Economic Impacts of Closing National Forests for Commercial Timber Production in Florida and Liberty County

Abstract: The paper assesses the impacts of a proposed policy, which suggests a ban on commercial timber harvest in the U.S. national forests. Specifically, this study examines the effect of this policy on a small forest dependent county (Liberty County) in Florida and Florida State by applying a computable general equilibrium (CGE) model. The results indicate that the proposed policy would decrease overall economic output by $5 million in Liberty County. The decrease in economic output at the state level in response to this policy is only $1 million. Results suggest that the welfare index in response to the proposed policy will drop by 2.9% in Liberty County while the change at the state level is negligible. At the county level, where limited alternate opportunities for labor and capital mobility, the negative effect of the proposed policy is shown to have a multiplying effect.

Key words: Computable General Equilibrium Model, commercial timber harvest, regional economic impacts, U.S. national forest.

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Introduction

National forests in the U.S. serve many social, economic, and environmental needs of Americans and people around the world. A proper management of these forests has a profound impact on local economies and the environment (Daniels et al. 1991, USDA Forest Service 2000). However, changes in public preferences towards the use of these forests continue to generate new forest management issues, which often translate into new policies or induce changes in existing policies. Since the Organic Administration Act of June 4, 1897, wherein the creation of the national forest system "to improve and protect" public forestlands was authorized, numerous laws, Clean Water Act and Endangered Species Act for example, have been enforced in the U.S. (USDA Forest Service 2000). These federal policies have been influencing the structure and function of the USDA Forest Service and management of national forests either directly or indirectly. In recent years, there has been an increasing attention towards the environmental conservation, outdoor recreation use, and non-timber values of national forests in the U.S. (Chamberlain et al. 2002, Cordel et al. 1999, Loomis and Walsh 1997, Wear and Greis 2001). These motives have caused more pressure on changes in policies relating to the management of our national forests. One such policy proposal is HR 1494: National Forest Protection and Restoration Act 2001. In essence, the bill purports to:

> Save taxpayers money, reduce the deficit, cut corporate welfare, protect communities from wildfires, and restore America's natural heritage by eliminating the fiscally wasteful and ecologically destructive commercial logging program on Federal public lands, restoring native biodiversity in our Federal public forests, and facilitating the

economic recovery and diversification of communities affected by the Federal logging program (U.S. Congress 2001, HR 1494).

The proposal mainly reflects the public demand for alternative use of public land, perceived net economic gain in such alternative uses, and apparent need for protection of ecosystems and biological diversity. This bill is causing intense discussions among forest dependent communities, forestry professionals, and policy makers across the nation. Although the bill needs the majority support in the House and the Senate to become law, it would be useful to gain insights about the economic impacts of this bill, at least in selected areas. Apparently, the proposal may have ecological economic benefits but it could also impose certain opportunity costs, at least in the short-run, in the form of forgone timber revenues. More importantly, the opportunity costs may not be uniform across regions. The role of timber receipts and income from forest sector in some regions may be more critical than in other regions. As such, the economic impact can be much more intense in forest dependent communities thereby impacting their stability (Clary 1986, Daniels et al. 1991). In the context of Florida, it is expected that economic impacts of the HR 1494 in Liberty County may be more serious than those in overall Florida, as forestry is a key component in the county's economy.

In this study we examine economic impacts of the HR 1494: National Forest Protection and Restoration Act 2001 on both Liberty County and the state of Florida. Specifically we evaluate the effects of eliminating commercial logging activity on national forests in Florida on income, output, and welfare. A computable general equilibrium (CGE) model is applied to achieve this task. The rest of the paper is organized as follows. In the following section, technical features of the CGE model and details of data are discussed. The details of timber harvest in Apalachicola National Forest and other national forests in Florida are also discussed to define the

policy shocks. Model results are then presented and discussed in Section three. The final section provides a brief summary, conclusions, limitations of the study, and suggestions for further research.

