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**Part time Farming, Farm Productivity, and Farm Income: Evidence from the Southeast
US**

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Abstract

We analyzed the effect of part time farming in the US using a panel data analysis method. Data from three census years on ten southern states and the counties therein indicated that part time farming has a positive impact on the total value of the farm products produced. Although the result is preliminary, it sheds an important light on the changing farm structure in the USA.

Introduction

Part time farming has been increasing steadily in the US. It is currently the largest segment among all the farm sectors in the country. We define part time farming as an activity where a farmer is involved in other than the farm activities and earns a substantial portion of income from outside the farming. A common definition of part time farming is an operator who works 150-200 days on an off-farm sector. The reasons for growing number of part time operators are, as one can safely conjecture, the technical change in agricultural sector and economic prosperity coupled with an ample opportunity of work on the off-farm sector.

Fuller (1990, 1991) argues that connoting part-time farmers as small inefficient or different farm operation is production bias. He further adds that Multiple job holding has been the norm among farm families, therefore part time farming is not a temporary or residual side effect. Part time farmers are not marginal producers.

It may be beneficial to review what Bartlett says about part time farming. She argues that there are three kinds of part time farmers - transitional, standard, and investors. She argues that standard and investor type of part time farmers may not be an inefficient. It is the transitional type of farmers who are likely to be inefficient in farming.

We wonder about the association of part time farming and the total farm income in the US. While we do not have any data that separates three kinds of part time farmers as classified by Bartlett, we still think the data we have collected would give us some idea on the role of part time farming on total farm income. If increased proportion of part time to full time farmers increases farm income, then we argue that it would not be such a negative shock to an agricultural community to see this new trend of farm ownership.

The objective of this study is to find the evolution of part time farming in the Southeast US over three census period and find their contribution in total farm income in the region.

Literature Review

The major reason for exiting farming operation is declining employment opportunity as well as financial stress in the farming sector. Fueling these factors are also availability of jobs outside of farming and better opportunity of earnings which led to increase exodus of farmers from farming sector (Huffman; Emerson; Loyns and Kraut).

Wu argues that farmers in the US adopt off farming route specially during the time of financial stress. He uses qualitative response model to analyze the farmers' strategies of adjusting through the reallocation of labor between farm and non-farm sectors. He also showed that the reduction in farming population has nothing to do with the rural area development.

Bartlett argues that where large farms are broken up into small farms for a part time operation, the total production from the area may decrease. He adds, however, that a part time farming may have helped to boost decentralization although most part-time farms are concentrated around large cities. Other positive roles of the part time farming, as Bartlett argues, are to alleviate rural poverty by raising farm land values and to provide an alternative life style for city dwellers.

Guttman and Haruvi analyze the determinant of part-time farming in a form of farmers' cooperative (Moshav) in Israel. They indicated that a capital intensity in the farm increases labor productivity so we should see more farmers working on the farm. Low capital intensive farms are supposed to have workers going for the off farm work. The product mix of the Moshav will affect the marginal productivity of the farms. If a distance to nearby city is higher

than the marginal revenue from finding the job, farmers are more likely to stay in the farm because of transportation and searching cost. Also, they add that the age factor plays important role in determining whether to go for part time or full time farming - the higher the age the more likely a farmer stay within a Moshav framework.

Part time farming is determined by the availability of work outside of the farm. The better the job outside the more likely a farmer to exit from the farming profession. Farm proprietor make decision based on the utility they expect to derive from working part time or completely retiring from the farm (Goetz and Debertin). On the question on why farmers quit? Goetz and Debertin say “our results suggest that farmers quit at faster rates holding constant the odds that a county is losing farmers if the value of their land and building is higher, they irrigate less of their land, they receive more government payment and if they reside in counties with high population densities or they are adjacent to a metropolitan area.”

Conceptual Framework and Model

We modeled that total farm value in a given county is based on the operating nature of the farmers. We also argue that the factors like total cultivable land and price of the major commodity contributes to the total value of the farm products in a given state. This can be written as

$$T_{\text{value}} = f(T_{\text{land}}, N_{\text{part time}}, N_{\text{full time}}, N_{\text{tenant}}, \text{crop prices}) \quad (1)$$

Here T_{land} is the total acreage of major crop land in the county, $N_{\text{part time}}$ is the number of part time farmers in the county, $N_{\text{full time}}$ is the number of full time farmers in the county, N_{tenant} is

the number of total tenant in the county and Crop prices represents per unit prices of the crop output.

We model the total value from agriculture as the function of total cultivable land, ownership characteristics and prices of major crops grown in the state. One also wants to test the hypothesis that the impact of part time farming is positive on total value of the products produced in a given county. Our interest is also to find if the marginal impact of part time farming is similar to the marginal impact of full time or tenant farmers towards increasing the total value of the agriculture produced in the state.

Data

A set of county-aggregated panel data obtained from three census year 1987, 1992, 1997 for all 10 southern states (AL, GA, FL, NC, SC, KY, TN, MS, AL, LA) constitute the data for this study. Important revenue generating row crops and their price as well as total harvested acreage of these crops were considered in the regression. Crop prices are other explanatory variables determining the total farm value. All of these data were obtained from the Census of Agriculture located on the USDA/NASS website. The model was estimated by using a TSCSREG procedure in the SAS system of Window Version 8.

