Has the "Farm Problem" Disappeared? A Comparison of Household and Self-Employment Income Levels of the Farm and Nonfarm Self-Employed

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Abstract

This study tests the impact of household and demographic factors on the economic well-being of the farm and nonfarm self-employed using data from the Integrated Public Use Microdata Series. Parametric and nonparametric techniques are used to test for statistical differences in self-employment and household income levels. Further, household and demographic factors are tested for their effect on self-employment income using a censored tobit regression model. The farm self-employed report significantly higher levels of self-employment income. Results reveal that several household and demographic factors significantly impact self-employment income levels for the farm and nonfarm self-employed, with key differences in impacts.

1. Introduction

Increasing attention has been and is currently being paid to entrepreneurship across many disciplines, with agriculture serving as no exception. Despite growing interest in the topic of agricultural entrepreneurship, a relatively small amount of research has explored farmers as entrepreneurs (Knudson et al., 2004; Richards and Bulkley, 2007). Although the majority of farms in the United States are organized as proprietorships (Mishra et al., 2002), the agricultural economics literature has yet to explore the entrepreneurial nature of farming in comparable depths to other industries (Knudson et al., 2004; Richards and Bulkley, 2007). Further, few comparisons have been made between farmers and entrepreneurs in other sectors.

Researchers argue that difficulties have arisen in drawing comparisons between farm and nonfarm entrepreneurs. A number of agricultural economists have addressed the existence of and issues associated with the farm problem, in which increases in technical efficiency and productivity growth lead to decreases in price as surpluses occur. Researchers tend to agree that at one time in history, farm households were indeed financially disadvantaged in comparison to other households in the U.S. Gardner (1992) reviewed the literature related to the farm problem and noted that the farm problem in the U.S. has gradually diminished over the past four decades. The supplementing of farm income with off-farm work has led to average farm household

income levels comparable to those of all households in the U.S. since 1990, and greater than all households in the U.S. since 1996 (Mishra and Sandretto, 2002).

Gardner (1992) suggested that in spite of the disappearance of the farm problem, comparing farm and nonfarm household income is a complicated matter, due to factors such as income source, family demographics, tax rates, capital depreciation, commodity inventories, etc. In a study conducted for the USDA, Mishra et al. (2002) evaluated incomes of farm and nonfarm proprietorship households. They noted that "stark differences" exist between farm and nonfarm proprietorship households since the importance of the business as a source of household income varies between the two groups. Results from their comparison concluded that for more than 60% of farm proprietorship households in 1997, the business reported negative income, which channeled money away from the household. They also concluded that business ownership accounted for approximately 80% of total household income for over half the observations of nonfarm proprietorship households, while only 7% of farm proprietorship households indicated that farm business income accounted for more than 80% of their household income. Despite these differences, Mishra et al. (2002) suggested that comparing farm-related businesses with other small, family-owned businesses is valuable, since both are vulnerable to many of the same obstacles and economic fluctuations.

Katchova (2008) extended the work of Mishra et al. (2002) to empirically compare the economic well-being of farm and nonfarm households using the 2004 Agricultural Resource Management Surveys (ARMS) and 2004 Survey of Consumer Finances (SCF) datasets. Results of her analysis indicated that when economic well-being is represented by income and net worth, the economic well-being of households varies based on the level of business involvement and the life cycle stage of the household. Katchova (2008) tested the effect of age, education, and

household size on the well-being measures. The primary conclusions of her research are: (1) income levels of rural residents and intermediate farm households are statistically similar to that of nonfarm, wage-earner households, and (2) commercial farm households are statistically comparable in well-being to nonfarm households that operate businesses.

Extending the information revealed by Mishra et al. (2002) and Katchova (2008), the dual objective of this study is (1) to test for statistical differences between household and self-employment income levels between the farm and nonfarm self-employed and (2) to empirically examine household and demographic factors that may pose an impact on the level of self-employment well-being for farm and nonfarm self-employed households. The Integrated Public Use Microdata Series (IPUMS) is employed. Since the same questions were asked to all households and individuals tracked through the IPUMS dataset, the use of this dataset allows for direct empirical comparison of household and self-employment income levels between the farm and nonfarm self-employed. Parametric and nonparametric techniques are used to determine if significant differences exist between farm and nonfarm self-employment income levels. A censored tobit regression model is used to explore the household and demographic determinants of self-employment income for the farm, nonfarm, and total self-employed samples.

2. Background

The Farm Problem

Researchers argue that farmers have increasingly sought off-farm work to increase their household income and reduce the variability associated with farm income over the past several decades (Ahearn, 1986; Gunter and McNamara, 1990; Hallberg et al., 1991; Mishra and Goodwin, 1997; Mishra and Sandretto, 2002; Perry and Hoppe, 1993; Sumner, 1982). Mishra

and Sandretto (2002) reported that 94% of farm households collect some type of nonfarm income. Mishra et al. (2002) reported that more than half of U.S. farm operators were employed off-farm, and of those, 80% held full-time jobs off-farm. As such, recent studies cite work off-farm as a major contributor to the dissolution of the "farm problem." Researchers have pinpointed specific factors which lead to off-farm work, such as higher education, nonfarm wages, and the value of off-farm work (e.g., Tokle and Huffman, 1991; Gould and Saupe, 1989; Huffman, 1980; Gisser, 1965; Fall and Magnac, 2004). Gardner (1992) suggested that comparing farm and nonfarm income is a difficult matter due to a number of complicating factors. Despite the perceived large income differences between farm and nonfarm households, little de facto difference exists since many farm households supplement their farm proprietorship income with off-farm income. Further, it has been noted that such comparison between farm and nonfarm proprietor households is useful since both are likely exposed to similar macroeconomic shocks, types of risk, and lack of asset mobility (Mishra et al., 2002).

Despite the differences that exist, researchers and policymakers alike have noted the importance of understanding agricultural entrepreneurs and the level of income parity that exists between them and their nonfarm counterparts. Knudson et al. (2004) noted that in the 2002 Farm Bill, Section 6401 designated $27.7 million in competitive grants for independent producers, agricultural producer groups, farmer or rancher cooperatives and farmer controlled private firms in seeking out value-added activities (Federal Register, p. 52565). Section 6402 provided for the creation of ten agricultural innovation centers, designed for the purpose of encouraging "the ability of agricultural producers to reap the benefits of producing and marketing value-added products" (Federal Register, p. 53540). It likewise appears that the upcoming Farm Bill will

include legislation related to value-added and farm business development opportunities through the Rural Development Title.