Model specification

The three National Forests, Ocala, Apalachicola, and Oceola, in Florida occupy approximately 1.25 million acres of land. The Ocala National Forest offers unique ecological sites, trails, and natural springs along with timber harvesting areas. The Apalachicola National Forest consists of flat to gently rolling terrain and moist lowlands where cypress, longleaf pine/wiregrass, and savannas provide habitat for an unusual combination of vertebrates and wildflowers. In the Osceola National Forest, visitors will hike, fish and camp on a regular basis. Consistent with management guidelines stipulated in the National Forest Management Act 1976, the U.S. Forest Service manages these areas for multiple uses, providing many economic and environmental benefits to local communities. In all these forests timber is harvested as a part of the overall management strategy to support local communities via a continuous flow of forest products. Figure 1 presents the annual timber receipts of the Apalachicola and all National Forests in Florida from 1986 to 1997 (USDA Forest Service 1998). The timber receipts trend indicates that over time there has been a significant decline in timber receipts in both Apalachicola and all National Forests in Florida.

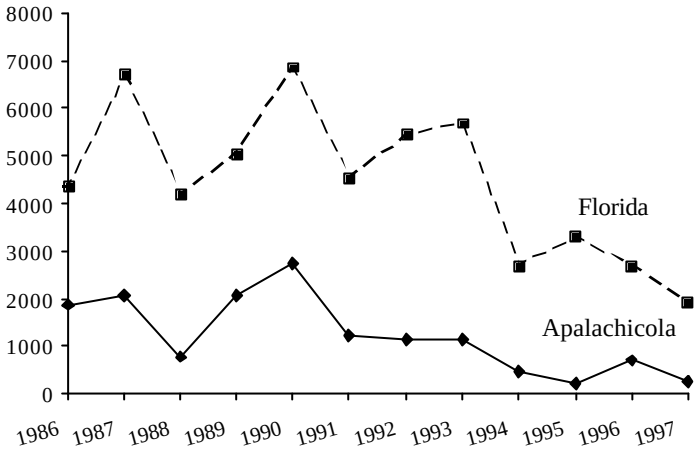

Figure 1. Annual Timber Receipts from Apalachicola National Forest and National Forests of Florida from 1986 to 1997 (Values are in $000s)

Table 1. Average Annual Timber Receipts (1986-1997) from Florida National Forests (US $000s)

National Forest	Mean	Std Dev	Min	Max
Apalachicola (Liberty County)	1,214.33	808.34	204.00	2,703.00
Ocala	2,163.92	715.56	1,026.00	3,507.00
Oceola	1,063.33	614.53	98.00	2,142.00
Florida Total	4,441.58	1,597.63	1,889.00	6,868.00

The average annual timber receipt from Apalachicola National Forest is $1.22 million, 27% of the total receipt from national forests in Florida (Table 1). If HR 1494 becomes a law, it is expected that there will be a direct reduction in the economic activity by $1.22 and $4.44 million, respectively, in Liberty County and the state of Florida. Although the forest sector may

be a small portion of the overall economy, it may have linkages with the rest of the economy. In order to capture these intersectoral linkages, a CGE analysis may be an appropriate approach (Alavalapati et al.1998). Many researchers have applied computable general equilibrium (CGE) models to analyze regional forestry issues. Daniels et al. (1991) have applied this approach to assess the distributive impacts of Forest Service attempts to maintain stability in forest dependent communities. Alavalapati et al. (1997) have applied a CGE model to assess economic impacts of stumpage price increase in British Columbia. Pohjola (1999) has applied this approach to assess economy-wide effects of reducing CO2 emissions. Patriquin et al. (2003) have recently applied this model to estimate the impacts of resource management policies in a forest dependent community in Canada.

Since H.R. 1494 is expected to restrict the use of forestland for commercial logging, this would reflect as an increase in the cost of capital (includes both land and capital), which causes a decrease in the logging output. Accordingly we introduced a cost parameter and calibrated the model such that an increase in the cost of capital reduced the output in the forest sector by $1.22 million and $4.44 million, respectively, in Liberty County and Florida. We used 1999 IMPLAN data as the basis for calibrating the benchmark equilibrium. The model was solved using the PATH solver in General Algebraic Modeling System (GAMS).

Our model aggregates Liberty County economy into eight sectors (Dairy and livestock products; Agriculture products, Processed food products; Forest products and logging; Sawmill products; Wood products; Pulp and paper; Utilities and services) and Florida economy into nine sectors (Agriculture, food and livestock; Forest products and logging; Saw mill products; Wood products; Office furniture and fixtures; Pulp and paper products; Non-renewable natural resources; Manufacturing; Utilities and services). Salient features of our model are described

below in six parts. The notations used in the mathematical model and the equations are presented in Table 2 and 3, respectively.

