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Cesar L. Escalante and Calum G. Turvey

Agricultural Finance Markets in Transition
Proceedings of The Annual Meeting of NCT-194 Hosted by the Center for the Study of Rural America,
Federal Reserve Bank of Kansas City
October 6 - 7, 2003

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Cesar L. Escalante and Calum G. Turvey[1]

[1] Calum G. Turvey is Professor at the Department of Agricultural, Food and Resource Economics at Rutgers University. Cesar L. Escalante is Assistant Professor at the Department of Agricultural and Applied Economics at the University of Georgia. Senior authorship decided by a coin toss.

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Sustainable growth, measured by the sustainable growth rate, represents the maximum rate at which a firm can expand its sales without depleting its financial resources (Higgins 2001). If a firm grows at a rate greater than its sustainable growth rate then it must source capital from other sources, such as increased borrowing or the sale of assets. When growth in sales falls short of the sustainable growth rate, assets are being underutilized and cash will generally be accumulated in unproductive ways.

Financial leverage in agriculture has been of considerable interest to a wide range of stakeholders for over 20 years. The financial crises of the late 1980's and market instability in the late 1990's has exemplified the need to continually investigate models that aid in understanding farm debt decisions. For many, the expected utility-mean-variance approach to modeling farm financial structure decisions has provided considerable insights into the financial leveraging process (Collins; Barry and Robison; Barry, Baker and Sanint). Studies that have investigated the relationship between reductions in business risk and increased financial leverage include Collins, and Escalante and Barry who examine risk balancing in general; Turvey and Baker who examine relationships between leverage and hedging; Featherstone, et al. who examine various issues in agricultural finance and price support policies; Moss, Ford and Boggess who examine capital gains deductions; and Ahrendsen, Collender and Dixon who examine depreciation and investment tax credits.

Sustainable or balanced growth examines the same issue except from an operating and accounting point of view. It decomposes the returns to equity into four components; profit margin, retention (owner withdrawals), asset turnover and leverage. A decrease in any one of these ratios will lower the sustainable growth rate, and increase the likelihood that financial leverage will be required to sustain the farm. In contrast to the risk-balancing strategy derived in mean-variance models, the sustainable growth rate is proscriptive, as well as explanatory, and can provide insights into farm operating and financial decisions based on readily available accounting information. Furthermore, analyses of financial risk, as per the root model of Barry, Baker and Sanint, and Collins, take the variability of the return on assets or equity as given and do not ordinarily examine the operating factors that give rise to such volatility in the first place. The advantage of exploring a sustainable growth rate paradigm is that the paradigm possesses such insights. We are unaware of any previous studies that have explored the sustainable growth rate model in the context of agricultural finance, and we believe that this paradigm is a complement to previous studies.

The purpose of this paper is to first introduce the sustainable growth rate model as a conceptual paradigm and then to use the model to measure the sustainable growth rate in U.S. agriculture. A cross-sectional analysis is used so that all states and regions are covered. As a positivist approach to understanding financial leverage in agriculture, the use of sustainable growth in explaining debt is more than pragmatic. If sustainable growth rates fall relative to growth in sales, working capital shortfalls are inevitable. The model benefits the farm sector in three ways. First, from a business perspective, this inevitability principle provides a useful yet simple approach to explaining financial leverage and working capital strategies to farmers; Second, from a policy perspective, the inevitability principle provides some guidance as to how public policy can impact leverage decisions at the farm level; and third, from an academic perspective, this paper introduces as new, a tool that has been used by financial practitioners in the non-farm sector since the 1970's (e.g. Higgins 1972).

The next section describes the principles behind the sustainable growth model. This is followed by an analysis of sustainable growth in the U.S. farm sector. The results are then discussed and the paper is concluded.

The Sustainable Growth Model

The sustainable growth rate equation is given by

$$(1)\quad g_s = \left[\frac{NI}{R}\right]\left[\frac{NI - \mathrm{W}}{NI}\right]\left[\frac{R}{A}\right]\left[\frac{A}{E_{beg}}\right]$$

or

$$(2)\quad g_s = \left[\frac{NI}{R}\right]\left[\frac{NI - \mathrm{W}}{NI}\right]\left[\frac{R}{A}\right]\left[1 + \frac{\mathrm{D}}{E_{beg}}\right]$$

where NI is net income, R is revenue or sales, W is owner withdrawals, A is assets, D is debt and E_{beg} is the beginning of period equity. From left to right, the bracketed terms in the right hand sides of (1) and (2) represent the profit margin, retention ratio, asset turnover, and financial leverage, respectively. The relationship between sustainable growth and the return on equity (ROE) is given by the last term, which uses the beginning of period equity rather than the end of period equity. That is

$$(3)\quad ROE = \left[\frac{NI}{R}\right]\left[\frac{NI - \mathrm{W}}{NI}\right]\left[\frac{R}{A}\right]\left[1 + \frac{\mathrm{D}}{E}\right]$$