Two particular studies in the agricultural economics literature highlight the growing interest of entrepreneurship in agricultural economics, Ng (2002) and Parcell and Sykuta (2003). Although neither Ng (2002) nor Parcell and Sykuta (2003) directly tackled the issue of empirically studying agricultural entrepreneurial performance, their studies are aimed at learning more about entrepreneurs in an agricultural context. Both Mishra et al. (2002) and Hopkins and Morehart (2004) discussed well-being of farm and nonfarm households; however, as noted by Katchova (2008), both were limited in scope. Katchova (2008) moved the information provided by Mishra et al. (2002) and Hopkins and Morehart (2004) forward through statistically comparing farm and nonfarm household well-being, and determined farm households were at no significant disadvantage. This research further advances the literature by statistically comparing both household and self-employment income levels of the farm and nonfarm self-employed, and by determining factors that significantly contribute to higher levels of household income for the two groups via a censored tobit analysis.

Household and Family Business Models

A major distinction between wage earners and the self-employed is the relationship of the business to the household. From an economic theory standpoint, choices regarding production, consumption, and labor supply are typically considered three separate matters involving three different agents: producers, consumers, and workers (Sadoulet and de Janvry, 1995). The concept of separability, which suggests that the household is concerned with maximizing its

utility through choosing optimal levels of production and consumption separately, has been widely tested in economics.

Fall and Magnac (2004) contended that the separability property has been rejected when studies considered data from developed countries (Lopez, 1984; Elhorst, 1994). Since the separability property requires that the implicit prices for labor are identical in all activities (Fall and Magnac, 2004), failure of the separability property is generally due to some type of market failure. Market failure occurs for a number of reasons; including transactions costs, shallow local markets, price risks, and risk aversion. When any market failure occurs, the household can no longer be considered "separable" and the consumption decisions must be modeled simultaneously with the production/income decision.

In his seminal piece on household economics, Becker (1981) contended that the household, as a unit, produces both market and non-market goods and time. Mattila-Wiro (1999) proposed that the household is indeed a production unit, but argued that intra-household choices made by all individuals involved must be considered to correctly evaluate the household environment. Further, in making intra-household decisions, separability inherently fails since household members face different wage rates.

Although not explicit in all cases, the family business literature likewise addresses the phenomenon of separability and non-separability of family and business decisions under self-employment. Ibrahim and Ellis (1994) appeared to argue for separability of the family and business models, referring back to economic theory regarding the differing objectives pursued by businesses and households. They also discussed the emotional and irrational elements of families, and suggested that for families and businesses to successfully coexist, they should operate under "separation." Alternatively, Heck et al. (1995) suggested that research on home-

based businesses indicated that a large number of those businesses were started for support of the family; thus, implying that in a family business model context, family and business are not separable. Such contentions have led to the Sustainable Family Business Model (Stafford et al., 1999) in which both characteristics of the business and the family lead to business outcomes. The Sustainable Family Business Model is covered in more detail in the conceptual model discussion.

3. Data and Methods

Data for this analysis comes from the Integrated Public Use Microdata Series (IPUMS), which draws from fifteen federal censuses and the American Community Surveys (ACS) from 2000 through 2005. The ACS sample is a 1-in-100 national random sample of the population, which contains approximately 1,159,000 household records and 2,878,000 person records. Due to the size of the available sample, only the 2005 ACS was utilized from the IPUMS dataset to create the random sample for this analysis. For the purposes of this analysis, a sample of 69,092 observations was pulled from the ACS.

To ensure the independence of observations in the analysis, all respondents aside from the household heads were eliminated. After removing spouses and other relatives, 27,780 household head observations remained in the sample. Of the household head observations, 2,853 indicated self-employment as their primary source of employment, yielding a self-employment rate of approximately 10.27%. Table 1 displays summary statistics for the farm and nonfarm self-employed.

[Place Table 1 approximately here]

Since the primary interest of this study is comparing the farm and nonfarm self-employed, the sample of self-employed household heads was further divided between those that

meet the USDA farm status criteria and those that do not. Of the self-employed household heads, 145 individuals indicated meeting the USDA criteria for a farm, which requires an individual to sell or have the potential to sell at least $1,000 in agricultural products per year. Of those individuals reporting farm status, approximately 68% reported $10,000 or more in agricultural sales.

Since farm or business income (self-employment income) is the dependent variable in the analysis, Figure 1 shows the distribution of the farm and nonfarm self-employed across income categories in 2004, where household income represents the total income of all household members, ages 15 and older. Total income is the individual household head's total pre-tax personal income or loss.

[Place Figure 1 approximately here]

On average, household, total, wage, and investment income are higher for the nonfarm self-employed than for farm self-employed. Average income from the farm or business, however, is higher for the farm self-employed, which is somewhat unexpected since Mishra et al. (2002) reported that farming often serves as a drain on household income.

Parametric and Non-Parametric Tests

Both parametric and nonparametric tests are performed to determine whether significant differences exist between the farm and nonfarm self-employed related to household and self-employment income levels. Following the methods of Katchova (2008), since these income types possess nonsymmetrical distributions, comparisons are made for both means and medians using t-tests and Kruskal-Wallis tests in STATA 10, respectively.

When means are compared using parametric methods, it is assumed that the variables possess a normal distribution. When sample sizes are considered "large," then according to the properties of the Central Limit Theorem, the sampling distribution of the mean may be approximated by the normal distribution. Thus, t-tests are appropriately used to evaluate household and self-employment income means between the farm and nonfarm self-employed.

Nonparametric tests possess fewer restrictions in terms of assumptions, the most useful of which for this analysis, is dropping the assumption of normality. Despite the usefulness of these tests, they are limited in that the techniques are based on ranks of individual observations as opposed to the absolute numeric values. This may lead to loss of information on behalf of the researcher. For the purpose of this research, the Kruskal-Wallis test statistic is used, since it is a multi-sample form of the two-sample Mann-Whitney-Wilcoxon test. The Kruskal-Wallis test is calculated using the following:

$$H = \frac{12}{n(n+1)}\sum\frac{R_j^2}{n_j} - 3(n+1) \quad (9)$$

Where n represents the sample size and R_j is the sum of ranks for the j^{th} sample. The sampling distribution of H is approximately χ^2 with $m - 1$ degrees of freedom, where m represents the number of groups being compared.

