Loans for Reforestation: Family Forest Owners and Timber Supply

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Family forest owner decisions to invest in reforestation after timber harvesting have long been a forest policy issue due to conservation, environmental, and timber supply concerns. Fifty-six percent of private forest land in the United States is privately owned and 62 percent of that private forest land is owned by family forest owners (Butler 2008). These owners have a large impact on the nation's timber supply and technical, educational, and financial incentive programs exist to encourage reforestation on private forest lands (Arano 2004a).

Both forest owner and reforestation investment characteristics interact to determine propensity to reforest harvested timberland. Forest owner characteristics (like income and asset position, forest management goals, and perception of forestry as an investment) form the framework for the investment decision. Size of forest holding has consistently been found to be a crucial variable affecting forestry investment; owners of larger holding are more likely to reforest and use forestry inventive programs (Straka et al. 1984).

Also, the reforestation investment characteristics (like anticipated rate of return, risk and liquidity associated with that rate of return, and financial incentives) determine "earning capacity" relative to other investments (McMahon 1964). Fecso et al. (1982) identified three fundamental economic reasons that hindered family forest owner reforestation: capital constraints, timber illiquidity, and the expectations of low financial returns. In terms of financial constraints, family forest owners are particularly sensitive to upfront reforestation costs, income and capital limitations, and financial assistance opportunities (Royer 1987). Two of the main reasons harvested timberland is not regenerated in the South are that landowners expect the forest to naturally regenerate at no cost and their expectations for a reasonable rate of return from immediate reforestation costs are low (Royer and Kaiser 1983).

Perceptions concerning profitability have a large impact on family forest reforestation decisions and variables that affect or are perceived to affect rate of return can turn a regenerator into a non-regenerator, particularly limited capital (other uses for timber sale revenue), high immediate costs, and long-term prospects for stumpage prices and interest rates (Doolittle and Straka 1987, Zhang and Flick 2001). After timber harvesting in Mississippi, family forest owners who regenerated placed a much higher importance on anticipated future timber sale profits and current timber sale income as a source of paying for reforestation than the availability of financial assistance funding. Those family forest owners who did not regenerate faulted high reforestation costs and low expected returns, risk, lack of capital, lack of cost-share funding, and non-availability of loans at a reasonable interest rate (Arano et al. 2004). The two most common reforestation incentives are cost-share and tax incentives. Both consistently are shown to have large positive impacts on family forest owner decisions to regenerate harvested timberland, plus when combined, the impacts tend to be additive (Royer and Moulton 1987). Effective public policy designed to impact family forest owner reforestation decisions must consider the full range of policy instruments and the interaction between them (Hyberg and Holthausen 1989).

That forestry investments are strongly influenced by interest rates is well-established in the literature. Both interest rates and credit availability play a large role in these investments due to the high capital requirement, long time periods involved, and the resulting sensitivity to interest rates (Worrell and Irland 1975). The standard forestry economics textbooks clearly show the relationship between forestry investment and the interest rate (cost of capital), risk, and expected rate of return (Duerr 1960, Gregory 1972, Klemperer 1996, Zhang and Pearse 2011). Even the first economist to win the Nobel Prize once discussed the "bogey of compound interest" in forestry investments. He noted many forestry investment analyses used rather low rates of interest (in the five percent range) and he thought that "the notion that for such gilt-edge rates I would tie up my own capital in a 50-year (much less a 100-year) timber investment, with all the uncertainties and risks that the lumber industry is subject to, at first strikes one as slightly daft" (Samuelson 1976). Expected cash flow is usually a forest owner's basis for the anticipated rate of return from forestry investments and reforestation incentives. Incentives that reduce the high front end costs of reforestation or carrying costs tend to make these investments more attractive and increase reforestation rates (Bullard et al. 2002).