Table 2 Model Parameters and Variables

Parameters	
d_{Ai}	substitution elasticities of Armington function
d_{Ti}	substitution elasticities of CET function
d_{Fi}	CES capital-labor substitution elasticities of firms
t_{Ci}	tax rate on consumer commodities
t_{Ki}	tax rate on capital use
t_{Li}	tax rate on labor use
t_{Mi}	tariff rate on imports
t_y	marginal propensity to save
g_{Fi}	CES share parameter in the production function of firm
a_{Fi}	efficiency parameter of CES production function of firm
g_{Ai}	CES share parameter in the production function of commodity
b_{Ai}	efficiency parameter of CES production function of commodity
g_{Ti}	CET share parameter regarding destination of domestic output
h_i	shift parameter in the CET function of firm
q_i	power in nested-ELES household utility function
m_i	subsistence household consumption quantities
y	household's marginal propensity to save
J	replacement rate
x	Phillips curve parameter
IO_{ij}	intermediate demand
a_{Ii}	Cobb-Douglas power in the bank's utility function
a_{CGi}	Cobb-Douglas power in government utility function (commodities)
a_{KGi}	Cobb-Douglas power in government utility function (capital)
a_{LGi}	Cobb-Douglas power in government utility function (labor)
Variables	
P_K	price of primary factor (capital)

P_L	price of primary factor (labor)
P_i	prices of domestic output
K_S	primary factor (capital) endowments
L_S	primary factor (labor) endowments
S_i	supply of domestic output of firms
S_{Di}	domestic output of firms delivered to home market
P_{Di}	domestic output price delivered to home country
X_i	domestic sales of composite commodity
P_i	sales price of composite commodity
P_{index}	price index of domestic commodity
P_i^{WXZ}	world market prices of exports in terms of foreign currency
P_i^{WMZ}	world market prices of imports in terms of foreign currency
e	exchange rate
P_i^{DM}	import prices in national currency
P_i^{DX}	export prices in national currency
E_i	exports
M_i	imports
K_i	capital demand
L_i	labor demand
C_i	consumer demand Y household's income
U	utility levels
S_H	household saving
B	consumer expenditure
S_G	government saving
S_F	foreign saving
S_T	total domestic and foreign savings
I_i	investment
C_L	leisure demand
E_B	extended consumer expenditure
T_S	time endowment
E_u	unemployment
C_{Gi}	government demand for commodities
K_{Gi}	government demand for capital
L_{Gi}	government demand for labor
T_R	tax revenues
T_F	tax transfer

T_{OF}	other transfer
T_{Ki}	tax revenue on use of capital
T_{Li}	tax revenue on use of labor
T_{Ci}	tax revenue on consumer commodities
T_{Mi}	tax revenue on imports
T_Y	income taxes

Table 3 Model Description

Consumer Expenditures

1. $C_i = m_i + q_i[(1+t_{Ci})P_i]^{-1}(B - \sum_{j=1}^{9}(1+t_{Cj})P_j m_i)$

2. $S_H = y\ (1-t_y)Y$

3. $L_S = (T_S - m_{10}) - \frac{q_{10}}{(1-q_{10})}[(1-t_y)P_L]^{-1}\left[B - \sum_{j=1}^{9}(1+t_{Cj})P_j m_j\right]$

4. $\left(\frac{P_L^{\ 1}/P_C^{\ 1}}{P_L^{\ 0}/P_C^{\ 0}} - 1\right) = x\left(\frac{E_U^{\ 1}/L_S^{\ 1}}{E_U^{\ 0}/L_S^{\ 0}} - 1\right)$

5. $P_{index} = \frac{\sum_{i=1}^{9}(1+t_{Ci})P_i C_i^0}{\sum_{i=1}^{9}(1+t_{Ci}^{\ 0})P_i^0 C_i^0}$

Investment Demand

6. $S_T = S_H + S_G + eS_F$

7. $I_i = a_{Ii} \cdot P_i^{-1} \cdot S_T$

Firms

8. $K_i = g_{Fi}^{\ s_{Fi}}[(1+t_{Ki})P_K]^{-d_{Fi}}\left(g_{Fi}^{\ d_{Fi}}[(1+t_{Ki})P_K]^{1-d_{Fi}} + (1-g_{Fi})^{d_{Fi}}[(1+t_{Li})P_L]^{1-d_{Fi}}\right)^{d_{Fi}/(1-d_{Fi})}(S_i / a_{Fi})$

9.