Conceptual Model

It is unlikely that profit maximization is the sole objective of self-employed household heads, since objectives of the household must also be met simultaneously. Stafford et al. (1999) developed a model of sustainable family businesses that incorporates features of both the family and the business. This model portrays business outcomes as a function of family and business attributes, and provides the family with a comparable contribution to business outcomes as the

business itself. It likewise provides the business with a comparable weight to family outcomes as the family itself. As illustrated in Figure 2, both resources and constraints involving the family and the business lead to disruptions in business and family transactions and processes that detail times of stability and times of change. Transactions lead to responses to disruptions and both subjective and objective achievements. These achievements and responses to disruptions lead to sustainability for the family and the business. This model is expected to play a large role in the censored tobit regression model through the household income and family characteristic variables. For a full treatment of the conceptual model, refer to Stafford et al. (1999).

[Place Figure 2 approximately here]

Censored Regression Model

One objective of this analysis is to model self-employment income as a function of demographic and socioeconomic attributes and characteristics of the family and business. Since self-employment income serves as the dependent variable and is bottom censored, it is imperative to consider this censoring in the model. Greene (2003) noted that censoring of dependent variables is a common problem encountered in the use of microeconomic data. In censoring data, all values in a specific range are transformed to or reported as a single value. Tobin (1958) first identified this issue and suggested that special consideration be given to instances in which censoring occurs. He then proposed the tobit model, which essentially formed a hybrid model of the probit and multiple regression models.

The IPUMS-ACS dataset bottom-codes the self-employment income data by setting lower thresholds. In the ACS dataset, self-employment income is limited at the bottom by a value of $-10,186; thus, the variable is censored at the ACS bottom code. In such a situation,

using an Ordinary Least Squares (OLS) approach yields inconsistent estimates for the coefficients. A tobit model accounts for the censored data, yielding consistent estimates of the coefficients, and is of the basic form:

$$y_t = \beta' x_i + e_i$$

$$(3) \qquad y_i = \begin{cases} y_i^* & \text{if } y_i^* > -10{,}186 \\ -10{,}186 & \text{if } y_i^* \le -10{,}186 \end{cases}$$

where *y** represents the observed farm or business income value from the dataset. The *y** value is reported as *y*, which takes on the actual income value, *y**, if self-employment income is above the lower censoring threshold, or the censored value -10,186 if the actual income value is at or below -10,186. Since the interest of this study is the impact of the explanatory variables on positive self-employment farm or business income, given that the individual indicates he/she is self-employed, the tobit coefficients are reported. The tobit coefficients are interpreted conditionally as a measure of the impact of the explanatory variable on farm or business income, given that the individual is self-employed.

An issue that must be considered with the model is the possibility of endogeneity. Some degree of simultaneity is likely present between the self-employment income variable and the household income variable. Since availability of household income may affect self-employment income and self-employment income contributes to or detracts from household income, the issue of endogeneity must be addressed. The simultaneity of the household income and self-employment income variables indicates that the following simultaneous tobit model, employing the steps outlined by Smith and Blundell (1986), should be used:

(4a) $y_1^* = x_1' \beta_1 + y_2' \delta_1 + u_1$

(4b) $y_2' = x_i' \theta_2 + v_2'$

Where y_1^* represents self-employment farm or business income and y_2' represents household income. Under this specification, x_i' represents the vector of observations (x_1', x_2') on the maintained weakly exogenous variables $\mathrm{K}(= K_1 + K_2)$, where the usual identification assumptions apply. Observations on the self-employment income variable, y_1^* are censored, although the endogenous vector for total household income, y_2', is continuously observed. As in Smith and Blundell (1986), the error u_1 in the self-employment income model can be written so that it is conditional on the error term, v_2', from the household income model as such:

(5) $u_1 = v_2'\alpha + \varepsilon_1$

Substituting equation (5) into equation (4a), the following conditional model is created so that the self-employment farm or business income model is written conditional of the error term of the household income model:

(4a') $y_1^* = x_1'\beta_1 + y_2'\delta_1 + v_2'\alpha + \varepsilon_1$

Thus, the following conditional censoring rule is motivated:

(6) $y_1 = \begin{cases} y_1 * & \text{if } \varepsilon_1 > -(x_1'\beta_1 + y_2'\delta_1 + v_2'\alpha) \\ 0 & \text{otherwise} \end{cases}$

Equations (7) and (8) may now be estimated, which replace equations (4a') and (6), by the following standard tobit model.

(7) $y_1 = x_1'\beta_1 + y_2'\delta_1 + \hat{v}_2'\alpha + e_1$

(8) $y_1 = \begin{cases} y_1 * & \text{if } e_1 > -(x_1'\beta_1 + y_2'\delta_1 + \hat{v}_2'\alpha) \\ 0 & \text{otherwise} \end{cases}$

The instrumental variable (censored) tobit model was estimated in STATA 10 SE to test the above simultaneous tobit model. The Wald test for exogeneity utilized in STATA rejects the

hypothesis of weak exogeneity; thus, the instrumental variable tobit model was selected as the appropriate method. Since heteroskedasticity is often an issue in censored tobit regression models, robust standard errors were calculated to correct for heteroskedasticity of unknown form.

4. Results and Discussion

Parametric and Non-parametric Comparison

Mishra et al. (2002) indicated that farm and nonfarm proprietors would likely experience large differences in well-being. When this hypothesis was tested empirically by Katchova (2008), using both parametric and non-parametric techniques, she found that farm and nonfarm households were not significantly different in terms of household income and net worth. Since the IPUMS dataset separates self-employment income for the household head from household income, this study tests for differences in household and self-employment income levels between the farm and nonfarm self-employed. Results from these analyses are shown in Table 2.

