractive lifestyle for certain people that are reflected in the high rate of satisfaction found in many farm surveys.

Figure 7 shows that off-farm income has been growing as a percentage of total family incomes on farms in Canada. In 2002, net farm income was only an average of $9,225 in Canada while off-farm income averaged $63,160. The share of off-farm

income as a percent of total farm family income increased from 72 percent in 1980 to 87 percent in 2002 (AAFC, 2005).

The use of the present value pricing model where the numerator is based on calculated net farm incomes does not account for the large amount of purchasing power gained from off-farm employment. The average farm family income in 2003 was $64,074 (AAFC, 2005) but only the large farms ($100,000 - $500,000 total sales) and very large farms ($500,000 and over) had significant net farm incomes (Figure 8). Increasingly significant off-farm incomes do not change land productivity and rents accruing to farmland, but they do raise the ability to pay for farmland for consumption reasons. They also allow self-financing to reduce the risk and credit cost of buying farmland, and permit holding land in downturns, keeping prices higher than otherwise.

3.4 Role of the Interest Rate: Time Patterns of Real Interest Rates

An explanation of the pattern of asset prices in Canada must include some discussion of the denominator of the net present value formula as well as the numerator. This is particularly so when there has been considerable variation in real interest rates in Canada in the past fifty years (see Figure 10). This is all the more important when asset values in agriculture have increased steadily during the past two decades, particularly quota values. The striking observation about real interest rates is that they fell to their lowest levels since 1950 during the decade of the 1970s, they peaked in the 1980s, more in the early 1980s but in 1989-90 again, then they gradually fell to current relatively low levels.

These patterns in real rates are quite clearly seen, inversely, in asset values. The rapid decline in farmland values following 1981-82 came on the heels of the rapid increase in real interest rates during 1980-81 and the sustained high rates (almost three times the average of the 1950-75 period) observed subsequently until 1990. The recent increase in asset values during the 1990-2003 period can be interpreted as being, in part, a natural response to the decline in real interest rates that have occurred since 1990.

3.5 Importance of Factors Outside of Agriculture

We have already noted that non-farm factors play a role in farmland prices, especially in certain regions. However, the integration between rural and urban markets for all farm inputs, notably labour and land, has become closer over the last several decades, leading us to add more detail to this relation. First, there are close ties between real estate and bank lending, as with other forms of investment. This is why we noted the potential importance of inflation as a factor in farmland prices, reflecting the substitution in asset portfolios among land, equities and bonds. In addition, the interest rate itself mediates the competing demands of these investment categories and, as already noted, plays a critical role in farmland demand. As non-farm ownership of farmland has tended to become more common, these relations across different forms of investment within portfolios, including farmland, have likely become tighter.

Economic growth in the larger economy can cause land prices to rise because the demand for real estate increases against a constrained supply of land, just as economic

recession can cause the reverse. Land prices have a tendency to increase faster than the rate of economic growth because the income streams on which they are based are residuals (after all other costs have been paid). Relatively small changes (positive or negative) in aggregate demand cause proportionately greater changes (positive or negative) in firms' net margins leading sometimes to long periods of land price inflation or deflation.

The markets for most inputs or products tend to be self-correcting: price rises will bring forth increased supply, thereby leading to lower prices. In the markets for many agricultural products, the self-correcting process may be lagged because of the biological time demands required to increase production. Thus, hog price cycles tend to be 3-4 years in length and beef price cycles tend to be 10-12 years in length. However, the self-correcting process in the land market can be much longer. Owners may hold land off the market when land rents turn down, preferring to await rescue by either an upturn in rents or improved economic conditions that tend to increase the prices of all real estate.

This process is further exacerbated by speculative behaviour of some investors on the land market. This is the source of the literature on booms (bubbles) and busts in land prices that was noted above. Some may have little or no interest in using the land productively, preferring to wait for increases in its value. Since the price of most farmland has had a long term upward trend (although not in real terms since the early-mid 1980s), this often has been a successful strategy. This is especially true in areas close to major urban areas where agricultural land continuously is tapped for industrial or municipal use.

4. Examining the Data

We now turn to selected time series data found in Appendix 2 to apply this background in capitalization research with the objective of interpreting recent trends and offering insights as to these developments.

Figure 1 shows the total amount of farm capital in Canada, broken down into its components. Although similar to Fig 5 in Appendix 1 it shows each variable independently from the horizontal axis and for only the past thirty-odd years. It is in real terms and shows first that farm capital is heavily dominated by land and buildings. Further, the real value peaked in the 1979-81 period, whether you look at total farm capital or only land and buildings. Capital (really land and buildings) values fell to the late 1980s, since when they have slowly increased to current levels. There is no evidence of any dramatic change or bubble in land or capital values since the early 1980s, although the 1979-81 peak in land and capital values was clearly unusual and in retrospect unsustainable.

Figure 2 shows that the increase in aggregate quota values has been much more dramatic in real terms than has been the increase in land and buildings, or the total of non-quota farm capital. It has increased steadily in value since the first year for which aggregate data are available, and the pace of increase has quickened sharply since the mid-1990s. In the aggregate there is no clear sign of abatement of this rise. Also, because the total

quantity of quota has grown very slowly, the pattern of Fig. 2 can be taken as a rough indicator of the growth in unit quota prices. However, when we add the total value of quotas to the total value of other farm capital, shown in Fig. 3, the effect is relatively small, although growing. The total value of farm capital excluding quota is roughly $200 billion in 2003, while the value of quota was about $25 billion. Quota now accounts for about 1/8 of the total value of farm capital in Canada including quota values. Even with quota values included, the current real value of farm capital is still below its 1980 peak.

When the real value of farm land and buildings are placed on a per acre basis, as shown in Fig. 4, the time series pattern is not fundamentally different from the aggregate value of land and buildings from Fig. 1. Land "prices" peaked in 1981 at a Canada-wide average of $1100/acre, in 2003 dollars. These prices have gradually increased since their post-1981 trough in 1988 so that by 2003 they had reached $900/acre, also in 2003 dollars. Figure 5 shows how gradual has been the growth in land prices when compared with the growth in quota values. To give some quantification to these two different patterns, since 1990, for an arbitrary comparison point past the 1980s decline in land prices, real land prices have risen at a compound growth rate of 2.0 percent per year. Real (aggregate) quota values have grown at a compound annual rate of 7.7 percent per year, almost four times faster and a rate of asset value growth that is not often observed over such a lengthy time period.

Figure 6 shows the pattern of real net farm income in Canada from 1971 to 2004. As noted above in the introduction, these data show a decline in real net farm income over this period and over most subperiods, but one that is less dramatic than commonly claimed. Using 3 year moving averages centered on 1972 and 2003 (with actual 2004 data), the decline is 0.95 percent per year, almost a one percent annual decline. If we look only at the period from 1990 to 2003, to conform to the land price data just discussed, the rate of decline is almost identical, -0.93 percent per year.[5] Even with the caveat of footnote 5, still this shows gradual modest annual declines in net farm income while land prices are rising, at least over the 1990s to date at 2 percent per year. This calls for closer examination.

One aspect that deserves attention is the point raised in section 3.2 above, that these numbers are all averages but typically land is being purchased not by average farmers but by farmers somewhat larger than average. We make a small correction to the net farm income data in Figure 8 by restricting ourselves to only those farms with gross sales (receipts) of $10,000 or more. This is hardly a large farm, but it does remove some of the smaller hobby farms from the data. Even this change shows different results for net farm income. Relying on census data for such disaggregation we see from Fig 9 that average real net farm income declined from 1981 to 1991, but has risen since then in both subsequent intercensal periods. From 1991 to 2001, average net farm income rose by at least 40 percent, or by 3.5 percent per year in real terms. Ideally, one should look at even larger farms because even $10,000 in annual sales can hardly be considered a serious income earning operation.

[5] Note that such results are sometimes quite sensitive to the choice of end point, particularly when the 2003 and to a lesser extent, the 2004 net income data are depressed by the BSE crisis.

Another aspect to examine is the pattern of real interest rates, as discussed in section 3.4 above. These are shown in Figure 9, where what is striking is the jump in real rates that occurred in the 1979-80 period, preceded by declining rates in the period from 1960 to 1975, and followed by historically very high real rates throughout the 1980s. The period since 1990 to date shows declining real rates. These rate patterns are important to consider in addition to the net income patterns just discussed. Land prices reflect both net income to land as well as interest rates used to discount those returns, however they are expected to move into the future. These rates on a casual review show a striking inverse relation to the actual pattern of farmland prices. Those real prices rose to historic highs in the late 1970s following historical low real interest rates. Then as real rates spiked, land prices fell. The fall in land prices continued as real rates remained high in the 1980s. Then they have gradually grown in the 1990s as real rates on average declined.

The final figure to examine is Fig 10 showing the ratio of total farm debt to net farm income. These data run from 1971 to 2003 and show, after 1974, a more or less steady increase in the ratio. The ratio does shoot upward somewhat in the last two years of data which is a reflection of the large fall in net farm income in those years. But still, the ratio is only slightly above the general trend upward. This trend by itself is not necessarily alarming. It shows that farms are being financed more by debt and less by equity. However, the level of equity has been historically high in agriculture. Further, if this debt is being taken on by the larger farms whose net farm income has been increasing over the last decade, this may be economically sustainable and not surprising. In terms of its effect on capitalization and land prices, we know from the empirical work reviewed earlier that there is no close relationship.

Other Explanatory Factors for Rising Land Prices in the 1990s

That literature guides us with more insights as to what might be occurring in the land market to explain how land prices can be rising with aggregate net farm income declining. Five factors can be seen to be playing a role.

First, expected net returns are known to be critical, and they may be different from aggregate net farm income data for those farmers who are doing the land buying. Their view of higher expected returns may be due to their own economies of size, their ability to use newer technologies that cut their costs or increase their yields, or their ability to sell into higher priced markets. Second, they may expect government payments or related benefits to be increased in coming years, at least in part to compensate for any poor market returns. Figure 6 in Appendix 1 shows how those payments have grown quite substantially in the last five years, at least in Saskatchewan. It might be be quite rational, if you expected those returns to continue, to buy land or pay more for any land purchases.