Assuming growth in equity is positive (i.e. $E_{beg} < E$), and all other things being equal, a comparison of (2) and (3) indicates that the sustainable growth rate is marginally higher than the ROE. Furthermore, all other things being equal, $E - E_{beg} > 0$ can only be attributed to increases in sales and if $E = E_{beg}$ then the change in sales will be zero. It is through this mechanism that the sustainable growth rate is linked to the percentage change in sales. The sustainable growth equation also includes as part of its product the return on assets (ROA). That is

$$(4)\quad ROA = \left[\frac{NI}{R}\right]\left[\frac{NI - \mathrm{W}}{NI}\right]\left[\frac{R}{A}\right]$$

indicating that the difference between the ROE and ROA is that the latter measures profitability on assets regardless of capital structure. To complete the relationships we can write

$$(5)\quad g_s = ROA\left[1 + \frac{\mathrm{D}}{E_{beg}}\right]$$

The sustainable growth relationships show how increases in sales must be managed. Balanced growth occurs when the percentage change in sales from one period to the next is equal to the sustainable growth rate. If this happens, then no adjustments need to be made to the profit margin, owner withdrawals, turnover or leverage. We refer to the difference between the growth in sales and the sustainable growth rate as the sustainable growth challenge (SGC). If sales increase faster than the sustainable growth rate, the SGC is positive and operating and financial adjustments need to be made in order to restore an accounting and operating balance. An increase in sales must be supported by any or all of the following: an increase in profitability (decrease in costs), a decrease in owner withdrawals, an increase in asset turnover, or an increase in financial leverage. In contrast, if the SGC is negative, sales growth is lower than the sustainable growth rate, cash surpluses increase and either sales must decrease, owner withdrawals increase, asset turnover decreases, or financial leverage is reduced.

The relationship between sustainable growth rates, operating leverage and financial leverage is depicted in Figure 1 with the growth in sales on the vertical axis and the ROA on the horizontal axis. Three balanced lines are presented for 0% debt, $D/E_{beg} = 0.25$ and $D/E_{beg} = 0.50$. Consider point A, which represents an unlevered farm with 6% ROA and sales growth of 6%. The strategic decision is to increase output and sales by 3% to 9%. Since 9% is higher than the sustainable growth rate of 6%, cash deficits will occur unless some actions are taken to bring sustainable growth into balance. If the decision is to maintain output and sales levels, unlevered actions will have to be taken to increase the ROA to 9% (at point B) as well. This can only be achieved by increasing the profit margin, decreasing withdrawals, or increasing the asset turnover ratio. If the asset base is relatively fixed in the short run then economies of scale must be achieved in order to ensure that the profit margin grows. Failing that, the growth can only be financed through minimization of owner withdrawals. But if growth in sales was achieved by expanding the asset base then the asset turnover ratio could in fact decrease, putting even greater pressure on the profit margin and retention ratio as means to manage growth. For most farmers in competitive markets this would be difficult. Point C in figure 1 shows an alternative strategy. Holding the ROA constant, the increased sales can be balanced by increasing debt to 50% of beginning equity. In reality, increased growth will most likely be a combination of changes to ROA and financial leverage, e.g. point D in Figure 1 with an increase in debt to 25% of equity and an increase in the ROA from 6% to about 7.2%.

It has long been argued that the increase in farm size has been justified based on economies of scale which reduce costs on a per unit basis. If output increases at a lower per unit cost, the anticipated profit margin would increase. Holding all other factors constant, economies of scale can be used to justify a balanced growth strategy with increased sales. That is, if farm expansion coincides with increased sales (active growth) without achieving economies of scale (actual growth exceeds sustainable growth) then the balance can only be maintained by decreasing household consumption, increasing financial leverage, or increasing asset turnover. This latter consideration has also been the focus of considerable interest in the agricultural finance literature. If sales can increase without having to increase the asset base, even if profit margins remain constant, then increased sales growth can be balanced with sustainable growth.

The introduction of high yielding or genetically modified crops is an example of how such economies can emerge. However, if the asset base is increased through the acquisition of land or other capital, and inflated on speculative prices, then the sustainable growth rate can fall as the asset turnover declines. If increased profit margins are not sufficient to offset lower asset turnover, then the growth in sales will exceed the sustainable growth rate. Ultimately, cash shortages will arise and, either household consumption will have to decrease or financial leverage will have to increase.

From an accounting point of view, balanced growth can aid in making strategic decisions that can help explain observable patterns of consumption, investment and leverage. Such an assessment has not previously been done. In the next section, we examine historical farm accounting data to measure active versus sustainable growth rates and to determine whether or not observable characteristics of the U.S. farm sector conform to a balanced growth paradigm.

Data and Measurement Issues

Our estimates of sustainable and actual business growth rates were obtained from the farm balance sheet and income statement information compiled by the United States Department of Agriculture (USDA) at the state level for the years 1980 to 2001. Sustainable growth rates were derived from measures of farm equity returns, calculated using net worth value at the beginning of each calendar year, and the farm business' earnings retention rate for the year. The latter measure is merely estimated since the USDA's reporting format uses only aggregate financial measures and leaves out details concerning the inflows and outflows to the farm equity account such as non-farm incomes generated, family living withdrawals and both unrealized and realized capital gains from property appreciation and sales, respectively. We therefore used an approximation of the earnings retention rate using information on net farm income realized for the year and the beginning and ending levels of farm net worth. These approximated rates of sustainable growth are then compared to the actual levels of farm revenue growth to generate information on the SGC rates.

National and Regional Rates of Sustainable Growth Challenge

Figure 2 presents a plot of actual growth, sustainable growth and the resulting SGC rates for U. S. farms during the period 1981-2001. The trends indicate a tendency for farms to experience positive SGCs in the 1980s. Interestingly, the farm sector was plagued with declining commodity prices during this period, although farmers continued to receive substantial counter-cyclical subsidies from the government. However, it appears that positive SGCs can be largely attributed to lower rates of sustainable growth, instead of the industry's capacity to generate higher actual revenues, for the farm sector during these years. This is a direct result of the rapid depletion of farm equity, indicative of the severe financial crises experienced by most farm businesses at that time. As far back as the mid to late 1970s, the farm sector's loan to value ratios have increased significantly, thus, enabling farmers to increase asset holdings even with less equity commitment. During this time, farmers were able to monetize their unrealized capital gains as the appreciation of land values allowed farmers to borrow beyond the farm's actual repayment capacity. The dramatic decline of land values in the 1980s, however, ushered in a period of severe financial stress as the real concern for debt repayment capacity surfaced for farm borrowers that incurred debts beyond the affordable limit.