[Place Table 2 approximately here]

The results of the t-test and Kruskal-Wallis statistics were consistent for both self-employment and household income levels. Like Katchova (2008), we found no significant differences between household income levels of the farm and nonfarm self-employed. Significant differences were determined in self-employment income levels, however, at the 10% and 5% level, for the t-test and Kruskal-Wallis tests, respectively. These results indicate that in terms of self-employment income, the farm self-employed have a significantly higher level of income than the nonfarm self-employed.

Censored Tobit Regression Model

To determine factors impacting self-employment income for the farm and nonfarm self-employed, three models were tested representing three general groups: nonfarm self-employed, farm self-employed, and total self-employed. The total self-employed model was used to test the impact of farm status on self-employment income. Results of the censored tobit regression model are reported in Table 3.

[Place Table 3 approximately here]

All three models estimated household income instrumented by a number of variables. As such, the household income variable posed a negative and significant effect on self-employment income at the 1% level in the nonfarm and total self-employed models and posed no significant effect for the farm self-employed. This was contrary to the anticipated effect, since higher levels of household income were expected to insulate the business from failure. Although this result may appear counter-intuitive, it likely provides increased insight into the importance of the sustainable family business model and the interface existing between the business and the family.

For the nonfarm and total self-employed, having a high school degree, some college, or an associate degree was positive and significant at the 5% level. All higher levels of education were positive and significant at the 1% level. For the farm self-employed, when compared to having less than a high school degree, a high school degree or some college positively and significantly impacted farm or business self-employment income at the 5% and 10% levels, respectively. Overall the results support the previous literature related to the relationship between education and performance.

Gender was tested across all three models. No significant gender gaps were found. Although race was excluded from the farm self-employed category models, since all but one

observation had indicated white as the primary race, significant results appeared for both the nonfarm and total self-employed and models. For the nonfarm and total self-employed models, when compared to the "White" race designation, being American Indian, Black, or some other race, negatively and significantly impacted self-employment income at the 10% , 1%, and 1% levels, respectively. Designating Asian as the primary race did not significantly impact self-employment income. Previous research in the entrepreneurship literature has typically found minorities to have higher prevalence rates regarding entrepreneurial entry, but Whites tend to have increased chances of success compared to their minority counterparts (Bates, 2000; Fairlie, 1999, 2004; Fairlie and Meyer, 2000; Hout and Rosen, 2000; Light and Rosenstein, 1995, Meyer, 1990). Overall, the results support the findings from previous research related to minority success.

For the farm self-employed, when compared to being single, being married exerted a positive and significant impact on self-employment farm or business income at the 10% level. Previous literature related to marital status has often found marriage to have a positive impact on entrepreneurial success; thus, the results for the farm self-employed generally adhere to the previously obtained results. However, no significant impact was determined for the nonfarm or total self-employed with regards to marital status.

To account for the effect of family on self-employment income, family size variables were included in all three models. Family size was not found to be a significant factor in determining farm or business self-employment income. The results were surprising when compared to the findings of the general entrepreneurship studies and the findings of El-Osta et al. (2007) for farm households, where number of people living in the household was found to have a large, negative impact on household wealth and income. Likewise, with the sustainable family

business model serving as the conceptual foundation of the analysis, family size was expected to play a significant role in determining self-employment income.

Farm versus nonfarm status[1] was tested in Model 3 for the total self-employed. Farm status did not significantly affect self-employment income. Since Mishra et al. (2002) found that farm proprietorships often subtracted money from the household, it was expected that farm status would significantly lower self-employment income. In analyzing the farm self-employed in Model 2, agricultural sales of $1000 to $2499 served as the reference; thus, when compared to the lowest sales levels, farm product sales at any level did not exert a significant impact on farm or business self-employment income.

The "West" region served as the reference across the three models. When compared to the self-employed in the West, those in the Midwest negatively impacted self-employment income at the 5% level for the nonfarm and total self-employed. Since composition of regions and divisions often vary a great deal across studies and largely depend on the structure of the dataset, consistent results related to regional effects have not yet been determined for the entrepreneurship literature. The impact of metropolitan status on self-employment income was also tested, and was found to exert no significant influence on self-employment income across the three models.

Higher ages were found to promote higher levels of self-employment income at the 1% level across the total self-employed and nonfarm self-employed models. No significant effects were found for the farm self-employed. Since the average age in the dataset was relatively high and the self-employed at older ages generally had a greater amount of time to establish the business, the positive and significant impact of age was expected. Age squared was also tested to

[1] To adhere to USDA farm status, at least $1000 in agricultural products were or could have been sold during a given year.

determine if diminishing returns to age exist. As expected, the age squared variable had a negative and significant impact. This intuitively indicates that at some point higher age becomes a negative factor. The insignificant results of age on self-employment income for the farm self-employed may be due to the combination of a tighter age range and the higher average age for the farm self-employed.

Two work-related variables were considered in the analysis: the number of weeks worked last year and the usual hours worked per week. Across the nonfarm and total self-employed categories, both variables were positive and significant influences of self-employment income at the 1% level. For the farm self-employed, the number of weeks worked last year did not serve as a significant factor; however, the usual number of hours worked per week was significant at the 5% level. Although the number of weeks worked last year may not be important for farmers, since typically their work is concentrated at certain times of the year, the hours worked per week had a large, significant impact.

5. Summary and Conclusions

Although a great deal of research has investigated factors that influence the success of the self-employed, relatively few studies have been conducted related to the well-being of agricultural entrepreneurs. Knudson et al. (2004) noted this as a serious short-coming in the agricultural economics literature. Since approximately 80% of farms are organized as sole proprietorships, farmers remain one of the most largely overlooked dimensions of the entrepreneurship literature. Although the farm problem is widely believed to have dissipated over the past few decades, a number of issues have reportedly arisen in comparing farm

entrepreneurs to their nonfarm counterparts; thus, largely preventing direct comparisons between the farm and nonfarm self-employed.

Mishra et al. (2002) and Katchova (2008) compared farm and nonfarm proprietors using the Agricultural Resource Management Survey and the Survey of Consumer Finances. Although these researchers made great strides in comparing the well-being of farm and nonfarm households, many questions still remain. In an attempt to answer some of the remaining questions, the current study utilized the Integrated Public Use Microdata Series American Community Surveys (IPUMS-ACS) dataset to directly compare the farm and nonfarm self-employed, along with determining household and demographic factors impacting self-employment income for both groups.