$L_i = (1-g_{Fi})^{d_{Fi}}[(1+t_{Ki})P_L]^{-d_{Fi}}\left(g_{Fi}^{\ d_{FI}}[(1+t_{Ki})P_K]^{1-d_{Fi}} + (1-g_{Fi})^{d_{Fi}}[(1+t_{Li})P_L]^{1-d_{Fi}}\right)^{d_{Fi}/(1-d_{Fi})}(S_i / a_{Fi})$

Foreign Demand

10. $S_{Di} = (1-g_{Ai})^{s_{Ai}} P_{Di}^{-s_{Ai}}\left[g_{Ai}^{\ s_{Ai}} P_{Mi}^{\ 1-s_{Ai}} + (1-g_{Ai})^{s_{Ai}} P_{Di}^{\ 1-s_{Ai}}\right]^{s_{Ai}/(1-s_{Ai})}(X_i / b_{Ai})$

11. $M_i = g_{Ai}^{\ s_{Ai}} P_{Mi}^{-s_{Ai}}\left[g_{Ai}^{\ s_{Ai}} P_{Mi}^{\ 1-s_{Ai}} + (1-g_{Ai})^{s_{Ai}} P_{Di}^{\ 1-s_{Ai}}\right]^{s_{Ai}/(1-s_{Ai})}(X_i / b_{Ai})$

12. $S_{Di} = (1-g_{Ti})^{s_{Ti}} P_{Di}^{-s_{Ti}}\left[g_{Ti}^{\ s_{Ti}} P_{Mi}^{\ 1-s_{Ti}} + (1-g_{Ti})^{s_{Ti}} P_{Di}^{\ 1-s_{Ti}}\right]^{s_{Ti}/(1-s_{Ti})}(X_i / h_i)$

13. $E_i = g_{Ti}^{\ s_{Ti}} P_{Xi}^{\ -s_{Ti}} \left[g_{Ti}^{\ s_{Ti}} P_{Mi}^{\ 1-s_{Ti}} + (1-g_{Ti})^{s_{Ti}} P_{Di}^{\ 1-s_{Ti}} \right]^{s_{Ti}/(1-s_{Ti})} (X_i / h_i)$
14. $P_i^{DM} = (1+t_{Mi}) e P_i^{WMZ}$
15. $P_i^{DX} = e P_i^{WXZ}$

Balance of Payment

16. $\sum_{i=1}^{9} P_i^{DM} M_i = \sum_{i=1}^{9} P_i^{DX} E_i + S_F$

Government

17. $C_{Gi} = a_{CGi} P_i^{-1} (T_R - T_F - S_G)$
18. $K_{Gi} = a_{KGi} P_K^{\ -1} (T_R - T_F - S_G)$
19. $L_{Gi} = a_{LGi} P_L^{\ -1} (T_R - T_F - S_G)$
20. $T_R = \sum_{i=1}^{9} (t_{Ci} P_i C_i + t_{Ki} P_K K_i + t_{Li} P_L L_i + t_{Mi} e P_i^{DM} M_i) + t_Y Y$
21. $T_F = J P_L E_U + P_{index} T_{OF}$

Market Clearing

22. $\sum_{i=1}^{9} K_i + K_G = K_S$
23. $\sum_{i=1}^{9} L_i + L_G = L_S - E_U$
24. $X_i = \sum_{i=1}^{9} \sum_{j=1}^{9} IO_{ij} S_i + C_{Gi} + C_i + I_i \quad (\text{i} = 1...9)$

Income Equations

25. $Y = P_K K_S + P_L (L_S - E_U) + T_F$
26. $B = (1-t_Y) Y - S_H$
27. $P_i S_i = (1+t_{Ki}) P_K K_i + (1+t_{Li}) P_L L_i + \sum_{i=1}^{9} \sum_{j=1}^{9} P_i IO_{ji} S_i \qquad (i = 1...9)$
28. $P_i X_i = P_i^{WMZ} M_i + P_{Di} S_{Di}$
29. $P_i S_i = P_i^{WXZ} E_i + P_{Di} S_{Di}$

Macroeconomic Closures

30. $K_S = \sum_{i=1}^{9} K_i$
31. $S_F = 0$
32. $S_G = 0$
33. $T_{OF} = \overline{T_{OF}}$