Third, and related to the point just made, little since section 2 has been mentioned of risk. Yet along with the increase in government payments, there may be an expectation that the risk of a reduction in those payments is diminishing, even if payments have not increased. In other words, if there is a belief that the risk of a change in policy to reduce your government payments is falling, that government payments are becoming more secure and more likely, that will lower the discount rate in an asset purchase decision and raise the price a buyer is willing to pay. This is already suggested as a plausible reason why quota values have increased substantially since the Uruguay Round Agreement has been

implemented. In some cases, this point may be empirically undistinguishable from a decline in real interest rates, although there is some independent evidence that the risk associated with milk quotas fell in the late 1990s (Barichello, 1999).

Finally, there are two other factors that may have had some influence on higher land prices, even if they were relevant in only selected areas. First, there is the possibility of increased off farm returns, raising expectations of future returns from urban development or an urban-related increase in future land prices (a capital gains expectation). This may not apply generally across Canada, but is a plausible argument in areas near urban development like Ontario and southern BC. Second, there can be some influence from rising off farm incomes of farm families. This may lower effective interest rates if it allows self-financed land purchases or it may simply may allow for increased land demand for consumption reasons. Like the first point, this may only apply to some farm families across the country but for those individuals it may lead to small effects in the aggregate land market in the direction of increasing land prices for a given net farm income.

5. Summary and Conclusions

The price of agricultural land in Canada has continued to increase at the same time that net farm incomes have trended downward. Improved efficiency in production of most agricultural products has led to continued decreases in average costs of production. In an industry that predominantly is characterized by perfect competition, any reduction in costs must either be accompanied by a reduction in product price or by an increase in the price of that input that is most inelastic in supply, usually land. This is the only way that long term economic profits in the industry will return to zero.

There have been many attempts to better understand price movements in the land market. The net present value pricing model calculates the value of an asset as a function of the annual stream of net returns it generates and the real rate of interest. Many empirical studies have used variations of this model to describe or predict changes in agricultural land prices. Most studies have found statistical support for the present value pricing model in its general form– anything that increased net returns (including subsidies) or lowered the real rate of interest (including government subsidies in their lending programs) seemed to be associated with increased land prices. However, most authors bemoaned the fact that their model still left unexplained plenty of variability on land prices.

This study has shown that there are problems in using a too-simple version of the net present value model in an empirical study of land prices. First, there is a theoretical problem with definition of the numerator. There is no completely suitable method of deriving the net return from an agricultural operation when two (or more) major inputs are not purchased in the market place. In the case of agriculture, the opportunity cost of owned labour may be very low because such a high proportion of those engaged in the industry have a fondness for the lifestyle and seem unprepared to exit the industry despite long periods of low returns. This means that the annual returns to the land resource might

well be much higher than usually are calculated (after valuing labour cost at some off-farm equivalent).

Second, it is well known that the main purchasers of farm land and production quotas tend to be those who are either larger in scale or more efficient in production. These are producers who have higher net returns than show up in most data that are based on an average of all farm operations. If the present value models in the empirical studies had used the "correct data," perhaps their performance would have been improved.

Unquestionably, the present value model can explain a great deal about movements in the prices of agricultural land and production quotas. However, the very nature of these two inputs (bother of which are extremely inelastic in supply) has led to a great deal of speculation in their prices. General economic conditions, including the prices of other forms of real estate (houses, office buildings), have an influence on the prices of agricultural land and production quotas. The agricultural economy is much more integrated into the regular economy than it used to be, especially in the labour market. Part-time farmers, hobby farmers, speculators eyeing the future growth of urban areas, and actions of many others have meant that financial conditions in the relatively narrow agricultural production industry have become much less important in the final determination of land prices.

Finally, when it comes to explaining why land prices are going up while net farm income appears to be declining, there are a number of important factors that may explain or at least be consistent with these observations. Net farm income may be falling less than some commentators claim. The net farm income data in the aggregate may be inappropriate to reflect incomes of actual asset buyers. Real interest rates are declining. There is the possibility of government payments offsetting market price declines. The risk of government programs being ended or payment falling may be declining. And there may be nonfarm financial returns to land that are climbing and off farm incomes that are also climbing. All these factors are consistent with increased land prices for given published net farm income data, exactly as we have observed.

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Oltmer, Katrin and Raymond J. G. M. Florax. 2001. Impacts of agricultural policy reform on land prices: A quantitative analysis of the literature. Presented at 2001 AAEA – CAES Annual Conference, Chicago.

Shi, Y. J., T. T. Phibbs, and D. Colyer. 1997. Agricultural land values under urbanizing influences. Land Economics 73(1): 90-100.

APPENDIX 1

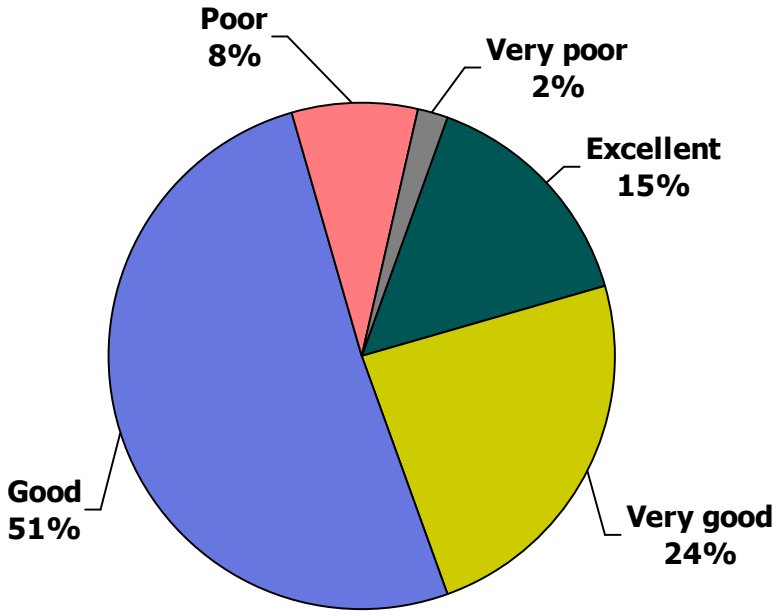

Figure 1. Standard of Living Rating of Canadian Farm Operators, Spring 2003. (Source: AAFC 2003)

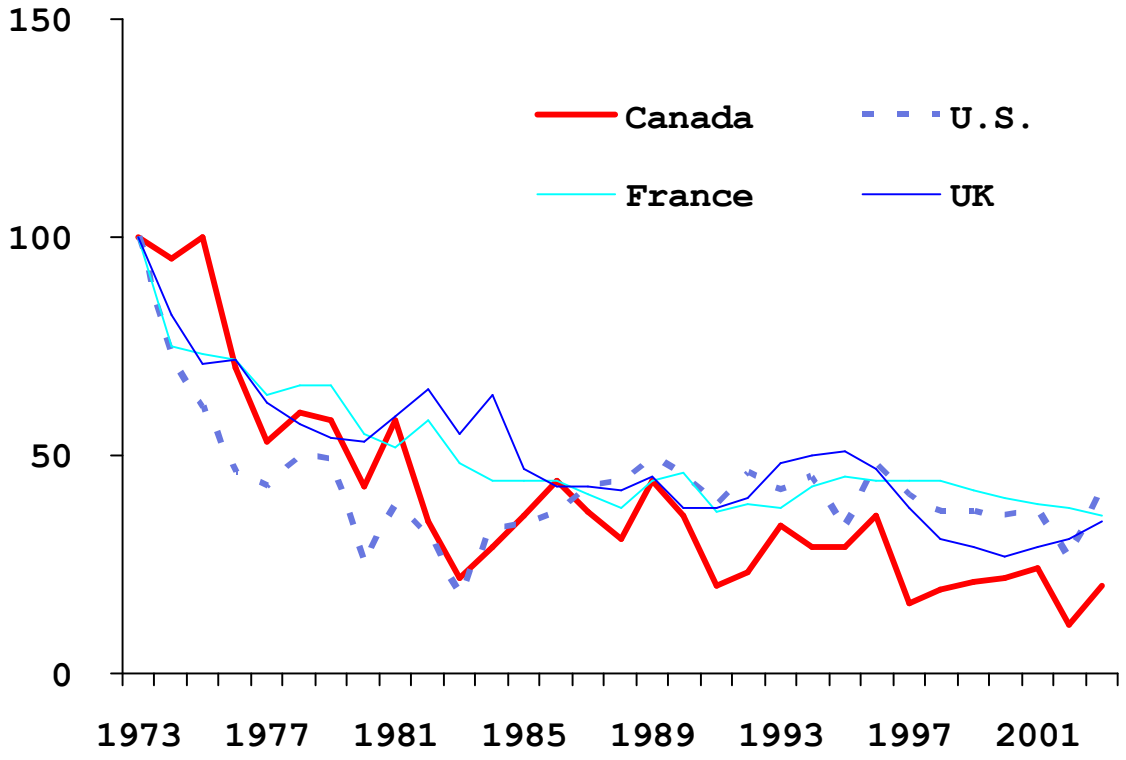

Figure 2. Total Net Farm Income in Canada, the United States, France and the United Kingdom, 1973-2003. (Source AAFC 2005)

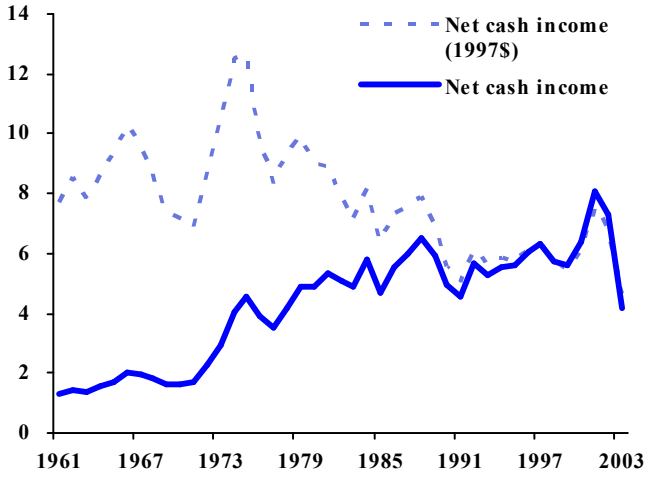

Figure 3. Net Cash Farm Income in Canada (Nominal and Real Terms) 1961 – 2003. (Source: AAFC 2005)