The results of this analysis reveal that no significant differences appear to exist between household income levels of the farm and nonfarm self-employed; thus, policies aimed at raising household incomes of the farm self-employed appear to have worked in conjunction with the increased importance of off-farm work. Results likewise reveal, however, that the farm self-employed reported significantly higher self-employment income levels than their nonfarm counterparts. Thus, although household well-being levels are comparable, as of 2005, the nonfarm self-employed can expect significantly lower self-employment income levels when evaluated at both the means and medians.

One of the most interesting outcomes of the study from the censored regression analysis was the result related to household income. Although the results ran counter to the hypothesized effect, the relationship highlights the interface between the family and the business. The results of the current analysis indicate that higher household income levels negatively and significantly impact self-employment income levels. Such a result does not necessarily suggest that with

higher levels of household income, a self-employed individual may possess lower levels of motivation for business success. Rather, when household income grows, the household head may be permitted to reinvest more of his/her self-employment earnings into the venture; thus, eliminating it from the household income calculation. Further, such an arrangement may be more lucrative for tax purposes.

According to the Sustainable Family Business Model (Stafford et al., 1999), the resource transactions between the family and the business lead to subjective and objective achievements. For example, a subjective achievement of the family, such as reaching a certain standard of living may lead to reinvestment of funds back into the venture. This in turn may allow the firm to reach a specific goal, such as hiring an employee or expanding the venture, which when considered with family achievements, may lead to sustainability for both the business and the family.

With regards to the family characteristics variables, family size did not play a significant role in determining the level of household income for farm or nonfarm self-employed. When compared to being single, however, being married had a positive and significant impact on self-employment income for the farm self-employed. Due previous research on social capital and networks, the presence of a spouse was expected to significantly impact self-employment income. The significance of being married for the farm self-employed may indicate a sizable interface between the family and business; thus, highlighting the importance of considering family characteristics along with characteristics of the business.

Since education has generally been found to heighten the performance of entrepreneurs (van der Sluis et al., 2003), it was predicted that higher levels of education would positively contribute to self-employment farm or business income. For the nonfarm and total self-

employed, higher levels of education positively impacted self-employment income when less than high school served as the reference. For the farm self-employed, a high school education and some college exerted a positive effect on self-employment income. Since the farm self-employed had a larger number of household heads with high school as the highest degree, it is unsurprising that high school would have a positive and significant impact. Higher levels of education had large impacts for the nonfarm and total self-employed; thus, highlighting the importance of human capital to self-employment income and confirming the consensus of the related literature.

Although the results related to this study provide many insights into the farm and nonfarm self-employed, there are a number of other factors that would prove interesting to explore for future study. However, current limitations in using the IPUMS-ACS dataset eliminate these possibilities. Management-related variables such as those explored by Mishra et al. (2002) would add a great deal of depth to the results of the study, although the current structure of the IPUMS dataset does not include management-related information beyond the number of hours worked per week and the number of weeks worked in the previous year.

Farm households have been traditionally viewed as disadvantaged in comparison to nonfarm households, but when primarily self-employed farm and nonfarm household heads are directly compared in this analysis, there appears to be no significant difference in household income as of 2005. Although no significant differences were determined for household income between the groups, the farm self-employed reported significantly higher levels of self-employment income than did the nonfarm self-employed. This finding indicates that the initiative taken by policymakers to improve parity of income between farm and nonfarm households appears to have been effective thus far. However, these findings may also suggest

that some government business assistance would be useful to the nonfarm self-employed in removing significant differences in self-employment income between the two groups and stimulating nonfarm business development and success. Additional research related to the effectiveness of government assistance to small business owners, such as tax breaks, insurance assistance, etc. would prove valuable in testing the possible implications of this result.

This analysis also highlights that although overall family size and marital status do not appear to play a large role in determining self-employment income, the household may still have a large and significant impact on the business in terms of higher household income levels. This result lends further support to the applicability of the Sustainable Family Business Models, since it appears that when some subjective success is gained (i.e., a certain standard of living is reached related to household income levels), then the household head may have the opportunity to retain and reinvest more of the capital earned for business operations and expansions to further the goals of the business, rather than contributing those funds to the household. Additional research related to household income levels and reinvestment of self-employment income into the business would test the validity of the results of this analysis and further highlight the importance and real-world applicability of the Sustainable Family Business Model in entrepreneurship and small business research.

References

Ahearn, M. (1986). *Financial Well-Being of Farm Operators and Their Households* (No. AER 563). Washington, DC: USDA, ERS.

Bates, T. (2000). Financing the Development of Urban Minority Communities: Lessons of History. *Economic Development Quarterly, 14*(3), 227-242.

Becker, G. S. (1981). *A Treatise on the Family*. Boston: Harvard University Press.

Blanchflower, D. G., and Oswald, A. J. (1998). What Makes an Entrepreneur? *Journal of Labor Economics, 16,* 26-60.

Bonacich, E. and Light, I.H. (1988). *Immigrant Entrepreneurs: Koreans in Los Angeles 1965-1982*. University of California Press.

Carroll, G. R., and Mosakowski, E. (1987). The Career Dynamics of Self-Employment. *Administrative Science Quarterly, 32,* 570-589.

Clark, K., and Drinkwater, S. (1998). Ethnicity and Self-Employment in Britain. *Oxford Bulletin of Economics and Statistics, 60*(3), 383-407.

Douglas, E. J., and Shepherd, D. A. (2000). Entrepreneurship as a Utility Maximizing Response. *Journal of Business Venturing, 15,* 231-251.

Elhorst, J. P. (1994). Firm-Household Interrelationships on Dutch Dairy Farms. *European Review of Agricultural Economics, 21,* 259-276.

El-Osta, H. S., Mishra, A. K., and Morehart, M. J. (2007). Determinants of Economic Well-Being among U.S. Farm Operator Households. *Agricultural Economics, 36*(3), 291-304.

Fairlie, R. (1999). The Absence of the African-American Owned Business: An Analysis of the Dynamics of Self-Employment. *Journal of Labor Economics, 17*(1), 80-108.