In the 1990s, reforms and conservative credit policies implemented by lenders demanded farmers to make more cautious borrowing decisions. As business expansion plans were more synchronized with actual farm production and financial capabilities, the SGC values in the early to mid-1990s in Figure 2 border along the horizontal axis, suggesting only slight differences between realized and sustainable growth rates. Notably, the SGC values have been negative from 1998-2001, consistent with the steady plunge of farm commodity prices during this period. Moreover, radical changes in federal policy towards agriculture involve a shift from market-based to fixed, decoupled production and price support payments. Although the federal government later disbursed large ad-hoc farm income subsidy appropriations, most farms actually realized lower business growth rates due to perceptions of increased income volatility and uncertainty.

Tables 1, 2 and 3 report actual farm revenue growth rates, estimates of the rate of sustainable growth and the resulting SGC rates, respectively, for the ten production regions in the country. The USDA has actually introduced a newer scheme for classifying counties in each state into major farm resource regions, however, since our data set are aggregated at the state-level we had to resort to the older farm production regional classification system. Hence, the regions considered include the Northeast, Lake States, Corn Belt, Northern Plains, Appalachian, Southeast, Delta States, Southern Plains, Mountains and the Pacific. These groupings were based on state boundaries, with a regional classification assigned to neighboring states with similar production practices and resource characteristics.

Table 4 presents statistical measures for each region to analyze differences in SGC patterns at certain time periods. The summary indicates overall positive mean SGC rates across all regions in the 1980s, with mean SGC rates ranging from 1.52% for the Northeastern states to 8.70% for the Delta States. The relative variability indicators (coefficient of variation) are considerably small, with a high of 3.28% for the Northeastern states and a low of 0.67% for the Mountain states.

In the early 1980s, positive SGC rates are the result of fluctuating actual revenue growth rates (Table 1) and (almost consistently) negative sustainable growth rates (Table 2), experienced especially in the Corn Belt, Appalachian, Lake, Northern Plains and the Southeast regions where grain producers have been most affected by the radical decline of farmland values. During this period, high interest rates and declining export demand led to a nationwide 31% drop in farm real estate values and compounded debt repayment problems for highly leveraged producers. Interestingly, the livestock producers in the Northeast realized positive rates of growth and sustainability for most of this period as the relatively low sensitivity of pastureland to sudden market adjustments of land values spared these producers from the financial influence of the boom-bust cycle of the 70s and 80s.

In the 1990s, the effects of increasing farm income risk due to greater market uncertainty and the changing structure of federal policy towards agriculture are reflected in mixed results obtained for the different regions. The heterogeneity of regional production profiles account for divergent trends in SGC levels.

During the period 1990-1995 when federal payments provided income stabilization benefits, the corn and soybean producers in the Corn Belt and Lake States, who largely benefited from such subsidies, were able to build up excess production capacities as a result of stronger equity positions and debt servicing capabilities. Hence, these farms realized negative average SGC rates, with lower relative variability, during this period.

Elsewhere in the country, the gap between actual and sustainable growth rates was lower when compared to the wider disparity of growth rates realized in the 1980s. Cotton and peanut farmers in the Southeast and Delta states continued to receive federal support, although not by as much as the subsidies appropriated for the grain producers. The dairy, cattle, hog and broiler farmers in the Northeast, Northern Plains, Mountain states and Southern Plains relied on marketing strategies and production alliances to enhance financial conditions resulting in greater access to more sources of capital.

As federal farm support veered away from a market-oriented type of subsidy and agricultural commodity prices declined steadily in the latter part of the 1990s, mean SGC rates still remained close to 1 although relative variability increased considerably in 6 of 10 regions.

Preliminary Analysis of Balanced Growth Strategies

This section presents a cursory analysis of relationships between the historical levels of SGC rates and several variables included in the sustainable growth paradigm. Figure 3 presents the trends in the SGC rates and debt-to-asset ratios, decomposed into long-term and non-long-term components, for all US farms during the period 1981 to 2001. The financial leverage ratios were derived from the aggregate balance sheets compiled by the USDA-ERS for all U. S. farms during the 21-year period. The long-term leverage measures were calculated as the ratio of total farm real estate debt to the total market value of farm real estate asset holdings for each year. The shorter-term measures were calculated by dividing the total levels of intermediate and short-term loans by the sum of the total value of non-real estate assets, including crop and livestock inventories, machineries and equipment, purchased inputs and financial assets.

In order to discern clear patterns of relationships between the measures presented in Figure 3, a summary is presented in Table 5 of the results of basic correlation analysis performed on pairs of values of SGC rates and, among other variables, values of each of the two leverage measures over certain time frames. The graphs and derived correlation measures indicate that both long- and non-long term measures of financial leverage are positively correlated with changes in SGC rates over the entire 21-year period, differing in magnitude of the correlation coefficients by only 5 percentage points at 0.4976 and 0.4476, respectively. Significant deviations in correlation results are obtained, however, when different (shorter) time periods are considered. In the 1980s, positive correlation between both financial leverage measures and SGC is maintained, although the shorter-term measure has a higher correlation coefficient at 0.3269 (versus 0.2095 for the long-term variable). As noted earlier, farmers exhibited an aggressive borrowing behavior in the 1980s as farmland values appreciated. Viewed in terms of the sustainable growth paradigm, farms in general resorted to financial leveraging as a means of increasing liquidity and production capacity build-up during such period, with a greater tendency to resort to intermediate- and short-term loans vis-à-vis longer-term loans. The latter result could suggest that short-term liquidity, instead of fixed asset accumulation, was a more pressing concern among farm businesses at that time and farms relied on short- and intermediate-term loans to address this need.