Interest rates have long been recognized as an unusually crucial variable affecting forestry investment. Forestry investment has several disadvantages that tend to limit credit availability: family forests tend to be small holdings, equating to many small loans; forests are a long-term investment and the major revenues occurs at the end of the investment; perceived risk is high; forest management on these small tracts tends to be uncertain; and, finally even tax costs can be a burden. An effective forestry credit system would need to utilize an efficient organizational structure to accommodate the many small loans, would need to account for the long holding period involved in forestry, would need corresponding low interest rates similar to agricultural financing, and, in order to maintain the low interest rates, would need the government-type loan agency with low operating margins (Hammar and Mussman 1940).

Looking at the "forest land problem" in 1930, acknowledging that public regulation of private forests was not likely to occur, one author proposed incentives to encourage reforestation. He suggested the federal land banks be authorized to finance timber growing, provision for forestation loans be established, and cooperative forest insurance programs be organized. Forestation loans would be for reforestation costs, require insurance on the tree crop, and utilize sustained yield management. These loans would be secured by the land and covered for tree crop loss by insurance. The loan duration would run until the trees were harvested and the interest rate would be that of government bonds (Herbert 1930). Two years later another author described the cooperative credit system in Norway and its use in financing forestry investments. His suggestion was to utilize existing American institutions like the federal land banks to allow farm woodlots as collateral for reforestation efforts (Frank 1932).

Provencher (1990) proposed a forestry investment loan program as an effective alternative to cost-share incentives. His proposal was for the government to loan the full cost of a forestry investment, with repayment at the time of harvest. Repayment would be the government's full cost and the forest owner would keep any surplus as profit. There is no risk to the owner; if harvest value did not cover the full investment cost, the landowner would not be liable for the difference. Also, the government assumes the risk of pests or fire destroying the forest.

While little is in the literature specifically addressing the effectiveness of loan programs in encouraging family forest owners to regenerate harvested timberland, one study included a hypothetical reforestation loan program as a proposed tool to encourage landowners to engage in reforestation activities (Gunter, Bullard, Doolittle, and Arano 2001). Acceptance of this hypothetical reforestation loan was shown to have a statistically significant relationship with the reforestation decision. That is, family forest owners who regenerated were more interested in these loans than those that did not regenerate. Interestingly, if the loan was from the government, interest for both regenerators and non-regenerators waned. This relationship was also statistically significant. The main reasons that family forest owners who regenerated did not find the loan option attractive were not being in debt (21.3%), using the land as collateral for the loan (17.1%), and not needing a loan (15.0%). The main reasons that non-regenerators did not find the loan option attractive were not wanting to use the land as collateral (27.6%), not wanting to be in debt (17.7%), and old age (13.6%). In addition, one option was for a ten-year annual payment of $25/acre. This was generally not seen as making the overall loan more attractive.

A Mississippi study involved family forest owners who harvested timber between 1994 and 1998. A hypothetical loan program designed to defer the high cost of reforestation was posed to the landowners to determine attractiveness. The loan was to be at a competitive rate (7.0 – 7.5%) and would not be due until timber harvest. The reforested land would serve as collateral and the landowner would have a one-time up-front insurance premium to protect from forest loss added to the loan balance. The forest owner would not be allowed to participate in any other forestry incentive programs (like cost-share), with the exception of the Mississippi Reforestation Tax Credit (Arano et al. 2004a). Results from a regression analysis based on the survey data provide some general conclusions on interest in the option by family forest owners.

Four variables representing landowner characteristics influenced interest in participation in the loan program. First, income was negatively related to the decision to participate; lower income forest owners were less likely to participate. Specifically, a forest owner with an income of $30,000 was less likely to participate than one with an income of $90,000. Second, interest in participation decreased with age. Third, race affected interest in participation; black landowners were more interested than white landowners. Fourth, sex also affected interest in participation; males were more interested than females. Surprisingly, educational level was not a statistically significant variable; the literature often identifies this variable as important in these types of decisions. The results suggest that socio-economic landowner characteristics can be used to predict participation in programs of this type (Arano et al. 2004a)

One tract ownership characteristic influenced participation. Size of forest holding was positively related to interest in participation. This is strongly supported by the literature (Hatcher et al. 2013). The form of ownership (individual, partnership, or corporate) was not significant in terms of the decision to participate. The influence of other existing incentive programs (e.g., cost-share and tax credits) was also considered. Awareness of other financial forestry incentive programs and experience with these programs made a landowner more likely to participate (Arano et al. 2004a).