Fairlie, R. (2004). Recent Trends in Ethnic and Racial Business Ownership. *Small Business Economics, 23*(3), 203-218.

Fairlie, R., and Meyer, B. (2000). Trends in Self-Employment among White and Black Men during the Twentieth Century. *Journal of Human Resources, 35*(4), 643-669.

Fall, M., and Magnac, T. (2004). How Valuable is On-Farm Work to Farmers? *American Journal of Agricultural Economics, 86*(1), 267-281.

Gardner, B. L. (1992). Changing Economics Perspectives on the Farm Problem. *Journal of Economic Literature, 30,* 62-101.

Gisser, M. (1965). Schooling and the Farm Problem. *Econometrica, 33*(3), 582-592.

Gould, B. W., and Saupe, W. E. (1989). Off-Farm Labor Market Entry and Exit. *American Journal of Agricultural Economics, 71*(4), 960-969.

Greene, W. H. (2003). *Econometric Analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.
Gunter, L., and McNamara, K. T. (1990). The Impact of Local Labor Market Conditions on the Off-Farm Earnings of Farm Operators. *Southern Journal of Agricultural Economics, 22*, 155-165.

Hallberg, M. C., Findeis, J. L., and Lass, D. A. (1991). *Multiple Job-Holding among Farm Families*. Ames, IA: Iowa State University Press.

Hamilton, B. H. (2000). Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment. *Journal of Political Economy, 108*(3), 604-631.

Heck, R. K. Z., Owen, A. J., & Rowe, B. R. (1995). *Home-based Employment and Family Life*. Westport, CT: Auburn House.

Hopkins, J., and Morehart, M. (2004). Assessing Farm Household Well-Being – Beyond Farmers and Farm Income. *Amber Waves* 2(8), 8.

Hout, M., and Rosen, H. S. (2000). Self-Employment, Family Background, and Race. *Journal of Human Resources, 35*(4), 670-692.

Huffman, W. E. (1980). Farm and off-Farm Work Decisions: The Role of Human Capital. *The Review of Economics and Statistics, 62*(1), 14-23.

Ibrahim, A. B., and Ellis, W. H. (1994). *Family Business Management: Concepts and Practice*. Dubuque, IA: Kendall/Hunt.

Katchova, A. L. (2008). A Comparison of the Economic Well-Being of Farm and Nonfarm Households. *American Journal of Agricultural Economics, 90*(3), 733-747.

Knudson, W., Wysocki, A., Champagne, J., and Peterson, H. C. (2004). Entrepreneurship and Innovation in the Agri-Food System. *American Journal of Agricultural Economics, 86*(5), 1330-1336.

Lazear, E. P. (2004). Balanced Skills and Entrepreneurship. *The American Economic Review, 94*(2), 208-211.

Le, A. T. (1999). Empirical Studies of Self-Employment. *Journal of Economic Surveys,13*(4), 381-416.

Lee, J. (2006). Family Firm Performance: Further Evidence. *Family Business Review, 19*(2), 103-114.

Light, I.H. (1972). *Ethnic Enterprise in America*. University of California Press.

Light, I. H., and Rosenstein, C. (1995). *Race, Ethnicity and Entrepreneurship in Urban America*. New York, NY: Walter de Gruyter.

Lopez, R. E. (1984). Estimating Labor Supply and Production Decisions of Self-Employed Farm Producers. *European Economic Review, 24*, 61-82.

Meyer, B. (1990). *Why Are There So Few Black Entrepreneurs?* Unpublished manuscript.

Mishra, A. K., El-Osta, H. S., Morehart, M. J., Johnson, J. D., and Hopkins, J. W. (2002). *Farm and Nonfarm Household Comparability* (No. AER-812): Economic Research Service/USDA.

Mishra, A. K., and Goodwin, B. K. (1997). Farm Income Variability and the Supply of Off-Farm Labor. *American Journal of Agricultural Economics, 79*, 880-887.

Mishra, A. K., and Sandretto, C. L. (2002). Stability of Farm Income and the Role of Nonfarm Income in U.S. Agriculture. *Review of Agricultural Economics, 24*(1), 208-221.

Olson, P.D., Zuiker, V.S., Danes, S.M., Stafford, K., Heck, R.K.Z., and Duncan, K.A. (2003). The Impact of the Family and the Business on Family Business Sustainability. *Journal of Business Venturing, 18*, 639-666.

Perry, J. E., and Hoppe, R. (1993). *Off-Farm Income Plays Pivotal Role*. Washington, DC: USDA.

Ruggles, S., Sobek, M., Alexander, T., Fitch, C. A., Goeken, R., Hall, P. K., et al. (2004). *Integrated Public Use Microdata Series: Version 3.0*, from http://usa.ipums.org/usa/

Sadoulet, E., and Janvry, A. D. (1994). *Quantitative Development Policy Analysis*: The Johns Hopkins University Press.

Smith, R. J., and Blundell, R. W. (1986). An Exogeneity Test for a Simultaneous Equation Tobit Model with an Application to Labor Supply. *Econometrica, 54*(3), 679-685.

Stafford, K., Duncan, K. A., Dane, S., and Winter, M. (1999). A Research Model of Sustainable Family Businesses. *Family Business Review, 12*(3), 197-208.

Sumner, D. A. (1982). The Off-Farm Labor Supply of Farmers. *American Journal of Agricultural Economics, 64*, 499-509.

Tauer, L. (1995). Age and Farmer Productivity. *Review of Agricultural Economics, 17*(1), 63-69.

Tobin, J. (1958). Estimation of Relationships for Limited Dependent Variables. *Econometrica, 26*(1), 24-36.

Tokle, J. G., and Huffman, W. E. (1991). Local Economic Conditions and Wage Labor Decisions of Farm and Rural Nonfarm Couples. *American Journal of Agricultural Economics, 73*(3), 652-670.

US Census of Agriculture (2002). http://www.agcensus.usda.gov/Publications/2002/index.asp.

USDA/ERS. (2001). *America's Diverse Family Farms* (No. AIB 769). Washington DC: USDA/ERS.

Waldinger, R. D. (1986). *Through the Eye of the Needle*. New York, NY: New York University Press.