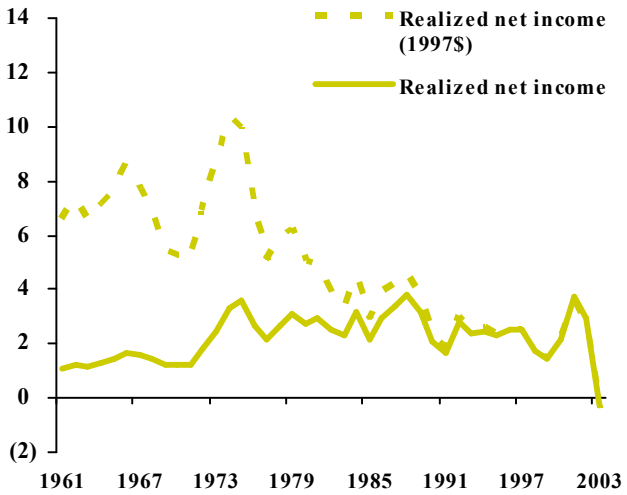

Figure 4. Realized Net Farm Income in Canada 1961-2003. (Source AAFC 2005)

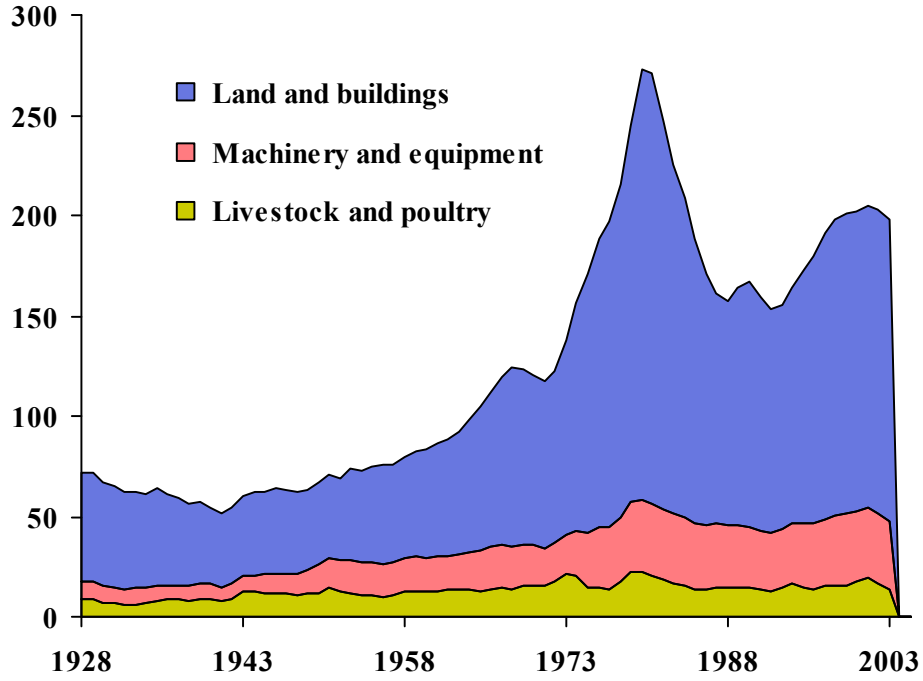

Figure 5. Total Value of Farm Assets in Canada (2003 dollars), 1928 - 2003. (Source: AAFC 2005)

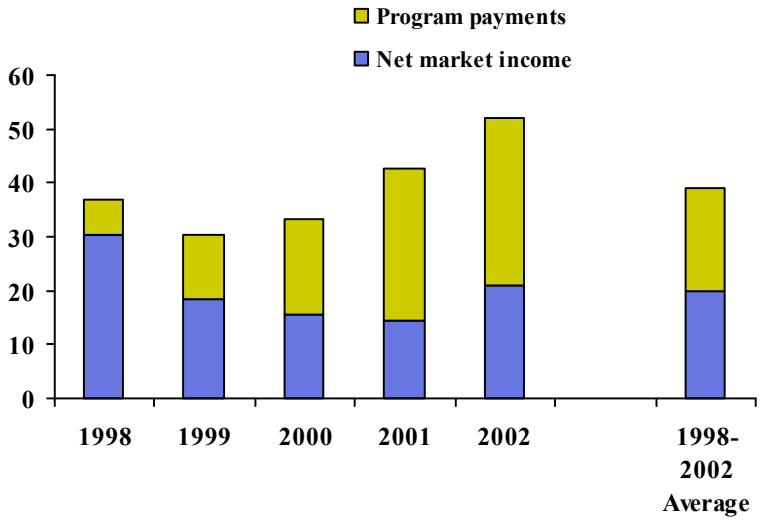

Figure 6. Net Cash Incomes of Saskatchewan Grains and Oilseeds Farms With Gross Revenues Between $100,000 and $250,000 (Top 20% of

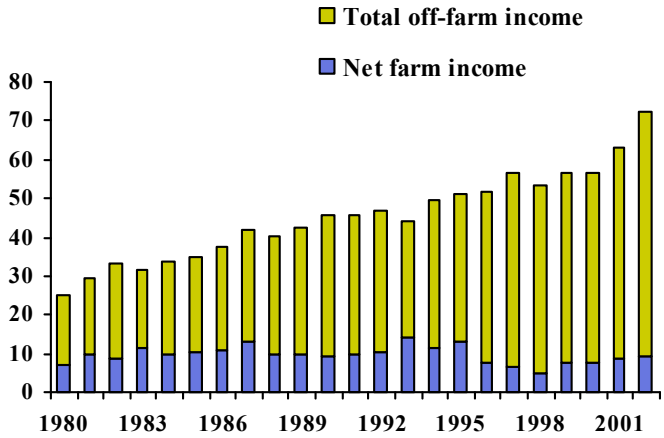

Figure 7. Income of Farm Families by Source in Canada, 1980 - 2002. (Source: AAFC 2005)

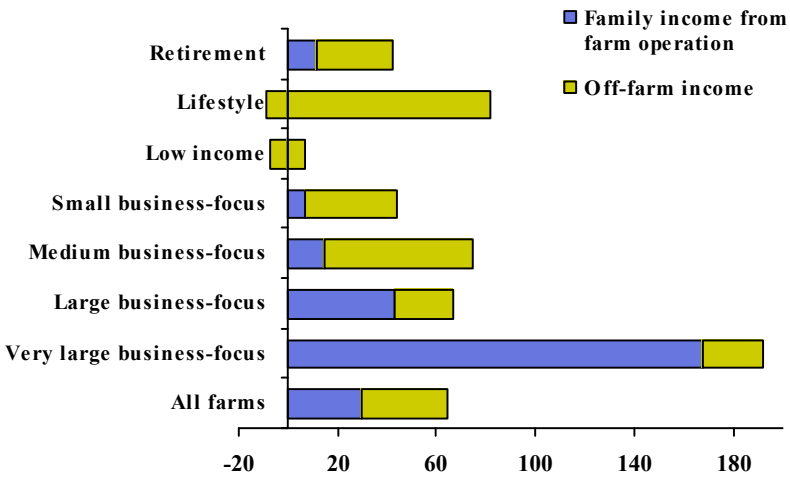

Figure 8. Total Farm Family Income in Canada by Type of Farm, 2003. (Source: AAFC 2005)

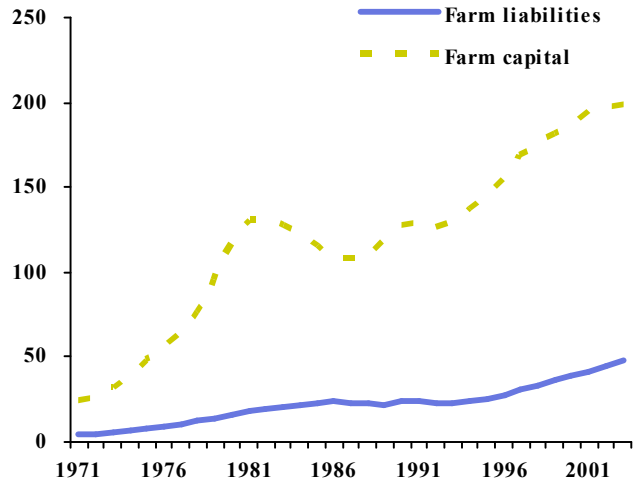

Figure 1. Farm Capital and Liabilities in Canada, Billions of Nominal Dollars 1971 - 2003 (Source: AAFC 2005)

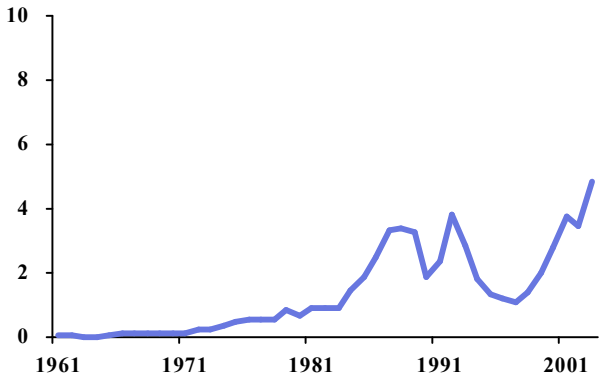

Figure 10. Direct Government Payments in Canada, Billions of Nominal Dollars 1961 - 2003. (Source: AAFC 2005)

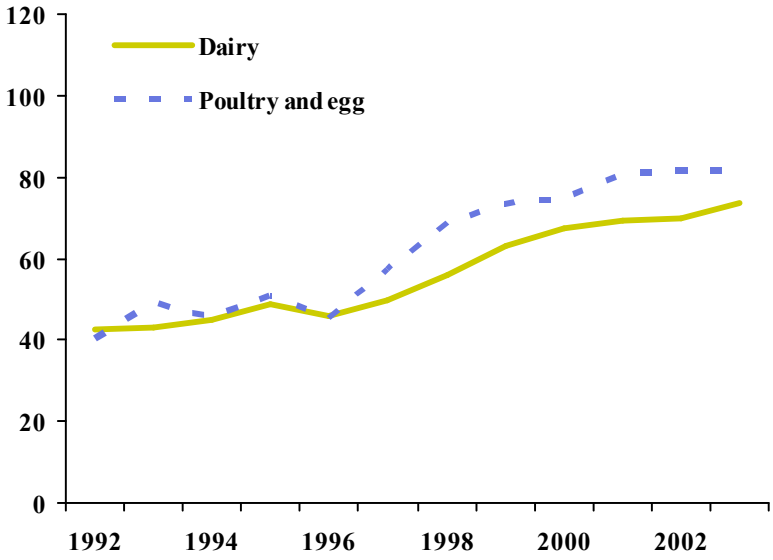

Figure 2. Net Operating Income per Farm for Dairy and Poultry and Egg Farms in Canada, 1992 - 2003. (Source: AAFC 2005)