In the nineties, there was a diminishing reliance on financial leveraging to boost sustainable growth potential, given the low and negative correlation results (Table 5) for non-long-term and long-term financial leverage measures, respectively. During this period, the propensity to incur loans among farmers has been regulated by stricter credit risk assessment and credit rationing policies by lenders. Thus, more cautious borrowing decisions were made. The results also implied that financial leveraging could have been avoided by some farmers whenever opportunities to implement alternative strategies to improve sustainable growth rates were available.

The other correlation results in Table 5 and the plots presented in Figure 4 for historical levels of net profit margin (NFIRAT) and asset turnover (ATO) ratios suggest that during times of restrictive credit environments the farmers resorted to other strategies to increase sustainable growth potentials. In the eighties when farmers relied more on financial leveraging to increase sustainable growth rates, NFIRAT and ATO produced negative correlations with SGC. During this time, increased financial and operating inefficiency resulted in profit margin squeezes while the maintenance of excess production capacities through building up inventories of idle, obsolete and unproductive assets brought down the farm sector's ATO rates.

In the nineties profit margins and asset productivity became important tools for attaining higher rates of sustainable growth as the NFIRAT and ATO were found to be highly correlated with SGC rates at 0.7302 and 0.5818, respectively. More favorable market conditions in the early part of the decade, the availability of more efficient production technologies (i.e. the introduction of GMOs), and the implementation of risk-reducing marketing plans all contributed to the attainment of more acceptable profit margins. The prevalence of real estate and equipment leasing contracts as well as the implementation of more prudent asset management strategies aimed at eliminating idle production capacity did not only result in improved ATO ratios but also provided additional liquidity-enhancing mechanisms for some farms through cash proceeds from asset liquidation and the more favorable expense disbursement schemes available under certain land leasing arrangements.

While this analysis does not include the liquidity implications of changes in equity withdrawals for farm household consumption due to data limitations, it can be clearly seen that, over the time frame considered, the significance/insignificance of strategies that involve financial leveraging, income efficiency and asset productivity alternately complement each other to modify a farm's sustainable growth potential in order to achieve balanced growth.

Conclusions

This paper has presented a different approach to examining certain aspects of agriculture finance by introducing the concept of sustainable growth as presented by Higgins (1972, 2001). The sustainable growth model requires a balance between increased sales at the farm level and changes in corresponding accounting measures such as profit margin, owner withdrawals or business retention rates, asset turnover, and financial leverage. We argue that this paradigm can be used to explain observed financial and operating conditions in agriculture. In particular, we note that when farm revenues increase above a measured sustainable growth rate, there is also a tendency for farm debt to increase, and when revenues fall, there is a tendency for farm debt to decrease. But the role of debt is not so simply related to increases in sales. Household consumption expenditures, represented by owner withdrawals, also play a role. As expenditures increase due to inflation, the retention ratio and sustainable growth falls, relative to sales. This condition increases the pressure on cash flow and increased use of debt. Likewise, in periods of inflationary land values, as turnover falls and if sustainable growth falls relative to sales, cash shortages need to be absorbed through either restrictions in household expenditures or increased use of debt.

This study has provided estimates of actual and sustainable growth rates from 1981 to 2001 for the seven producing regions in the United States and discusses these within the context of the agriculture economy. Our analyses show a general contribution to the sustainable growth paradigm.

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Table 1. Average Rates of Actual Revenue Growth of U.S. Farms (Percent), By Region, 1981-2001											
Year	APL[1]	CB[2]	DS[3]	LS[4]	MTNS[5]	NE[6]	NPLNS[7]	PCFC[8]	SE[9]	SPLNS[10]	All States
1981	14.46	10.98	16.20	7.98	-0.15	12.63	16.90	2.06	16.53	13.16	11.42
1982	-1.37	-3.90	-2.56	0.14	-1.81	4.49	4.38	4.38	-1.27	0.92	-1.31
1983	-8.47	-15.53	-4.30	-6.82	1.72	1.67	-3.94	8.86	-4.66	-4.60	-6.27
1984	12.34	21.29	8.33	7.67	-0.58	1.62	9.84	-1.01	9.05	-0.24	9.18
1985	-9.28	-2.10	-9.34	-5.18	-6.16	-1.20	-1.48	-3.10	-6.98	-2.41	-4.02
1986	-4.84	-6.76	-9.29	-3.49	2.27	0.39	-4.09	6.95	-5.01	-0.87	-3.15
1987	7.70	4.01	17.61	5.49	10.90	5.01	5.48	6.69	13.26	9.96	7.86
1988	8.48	1.72	16.63	-1.56	9.50	5.71	1.82	6.17	12.14	11.44	5.64
1989	7.89	12.82	1.30	17.34	7.14	4.71	3.95	4.75	12.99	1.89	7.85
1990	3.86	0.08	-0.11	-1.08	4.58	2.89	11.30	2.95	-8.36	7.60	3.22
1991	-0.68	-7.83	2.51	-5.05	-0.26	-3.46	-5.66	-2.04	7.25	-1.24	-3.09
1992	7.03	11.99	5.67	0.03	-2.65	5.53	7.76	1.35	-1.10	-0.40	4.50
1993	2.79	-3.61	2.05	-1.06	13.95	-1.17	-2.45	9.90	2.36	6.96	2.22
1994	5.70	8.88	9.17	10.72	-3.93	4.35	7.01	4.54	8.89	1.84	5.36
1995	-1.77	-7.43	-3.00	-1.56	2.38	-2.60	-7.84	0.59	-0.99	-5.70	-2.45
1996	7.19	20.99	16.65	9.55	4.76	7.02	22.65	7.89	9.58	-0.58	11.86
1997	1.66	0.74	-5.06	-1.22	6.92	-3.32	-6.82	3.04	2.15	13.49	1.00
1998	0.20	-6.75	-4.73	1.89	-0.03	2.10	3.55	-3.15	-0.44	-7.10	-2.53
1999	-3.62	-4.97	5.47	1.17	3.75	-0.63	-0.35	1.40	2.18	12.47	1.02
2000	12.48	9.35	-6.90	-1.86	2.94	3.42	6.36	4.37	-0.90	-2.55	3.09
2001	-2.76	1.97	7.58	2.64	4.34	0.66	0.16	-0.50	6.52	1.97	1.99