Table 1. Summary Statistics for the Farm and Nonfarm Self-employed

FARM SELF-EMPLOYED					NONFARM SELF-EMPLOYED				
Variable	**Mean**	**Std. Dev.**	**Min**	**Max**	**Variable**	**Mean**	**Std. Dev.**	**Min**	**Max**
HHINCOME	84,176.39	72,994.12	-5,093.00	429,878.00	HHINCOME	90,298.63	92,223.64	-10,186.00	954,492.00
NORTHEAST	0.0690	0.2543	0	1	NORTHEAST	0.1758	0.3807	0	1
MIDWEST	0.5655	0.4974	0	1	MIDWEST	0.2138	0.4101	0	1
SOUTH	0.2138	0.4114	0	1	SOUTH	0.3408	0.4741	0	1
FARMPRDX5	0.0966	0.2964	0	1	FARMPRDX5				
FARMPRDX6	0.1310	0.3386	0	1	FARMPRDX6				
FARMPRDX7	0.6828	0.4670	0	1	FARMPRDX7				
METAREA	0.1793	0.3849	0	1	METAREA	0.7171	0.4505	0	1
FAMSIZE2	0.4966	0.5017	0	1	FAMSIZE2	0.3523	0.4778	0	1
FAMSIZE3	0.1517	0.3600	0	1	FAMSIZE3	0.1555	0.3624	0	1
FAMSIZE4	0.0690	0.2543	0	1	FAMSIZE4	0.1566	0.3635	0	1
FAMSIZE5	0.0966	0.2964	0	1	FAMSIZE5	0.0672	0.2504	0	1
FAMSIZE6+	0.0207	0.1428	0	1	FAMSIZE6+	0.0310	0.1734	0	1
MALE	0.9103	0.2867	0	1	MALE	0.7386	0.4395	0	1
AGE	57.5103	13.2188	25	87	AGE	51.0632	13.1311	17	91
MARRIED	0.8000	0.4014	0	1	MARRIED	0.6525	0.4763	0	1
AMERIND					AMERIND	0.0103	0.1012		
ASIAN					ASIAN	0.0399	0.1957	0	1
BLACK					BLACK	0.0439	0.2050	0	1
WHITE					WHITE	0.8881	0.3153	0	1
HS	0.4069	0.4930	0	1	HS	0.2522	0.4344	0	1
SOMECOL	0.2069	0.4065	0	1	SOMECOL	0.2138	0.4101	0	1
ASSOC	0.0828	0.2765	0	1	ASSOC	0.0665	0.2491	0	1
BS	0.1448	0.3531	0	1	BS	0.2020	0.4016	0	1
MS	0.0207	0.1428	0	1	MS	0.0705	0.2561	0	1
PROFL					PROFL	0.0683	0.2523	0	1
DOC					DOC	0.0207	0.1423	0	1
WKSLAST	43.6690	16.4068	0	52	WKSLAST	41.2928	17.6301	0	52
UHRSWRK	48.1517	25.3427	0	99	UHRSWRK	37.8261	20.4008	0	99