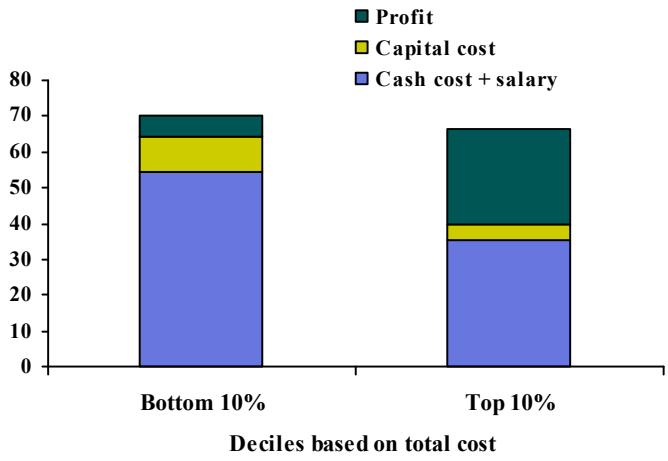

Figure 3. Cost of Production on Quebec Dairy Farms, 2003. (Source: AAFC 2005)

APPENDIX 2

Capital Value

Farm Capital is obtained by adding: livestock and poultry + land and buildings + machinery and equipment.
Source Statistics Canada, Agriculture division, Farm income and prices section, November 2004

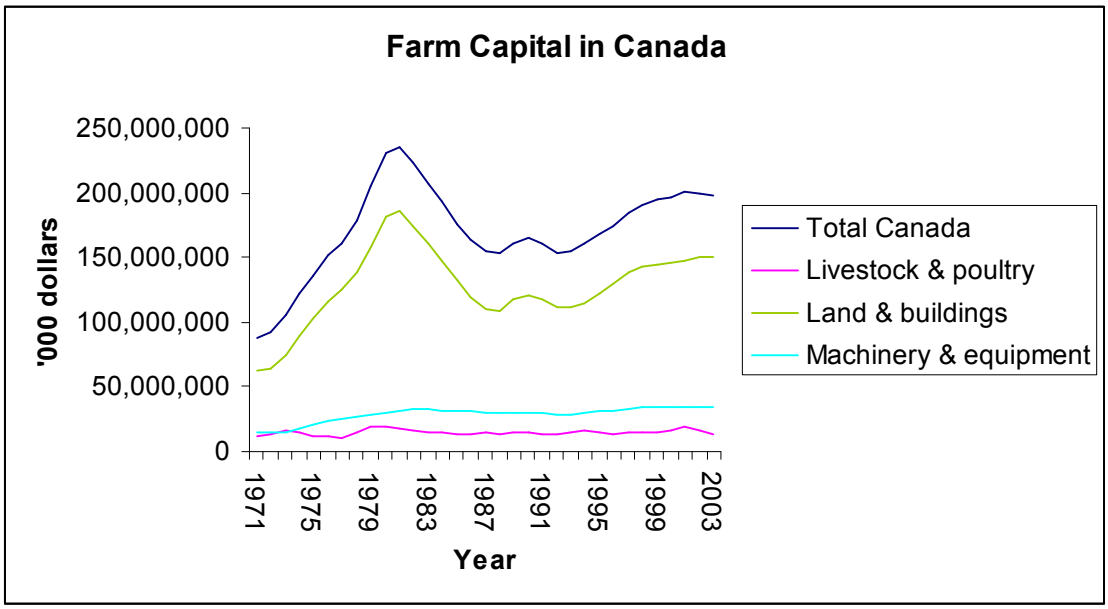

Figure 1. Value of Farm Capital (2003=100)

Quota Value

Source: Statistics Canada 2004. Statistics Canada Classification:
TABLE NUMBER: 20020 BALANCE SHEET OF THE AGRICULTURAL SECTOR, AT DECEMBER 31, AND RATIOS Data Sources: IMDB (Integrated Meta Data Base) Numbers:
5029 - BALANCE SHEET OF THE AGRICULTURAL SECTOR AT DECEMBER 31

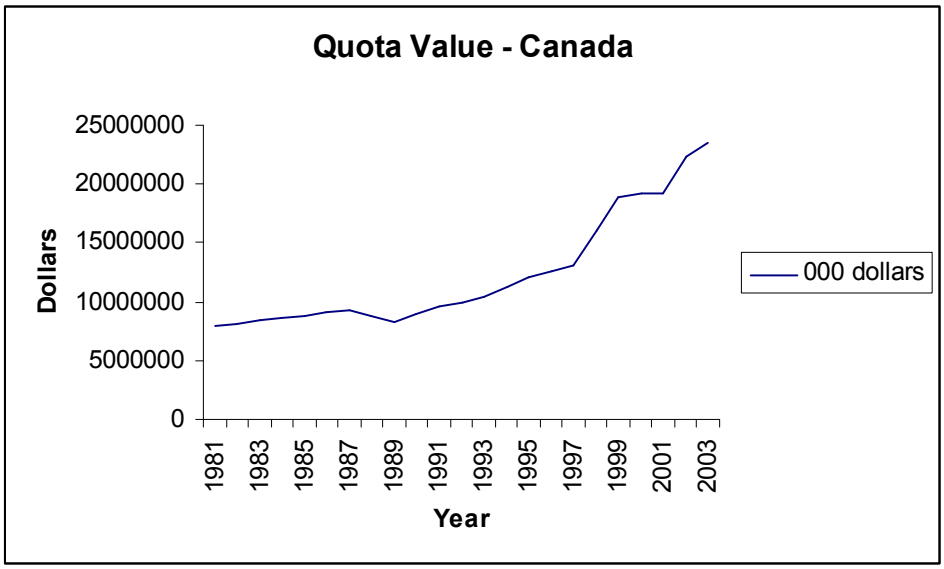

Figure 2. Value of Quota for Canada (2003=100)

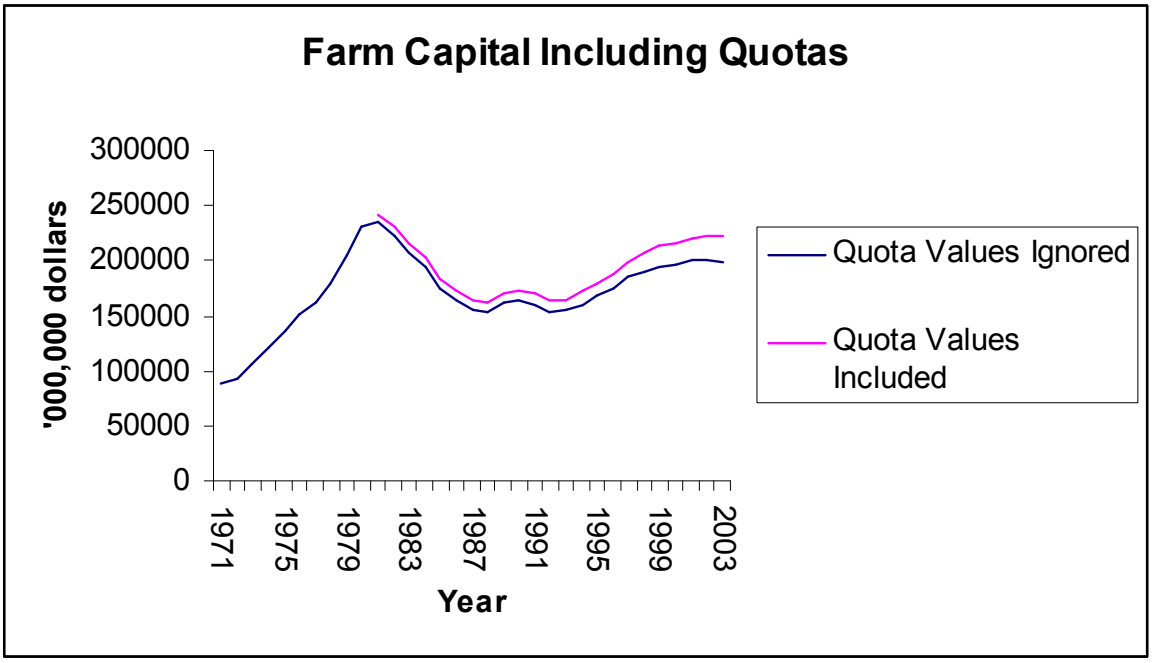

Figure 3. Comparison of Farm Capital including and excluding quota values.

Land Value

Source - Statistics Canada, Agriculture division, Farm income and prices section, November 2004
The value of land and buildings estimates the market value of real estate used for agricultural production. It includes the value of all property operated by the holding, whether owned or rented from others, but excludes the value of property rented to others. It also excludes the value of farm offices not located on farm holdings, even though they are assets used to produce agricultural products. The impact of this limitation on the data is considered to be insignificant. Values are represented in dollars per acre. Values were transformed to 2003 values using the GDP deflator value for 2003.