About 38% of the surveyed Mississippi forest owners indicated a willingness to participate. Participation in forestry programs follows a diffusion of innovations pattern; more innovative community leaders break the path for new practices and over time they attract followers (Doolittle and Straka 1987). This level of expressed interest shows the idea has potential. The study shows that the landowner and ownership information can be used to target the program to forest owners likely to participate (Arano et al. 2004b).

A related Mississippi study described this proposed loan program in detail and analyzed forest owner interest or lack of interest in the option (Gunter, Idassi, and Granskog 2001). A specific program for Mississippi is outlined with operating details. Some forest owners expressed a reluctance to get involved in government programs like this. Lower than market interest rates and using standing timber as collateral (as opposed to the land) were means to increase attractiveness. Some forest owners simply do not like debt, making any sort of loan program unattractive.

The literature on family forest owners, their interest in forestry financial incentives, and how these incentives impact reforestation decisions is clear. Forest owner and investment characteristics play a large role in determining who will regenerate forest land and who will not. In particular, size of forest holding is crucial. It is related to income and asset positon and investor behavior. Owners of large forest holdings are more likely to reforest and use forestry incentive programs. Three crucial financial variables that influence reforestation are high initial capital requirements, poor liquidity of timber investments, and rate of return expectation from timber investment. The two standard forestry incentives, cost-share programs and tax incentives, are proven to increase reforestation levels.

Loans to aid in financing reforestation have been proposed as an additional inventive. Forest owner interest varied. Like other incentive programs, owners of larger forest holdings tended to have higher interest levels in loan options. Forest owner resistance to the idea centered on distrust of government programs, aversion to debt, aversion to use of land as collateral, and fear of rising interest rates or insurance premiums. The proposed loan program in Mississippi was structured to minimize most of these concerns.

Discussion

The literature review provided valuable insights into obstacles to a reforestation loan program. The concept is not a new one and one state has worked out details of how a program might work. Would such a reforestation program be a viable option today to address the issue?

This document was generated to address a question posed by the U.S. Endowment for Forestry and Communities. The question posed is: To encourage family forest owners to reinvest in management we (society) provides a range of state or federal cost-share incentives designed to "buy-down" the out-of-pocket costs of site prep, stand improvement, planting etc. Cost shares probably are in the range of 50% on the low-side to 70% on the high (with extremes of 25% and a few reaching 90% of cost). The trouble is there is never enough money to meet all the needs and this is without aggressive outreach and promotion programs designed to drive landowners to the agencies for assistance. As demands on public resources increase, even these programs may fall by the wayside. While at 90% it likely is always a better deal for the landowner to take the money and run, where out-of-pocket cash is hard to come by, are there other methods to help advance the objective? A possible solution is a low-interest loan fund – let's say 1-3% interest rate or even 0% -- that a landowner could borrow essentially 100% of the needed funds, thus having nothing out-of-pocket with the loan to be secured by the land with repayment to be at time of first harvest (e.g. thinning at age 15 for instance). How would the economics of the two approaches compare and contrast? In short, are the cost share programs always better financially for the landowner and/or are there times when the loan is more beneficial? Or is there a sliding scale where one is more favorable at one end of the spectrum and it gradually shifts to the other?