Expenditure Equations and Investment Demand

The model assumes that consumers seek to maximize utility as characterized by a nested Linear Expenditure System (LES) based on a Stone-Geary utility function. Total consumption is split into two components – consumption goods and leisure component (equation 1). The model apportions the overall consumption of a commodity across the two components by using expenditure elasticities and a Frisch parameter. Under the Stone-Geary function, household utility is derived only from the leisure component of consumption. 'Leisure' demand is determined by relative prices and the size of the overall budget for leisure, which is described in Equation [3]. The sourcing of the commodity is determined from a two-level optimization process. In the first stage, consumer chooses between leisure and a composite consumption good and maximizes Stone-Geary utility function subject to a budget constraint. In the second LES nest, the consumer chooses between domestic and import goods in each sector assuming that imported and domestic commodities are imperfect substitutes. Household saving is described in equation [2] and Phillips curve is introduced to capture the negative relationship between real wages and the unemployment rate and is illustrated in equation [4]. The price index is defined in Equation [5] and we selected wage as the numeraire. The representative agent receives income from primary factors and net transfers from the government and uses this income to purchase all the products in the market. Domestic final demands are composed of private consumption, government consumption, and investment. Changes in aggregate consumption are a direct measure of the equivalent variation of policy changes, which is the index of welfare effect in our model. Total saving is the sum of household saving, government saving and foreign investment saving (Equation 6).

Firm Production Equations and Foreign Demand

Production in the economy is specified by CES technologies. Production exhibits constant returns to scale and firms are perfectly competitive, which implies that prices equal marginal costs of production. Producers are constrained in their choice of inputs by a three-level nested production technology. At the top level, individual intermediate goods and the bundle of primary factors are used in fixed proportions reflecting the Leontief type of technology. These proportions are derived from input-output coefficients in the model's database. At the second level, each sector has a constant elasticity of substitution (CES) aggregator of production labor and capital. Value added is produced with a CES function of aggregate labor and capital (equation [8] and equation [9]). At the third level, the firms have the choice of buying intermediate inputs from the domestic market or the foreign market according to the constant elasticity of transformation function (CET). The second and third level of production modeling requires a number of sets of elasticities. We have chosen elasticity values from the previous literature and based on our knowledge of the study regions (Shoven and Whalley, 1992). Equation [10] is Armington function, which shows how imports and domestic output are used to generate the composite commodities. Equation [11] expresses import demand as a function of the relative prices of imports and domestic commodities. It is derived from a cost-minimization approach subject to equation [10] and a fixed level of composite commodity demand. Equation [12] provides the Constant Elasticity of Transformation (CET) function that transforms domestic output to commodities to exports and domestic sales. Equation [13] is derived from profit maximization subject to equation [12] and a fixed level of domestic output; it defines export supply as a function of relative prices. Firms pay indirect taxes and other costs including working capital costs and wages. Finally, each CES and Leontief function carries a "technical change'

parameter which can be set exogenously to shift the share of a given item in the relevant aggregate. We considered labor supply endogenous and assumed that labor is mobile across sectors. Capital (a composite of capital and land) is considered mobile among sectors and assumed fixed in each region. Profit maximization implies that the value of marginal rate of transformation of the domestic good for an aggregate export will equal the relative domestic good price in terms of an aggregate export index. Equation [13] and Equation [14] are the price of import and export equations respectively. Balance of payment is described in equation [16].

Government Equations

The government maximizes a Cobb-Douglas utility function under a balanced budget (Equation [17], [18], [19]). Government obtains its revenue from collecting income taxes, indirect taxes, and tariffs levied on imported goods. Tax revenues from consumption goods, capital and labor use, and from the household's income, are made nominal by using the Laspeyres consumer price index (Equation [20]). The government pays unemployment benefits to the household at the replacement rate (Equation [21]). Government total payment equals to the payment benefits to unemployment and other lump sum transfers.

Income Equations

The model institutions are households, government, firms, and the rest of the world. Factor income is channeled completely to the household. The household received part of its income from government transfer (Equation [25]). Equation [26] describes the net income after tax plus saving equals consumer's total expenditure. Equation [27] is a zero profit condition, where the total supply of domestic output of firms equals to the value added and intermediate demand. Equations [28] and [29] are zero profit condition for import and export according to Armington assumption.