Theoretical Model

Given the nature of the data and our conceptual model, we used a panel data analysis technique to find the valid conclusion from this study. We assumed that the error term in each of the county is contemporaneously correlated to the error terms in the other counties and autocorrelated to its own error term of the past. This is a valid assumption because the decision

of farmers in one county could affect the decision of farmers in other counties.

The empirical model and the error structure used to find the relationship between total farm value in a given parish and the farming relationship is as follow:

$$y_{it} = \sum_{k=1}^K x_{itk} \beta_k + u_{it} \quad (1)$$

$$u_{it} = \rho_i u_{i,t-1} + \varepsilon_{it} \quad (2)$$

$$i = 1, \dots, N$$

$$t = 1, \dots, T$$

Here, equation 1 is a functional form of the empirical model and equation 2 is the error structure associated with this model. Also, y is total farm value, x_i are the explanatory variables including the farm ownership, total land and crop prices, u is the error term which is heteroscedastic, autocorrelated, and contemporaneously related, ε is an iid error term, i are the counties in a given state and t is the time period. As shown in 2, the model is first order autoregressive with contemporaneous correlation between cross section observations.

Results

We estimated both fixed and random effect models to find the effect of a farm proprietorship on

total value of farm products produced. Due to the similar nature of the result obtained from most of the states, we present only the results from Alabama in detail and go over the results from the other state briefly.

Hausman's test for fixed effect indicates that we failed to reject the fixed effect in the model as indicated by the significance of the F-value obtained in this regression. Since individual specific dummy coefficients are too many to present here, we limit ourselves to only few parameters of estimation related to farm proprietorships. Most of these parameters associated with heterogeneity across farms and heterogeneity across times are significant. The R^2 values associated with fixed effect models are in the range of 0.9-0.93 indicating a very good fit of the model.

In both one way and two ways fixed effect models, the coefficients associated with a part-owner are positive meaning that increase in part time farming increases value of the total farm products. The coefficients associated with full ownership are negative meaning that increase in full time farming causes decline in total value of farm products. This really does not tell any thing except that full time producers may be increasing total amounts of crop output. Given the fact that crop prices have been almost stable in the US in last couple of years, these coefficients indicate most of the full time farmers are marginal producers in Alabama. When we look at the coefficients associated with part time farming, we can conclude that increase in part time farming is associated with the positive impact on the total value of the farm products. Our explanation is that given the fact that the job market is pretty strong, the part-time farmers cultivate only crop area that he or she can manage well and keep the productivity up. Coefficients associated with tenancy have opposite signs in two different fixed effect models. Therefore, we cannot say any thing definite about the relationship of tenancy and total value of

farm products.

If we move to Random effect models, we can immediately see that R^2 value associated with each of these models is substantially lower than the fixed effect models. The result is realistic as most of the models that use random effects have lower R^2 than the fixed effect models. Since the values from the Hausman's test on Random effect are insignificant, we do not want to over emphasize the results from Random effect models. In any case, both of the one way and two way random effect models have also indicated a positive contribution of an increase in part time farming to the total value of the output produced in farms.

We also estimated the model using Parks method assuming that there is contemporaneous correlation among different counties on the value of the farm products produced. R^2 value of the model is quite high. Also, the results indicate that increase in part-time ownership increases the total value of the farm products produced. The result is similar for the DaSilva method which assumes MA(1) of the error term. We cannot say any thing definite about the role of full time ownership and tenancy on the value of the total farm products produced. The results obtained by using the Parks method are similar to the results obtained by using the two way fixed effect model.

The results from other states coincide with the results from Alabama. In general, we saw fixed effect models being better than the random effect models as indicated by the R^2 values. We also saw that the coefficient associated with part-time farming is positive and significant.

Conclusions

The previous literatures present mixed views about the increase in part time farming. There is also fear that an increase in percentage of people doing part-time farming would replace the way

of farming in the U.S. and reduce the total farm products. In our result, at least for the case of selected ten southern states of the U.S., we do not see any of the substantial effect of decrease in farm value products from an increase in the proportion of part-time farmers. Our argument is that part time farmers limit crop and production acreage to a level that he/she can manage well, therefore being more efficient than the full time or the tenancy. We know the impact of tenancy from the literature already. The result obtained from this study would not alarm policy makers rather it will help to formulate policy to facilitate part time farming in the U.S. We also argue that increase trend toward part time farming in the US is due to a strong job market outside of farming. We should see the decline in part time farming as labor market outside of the farming sector slows down. The future work consists of regressing part time farming to other component in the economy such as strong labor markets outside the farm sector. This will help us to establish the fact if increased opportunity for laborers outside of the farming sector has a negative impact on the farm proprietorship.

Table 1: Effect of Part Time Farming on Total Output Value in Alabama

Variables	Fixed Effect Model		Random Effect Model		Parks	DaSelva
	One-Way	Two-Way	One-Way	Two-Way		
Intercept	1510.01	4397.09	16466.42	13825.88	-4534.85	13752.44
Full	-0.34	-0.03	0.25	0.28	-1.50	0.27
Owner						
Part	0.89*	1.21*	1.03**	0.99*	1.14*	0.99*
Owner						
Tenant	-0.61	0.47	-0.88	-0.08	1.10	-0.06
R ²	0.90	0.93	0.08	0.09	0.90	0.09
Hausman-	15.37*	22.01*	1.66	3.46		
test Result			(3df, p=0.6)	(3df, pr=0.3)		

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