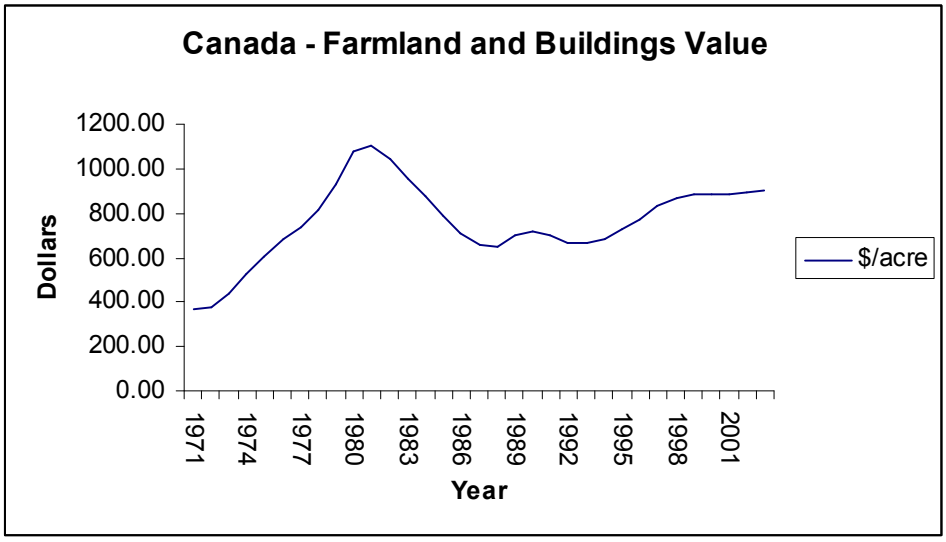

Figure 4. Value per acre of farmland and buildings in Canada (2003=100)

Comparing Growth Rates in Quota and Land Values:

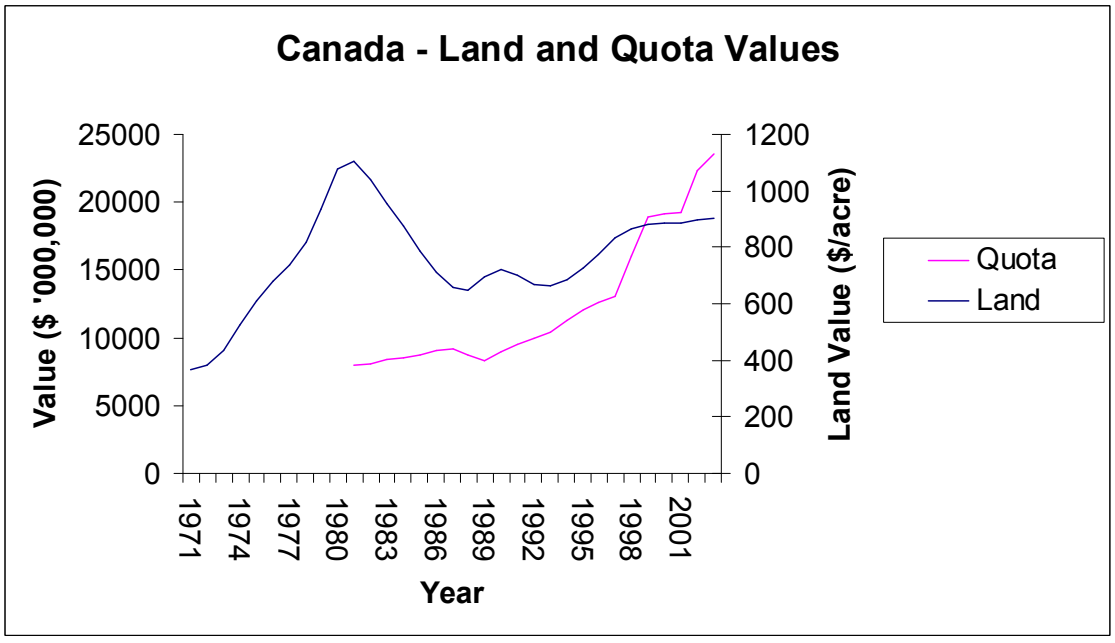

Figure 5. Value of total agricultural farm land and buildings and quota values for Canada (2003=100).

Real Net Farm Income

Source: Statistics Canada, Agriculture Economic Statistics, November 2004 (Agriculture Division, Farm Income and Prices Section)
Net Farm Income for sales over 10000; Net cash income=Total farm receipts-operating expenses after rebates

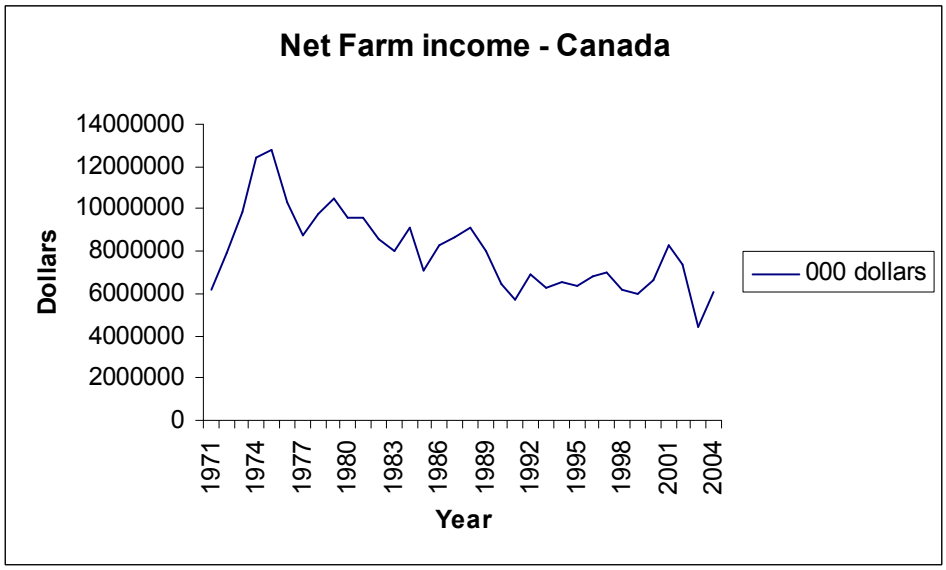

Figure 6. Net farm income in Canada (2003=100)

Number of Farms

Source: Statistics Canada and the Agricultural Census. Inter-census years were obtained for the last 10 years since 1991. For previous years I used changes in number of farms with sales over $2500 and $10000 and in Whole Farm database reference manual, July 2004.

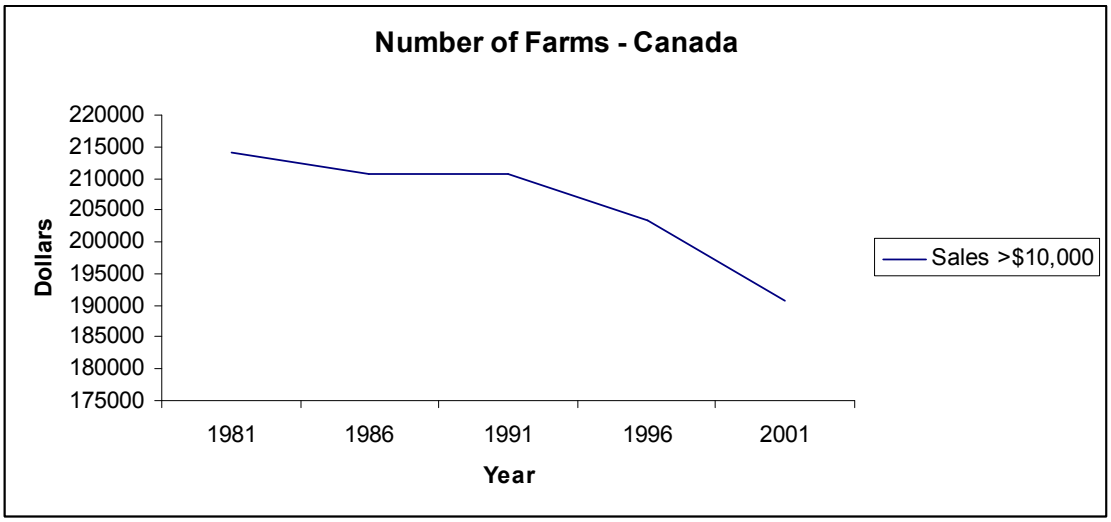

Figure 7. Number of Farms in Canada with gross receipts over $10,000

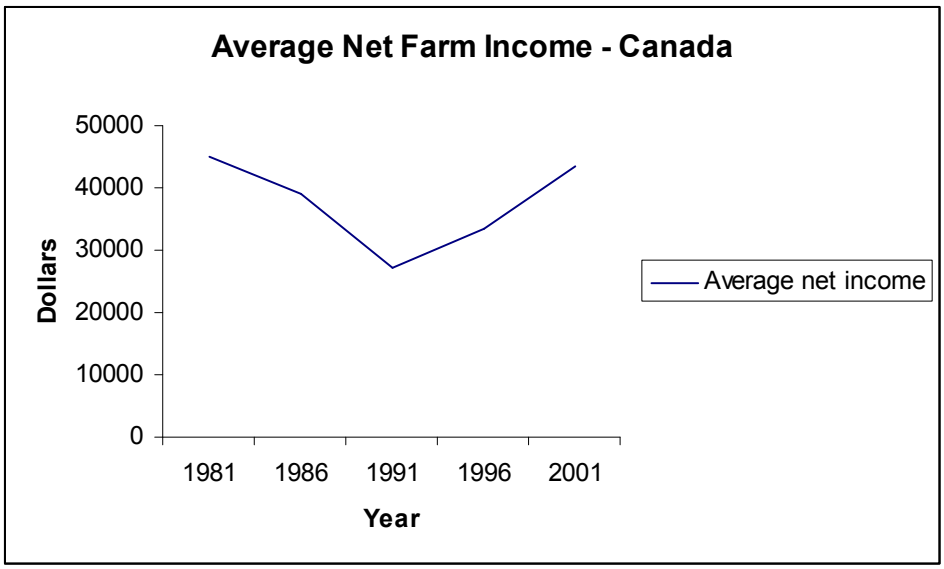

Figure 8. Average Net farm income in Canada (2003=100), receipts >$10,000. Data only for census years.