Macroeconomic Closure and Market Clearing

The equilibrium conditions for factor markets are defined in equations [30-33]. Two market clearance rules follow from our static equilibrium assumption. Both capital and labor markets clearing conditions hold in the model (Equation [22-24]). While most of the equations are self-explanatory, an additional explanation is in order. First, the model description presented in Table 3 reflects Florida model with 9 sectors and 9 commodities. The corresponding model for Liberty County will have only 8 sectors and 8 commodities. Second, all tax rates are zero in the benchmark equilibrium. Third, in order to capture of the limited mobility of labor across sectors in Liberty County relative to Florida, we set the elasticity of labor supply and CES capital-labor substitution-elasticities low.

Model Results and Discussion

Table 4 describes the impacts of a $1.22 million reduction in the Forest products and logging sector output in Liberty County. For each sector, changes in the return on capital, labor, domestic price of output, and output are presented along with benchmark values. As explained earlier, the policy shock enters the Forest products and logging sector by reducing its output by $1.12 million or by 10%. Results indicate that the overall output in Liberty County will decrease by about $5.1 million or by 4% in response to the proposed policy. Although we notice a significant drop in the returns to capital and labor in the Forest and logging sector, the overall decrease in the returns for these factors is minimal. Results suggest that the returns to capital would slightly increase in all sectors except in the Forest and logging, Pulp and paper products, and Utilities and services sectors. On the other hand, the returns to labor are shown to decrease in all the sectors, except Processed food products sector in the economy (Table 4). Commodity prices are shown to increase significantly in the Forest products and logging sector due to a

Table 4 Economic Impacts of a $1.22 million Reduction in the Logging Sector, Liberty County

	Returns on capital ($000)			Returns on labor ($000)			Domestic output Price index (%)			Output ($000)		
Sectors	Bench Mark	After Policy	Change (%)	Bench Mark	After Policy	Change (%)	Bench Mark	After Policy	Change (%)	Bench Mark	After Policy	Change (%)
Dairy and livestock products	188.41	196.51	4.00	1672.29	1616.39	-3.00	1.00	0.97	-3.00	2252.51	2212.21	-2.00
Agriculture products	282.20	287.55	2.00	964.57	934.22	-3.00	1.00	0.96	-4.00	2180.35	2126.67	-2.00
Processed food products	79.16	236.29	198.00	92.14	261.41	184.00	1.00	0.63	-36.00	197.06	396.52	101.00
Forest products and logging	3484.42	3237.01	-7.00	3181.60	2961.16	-7.00	1.00	1.02	2.12	11696.71	10478.98	-10.00
Sawmill products	13.01	13.33	2.00	34.37	33.05	-4.00	1.00	0.99	-1.00	287.36	281.38	-2.00
Wood products	318.11	363.39	14.00	391.86	391.85	0.00	1.00	0.98	-2.00	6255.25	6103.10	-2.00
Pulp and paper products	190.54	189.91	0.00	298.09	289.65	-3.00	1.00	0.97	-3.00	2494.70	2460.76	-1.00
Utilities and services	14010.58	13951.93	0.00	39422.82	37539.93	-5.00	1.00	0.99	-1.00	119196.33	115390.11	-3.00
Total	18566.43	18475.92	0.00	62841.93	62771.74	0.00				144560.27	139449.73	-4.00

decrease in the output while the prices of outputs in other sectors dropped slightly. The welfare index, as measured by changes in aggregate consumption, will decrease in Liberty County by 2.9% in response to $1.22 million reduction in the Forest and logging sector. Overall, the results indicate that the Liberty County's economy will experience a significant decrease in response to the reduction in the logging sector. This is a common result in most of the forest resource dependent communities (Alavalapati et al. 1997). Forest resource dependent communities do not provide many alternative economic opportunities for capital and labor to engage in other sectors of the economy.

Table 5 presents economic impacts of a timber harvest reduction by $4.44 million in Florida. Unlike the case of Liberty County, the impact of HR 1494 on the overall economy of Florida is very minimal. Results indicate that the overall output will drop by about $1 million in response to a $4.4 million drop in the forest and logging sector. We notice a slight increase in the overall returns for capital and labor. These results should not be surprising because the Forest and logging sector is very small relative to the overall size of the Florida economy (0.2%). Furthermore, in a larger economy, factors of production will have greater opportunities to move across sectors. As a result it may be even possible to see an overall increase in the economy in response to a contraction in a particular sector caused by a shock.