The basic question is one of cash flows and rate of return. Cost-share, tax incentives, and the loan program would each provide a vehicle to reduce the cost side of the cash flows and, thus, increase rate of return. Each provides a benefit and the benefits can be additive. If the amounts of each incentive were known, the impact on rate of return could be easily determined, along with a break-even point between alternatives. However, these alternatives represent a situation where discounted cash flow analysis will not provide the full picture. Interest rates are used to equate cash flows. At a specified interest rate a cost-share payment can be equated with an equivalent loan opportunity, but this would assume the forest owner had the capital to invest in reforestation to start with. The cost-share payment option presumes the forest owner can come up with the remaining portion of the reforestation investment and can also cover the carrying costs of the rotation to harvest age. Unless the forest owner has the capital to cover the reforestation and annual costs of a timber rotation, the cost-share payment will be an impossible option. Because of the possibility of capital limitations eliminating the cost-share option, the break-even analysis might not be relevant.

A break-even analysis would have to address cash flows. Cost-share programs and tax incentives affect cash flows and the resulting rate of return can be easily calculated. Likewise, a

loan can impact cash flow, and, especially if the loan's interest rate is below market, a loan also affects rate of return. But, this is deceptive. The loan is not likely to have as great an impact as the cost-share payment, and the real value of the loan is its impact on capital availability. Capital availability is more likely to affect whether a forest owner can reforest at all. While the loan may result in a higher or lower rate of return, its main impact is different than the cost-share payment or tax incentive. Thus, cost-share and tax incentives mainly affect rate of return and loan programs mainly affect capital limitations, making a break-even analysis inappropriate.

The break-even analysis described above was based on rate of return. The logical approach to break-even analysis is a below-market interest rate loan versus a fixed percentage cost-share payment. At what point would both produce the same increase in expected rate of return? There is a second break-even analysis approach. The loan program certainly addresses the capital availability problem. The cost-share program was probably intended to produce higher expected rates of return, but it also reduces necessary net capital. If break-even analysis was applied to the capital limitation aspect of the problem, relevancy might increase. Still a comparison is difficult as the loan addresses the entire capital availability question and the cost-share program address part of it.

The literature shows that key financial variables influencing reforestation that would be impacted by a loan program are: limited capital, limited timber liquidity, and low expectation of financial return. Limited capital relates to the initial reforestation decision, but it can also relate to annual cash flows that require the forest owner to address negative cash flows for most of the years in a long timber rotation. Thus, the illiquidity can require cash outlays periodically, along with the large initial outlay for reforestation. Cost-share addresses the initial reforestation cost. The loan option has the advantage that it could allow for periodic payments to cover these annual management and tax costs. Notice in the literature that the proposed Mississippi reforestation loan program included $25/acre annual payments. The ability to easily increase liquidity with annual payment options could enhance the attractiveness of the loan option. Thus, the focus of any loan program needs to be broader than just financing initial reforestation costs. The loan option could also simultaneously address liquidity (by allowing for some sort of early return of expected proceeds) and expected rate of return (by adjusting the interest rate relative to market rates). An even better way to address liquidity would be to allow for easier access to loans based on future timber harvest revenues at any point in the rotation. Perhaps the forest owner has the capital to reforest today, but is worried that spending the money today may "tie his capital up" for a prolonged period of time. Knowledge that the timber investment was liquid and the capital could be reclaimed mid-rotation might also encourage reforestation with no loan necessary to cover initial reforestation costs.

Size of forest holding is a key variable that affects any forestry financial incentive. Many research studies have shown that owners of larger forest holdings are more likely to reforest, invest in timber management, and be aware of and use forestry incentives. This is definitely the case with cost-share programs and tax incentives. The Mississippi study showed that it is likely the case for the reforestation loan program also. Is it desirable to promote forestry incentives that will tend to be used by forest owners with the highest income and most assets? That is the expectation for any reforestation loan program (as with any other incentive option). An issue that must be addressed is how to target the loans to those who were most likely not to regenerate, as opposed to a loan program for those who would have reforested anyway.