Interest Rate

Real value Prime rate (2003=100)

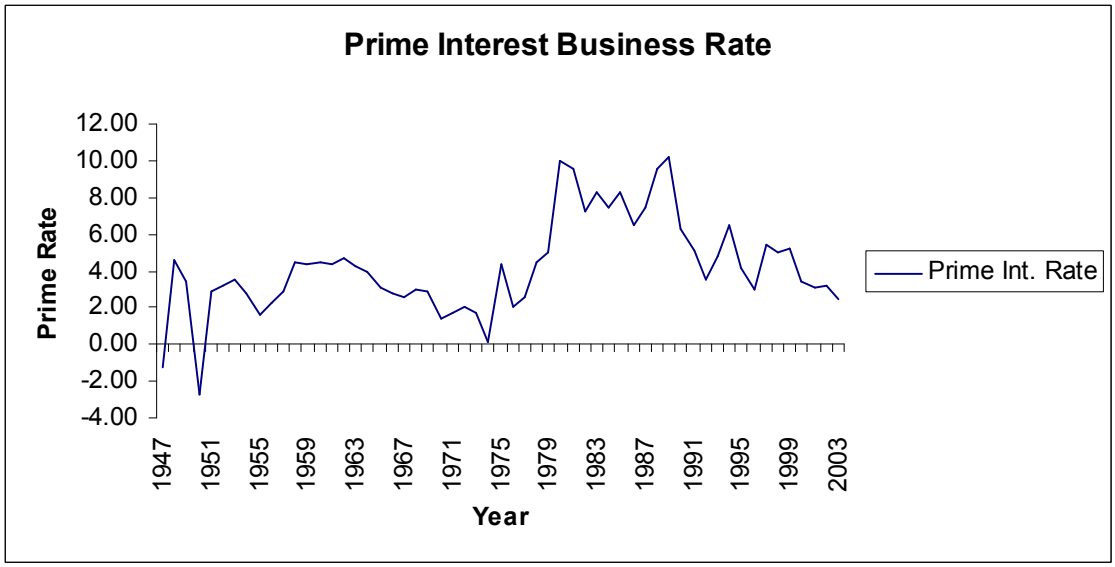

Figure 9. Prime Business Administered Interest Rates (2003=100)

Source: Bank of Canada, Department of Monetary and Financial Analysis.
* The prime business loan rate is the interest rate charged to the most credit-worthy borrowers. For the Deflator we used: IMPLICIT PR DEFLATOR: GROSS NATIONAL PRODUCT
Factor : averaged, Period : 1947:1 - 2003:3
Selected Period : 1947:1 - 2003:3
Frequency : quarterly

Ratio of Total Farm Debt to Net Farm Income

Total farm debt outstanding divided by net farm income.
Table 3 shows the ratio values for total farm debt to net farm income
Total Farm Debt Outstanding was obtained from:
TABLE TITLE: FARM DEBT OUTSTANDING, CLASSIFIED BY LENDER
Data Sources: IMDB (Integrated Meta Data Base) 2004
Numbers: 3472 - FARM DEBT OUTSTANDING sales over 10000
SERIES TITLE: by province; FARM DEBT OUTSTANDING, TOTAL

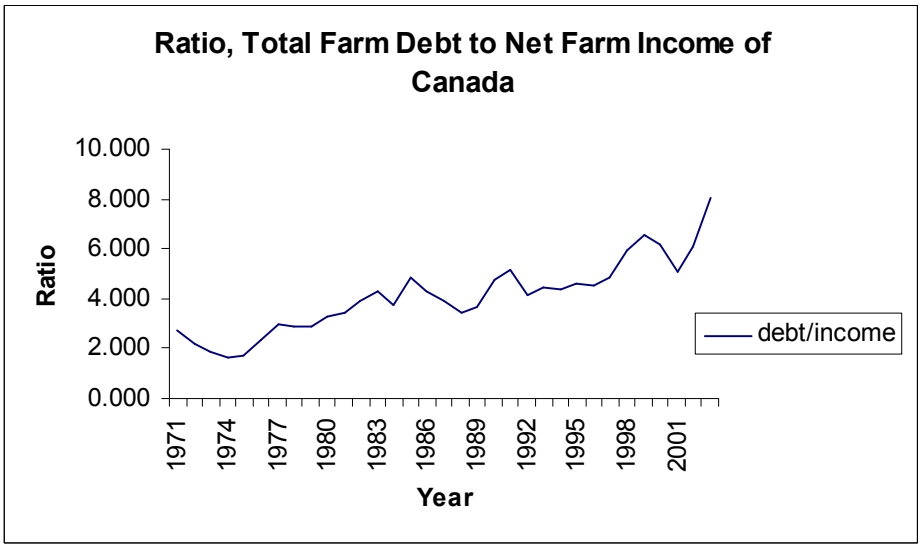

Figure 10. Ratio of Total Farm Debt to Total Net Farm Income – Canada

Note: To give a longer run picture of this debt-net farm income ratio, for 2003, a three year moving average is used for the denominator (net farm income), taking the average of the three years 2002-2004.

TABLES

Table 1. Prime Business Administered Interest Rates, and the implicit Pr deflator used for obtaining real values.

						a	b	b-a
Implicit Pr deflator: GDP								Prime rate
Year	1Q	2 Q	3 Q	4 Q	Average (4 Q)	calculation (cpit/cpit-1)-1	rate of inflation x100	Prime business interest rate	real value Interest rate
1947	16.02	16.16	16.4	16.79	**16.34**			4.50	
1948	16.95	17.14	17.48	17.53	**17.28**	0.057	5.71	4.50	**-1.21**
1949	17.44	17.25	17.15	17.17	**17.25**	-0.001	-0.13	4.50	**4.63**
1950	17.12	17.18	17.55	17.89	**17.44**	0.011	1.06	4.50	**3.44**
1951	18.56	18.67	18.68	18.88	**18.70**	0.072	7.24	4.50	**-2.74**
1952	18.84	18.88	19.1	19.15	**18.99**	0.016	1.58	4.50	**2.92**
1953	19.17	19.19	19.27	19.32	**19.24**	0.013	1.29	4.50	**3.21**
1954	19.39	19.4	19.44	19.49	**19.43**	0.010	1.00	4.50	**3.50**
1955	19.58	19.67	19.81	20.01	**19.77**	0.017	1.74	4.50	**2.76**
1956	20.21	20.33	20.59	20.66	**20.45**	0.034	3.44	5.04	**1.60**
1957	20.96	21.1	21.22	21.23	**21.13**	0.033	3.33	5.58	**2.26**
1958	21.46	21.54	21.69	21.81	**21.63**	0.024	2.35	5.27	**2.92**
1959	21.82	21.83	21.88	21.98	**21.88**	0.012	1.17	5.65	**4.48**
1960	22.07	22.15	22.23	22.29	**22.19**	0.014	1.41	5.75	**4.34**
1961	22.34	22.39	22.45	22.53	**22.43**	0.011	1.09	5.60	**4.51**
1962	22.67	22.7	22.75	22.83	**22.74**	0.014	1.38	5.71	**4.33**
1963	22.9	22.93	22.97	23.15	**22.99**	0.011	1.10	5.75	**4.65**
1964	23.22	23.27	23.37	23.48	**23.34**	0.015	1.51	5.75	**4.24**
1965	23.6	23.71	23.8	23.97	**23.77**	0.019	1.86	5.77	**3.91**
1966	24.12	24.32	24.58	24.79	**24.45**	0.029	2.87	6.00	**3.13**
1967	24.89	25.04	25.31	25.59	**25.21**	0.031	3.09	5.92	**2.83**
1968	25.87	26.14	26.39	26.76	**26.29**	0.043	4.29	6.92	**2.62**
1969	27.03	27.38	27.79	28.15	**27.59**	0.049	4.94	7.96	**3.02**
1970	28.54	28.94	29.17	29.56	**29.05**	0.053	5.31	8.17	**2.86**
1971	30	30.4	30.71	30.96	**30.52**	0.050	5.04	6.48	**1.44**
1972	31.41	31.61	31.92	32.32	**31.82**	0.043	4.25	6.00	**1.75**
1973	32.71	33.25	33.86	34.58	**33.60**	0.056	5.61	7.65	**2.04**
1974	35.2	36.02	37.08	38.19	**36.62**	0.090	9.00	10.75	**1.75**
1975	39.08	39.63	40.33	41.05	**40.02**	0.093	9.28	9.42	**0.13**
1976	41.5	41.92	42.51	43.28	**42.30**	0.057	5.70	10.04	**4.34**
1977	43.97	44.71	45.25	46.17	**45.03**	0.064	6.44	8.50	**2.06**
1978	46.87	47.78	48.61	49.6	**48.22**	0.071	7.08	9.69	**2.60**
1979	50.56	51.72	52.82	53.9	**52.25**	0.084	8.37	12.90	**4.53**
1980	55.12	56.35	57.61	59.14	**57.06**	0.092	9.20	14.25	**5.05**
1981	60.67	61.77	62.97	64.11	**62.38**	0.093	9.33	19.29	**9.96**
1982	65	65.84	66.76	67.46	**66.27**	0.062	6.23	15.81	**9.58**
1983	67.96	68.57	69.18	69.79	**68.88**	0.039	3.94	11.17	**7.23**
1984	70.6	71.17	71.74	72.25	**71.44**	0.037	3.72	12.06	**8.34**
1985	73.01	73.5	73.86	74.4	**73.69**	0.032	3.15	10.58	**7.43**
1986	74.69	75.05	75.51	76.02	**75.32**	0.022	2.21	10.52	**8.32**
1987	76.71	77.27	77.84	78.46	**77.57**	0.030	2.99	9.52	**6.53**

1988	78.99	79.79	80.72	81.34	**80.21**	0.034	3.40	10.83	**7.43**
1989	82.2	83.02	83.63	84.25	**83.28**	0.038	3.82	13.33	**9.51**
1990	85.2	86.17	87	87.76	**86.53**	0.039	3.91	14.06	**10.15**
1991	88.78	89.41	90	90.48	**89.67**	0.036	3.62	9.94	**6.31**
1992	91.15	91.67	91.97	92.55	**91.84**	0.024	2.42	7.48	**5.06**
1993	93.32	93.83	94.26	94.81	**94.06**	0.024	2.42	5.94	**3.52**
1994	95.29	95.73	96.29	96.74	**96.01**	0.021	2.08	6.88	**4.79**
1995	97.45	97.87	98.31	98.79	**98.11**	0.022	2.18	8.65	**6.47**
1996	99.39	99.74	100.2	100.63	**100.00**	0.019	1.93	6.06	**4.14**
1997	101.33	101.8	102.1	102.46	**101.92**	0.019	1.93	4.96	**3.03**
1998	102.73	103	103.3	103.62	**103.17**	0.012	1.22	6.60	**5.38**
1999	104.08	104.5	104.8	105.24	**104.65**	0.014	1.44	6.44	**5.00**
2000	106.04	106.6	107.1	107.64	**106.85**	0.021	2.10	7.27	**5.17**
2001	108.62	109.3	109.9	109.74	**109.39**	0.024	2.37	5.81	**3.44**
2002	110.11	110.5	110.7	111.22	**110.63**	0.011	1.14	4.21	**3.07**
2003	111.88	112.2	112.6	n/a	**112.22**	0.014	1.44	4.69	**3.24**
2004*	*1.3*	*1.7*	*1.6*	*1.6*	**113.79**		1.55**	4.00	**2.45**

* These are the inflation (year-over-year percentage change) rates obtained from the Bank of Canada.