Notes: (1) The Appalachian states include Kentucky, North Carolina, Tennessee, Virginia and West Virginia; (2) The Corn Belt states include Illinois, Indiana, Iowa, Missouri and Ohio; (3) The Delta States are Arkansas, Louisiana and Mississippi; (4) The Lake States are Michigan, Minnesota and Wisconsin; (5) The Mountain States are Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming; (6) The Northeast Region includes Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont; (7) The Northern Plains includes Kansas, Nebraska, North Dakota and South Dakota; (8) The Pacific Region includes Alaska, California, Hawaii, Oregon and Washington; (9) The Southeast Region includes Alabama, Florida, Georgia and South Carolina; and (10) The Southern Plains includes Oklahoma and Texas.

Table 2. Average Rates of Sustainable Growth of U.S. Farms (Percent), By Region, 1981-2001											
Year	APL[1]	CB[2]	DS[3]	LS[4]	MTNS[5]	NE[6]	NPLNS[7]	PCFC[8]	SE[9]	SPLNS[10]	All States
1981	-2.06	-9.98	-4.44	-3.36	0.52	1.28	-0.89	3.27	-6.58	2.45	-2.03
1982	-2.04	-10.33	-9.64	-5.73	-5.12	-2.47	-5.79	0.57	-3.69	-2.11	-5.51
1983	-0.66	-3.34	0.53	-3.65	0.54	1.49	-3.70	0.02	-3.38	1.17	-0.46
1984	-7.75	-22.54	-8.96	-15.99	-9.43	0.56	-19.38	-7.48	-5.76	-8.46	-11.84
1985	-2.64	-10.30	-13.15	-13.24	-11.48	2.59	-11.51	-5.24	-2.81	-14.48	-10.27
1986	-1.05	-5.47	-12.77	-8.81	-2.53	4.57	-6.08	-8.85	0.98	-6.26	-4.59
1987	-0.44	5.43	3.51	8.21	0.84	5.53	7.66	-0.22	5.73	3.12	6.59
1988	2.84	3.74	1.81	3.96	1.46	5.92	5.35	4.33	6.01	0.95	6.04
1989	3.06	2.91	-0.59	6.12	0.48	1.91	3.95	5.31	6.36	0.13	4.27
1990	-0.27	3.89	2.59	6.26	4.10	-1.77	2.77	5.23	1.41	0.39	3.86
1991	2.51	0.70	-2.74	0.55	0.19	-0.71	-2.09	-0.87	0.15	0.46	0.33
1992	4.71	3.47	2.81	3.22	-4.24	6.47	2.10	1.67	3.94	4.52	3.37
1993	2.33	2.88	2.81	-0.05	6.78	-0.79	3.93	2.69	3.97	2.98	5.28
1994	5.13	3.57	3.43	2.18	2.74	0.05	1.87	0.54	5.07	1.13	2.70
1995	3.13	2.36	2.66	3.28	2.59	-0.12	1.14	1.73	1.89	-2.13	3.43
1996	2.97	5.33	0.21	3.26	2.42	0.13	4.94	2.19	1.72	2.45	3.92
1997	2.88	4.93	4.19	1.71	3.13	-1.76	3.79	0.81	3.71	4.82	4.61
1998	0.62	2.66	4.16	3.57	0.06	2.24	-0.29	2.41	2.90	0.21	2.78
1999	2.96	1.96	4.18	4.55	3.49	-2.49	5.12	0.73	2.50	3.12	5.07
2000	5.53	2.65	1.29	2.63	2.43	3.78	3.33	1.55	5.91	4.88	4.98
2001	2.15	2.22	1.78	1.89	1.16	2.82	1.34	1.20	5.39	4.34	3.59

Notes: (1) Appalachian; (2) Corn Belt; (3) Delta States; (4) Lake States; (5) Mountain States; (6) Northeast; (7) Northern Plains; (8) Pacific; (9) Southeast; and (10) Southern Plains.