Table 5 Economic Impacts of a $4.4 million Reduction in the Logging Sector, Florida (US $millions)

	Returns on capital ($000)			Returns on labor ($000)			Domestic Output Price Index			Output ($000)		
Sectors	Bench Mark	After Policy	Change (%)	Bench Mark	After Policy	Change	Bench Mark	After Policy	Change (%)	Bench Mark	After Policy	Change (%)
Agriculture, food, & livestock	2797.99	2797.90	0.00	5336.06	5335.87	0.00	1.00	0.9980	-0.20	15131.64	15131.13	0.00
Forest products & logging	367.95	366.18	0.00	119.58	119.01	0.00	1.00	0.9570	-4.30	914.13	909.73	0.00
Saw mill products	47.80	47.80	0.00	195.21	195.21	0.00	1.00	0.9980	-0.20	657.05	657.06	0.00
Wood products	133.	133.60	0.00	443.94	443.94	0.00	1.00	1.0003	0.03	1360.05	1360.07	0.00
Office furniture & fixtures	54.46	56.46	0.00	271.11	271.11	0.00	1.00	0.9995	-0.05	801.51	801.51	0.00
Pulp and paper products	916.09	916.10	0.00	1997.97	1997.96	0.00	1.00	0.9988	-0.12	6774.66	6774.67	0.00
Non-renewable resources	645.71	646.80	0.00	311.09	311.12	0.00	1.00	0.9977	-0.23	1635.80	1636.04	0.00
Manufacturing	5980.05	5980.24	0.00	16146.38	16146.72	0.00	1.00	0.9988	-0.12	43981.54	43982.61	0.00
Utilities and services	92643.78	92645.30	0.00	214808.71	214809.81	0.00	1.00	0.9988	-0.12	417825.77	417828.35	0.00
Total	103587.43	103590.38	0.00	239630.05	239630.75	0.00				489082.15	489081.18	0.00

Summary and conclusions

The HR 1494 National Forest Protection and Restoration Act 2001 proposes a ban on commercial timber harvest on all national forests in the U.S. In this study, we examine economy-wide impacts of this proposal on Liberty County (a small forest dependent county) and on the state of Florida. Based on the historical harvest data, we estimated that the bill would reduce the average annual timber harvest by $4.44 million in Florida and by $1.22 million in Liberty County alone. In order to capture the intersectoral linkages and associated multiplier and trade off impacts, we employed a computational general equilibrium (CGE) approach. Analyses were conducted separately for Florida and Liberty County since significant structural differences exist between these two economies. For example, the share all forestry related sectors in the Florida economy is only 1.9% while the corresponding share in Liberty County is about 17%.

The results reveal that the impact of HR 1494 ($4.44 million) in Florida would have minimal impact on the economy. However, the magnitude of the impact of HR 1494 on the economy of Liberty County appears to be high. Results of this study provide important insights to policy makers and implementing agencies. First, the impact of this proposal is not uniform across the state. In Liberty County, with limited alternate employment opportunities and less scope in the expansion in other sectors, this proposal causes a significant reduction in the welfare of households. The USDA Forest Service is required, by law, to return 25% of gross timber receipts from the National Forests directly to the counties located within the National Forests in addition to annual payments in lieu of taxes. Although a new law, the Rural Schools Stabilization Act, decouples the county receipts from the timber harvest level and replaces the 25% forest payments, the elimination of logging activity would certainly compound the on-going socioeconomic crisis. This suggests that without appropriate compensation schemes to offset the

negative impacts, the social acceptability of the proposed policy is doubtful in Liberty County. At the state level, where people are less dependent on the forest sector, HR 1494 may have a greater appeal. It is important that policy makers consider these regional differences and address equity issues in making decisions.

Finally we would to point out the limitations associated with our study. First, the model does not consider the environmental benefits or increased opportunities in recreation, if any, associated with HR 1494 proposal. It is quite possible that the utility of residents of Liberty County and Florida may increase from improved environmental services associated with the proposal. Second, the models used in simulated the policy shocks are sensitive to the parameters used in the model. Although we used the best information that is available for us, there is significant scope to refine the parameters. Third, it would be interesting to disaggregate the land from capital and to consider it as an exogenous variable. This would allow to simulate the policy shock by reducing the forest land available for the Forest and logging sector.

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