** Obtained from the average of the rate of inflation in the four quarters in 2004.

Table 2. Net Farm income (2003=100)

Real Net Farm Income (2003=100)

(000' of dollars)

year	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	Canada
1971		28305	52505	55454	834246	1487250	568403	1833615	1146791	159707	6166276
1972	12984	37648	66071	74537	1042825	1783083	829557	2497019	1375880	216905	7936509
1973	16139	110871	97290	148162	1105781	2401456	1031463	2813372	1739104	371125	9834762
1974	18239	109210	63885	131404	1186888	2727006	1279053	4061751	2509387	329320	12416143
1975	15890	80335	65165	85634	1412804	2603253	1313640	4599125	2377679	252619	12806145
1976	15575	116769	82849	109429	1198355	2467245	906302	3302933	1829665	249267	10278389
1977	16373	59014	96444	78655	1058813	2157200	682096	2648159	1699210	237602	8733565
1978	18532	60351	120807	89837	1242249	2299998	1003851	2759567	1923440	253879	9772512
1979	16495	84181	107887	94893	1273051	2377977	960840	3089613	2204283	275698	10484918
1980	10999	90080	96150	59917	1321859	1943738	902895	2879784	2008409	271104	9584935
1981	6363	134135	97606	79368	1273112	2074928	719863	2965578	2095405	170918	9617277
1982	4869	62318	72909	46276	1277554	1772243	740256	2655909	1790432	181827	8604592
1983	6006	64707	62910	63904	986715	2026757	736434	2204210	1657228	171727	7980598
1984	9831	82144	77075	76546	1426344	2188159	837867	2610517	1552597	216932	9078010
1985	7637	43822	81414	59417	1303047	1585201	761119	1783136	1232438	265136	7122367
1986	5103	59698	101177	68272	1427487	2236208	951242	1865806	1195547	334850	8245390
1987	5703	93712	117814	76001	1299161	2076350	945716	2163784	1502627	339325	8620192
1988	9278	68680	124000	85359	1441635	2032483	832031	2236737	1901937	352533	9084673
1989	11068	117887	110665	94935	1458176	1782953	694967	1857635	1587785	306805	8022876
1990	7077	102959	112538	90937	1304951	1595708	492530	1229301	1135949	337322	6409272
1991	9681	77677	87279	66994	1236177	1325158	459695	1248910	868102	334422	5714095
1992	12270	45220	83275	76227	1069908	1667556	557944	1452093	1601655	343862	6910011
1993	9927	54375	67205	85422	1149144	1233749	684203	1419714	1253823	321116	6278676
1994	7518	106465	70771	70651	1191686	1074141	541545	1737961	1446109	251992	6498839
1995	7208	83052	65100	49989	1110783	1157345	465968	1716052	1510116	226572	6392185
1996	15070	51139	92192	59091	1180790	1269213	589376	1384540	1854766	298548	6794726
1997	16279	34015	73895	43755	1220397	1260339	760430	1771652	1463898	312097	6956754
1998	10390	71259	77986	67942	1179675	1230622	605698	1372962	1270276	320903	6207712
1999	11762	83805	87237	86692	1284947	1273023	570174	1354894	856652	364370	5973554
2000	8276	42696	88864	51713	1254140	1543985	616603	1207737	1476206	386582	6676796
2001	8067	46145	71390	73837	1317924	1631518	935226	1765417	1958138	467648	8275307
2002	6279	53206	37405	66714	931703	1303792	938229	1682740	2077614	300012	7397683
2003	6171	34348	38604	40489	1027230	1121060	508720	638837	713018	312203	4440665
2004											5994273

Table 3. Ratio of Total Farm debt to Total Farm net Farm income.

Ratio of Total Farm Debt to Total Net Farm Income

farm debt divided by farm income

Year	PEI	NL	NS	NB	QC	On	MB	SK	AB	BC	Canada
1971	4.815		3.318	3.024	2.705	3.139	2.735	1.813	3.037	7.483	2.750
1972	3.425		2.610	2.258	2.000	2.653	1.851	1.352	2.673	5.597	2.153
1973	1.147		1.842	1.122	1.761	2.130	1.617	1.338	2.480	3.523	1.890
1974	1.243		3.061	1.400	1.814	1.977	1.362	1.001	1.889	4.555	1.619
1975	1.853		3.252	2.425	1.825	2.267	1.400	0.961	2.094	6.784	1.718
1976	1.313		2.567	1.853	2.352	2.605	2.292	1.513	2.968	7.529	2.354
1977	2.882		2.348	2.835	2.904	3.249	3.371	1.967	3.300	8.603	2.961
1978	2.904		2.069	2.712	2.644	3.335	2.501	2.068	3.169	8.765	2.882
1979	2.175		2.556	2.895	2.934	3.481	2.852	1.918	2.989	9.061	2.909
1980	2.170		2.936	4.803	3.038	4.362	3.091	2.041	3.371	9.525	3.264
1981	1.563	4.401	3.343	4.093	3.509	4.139	3.925	2.110	3.525	14.474	3.419
1982	3.679	5.845	4.551	6.739	3.589	4.811	3.892	2.532	4.355	13.366	3.934
1983	3.823	5.512	5.268	4.420	4.562	4.061	4.032	3.341	4.956	11.979	4.289
1984	2.966	3.588	4.401	4.094	3.188	3.752	3.517	2.838	5.236	9.218	3.764
1985	5.748	4.535	4.048	5.709	3.419	5.096	3.947	4.349	6.615	7.392	4.824
1986	4.160	6.715	3.144	4.961	3.104	3.388	3.142	4.895	6.914	5.506	4.266
1987	2.462	6.371	2.703	4.401	3.361	3.395	2.938	4.010	5.287	5.340	3.892
1988	3.378	4.452	2.644	3.826	3.004	3.292	3.115	3.397	4.023	4.674	3.461
1989	1.828	3.998	2.943	3.029	2.975	3.501	3.404	3.623	4.875	4.785	3.709
1990	2.250	6.128	3.051	3.110	3.346	4.047	5.534	5.448	7.054	4.407	4.782
1991	3.033	4.834	3.962	4.225	3.569	4.545	5.416	4.932	9.229	4.324	5.154
1992	5.606	3.643	3.969	3.700	4.242	3.516	4.508	3.989	4.751	3.914	4.135
1993	5.154	4.201	4.681	3.231	3.770	4.812	3.522	3.767	6.052	4.375	4.449
1994	3.127	6.063	5.066	3.827	4.035	5.615	4.784	2.966	5.172	6.022	4.399
1995	4.277	6.305	5.421	6.226	4.534	5.394	5.959	3.011	5.024	6.934	4.607
1996	7.311	3.170	3.977	5.720	4.627	5.276	4.929	3.900	4.172	5.575	4.561
1997	12.190	2.780	5.431	8.332	4.904	5.999	4.084	3.214	5.725	5.829	4.854
1998	6.415	4.633	5.588	5.727	5.622	6.749	5.658	4.424	7.038	6.303	5.917
1999	5.672	4.439	5.189	4.738	5.712	6.912	6.601	4.598	10.872	6.100	6.539
2000	11.618	5.914	5.490	8.663	6.374	6.188	6.327	5.184	6.494	5.857	6.147
2001	11.290	6.820	7.057	6.559	6.332	6.094	4.330	3.522	4.970	4.864	5.090
2002	10.506	10.851	14.887	7.900	10.110	8.639	4.595	3.659	4.773	7.868	6.102
2003	17.768	10.658	15.461	14.973	9.482	10.430	9.374	10.427	14.716	7.833	8.021

Table 4. Total land and Buildings Capital Value for Canada (2003=100)

Year	Land & buildings
1971	62,191,169
1972	64,722,260
1973	74,257,254
1974	88,929,499
1975	102,740,465
1976	115,547,033
1977	124,598,729
1978	137,995,490
1979	157,114,720
1980	181,013,595
1981	185,794,669
1982	174,554,937
1983	160,288,128
1984	147,058,263
1985	131,940,705
1986	119,331,401
1987	110,482,626
1988	108,709,030
1989	116,856,697
1990	120,459,686
1991	117,299,946
1992	112,166,935
1993	111,176,108
1994	114,935,290
1995	122,317,404
1996	129,821,466
1997	137,989,775
1998	142,528,722
1999	144,851,582
2000	146,029,556
2001	147,538,469
2002	149,577,057
2003	150,858,368