Table 3. Average Rates of Sustainable Growth Challenge of U.S. Farms (Percent), By Region, 1981-2001											
Year	APL[1]	CB[2]	DS[3]	LS[4]	MTNS[5]	NE[6]	NPLNS[7]	PCFC[8]	SE[9]	SPLNS[10]	All States
1981	16.52	20.96	20.63	11.34	-0.67	11.35	17.79	-1.21	23.11	10.72	13.45
1982	0.68	6.43	7.09	5.87	3.31	6.96	10.17	3.81	2.42	3.03	4.20
1983	-7.81	-12.20	-4.83	-3.17	1.18	0.18	-0.24	8.84	-1.28	-5.78	-5.81
1984	20.09	43.84	17.29	23.66	8.85	1.06	29.22	6.47	14.80	8.23	21.02
1985	-6.64	8.20	3.82	8.05	5.33	-3.80	10.03	2.14	-4.16	12.07	6.25
1986	-3.79	-1.29	3.49	5.32	4.81	-4.18	1.99	15.80	-5.98	5.39	1.45
1987	8.14	-1.41	14.09	-2.71	10.06	-0.52	-2.17	6.91	7.54	6.84	1.27
1988	5.64	-2.03	14.82	-5.52	8.04	-0.21	-3.53	1.84	6.12	10.49	-0.41
1989	4.83	9.91	1.88	11.22	6.66	2.80	0.01	-0.56	6.64	1.76	3.58
1990	4.13	-3.81	-2.71	-7.34	0.48	4.66	8.53	-2.28	-9.78	7.21	-0.64
1991	-3.19	-8.52	5.25	-5.60	-0.45	-2.76	-3.57	-1.18	7.10	-1.70	-3.41
1992	2.32	8.53	2.86	-3.18	1.59	-0.94	5.66	-0.32	-5.04	-4.93	1.13
1993	0.45	-6.49	-0.75	-1.01	7.18	-0.38	-6.38	7.21	-1.61	3.98	-3.06
1994	0.58	5.31	5.74	8.54	-6.66	4.29	5.15	4.00	3.81	0.71	2.66
1995	-4.90	-9.79	-5.66	-4.85	-0.21	-2.48	-8.98	-1.14	-2.88	-3.57	-5.88
1996	4.23	15.65	16.44	6.29	2.33	6.88	17.71	5.69	7.87	-3.04	7.94
1997	-1.22	-4.19	-9.26	-2.93	3.78	-1.56	-10.61	2.24	-1.56	8.68	-3.61
1998	-0.42	-9.41	-8.89	-1.68	-0.08	-0.15	3.85	-5.56	-3.33	-7.32	-5.31
1999	-6.58	-6.93	1.30	-3.38	0.26	1.86	-5.46	0.67	-0.32	9.36	-4.05
2000	6.96	6.70	-8.19	-4.48	0.52	-0.36	3.03	2.82	-6.81	-7.43	-1.89
2001	-4.91	-0.24	5.80	0.75	3.18	-2.17	-1.18	-1.69	1.14	-2.37	-1.60

Notes: (1) Appalachian; (2) Corn Belt; (3) Delta States; (4) Lake States; (5) Mountain States; (6) Northeast; (7) Northern Plains; (8) Pacific; (9) Southeast; and (10) Southern Plains.

Table 4. Summary Statistics for SGC Rates, By Region, Selected Time Periods, in Percent										
Time Period	APL[1]	CB[2]	DS[3]	LS[4]	MTNS[5]	NE[6]	NPLNS[7]	PCFC[8]	SE[9]	SPLNS[10]	All States
1981-2001											
Mean	1.67	2.82	3.82	1.68	2.83	0.98	3.38	2.59	1.80	2.49	1.85
Std. Dev.	7.25	12.90	8.91	7.77	3.96	3.95	9.75	4.77	7.76	6.42	6.52
C. V.	4.34	4.57	2.33	4.64	1.40	4.03	2.88	1.84	4.31	2.58	3.52
1980-1989											
Mean	4.18	8.05	8.70	6.01	5.28	1.52	7.03	4.89	5.47	5.86	6.29
Std. Dev.	9.75	16.36	8.41	9.12	3.56	4.97	10.90	5.32	9.24	5.60	6.83
C. V.	2.33	2.03	0.97	1.52	0.67	3.28	1.55	1.09	1.69	0.96	1.09
1990-1995											
Mean	-0.10	-2.46	0.79	-2.24	0.32	0.40	0.07	1.05	-1.40	0.28	-1.53
Std. Dev.	3.38	7.61	4.58	5.70	4.43	3.28	7.28	3.73	6.08	4.64	3.17
C. V.	-33.24	-3.09	5.82	-2.55	13.84	8.23	107.24	3.56	-4.35	16.38	-2.07
1996-2001											
Mean	-0.33	0.26	-0.47	-0.91	1.67	0.75	1.22	0.69	-0.50	-0.35	-1.42
Std. Dev.	5.19	9.42	10.35	3.95	1.65	3.31	9.72	3.92	4.93	7.56	4.79
C. V.	-15.91	35.68	-22.13	-4.36	0.99	4.40	7.95	5.65	-9.83	-21.49	-3.37

Notes: (1) Appalachian; (2) Corn Belt; (3) Delta States; (4) Lake States; (5) Mountain States; (6) Northeast; (7) Northern Plains; (8) Pacific; (9) Southeast; and (10) Southern Plains.