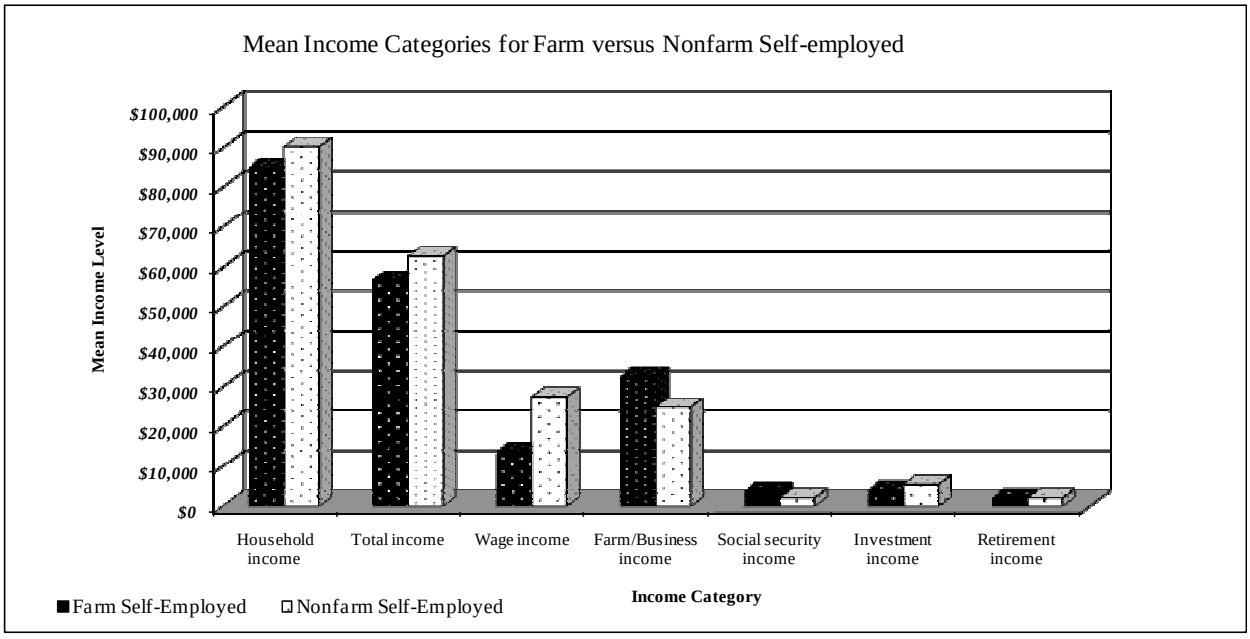

Figure 1. Mean Income Categories for Farm versus Nonfarm Self-employed

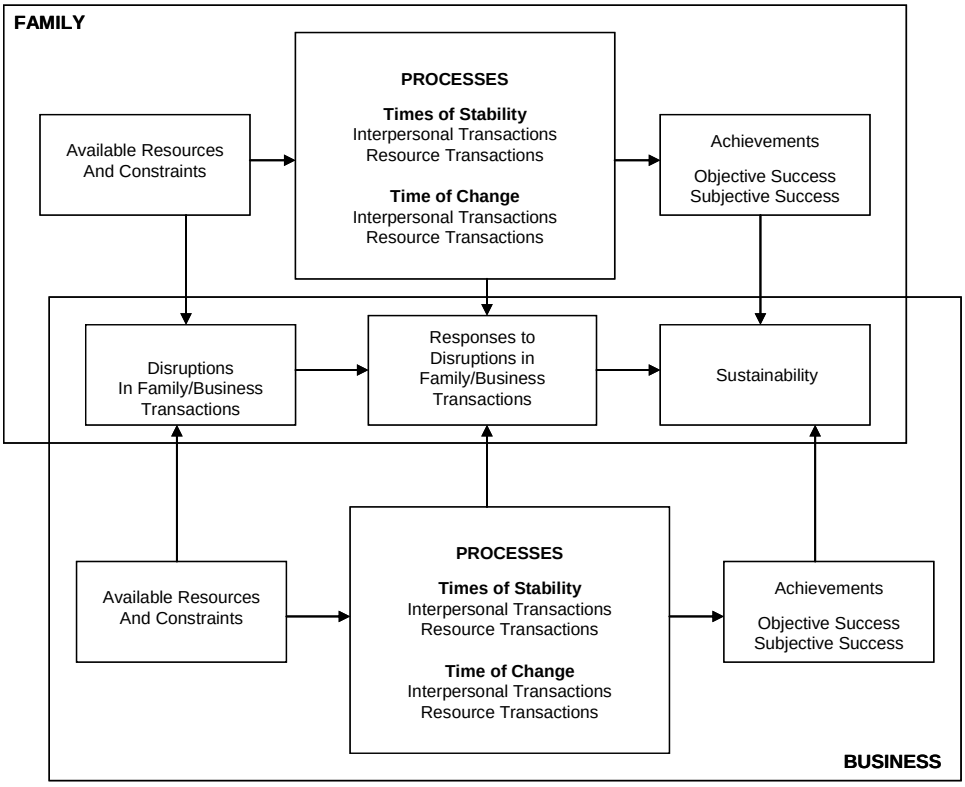

Figure 2: Sustainable Family Business Model Developed by Stafford et al. (1999)

Table 2. Results of the Parametric and Nonparametric Tests

Parametric Test

	Mean Household Income	Mean Business Income
Nonfarm	90,299	24,794
Farm	84,176	32,498
Difference	6122	-7705
t	0.790	-1.776
p	0.784	0.076

Non-Parametric Test

	Household Income Rank Sum	Business Income Rank Sum
Nonfarm	3,860,000	3,840,000
Farm	211,421	232,268
chi-squared	0.217	6.883
probability	0.641	0.009

Table 3. Results of the Censored Tobit Regression Models for Farm and Nonfarm Self-Employment Income

Variable	NONFARM	FARM	TOTAL
HHINCOME	-0.238	-0.108	-0.236
	(-6.09)***	(-0.79)	(-6.25)***
NORTHEAST	-1214.164	-4987.586	-1355.903
	(-0.33)	(-0.28)	(-0.37)
MIDWEST	-9264.355	19219.810	-8730.241
	(-2.51)**	(1.37)	(-2.43)**
SOUTH	-4035.126	21566.970	-3685.403
	(-1.14)	(1.30)	(-1.06)
FARMY			5413.673
			(0.85)
FARMPRDX5		36057.640	
		(1.62)	
FARMPRDX6		-1077.085	
		(-0.06)	
FARMPRDX7		-2953.478	
		(-0.21)	
METAREA	256.580	806.858	266.332
	(0.09)	(0.06)	(0.09)
FAMSIZE2	3804.970	-9221.310	3157.563
	(0.80)	(-0.64)	(0.67)
FAMSIZE3	5805.182	22828.440	6122.45
	(0.95)	(1.14)	(1.02)
FAMSIZE4	1022.982	-3267.347	330.272
	(0.18)	(-0.11)	(0.06)
FAMSIZE5	3691.704	-7651.323	3555.564
	(0.58)	(-0.40)	(0.56)
FAMSIZE6+	10855.610	-20359.650	10041.000
	(1.21)	(-0.65)	(1.13)
MALE	4559.980	-4441.439	4013.151
	(1.57)	(-0.19)	(1.39)

Note: *,**,*** denotes statistical significance at the 10%, 5%, and 1% levels, respectively

Table 3. Results of the Instrumental Variable Tobit Regression Models for Farm and Nonfarm Self-Employment Income (continued)

Variable	NONFARM	FARM	TOTAL
AGE	1645.784	-411.667	1726.830
	(3.56)***	(-0.24)	(3.86)***
AGE^2	-13.758	1.252	-14.734
	(-3.14)***	(0.08)	(-3.49)***
MARRIED	3455.907	24616.210	4258.959
	(0.74)	(1.70)*	(0.92)
AMERIND	-7411.754		-7520.147
	(-1.66)*		(-1.69)*
ASIAN	-933.924		-1007.498
	(-0.14)		(-0.16)
BLACK	-14040.340		-14117.350
	(-4.38)***		(-4.40)***
OTHER	-14813.270		-14659.380
	(-4.04)***		(-4.30)***
HS	6391.209	25756.280	7271.132
	(2.21)**	(2.18)**	(2.57)***
SOMECOLL	7597.014	21781.400	7773.517
	(2.37)**	(1.70)*	(2.48)**
ASSOC	12648.980	43276.400	13197.220
	(2.36)**	(1.52)	(2.50)**
BS	14434.370	14258.390	14191.770
	(3.56)***	(0.80)	(3.57)***
MS	26768.060	4711.013	26437.860
	(3.61)***	(0.34)	(3.64)***
PROFL	60821.610		60606.920
	(5.49)***		(5.52)***
DOC	36209.460		35915.480
	(4.19)***		(4.18)***
WKSLASTYR	538.509	108.601	511.055
	(8.22)***	(0.46)	(8.08)***
UHRSWRKWK	299.413	664.275	328.758
	(3.98)***	(2.97)**	(4.59)***
Constant	-50608.460	-26046.430	-52393.360
	(-3.92)***	(-0.51)	(-4.17)***
Alpha	0.821	0.813	0.823
lns	10.318	10.094	10.316
lnv	11.022	10.863	11.021
N	2708	145	2853
Wald Test	238.420	24.300	245.940
Prob>chi2	0.0000	0.0000	0.0000