Table 5. Value per acre of farmland and buildings in real values 2003

Value per acre of farm land and buildings (2003=100)

year	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
1971	0.00	485.41	367.73	294.19	448.64	1195.14	264.77	216.96	261.09	816.37	367.73
1972	0.00	532.63	412.70	317.46	479.72	1241.63	271.61	211.64	296.30	821.88	380.96
1973	0.00	617.90	490.98	364.06	527.72	1469.59	307.28	237.14	347.36	905.13	437.54
1974	0.00	750.76	606.74	435.13	569.96	1786.50	367.72	275.79	429.01	1158.32	524.00
1975	0.00	776.71	650.53	518.74	616.88	2100.20	395.36	328.07	504.72	1273.02	608.47
1976	1949.86	790.56	697.71	535.88	726.89	2369.02	448.34	376.71	565.06	1337.05	681.79
1977	1794.58	815.04	695.40	538.37	864.89	2480.00	496.00	403.78	625.61	1423.20	737.77
1978	1862.05	933.35	756.46	598.18	968.27	2648.76	574.91	460.86	695.94	1619.98	816.97
1979	1956.66	1112.57	822.61	633.61	1058.87	2794.31	625.01	517.62	910.67	1767.65	932.15
1980	2035.78	1148.69	989.37	666.79	1166.39	3005.47	696.29	653.02	1070.01	2035.78	1075.91
1981	2038.30	1232.33	989.47	732.20	1198.15	3049.35	737.60	687.23	1079.42	2142.64	1106.40
1982	1739.28	1109.28	934.84	694.36	1168.55	2809.61	643.55	699.44	1002.58	1834.12	1039.84
1983	1626.12	1132.42	951.56	708.78	1151.97	2512.50	619.16	659.90	884.75	1777.65	954.81
1984	1473.48	1102.75	929.96	717.89	1083.90	2370.45	576.51	617.35	774.44	1625.86	876.55
1985	1387.33	1134.53	935.04	738.59	1003.56	2135.05	546.71	543.66	689.86	1463.47	787.32
1986	1293.32	1083.23	949.13	721.16	986.38	1919.12	512.56	494.68	606.43	1317.16	712.22
1987	1322.32	1080.71	963.53	721.92	1008.38	1863.40	470.19	431.13	558.44	1205.13	659.71
1988	1348.75	1073.12	973.79	720.55	1017.16	2083.29	425.33	400.15	523.27	1221.43	649.19
1989	1369.19	1125.27	1020.15	730.41	1052.49	2571.27	442.02	385.42	553.87	1296.41	698.07
1990	1388.97	1295.60	1063.45	771.65	1114.03	2784.43	465.58	368.32	560.26	1404.53	719.78
1991	1421.76	1284.09	1021.26	807.25	1148.92	2882.32	446.80	331.66	518.14	1489.34	700.87
1992	1405.31	1356.43	1021.60	805.30	1152.36	2668.87	439.92	311.61	494.91	1517.74	668.44
1993	1388.85	1362.60	1020.16	804.19	1165.72	2558.15	445.05	301.87	492.78	1669.24	662.21
1994	1406.12	1527.68	1022.74	806.50	1205.07	2494.31	453.51	316.76	525.98	1857.29	682.60
1995	1421.88	1767.34	1024.94	862.51	1274.32	2502.88	472.44	342.03	589.11	2021.29	725.24
1996	1443.26	1836.07	1053.83	914.67	1369.19	2675.54	497.17	352.40	620.63	2121.13	773.26
1997	1435.79	1856.40	1057.02	967.84	1498.55	2899.11	526.31	362.25	657.34	2210.94	834.61
1998	1452.18	1869.89	1103.01	1013.81	1595.77	3019.67	541.71	363.32	696.18	2186.43	865.87
1999	1470.22	1913.10	1145.29	1086.31	1709.35	3080.91	542.62	361.39	718.49	2125.43	881.49
2000	1462.00	1914.68	1168.97	1110.16	1799.14	3076.30	544.05	356.05	742.55	2093.23	886.44
2001	1492.75	1907.24	1183.94	1139.83	1904.16	3106.57	538.62	345.74	766.38	2097.04	884.37
2002	1475.99	1885.82	1184.85	1134.13	1986.24	3180.22	538.66	342.88	781.11	2145.51	897.77
2003	1455.00	1864.00	1173.00	1129.00	2003.00	3229.00	548.00	346.00	787.00	2167.00	905.00

Source Statistics Canada, Agriculture division, Farm income and prices section, November 2004 ($/acre)

Table 6. Value of Quota for Canada (2003=100)

Value of Quota (2003=100)

(000 dollars)

year	N.L	PEI	NS	NB	QC	ON	MB	SK	AB	BC	Canada
1981	9114	49392	66461	46920	2083711	4335635	6349	18803	175819	1127916	7920123
1982	11371	64010	85670	61866	2287920	4247941	5187	28557	269487	1024735	8086742
1983	13625	78433	104652	76548	2515227	4247152	4231	37917	359310	950254	8387350
1984	15720	73094	136292	90690	2734842	3981581	17476	61638	426544	1031677	8569555
1985	17744	68414	166442	104292	2951698	3750257	29930	84069	491194	1112152	8776190
1986	19813	64545	196427	118062	3181981	3562086	41991	106045	556606	1197748	9045306
1987	21617	60348	223323	130189	3375013	3354505	53111	126066	614247	1269378	9227796
1988	20817	52503	226127	138562	3326268	3027401	140695	140325	540981	1130159	8743839
1989	19965	44930	227584	145652	3263888	2707255	221563	152891	469973	994710	8248413
1990	19132	56617	228059	142622	3464729	3194535	248194	154019	502954	912291	8923153
1991	18383	67442	228923	138609	3641291	3648833	272514	155275	533793	821906	9526972
1992	17907	74187	247672	153459	3580604	3755694	360509	156079	624675	1002771	9973558
1993	17444	80576	265408	167530	3520751	3855475	444199	156758	710967	1174638	10393746
1994	20471	106881	279636	168829	4066870	3960860	544411	159910	715912	1215503	11239283
1995	23345	131955	292893	169841	4584847	4056445	639738	162712	719666	1253009	12034448
1996	31012	127384	318431	202593	4403653	4726787	538287	245814	815980	1151806	12561747
1997	38380	122937	342896	234046	4227625	5370282	440439	325713	908386	1053969	13064674
1998	38900	160806	393432	306703	5957855	6053752	497521	335855	1191293	1115733	16051849
1999	39317	197323	441758	376770	7629467	6705669	551988	344970	1464124	1173354	18924739
2000	44376	211817	467054	371999	7413845	6970427	540825	391387	1422912	1291128	19125768
2001	49078	225035	489826	366295	7184852	7202376	528489	434596	1379126	1399849	19259523
2002	60939	237741	600830	404503	7554119	8608423	796205	532414	1799504	1805002	22399681
2003	74446	292804	567605	397389	8197004	9103114	839321	276533	1600411	2243946	23592573

Total Farm Capital (2003=100)

(000's of dollars)

Year	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.
1971	0	593,700	754,727	632,385	7,991,519	25,256,636	7,527,449	20,095,808	19,124
1972	0	637,703	813,444	664,225	8,454,228	26,440,530	7,773,707	20,161,099	21,355
1973	0	712,408	930,615	727,715	9,313,261	30,795,078	8,794,291	22,521,176	25,182
1974	0	822,208	1,084,683	822,165	9,880,333	35,834,843	10,140,206	25,584,649	29,458
1975	0	847,547	1,129,667	909,695	10,092,417	40,502,480	10,734,293	29,355,970	32,826
1976	188,914	866,881	1,191,712	929,626	11,130,231	45,001,577	12,028,906	33,657,306	36,776
1977	176,756	888,931	1,181,043	922,440	12,669,390	46,418,370	13,078,005	35,359,530	40,013
1978	186,040	1,016,571	1,298,411	1,016,746	13,854,325	49,474,977	15,021,571	40,188,257	45,258
1979	198,314	1,170,211	1,426,001	1,092,480	15,535,994	53,030,338	16,548,463	45,069,685	57,879
1980	207,016	1,205,403	1,641,787	1,142,522	16,911,640	56,046,545	18,093,859	54,356,821	65,955
1981	208,140	1,262,120	1,632,045	1,204,166	17,113,333	56,284,253	18,822,478	56,408,972	66,303
1982	186,430	1,169,130	1,548,230	1,148,058	16,673,451	51,768,127	17,105,092	57,529,708	62,808
1983	177,682	1,154,435	1,529,949	1,139,761	15,980,106	46,248,183	16,577,310	54,961,742	56,988
1984	168,811	1,126,527	1,475,729	1,148,580	15,288,923	43,238,898	15,715,068	52,160,494	51,266
1985	163,452	1,131,690	1,443,045	1,151,407	14,212,305	38,900,772	14,791,348	46,723,286	46,541
1986	156,763	1,094,917	1,428,526	1,123,558	14,041,369	35,258,197	14,204,262	43,544,210	42,512
1987	167,480	1,079,293	1,434,824	1,112,472	14,336,750	34,450,730	13,500,308	39,693,623	40,437
1988	179,652	1,064,203	1,445,378	1,104,656	14,288,515	37,140,800	12,593,958	37,233,311	38,798
1989	191,652	1,107,626	1,476,846	1,094,676	14,549,615	43,568,379	12,930,767	36,111,352	40,588
1990	205,402	1,205,821	1,502,161	1,134,612	15,063,254	46,230,719	13,407,052	34,746,729	41,041
1991	219,388	1,178,792	1,443,317	1,146,625	14,770,914	47,025,650	12,836,185	32,255,875	38,635
1992	215,179	1,207,014	1,417,433	1,120,659	14,453,379	44,010,824	12,582,287	30,866,157	36,875
1993	210,365	1,215,294	1,407,288	1,112,000	14,715,187	42,904,921	12,754,772	30,798,551	37,518
1994	211,236	1,337,758	1,404,020	1,114,540	15,199,512	42,576,661	13,117,573	32,151,427	40,086
1995	211,360	1,498,248	1,384,996	1,160,624	15,845,479	43,023,363	13,657,426	34,121,439	43,014
1996	204,798	1,599,317	1,452,475	1,237,279	16,909,041	45,569,781	14,081,816	33,640,187	44,833
1997	203,482	1,611,205	1,542,414	1,324,095	18,122,674	48,774,281	15,014,947	34,707,713	47,708
1998	203,909	1,617,586	1,579,790	1,375,120	18,887,956	50,313,122	15,433,321	35,224,731	50,259
1999	207,011	1,645,463	1,622,361	1,455,109	19,894,216	51,018,422	15,513,520	35,191,631	51,924
2000	203,282	1,654,378	1,665,604	1,504,737	20,928,880	51,172,903	15,618,013	34,753,128	53,860
2001	209,513	1,648,470	1,684,609	1,554,730	22,058,793	51,711,818	15,626,419	33,808,785	55,840
2002	213,451	1,626,829	1,672,968	1,540,855	22,477,529	52,103,141	15,329,334	33,185,923	55,821
2003	216,381	1,593,249	1,642,021	1,518,782	22,360,668	52,265,252	15,238,936	32,823,080	54,819

Table 6. Farm Capital (2003=100)