Loans for reforestation have a set of disadvantages that are common to any loan program. Significant numbers of forest owners are adverse to loans of any type. They responded to surveys as not liking to be in debt, not liking to be in these types of government programs, not liking to potentially burden their children with debt, and not liking the land being used as collateral. The issue of collateral is significant. Forest owners seem to prefer that the standing trees and not the land serve as collateral. Of course, any lending organization would prefer the more solid collateral. The Mississippi studies strongly suggest that type of collateral can have a major effect on attractiveness of the loans.

At least in Mississippi, it seems, the agency or organization offering the loan will have an impact on attractiveness. Government loans are unpopular with some forest owners. Agencies or organizations already in the loan business and recognized by the community may need to be the originator of the loan. A private organization may have an advantage in terms of acceptability to the forest owners. Also, the studies showed some forest owner characteristics were predictive of interest in the loan option (e.g., race, sex, size of forest holding). If desirable, these loans could be targeted towards individuals most likely to change plans not to reforest into plans to accomplish reforestation.

Does the Problem Go Beyond Capital Availability?

Is the reforestation loan option the right place to focus when addressing family forest owners who neglect to reforest after timber harvesting? The crux of this problem has always centered on the size of forest holding issue. As size of forest holding increases, family forest owners are (Butler 2008):

- much more likely to have owned their forest land for 25 years.
- much more likely to have transferred their land to others.
- much more likely to rate timber production as important.
- less likely to rate enjoyment of beauty and scenery as important.
- much more likely to be an absentee owner.
- much more likely to lease their land.

- much more likely to participate in cost-share.
- more likely to have an easement.
- much more likely to participate in a forest certification program.
- much more likely to commercially harvest timber.
- much more likely to have a written forest management plan and receive management advice.

That same study has data on cost-share programs (Butler 2008). There may be implications for loan programs. Most cost-share money goes to the owners of larger holdings. This makes sense because they have the greatest potential to make use of the funds. But you could also argue they are the least likely to need cost-share aid. About 4.5% of family forest owners who own less than 100 acres participate in cost-share programs, while 23% of those that own more than 100 acres participate. That equates to about 8.5% of acreage in the less than 100 acres size of forest holding participating in cost-share programs, while nearly 32% of acreage in the greater than 100 acre size participates. So nearly half of the 1,000+ acre owners use cost share, but only 3% of the really small owners get cost-share.

The importance of size of forest holding relationships increases dramatically when the parcelization problem is considered. There is a strong current and expected future trend towards forest parcelization in the United States (Hatcher et al. 2013). As average forested tract sizes decrease, likelihood of reforestation after timber harvesting decreases. Even if forest owner attitudes towards reforestation do not change with changing tract sizes, economies of scale play an important role in increasing reforestation costs (Straka et al. 1984). Smaller and smaller forest tracts become costlier and costlier to reforest. This trend is pronounced and will be the primary factor affecting long-term family forest timber supply.

The proposed reforestation loan program is an interesting idea. It addresses a family forest reforestation problem. Unfortunately, unless the program is very broadly designed, it will address only the high initial cost portion of a very complex problem. If combined with the other incentive options (cost-share and tax incentives), impact can be expanded. While this has the potential to significantly increase family forest contribution to timber supply, it does little to address the more fundamental problem: increasingly smaller and smaller family forest tracts that have become uneconomical in terms of timber growing.

The real place to have an impact on family forest reforestation is to focus on financial mechanisms, harvesting/reforestation technology, and forest management systems designed for this small forest holdings. Forestry cooperatives, or other mechanisms to consolidate reforestation and timber harvesting opportunities, need to be considered. Forest parcelization is the primary force driving long-term family forest timber supply problems. It must be the center of any effective financial incentive program that hopes to actually change forest owner behavior. If a loan program is that financial incentive, then its focus needs to be the smaller forest holdings, or the likelihood becomes financing large forest holdings that would have been reforested without the program.

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