

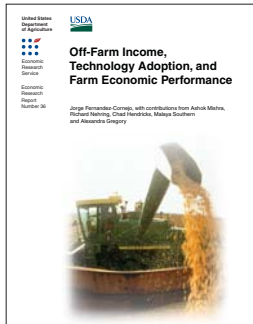
ERS *Report Summary*

Resources and Environment

Economic Research Service

February 2007

U.S. Department of Agriculture



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Off-Farm Income, Production Decisions, and Farm Economic Performance

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U.S. farmers must make a host of decisions relating to their farms' operation, including what to grow, when to grow it, in what quantities, and by what methods. Often overlooked in this calculation, but factoring heavily in the diversity of U.S. farms and farm households, is the fact that most operators split their time between farm and nonfarm activities. Large farms are typically able to economize on inputs and better coordinate stages of production. Smaller farms, though often unprofitable from a farm business perspective, have persevered by being part of household enterprises that combine farm and off-farm activities. Their operators' onfarm decisions, from choice of technology to choice of specialty, are often influenced by off-farm commitments and income. And when viewed from a broader perspective, many small farm households' efficiency would be envied by the operator of even the largest farm.

What Is the Issue?

Onfarm and off-farm activities compete for limited managerial time (mainly of the operator and spouse). How farm operator households allocate their time largely affects production decisions (such as technology adoption), economic performance, and the household's economic well being. The extent of off-farm work and its relationship with farm economic performance have many policy implications. For example, government support of agriculture (via conservation, research and development, extension, and commodity programs) may affect farm households differently depending on the relative importance of onfarm versus off-farm income. And policies promoting adoption of farm technologies, to be most effective, must account for different demands on managerial time and the relative ability of the farm household to accommodate those demands.

What Did the Study Find?

Off-farm employment and income vary inversely with farm size. In 2004, farm households with farm sales less than \$10,000 had average off-farm earned income of \$54,600, while households with farm sales between \$500,000 and \$1 million averaged only \$30,100. The largest source of variation is the off-farm income earned by operators; off-farm income obtained by spouses is rather stable across farm sizes. Operators of smaller farms typically participated more in off-farm employment, worked more hours off the farm, and had a higher off-farm income than those of larger farms.

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Farmers have an economic incentive to increase farm size only if the gain in output can be had with a less than proportionate increase in inputs. Operators of smaller farms (annual sales below \$100,000) are estimated to need an increase of 5 percent in all inputs to support a 10-percent increase in all farm outputs, while larger farms (sales above \$500,000) require an estimated 8-percent increase in inputs to achieve the same increase in outputs. This means smaller farmers have a greater incentive to expand. However, a household perspective (including off-farm income activities) reduces the inclination for small farmers to up their farm size. **Including off-farm income-generating activities improves the overall economic performance of the household.** More importantly, the relative improvement is greater for smaller farms than for larger farms. Thus, households operating smaller farms may compensate for the scale disadvantages of their farm business by integrating farm and off-farm activities. Our estimates for corn and soybean farms show that households engaged in off-farm income-generating activities together with the production of traditional farm outputs have cost savings of 24 percent relative to carrying out those activities separately.

Off-farm income affects how we view technical efficiency (how well a farm transforms inputs into outputs given the technology at its disposal). Farm-level efficiency increases with farm size, but such a one-sided perspective is misleading because off-farm income is increasingly important to farm households as an output. When off-farm activities are included, household-level efficiencies are higher than farm-level efficiencies across all farm sizes, but **efficiency gains from integrating off-farm work into the output portfolio are greater for smaller farms.** As a result, household-level efficiencies of smaller farms are comparable to farm-level efficiencies of larger farms. This suggests that households operating small farms have partially adapted to shortfalls in farm-level performance by increasing their off-farm income.

The adoption of management-saving technologies (e.g., herbicide-tolerant crops, conservation tillage) is significantly related to higher off-farm household income. While household income from onfarm sources is not significantly associated with adoption of these technologies, total household income does have a significantly positive association with such adoption. On the other hand, managerially intensive technologies (such as precision farming) are associated with significantly lower off-farm income. These findings corroborate a tradeoff between household/operator time spent in onfarm and off-farm activities. Households operating small farms, which lack economies of scale, devote more time to off-farm opportunities and are more likely to adopt management-saving technologies.

How Was the Study Conducted?

To examine the relationships between off-farm income, farm and household characteristics, and economic performance of U.S. farm households, we developed several econometric models and estimated them using USDA's Agricultural Resource Management Survey (ARMS) data for several years (1996-2001). To examine the relationship between off-farm work and economic performance of farm households (including economies of scale and scope, and economic efficiency), we compared estimates obtained using traditional farm-level models to estimates obtained using household-level models (including off-farm income-generating activities along with traditional farm outputs such as crops and livestock). To examine the relationship between off-farm income and technology adoption, we developed a model that incorporates the adoption decision into the agricultural household framework. We examined the interaction of off-farm work and adoption of agricultural technologies of varying managerial intensity, including herbicide-tolerant crops, precision agriculture, conservation tillage, and Bt corn, after controlling for other factors.