Table 5. Correlation of SGC Rates and Relevant Financial Measures, U. S. Farms, Selected Time Periods			
Financial Measure paired with SGC	Correlation Coefficients		
	1981-2001	1981-1989	1990-2001
Net Farm Income Ratio	-0.2465	-0.0526	0.7302
Asset Turnover Ratio	0.0517	-0.0598	0.5818
Long-Term Debt-Fixed Farm Asset Ratio	0.4976	0.2095	0.0746
Non-Long-Term Debt-Non-Fixed Farm Asset Ratio	0.4476	0.3269	-0.2158

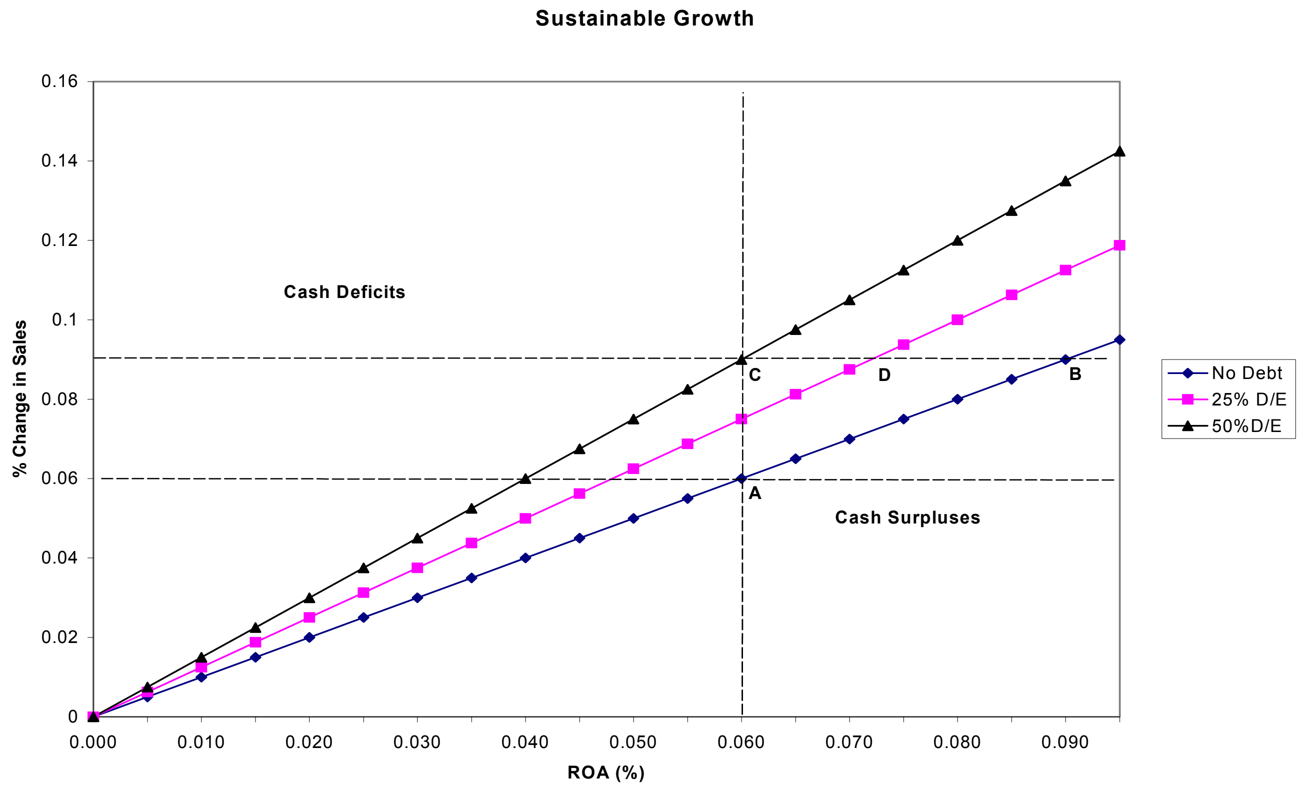
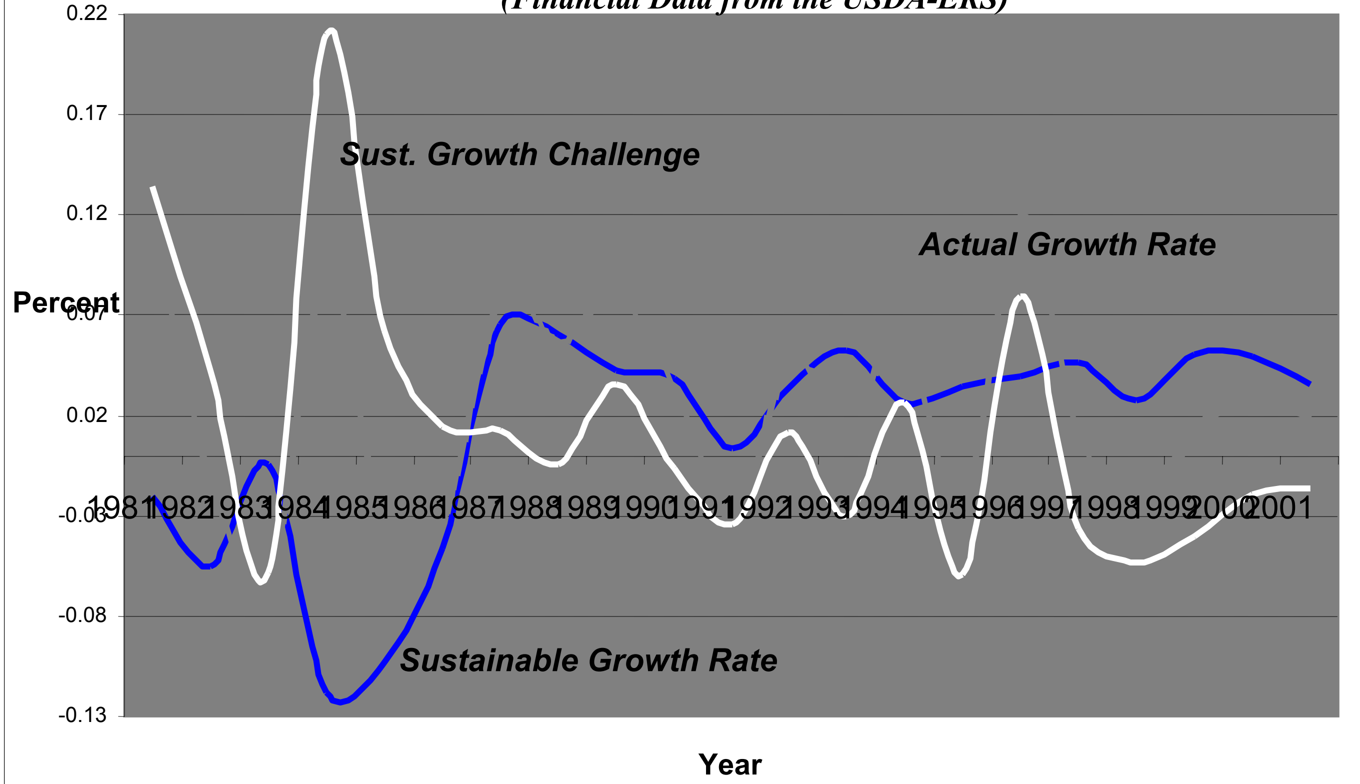


Figure 1: A Graphical Depiction of Sustainable Growth

Figure 2. Rates of Actual Growth, Sustainable Growth and Sustainable Growth Challenge, U. S. Farms, 1981-2001

(Financial Data from the USDA-ERS)



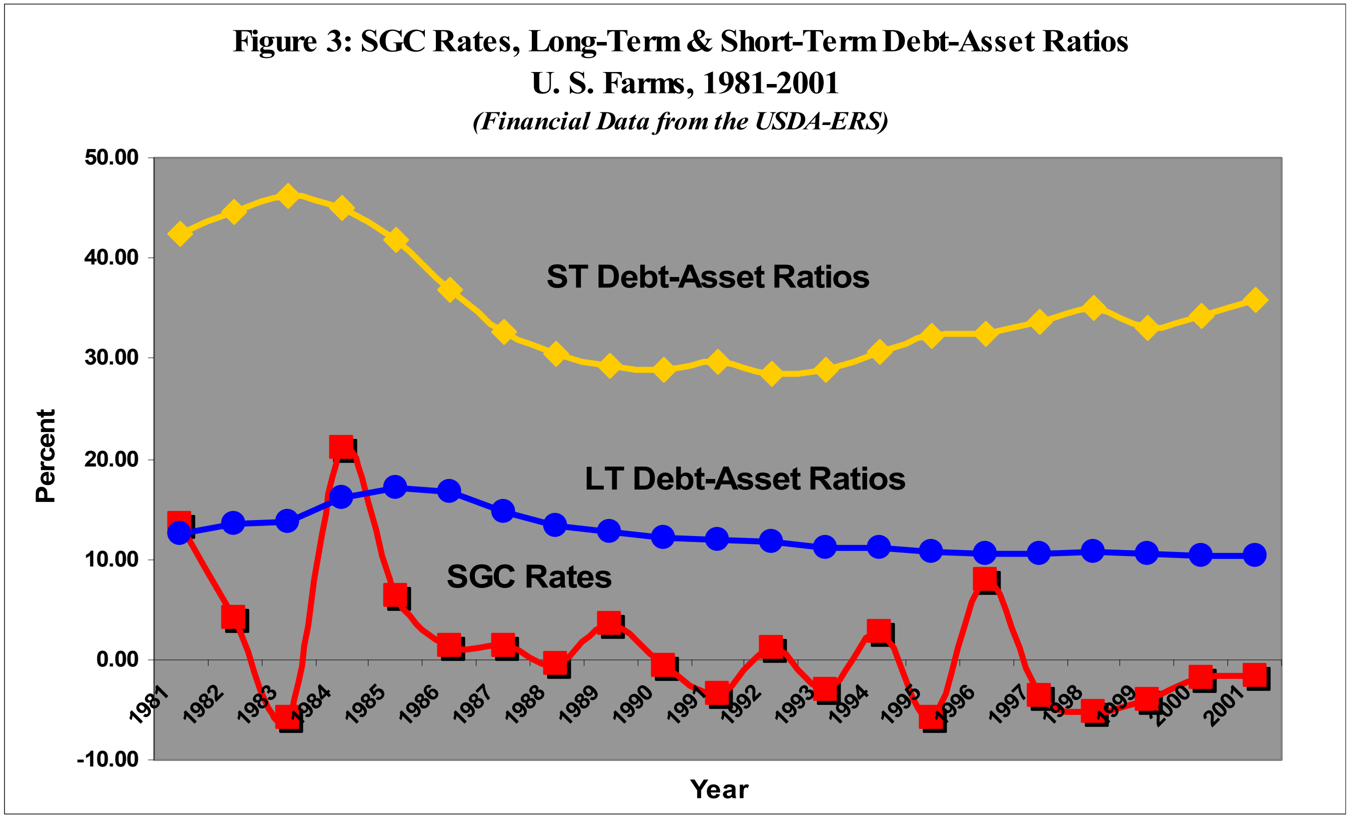


Figure 3: SGC Rates, Long-Term & Short-Term Debt-Asset Ratios
U. S. Farms, 1981-2001
(Financial Data from the USDA-ERS)
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
Percent
ST Debt-Asset Ratios
LT Debt-Asset Ratios
SGC Rates
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Year

Figure 4. Net Farm Income (NFI) Ratios, Asset Turnover Ratios (ATO) and Sustainable Growth Challenge (SGC) Rates, U. S. Farms, 1981-2002

(Financial Data from the USDA-ERS)